Multimedia Careers ■ Make Your Monitors Tell the Truth

Electronic Musician

July 1995

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HoT DSP Plug-Ins

**********3-DIGIT 109
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IT'S UNLEASHED MORE CREATIVITY THAN

The Mackie CR-1604 16x2 mic/line mixer is getting dangerously close to becoming a pro audio classic.

Not because it has the most mic inputs, knobs, buses or switches — others have long since topped us for sheer numbers of doo-dads and thingamabobs.

No, the CR-1604 has ended up in so many studios and on so many stages because it sounds good. And because it's downright easy to use.

More than any other component, your mixer is the focal point of all your creative efforts. If it's complicated to operate, you've just erected a frustrating barrier between you and your music. If it's noisy, everything that's recorded will be noisy, too.

When you're looking for an affordable, compact mixer that's good enough to regularly record complete albums and primetime TV soundtracks, call us toll-free (M-F 8:00 AM to 5PM PT).

You'll talk to a real person who'll send you our 40-page color tabloid complete with a 16-page hook-up and applications guide.

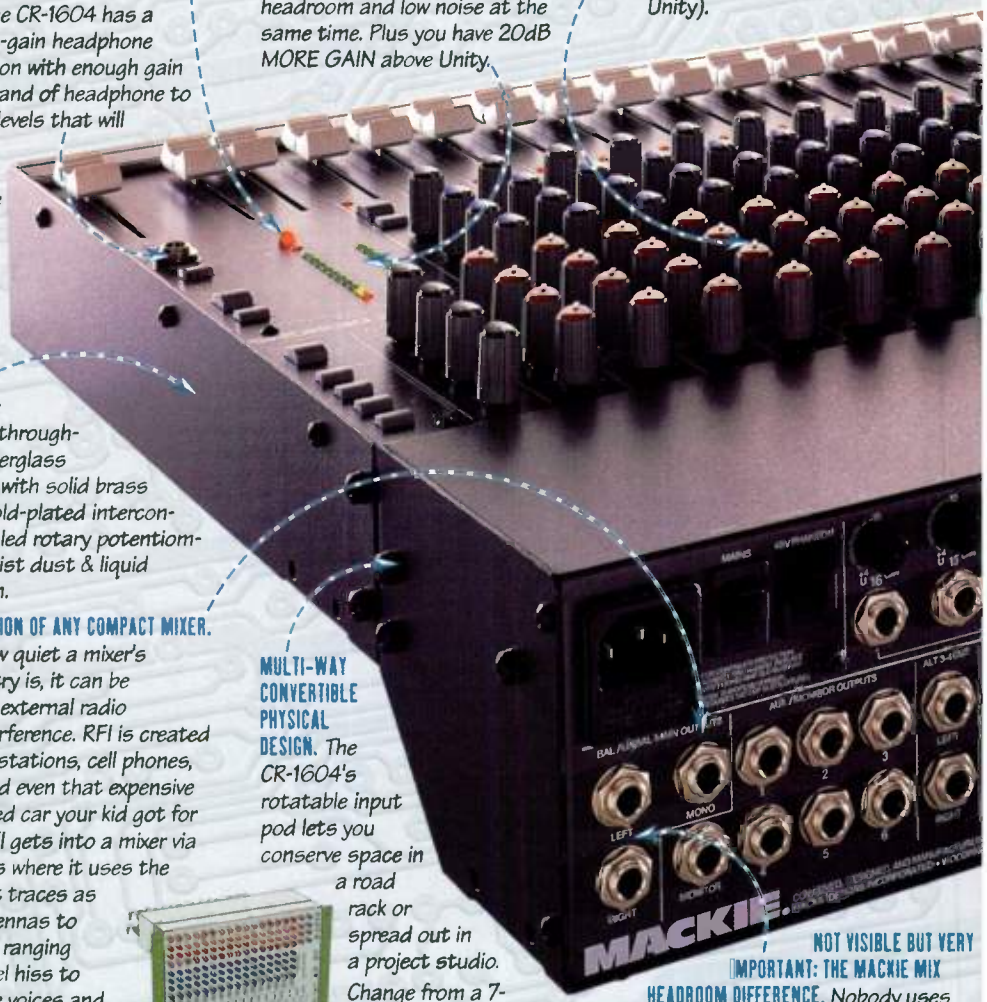
Then start exercising your musical creativity with the mixer that's becoming a classic for all the right reasons.

EXTREMELY RUDE, BLINKING SOLO LIGHT. Sounds like a minor detail until some night at 2AM when you can't figure out why there's no sound coming out of your monitors.

BEEFY HEADPHONE AMP WITH SEPARATE VOLUME FADER. Instead of the usual wimpy amp, the CR-1604 has a separate, high-gain headphone amplifier section with enough gain to drive any brand of headphone to shock volume levels that will satisfy even a drummer. Also has more than enough gain to drive any monitor amplifier.

DUAL PURPOSE METERING SYSTEM. Besides showing main L/R output level, the LED ladders are used to establish input levels. Set a channel fader at Unity, press the channel's SOLO button and set input trim level. This approach achieves very high headroom and low noise at the same time. Plus you have 20dB MORE GAIN above Unity.

INSTANT HANDS-ON-ACCESS to constant power pan controls, musical 3-band equalization, ALT 3/4 extra stereo bus, stereo in-place solo, seven high gain Aux sends per channel (via four controls) and four high gain stereo Aux returns (20dB more gain above Unity).



INSIDE: QUALITY COMPONENTS like double-sided, through-hole plated fiberglass circuit boards with solid brass stand-offs, gold-plated interconnects and sealed rotary potentiometers that resist dust & liquid contamination.

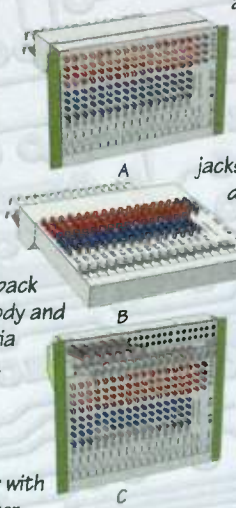
BEST RFI PROTECTION OF ANY COMPACT MIXER. No matter how quiet a mixer's internal circuitry is, it can be sabotoged by external radio frequency interference. RFI is created by broadcast stations, cell phones, computers and even that expensive radio-controlled car your kid got for Christmas. RFI gets into a mixer via the input jacks where it uses the internal circuit traces as miniature antennas to produce noise ranging from a low-level hiss to actual, audible voices and music.

The CR-1604's 1/4" jacks use a shunting capacitor to stop RFI before the main circuit traces. Instead, RFI is re-routed back through the metal jack body and washer, then dissipated via the mixer's outer chassis.

XLR inputs are likewise protected from RFI via ferrite beads.

Next time you see a mixer with plastic 1/4" jacks, remember what you just learned.

MULTI-WAY CONVERTIBLE PHYSICAL DESIGN. The CR-1604's rotatable input pod lets you conserve space in a road rack or spread out in a project studio. Change from a 7-rack-space mixer with jacks to back (A) to a tabletop design with jacks to top (B) in minutes. Add our optional RotoPod bracket (C) and rotate inputs and outputs to the same plane as the mixer's controls (a favorite for small SR set-ups).



Any of these conversions takes just minutes with a Phillips-head screwdriver. And our XLR10 10-mic-preamp expander can be added in any of the configurations.

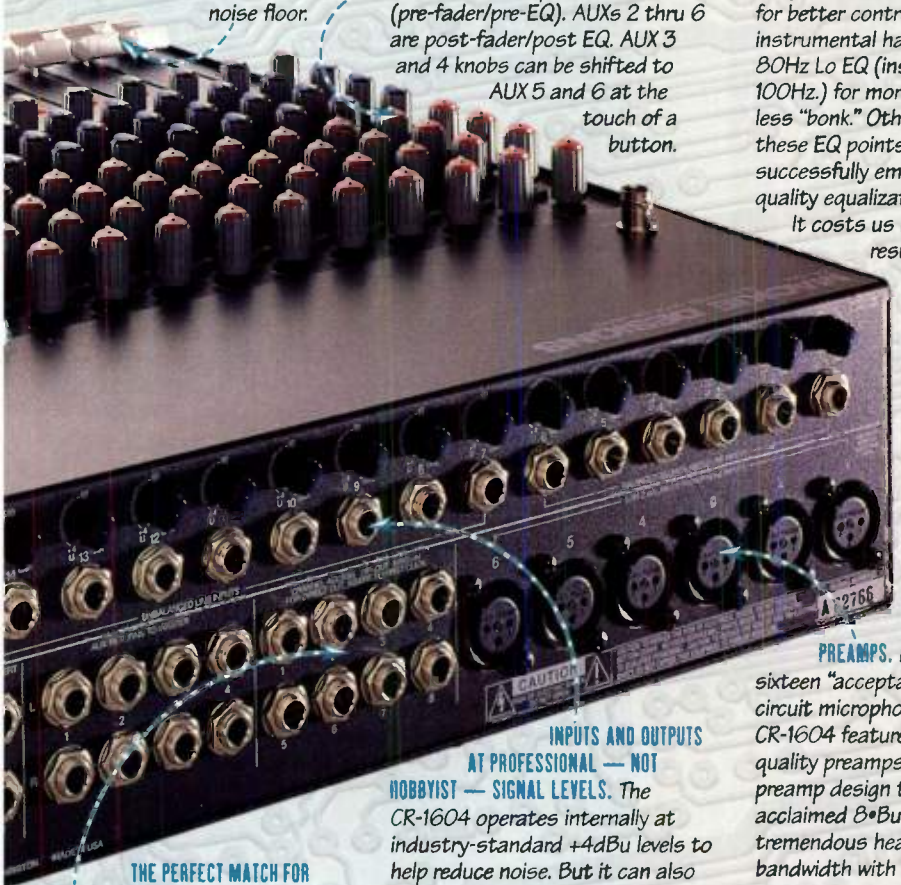
NOT VISIBLE BUT VERY IMPORTANT: THE MACKIE MIX HEADROOM DIFFERENCE. Nobody uses just one channel of a mixer(although most headroom specs are stated that way). In any mixer, the mix amp stage combines signals from ALL inputs at once. If it overloads, you can't back off the master fader because it comes AFTER the the mix amp. So audible distortion results when the mix amp gets bogged down with multiple hot inputs. Mackie's unique mix amp architecture provides as much as twice the mix headroom of conventional designs. No wonder it's a favorite of top electronic percussionists.

©1995

ANY OTHER COMPACT MIXER.

ULTRA-LOW NOISE. When you compare noise specs, look for the one that counts: all 16 channels up at Unity Gain — not one channel at Unity gain. No other compact mixer beats the CR-1604 when it comes to low noise floor.

MULTI-FUNCTION AUX SEND SYSTEM WITH LOADS OF GAIN. AUX 1 on each channel can be used either for effects (post-fader/pre-EQ) or switched to monitor sends for stage monitor or headphone cue signal (pre-fader/pre-EQ). AUXs 2 thru 6 are post-fader/post EQ. AUX 3 and 4 knobs can be shifted to AUX 5 and 6 at the touch of a button.



MUSICAL 3-BAND EQUALIZATION. The CR-1604 redefined equalization points for compact mixers: 12kHz Hi EQ (instead of 10kHz) for more sizzle and less aural fatigue, 2.5kHz Mid (vs. 1kHz) for better control of vocals and instrumental harmonics, and 80Hz Lo EQ (instead of 100Hz.) for more depth and less "bonk." Others have copied these EQ points, but none have successfully emulated our quality equalization circuitry.

It costs us more, but the result is zero phase distortion and a sweeter, more musical sound. It's another reason that the CR-1604 is a favorite of TV and film soundtrack scorers.

LEGENDARY MICROPHONE PREAMPS. Instead of sixteen "acceptable" integrated circuit microphone preamps, the CR-1604 features six big-console-quality preamps...the same mic preamp design that's on our acclaimed 8•Bus consoles. You get tremendous headroom and bandwidth with less noise and distortion. If your particular application requires more mic inputs, simply add our XLR10 10-Mic-Preamp Expander. Both it and the CR-1604's internal mic preamps have real and verifiable specs of –129.5 dBm E.I.N., 300,000Hz bandwidth and 0.005% THD. No wonder several of the world's top microphone manufacturers use Mackie Designs CR-1604s to demo their finest condenser mics at trade shows.

INPUTS AND OUTPUTS AT PROFESSIONAL — NOT HOBBYIST — SIGNAL LEVELS. The CR-1604 operates internally at industry-standard +4dBu levels to help reduce noise. But it can also handle the weaker –10dBV levels found on some digital multitrack machines and other equipment.

THE PERFECT MATCH FOR ADATs, DA-88s AND HARD DISK RECORDING SYSTEMS. We'd dearly love for you to buy one of our 8•Bus in-line consoles, but the CR-1604 makes a very effective 8-track recording mixer. The CR-1604's first eight channels have post-fader channel inserts (channel access). This VERY important feature is found on few other compact mixers. It lets you create a "split console" so that you can simultaneously track on eight channels and monitor/mixdown on eight more.

EXPANDABILITY. If you add a second or third digital multitrack, you can use one or two additional CR-1604s with our MixerMixer active combiner. It lets you run 32 or 48 channels without having to "cascade" the mixers.

[1]This is no idle boast. Consider these tours for starters: Madonna, Rolling Stones, BoyzIIMen, Whitney Houston, INXS, Janet Jackson, Peter Gabriel, Bette Midler, Bruce Springsteen, Paula Abdul and Moody Blues. Mention in this list denotes useage by band members or tour techs and in no way constitutes an endorsement by the artists mentioned.

[2]More fine print: Mention in this ad denotes useage as reported to Mackie Designs and in no way denotes endorsement by the artist, program or production company listed.

- Split monitor configurable for easy 8-track digital tracking & mixdown
- Used on more superstar world tours in the last three years than all other compact mixer brands combined[1]
- Legendary studio-quality discrete microphone preamps
- Used by members of the Tonight Show band, David Letterman band, Conan O'Brien band, Saturday Night Live Band[2]
- Expandable with XLR10 Mic Preamp Expander & Mixer Mixer active combiner
- Used by Fox Television Sports for Monday Night Football on-field sound[2]
- Built-like-a-tank physical construction (it's too darned homely to be fragile)
- Used for sound design and incidental musical scoring on the world's most popular TV show
- Special mix amp architecture for twice the mixdown headroom of other designs

MACKIE.™

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I N S I

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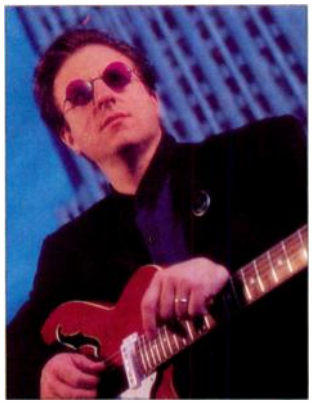
Cover: Photo/Digital Imaging by David Bishop

People Movers

When the going gets nuts, the nutty just get nuttier.



ROBERT PERRY

Nothing stays the same. Maybe that's why I smile every time I hear the phrase: If you want to make God laugh, tell him your plans. I'm sure that snippet of wit is not popular with people who carry those cute little day planners everywhere they go. But let's face it, destiny is a mischievous sprite who routinely trashes the best-laid plans of the world's most brilliant strategists. And as the stubborn imp is quite deaf to protestations and appeals, it might not be such a dumb move to embrace anarchy. Maybe you'll discover something wonderful about being energized by unexpected challenges. I can speak from personal experience here, because we've weathered some whippet-quick staff changes the past few weeks.

To start with, we won't be graced by the creative mind, superior editing skills, and sharp tongue of Associate Editor Mary Cosola for awhile. It's a happy separation: First, because it's temporary and, second, because she's on maternity leave. Mary had a boy—Drew Montgomery—on May 17, and is scheduled to return to our ranks in August.

Mary's departure isn't as scary as it could be, however, because we've promoted Editorial Assistant Diane Lowery to Copy Editor. Diane will now be responsible for copy and graphics tracking and keeping me on the straight and narrow. (A thankless task, believe me!)

We've also added two editorial assistants to the staff. Paula Iveland calls herself a renegade linguist (and no, I don't understand what she means by that) and holds a masters degree in linguistics from the University of California Santa Cruz. She recently spent a year in Mexico teaching English and is currently indulging her artistic muse by exploring sculpture, painting, and African dance.

Jennifer Seidel has a degree in English literature from the University of California Berkeley, and rumor has it that she's an excellent singer. She is furiously writing songs for a demo project—she has started fifteen tunes but hasn't managed to finish one yet—and dreams of being produced by T-Bone Burnett.

On a sad note, Associate Art Director Patsy Law is leaving us to join a family publishing business in Houston, Texas. Patsy is a truly talented artist with a rare gift for bringing text to life with empathetic graphic enhancements. She'll be hard to replace, and we'll miss her something awful.

But let's end on a smile. **EM** just won a coveted Maggie for "Best Table of Contents" at the 1995 Western Publication Association awards. Hurray! The cool thing about this honor—besides the fact that we smoked some beautifully designed magazines—is that it's a true collaborative effort between our art and editorial staffs. I'm happy to take credit for the text blurbs, but I'm sure that Art Director Linda Birch's dazzling graphic treatment is what aced the award. My thanks to Linda, once again, for making **EM** look better than magazines with larger staffs and bigger art budgets. Now if we can just keep people in their seats for awhile!

Michael Molenda

Electronic Musician®

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tel. (203) 838-9100, fax (203) 838-2550

Subscription Services Office
(Address changes and customer-service inquiries)
PO Box 41525, Nashville, TN 37204
tel. (800) 843-4086 or (615) 377-3322

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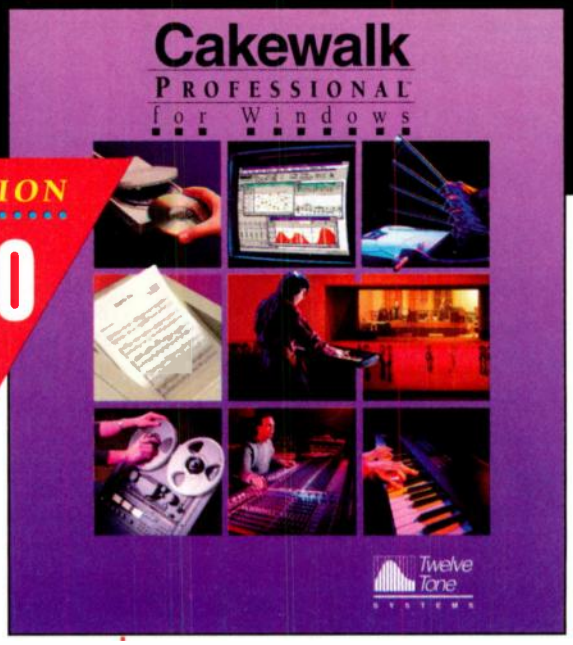
Electronic Musician: (ISSN: 0884-4720) is published monthly by Cardinal Business Media, Inc., 6400 Hollis St., #12, Emeryville, CA 94608. ©1995. This is Volume 11, Number 7, July 1995. One year (12 issues) subscription is $24; outside the U.S. is $49.95. Second Class postage paid at Oakland, CA, and additional mailing offices. All rights reserved. This publication may not be reproduced or quoted in whole or in part by any means, printed or electronic, without the written permission of the publishers. POSTMASTER: Send address changes to Electronic Musician, PO Box 41525, Nashville, TN 37204. Editeur Responsable (Belgique): Christian Desmet, Vuurgatstraat 92, 3090 Overijse, Belgique. Canadian GST #129597951. Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No.0478741.

Cardinal Business Media, Inc.
Also publishers of *Mix*® magazine.
Printed in the USA.

BPA INTERNATIONAL

PLAY HARD.



WORK EASY.

Tired of music software that's hard to work with? Spending more time making tech support calls than you are making music?

Then bring in the Professional.

Cakewalk Professional remains the leading MIDI sequencer for Windows today. It's powerful, fast, stable, and yes — extremely usable.

And while other music software companies scramble to release something on the Windows platform, Twelve Tone Systems is now shipping the third major release of its award-winning sequencer.

Here are some of the new 3.0 features:

BANG ON THIS

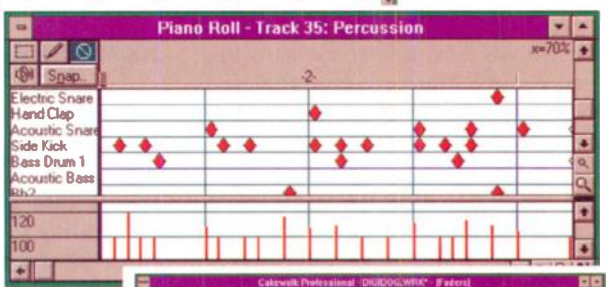
So what *else* is new in 3.0? Plenty.

- Percussion Editing
- MIDI Machine Control
- Enhanced Swing Quantizing
- Printing Up to 24 Staves per Page
- Expanded Instrument Definitions
- Bank Select
- Way More

> *"Simply put, it's a professional powerhouse."*
> *Electronic Musician, 3/94*

GRAB A GROOVE

The new Groove Quantize option lets you "steal the feel" of one track, and use it to quantize another. Cakewalk's own groove format supports note start-times, durations and velocities. Also works with DNA Grooves.



WHAT'S THE WORD

Add lyrics directly into the Staff view, and print in your notation. For on-stage performances, use the Lyrics view to see scrolling lyrics or stage cues in large fonts.

MASTER MIXES

Mix volume, pan and other controllers using 96 assignable faders and 32 Note On buttons. Create fader groups for automated cross-fades and mix-downs. And the Faders view now fully supports the Mackie OTTO 1604 MIDI automation package.

ELECTRONIC MUSICIAN 1995 EDITORS CHOICE

GENERAL MIDI

PC Multimedia PC

OTHER PROFESSIONAL FEATURES:

256 tracks; rock-solid SMPTE/MTC sync; custom programming language with macro recorder; MIDI remote control; system exclusive librarian and event filters, to name a few.

And with support for MCI commands and digital audio wave files, Cakewalk Professional can be the engine that drives your next multimedia project.

So play all day. Play all night. And let Cakewalk Professional do the hard work for you.

NOW PLAYING EVERYWHERE

Cakewalk Professional 3.0 is just $349, and is available at finer music and computer stores everywhere. For more information, or to order the Cakewalk Professional Demo Pack for just $5, call:

800-234-1171 OR 617-926-2480.

Call today and get a free copy of Twelve Tone Systems' customer newsletter, *QuarterTone*, while supplies last.

Twelve Tone SYSTEMS

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WRH

LETTERS

CHERRY CHERRY

I've just gotta know!!! What is that cute guitar amplifier setup on the front cover of the April 1995 **EM**? Where is it made and by whom? I just love that luscious, melt-in-your-mouth-but-not-in-your-ears, cherry red color!

John Rivera
Bronx, NY

John—That cute guitar amplifier is the Continental model, courtesy of the Tone King Amplifier Co., 703 S. Luzerne Ave., Baltimore, MD 21224; tel. (410) 327-6530. The amp comes in a way-groovy turquoise, too.—Diane L.

JUNGLE FEVER

Thank you for such a fine article on surviving in the music industry ("Working Musician: Welcome to the Jungle," April 1995). The article covered every relevant aspect, and I could see the experience and acumen behind each insight and tip. It could not have come at a better time for me, as yesterday I experienced one of those rare, personal traumas regarding my music career. The advice and encouragement helped so much. Thanks a million!

D. Hudson
no address given

I would like to praise **EM** and Anthony Ferrara for a job well done. "Welcome to the Jungle" made some important points. At times, I think our industry publications get too involved in reviewing equipment, and they forget about the other tools a professional needs to survive in the music business. Mr. Ferrara helps us realize that talent, equipment, and contacts are not all that is needed to succeed and that your work can be overseen with poor judgment and decisions. There are many musicians with tremendous musical skills who lack in the areas covered in the article. Hopefully, they will read it and put the advice to use.

Jim Cara
Prodigy Special Contributor
TJPT43A@prodigy.com

VISUAL ICON

I have been reading your articles on mixing and mastering ("All Mixed Up," February/March 1995). I have all the equipment to do both (mixer, compressors, ADAT, DAT, etc.). But I am somewhat handicapped or, to be politically correct, "physically challenged." I am totally deaf in my right ear.

One of my goals is to make a pro-quality CD, even with this handicap. I was wondering whether any visual aids are available in the *Windows* world? I read about a Mac program where you could move icons relating to instruments or sounds, and it would pan the selected signals left or right.

If there's nothing out there yet, maybe this letter will inspire software companies. But if you could help me out, I would greatly appreciate it.

David Lee Armstrong
Waukegan, IL

David—First off, Brian Wilson of the Beach Boys shares your "challenge," and it didn't stop him from producing some of rock's most enduring classics. Does anyone care that most of those productions are monaural? Believe me, if you've been blessed with a killer song and performance, you'll find it difficult to blow it in the mix. Talent always seems to shine through.

Regarding visual aids, a software mixer that graphically displays (and controls) sound placement in the stereo spectrum should be on the horizon. Designed by David Gibson, The Virtual Mixer is already being used in classes at the California Recording Institute (Menlo Park, CA). Gibson says that the mixer, manufactured by his Virtual Mixing Company, will first be produced for the Yamaha ProMix 01. Eventually the Virtual Mixer should be available for Digidesign's ProTools systems, numerous sequencing programs, and finally, conventional mixing consoles outfitted with automation packages. Initial computer platforms will be Mac and SGI, with a Windows *version to follow.*

For now, however, you can track stereo placement of specific instruments by simply looking at the position of the pan pots. Once you've set up a good visual representation of a stereo field, have a friend check your mix to confirm everything is in phase and sonically balanced. It's always a good idea to have an outside party audition (and critique) your mixes, regardless of your hearing health. By the way, I've produced hundreds of professional audio projects that have been (hopefully) enjoyed all over the world, even though I'm somewhat hampered by a slight case of tinnitus. If you've got desire and drive, nothing will stop you from achieving your goal.—Michael M.

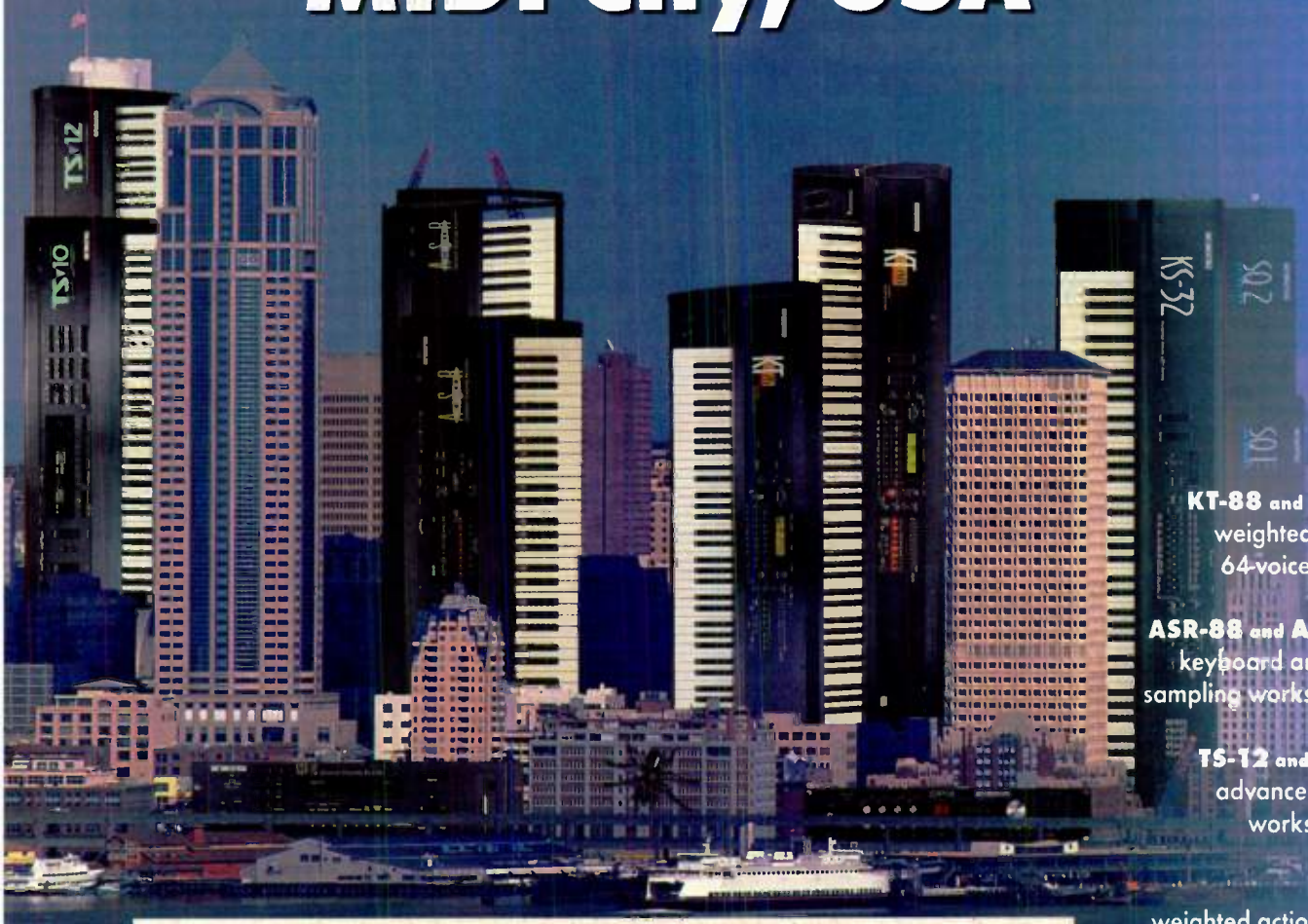
BAND-IN-A-BOX STYLE

Thank you for the review "PG Music *Band-in-a-Box Pro* 6.0 (*Windows*)" (March 1995). I have used *Band-in-a-Box* for several years, and it was fun reading about the program through the eyes of a neophyte. Although it is unfortunate that Mr. Metts was unfamiliar with earlier versions of *Band-in-a-Box*, his comments lacked the comparative qualities a good software-update review should provide. For example, the Horn Parts setting mentioned on p. 145 has *never* been functional; perhaps it will be in version 7.0. Nevertheless, *Band-in-a-Box* is "one great program" and, in its most recent evolution, has really come of age. Many needed and much-welcomed changes brought the program to a new level of musicality. The Rest (no chord) function is worth the price of the upgrade alone.

Likewise, thank you for including a

VALERIE SPAIN

MIDI City, USA



make music think ENSONIQ

KT-88 and KT-76
weighted action
64-voice synths

ASR-88 and ASR-10
keyboard and rack
sampling workstations

TS-12 and TS-10
advanced synth
workstations

KS-32
weighted action synth

SQ-2 and SQ-1 PLUS
low-cost 32-voice synths

DP/4+
parallel effects processor

your kind of town

Look around town — it seems that ENSONIQ instruments keep popping up all over the place. And with good reason.

First, there's our sound. Warm, rich, and perfectly suited for your next piece of music – whatever the style. That's because we have been working with top artists for years, producing our legendary Signature Series, our growing CD-ROM library, and the stunning waveforms that are found in all of our synthesizers.

Plus, ENSONIQ instruments have earned the reputation for being easier to use – more *musical* – than other electronic instruments. Why, you might ask? We're musicians ourselves, so we know how frustrating it can be if your instrument is fighting you instead of jamming with you!

Most important, we listen to our users, enhancing our products with *free* OS releases and plenty of great new sounds. This guarantees that your instrument will continue to grow in value for you in the years to come.

So why get stuck in some unfamiliar town when everything you need is right here?

Welcome to MIDI City.

Every ENSONIQ instrument is made in America. Call 1-800-553-5151 for dealer info. Or, try our automated fax retrieval system at 1-800-257-1439.

ENSONIQ
LEADING THE WORLD IN SOUND INNOVATION

☐ Send me information on:
- ☐ KT Series *64-voice weighted action synths*
- ☐ TS Series *synths*
- ☐ ASR Series *samplers*
- ☐ SQ Series *synths*
- ☐ KS-32 *weighted action synth*
- ☐ DP/4+ *parallel effects processor*

☐ I'd also like your *make music* **think ENSONIQ** demo CD *(enclosed is $5.00 for shipping and handling).*

Name _____

Address _____

City _____ *State* _____ *Zip* _____

Phone (_____) _____

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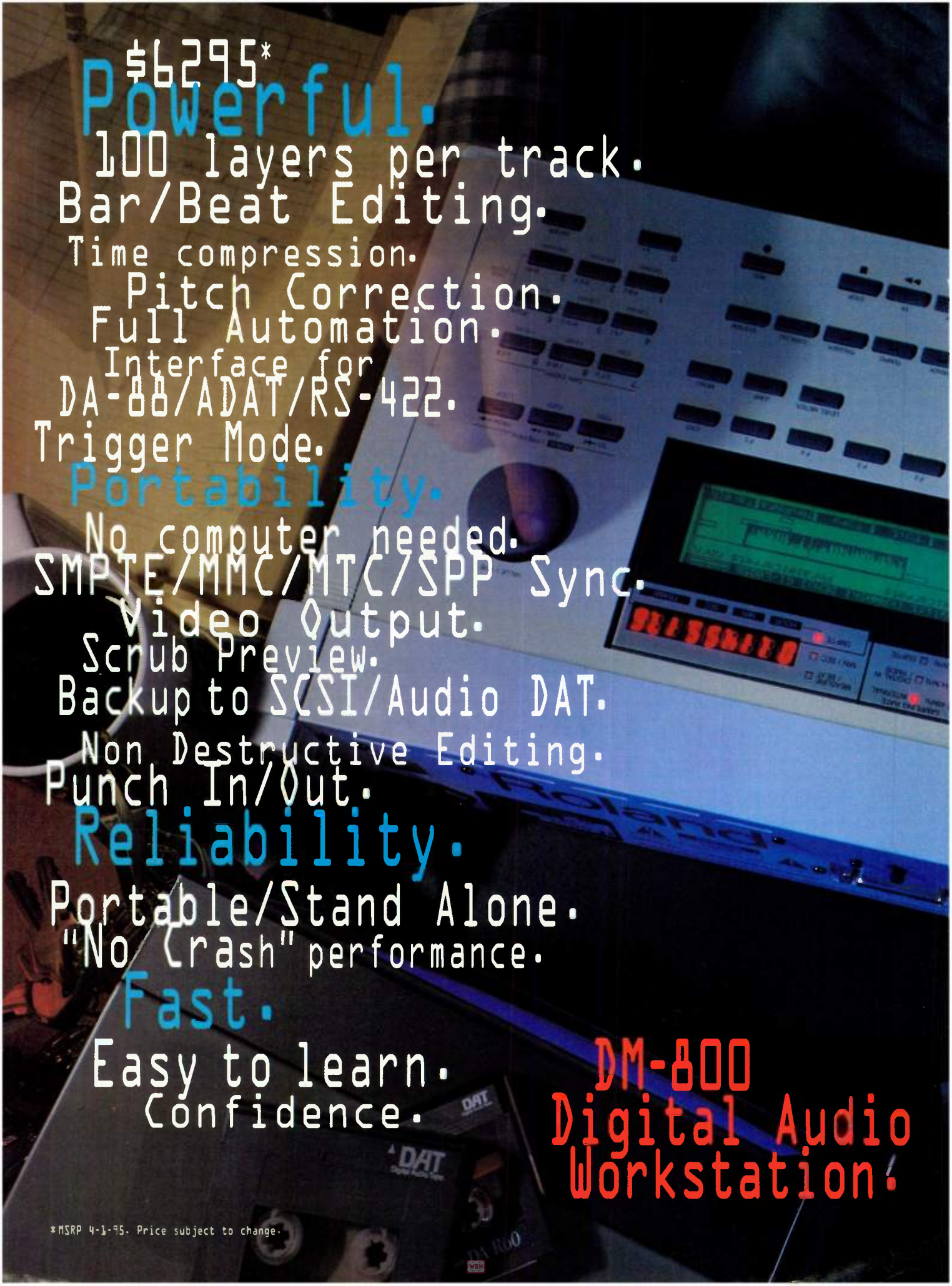
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review of Norton Music's User Styles disks. These disks are fantastic! I question the reviewer's statement "There aren't a lot of bread-and-butter Styles on these disks." (Because Mr. Metts did not recognize them as such, I suspect he is a writer who plays, not a player who writes.) As a full-time musician in a small, sequence-based band, playing a variety of musical styles keeps us booked. Norton Music's Styles are not only bread-and-butter styles, they are real, usable, gig-proven styles: authentic Latin rhythms; an incredible *polyrhythmic* reggae groove; fun, hard-drivin' R&B and rock styles that work well for country and western, too; and the crowd-pleasing Key West style that helps us obey the Buffett Law. (The "Law" requires every band to play at least one Jimmy Buffett song per night.) In fact, many of PG Music's newer user styles utilize concepts innovated by Norton Music on Norton Music's User Style Disks 1 and 2.

Keep up the good work. Articles like these help us to "get with the program."

L. M. Chandler
Alexandria, VA

Author Allan Metts responds: *From time to time,* Electronic Musician *runs "software-update reviews" in which we emphasize a program's new features and recent changes. Readers are usually referred to a review of an earlier version to get the scoop on the program's core features.*

Band-in-a-Box *was not one of those reviews. It had not been reviewed in* **EM** *in over four years, and that review was a short piece appearing in what was then called "First Takes and Quick Picks." And in spite of the program's popularity, there are still plenty of readers out there who don't know what* Band-in-a-Box *is all about. These factors prompted me to review the program from the ground up, with less emphasis on what was added in version 6.0.*

As for the Norton Music Style disks, I guess you and I come from different perspectives. Although I can certainly understand why you would want a wide variety of styles in a sequence-based band, I wanted less of the esoteric and more of the mainstream in my environment. I don't write many songs with a Dixieland or cha-cha feel and would rather have had more ballad and rock styles. But I've been told before that my definition of mainstream is a little narrow, so your point is a valid one.

Finally, allow me to set the record straight on a couple of points in your letter. First, the Band-in-a-Box *Horn part* was *functional in earlier versions of the program. You had to disable the Guitar part to use it (PG Music left it in version 6.0 to maintain compatibility with any styles that may still have Horn parts). Second, I consider myself a "player who writes"; just don't let my editor find out about it!*

ARGOT POLYGLOT

Thanks for your magazine. For a nonpro like myself, **EM** has taught me a lot and given me enough lingo to be conversant and unintimidated.

W. Winter
Washington, DC

Hats off to a great publication. Returning to the music world after several years off, I'm glad to see that **EM** is just as informative and fun as ever. However, after being away so long I have lost a lot of the jargon and the abbreviations that reign supreme throughout your publication. How

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about a one-page glossary in the back, or even sidebars in each article that will unravel a few of these vowel-less enigmas?

Tim Heuertz
Omaha, NE

Tim—Whenever we cover new ground, we always try to set everyone (including ourselves) straight on the jargon scene. Scott Wilkinson is very sensitive to lingo terror in his "Square One" columns and always tries to clarify abbreviations and mysterious acronyms. You can also tutor yourself by grabbing a copy of Tech Terms, *cowritten by our illustrious senior editor, Steve Oppenheimer. (Just call Mix Bookshelf at tel. [800] 233-9604.) Unfortunately, it would be difficult to dedicate even one page of valuable editorial real estate for a monthly glossary.—Michael M.*

MASTER BLASTER

I am co-owner of an Italian mastering facility in Bologna, called Officine Sonica. Mastering is a critical passage in record and CD production and often is very misunderstood in my country. I would appreciate an article that would explain the techniques and tricks of American mastering engineers. By the way, **EM** is well done and useful in every perspective. Thanks a lot and keep up the good work.

Mario Barrai
Officine Sonica
mario_barrai@basker.sub link.org

Mario—Nice to hear from my homeland! We are planning a "Day in the Life" feature that peeks behind the scenes of a professional mastering facility. It will run at a later date this year. On the more definite front, Scott Wilkinson is writing a "Square One" column on premastering techniques for the August 1995 issue, and we published "Recording Musician: DAT Mastering at Home" in the October 1994 issue.—Michael M.

ERROR LOG

May 1995, "IRCAM SVP 1.2 (Mac)," p. 134: A channel vocoder imposes the *spectral envelope,* or *amplitude spectrum* (not the amplitude envelope, as stated), of one signal upon another. Also, in the "Cymbalic Parameter List" on p. 136, the fourth entry was accidentally omitted; it should be: Time (sec) 3.0, Scaling Factor 0.5. In the same list, the description of the time-scaling process is backward: The time scale is gradually stretched to 2.0, not 0.5, over the next 2.849 seconds.

May 1995, "EMAGIC Logic Audio 2.0 (Mac)," p. 120: We have several price revisions and corrections. *Logic* 2.5 upgrades are $129; *Logic Audio* 2.5 upgrades are $149. Upgrades to *Logic Audio* 2.52 for Power Mac are expected to cost $99, with an introductory upgrade price of $50 for those who purchase the v. 2.5 upgrade. The TDM extension is $249, and the AV extension is $129.

WE WELCOME YOUR FEEDBACK.

Address correspondence to "Letters," Electronic Musician, 6400 Hollis St. #12, Emeryville, CA 94608 or e-mail at emeditorial@pan.com. Published letters may be edited for space and clarity.

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The **SX** is a full-blown music workstation style keyboard, using the same "engine" as the award-winning S Series Turbo MusicProcessor, with all the things the MusicProcessor is famous for: hundreds of huge, fat sounds with 32-voice polyphony, a powerful 250,000 event 16-track sequencer (no that is not a typo, 250,000 events), dual digital effects processors, and a 3.5" disk drive. But that is only the beginning.

Although the **SX** has much in common with other workstations, it is capable of producing musical ideas of its own – riffs and patterns called *Styles* that can be edited, looped and combined to create and inspire your songs within minutes. The **SX** even has 64 programmable *Styles* for you to create your own patterns.

G I N E

Score Display: Lyrics + chords + melody, chords, lyrics (Zoom)

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Keyboard: Lightly-weighted Action with Velocity and Aftertouch

Basically, this whole ad is trying to tell you that Generalmusic's **SX** keyboard is much better than the Korg i3. In case you still don't get it, here are the precise reasons why.

	Generalmusic SX2	Korg i3
Sounds	376 ROM+1672 RAM	256
Sequencer	250,000	40,000
Sequencer Resolution	192 ppq	96 ppq
Battery-backed Seq. RAM	Yes	No
Record Tempo Changes	Yes	No
Load while Playing	Yes	No
Styles	96	48
Store User Styles	32 + 32 Variations	4
User Pitchable Drumsets	Unlimited	2
Lyric / Score	Yes	No
Video Output	Yes (option)	No
Load New Samples	Yes (2MB option)	No
Price	Less	More

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Sure, that would be enough - but wait, there's more! ***Imagine,*** without using any complicated computer software, pressing a single button and seeing any sequencer track instantly displayed as a musical score. Plus, the unique **SX** "preload" feature allows you to load new sounds and sequences while playing. The **SX** can be expanded with 2MB of optional sample RAM, which allows you to load in your favorite digital samples from choirs, to guitars, to applause. And, the optional video interface provides the connection to most televisions or computer monitors, which allows you to share your lyrics, music, or both with other people, turning your every performance into a multimedia event. For even more versatility the **SX** is available in two keyboard versions.

The **SX2** is 61-note keyboard, while the **SX3** has the expanded 76-note keyboard, both with lightly-weighted actions.

The new **SX** from Generalmusic is possibly more keyboard than you ever imagined. Way better, way cool, lots of fun, and for a lot less money than you might think. Visit your Generalmusic dealer today or contact Generalmusic Corporation for more information and the dealer closest to you.

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WHAT'S NEW

By Steve Oppenheimer

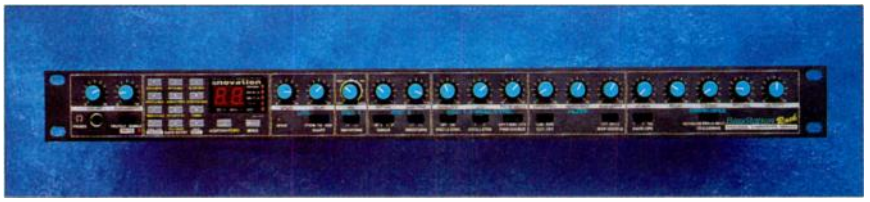
▲ AUDIO-TECHNICA AT873R

In Audio-Technica's AT873R condenser microphone ($225), the electrical charge is located on the fixed back plate instead of on the moving element, as in conventional designs. This lets the company use a gold-vaporized diaphragm only two microns thick, reducing moving mass by a third. According to A-T, the results are improved frequency and transient response and reduced distortion, even in intense sound fields.

In its stock configuration, the 48 VDC phantom-powered vocal mic has a hypercardioid polar pattern, but screw-in interchangeable elements provide a variety of pickup patterns, from cardioid and subcardioid to omnidirectional. The low-impedance (100Ω) mic comes with a stand clamp and windscreen.

The AT873R's frequency response is rated at 70 Hz to 20 kHz. Typical dynamic range is 113 dB, with a S/N ratio of 67 dB. The maximum input level is 140 dB SPL. Audio-Technica; tel. (216) 686-2600; fax (216) 686-0719.

Circle #401 on Reader Service Card



▲ NOVATION BASSSTATION RACK

You take the high road, and Novation will take the low road with its BassStation Rack MIDI-programmable, analog synthesizer ($799.95). Like the company's well-received BassStation keyboard, the 1U rack-mount sound module is intended primarily for playing bass lines but can be used for many common analog synthesis applications.

Like the keyboard version, the new unit mixes two voltage-controlled oscillators and feeds them to a resonant VCF and a VCA. The filter and VCA can be modulated by a single LFO and dedicated ADSR envelope generators. The oscillators can produce sawtooth or pulse waves, with pulse-width modulation, and can be hard-synched. The EGs can be single-triggered, multiple-triggered, or triggered with autoglide (i.e., when a second key is pressed, the pitch glides to a new note, and the envelope retriggers). A Portamento control is also included.

The BassStation Rack offers 40 factory presets and 60 user program locations, a huge improvement over the keyboard version. It has an external audio input to the filter section, and you can control the mix between the VCOs and the external sound source. The rack unit also offers CV/Gate In/Out-to-MIDI conversion, which can be assigned to a separate MIDI channel from the synth section. This provides independent, simultaneous MIDI control of the BassStation's internal synth and an external, voltage-controlled synth.

The user interface includes a 2-digit LED display and a data-entry keypad. An Audition button triggers sounds directly from the front panel. You can chain several BassStation Racks for increased polyphony, while master-controlling the functions of all units from the first one in the chain. Music Industries Corp. (distributor); tel. (516) 352-4110; fax (516) 352-0754.

Circle #402 on Reader Service Card

▼ E-MU E-64

E-mu Systems has introduced a mid-priced sampler that fills the gap between the company's high-end Emulator IV and bargain-priced ESI-32. The e-64 Digital Sampling System ($3,295), a 64-voice polyphonic device, is compatible with the E-IV, E-IIIx, ESI-32, Emax II, and Akai S1000/1100 sound libraries.

The 3U rack-mount unit features 64 sixth-order, digital resonant filters, which can be a variety of filter types; eight polyphonic outputs (four stereo pairs), with 18-bit DACs; an ASCII keyboard interface; a 240 × 64 LCD graphic display with onscreen waveform editing; and an icon-based user interface. The two ¼-inch inputs feed 18-bit, 128× oversampling, sigma-delta A/D converters.

Samples can be quickly located with the built-in library Search function. Samples can be loaded and resampling can be accomplished during playback. Pitch transposition is said to be virtually distortionless over a 10-octave range.

The e-64 comes with 2 MB of sample RAM, upgradable to 64 MB via standard SIMMs. As an option, up to 16 MB of Flash RAM can be added, which decreases the amount of accessible SIMM RAM by the same amount. The unit includes dual 50-pin SCSI ports; AES/EBU digital I/O; and an internal, high-density, floppy-disk drive. E-mu Systems; tel. (408) 438-1921; fax (408) 438-8612.

Circle #403 on Reader Service Card

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When you're performing or recording, nothing should stop your music from reaching its full potential. Especially your dynamics processor. No matter where your creativity leads you, the Alesis **3630 Compressor/Limiter** is the tool that lets you squeeze the most out of your music.

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The 3630 provides two full-featured professional compressor/limiters in one rack space. Its ease of use, extensive feature list and flexible operation make it an excellent dynamics processor for any application, from studio recording and mixing to instrument rigs, live sound reinforcement and broadcast.

True Stereo Operation and Flexible Features

The 3630 offers dual mono or linkable true stereo operation, so you can process your stereo signal (or two mono signals) from a single unit. Its flexible interface lets you choose between RMS and peak compression styles as well as hard knee or soft knee compression curves to customize the 3630's response for any source material. The 3630 also provides dual 12-segment LEDs that allow you to meter gain reduction *and* display input and output levels.

Clean, Quiet Professional Performance

Of course, the 3630 Compressor Limiter also has the great sound that has made it the choice of over 80,000 artists and engineers worldwide. We use the industry standard super low-noise VCA chip to eliminate pumping and breathing, and each channel's independent built-in noise gate has an adjustable threshold and close rate to ensure clean, transparent performance. The variable Attack and Release parameters offer wide ranges (0.1ms - 200ms and 50ms - 3s), allowing you to precisely control the dynamic response for the job at hand. The 3630's sidechain function can be used for ducking rhythm tracks and background music, or for de-essing vocals when used in conjunction with your favorite EQ device. And, of course, the 3630 allows the highest signal-to-noise ratio for mixing to analog tape *and* optimizes hot levels for digital recording.

Advanced Compression For Everyone

Along with its outstanding features and unparalleled performance, the 3630 Compressor Limiter remains incredibly affordable. Squeezing the most out of your music is easier than ever. Grab a 3630 at your Authorized Alesis Dealer today.

For more information about the 3630 Compressor/Limiter, see your Authorized Alesis Dealer or call Alesis at 310-836-7924
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We heard you when you asked for effects. In addition to global reverb and chorus, the JV-1080 has 40 insert effects combinations including rotary, dual pitch shift, tempo delay which syncs to MIDI clock, Hexa-chorus, distortion, and even multiple effects like overdrive/flanger.

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Spec for spec, bit for bit and dollar for dollar, no delay comes close to the D5000. With sampling, it could become the most valuable tool in your studio. Check it out at your nearest Yamaha dealer.

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ROLAND SDX-330

My parents tried to teach me the value of modulation in all things. Okay, they really said "moderation," but I wasn't good at that, and "modulation" is more to the point for recordists and sound designers. If that's you, Roland's SDX-330 Dimensional Expander ($1,095) may be the signal processor you've been looking for.

Focusing on chorus, flanger, and rotary effects, the SDX-330 also features Roland's 3-D Spatial Simulator technology. This combination of modulation and 2-channel, expanded-soundstage effects can be used in stereo sound-reinforcement as well as recording applications.

The unit features sixteen effects algorithms, including stereo and 3-D choruses and emulations of classic chorus devices (e.g., analog units, Roland SDD-320 Dimension D, and BOSS CE-1). With the Multiband Choruses, the sound is divided into two, three, or four bands for independent processing with different parameter settings. The 3-D Panner offers control of direction and speed of rotation. The rotary speaker effects include overdrive and various tremolo depths that simulate on-axis and off-axis mic positions. Each algorithm includes a post-effect, 3-band, parametric EQ.

The SDX-330 contains 100 presets and 200 user patch locations. Programs can also be dumped via MIDI SysEx. All parameters can be controlled in real time via MIDI note number, Aftertouch, Velocity, and Control Change messages, and a MIDI signal-present LED is provided. The unit also permits parameter control from an optional footswitch and CV pedal. A 17-character by 2-line, backlit LCD shows the program name and parameters, and a 3-character by 1-line LCD shows the current program number.

The unit's overall input and output levels can be independently switched between -20 dBm and +4 dBm, and front-panel level knobs are provided. A pair of 7-segment LED ladders show the L/R input levels. The hardware bypass can be enabled from the front panel or a footswitch.

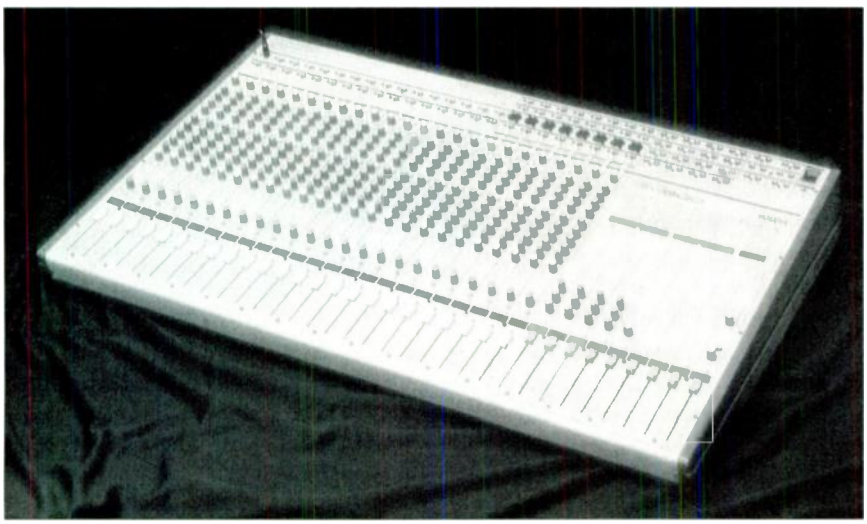
All A/D/A converters are 16-bit delta-sigma, and the ADCs sample at 44.1 kHz. With the effect on, the unit's THD is rated at 0.02% or less (1 kHz, nominal output) and dynamic range is rated at 90 dB or greater. Frequency response (with effect) is rated at 20 Hz to 20 kHz (±3 dB). Roland Corporation US; tel. (213) 685-5141; fax (213) 722-0911.

Circle #404 on Reader Service Card

YAMAHA RM800

The phenomenal growth of home and project studios has been greatly assisted by the evolution of affordable 8-bus mixers. Yamaha continues this welcome development with its RM800, available in 16-channel ($1,699) and 24-channel ($2,399) configurations. Each channel has a tape-return input, and eight channels have insert points, so the RM800-16 has a total of 40 inputs during mixdown, and the RM800-24 has 56 inputs. The jack field is top-mounted, sound-reinforcement style, for use as a patch bay.

In addition to the expected 100 mm faders, pan pot, trim, mute, and PFL solo, each channel has 3-band EQ with sweepable mids. There are three post-fader, mono, aux send buses; mono aux send 4 can be used as a prefader channel send (for mixdown) or a post tape-return send (e.g., for adding processing to a monitor mix during tracking). Auxes 5 and 6 can be either prefader, stereo aux sends (for mixdown), or monitor mix controls for the channel tape returns.



All channels have balanced, ¼-inch, mic/line inputs. The eight channels with inserts also have XLR mic inputs (selectable) and direct outputs, which can be used as tape sends. The +48V phantom power can be globally defeated.

The eight subgroups have two simultaneously available sets of outputs for +4 dBm and -10 dBV operation. Inserts are available for groups 7 and 8 and the main stereo bus.

The master section includes four stereo aux returns (+4 dBm). A single fader controls the L/R output level. Two-track (-10 dBV) and stereo sub (+4 dBm) inputs also are provided. In addition to the two sets (-10 and +4 dB) of L/R main outputs, there is a separate L/R pair of control-room outs that can be switched between the 2-track input, the stereo L/R bus, or the monitor bus (aux buses 5 and 6).

The frequency response is rated at 20 Hz to 20 kHz (+1/-2 dB). Its THD is rated at <0.1% (at +14 dB), and adjacent channel crosstalk is 70 dB (at 1 kHz). Yamaha; tel. (714) 522-9011; fax (714) 739-2680.

Circle #405 on Reader Service Card

GET SMART ▲ ▲ ▲ ▲ ▲

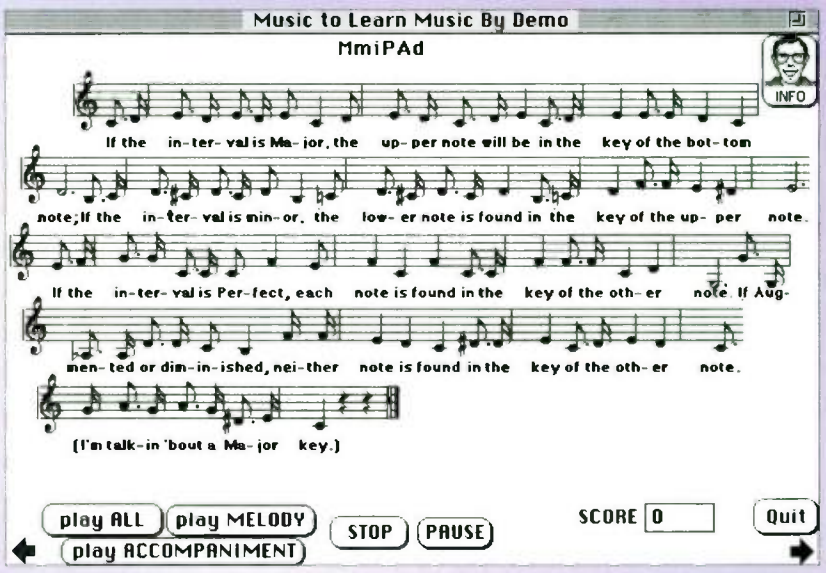
▶ TEACHNOLOGY

Students of all ages can benefit from TeAchnology's MI.Q. series of educational programs for the Macintosh. The four programs that currently constitute MI.Q. are interactive. The student sings the exercises into a microphone that is plugged into the company's custom MIDI Black Box hardware, which translates the vocal input into the MIDI data used by the program.

The first program, *Music Literacy Interactive* ($495 w/hardware; software only $139.95), is a self-paced sight-singing program that teaches pitch and rhythmic accuracy. It combines aural and visual note-recognition and uses a game design to make the learning process fun. All 333 examples are drawn from standard music literature, starting with folk songs and nursery rhymes and progressing in complexity up to symphonic music. The vocal range progresses from a fifth up to a twelfth. The program records your best score.

RhythmMac ($495 w/hardware; software only $139.95) focuses on metric and rhythmic examples. It simultaneously shows notation and plays rhythms, which the student attempts to match. You can pick your own exercises or let the program choose them at random. The student's success is indicated by a score.

An AudioGraphic Dictionary of Harmony Vol. 1 ($495 w/hardware; software only $139.95) is the first in a series of interactive harmony programs. The initial volume focuses on sight-singing SATB vocal parts. The student can listen to any combination of soprano, alto, tenor, and bass parts and can sing along with any part. The program can do automatic octave transposition, so you can sing parts outside your normal range. As with the aforementioned programs, the *AudioGraphic Dictionary* uses examples from standard music literature.



Music to Learn Music By ($495 w/hardware; software only $159.95) differs from the other MI.Q. programs in that it uses original music by series creator and veteran educator Dr. Warren Joseph. Dr. Joseph's music is designed to teach music literacy and fundamentals, including interval types and relationships, rhythmic organization, melodic and harmonic functions, and more. For example, some songs are entirely based on intervals of a minor third, some on sevenths, and so on.

Music to Learn Music By uses a *Music Fundamentals Songbook*, which is provided in three formats: print, audio cassette tape, and Standard MIDI File. One songbook is included with the program, and supplemental songbooks are available for $19.95 each. TeAchnology; tel. (800) 474-6447 or (618) 466-1775; fax (618) 466-1798.

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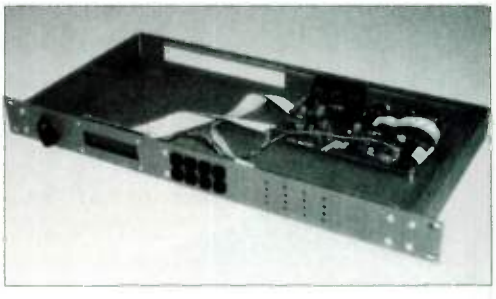
▶ PAVO MIDITOOLS KIT

Attention, do-it-yourselfers! Warm up your soldering irons and build your own custom MIDI controller with PAVO's MIDItools Custom Instrument Kit ($265). The kit includes a painted, 1U rackmount enclosure; backlit LCD; all components; and complete instructions. You can choose from a variety of sensors and switches, with up to 64 per unit. Assembly takes less than five hours, and no previous soldering experience is required.

Project examples include MIDI retrofits for analog synths and organs; home-brewed MIDI percussion and alternative controllers; joysticks, light sensors, and tape switches for interactive dance floors and museum exhibits; and MIDI-controlled theater lights.



PAVO also offers 21 other MIDItools kits ($200-$300), an applications newsletter, and technical support. A catalog is available upon request. PAVO; tel. (800) 546-5461; tel. and fax (215) 413-2355; e-mail: miditools@aol.com or 73074.2526@compuserve.com.

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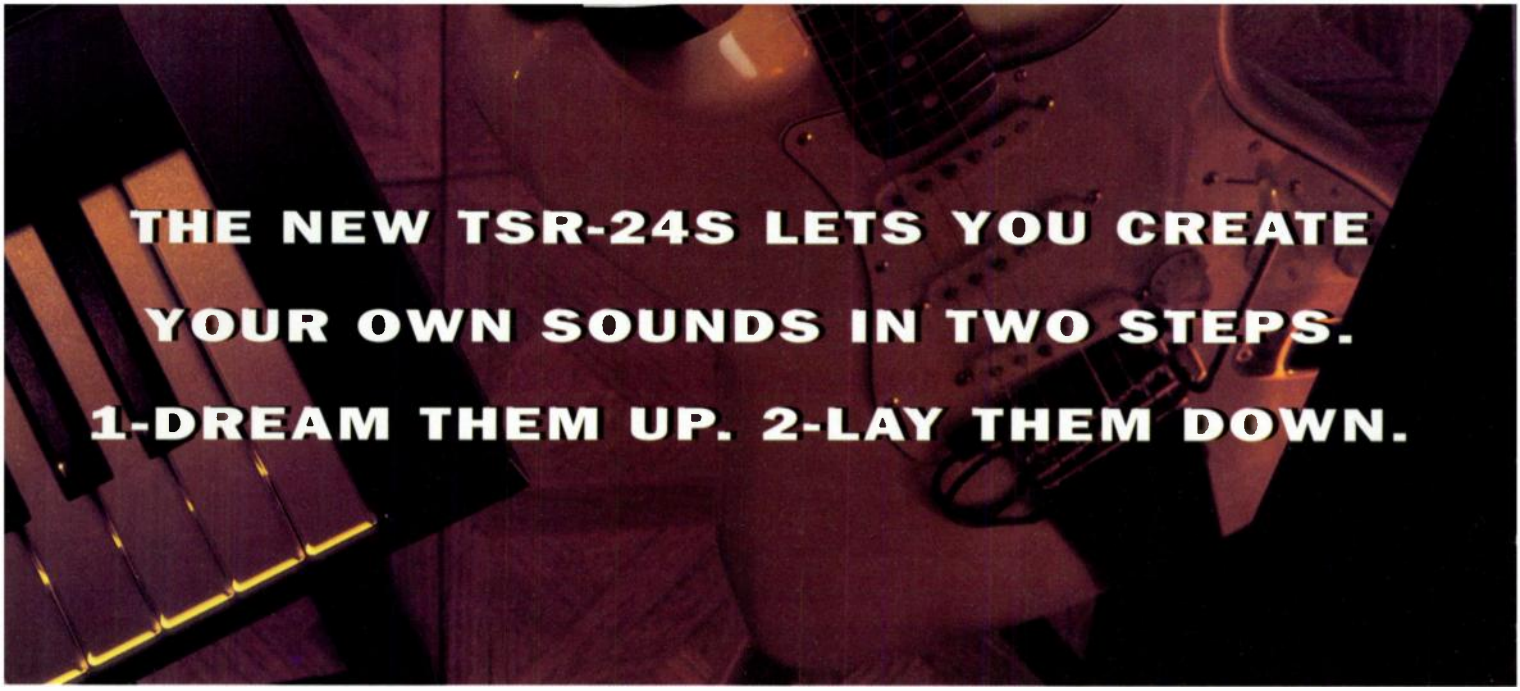

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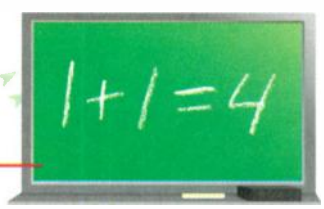

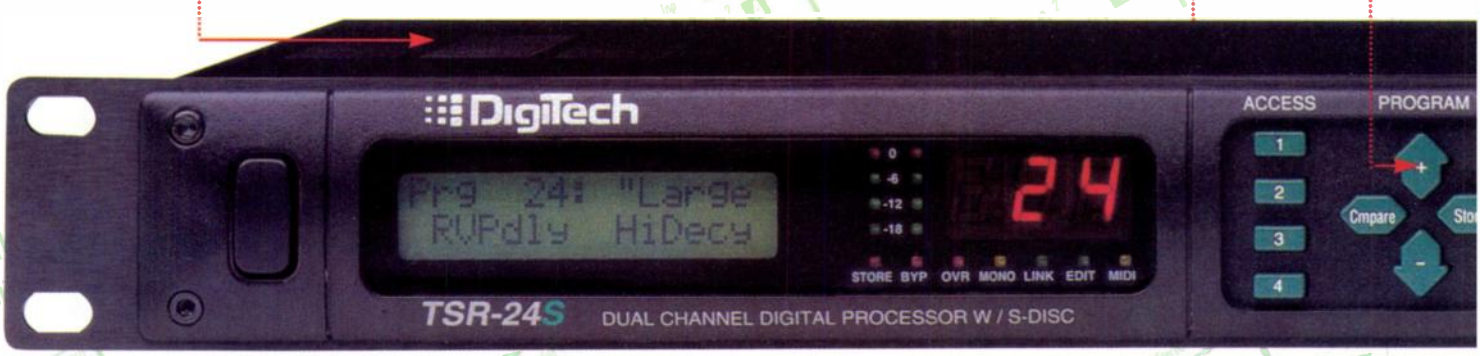

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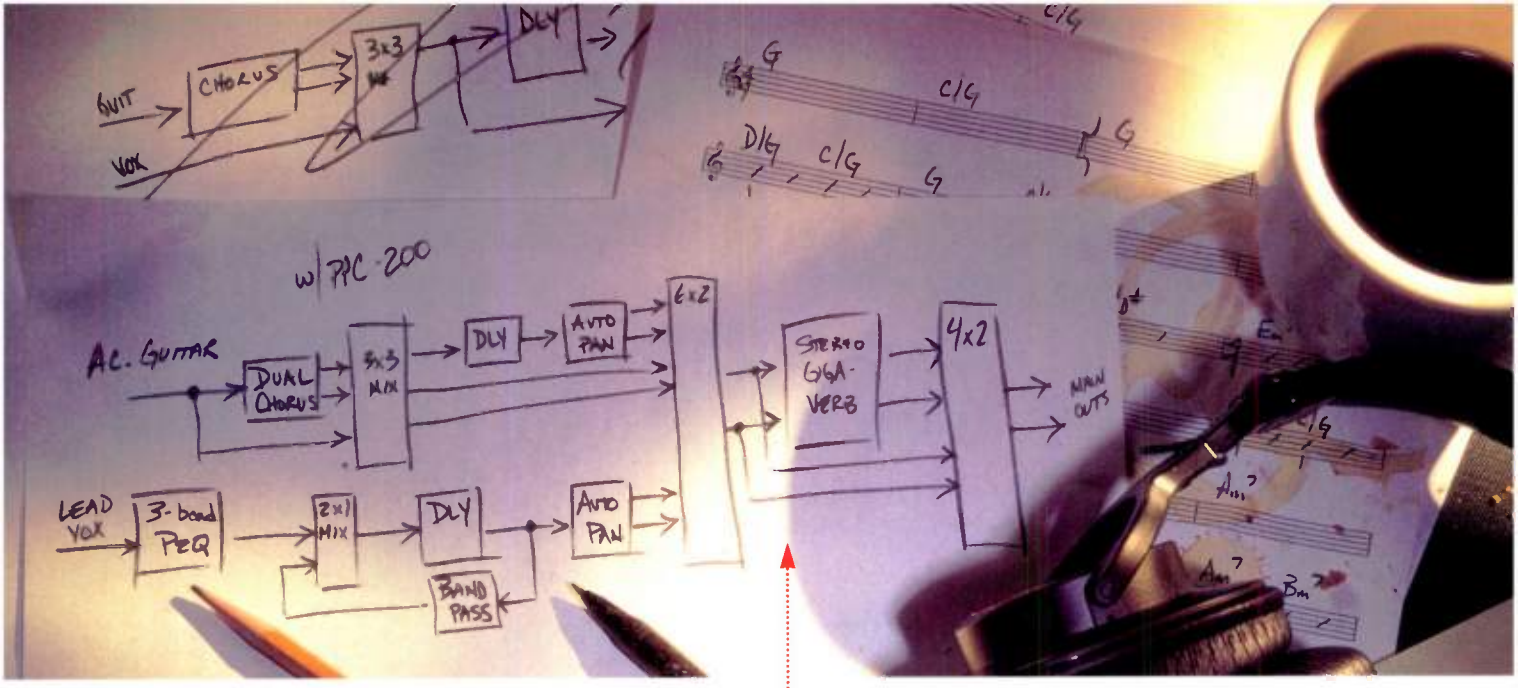

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▼ KAT INC.

KAT Inc., best known for its MIDI percussion controllers, has a new KATSKILLS division that will focus on educational software. The company's first interactive educational program is *Drum Tutor* 1.0 ($149.95) for the Macintosh.

The program teaches 40 standard drum rudiments (rolls, paradiddles, flams, ratamacues, etc.) by using a visual system that displays the various aspects of percussion performance. The student performs the exercises with a MIDI controller, and *Drum Tutor* evaluates accents, timing, and stickings and provides a score for each exercise. Exercises can be printed out, and additional exercises can be imported via Standard MIDI Files. KAT Inc.; tel. (413) 594-7466; fax (413) 592-7987.

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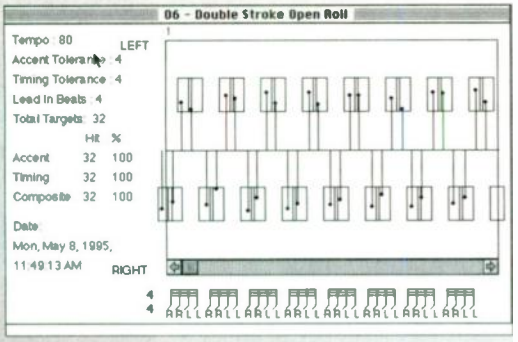
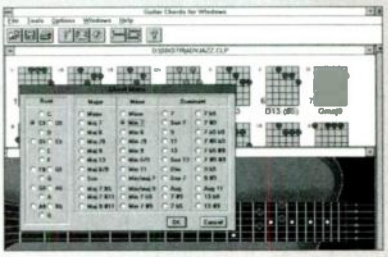


▶ SIX STRING SOFTWARE

If you're a student of the guitar and have a *Windows*-based PC, it's probably time to get with the program. In fact, you may want to check out two music-education/entertainment programs from Six String Software: *GuitarChords for Windows* and *GuitarTutor for Windows* ($49.95 ea.).



GuitarChords for Windows is derived from the company's *GuitarWorks* program and is based around the Chord Dictionary, which contains over 5,300 entries of 44 chord types. For each root and chord type, the program shows the chord definition, voicings, staff notation, and nine to twelve guitar fingerings. Users can also create their own chords. Fingerings are shown (with finger numbers) on the guitar neck and on standard chord diagrams. You can hear any chord by clicking on it.

Chords can be copied to the Chord Worksheet to build reference charts, which can be printed. The color graphics include bitmapped photos of real guitars. Two tuners are provided: a chromatic tuner and an interactive tuner for use with a mic and sound card. Open-string tunings are supported, and you can change the default tuning on any string. The new tunings are reflected in the chords displayed throughout the program.

GuitarTutor for Windows offers 130 exercises, which are shown in tablature and provided in a 125-page book as well as onscreen. Pop-up messages provide hints and suggestions. The Song Player feature provides variable-speed playback, looping, step forward and backward, memory points, fast forward, rewind, and jump-to points, all of which are designed to make the program easy to use. *GuitarTutor for Windows* includes the same two tuners as *GuitarChords for Windows* and features the same type of color graphics.

All of the company's companion disks, including *Scales & Riffs* ($14.95), work with *GuitarTutor*. Free song downloads are available for America Online members. Six String Software; tel. and fax (206) 631-5855; e-mail: guitarsoft@aol.com.

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▶ SPECTRAL TRANSLATOR

The proliferation of multitrack digital-audio formats can pose a big problem for those who work on multiple platforms. The Spectral Translator ($995) addresses this issue by providing direct digital translation between any two of the following formats: Alesis ADAT, Tascam DA-88, Yamaha Y2 (DMC1000, DMR8, and DRU8), and Spectral SMDAI (AudioEngine and Prisma). All are 16-bit formats, but the Translator is firmware upgradable to allow compatibility with future 20-, 24-, or 32-bit audio standards.

The 1U rack-mount unit supports all ADAT sample rates (40.4 to 50.8 kHz), although its front-panel indicator LEDs show the rate rounded to the nearest value of 44.1 or 48 kHz. It also can slave to external clock signals from any of the supported devices and can provide the master sync clock.

In Pass-Thru mode, the Translator passes unmodified 8-track audio directly to and from supported machines and a Spectral Prisma or AudioEngine. The unit is powered by an external supply.

Also new from Spectral is *MediaFiler* ($149), a software package that provides a variety of file transfers and format conversions (including batch-file conversion) across any standard network. Supported formats include Sound Designer I and II, SoundEdit, UNIX SND/AU, AIFF, WAV, Lightworks, OMF, ADPCM, SMP, CVSD, 8SVX, and MIDI Sample Dump. The program converts 8-bit files to and from 16-bit format and provides sample-rate conversion. Spectral, Inc.; tel. (800) 407-5832 or (206) 487-2931; fax (206) 487-3431. ●

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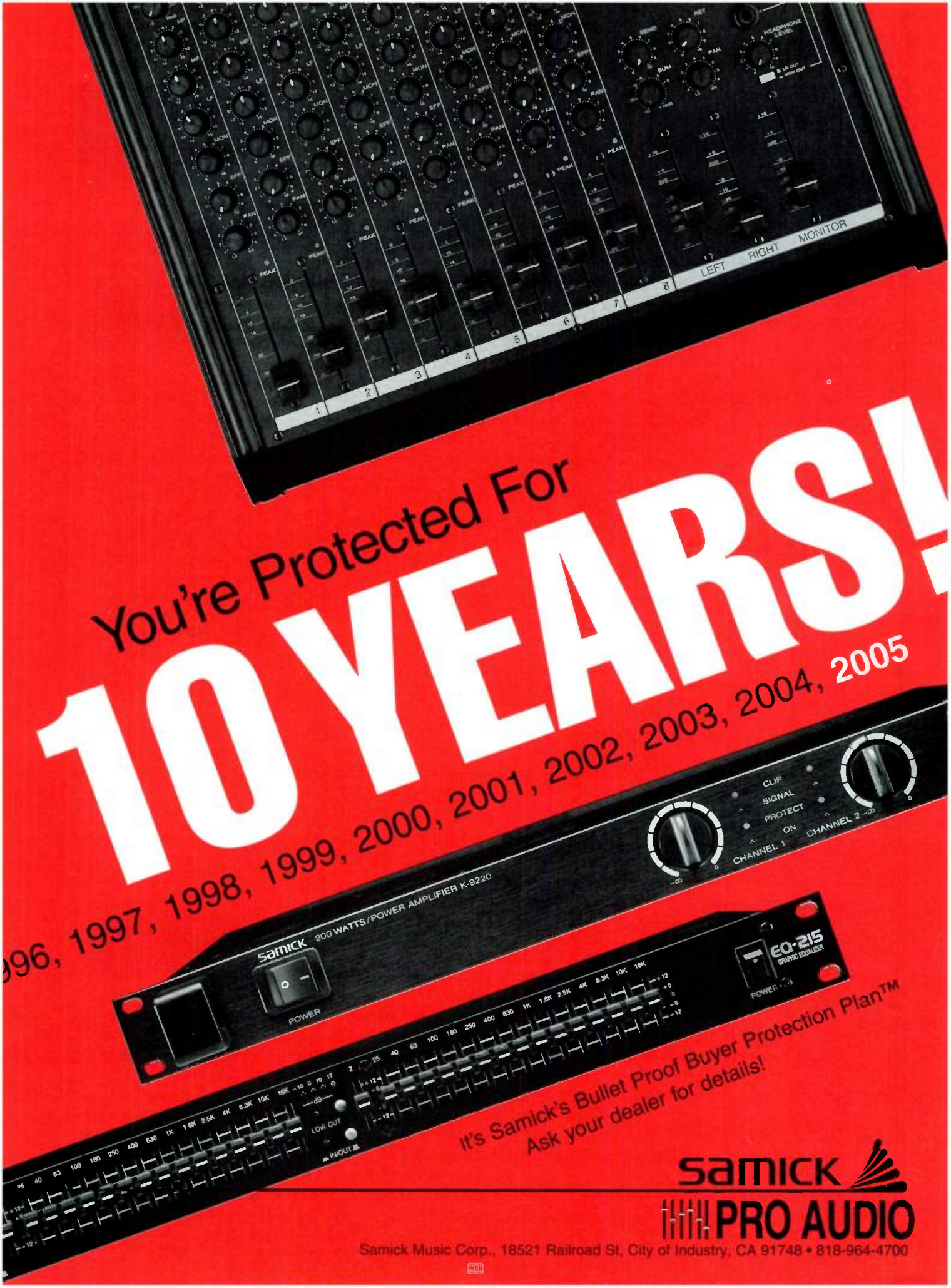
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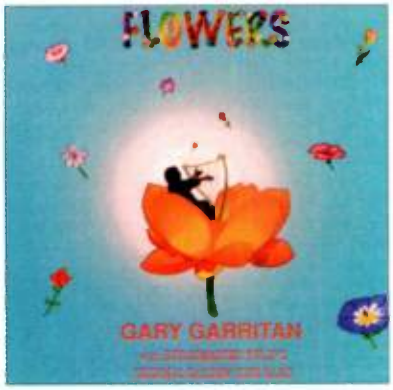


PRO FILE

Harping on MIDI

Gary Garritan electrifies a classic.

By Michael Hurwicz with Michael Molenda

Gary Garritan has been fascinated by the harp ever since he first saw Harpo Marx in *A Night in Casablanca*. Such a rambunctious role model may explain his unconventional approach to the instrument. In high school and college, Garritan played harp in rock 'n' roll bands, apparently unaware that harps and rock music don't mix. Years later, he ignored experts who said it was impossible to build a MIDI interface for the harp. Guess what? To date, Garritan has sold more than 30,000 CDs and tapes featuring his "impossible" MIDI harp.

But it was no small task making the experts eat their words. "The major difficulty in electrifying the harp was finding a pickup that would detect performance dynamics," says Garritan, who designed the harp with help from Eitaro Kawaguchi of The Center for Music Research at Florida State University. "Because the pickups trigger the pitch-to-MIDI converter, velocity is critical. Soft plucks must be reproduced as quiet sounds, while hard plucks must have a more aggressive attack. Without dynamic control, a performance is monochromatic because every note is reproduced at the same volume level."

Garritan tried various pickup types before settling on a piezo model, the Hot Dot, manufactured by Barcus Berry. Signal isolation and sensitivity problems were solved by building a custom bridge where each of the harp's 36 strings has direct contact with its own piezo pickup. The output of the piezos is routed to six custom, onboard preamps (each with six separate inputs). Then, the preamp outputs are routed through a standard 50-pin SCSI cable, which is connected to the system's pitch-to-MIDI converter.

Garritan's sound arsenal includes a Kurzweil K2000, E-mu UltraProteus, AVM Summit, and Yamaha DX7. His MIDI sequencer is Twelve Tone System's *Cakewalk Pro*, and he uses Digidesign's Session 8 hard-disk system for multitrack recording.

"Being able to connect the harp to MIDI modules is wonderful," says Garritan. "*Voila!* I can play violin, didgeridoo, accordion, or anything I want. I even mounted a Z-bar [MIDI] controller on the side of the harp so I can do pitch bends and other wild effects."

Unlike the acoustic harps played by Harpo Marx, however, Garritan's instrument is a patented solid-body design. The nonacoustic body was essential for MIDI work.

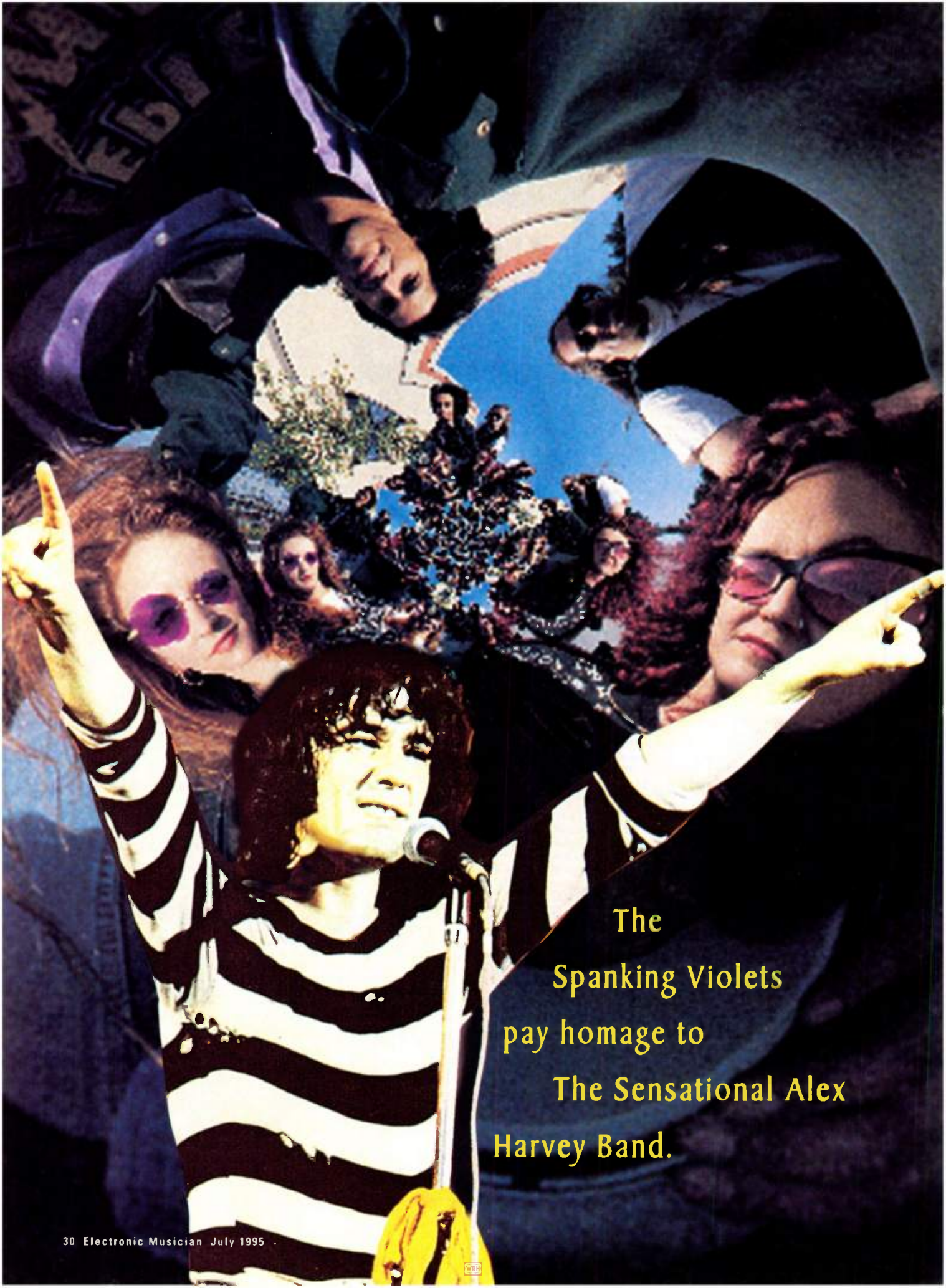
"A traditional acoustic harp has a limited range because it's diatonic," explains Garritan. "You can change pitch with pedals, but only up one sharp and down one flat. Obviously, I can program the MIDI harp to play any pitch. But this means that the pitches I'm playing in the MIDI realm can clash with the pitches sounding in the acoustic realm. I had to design a solid-body harp that would not produce any acoustic sounds that conflicted with the pitches from the sound modules."

When it comes to marketing, Garritan goes where the record companies *aren't*. In addition to distributing his albums in gift shops and bookstores, he often sets up booths at fairs and festivals. So if you want to hear Garritan's wondrous MIDI harp, you'll have to look wherever commercial tapes and CDs are *not* sold.

For more information: Gary Garritan, PO Box 151, Orcas Island, WA 98280; e-mail: 71520,3351@compuserve.com.

Michael Hurwicz *is a freelance journalist and singer/songwriter.*

Gary Garritan and his MIDI harp.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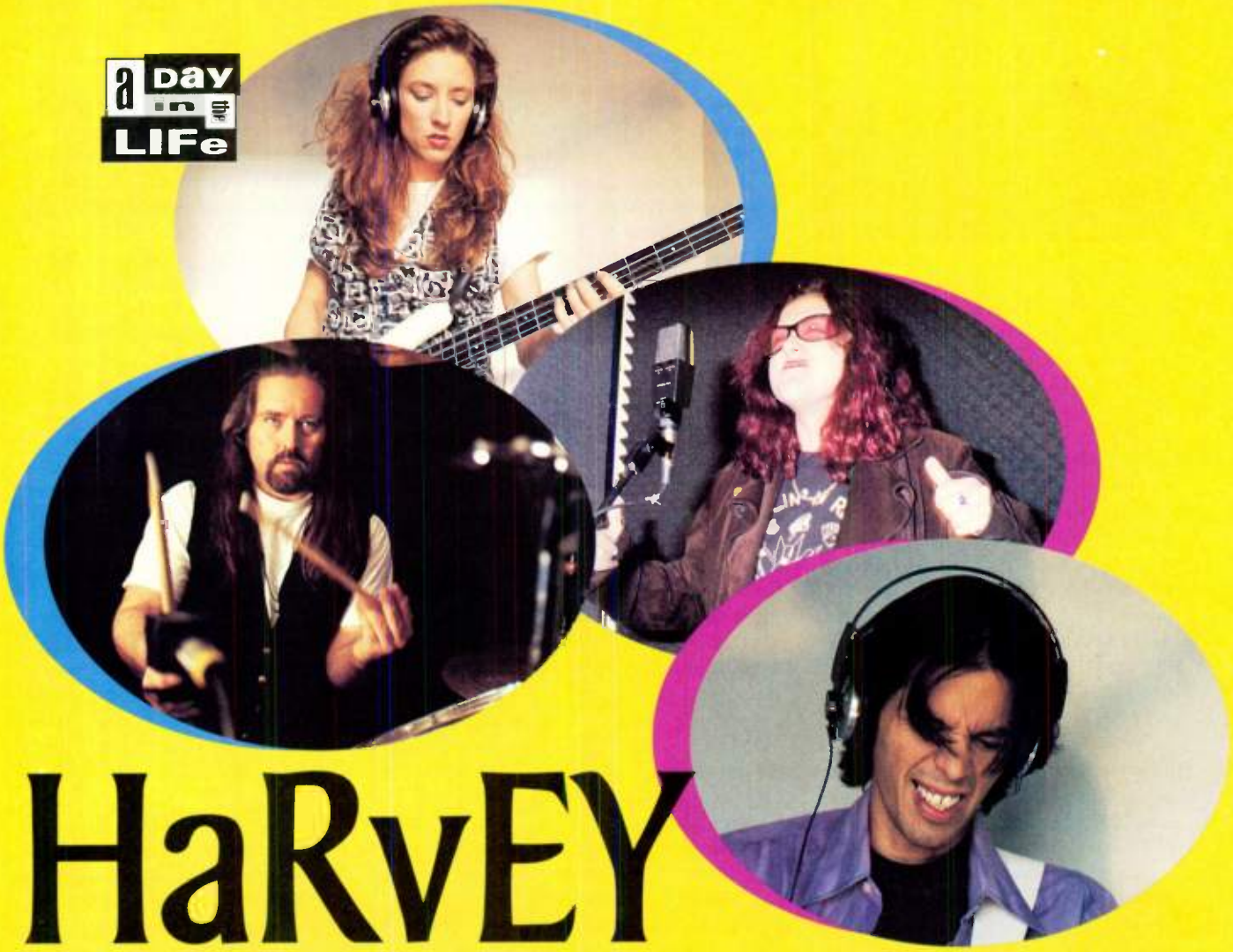

HaRvEY WaLLbanGers

by Michael Molenda

I COULDN'T BELIEVE MY EYES. It was 1972, and parading across my television was the strangest band I had ever seen. The lead singer wore a stocking over his head and looked old enough to be my father. A rather bored keyboardist was wrapped in a tattered bathrobe, while the bass player strutted about in mile-high platform shoes, a cape, and a codpiece. But the ultimate blasphemy was the guitar player—the sentinel of cool in my world—who dressed in Flash Gordon-style tights and painted his face like a leering puppet. I was furious at *Don Kirshner's Rock Concert*. How could they book these clowns?

Well, it only took two songs to convert me from an angry unbeliever into a lifelong fan. The wacky circus that was The Sensational Alex Harvey Band exploded into a multimedia extravaganza of twisted rock cabaret. Sets and props appeared out of thin air to bring the comic book-influenced songs of bandleader/vocalist Alex Harvey to life. And the old geezer had a flair for stepping into the personas of his

Photography by Claire Arnaud

mythical characters: The Tomahawk Kid, The Faith Healer, Vambo Marble-Eye, and various other superheroes. To top things off, that silly looking guitar player was a monster soloist. So although it was difficult supporting a band where the most normal member was the drummer, I pledged allegiance to The Sensational Alex Harvey Band.

Now, 23 years later, I'm producing a tribute album to the group, *Vambo Rools: A Tribute to The Sensational Alex Harvey Band* (Taxim Records, Germany). Is life weird or what? Fourteen San Francisco Bay Area artists pay homage to this nearly forgotten Scottish act, covering Harvey's whimsical songs in their own styles.

One of these local bands, the Spanking Violets, recorded their tribute track in just one night! The Violets' lightning efficiency provides a unique opportunity for our "A Day in the Life" series, as we can actually document a professional recording session on a single day, diary-type time line. In addition, we'll detail which mics were used for each instrument, all EQ and signal-processing tweaks, and why certain sound-sculpting decisions were made.

Although we recorded the album at Sound & Vision, the commercial recording studio I co-own with Digidesign Industrial Designer Neal Brighton, most of the production and engineering tricks used on this track can be adopted by any home recordist. So feel free to peek over my shoulder and steal as many riffs as you want.

And now, as Harvey himself could have intoned in his fractured Scottish brogue, "Listen, boys and girls, and I'll tell you the story of the great Sensational Alex Harvey Band tribute sessions...."

THE GENESIS OF DUMB

Admittedly, The Sensational Alex Harvey Band was not exactly the most brilliant choice for a tribute album. The group never conquered the States or dented the *Billboard* charts, even though the act was championed by hip U.S. rock mags such as *Creem* and *Hit Parader*. Harvey's exaggerated Scottish accent and theatrical excesses were just too twisted for mainstream America. After a few years of heady European chart and concert successes, health problems crept up on the old troubadour, and Harvey split up the act in 1977. Unfortunately, he never mounted a comeback. Harvey died while touring Belgium as a solo artist in 1982, just missing his 47th birthday.

I never forgot The Sensational Alex Harvey Band's strange and wonderful musical sideshow, so when 1970s rock styles—via artists such as Lenny Kravitz and The Black Crowes—slithered back into vogue, I decided the time was right for a SAHB tribute album. Of course, producing the project was not so much a business venture as a labor of misguided love. After all, a collection of marginal hits from an obscure band is hardly going to break any sales records.

The foolhardy endeavor did make *some* business sense, however, as SAHB possessed enough cult appeal to sell records in European niche markets. (Hence, the deal with Taxim Records for distribution overseas.) Tiny pockets of American fans and record collectors might also find the record appealing. In addition, I truly believed that Harvey's songs, once stripped of the bizarre vocal delivery and coquettish musical arrangements, were hip enough to entice young listeners. Finally, a tribute to a more renowned act risked certain (and deadly) competition from large record companies.

The next step was finding bands to cover Harvey's songs. At this point, I acted as a casting director, matching SAHB tracks to local San Francisco artists with complementary styles. For example, Dave Crimmen's roots rock sound and Elvis haircut made him the perfect choice to perform "The Last of the Teenage Idols." Eventually, fourteen bands signed on for the tribute, including The Gone Jackals (who recently provided the soundtrack for LucasArts' new "Full Throttle" CD-ROM game), Coyote Pudding, The Beast, Liz Wyatt, Eva Jay Fortune, Ariel (with guest vocalist Val Martino), Johnny Staton, Patrick Maier, Vocal Underground, Trichotic, Erasergun, and Ascot Jacket.

The acts were instructed to arrange Harvey's songs as if they were their own, much as the Beatles clarified their individual style by covering Motown tunes. Bands were also asked to perform their basic tracks live in the studio, so the record would resound with the sweat and vigor of musicians playing together in one room. It didn't seem right honoring a 1970s concert band with tracks constructed piece-by-piece through overdubs and sequencing.

DEAL BACKGROUND

Most European record deals are not gold mines. However, foreign labels can provide ample funding to complete a project, as well as a chance to enjoy widespread distribution and (through sales royalties) long-term profit participation. The "long-term" profits are no joke. Unlike major pop music conglomerates, labels catering to niche markets don't treat projects as "flavors of the month." Records often remain in

Engineer Dian Langlois at Sound & Vision's Trident Model 65 console.

MUSIC SOFTWARE

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these label's catalogs for years, charting steady, albeit unspectacular, sales. The European market has already been a career lifesaver for psychedelic refugees (such as Big Brother and the Holding Company, Spirit, and Darby Slick) who can't get arrested in the U.S.

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THE SESSION BEGINS

A mutual friend, Ross Garnick of *Guitar Player,* recommended the Spanking Violets as a possible contributor to the SAHB project. I went to see them perform at San Francisco's trendy Bottom of the Hill club and was impressed by lead singer Katharine Chase's voice and the tight, aggressive sound of the band. They were in. After mulling over a couple of song choices, the Violets chose "Rock 'n' Rool" for their SAHB track.

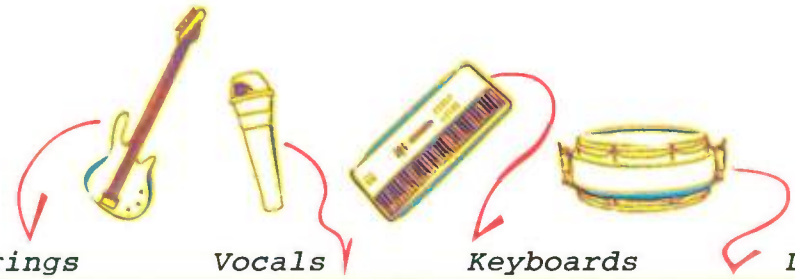
Although we had recorded *The Infinite Summer of Love* on a Tascam MS-16 one-inch, analog deck, we decided to use Alesis ADATs for *Vambo Rools.* One reason was to minimize tape costs—a significant expenditure when you've agreed to a small advance payment. *The Infinite Summer of Love* devoured six reels of Ampex 499 at a total cost of $360. The SAHB tribute required six Ampex 489 S-VHS cassettes for a penny-pinching outlay of $72. The ADATs also allowed easy compatibility between various studios, and the ability to make digital clones for safety copies.

On the night of the session, we scheduled Spanking Violets' drummer Kevin Allen at 6 pm, so he would have his kit set up by the time the rest of the band arrived at 7 pm.

6:00 PM

As Allen was assembling his kit, engineer Dian Langlois and I discussed miking strategies. We were tracking to digital, so we couldn't depend on analog tape coloration and compression to "fatten up" drum sounds. Because we had to ensure that the signals going to the ADATs were robust and punchy directly from the source sounds, we decided to record all the drums (except the snare) with condenser mics. It's a risky proposition subjecting $1,000 condensers to the possibility of a direct hit from an errant drumstick, but the warm, low-end resolution of these mics is well worth the hazard.

First, we tried an experiment and miked the kick drum with Peavey's new PVM T9000 tube condenser. (Hey, those sexy Neumann tube mics were



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PEAVEY

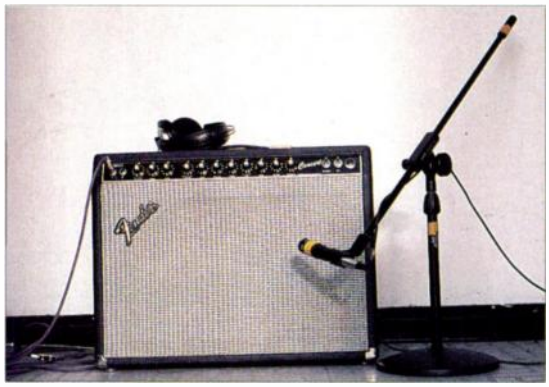
good enough for Ringo!) Allen leaves the front head on his kick, and although he was willing to remove it to facilitate mic placement, we liked the full sound the double heads produced. However, he did have a small, round hole cut into the head for stage miking. Langlois placed the T9000 approximately six inches from the hole, and tilted it slightly off-axis to avoid a rush of air from hitting the mic diaphragm head on. To further protect against signal overload and pops, we activated the mic's -10 dB pad.

Because we were going for an aggressive, raucous live sound, the trusty Shure SM57 dynamic mic was used on the snare. The mic was positioned an inch above the top snare head and approximately two inches over the rim. It was pointed slightly away from the hi-hat cymbals to minimize signal bleed from these sizzle monsters into the snare track. The bottom snare head was not miked, because we didn't feel the snare rattles captured by an undermiking position would deliver the macho swack needed to drive the band's cowpunk style.

The high rack tom was miked with an AKG C3000 condenser, the mid rack tom with a standard AKG C414, and the floor tom with the AKG C414/TL II "Vintage TL." All microphones were positioned approximately four inches above the top drum heads to capture a combination of attack, drum tone, and room ambience. In addition, every microphone had the -10 dB pad activated and the polar patterns were set to hypercardioid to minimize signal bleed and phasing.

On the drum overheads, a miking miscue produced a nice surprise. Typically, engineers use a matched set of condenser mics to capture an accurate stereo perspective. However, in our haste we inadvertently put an AKG C414 on the right (hi-hat side) and an Audio-Technica AT4033 on the left (ride cymbal side). Both mics were set to cardioid patterns with the -10 dB pads activated. When we listened to the overhead mics while Allen warmed up, the AT4033 captured a sharp ping from the ride, while the C414 reproduced a tight, bright sizzle from the hi-hat. I liked the definitive stereo spread that the two different mics produced, so I stuck with it. (Engineering Dudley Do-Rights are welcome to go, "tsk, tsk!")

We listened to all the mics individually (via the console's solo function) as Allen continued to bash away, and everything sounded pretty good. Langlois cut 700 Hz and boosted 4 kHz to get a little more snap from the kick drum (the low-frequency punch was killer), and boosted 7 kHz to get more crack from the snare. The equalization on the overhead microphones was cut at 100 Hz to diminish low-frequency rumble and that was it. All the other channels were left flat.



To capture a classic guitar roar, a Shure SM57 was positioned six inches off-axis from the speaker cone of a Fender Concert combo amp.

Miraculously, there were no hardware squeaks or ringing drum tones that required fixing—a laborious process that often adds hours to a drum miking session. The fact that Allen was so well prepared meant we could start setting up the other instruments after only a half hour. This meant that both drummer and engineer avoided getting burned out auditioning and tweaking sounds, which saved valuable mental (and physical) energy for the actual performance.

To maximize low-end response and warmth, condenser mics were used on every drum except the snare, which was miked with a Shure SM57 dynamic.

6:30 PM

Thankfully, the rest of the Spanking Violets arrived early, so we didn't lose any momentum afforded by Allen's swift drum set up. The band wanted to play together in the same room—which certainly enhanced the album's "live" concept—but I didn't want a mishmash of signals bleeding into the drum mics.

Isolating Cynthia Smith's bass was easy; Langlois simply took a direct line from her instrument into a Countryman direct box and routed the signal direct to tape. Smith played with a guitar pick, and, to enhance the wonderful midrange growl, the bass signal was squashed with a dbx 166 compressor at a 2:1 ratio with a threshold setting of -10 dB. We played with the EQ for a bit, attempting to improve the timbre, but realized the flat sound was just too good and left well enough alone.

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This Way You Can.

The two guitar amps used by vocalist/rhythm guitarist Chase and lead guitarist Ricc Sandoval posed a potential leakage problem. Sandoval said he didn't need to stand next to his amp—he was comfortable monitoring solely through headphones—so we moved his Fender Concert out into the studio hallway. Once again, the Spanking Violets' professionalism made sound sculpting ridiculously simple. The tone blasting straight out of Sandoval's amp was rough, ready, and perfect. There was no obnoxious hum, annoying buzz, or butchered frequency response. Langlois simply placed a Shure SM57 approximately six inches from the speaker cone, and slightly off-axis. This position captured just enough room ambience to animate the guitar tone, while maintaining Sandoval's stark, dusty timbre.

Chase, however, was more comfortable standing next to her Roland Jazz Chorus amp. This meant the amp would be in the main studio, spewing sound all over the drums. To minimize leakage, we moved two baffles in front of the amp to prevent direct signal bleed into the drum mics. Isolation wasn't ideal, but the signal bleed wasn't tragic. When we soloed the drum overheads and toms, we heard just a slight jangle from Chase's amp. (Luckily, she played a semiacoustic guitar that produced a clean tone and didn't crank up her volume.) As with Sandoval's amp, a Shure SM57 positioned slightly off-axis to the speaker cone produced the best sound.

An important thing to remember here is that a key factor of making good records is keeping the artists comfortable. Their performance is what makes a record special, *not* EQ tweaks or pristine sonics. In Chase's case, I'd gladly welcome a few guitar "ghosts" into the overhead drum tracks if having the amp in the room helped her deliver a passionate performance. After all, everything gets mixed down to two tracks anyway, and many classic recordings have enough signal bleed to turn your speakers crimson. Heck, Phil Spector elevated leakage to an art form!

However, I *was* relieved that the Spanking Violets were so well rehearsed that they didn't need a scratch vocal for arrangement cues. Chase's vocal style is pretty aggressive, and I didn't relish having her guitar *and* voice leaking into the drum mics. Vocal bleed can be annoying, because it's often audible behind the final lead vocal track. Ghost voices can produce a slapback effect that's nearly impossible to hide, and, in a worse-case scenario, the scratch vocal may contain incorrect lyrics that clash with the actual performance. (If you want to know how this sounds, listen critically to some Doors songs—Jim Morrison was often too drunk to care about singing the same words when doubling his vocal tracks.)

7:30 PM

After the microphones were positioned, we had the band run through the song to set accurate recording levels. It seems that whenever the "Record" light goes on, musicians play substantially louder than when they're giving you preliminary sound levels. Of course, we recorded everything—even the tests—just in case an incendiary performance occurred unexpectedly. ADAT tape is cheap, so don't be afraid to record each and every time the musicians make a sound.

During the run-throughs, we decided to tweak a few things. I wanted the guitars to sound more aggressive, so Langlois compressed them at a 2:1 ratio with a -5 dB threshold using the Symetrix 425. The processor was split into its dual function, giving each guitar dedicated compression controls. We left Chase's guitar flat, but Sandoval's tone lost a hint of brightness. To compensate, we boosted 7.5 kHz by approximately 4 dB, then decided to add a little more shimmer by boosting 10 kHz about 2 dB.

Before we began actual tracking, we had the band relax while we listened to some of the run-throughs. We auditioned the tracks at several different volume levels to critically check for overall clarity and tonal integrity. Even at extremely low volumes, everything sounded transparent and punchy. Louder monitoring levels were blissful; the kick rumbled like a Panzer, the snare cracked like thunder, and the toms sounded like cannons. Of course, the guitars and bass sounded wonderful, too. It was time to track.

8:00 PM

As I've said before, every aspect of the session was made easier by the Spanking Violets being so professional and well rehearsed. But I still wasn't prepared for how fast we got the take. Langlois pushed Record twice, and we were done. I mean it. Two takes and we had a basic track.

The band unleashed an energetic, rowdy performance that perfectly captured the whimsical intensity of The Sensational Alex Harvey Band. Although Allen opted not to use a click track, the tempo was absolutely locked down. Smith's bass line was freeze-dried to Allen's kick, making for a killer groove thing, and the guitars slashed and burned. There was nothing more I could ask for.

8:20 PM

Sandoval played all his solos and rhythm parts live, but he wanted to add a few more riffs at the song's conclusion to energize the final chorus. For this track, Langlois moved the SM57 back a foot or two to capture some more room tone. The adjustment produced a brighter, more open timbre than the main guitar track, which seemed appropriate for a rip-roaring solo at the final fade out. Sandoval nailed the solo in one take. It took longer to adjust the mic than it did to record the track.

8:45 PM

I rarely record final lead vocals at basic tracks sessions, but I wasn't complaining. The freshness and immediacy of

TRACK SHEET

1	kick
2	snare
3	rack tom 1
4	rack tom 2
5	floor tom
6	left drum overhead
7	right drum overhead
8	outro guitar solo
9	Chase's rhythm guitar
10	Sandoval's guitar
11	lead vocal
12	doubled lead vocal (bridge)
13	mob vocals, left (chorus)
14	mob vocals, center (chorus)
15	mob vocals, right (chorus)
16	bass

"Rock 'n' Rool" was certainly enhanced by the speed at which the Violets blazed through their parts. To really blow the track through the roof, however, Chase's vocal performance would have to be just as energetic and uninhibited as the rhythm section. So it didn't seem like a good idea to put up a windscreen and instruct Chase to keep her lips six inches from the microphone. While this approach yields a consistent recording level and vocal timbre, it was obvious that Chase's dynamic personality shouldn't be shackled by rules and regulations. In other words, she needed room to move.

We put Chase in our vocal booth, placed an AKG C414 approximately two feet in front of her, and raised it slightly above her head. (I selected the C414 because it's sensitive enough to capture a robust and extremely present vocal timbre, even when placed a few feet from the singer.) The polar pattern was set to cardioid and the diaphragm was angled towards her mouth. We asked Chase to forget about the mic and just sing. She could turn her head, mouth, and body any way the feeling moved her. Amazingly, her voice sounded full and present, even though the mic was effectively hanging in the air. The subtle timbral changes that occurred when she turned off-axis to the mic only served to enhance her performance dynamics and phrasing.

After a few EQ experiments during level tests, we decided to record the vocal flat. We compressed the track with the dbx 166 at a 2:1 ratio and a threshold of -5 dB. To diminish sibilance, we inserted dbx's 253 de-esser into the input module with the target frequency set to 8 kHz, the processing type to "broad band," and the processing level slider at its midpoint.

9:15 PM

Once again, we didn't earn our money on the tracking phase. Chase delivered a wonderfully schizophrenic vocal in one take. (Yes, that's *one* take.) Her voice leaped from demonic to macho to baby doll-like, acting out each nuance of Harvey's stream-of-consciousness lyrics. It was an unexpected reading, but brilliantly conceived and perfect for the song.

Chase listened to the playback and asked if she could sing the second verse again. Of course, she nailed it in a single take and improved upon the original reading. She also tried doubling her lead vocal, but the unison part interfered with the divine phrasing and timbre of the original performance. We opted not to erase the track, however, because the doubled vocal added a silky, sensual quality to the song's bridge.

10:00 PM

Now that the serious work was over, it was time for some fun. The final chorus of "Rock 'n' Rool" is a drunken mantra of "We're gonna rock, we're gonna rock, we're gonna rule," that cries out for completely over-the-top, mob vocals. The entire band, including engineer Langlois, was stuffed into the vocal booth and a single C414 microphone was positioned five feet above their heads.

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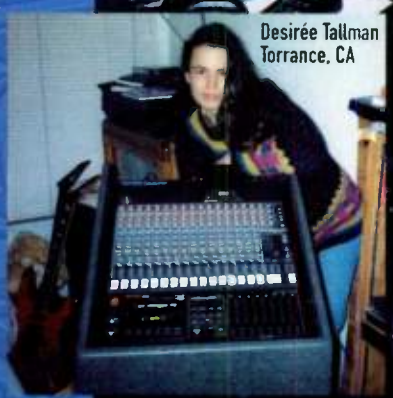
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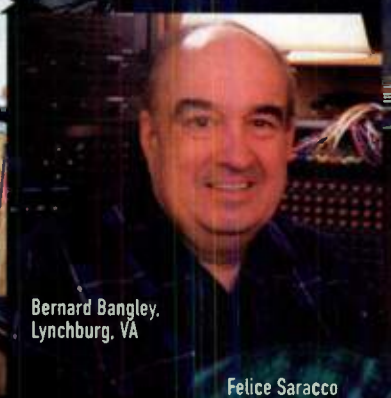
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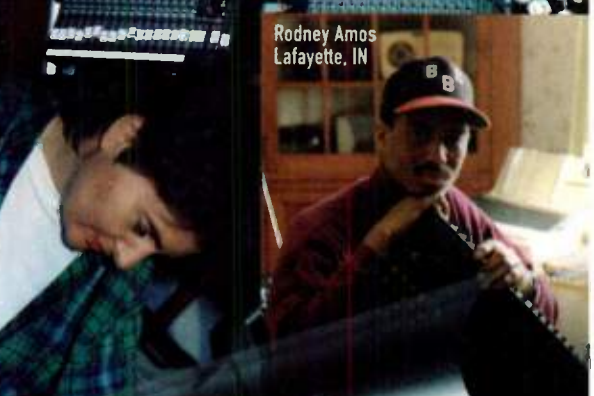
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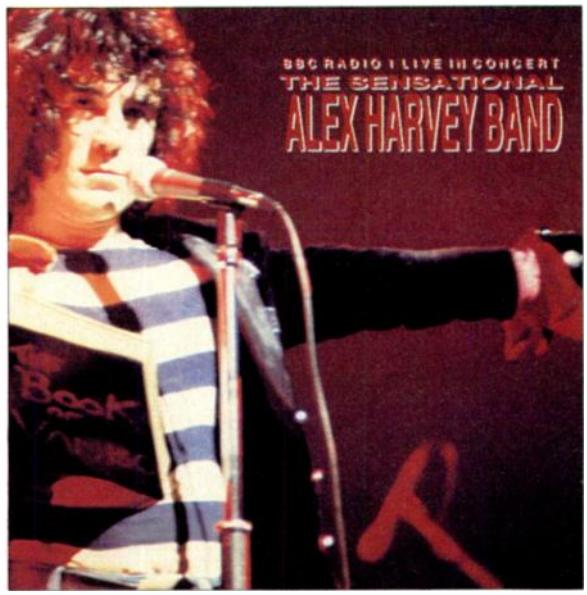
For the first pass, I set the polar pattern to omnidirectional and had the five singers encircle the microphone. The signal was compressed through the dbx 166 at a fairly conventional setting of a 2:1 ratio and a -10 dB threshold. The chorus chant was completed in one perfect, sloppy take. Then, I had the singers change positions, increased the compression to a hefty 4:1 ratio, and double-tracked the chant. But I wasn't finished yet. Next, I switched the microphone's polar pattern to a figure-8, increased the compression ratio to a brutal 10:1 (with a -20 dB threshold), and *triple-tracked* the mob. When the three unison vocal tracks were combined—one panned left, one panned right, and one center—the chant exploded with the brash roar of a stadium cheer. It was the perfect effect for the song's finale.

10:10 PM

Recording the three background vocal tracks took just ten minutes. After that, we listened to the song from start to finish and agreed that nothing else was needed. Any additional overdubs or sweetening parts would be superfluous. (Here's another tip about making records: Know when to quit!) A little more than four hours after opening the studio door, "Rock 'n' Rool" was in the can. My wife couldn't believe I was home in time to watch *Lovejoy* with her! (She's usually hours into her dreams when I finally stumble home.)

But speed has its benefits when the band is good enough to slam down some ripping tracks. I still feel the excitement and energy of the session every time I listen to "Rock 'n' Rool."



The man himself: The late, great "sensational" Alex Harvey.

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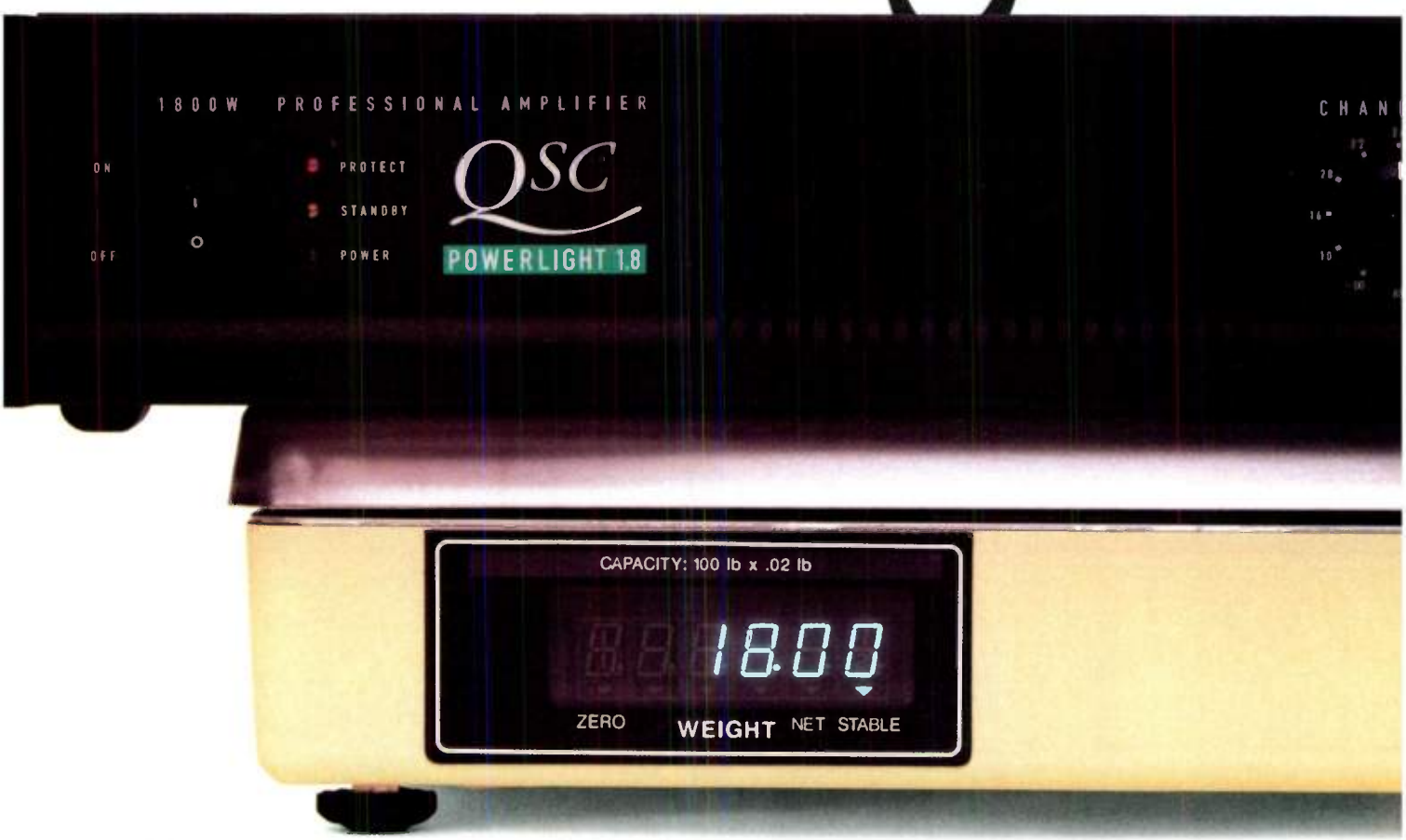

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Three models are available. PowerLight™ 1.0, 1.4 and 1.8—1000 watts, 1400 watts and 1800 watts respectively (at 2 ohms, both channels driven). Each amp weighs in at only 18 lbs.

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2 OHM*	500 Watts	700 Watts	900 Watts
4 OHM**	300 Watts	500 Watts	700 Watts

*1 kHz, 1% THD, TYPICAL. **20 Hz to 20 kHz, 0.1% THD

Each amp is covered by QSC's 3 Year Warranty** and highly efficient service department.

We always believed that the promise of switching technology should be more than lost weight. So we made high performance a mandate. Groundbreaking amplifiers are the result. High quality sound. High reliability. Very low weight.

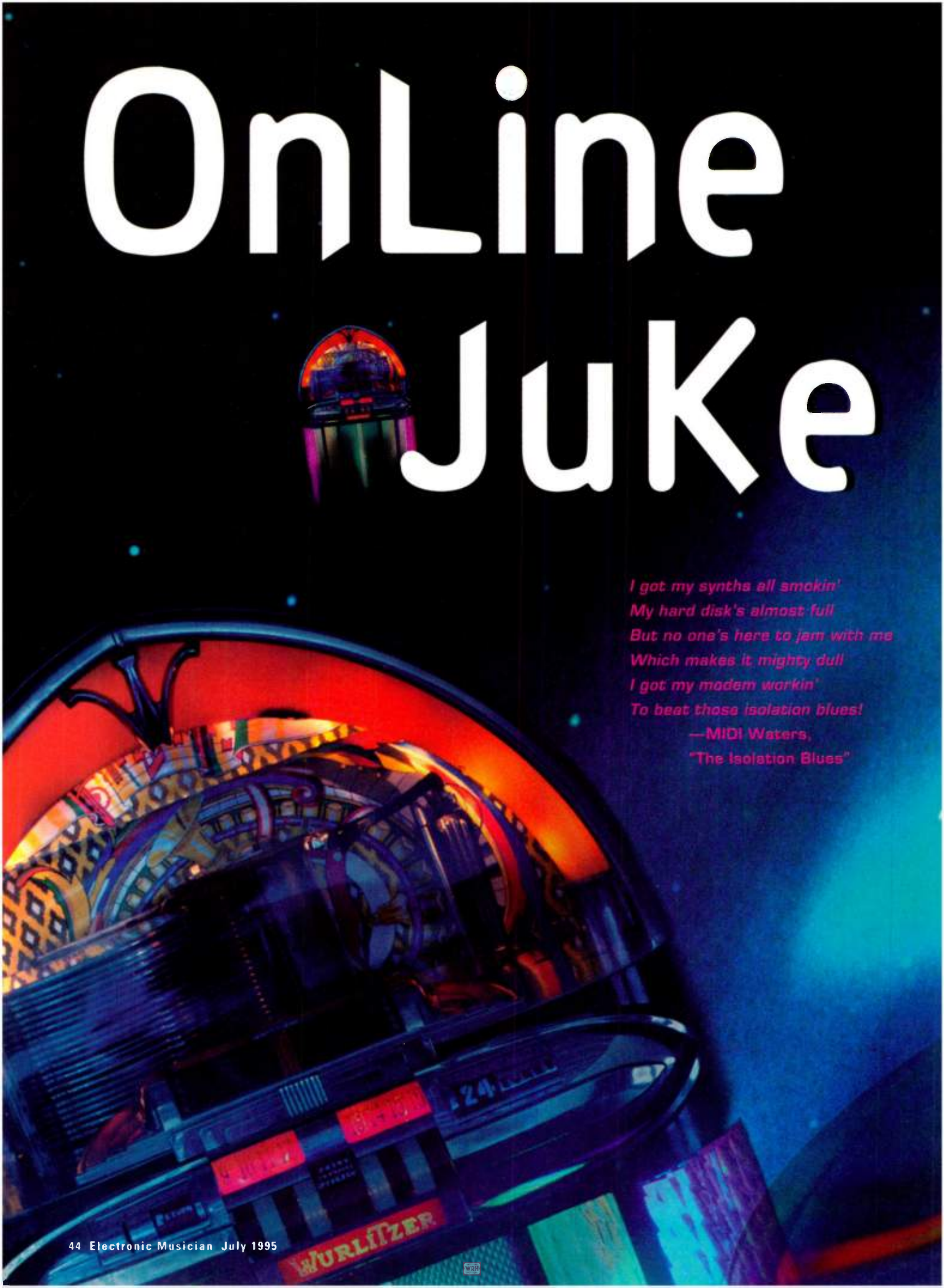
If you've been waiting for a light amp without compromise, see the PowerLight Series at your QSC Dealer, or call 714-754-6175 for a free brochure.

Your wait will be rewarded.

QSC® AUDIO

*The high performance of PowerLight Amplifiers is due to QSC's PowerWave Switching Technology™. **A total of 6 years coverage is available for PowerLight Amplifiers with QSC's exclusive 3 Year Extended Warranty. PowerWave Switching Technology is a trademark and QSC is a registered trademark of QSC Audio Products, Inc. 1675 MacArthur Blvd., Costa Mesa, CA 92626 USA 714-754-6175 Fax 714-754-6174.

OnLine JuKe



I got my synths all smokin'
My hard disk's almost full
But no one's here to jam with me
Which makes it mighty dull
I got my modem workin'
To beat those isolation blues!

—MIDI Waters,
"The Isolation Blues"

Subscribing to a commercial online service cures those ol' isolation blues.

JoinTs

Electronic musicians enjoy unprecedented musical freedom. We can compose and record entire albums and soundtracks without any help from other human beings. However, this freedom comes at a hefty price: Working in isolation can hinder creativity and seriously distort our musical perception. Interacting with other musicians is vital to the creative process; it tends to expand our consciousness and lead to new ideas that would otherwise remain undiscovered.

Fortunately, many electronic musicians own a computer, which provides a great way to beat the isolation blues. Simply add a modem to your rig and join one of the many online services where other musicians hang out. These services offer a wealth of information and resources, both musical and otherwise. But most importantly, they offer the opportunity to interact with other musicians who share your musical tastes and penchant for technology.

To help you decide which online service is best suited to your needs, we offer this comprehensive guide. Most of the services listed here are national in scope, with local-access phone numbers in most areas of the country. However, a few of the listings are actually sophisticated bulletin-board systems (BBSs), which typically offer dialup phone numbers that are local to the service, not the

By Scott Wilkinson

Photo/Digital Imaging by David Bishop

Online Juke Joints

user. For example, the Open Music Network is located in the San Francisco Bay Area, and its dialup number is in the 415 area code.

In most cases, user-local access numbers are provided by one or another dialup network, such as Sprintnet, Telenet, and/ or Tymnet. (Telenet should not be confused with telnet, which lets you access various systems on the Internet.) Contact the online services for more info on how to access their system using these networks. Some services have established their own dialup network and/or points of presence (POPs) at various locations around the country, and a few offer an 800 dialup number. This entry also indicates the maximum baud rate you can use to access the systems.

Each online service charges something for using its system. In all cases, this includes a monthly fee, which entitles you to a certain number of hours during the month. Additional hours are billed separately. Many services offer a free trial period, which lets you get acquainted with their offerings.

Perhaps the most important information is the list of music-related areas offered by each service. Many manufacturers, record labels, and magazines also maintain a presence on one or another online service.

Most services offer the opportunity to engage in "conversations" or "chats," in which several people type messages at each other in real time. Many chats are held on a regular weekly or monthly schedule, and some include celebrity guests.

Virtually all online services offer various files for downloading. Of particular interest to musicians are synth patches, samples, digital-audio files, sequences, music-related applications and utilities, product information and reviews, and pertinent articles. The types of musical download files offered by each service are listed in the table.

The national services all provide access to the Internet, which lets musicians explore the vast resources available there. Some services provide text-based access, while others offer graphic, icon-based access. In addition, they offer various Internet resources. (See "Cruising the Internet" in the April 1994 **EM** and "Magical Mystery Tours" in the October 1994 issue for more on the Internet.)

AMERICA ONLINE

You've probably seen or received at least one copy of America Online's free front-end software for Macintosh or *Windows*. (I've received at least ten copies via snail mail or packaged with various magazines!) This software lets you join AOL and try it out for ten hours free of charge. Apparently, flooding the market with these disks works; AOL's membership now exceeds two million.

After starting operation in 1985, AOL has formed strategic alliances with companies such as IBM, Apple, NBC, Time-Warner, the *New York Times*, and CNN to bring a wide variety of information to their members. Major areas include news, entertainment, personal finance, travel services, shopping, computing, newsstand (online magazines and newspapers), education, reference desk, kids services, and sports. In addition, there are many SIGs and real-time chat "rooms."

EM maintains a strong presence on AOL. To reach us, use Taxi to go to the Musicians' Message Center, where we feature two conferences: Electronic Musician and Mike Molenda's Production Notes. We can also be found in the Composers' Coffeehouse. Navigate to Composers' Messaging, then to Songwriting and the Business, and finally to Producers' Forum, which is moderated by our editor, Michael Molenda. If you want to send us e-mail, address it to **emeditor** (or **emeditor@aol.com** from elsewhere on the Internet).

COMPUSERVE

CompuServe Information Services (CIS) started offering excess processing time and storage on a business mainframe to personal-computer users way back in 1979. Since then, its ranks have swelled to over three million members. Like AOL, CompuServe offers free graphic front-end software for Macintosh, DOS, *Windows*, and OS/2 (although they are not as aggressive as AOL in their distribution; I've received only one copy of the software via snail mail). Unlike most online services, CompuServe members must use a series of five numbers followed by a series of three or four numbers as a user name, which makes it more difficult to remember.

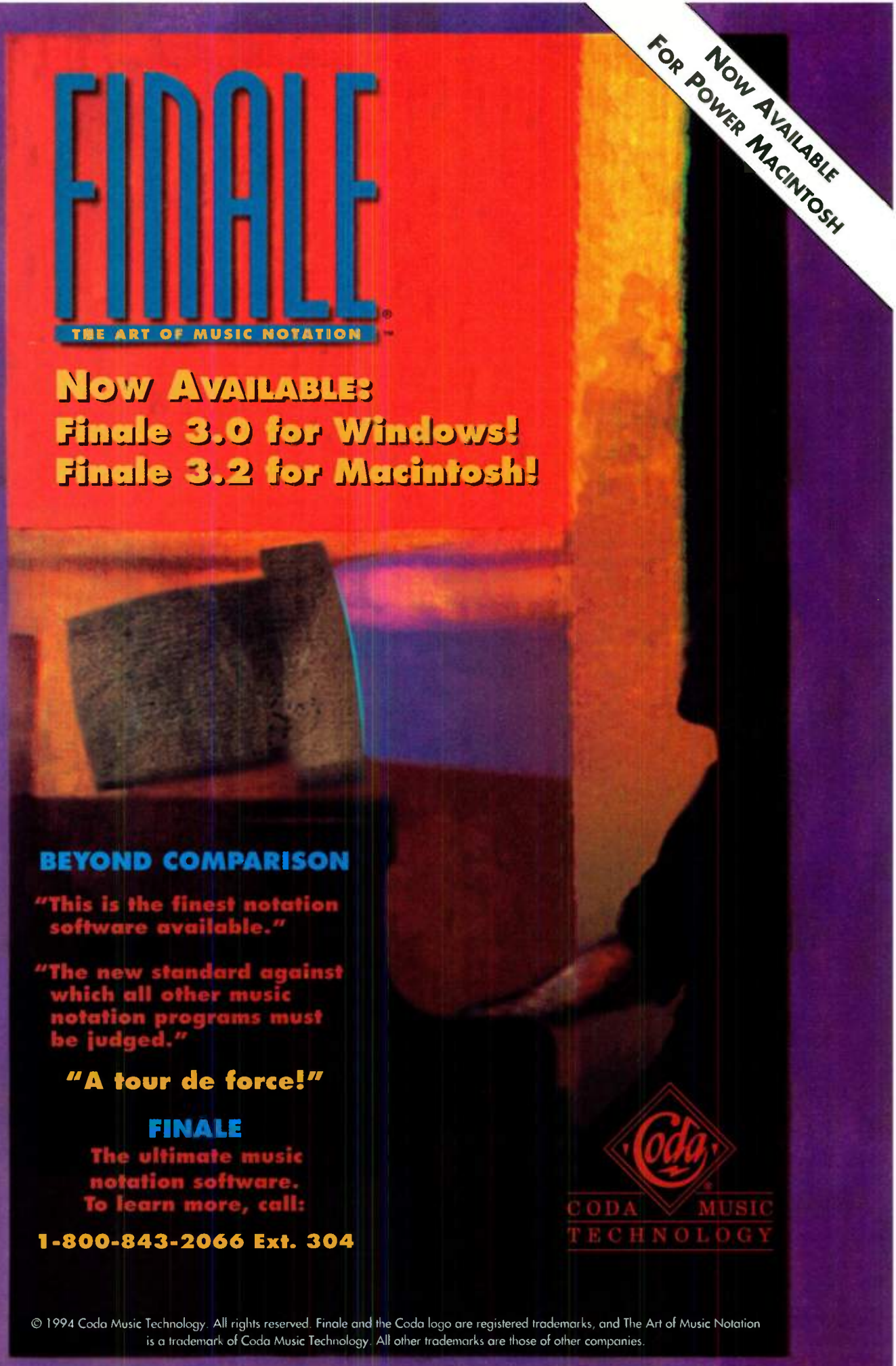
CompuServe's front-end software provides graphic access to the entire service, such as the Music Industry Forum.

As one of the oldest and largest national online services, CompuServe offers a wealth of information, including news, weather, sports, travel services, shopping, money matters and markets, entertainment and games, hobbies, health, family issues, and a huge reference section with over 850 databases. Of course, there are also many SIGs and real-time chat areas. In addition, CompuServe offers both text-based and graphic access to the Internet.

DELPHI INTERNET

Delphi Internet began its life as General Videotex Corp. in 1981. It is a

The Music Universe is eWorld's gateway to its many music resources.



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Online Juke Joints

member of the News Corporation family, which also includes 20th Century Fox Films, fX Cable Network, Fox Broadcasting Company, HarperCollins, *TV Guide*, British Sky Broadcasting, and Star Television. Major topic areas include news, weather, sports, travel, education, entertainment (including real-time, multiplayer games), computer support, and financial information, as well as many SIGs and chat areas. Delphi offers complete text-based access to the Internet as well.

Later this year, Delphi Internet intends to introduce a new, graphic user interface and greatly expanded content. The new, "third-generation" interface is based on a totally open, standards-based platform, and it will provide audio and video as well as hyperlinking capabilities and graphic Internet access. The entire service will look just like a Web site.

EWORLD

As the new kid on the national online block, eWorld was started by Apple Computer in 1994 and has already grown to include 80,000 members. Major topic areas include Arts and Leisure, Learning Center, Computer Center, Business and Finance, Marketplace, Community Center, and Newsstand. Each of these areas includes many SIGs and chat rooms. In addition, eWorld offers full graphic access to the Internet.

The *PAN Messenger* front-end software automates all activities on the service.

As you might expect, the majority of eWorld's musical information is found in the Music Universe, which is found in the Arts and Leisure area. In the upcoming months, eWorld plans to expand the Music Universe in several ways. The Gear Up section currently offers multimedia toolkits, graphics, and videos in addition to sounds, sequences, and drum loops. A new Music Expo section will feature product information and support for equipment and software directly from manufacturers. By this summer, live chats will include regular meetings for specific types of musicians (guitarists, drummers, etc.) and anyone interested in specific types of music (blues, rock, etc.).

EM also maintains a presence on

Multi-Port MIDI Support

professional MIDI interface for all IBM compatibles

Maximum MIDI
- 8 x 8 MIDI interface, 128 channels in & out
- True non-multiplexed multi-port operation
- Printer port connection allows use with desktop *and* notebook PCs

Superior SMPTE
- Bullet-proof operation
- Syncs to / generates all SMPTE formats
- Adjustable freewheel
- Automatic regeneration
- Selectable output level

Patchbay Power
- Standalone patchbay operation without PC
- Powerful matrix-based port routing & filtering
- Push-button program selection, SMPTE-MTC sync & generation

Windows Aware
- Works with all Windows MME MIDI applications
- Control applet simplifies setup and programming
- Multi-client driver allows concurrent access by multiple programs

MIDIENGINE 8Port/SE™

Music Quest™

call toll-free, USA/Canada: 1-800-876-1376

1700 Alma Drive Suite 330 Plano, TX 75075 USA Phone: 214 881-7408 Fax: 214 422-7094

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THE BIG PICTURE

The world's best studio monitors are like a picture window. If they perform with accuracy and transparency, you'll not only hear the mix, you'll see it. The new **Alesis Monitor Two™ Studio Reference Monitors** do just that.

Their sonic character was modeled after our TEC Award-winning Monitor One™, so you can mix on either speaker, in any size room, and get the same results. The difference? The Monitor Twos create a larger sound field, the sweet spot is bigger, bass response is deeper, and power handling is greater.

MONITOR TWO™
STUDIO REFERENCE MONITOR

Our design team's 35 years of experience has produced a remarkable crossover design with super-low phase and amplitude distortion. This unique asymmetrical network combines 2nd and 3rd order filters with crossover points at 1.5kHz and 5kHz. And to top it off, a new silk-dome tweeter delivers sweet, natural sound without the harshness that produces ear fatigue. So you can do marathon mixes and still make decisions that translate.

Monitor Twos are perfect for near to mid field monitoring in project studios, mixing suites, and even large control rooms. Or put them in your personal studio to make it sound virtually cinematic. Their combination of civilized size and serious muscle is due to our exclusive SuperPort™ bass venting technology that delivers accurate low end transients equal to much larger, more expensive systems. In fact, the Monitor Twos cost less than some near field monitors. Which makes the case for owning them, sort of...full bandwidth.

Award winning design team, 40Hz - 18kHz frequency response, 200 watt peak power, mirror-image sets, fun to touch non-slip rubber laminate on the cabinet, and a lot more. For mixes you can see. The Monitor Two is at your Alesis dealer now.

For more information about the Monitor Two, see your Authorized Alesis Dealer or call 1-800-5-ALESIS.
Monitor Two, Monitor One and SuperPort are trademarks of Alesis Corporation. TEC Awards are presented by the Mix Foundation for Excellence in Audio.

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ALESIS
STUDIO ELECTRONICS

Sonic Boom

"(Sound Forge) consistently performed in a rock-solid, glitch-free manner."
- Jim Aikin, Keyboard, May 1995

"Sound Forge succeeds in making itself the first truly complete professional sound editing system for Windows."
- Macromedia User Journal, March 1995

"This is what great software is all about."
- Electronic Musician, May 1995

Sound Forge Blasts the 16 Bit Barrier

Introducing Sound Forge for 32 Bit Windows™ – digital sound editing for Windows, Windows NT™, and Windows® 95 operating systems. Now all the features users have valued in Sound Forge are also available in a powerful new 32 Bit Windows version. Sound Forge for 32 Bit Windows is a full-featured sound editor intended for power hungry musicians, sound designers and multimedia developers seeking the performance benefits provided by high end 32 Bit Windows operating systems. This true 32 Bit flat model version of Sound Forge provides increased performance along with all the features available in the 16 Bit version. Both versions are unrivaled in power, making Sound Forge the most comprehensive digital sound editor for Windows.

"Sound Forge is a cool and full-featured program that's definitely a useful addition to any digi-head's toolbox"
- EQ, April 1995

"Sound Forge is so well written, so well documented, so powerful...it nearly brought tears to my eyes!"
- Seth Ritter, The Computer Program

For more information call Sonic Foundry at 1 800 57 SONIC (577 6642)

S O N I C F O U N D R Y

100 South Baldwin, Suite 204, Madison, WI 53703, Tel: (608) 256 3133 Fax: (608) 256 7300, CompuServe: 74774,1340 or GO SONIC, Internet:sales@sfoundry.com

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Online Juke Joints

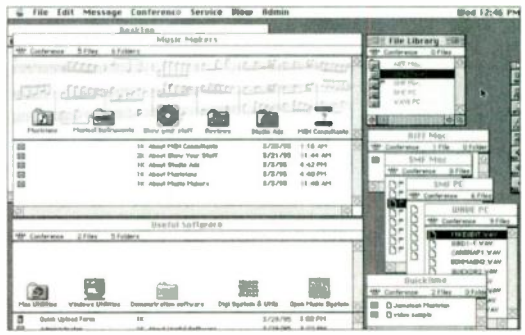
eWorld. To find us, navigate to the Music Universe, then to Gear Up, and finally to Electronic Musician.

GENIE

GEnie started in 1985 as an offshoot of GE Information Services. There are over 150 "RoundTables" that address a wide variety of interests. Each RoundTable includes a bulletin board, real-time conference, and software library. Major topic areas include news, sports, computing, hobbies and leisure, professional issues, games, small business, and research databases.

Both music-related RoundTables offer a complete ASCII magazine called *Hi-Tech Home*. The Music RoundTable is currently working on a complete overview of Frank Zappa's albums on the Rykodisc reissue program.

Recent developments include a graphic user interface (GUI) and a streamlined pricing structure, in which the prime-time surcharge has been reduced by 75% to $2/hour. In addition, GEnie now offers full text-based Internet access with special Internet "launch pads" and an Internet Education Center for newbies.



The Open Music Network offers lots of useful information and software for musicians.

OPEN MUSIC NETWORK

The Open Music Network (OMN) is actually a BBS, rather than a full-blown national online service. However, it's an important resource for electronic musicians all over the country. Started in 1994 with funding from Opcode, it became fully operational in the second quarter of 1995. It now includes 500 subscribers, and its content is entirely music-related. OMN uses SoftArc *FirstClass* software, which provides a GUI for those who have their front-end client software.

As of this writing, OMN offers eight dialup phone lines in the 415 area code (San Francisco Bay Area). By the time you read this, however, OMN should also have TCP/IP access, which will allow access from elsewhere on the Internet. It will also offer an ftp site (**ftp ftp/pub/omn**), from which you can download OMN's client software, and a Web site (**http://www.omn.com**).

PAN

The PAN Network is the only national online service devoted exclusively to music-related topics. Started in 1981, PAN has 3,000 members in over 40 countries and thousands of downloadable music files and programs. Currently, the user interface is of the text-based, command-line type. Full text-based Internet access is available now, and graphic access should be ready by this summer.

Like other online services, PAN offers free front-end software for Macintosh, DOS, and *Windows*. However, it also offers some unique services. For example, FaxScan broadcasts nightly faxes of new postings to members of particular forums. If you subscribe to PANScan, you receive a floppy disk via snail mail every month with all newly posted messages on all nonprivate forums during the previous month; this is great for busy professionals who don't have time to log on regularly. Thanks to the PANuities plan, members who upload files receive $1 off their monthly bill each time the file is downloaded. This discount accrues each month.

Of course, **EM** maintains a presence on PAN; you can find us in the Sigs and Usergroups area (which is also known as Synth/PAN Alley). You can send us e-mail at **emeditorial** (or **emeditorial@pan.com** from elsewhere on the Internet). In addition, **EM** readers can join PAN without the normal $250 signup fee (see sidebar, "PAN Signup").

PAN SIGNUP

EM readers are a special breed. For one thing, you can join The PAN Network without paying the normal $250 signup fee. PAN can be accessed with a local call from over 900 cities and 75 foreign countries via Telenet, Tymnet, or Internet. Here's how:

1) Dial your local Telenet or Tymnet access number. If you don't know the number, call Telenet at (800) 877-5045 or Tymnet at (800) 336-0149. You can also use the direct dialup number at (617) 576-0862. If you are in Europe, obtain an NUI from your country's PTT office.

2) Depending on your method of access, do the following once you have connected:
Direct: <CR><CR>
Internet: telnet pan.com
Telenet: <CR><CR><CR>
At the "@" prompt, type "C PAN"
(If you dial in at 2400 baud, type "@D" when you first connect)
Tymnet: "O" (without the quotes)
At the "Please Login:" prompt, type "PAN"
Overseas: PAN's International Host ID number is 311061703093. If that number doesn't work, the backup number is 310661703088. In some countries, this number may be preceded or followed by a zero. Please consult your local PTT office for details.

3) At the "Username:" prompt, type "PANJOIN"

4) At the "Password:" prompt, type "EMSIG"

You will then be welcomed to PAN's Online Signup area and prompted for billing information required to set up your PAN account. During the signup process, you will be asked to specify a username and you will be given a temporary password, which you can change at any time. If you have any questions, please contact PAN at (610) 584-0300; fax (610) 584-1038.

Online Services

Service	Access	Cost	Music Areas	Manufacturer Areas
America Online (AOL) Tel.: (800) 827-6364	Sprintnet AOL Network in beta testing 800 dialup in near future Max. baud rate = 28.8K	10 hr free trial $9.95/mo for 5 hrs; $2.95/hr thereafter No charge for e-mail, downloads, storage	RockLink Music Message Center Grateful Dead Woodstock MTV Sound, Studio, & Stage Taxi (A&R) Mac Music & Sound PC Music & Sound Composers Coffeehouse Creative Musicians Coalition Music Programmers Industry Connection Software Libraries	Advanced Gravis Articulate Systems Coda Digital Eclipse Dynaware Electronic Courseware IBVA JLCooper Kurzweil Macromedia Opcode Passport True Image Audio
CompuServe Information Services (CIS) Tel.: (614) 457-8600 Fax: (614) 457-0348 E-mail: 70006,101@compuserve.com Telnet address: compuserve.com World Wide Web URL: http://www.compuserve.com	Datapac Sprintnet Tymnet 800 dialup available for $6/hr Max. baud rate = 14.4K (28.8K by 4/30/96)	$9.95/mo for unlimited access to basic services plus 3 hrs of Internet access $4.80/hr for extended services (inc. music forums) $2.50/hr for Internet services (after 3 free hrs) Internet Club ($24.95/mo for basic services plus 20 hrs of Internet access; $1.95/hr thereafter)	All Music Guide (AMG) AMG Forum Music Industry Recording Industry RockNet Music/Arts MIDI/Music Sight and Sound Electronic Mall	Music Vendor Forums offer support from many manufacturers
Delphi Internet Tel.: (800) 695-4005 Fax: (617) 491-6692 E-mail: info@delphi.com Telnet address: delphi.com World Wide Web URL: http://www.delphi.com	Sprintnet Telenet Tymnet Max. baud rate = 14.4K	10/4 Plan ($10/mo for 4 hrs; $4/hr thereafter) 20/20 Plan ($20/mo for 20 hrs; $1.80/hr thereafter; $19 signup fee) $9/hr surcharge from 6 am to 6 pm Mon.-Fri. No charge for e-mail, downloads, storage	Alternative Music Singing Bible Music Fandom Music & Audio Big Beat Disc Jockey Eclectic Music City Various Artists	n/a

Record Label/ Media Areas	Regular Real-Time Chats	Download Files	Internet Access	Internet Resources
Warner Reprise *Spin* *Electronic Musician*	Many SIGs include real-time chat areas, e.g., Cyber-Talk in Warner Reprise Online (Mon. evenings) See individual SIGs for schedule The Nightclub offers real-time conferences and chat rooms Center Stage includes four chat rooms, each with a capacity of 5,000	Synth patches Samples Digital Audio Sequences Music apps/utils Product info & reviews Articles	Graphic	e-mail listserv usenet ftp telnet wais gopher WWW (proprietary browser)
Recording Industry Forum includes info from many record labels	No regular chats Recent chats have included appearances by Lou Reed, Thomas Dolby, Kenny Loggins, Motley Crue, Melissa Etheridge, Aerosmith, Pat Metheny	Synth patches Samples Digital Audio Sequences Music apps/utils Product info & reviews Articles	Text-based Graphic	e-mail listserv usenet ftp telnet WWW (Mosaic available for *Windows*; Mac version soon; any browser will work)
Rykodisc Hannibal Gramavision	Moody Blues (Sun. 10 pm ET) JazzTalk (Mon. 10 pm ET) Beatles (Tues. 10 pm ET) Alt/Grunge/Indie (Wed. 10 pm ET) Name That Tune (Thur. 10 pm ET) Fri. Nite Party (Fri. 10 pm ET) Music Trivia (Sat. 10 pm ET)	Synth patches Samples Digital audio Sequences Music apps/utils Product info (all available in Music City forum)	Text-based	e-mail listserv usenet irc ftp telnet wais gopher WWW (proprietary text-based browser)

ONLINE SERVICES

Service	Access	Cost	Music Areas	Manufacturer Areas
eWorld Tel.: (800) 775-4556 E-mail: askeac@eworld.com World Wide Web URL: http://www.eworld.com	British Telecom/MCI Sprintnet 800 dialup for 1st time sign-on Max. baud rate = 14.4K	10 hr free trial $8.95/mo for 4 hrs; $2.95/hr thereafter No charge for e-mail, downloads, storage	Music Universe Everyone's a Critic Backstage Pass Gear Up Patch Bay Much Music Ask the Musical Doctor Morph's Outpost	Upcoming Music Expo area of Music Universe will include hardware and software vendor info by Summer 1995
GEnie Tel.: (800) 638-9636 E-mail: feedback@genie.com World Wide Web URL: http://www.genie.com	Telenet Tymnet Sprintnet ($2/hr surcharge) 800 dialup available for $6/hr Hundreds of POPs Max. baud rate = 9600	$8.95/mo for 4 hrs; $3/hr thereafter plus $2/hr prime-time surcharge (8 am to 6 pm Mon.-Fri. user-local time) Access to some online areas incurs additional charges No charge for e-mail, downloads, storage	Music MIDI & Computer Capsule Reviews	Peavey PG Music MOTU KAT Dr. T's Ensoniq EMAGIC Binary Sounds
Open Music Network (OMN) Tel.: (415) 812-3277 Fax: (415) 856-3332 E-mail: paul_buelow@opcode.com World Wide Web URL: http://www.omn.com	(415) 856-0155 8 dialup lines TCP/IP Max. baud rate = 28.8K	3-month free trial membership (some access may be limited) $9.95/mo for 6 hrs; $2.50/hr thereafter	Musicians Needed/Avail Studio Ads Musical Instruments Show Your Stuff CD & Tape Reviews Consultants Various MIDI product user groups	Digidesign Opcode
The PAN Network Tel.: (610) 584-0300 Fax: (610) 584-1038 E-mail: pan@pan.com Telnet address: pan.com World Wide Web URL: http://www.pan.com	Datapac Sprintnet Telenet Tymnet POPs in Boston, Kansas City, London Max baud rate = 1.44 megabaud	Startup fee varies according to sponsor; $250 for nonsponsored accounts (*Electronic Musician* readers waive startup fee) $15-$35/mo for 1-5 hrs depending on billing plan $3-$9/hr thereafter depending on billing plan No charge for e-mail, downloads, storage	Audio Net Personnel Availability Songwriters/Publishers News Music Business Booking Contacts GigBank Legal Advisor Tour Support Promo Hotline Classifieds Various User Groups Synth & MIDI Shopping (retailers)	More than 200 manufacturers

Record Label/ Media Areas	Regular Real-Time Chats	Download Files	Internet Access	Internet Resources
Music Universe and Much Music publish info about a variety of record labels *Electronic Musician*	Backbeat Bar 'n' Grill (Sun. 6:30 pm PT)	Synth patches Samples Digital Audio Sequences Music apps/utils Product info & reviews Articles	Graphic	e-mail listserv usenet ftp wais gopher WWW (Proprietary graphic browser)
n/a	Night Owls Musical Cafe (Mon. 10 pm ET) MIDIJam (Fri. 10 pm ET)	Synth patches Samples Digital audio Sequences Music apps/utils Product info Articles	Text-based	e-mail usenet ftp telnet wais gopher WWW (Text-based Lynx browser)
n/a	Schedule changes often; see online calendar	Synth patches Samples Digital audio Sequences Music apps/utils Product info Articles	n/a	e-mail
More than 20 magazines (inc. *Electronic Musician*)	Music Business (Sun. 11 pm ET) Songwriters' Roundtable (Tues. 11 pm ET) Pro Audio (Wed. 11 pm ET)	Synth patches Samples Digital audio Sequences Music apps/utils Product info	Text-based (Graphic access due Summer 1995, along with SLIP/PPP)	e-mail listerv (receive only) usenet irc ftp telnet wais gopher WWW

ONLINE SERVICES

Service	Access	Cost	Music Areas	Manufacturer Areas
Prodigy Tel.: (800) PRODIGY	User-local access via Prodigy's distributed network; some sites use Tymnet Call (800) PRODIGY for local-access number Max baud rate = 14.4K	10 hr free trial $9.95/mo for 5 hrs; $2.95/hr thereafter No charge for e-mail, downloads, storage	Music 1 (rock, alternative, punk, pop, blues, etc.) Music 2 (country, jazz, classical, etc.) Music Biz Concerts & Tours Musicians/Songwriters	n/a
SonicNet Tel.: (212) 941-5912 Fax: (212) 343-9445 E-mail: info@sonicnet.com World Wide Web URL: http://www.sonicnet.com	Autonet (212) 431-1627 Max. baud rate = 28.8K	2-week free trial $10/mo for unlimited access $1-$3 artist royalty per online single download	NewStand Tours & Clubs Radio Wares & Tech Info Bands, Records, Labels Byte Me Demo Universe Store Rant Dog Rant Raunch-A-Rama Various topic boards & conferences	n/a
The WELL Tel.: (415) 332-4335 Fax: (415) 332-9233 E-mail: info@well.com Telnet Address: well.com World Wide Web URL: http://www.well.com	(415) 332-6106 (300-2400 baud) (415) 332-8410 (9600-14,400 baud) User-local access through Compuserve; $4/hr Various POPs	$15/mo $2/hr First 512 KB of disk storage is free; 512 KB to 2 MB is $5/mo; each additional MB is $5/mo	MIDI Music Band (private for pro and semipro musicians)	n/a

PRODIGY

Started in 1990 as a partnership between IBM and Sears, Prodigy's membership has already grown to over two million subscribers. Major topic areas include news, weather, sports, shopping, entertainment, travel, reference databases, finances and investments, small-business and home-office information, kids areas, education, TV, and newspapers. Complete text-based and graphic access to the Internet is also provided.

There are two music-related Bulletin Boards (BBs) on Prodigy: Music 1 and Music 2. Each of these BBs focuses on different styles of music. In addition, there are areas that concentrate on Music Biz, Concerts and Tours, and Musicians and Songwriters. Prodigy has hosted several large real-time chats with music celebrities in their "Chat Stadiums," which can currently accommodate over 1,000 people; larger stadiums under development will accommodate up to 20,000.

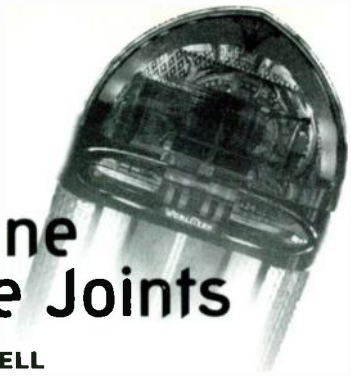
SONICNET

For all you "alternaphiles" out there, SonicNet is the ultimate online destination. Started in June, 1994, SonicNet is a BBS dedicated to indie rock and alternative culture with 3,000

Record Label/ Media Areas	Regular Real-Time Chats	Download Files	Internet Access	Internet Resources
n/a	No regular chats; recent chats have included Aerosmith, Jimmy Page, Robert Plant, Peter Gabriel "Chat Stadiums" can accommodate over 1,000 people in real time; new Stadiums will accommodate up to 20,000	n/a	Text-based Graphic	e-mail listserv usenet ftp wais gopher WWW (proprietary text-based or graphic browser) irc coming soon
Many indie labels, inc. Sub Pop Caroline Homestead Reaction Triple X Dirt Bar/None Alternative Tentacles	Mystery Melrose (Mon. 8 pm ET) United States of 'Zine (Last Tues. 10 pm ET) Slack City Live (Last Wed. 10 pm ET) Hardcore (3rd Thurs. 8 pm ET) Recent chats have included The Cramps, David Byrne, Marianne Faithfull, Flaming Lips, Kittywinder, Henry Rollins, Throwing Muses, Bob Mould, Steve Albini	Digital audio (indie-label and demo samples) Music apps/utils Articles Personality files	Text-based	e-mail usenet
n/a	n/a	n/a	Text-based	e-mail listserv usenet ftp telnet WWW

subscribers, 64 dialup phone lines, and a raging attitude. For example, the Rant Dog Rant area features interactive editorials by Rant Dog with immediate, uncensored responses from anyone. Byte Me reveals inside stories and gossip about the music business. The Demo Universe offers reviews of demo tapes and self-released music in all formats. Sound clips, cover art, band photos, biographical information, lyrics, and more from hundreds of bands are available for download. You can even join the Mystery Melrose Theater real-time chat as you watch *Melrose Place* on Monday nights and trash your favorite character online.

SonicNet offers a full-screen graphic user interface (GUI) and limited Internet access. This fall they will be launching an advanced World Wide Web service, offering chat, speech and music broadcasting, virtual-reality demos, video, and animation. SonicNet's Web presence will be compatible with all major browsers, including those offered by various online services. There will also be a special area for high-bandwidth users (ISDN and higher) featuring extra multimedia content. Their current Web site (**http://www.sonicnet.com**) offers a brief guide to the BBS and front-end client software for downloading.



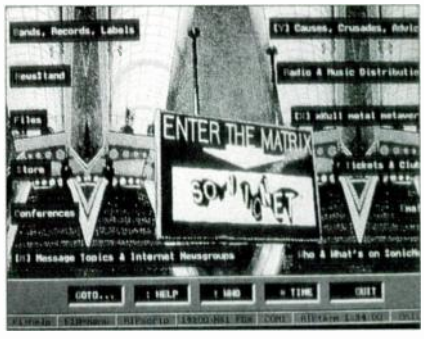
Online Juke Joints

THE WELL

Started in 1985 by Stewart Brand as part of his Whole Earth vision, the Whole Earth 'Lectronic Link (WELL) has become one of the hippest addresses on the Internet. With over 11,000 subscribers, The WELL is generally regarded as an articulate group of independent thinkers with a strong sense of online community. Although it currently operates like a BBS with dial-up numbers in the 415 area code, it will soon become a full-blown national online service with POPs all around the country. The WELL uses a command-line user interface and offers text-based Internet access.

The WELL includes over 260 conferences that address many and varied issues. Most of these conferences are open to all WELL members, although a few are private, requiring authorization from the conference leader. (For example, the women's conference is open to women only.) One of the hallmarks of The WELL is the high level of freedom members have to express themselves. In addition, The WELL supports a policy of "you own your own words," which means that members are responsible for their own words, and reproduction of those words outside The WELL system without permission may be challenged by the author.

Of the two music-related conferences, MIDI and Music are public while Band is private (for professional and semipro musicians). A few of the many topics in the Music conference include notation and transcription systems, sound design, home recording, rural home recording, musicians-referral network, the recording studio as a compositional tool, buying music in the 21st century, and buying and selling equipment. The Band conference includes some of the same topics in addition to others, such as CD mastering, musicians needed/gigs available, performing-arts medicine, instrument insurance, and musicians, computers, and CD-ROM development.



SonicNet's graphic user interface is way cool.

LOGOFF

Although you can't physically interact with other musicians via online services, you can communicate with many more of them than you could ever meet in a lifetime. In addition, these services offer sounds, software, and reference materials to help you with any musical project. With access to resources like these, musicians need never sing the isolation blues again.

Scott Wilkinson, EM *technical editor, spent a lot of time online doing research for this article.*

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An open letter from Morris Ballen, Disc Makers Chairman

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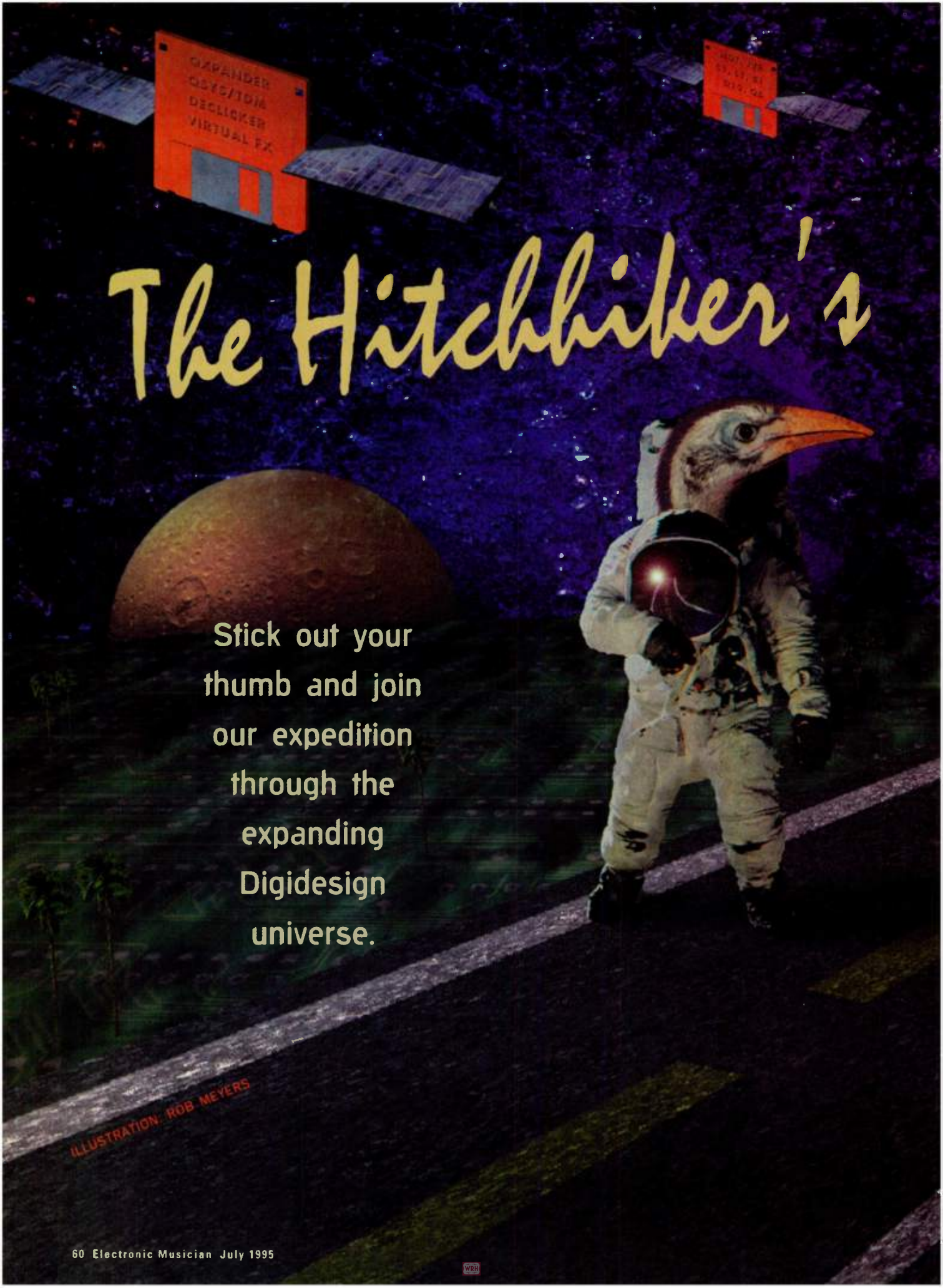

The Hitchhiker's

Stick out your thumb and join our expedition through the expanding Digidesign universe.

ILLUSTRATION: ROB MEYERS

By Paul D. Lehrman

Guide to Plug-ins

When it comes to digital-audio hardware on the Mac, the name of the game is Digidesign. As a result of this market dominance, Digidesign's products have inspired several generations of third-party products that work with the company's hardware and software. More recently, this process has been formalized, and dozens of "Development Partners"—third-party companies that signed on to create auxiliary products for Digidesign systems—have come to market with their wares.

Until recently, Digidesign and most third-party developers created stand-alone programs, which now form the core of the Digidesign world. These applications provide the essential digital-audio recording, editing, and playback environment required to use Digidesign hardware. As powerful as some of these programs are, none of them offers absolutely every conceivable function with equally high quality. That's just as well, because most people don't need every feature, and such a program would be complex and expensive.

As a result, a new category of software for Digidesign's hardware has emerged: specialized digital signal-processing (DSP) programs that operate as functional extensions, or "plug-ins," within the environment of a primary digital-audio recording program, rather than running as independent applications. With this approach, at least in theory, you would buy Pro Tools and then buy plug-ins that provide only the specialized functions you need, such as improved EQ, dynamics processing, and soundstage manipulation. If Pro Tools itself doesn't meet all your needs, you should be able to select a front-end program that has an attractive user interface and the basic features you want.

While Digidesign is developing some of these programs in-house, they have also provided "hooks" in their software so that their Development Partners can design plug-ins. Digidesign-related plug-ins come in two flavors: for *Sound Designer II* (*SD II*) and TDM. Opcode's *Studio Vision Pro,* EMAGIC's *Logic Audio,* and Steinberg's *Cubase Audio* digital-audio sequencers already support both *SD II* and TDM plug-ins, and Mark of the Unicorn will add TDM support in its upcoming *Digital Performer* 1.6 upgrade.

For the average Joe and Jane Harddisk, however, the constant assault of new software tools causes a lot of confusion. Many users don't understand what plug-ins are, why there are different types, and whether they must throw out everything they have in order to use the new stuff. For that matter, it's fair to ask whether you really need *any* of this. The Digidesign universe keeps changing, and nobody has all the answers, but I hope to help you start asking the right questions.

SOUND DESIGNER PLUG-INS

Since version 2.4 of *Sound Designer II* (version 2.8 is currently shipping), Digidesign has provided for software plug-ins, which reside in an SD II Plug-Ins folder on the Macintosh desktop. Installing a plug-in module is as simple as dropping it into that folder. The plug-in's function then shows up as an additional item in *Sound Designer*'s DSP menu.

Sound Designer plug-ins all follow the same basic operating procedure. Calling up the item opens a window that describes the function and accesses its parameters. If you highlighted a region of the sound file before opening the window, the plug-in will only affect that region; if not, it processes the whole file.

A Preview button in the window loops the sound file, and as you change the parameters, the sound changes accordingly. Only the portion of the sound file in RAM is looped, as doing this directly from disk within *Sound Designer* is difficult. You can specify the size of the RAM buffer, limited by the amount of RAM you have dedicated to the program. A Bypass button turns off the processing to let you hear the original file as it loops.

The Process button changes the sound file permanently ("destructively") and returns you to the main screen. An alternative to destructive processing is provided by the Playback button, which previews the files with the settings nondestructively applied, so the sound file remains unaltered. You can store the settings of the processing module in a small, separate file and recall them (and activate the module) when you play back the sound file. However, you can use only one processing module at a time in Playback mode; if you want to use two modules on the same sound file, at least one must be applied destructively.

TDM PLUG-INS

Digidesign's Time Division Multiplexing (TDM) started as an add-on for earlier versions of Pro Tools and now comes standard with Pro Tools III. TDM is a 256-channel, high-speed, digital-audio bus that resides entirely within the Mac. It allows different parts of the Pro Tools universe—both hardware cards and software—to be connected without the datastream ever leaving the computer. Within Pro Tools, TDM lets you create the equivalent of such standard studio tools as patch bays, mixers, auxiliary sends and returns, and outboard processors.

The processing power required for TDM software is provided by a dedicated hardware card called a "DSP Farm," which contains four Motorola 56000-series DSP chips. One DSP Farm card comes with TDM, and you can install multiple DSP Farm cards for additional processing power. (For more on TDM and DSP Farms, see "Virtual Effects" in the March 1994 **EM**.)

The TDM system is so flexible that designing a sensible user interface is a major challenge. For now, the most obvious approach is the onscreen modular mixing console (see **Fig. 1**). Within each input module, you can assign an effect as an "insert" (up to five inserts per channel), or you can route one or more channel "sends" to an auxiliary bus, which in turn goes to a processing module and is then brought back into the mix.

You can process an audio file within a TDM system, or with an external effects processor. To use external processing, you take an unused analog or digital output from the I/O interface, call it an auxiliary send, patch it out to the processor of your choice, and bring it back through an unused input. A hybrid type of processing is available with the latest version of Lexicon's NuVerb (reviewed in the November 1994 **EM**), which provides an effects processor on a NuBus card. NuVerb previously could be connected to a Pro Tools system using AES/EBU, but it can now directly address the TDM bus.

Internal processing is performed by TDM plug-ins. These programs are placed in a folder inside the DAE Folder, where Digidesign's essential *Digidesign Audio Engine* (*DAE*) software resides. Unlike *Sound Designer* plug-ins, TDM plug-ins work with disk files or any audio input in real time and are not destructive to the original files.

Using a TDM plug-in is a snap. From the onscreen mixing console, you set up the signal path, open the window, and play with the parameters. When you close the window, the processing remains active, and it will continue to be active until you specifically change it or take it out of the path.

Multiple simultaneous plug-ins are feasible because each plug-in is handled in real time by any one of the four DSP chips on a DSP Farm card. In fact, you can use multiple copies of the same plug-in without buying additional software. However, you can only *view* one insert module at a time.

The relationship between the number of plug-ins you can use and the size

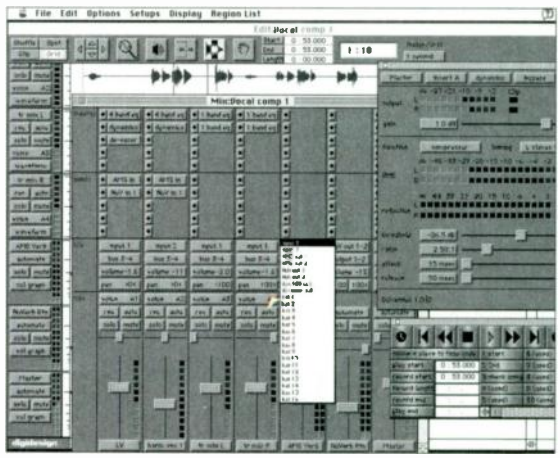

FIG. 1: The basic user-interface paradigm for Digidesign's TDM system is a virtual mixer with sends, returns, and meters.

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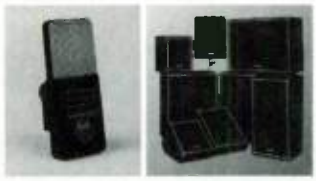
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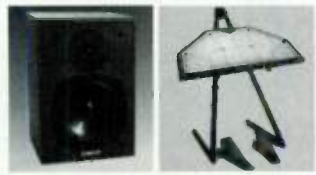
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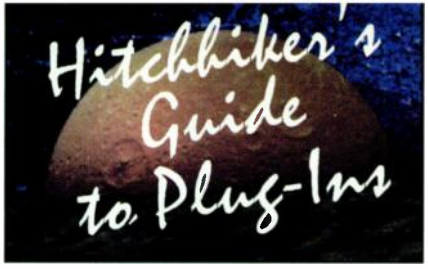
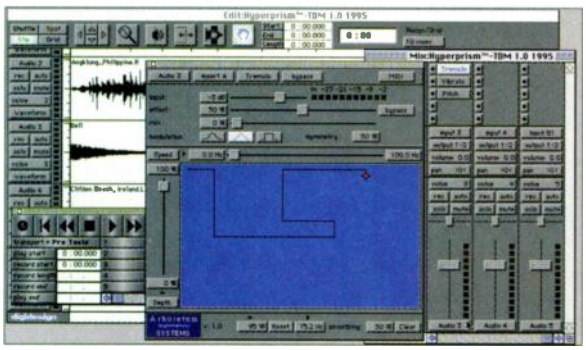

Hitchhiker's Guide to Plug-Ins

of your DSP Farm is not entirely linear. For one thing, two chips from the first DSP Farm are always used by Pro Tools' virtual mixer, and if the mixer gets too complex, it steals resources from a third chip, making that chip unavailable for anything else. A single DSP chip can handle multiple tasks, as long as they are of the same type. Each plug-in generally uses an entire chip (although sometimes you can run the same plug-in multiple times on one chip), so if you really want to get fancy with real-time processing, you will have to spring for additional DSP Farm cards. Digidesign's *Allocator* utility program (included with the Pro Tools package) helps you keep track of your DSP resources.

As in *Sound Designer,* you can use more processes than your immediate resources can handle by processing files in stages. For example, if you can't run a compressor and a reverb at the same time, bounce a track through the compressor, and then patch the resulting track through the reverb. The initial processing affects the track destructively, but the original file is still available (assuming you have sufficient disk space), and there is little or no generation noise as you add effects.

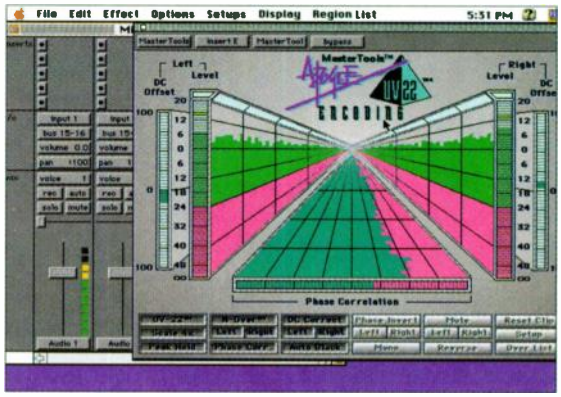


Arboretum Systems *Hyperprism-TDM* lets you apply multiple effects in real time, controlling them by drawing curves onscreen with a mouse.

Although I have personally tried almost all the products discussed here, please don't think of these brief summaries as substitutes for full-fledged reviews. They are merely meant to help steer you in directions that might appeal to you and to alert you to possible pitfalls.

APOGEE ELECTRONICS (TDM)

Apogee Electronics, known for its high-end A/D converters and mastering tools, has adapted its UV22 Super CD Encoding bit-reduction scheme for TDM (see "Tech Page: Sixteen Will Get You Twenty" in the October 1994 **EM**). Apogee's *MasterTools* plug-in ($795), which the company claims can capture audio with 20-bit resolution and beyond on a 16-bit DAT or CD, will be of interest to users creating masters directly from Pro Tools. Pro Tools has an internal resolution of 24 bits, which is a major reason you can use so many processors and mix so many channels without compromising the dynamic range.



Apogee Electronics *MasterTools* captures audio with 20-bit and better resolution on a 16-bit DAT or CD for creating masters from Pro Tools.

The forthcoming version 3.1 of the *Pro Tools* software lets you take extra advantage of this by allowing plug-ins to be inserted on the master output buses.

That's where you put Apogee's *Master Tools* plug-in. Besides introducing an ultrasonic dither-like signal, the module includes a number of other features, such as a visual history of levels with digital overloads and other flags logged against time code; a hard-limiting scheme called "Nova" that automatically drops the level when it detects an overload; phase metering and inverting with mono compatibility checking; and DC offset removal. A *Sound Designer* version should be out soon. I did not get a chance to try this plug-in, but the underlying technology has a good record.

ARBORETUM SYSTEMS (TDM)

Created in France, Arboretum Systems' *Hyperprism-TDM* ($795; upgrade from *Hyperprism* 1.5 $195) is one of the most fascinating Digidesign plug-ins. It was reviewed as a stand-alone application in the August 1994 **EM**, so I won't go into much detail here; suffice to say it lets you choose from a host of processing functions to impose on a sound file, including lowpass, highpass, bandpass, and band-reject filters; pitch shifting; ring modulation; autopan; vibrato; tremolo; phase shifting; flanging; M-S matrix; and (presumably) photon torpedoes.

These effects can be manipulated in real time, in two dimensions, by moving the mouse in a blue window. To illustrate how cool this is, picture a grid in which movement of the mouse vertically changes the pitch of a sample without changing its length, while horizontal movement does the opposite, all in real time, and all with nary a glitch in the audio as you move the mouse around the screen. The program records mouse movements as curves in the window. *Hyperprism-TDM* 1.0 offers a total of up to twelve simultaneously applicable effects and up to seven simultaneous effects with one DSP Farm.

There are a few problems with *Hyperprism.* You can't edit the curves after you've drawn them, which makes it hard to get a curve just right. The MIDI features allow remote control of the mouse from a controller or sequencer through Opcode's *OMS,* and they let you edit parameter values in a sequencer. In the stand-alone version I used (the TDM version wasn't yet available), this was clunky and inconsistent. (The stand-alone version lists for $595 and is not TDM-compatible. The two versions have different user interfaces.) Fortunately, according to the manufacturer, the MIDI features have been greatly improved in the TDM plug-in.

CRYSTAL RIVER (TDM)

This California company has been developing tools and techniques for 3-D

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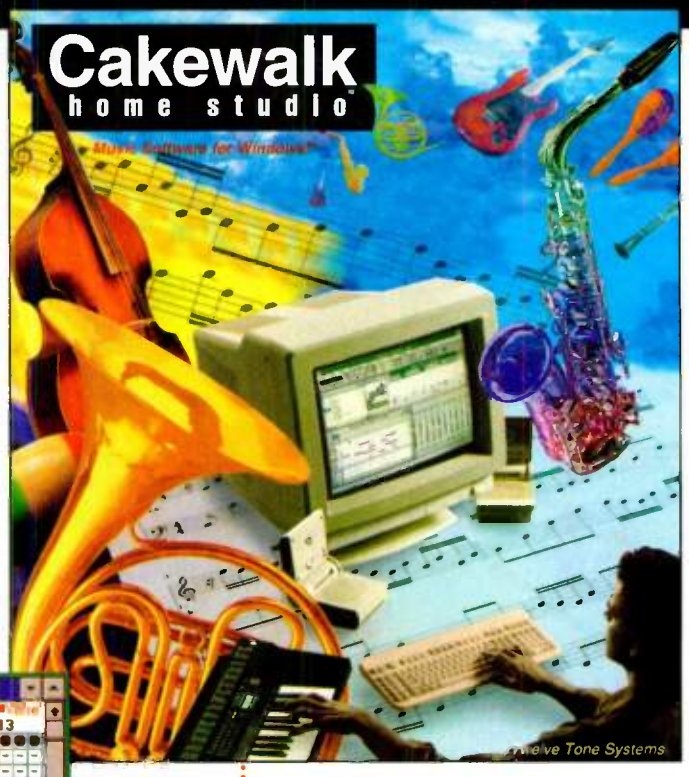

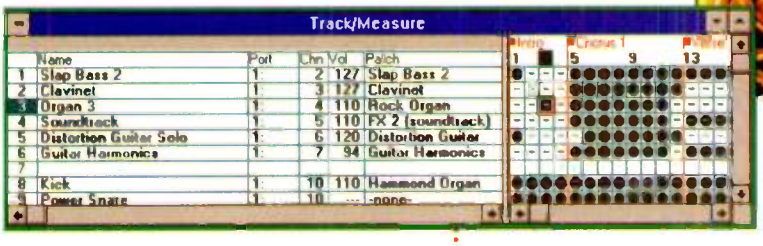

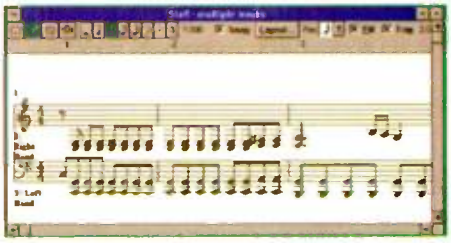

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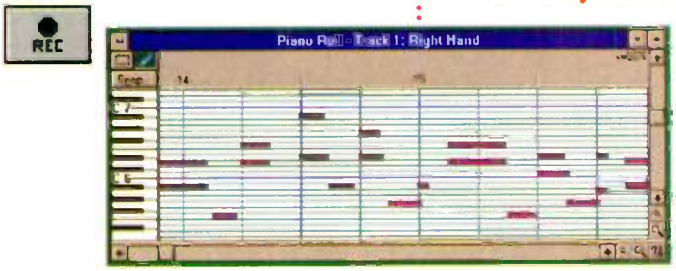

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Hitchhiker's Guide to Plug-Ins

audio since 1987 for a number of virtual-reality clients, including NASA. *ProTron* ($995), a mono-to-stereo TDM plug-in, is Crystal River Engineering's first entry into the professional audio market. This 3-D spatialization utility uses their AudioReality technology, which, according to the company's literature, "utilizes head-related transfer functions and proprietary spatialization algorithms."

You get to control the size of the room, the placement of the sound source relative to the room and the listener, the acoustic properties of the materials on the walls, and Doppler shift to simulate moving sound sources. Multiple modules can be used simultaneously (assuming you have enough DSP power) to create separate environments for different sources. The process is claimed to be completely mono-compatible.

ProTron's user interface is fun and ridiculously easy to learn, but I found the "3-D" aspects of the processing elusive. The room simulations are convincing, as is the placement of the sound source in the left/right field, and I can certainly hear a difference in the sound when it is moved "overhead" or "behind." But it would be difficult to convince me that the sound is actually where the program says it is. (At fact-check, the manufacturer claimed the 360-degree effect only works with headphones, but this was not stated in the review copy's documentation. According to Crystal River Engineering, with a pair of reference monitors arranged at ±30 degrees, sounds are placed beyond the speakers' boundaries to about ±60 degrees in azimuth and elevation, and in some cases up to ±90 degrees.)

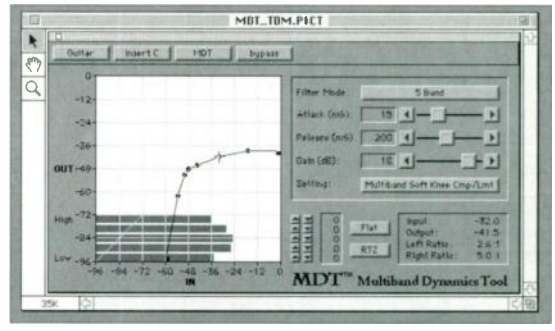
DIGIDESIGN (SD II/ TDM)

The first *Sound Designer II* plug-in was *Digidesign Intelligent Noise Reduction* (*DINR*; $995), and it is still an essential tool for many users. The program performs broadband noise reduction and hum removal on recorded files. *DINR*'s noise reduction works by analyzing a segment of the file in which there is no program material (i.e., the file contains background or room noise only) and then constructing a complex filter designed to remove that noise. The filter is then applied to the entire file. The shape of the filter is editable in a graphic window, and you can vary the amount of filtering applied.

The process works well as long as the noise is relatively constant and you don't push it too hard; otherwise, you can end up with frequency-response anomalies. The hum-removal function sets up one or more notch filters with precisely adjustable center frequencies. The bandwidth and spacing of multiple filters can be adjusted, or they can be generated based on harmonics of the original filter. A threshold control acts like a noise gate, removing the hum only when the program level dips. (*DINR* was evaluated in a sidebar to the Pro Tools 2.0 review in the October 1993 **EM**.)

D-Verb ($495) is a reverb module for TDM. It has seven basic algorithms and the usual reverb controls, including wet/dry mix, room size, decay, diffusion, lowpass filter, high-frequency decay, and predelay. The module can be configured with either mono or stereo ins and outs. An input-level control with metering is provided, which is especially important because the insert is always prefader, and overload is a serious consideration.

Although the sound is generally smooth, the quality of the algorithms varies: The rooms and church are excellent, while the hall exhibits an annoying "swimming" effect, especially with long decay times. The plate gets



With Jupiter's *Multiband Dynamics Tool* (*MDT*) compressor/limiter, you can create your own compression curves by drawing them on a graph. You can compress three or five bands separately before they are recombined.

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pretty raunchy when you increase the decay time—abrasive, metallic, and screechy are words that come to mind—but that's exactly what a real plate sounds like when you push it to its limits, so this is one of the more realistic plate simulators I've heard.

The latest Digidesign plug-in, *DPP-1* ($495), is a real-time pitch processor for TDM. Pitch can be altered within a 4-octave range, and pitch shifting can be combined with a 125 ms delay line with feedback for neat arpeggiation, or "climbing echo," effects. Coarse pitch changes are set with a musical staff and "8va" controls, while fine adjustments of ±50 cents are made with a slider. Numerical entry of pitch parameters is also provided, or you can specify a pitch ratio numerically. Minimum and maximum pitch controls can define a frequency "window" within which sounds will be processed.

A Crossfade control should be able to smooth out artifacts in the processed audio, but I couldn't hear much improvement. The module can handle mono or stereo inputs. Like most "harmony processors," the processing is not free of glitches, but I've heard a lot worse. It is straightforward to use and is undeniably a whole lot of fun.

JUPITER SYSTEMS (SD II/TDM)

Jupiter's *Multiband Dynamics Tool* (*MDT*) is a powerful, visually oriented compressor/limiter available in both *SD II* ($499) and TDM ($599) versions. You create your own compression curve by drawing it on a graph, specifying up to 30 threshold points. This lets you create any kind of curve with tremendous precision. Segments of the curve can have negative slopes (as the input gets louder, the output gets softer), and you can construct some wild combinations of gain, limiting, and gating. The "multiband" part refers to the ability to compress three or five bands separately before they are recombined. This is an effective way to overcome the pumping characteristics of regular compressors.

Unfortunately, *MDT*'s user interface is a little obtuse. Although putting a graphic front end on a dynamics processor is an interesting idea, it turns out not to be as important as having good metering. Unfortunately, *MDT* has no gain-reduction meters (Jupiter intends to add them in an upgrade), so there's no way to tell when you're getting close to clipping, and clipping is easy to do.

In addition, the fact that the frequency bands are fixed makes the module less than ideal for de-essing and frequency-dependent processing. These applications can be handled better by a hardware or software processor with a filtered sidechain. On the other hand, some of *MDT*'s features, such as negative compression slopes, are unique in the digital world and will be useful to adventurous engineers. (*MDT* for *Sound Designer II* was reviewed in the September 1994 **EM**.)

The *Jupiter Voice Processor*, or *JVP* (*SD II* $399; TDM $499) combines a dynamics processor with EQ and delay. It uses the same underlying compression algorithms as *MDT*, but it offers a different and more immediately useful front end. It's a Swiss Army knife (or as one user put it, "a Whitman's sampler") of software processors, including a compressor/expander/gate; de-esser; 3-band, ±24 dB, parametric EQ; and six(!)-tap, stereo, panning delay with feedback. Each processor and each pair of taps has its own window, but master input and output faders are present at all times to make sure things don't get out of hand. The gain-reduction meters are always onscreen, but they are occasionally obscured by other editing screens (for example, when editing delay taps).

Unlike a typical, inexpensive, hardware multi-effects device, *JVP* gives you a lot of control. The module contains some 54 separate parameters. As with most plug-ins, settings can be stored as separate files and instantly recalled, a feature that is especially welcome. My only complaint is that the manufacturer provides only a couple of sample settings. A comprehensive library from Jupiter Systems would go a long way toward firing the creative imagination of users.

QSOUND LABS (SD II/TDM)

This Canadian firm makes two plug-ins. *QXpander* is used for stereo enhancement, and *QSys/TDM* is based on QSystem 2, the company's technology for creating wide-stage stereo from mono sources, previously available only in a hardware unit with a price tag of around $16,000. The company boasts that the process has been used on recordings by artists such as Roger Waters and Sting.

QXpander ($295) is an *Sound Designer II* plug-in that broadens the apparent soundstage of a stereo mix or submix. The main controls, which can appear as either faders or rotary knobs, are designed to spread out the image and control the amount of mono information in the mix, thus allowing a tradeoff between dramatic enhancement and a centered image. A Dynamic Compensation section, with controls that are identical to those of a compressor, varies the amount of processing from

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Continued from page 5,176

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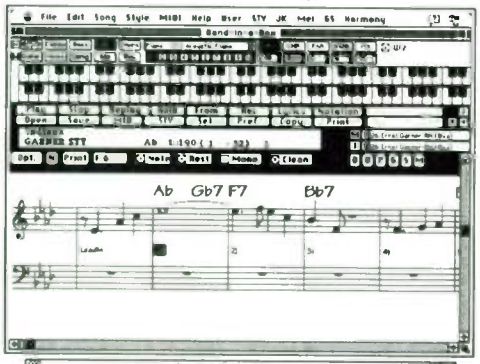

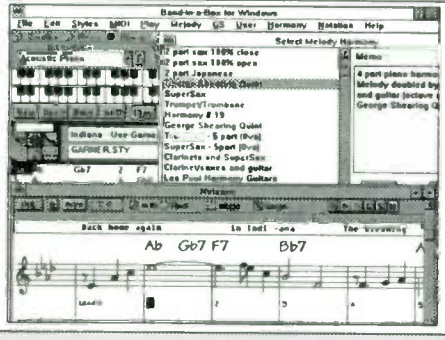

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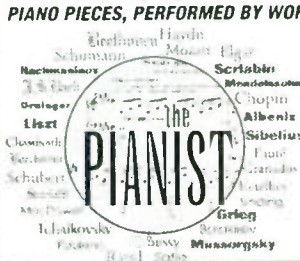

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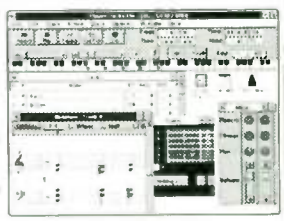

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one moment to the next, depending on the strength of the mono component of the input signal. A low-frequency, boost-only equalizer is designed to help in situations where the stereo processing might cause the center image to sound too thin.

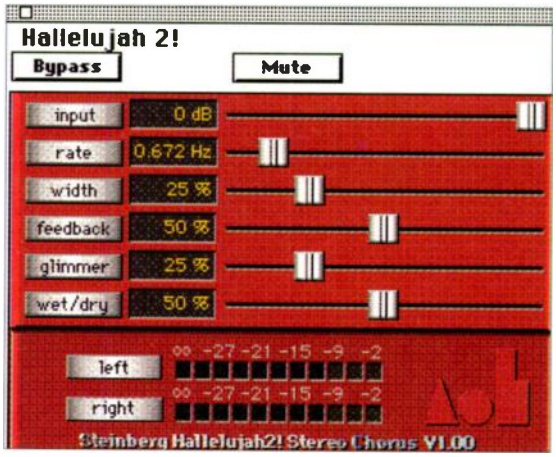
Of all the modules I played with, this one seems the least useful. The user interface is simple; so simple, in fact, that I couldn't get it to do much. I could only hear the effect when the Input, Spread, and Center controls were at their full-up (labeled, oddly, "0.00 dB") positions, and even then it was marginal. Perhaps there is some good technology here, but the module doesn't make it easy to get at. The biggest problem might be the sketchy documentation.

For TDM systems, the company is planning *QSys/TDM* ($1,495), which will process up to four mono sources simultaneously, creating a wide-stage stereo image for each. The stereo stage spreads a full 180 degrees, and individual delay lines of up to 30 ms can make the sounds appear larger. Extensive panning control is included: Sounds can be placed and moved around with the mouse, and the movements can be recorded and edited after the fact. When played back, the movements can be locked to SMPTE or MIDI Time Code, or triggered by MIDI note commands. I didn't get a chance to try this module, but it should be available by the time you read this.

STEINBERG (TDM)

The German makers of *Cubase* sequencers are developing two TDM plug-in products, both of which are scheduled to be available by midyear (which means neither was available for testing). *DeClicker* ($995) is designed to remove clicks and pops from recordings in real time. Parameters include Threshold, Quality, and Record Type (for use with different types of recording media).

The *Virtual FX Rack* ($399) will provide five plug-ins in one package. The plug-ins include a stereo chorusing module called (I'm not responsible for this!) *Hallelujah; Pandora,* a stereo autopanner; a stereo plate-reverb emulation called *Plate Runner;* a spatial enhancer called *Stereo Wizard;* and *Y-cables,* a signal merger/patcher utility that can function on the same DSP chip as *Pandora* or *Hallelujah.*

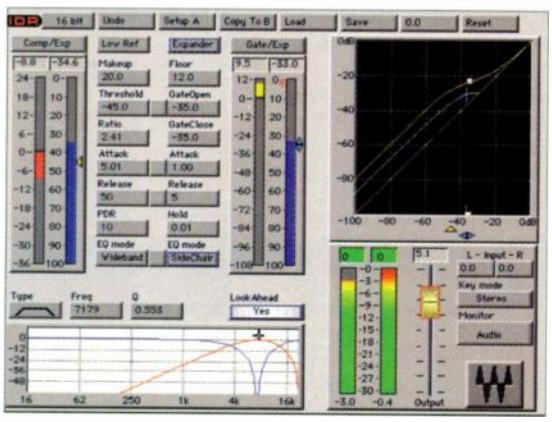


Steinberg's *Virtual FX Rack* is a package of five plug-ins, including *Hallelujah 2!,* a stereo chorusing module.

WAVES (SD II/TDM)

The Israeli company Waves was one of the first off the blocks with both *SD II* and TDM plug-ins and leads the pack in sheer number of products. Their plug-ins have consistently scored high among users for good design. All four of their current modules are available in TDM and *SD II* versions.

The *C1* compressor/gate module (*SD II* $700; TDM $850) includes a compressor/limiter, gate/expander, and filter. The compression attack time is adjustable down to 0.01 ms, and the "lookahead" feature unequivocally eliminates high-level transients, which would be extremely difficult with an outboard compressor. Release time can be fixed or program-dependent; in the latter mode, transients that last less than a certain duration will cause the module to use a shorter release time, so the compressor gets out of the way more quickly. Both the compressor and the gate modules have controls that can be set visually, with a graph of the transfer curves always in view.



Waves *C1* compressor/gate module combines a compressor/limiter, gate/expander, and filter. A "lookahead" feature eliminates high-level transients.

An interesting problem is that in the Pro Tools/TDM environment, the *C1* module imposes a delay on the program material of up to 7.5 ms. (The exact time depends on the sampling rate.) To avoid this, you either have to move the tracks you are processing 7.5 ms to the left, or slide all the other tracks 7.5 ms to the right.

The filter can be set up as a high-pass, lowpass, bandpass, or band-reject with adjustable frequency and Q. It can be inserted prior to the compressor and/or gate modules as a preprocessing filter, or it can be used in a "split" mode in which only certain parts of the spectrum get processed while the rest passes unchanged. The module normally acts in stereo, but it offers another highly useful mode that is unique to the Digidesign environment: It can be set up in dual mono, with one channel gating or ducking the other.

For all its flexibility, *C1* is easy to work with. The compressor's attack is very smooth, so much so that it's difficult (although not impossible) to get it to "pump" the sound in response to a kick drum or bass. The gate has the opposite problem: It's jumpy, and even though the attack and release are adjustable, it's difficult to make it operate smoothly. The filter and sidechain effects are clean and well implemented.

Q10 (*SD II* $450; TDM $600) is a 10-band, fully parametric equalizer, configurable in stereo or dual mono. Each band is adjustable as to type (shelving or peaking), gain (±18 dB), frequency, and Q. Curves can be drawn directly on the screen while the sound plays, and you can even sweep quickly up and down or across the spectrum, with no glitching.

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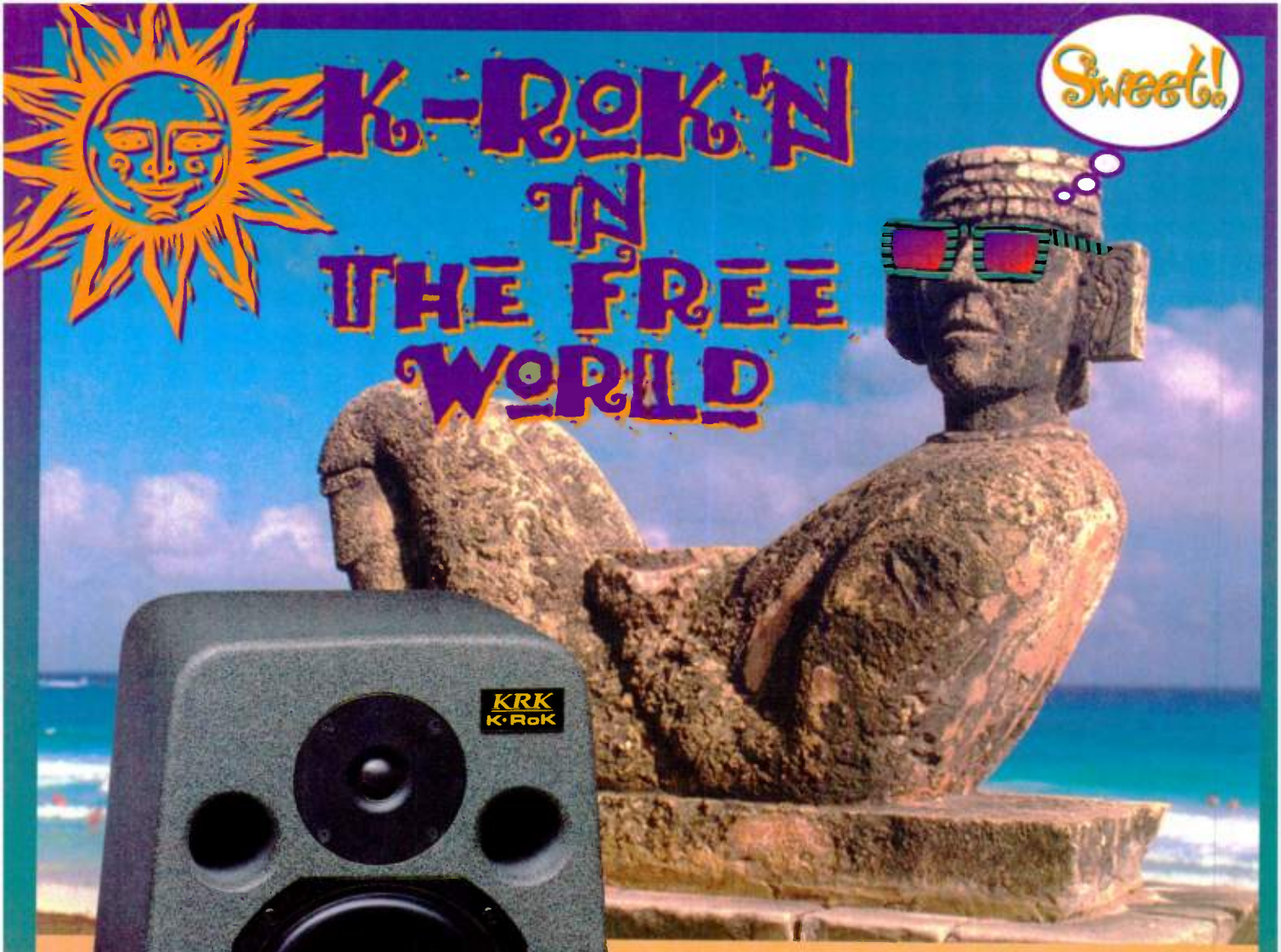

The new KRK K-RoK close-field monitor looks as if it's been carved out of solid granite. These bizarre-looking little monsters feature a unique box design that produces better linearity and low-end punch than any monitor in their class.

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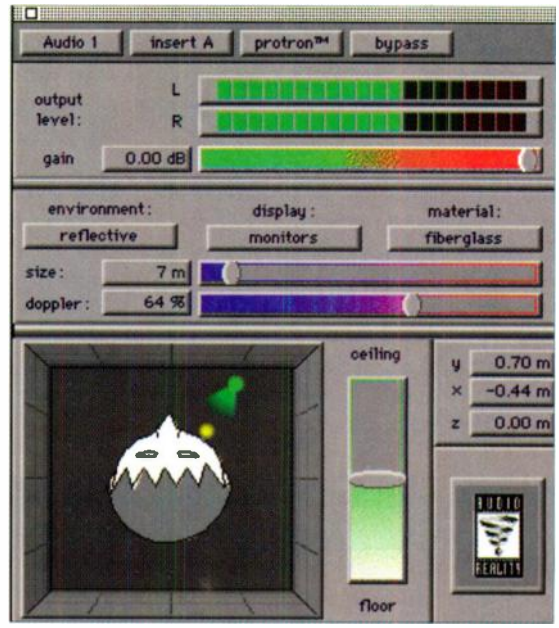
Filter points can be copied, pasted, and grouped. Automatic gain-normalization is available, and a Requantization function can be invoked to minimize noise when producing 16- or 20-bit files. The equalization sounds great, with no ringing or other obvious phase errors, and the interface is almost completely intuitive, the very model of a modern software module. (*Q10* was reviewed in the June 1994 **EM**.)

The *S1 Stereo Imager* (*SD II* $500; TDM $650) performs some interesting tricks with the stereo soundstage. It can pull down sounds on one side of the stage and pull them up on the other side without affecting the position of sounds in the center. Conversely, it can move sounds in the center to one side or the other without changing the overall stereo balance. It can also adjust the apparent width of the stereo image. A Shuffling function (with a silly name) increases the stereo separation of bass frequencies, with an adjustable crossover point, to produce a more spacious image.

All the operations are designed for maximum mono compatibility, with minimal added "phasiness," and metering is provided in both left/right and mono/stereo modes. The processing is smooth and artifact-free. The best part is the display: It uses triangular vectors, adjustable with the mouse, on a grid of concentric semicircles, which makes perfect sense.

I have saved the best for last: Engineers who have worked extensively with Waves' *L1 Ultramaximizer* (*SD II* $650; TDM $800) can't say enough good things about its performance. The manufacturer claims that the peak limiter/"re-quantizer" module increases the "apparent resolution" of a sound by three bits. If you put aside the hype for a moment, what you really have with *L1* is a brickwall compressor/limiter that lets you accurately and absolutely define the dynamic



With Crystal River Engineering *ProTron*, you can place and manipulate sound within a 3-D soundfield.

range of a mix, plus a requantizer and dither generator that lets you hear what that processed mix sounds like in different file formats and different bit resolutions.

If you are "downsizing" the file by reducing the number of bits, you can choose from two dithering/noise-shaping algorithms. One maintains the signal's linearity, while allowing the noise floor to increase to the level normally associated with the lower bit depth. The other sacrifices linearity, which introduces some low-level distortion, but it keeps the noise floor so far down you'd swear you were using a lot more bits than you are, hence the hype. You couldn't ask for a more powerful tool for creating 8-bit "multimedia" files (actually 16-bit files in which the last eight bits have no information) from your precious 16-bit recordings. I found it easy to set up *L1*, and it sounds very musical.

The TDM versions of *C1*, *Q10*, and *L1* can be used as TDM or *Sound Designer II* plug-ins. A separate application, *WaveShellTDM* ($100), must be installed to "patch" them into the TDM bus. According to Waves, *WaveShellTDM* provides a software gateway that lets you run multiple Waves plug-ins, while making the TDM core system think there is only one plug-in. That way, more than one Waves plug-in can run on the same chip (which is not possible with other plug-ins), assuming you don't exceed the chip's resources.

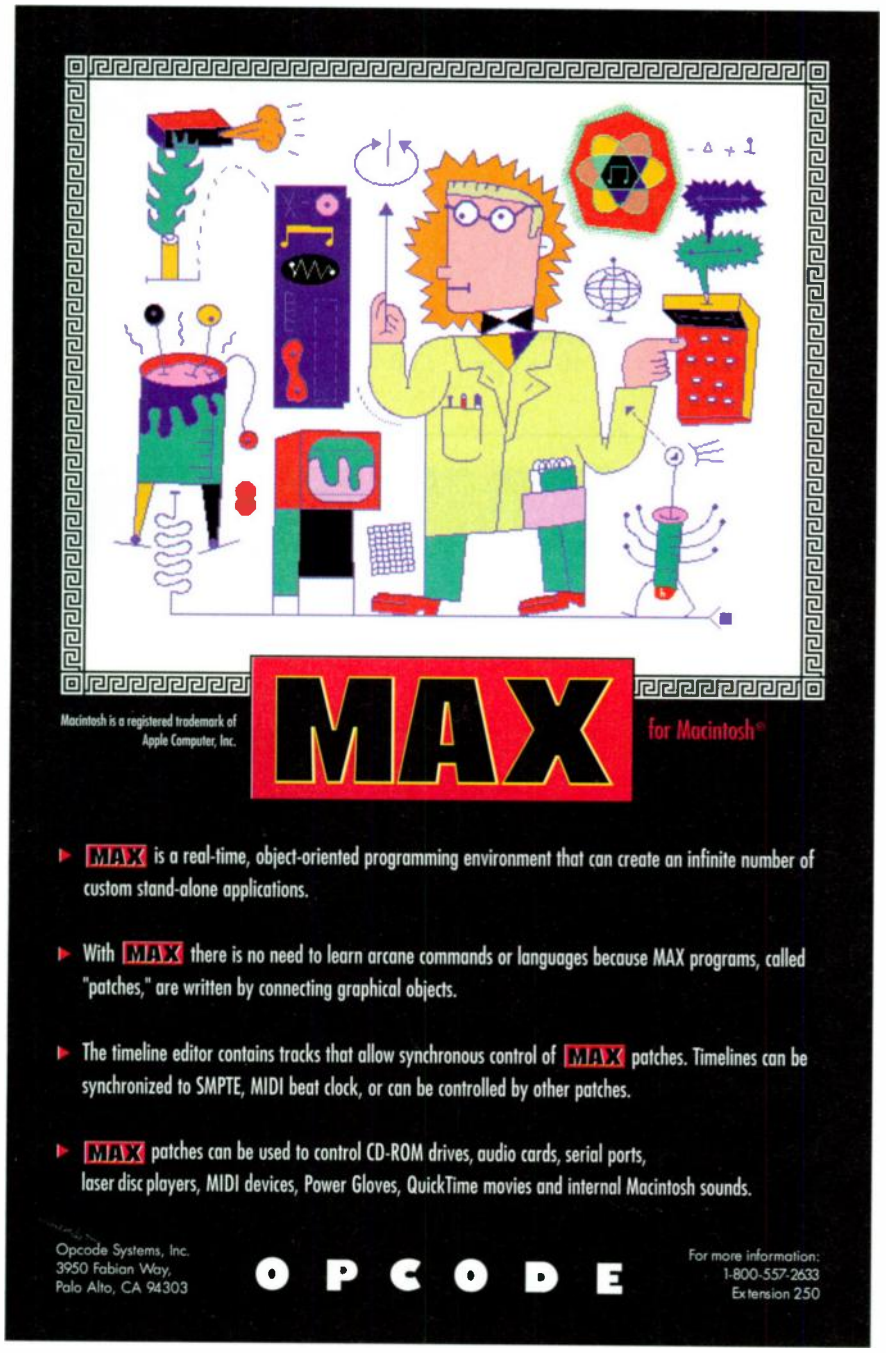
In addition, you can run the same Waves plug-in up to three times simultaneously (up to six times with *S1*). The module software is not copy-protected, but you need a hardware dongle, which comes with *WaveShellTDM* and attaches to your ADB port between the Mac and the keyboard, to make any of it work. The dongle only supports three simultaneous software modules; if you want to use more, you must buy more authorizations. (Waves updates the dongle remotely, via modem.)

As I write this, there are still some hardware and software incompatibilities in Waves' products. None work with *Sound Designer II* 2.8 on Pro Tools III or Session 8 hardware, although they work just fine with Pro Tools 2.0 on that hardware. According to Waves, all of this will be fixed in a free upgrade by the time you read this.

Waves offers two other interesting products. Their *Q6* 6-band equalizer ($400) is available for Sound Tools I hardware systems only. The other product, *WaveShellRT* ($100), is a real-time program that lets you modify incoming signals using whatever Waves plug-ins you have installed. Unfortunately, it won't run in the background with interrupt-driven applications, such as a sequencer; for example, you can't use your MIDI sequencer as an automation controller while processing audio.

PROPRIETARY PLUG-INS

In addition to supporting TDM and *SD II* plug-ins, EMAGIC and Opcode have announced their own program "extensions" for their digital-audio sequencers. (Extensions are software modules that add features to an existing program. Plug-ins are one type of extension, but they are not the only type. For instance, one EMAGIC extension is a driver that lets *Logic Audio* address Yamaha's CBX-D5 hard-disk recorder.) Space doesn't permit a



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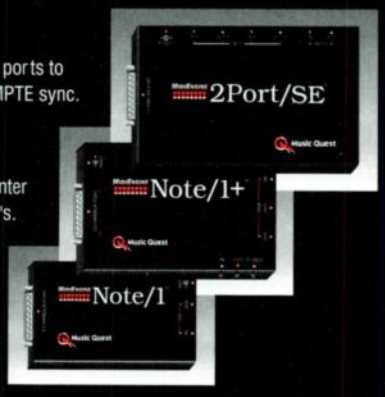

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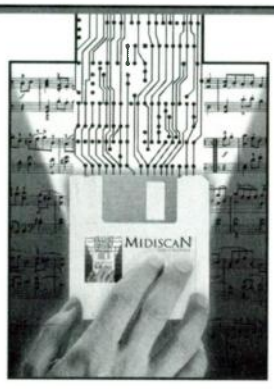

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Hitchhiker's Guide to Plug-Ins

detailed discussion of these proprietary extensions here, so for now, just keep in mind that they are not the same as TDM or *SD II* plug-ins.

To complicate the situation a bit, Adobe Systems offers an open-standard plug-in format for its *Premier* multimedia software, and OSC has opted to support this format for its *Deck II* audio-recording program. Because it addresses Digidesign's hardware through OSC's software engine, rather than through *DAE*, *Deck II* is able to wrangle more audio tracks from the hardware than its competitors. The down side of this approach is that OSC's program does not support TDM, nor is it compatible with Pro Tools III, which requires *DAE*. An OSC spokesperson stated that several leading TDM and *SD II* plug-in developers, including Waves, will release Adobe-format versions of their plug-ins for use with *Deck II*.

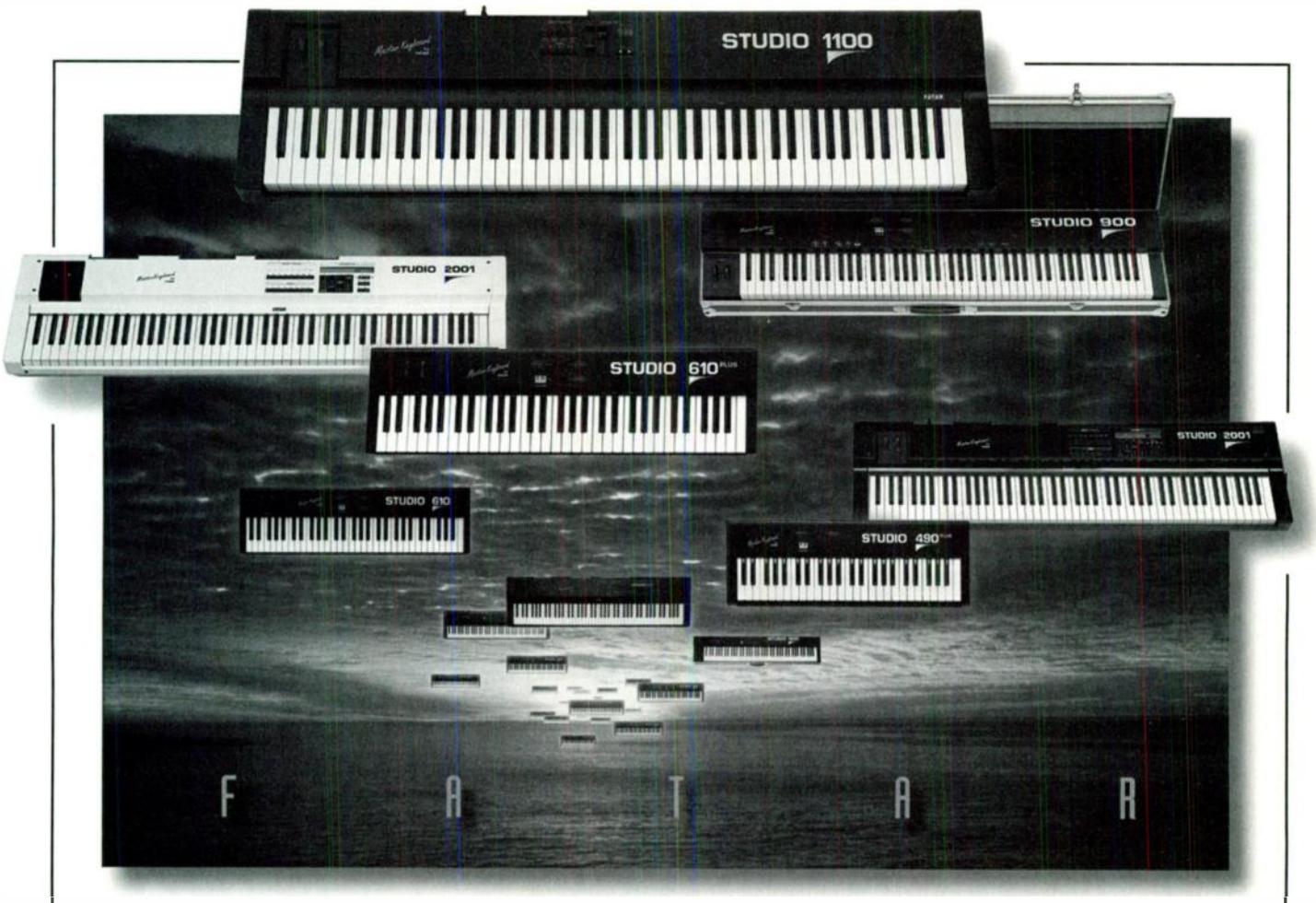
PLUG IN, TURN ON, DROP IN

Digidesign's universe, like Einstein's, is constantly expanding, and it shows no sign of slowing down as more developers from all over the world jump in. These tools will become even more useful as transformations across multiple platforms become easier and faster. Improved user interfaces and increasingly tight integration seem virtually inevitable.

Things will get even more interesting as Power Macs, with their impressive built-in DSP capabilities, become more prevalent. They won't make hardware obsolete—you'll still need inputs and outputs, and additional processing power is always desirable for digital audio—but the amount of power you'll be able to wield for a given dollar investment will make today's tools look positively Jurassic. Watch out!

(Thanks to Marsha Vdovin, Wynn Bowman, Dan Caccavo, Dave Lebolt, Dave Frangioni, and the gang at Parsons Audio for their invaluable assistance.)

Paul D. Lehrman *is the coauthor of* MIDI for the Professional, *available from Mix Bookshelf, and is the director of the Pro School program at the University of Massachusetts Lowell.*



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By Russell Cardwell

Dream Sequences

It's a nightmare. What should have been a simple three- to four-hour session is entering its tenth agonizing hour. Exhausted, irritable, their endurance spent, the musicians and engineer can no longer concentrate on the job at hand. Much of the session has been spent trying to figure out what sound is supposed to be assigned to which track on the sequencer. There's a crash cymbal where the snare should be, and the bass-drum part is being played by a timbale. As dawn approaches, noise and errors creep onto tape unnoticed. Hours of costly studio time have been squandered, and a project that was months in the making is ruined, perhaps beyond repair.

What an unnecessary waste! If the sequences had been better prepared for the studio, this unhappy scenario could have been prevented. MIDI technology puts powerful tools into the hands of musicians, yet techniques to use these tools efficiently in a professional recording studio are many times learned only through costly trial and error.

Avoid nightmares by prepping sequences for pro-studio mixdowns.

Fortunately, you don't have to learn these lessons the hard way. These useful strategies and procedures, which I developed over the years, will help you avoid some common pitfalls and make the most of your studio time. Let's begin by scrutinizing the development of an imaginary project.

Illustration by Troy Thomas

Dream Sequences

RIGHT FROM THE START

You've been contacted by Betsy Bigger of Bigger & Bigger Ad Agency. One of their clients, Stupid Products, Inc., is launching a corporate-imaging campaign, and they want signature music. You agree to produce a jingle and a series of related songs based on their new ad slogan, "Get Stupid, Now!" You have settled on a price and a delivery date, signed the contracts, and are ready to begin.

Your first step is to fire up your sequencer and open a template, which is a sequencer file that contains your default settings. Creating a template is easy: Just open a new file, assign each of the sounds you commonly use to a track, and save the file with the name "Template." You want to use this otherwise-empty file as a starting point from now on, so be sure to keep it pristine by saving it with a different name after you've actually begun entering sequence data. (On a Mac with System 7.0 or later, you can make the template a Stationary file that will open as a new, untitled document each time.) Using a template not only saves you time in preproduction but helps you maintain consistent standards from project to project. This consistency saves you time and money when you bring your project into a professional studio.

A portion of a template I work from is shown in **Fig. 1**. I have used these track and MIDI channel assignments for several years and can find my rhythm section blindfolded. Piano occupies track 3/channel 9 and bass is on track 2/channel 2. Drums are on channels 3 and 4, with each sound on its own track. Additional sampled instruments occupy channels 5 through 8. Channels 10 through 16 and the channels on MIDI port B are available for synths and other samplers.

Channel 1 contains a controller patch called "MIDI Inst." MIDI Inst has a sidestick sample assigned to MIDI note 127, outside the range of my keyboard. My sequencing template uses this sample to play a click track. All the other notes in MIDI Inst have no sound. That way, channel 1 is always available in the studio to add a new part at the last minute, send messages to an effects device, control MIDI mutes or faders, and so forth.

These channel assignments do not conform to the General MIDI specification, which was not available when I chose my defaults. GM provides a common set of track and channel assignments, which simplifies and streamlines your job considerably. Therefore, it is a good idea to go with GM assignments, at least to the extent you use the standard set of instruments covered by GM. (For details on General MIDI, see "MIDI for the Masses" in the August 1991 **EM**; for applications notes, see "Generating General MIDI" in the September 1992 issue.)

ISOLATING TRACKS

Referring again to the template shown in **Fig. 1**, notice that each drum sound is assigned to a separate sequencer track. This is very important. In the studio with the clock running, you need to be able to quickly solo and mute these instruments so they can be recorded separately.

Why record them separately? Recording drum tracks one at a time makes it easier to notice any problems. For example, you won't be surprised by that annoying pop at the end of your snare sample during mixdown. You may also want to equalize or compress some sounds as they go to tape, saving time and compression channels. (There *never* seem to be enough compression channels at mixdown time. Is this an immutable law of the universe?)

To isolate your drums, you'll need to plan and prepare. Some sequencers allow you to define devices, automatically routing incoming MIDI data to appropriate tracks. For example, you might create a device that defines notes between C3 and G3 as Kick Drum, notes between G♯3 and C4 as Snare, C♯4 as Rimshot, D4 as Sidestick, D♯4 as Snare Roll, and so on. With this setup, you need only play the parts and let the sequencer sort them onto separate tracks for you.

Other sequencers require you to exercise a little more ingenuity. One sequencer may allow you to set up input filters so that each track responds only to notes within a specific range. Another may require that you record all the drums on a single channel, then copy a range of notes to your Kick track, another range of notes to your Snare track, and so forth.

If you are using the internal sequencer in a keyboard, you may be unable to separate, mute, and solo tracks in this way. To get around this, after you've finished sequencing, save a copy of your song, renamed "Stupid Jingle—Kick." In this copy, delete everything but the kick. Then save another copy as "Stupid Jingle—Snare" and delete everything but the snare. Repeat the procedure as needed.

Even if your sequencer can isolate and solo tracks, you may want to use this strategy to save time. For example, if your song consists of several linked sections, it can take a while to go through each section and select one instrument to solo. Ultimately you may find that it is much quicker to simply

Sect 1:Untitled

	R	M	S	Name	Loop	Bars	Instrument
1				Click		1	MIDI Inst
2				Bass		1	Bass 2
3	●			Piano		1	Piano 9
4				Kick		1	Drums 3
5				Snare		1	Drums 3
6				Rim		1	Drums 3
7				Stick		1	Drums 3
8				Roll		1	Drums 3
9				Tom 1		1	Drums 3
10				Tom 2		1	Drums 3
11				Tom 3		1	Drums 3
12				Tom 4		1	Drums 3
13				Closed Hat		1	Drums 4
14				Half Hat		1	Drums 4
15				Open Hat		1	Drums 4
16				Foot Hat		1	Drums 4
17				Ride 1		1	Drums 4
18				Ride Bell 1		1	Drums 4
19				Ride 2		1	Drums 4
20				Ride Bell 2		1	Drums 4
21				Crash 1		1	Drums 4
22				Grab 1		1	Drums 4
23				Crash 2		1	Drums 4
24				Grab 2		1	Drums 4
25				Splash		1	Drums 4
26				China		1	Drums 4
27				Claps		1	Drums 4
28				Tamborine		1	Drums 4

FIG. 1: Basing your sequences on a standardized template promotes consistency, which saves time in pre-production and in the professional studio. Notice that each drum is assigned to its own track. This allows each sound to be quickly soloed and recorded individually.

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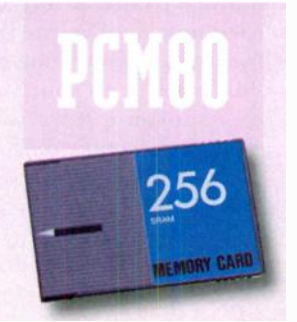

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load a new song into your sequencer between each take.

THE ART OF DRUM MAPPING

Regardless of the strategy you use to place each instrument on a separate track, you'll get better results if your drum kits follow a consistent key map. Once again, consistency offers many advantages, such as making it easy to audition different kits with the sequencer running or to import new drum samples into a kit. However, remapping all your drum kits can be tedious and time consuming. Take one of those weekends when you really should be out doing something useful for yourself, brew up some strong coffee, gather all your floppy disks around, and get ready for some really obsessive/compulsive behavior.

One way to make mapping easier is to create one drum kit as a template, clone it a dozen times, and import new drum samples into the clones. Another way is to use the General MIDI drum map (see table, "General MIDI Drum Map"). While the GM map has some drawbacks, it has one tremendous advantage: It's a standard adopted by many manufacturers, and most new gear will probably include it as a default. By adopting this map, you could save yourself plenty of tedium.

While you're at it, here's another tip. Create two versions of each kit: a preproduction kit and a studio kit. Preproduction versions are optimized for sequencing, with drums and percussion panned in a natural stereo image. Studio versions are optimized for tracking, with kick and snare assigned to individual audio outputs (assuming your sound source has multiple outs). Depending on how many outputs and tracks you have, you may also want to isolate your hi-hat, a stereo spread of toms, and a stereo spread of cymbals.

This may seem like an awful lot of work now, but it will save you a few minutes between each track. And remember, in the studio, time really *is* money.

ON YOUR MARK, GET SET . . .

Let's assume you've finished sequencing. The client has approved the demo tracks, and you have booked some studio time. Now you're ready to prepare your sequences for the studio.

The first step in this process is to attach a count-off to each song in your project. To make this as painless as possible, create a sequence two measures long, give it a clever name (such as "CountOff"), and save it in the same location as your template. The count-off sequence I use consists of two measures of click. When I'm finished with preproduction, I adjust the tempo and time signature to match the beginning of each song, and I paste it in.

Even if you have no intention of adding live instruments to your song, it doesn't hurt to have some count-off measures. You never know what might happen in the studio. You may run into a Kaluli Mouth Harp virtuoso who is perfect for your track. Keep your options open. But these count-off bars will serve other purposes, too.

These two bars give you the opportunity to reset all your MIDI instruments. The count-off sequence I use contains Pitch Bend and Modulation messages of zero. If I have used any other controllers during the song, I paste in zero messages for those, too. This is also a good spot to place your initial Program Change messages.

NORMALIZING GAIN

Perhaps the most important function of the count-off sequence is to normalize the gain of your instruments. Throughout the pre-production phase, you have been making a rough mix of your tracks. You probably used MIDI Volume messages to do this. In the studio, though, you want to record each instrument at an output level most likely to achieve the maximum signal-to-noise ratio. For most synths and samplers, this is full volume. There are a few exceptions, particularly with older instruments; experiment with your gear to find the best levels.

To simplify this process, include in your count-off sequence a MIDI Volume message of 127 on each channel. During the sequencing process try to adjust levels using the mixer, rather than MIDI messages. Unless your mixer features automation, this means you must abandon the pleasures of automated mixing with MIDI Volume messages. That is the trade-off for maximizing the signal-to-noise ratio.

Adjusting individual instrument levels at the mixer may be impossible with multitimbral devices that lack sufficient audio outputs, however. In that event, use the minimum number of Volume messages required, preferably placing them on beat 1 of the pattern, where they are easy to find and delete. When you paste the count-off measures into the song, delete all other Volume messages. It may sound a bit odd if the wind chimes blast away the lead guitar, but it keeps your tracks clean.

At the same time, you should make a thorough check of all Velocity messages. Most of the time, these can stand some tweaking. A common practice in most studios is to apply compression to at least the kick, snare, and bass. You can save some studio time by compressing their Velocities now. The simplest way to accomplish this is to divide their Velocity values by two and add the same number to all of them.

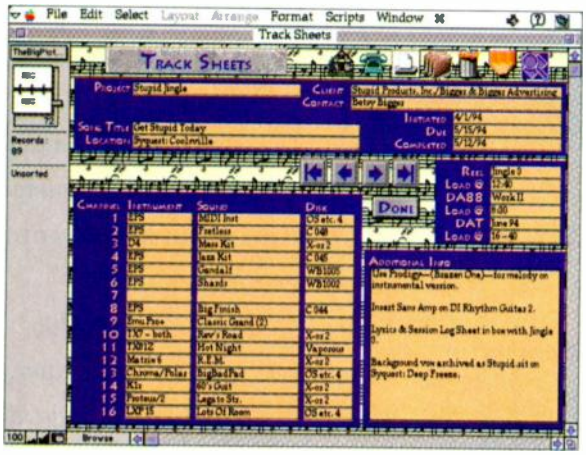

FIG. 2: A simple database program is a great way to document and track the details that abound in every project.

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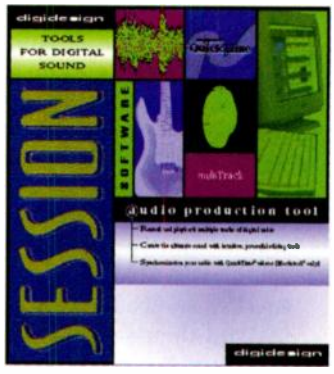

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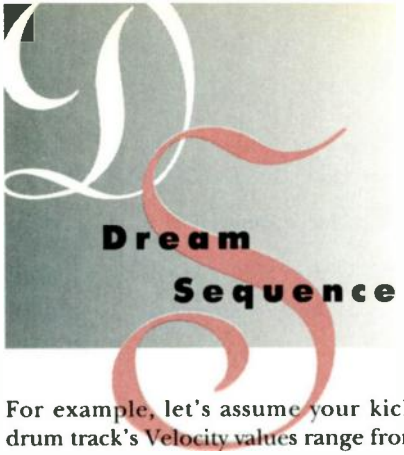

For example, let's assume your kick-drum track's Velocity values range from 72 to 127, and you want to compress them so that they fall within the range of 100 to 127. Select the entire track, divide all the Velocities by 2, and add 64 to each one.

DECISIONS, DECISIONS

Now is the time to make some decisions about how you are going to treat your MIDI instruments in the recording studio. First, you're going to need to decide which instruments to lay to multitrack tape and which to keep virtual (played by the sequencer in sync with the multitrack).

There are several advantages to keeping the maximum number of tracks virtual all the way to mixdown. It lets you create far more tracks than are possible with a tape machine. Also, you can edit all virtual parts and their accompanying sounds, in fine detail, right up to the last minute. Finally, although this may be of decreasing importance in the age of digital recorders, virtual tracks are recorded with first-generation fidelity at mixdown.

There are at least two big negatives to keeping the tracks virtual. First, you end up using a lot of effects processors simultaneously at mixdown. If you take the tracks to tape, you can use the studio's high-end superprocessor more than once.

But for me, the main issue is how many times you end up lugging your gear to the studio. Any instrument you leave virtual may have to be carried to the studio for a given session. When the guitarist comes in to record tracks, you may have to haul your gear to the studio, and you might have to do it again every time the sax player, lead vocalist, and background singers come in. And then you need to haul it for mixdown. You could waste quite a few studio hours setting up and tearing down your gear.

A few workarounds can help you keep your tracks virtual. First, keep in mind that most session players don't have to hear the entire mix to do an overdub. The sax player might be able to do just fine with a taped scratch vocal and sequenced bass, drums, and pad. You can do that with one 32-voice sound module, and it doesn't necessarily have to be a module used at mixdown. If you have been using General MIDI track and channel assignments from the beginning, you'll reap the benefits here; one low-cost GM module might even handle all the interim sessions.

The other alternative is to record to tape, at the first session, a rough stereo submix of the virtual tracks required for overdubs. These scratch tracks are merely intended to supply the same basics as the single-module sequence and can be dumped later, but in the meanwhile, they could relieve you from the hassle of hauling synths and sequencing gear every time.

Another point to consider is whether the instrument needs to be treated with a specific effect. For example, a crunch guitar sample may need to be processed through a speaker emulator or guitar effects unit. If so, it may be more convenient to put the instrument on tape, especially if you want to use your own effects box. (It's one less box to carry around.)

The next decision you need to make is what to do about stereo samples. Stereo samples sound great, but they take twice as many tape tracks, mixer channels, patch cords, inserts, sends, and returns, all of which are limited commodities in most studios. Stereo instruments also limit your panning choices at mixdown. To retain their stereo image without phase problems, they generally must be panned hard left and right.

To avoid running out of studio hardware, not to mention crowding the middle of the soundstage, it is important to anticipate which sounds must be stereo and which can be mono. Unless an instrument is featured out front, plays a solo part, needs to be spread across the soundstage (for example, grand piano), or incorporates stereo panning effects, it is best recorded in mono. It is critical to edit your stereo samples and synth patches to make sure they are mono-compatible *before* you go to the studio.

Similarly, you should turn off the effects in your keyboard, especially for tracks that are going directly to tape. Unless a specific effect is integral to a particular patch, leave it off. You can always add effects later; you can never take them away. Besides, most studios have a variety of effects devices that sound much better than the ones in your keyboard. These high-end effects

General MIDI Drum Map

MIDI #	Note	Sound
35	B1	Acoustic Bass Drum
36	C2	Bass Drum 1
37	C♯2	Side Stick
38	D2	Acoustic Snare
39	D♯2	Hand Clap
40	E2	Electric Snare
41	F2	Low Floor Tom
42	F♯2	Closed Hi-Hat
43	G2	High Floor Tom
44	G♯2	Pedal Hi-Hat
45	A2	Low Tom
46	A♯2	Open Hi-Hat
47	B2	Low Mid Tom
48	C3	Hi Mid Tom
49	C♯3	Crash Cymbal 1
50	D3	High Tom
51	D♯3	Ride Cymbal
52	E3	Chinese Cymbal
53	F3	Ride Bell
54	F♯3	Tambourine
55	G3	Splash Cymbal
56	G♯3	Cowbell
57	A3	Crash Cymbal 2
58	A♯3	Vibraslap
59	B3	Ride Cymbal 2
60	C4	Hi Bongo
61	C♯4	Low Bongo
62	D4	Mute Hi Conga
63	D♯4	Open Hi Conga
64	E4	Open Low Conga
65	F4	High Timbale
66	F♯4	Low Timbale
67	G4	High Agogo
68	G♯4	Low Agogo
69	A4	Cabasa
70	A♯4	Maracas
71	B4	Short Whistle
72	C5	Long Whistle
73	C♯5	Short Guiro
74	D5	Long Guiro
75	D♯5	Claves
76	E5	Hi Wood Block
77	F5	Low Wood Block
78	F♯5	Mute Cuica
79	G5	Open Cuica
80	G♯5	Mute Triangle
81	A5	Open Triangle

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GET IT IN WRITING

Last, but definitely not least, document everything. Keep detailed records from the beginning of your project through its completion. The best way to do this is to enter all the relevant information into a simple database program. The database I use (see **Fig. 2**) includes basic client contact information, the location of the sequencer file, the instruments and sounds used on the project, and the locations of those sounds. The names of the multitrack tapes and the DAT master are also listed, along with the load times or program numbers for the project. The space at the bottom is used to record additional information, such as non-MIDI instruments and effects devices used, the location of lyrics, session notes, and other information of importance.

A database like this is simple to set up and will save you a lot of time. If you don't have a database program, design a form in your word processor, or create a paper form and photocopy it. Take notes as you work, and store them where you can easily find them.

PROMOTE WORLD PEACE

Following these steps to prepare your project for the studio may seem like a lot of extra work, but it will save you time, money, and headaches in the studio. Perhaps more importantly, it will let you concentrate less on technical details and more on making music. This will reduce the amount of stress you experience, hence reducing the amount of stress you pass on to others. Which perhaps will lead to a lasting world peace. Or maybe not. Anyway, it couldn't hurt.

Oh, and one more thing. When you pack your gear for the studio, don't forget the power cords!

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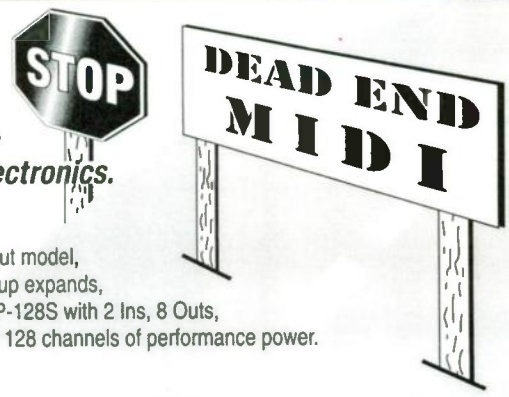

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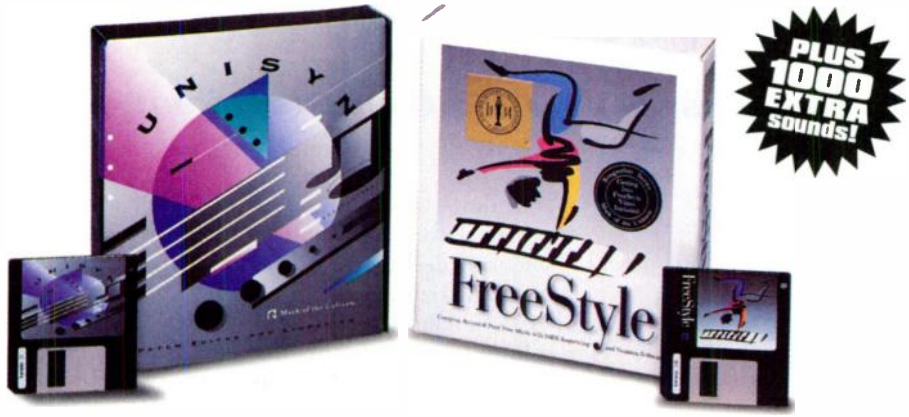

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SERVICE CLINIC

Soldering, Part 2

Tips and techniques for creating the perfect joint.

By Alan Gary Campbell

Last month, we explored basic soldering theory, soldering and desoldering devices, the preparation of PC boards and components, and types of solder. We considered that closed-loop, temperature-controlled soldering and desoldering stations were best for reliable work; that 63/37 solder was the preferred alloy; and that all work should be properly cleaned before soldering. With those points in mind, let's get to the soldering business at hand.

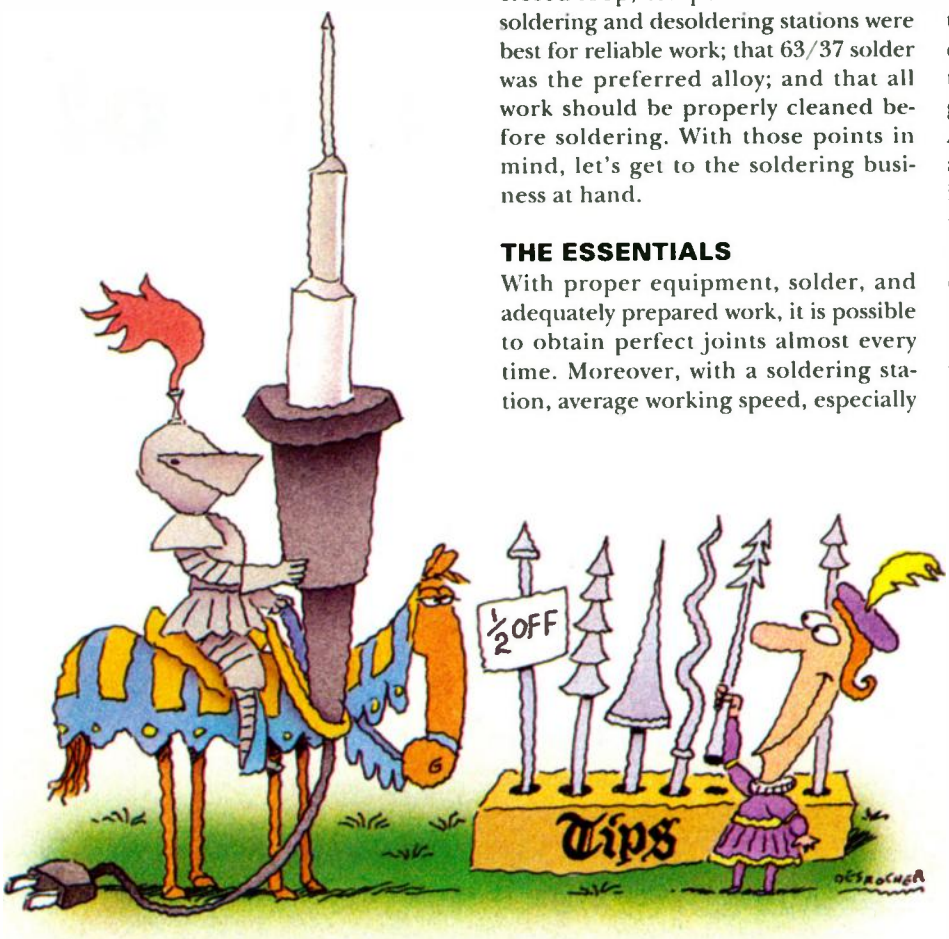
THE ESSENTIALS

With proper equipment, solder, and adequately prepared work, it is possible to obtain perfect joints almost every time. Moreover, with a soldering station, average working speed, especially when you're working with small components, can be very fast: a completed joint in about the time it takes to say "solder."

The key points for fast, reliable joints are simple: a good station, the right tip, and a clean sponge, all in good condition; the right solder; the right temperature setting; clean work; and good mechanical support for the joint. Assuming that the do-it-yourselfer has access to an Ungar or Weller soldering station in good condition, the first requirement is met. (With an older station, sometimes the heating cartridge can lose capacity before it fails completely.)

Select a tip based on the size of the work. For ICs and other small solid-state components, only a small tip (approximately 1/32-inch) should be used. This helps avoid annoying solder bridges between pins. For somewhat larger components, such as resistors and capacitors (especially power-supply filter caps), intermediate-size tips are preferable. For electromechanical components, such as audio jacks, use a comparatively large (1/8-inch) tip. As the work progresses, it is far better to allow a station to cool and switch to the proper tip than to solder larger or smaller work with the wrong-size tip.

All quality soldering and desoldering stations provide a receptacle for a cleaning sponge, an essential element of good soldering practice. The sponge



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THIS SPRING, we're particularly excited about the books we've published ourselves over the past couple of months, including a new title from our Rockpress imprint, the new *1995 Recording Industry Sourcebook* and *Sourcebase*, the first annual *Audio and Music Education* and *Onstage* directories, and our first-ever CD-ROM: *The Allen Sides Microphone Cabinet*. Backed by the industry knowledge of the publishers of *Mix*, *Electronic Musician* and Mix Bookshelf, these titles will give you invaluable help with your music business or music production career. And this is just the tip of the iceberg—be sure to call for a free copy of our main catalog, with over 600 titles in all!

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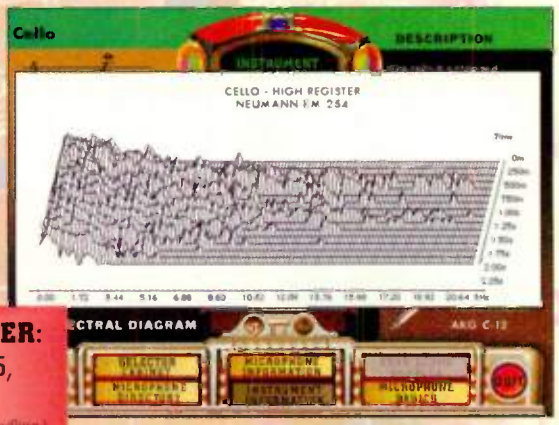

Allen Sides has recorded and mixed sessions for dozens of world-class artists such as Ry Cooder, Count Basie, Ray Charles, Sinead O'Connor and Brian Setzer.

David Schwartz, producer of this CD-ROM project, is the founder and former editor-in-chief of *Mix*, the world's leading magazine for sound and music recording and production.

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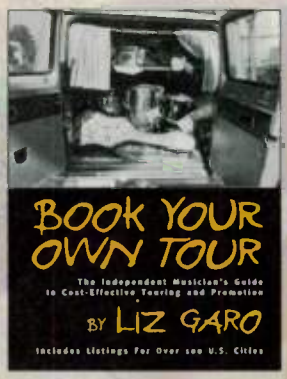

BOOK YOUR OWN TOUR
Liz Garo
© 1995, 175 pp. (P)
3049A) $19.95

This guide to "planning and surviving an independent tour" offers city-by-city directories of clubs, promoters, record stores, radio stations, print media and other fun stuff, like where to stay for cheap and where to get good coffee and vegetarian food. Garo also includes sections putting together promo packages for clubs, dealing with club owners and promoters, getting paid and using local media, as well as sample contracts, tons of interviews with folks who've been through it all. She even provides a van buyer's guide and directions for building a loft! This is by far the most complete title of its kind.

And check out these Rockpress classics:

GETTING RADIO AIRPLAY, 2nd Ed.
Gary Hustwit
© 1993, 125 pp. (P)
Learn how to get your record played on radio and make waves for your band by being smart about sending out review albums and professionally following up with phone calls. Features interviews with radio station music directors, record label promotions staff and independent artists who've done it. Includes new, updated college and commercial radio directories. **3027A) $19.95**

NETWORKING IN THE MUSIC INDUSTRY
Clevo & Olsen
© 1993, 225 pp. (P)
Find ways to meet other music professionals who can help your career with this streetwise book. Learn how to use music conferences, video, computer bulletin boards, music associations and the press to make valuable new contacts. Includes candid discussions of label/artist relationships, music publishing and the indie scene. **3052A) $19.95**

101 WAYS TO MAKE MONEY RIGHT NOW IN THE MUSIC BUSINESS
Bob Baker
© 1992, 140 pp. (P)
If your career plan only covers gigging and recording, you could be ignoring dozens of money-making opportunities. Use this book to discover specialized niches you may have overlooked, generate extra revenue and jump-start your career. Don't spend a lifetime paying dues—explore these untapped markets and cash in now! **3045A) $14.95**

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1995 RECORDING INDUSTRY SOURCEBOOK

©1995, 475 pp. (Spiral) **1951A) $74.95**

Announcement: Beginning with this 1995 edition, *Recording Industry Sourcebook* and Mix Bookshelf have joined forces to create North America's essential music business and production directory! This massive industry guide is a top-quality, spiral-bound, tab-divided book with over 12,000 updated listings in 55 categories. It offers comprehensive directories of record labels, producers, managers, distributors, attorneys, equipment suppliers, music video companies, media contacts and much more. Entries list contact names, titles, phone and fax numbers, styles of music preferred and information on whether they'll accept unsolicited demos.

RECORDING INDUSTRY SOURCEBASE

We also offer our unparalleled database on 3.5" disks for Macintosh or Windows! Professional Manager gives you 55 categories covering music business and production, while Personal Manager breaks out the production categories for working musicians. Both packages include *ACT!* contact management software and a copy of the *Sourcebook* itself.

Professional Manager, Macintosh **1946MA) $695.00**
Professional Manager, Windows **1946WA) $695.00**
Personal Manager, Macintosh **1945MA) $395.00**
Personal Manager, Windows **1945WA) $395.00**

Audio+Music EDUCATION 95

AUDIO AND MUSIC EDUCATION 1995

©1995, 88 pp. (Bound) **AME) $15.00**

New for 1995 is our comprehensive listing of programs from all over the U.S. and Canada in music recording, music technology, electronic music, music business, audio post-production, sound reinforcement, broadcast communications and music theory. Also includes articles on careers and choosing a program, plus resource listings of industry organizations, publications and software manufacturers.

ONSTAGE

ONSTAGE 1995

©1995, 96 pp. (Bound) **OS) $15.00**

Onstage, available in July, encompasses all segments of audio performance in a single annual directory. Listings include remote recording, sound reinforcement, lighting companies, equipment retail and rental, arenas and stadiums, booking agencies, managers, touring companies, promoters, production personnel, insurance companies, security services, corporate sponsors, festivals and more! Plus, we've included a list of high-tech services such as networks and satellite broadcast companies.

1995 MIX MASTER DIRECTORY

©1995, 208 pp. (Bound) **995A) $24.95**

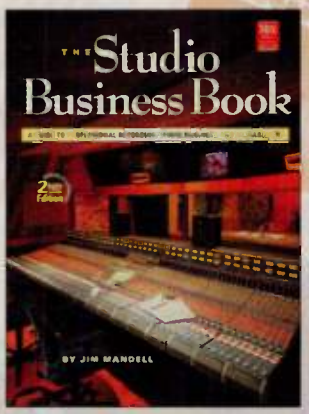
Our national business-to-business directory for the audio industry features manufacturer listings with new and current products, cross-indexed by product type. It also lists audio recording and video production facilities, sound reinforcement and remote recording companies, mastering, duplication and CD replication services, independent engineers and producers, studio designers and suppliers, recording schools, seminars and programs, trade organizations, and more.

WRH

New titles from Cardinal Business Media!

MACTWEEK/ WINTWEEK
Keith Seppanen
©1995, one 3.5" disk.
Macintosh **018A) $14.95**
Windows **019A) $14.95**

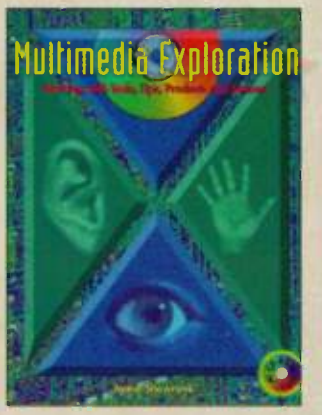
New from Mix Bookshelf—an accurate computer simulation of the tape alignment procedure for analog recorders! Designed as a supplement to classroom instruction, this inventive program is divided into three sections: Overview allows the user to explore the various components of the recorder, Tutorial demonstrates the alignment procedure step by step, and Simulation lets you perform the procedure unaided to test your comprehension.



THE STUDIO BUSINESS BOOK, Revised Edition
Jim Mandell
©1995, 288 pp. (P)
1319A) $34.95

MIX PRO AUDIO SERIES

The updated MixBooks edition of this informative, wide-ranging guide offers in depth, detailed, specific information on all aspects of putting together and managing a recording studio, including: writing a business plan, getting funding, buying equipment, determining expenses and rates, bidding on projects, developing new contacts, advertising and PR, scheduling, managing, hiring and firing personnel, and more. It also provides a reference guide to studio terms and technology, a list of industry organizations and a recommended reading list.



MULTIMEDIA EXPLORATION: Working With Tools, Tips, Products and Sources
Jamie Showrank
©1995, 311 pp. (P) with CD-ROM
3921A) $38.95

This new book/CD-ROM package from CBM Books walks you through multimedia applications and authoring, the resources used in multimedia projects, and the systems that network multimedia data. Features chapters on enabling technologies, the various aspects of CD-ROMs, sound sampling and synthesis, MIDI, photo images, digital video, networking, conferencing and online applications. It also includes lists of multimedia organizations and periodicals, authoring tools, CD-ROM recorders, conferencing products and Internet packages.

MODULAR DIGITAL MULTITRACKS: The Power User's Guide
George Petersen
©1994, 128 pp. (P) **003A) $29.95**

MIX PRO AUDIO SERIES

The only book on the revolutionary new modular digital recorders! Petersen provides unbiased evaluations of the units and their peripherals, inside tips on connecting and operating them, advanced techniques for synchronization, editing and mixing, features that aren't mentioned in the manufacturers' literature, and secret commands and undocumented error messages. And the book pays for itself, with instructions for making your own cables and snakes!

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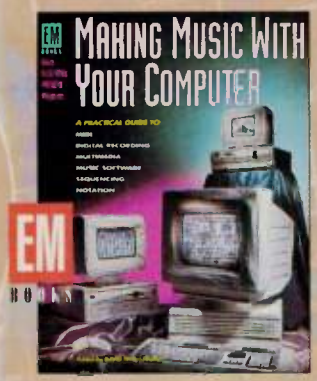
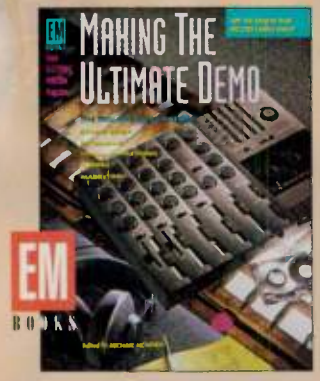


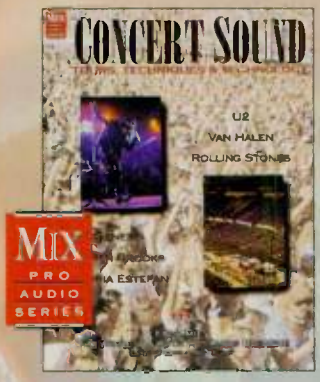
MAKING MUSIC WITH YOUR COMPUTER
David (Rudy) Trubitt, ed.
© 1993, 128 pp. (P)
013A) $17.95

A valuable introduction to the basics of computer music—whether you're a computer user entering the world of music and sound or a musician searching for the right computer, this book will help you get the most out of today's electronic music technology. You'll learn how computers contribute to the creative process and get tips on selecting programs and gear, plus info on MIDI sequencing, music notation, hard disk recording and desktop multimedia, a directory of manufacturers and an extensive glossary.



MAKING THE ULTIMATE DEMO
Michael Molenda, ed.
© 1993, 128 pp. (P)
017A) $17.95

This book will teach you how to record and market a demo tape—a critical step toward gaining exposure for your music. You'll learn how to record killer vocal and instrumental tracks, use signal processing like the pros and make intelligent mixdown decisions. And once your ultimate demo is "in the can," you'll know how to release and promote your recording on a budget and approach record labels without wasting your time. Packed with tips from industry veterans, this book will improve both the sound of your recordings and your prospects for success.



CONCERT SOUND: Tours, Techniques & Technology
David (Rudy) Trubitt, ed.
© 1993, 180 pp. (P)
004A) $24.95

Go behind the boards with today's top touring acts and learn the basic principles of live sound from the pros. Concert Sound combines exclusive coverage of 24 major tours, including U2, the Rolling Stones, Garth Brooks and k.d. lang, with practical chapters on live sound techniques and business, safety issues and new technologies. Special sections on monitor mixing, drum miking, noise regulations and computer control make this a unique introduction to professional sound reinforcement.

MIX REFERENCE DISC
From Mix magazine
© 1994, one compact disc
MRD)

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From the world's leading pro audio magazine comes the most affordable and most widely used test-tone CD on the market today. This versatile professional tool has a variety of applications, including tape deck alignment, audio equipment calibration, testing sound system performance, troubleshooting and diagnostics. It features alignment tones, 1/3 octave bands, frequency sweeps, a digital black noise check and frequency response tests, at a fraction of the cost of competing test-tone CDs.

SOUND FOR PICTURE: An Inside Look at Audio Production in Film and Television
The Editors of Mix
© 1993, 140 pp. (P)
011A) $17.95

Packed with film-scoring secrets! Take a look behind the scenes as top Hollywood sound professionals reveal how dialog, sound effects and musical scores are recorded, edited and assembled into seamless soundtracks. Exclusive case studies spotlight blockbusters like *Terminator 2*, *Malcolm X*, *The Simpsons*, *The Doors*, *Twin Peaks* and many others, focusing on both the equipment used and the philosophical side of sound design.

MUSIC PRODUCERS: Conversations With Today's Top Record Makers
The Editors of Mix
© 1992, 128 pp. (P)
006A) $17.95

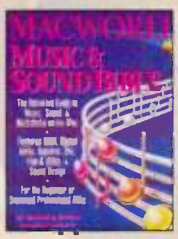
Twenty-four producers, including Don Dixon (R.E.M.), Bruce Fairbairn (Aerosmith), Daniel Lanois (U2), Bill Laswell (P.I.L.), Jeff Lynne (Tom Petty), George Martin (The Beatles), Hugh Padgham (Sting), Phil Ramone (Billy Joel), Rick Rubin (Red Hot Chili Peppers), Don Was (Bonnie Raitt) and 13 others discuss how they got started, how they mediate between labels and artists, what equipment they prefer, analog/digital format decisions, how they 'build' a mix and much more.

Bookshelf Bestsellers

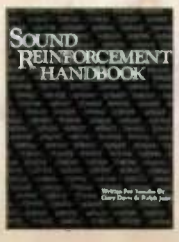
MODERN RECORDING TECHNIQUES, 4th Ed.
Huber & Runstein
© 1995, 425 pp. (P)
Entirely rewritten edition of this popular intruductory text is a comprehensive, readable up-to-date guide to all facets of recording. **1031B) $29.99**

THE MUSICIAN'S BUSINESS AND LEGAL GUIDE
Mark Halloran, Ed.
© 1991, 454 pp. (P)
The most complete, accessible book yet on music business and law, with real-life examples that any musician can understand. **3013B) $29.95**

MIDI FOR THE PROFESSIONAL
Lehrman & Tully
© 1993, 239 pp. (P)
This advanced reference combines in-depth technical information with expert creative advice and practical production tips. **3480A) $19.95**



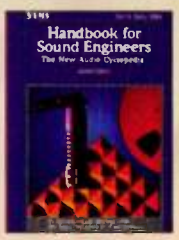
MACWORLD MUSIC & SOUND BIBLE
Christopher Yavelow
© 1992, 1,398 pp. (P)
In-depth analysis of over 800 Mac hardware and software options for MIDI sequencing, notation, digital audio, sampling and multimedia, plus System 7 coverage. **3522B) $37.95**



SOUND REINFORCEMENT HANDBOOK, 2nd Ed.
Davis & Jones
© 1989, 417 pp. (P)
This comprehensive reference work on live sound reinforcement examines every aspect from current and cables to speaker placement and room equalization. **1405B) $34.95**

STUDIO BUSINESS FORMS
Kevan Patten
46 vital documents on disk, including work order, contract, invoice, equipment inventory, take sheets, track sheets, cue sheets, and more, plus tape label and J-card templates.
Paper version **1056A) $39.95**
Macintosh **1057A) $39.95**

MUSIC BUSINESS CONTRACTS
Kevan Patten
© 1993, 44 pp. (Bound) plus disk
Essential music contracts on computer disk! Includes forms for recording and publishing deals, songwriters, vocalists, performers, joint ventures, partnerships and producers—43 in all.
Macintosh: **3031-MA) $49.95**
IBM (3.5" disk): **3031-P3A) $49.95**



HANDBOOK FOR SOUND ENGINEERS: The New Audio Cyclopedia, 2nd Ed.
Glen Ballou, ed.
© 1991, 1,506 pp. (H)
The definitive pro audio technical reference, with updated coverage of sound-system design and installation, loudspeaker and enclosure design and typical audio circuitry. **1595B) $99.95**

BUILDING A RECORDING STUDIO, 4th Ed.
Jeff Cooper
© 1984, 209 pp. (Spiral)
This classic advanced book on studio planning and construction covers acoustics, soundproofing and studio and control room design. **1300C) $29.95**

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should be kept damp—not soaked—and frequently cleared of excess solder and residue. The solder should be brushed away into a solid-waste receptacle, and then the remaining residue can be washed out under the tap. *Under no circumstances should a soldering sponge be washed in a sink used for food preparation, because solder contains lead.* A worn sponge quickly loses its ability to clean and should be replaced. Use only the manufacturer's recommended sponge.

As mentioned last month, a 63/37, rosin-core (single- or multicore) solder is ideal for all electronics work. A 0.037-inch diameter solder is well suited for IC and small-component work but is still usable with larger components. However, you might find 0.025-inch solder easier to handle. Proper cleaning of PC boards and components was also detailed last month. It is critical to clean *all* components before soldering. You cannot solder properly if your work isn't clean.

Proper temperature setting is important, too. Around 600 degrees Fahrenheit is appropriate for small, solid-state components. Intermediate temperatures apply to somewhat larger components. High or maximum temperatures are rarely needed and should be reserved for large electromechanical components. Cranking up the temperature setting is no substitute for proper tip size or clean work.

Another critical factor is mechanical support. Component leads should be spread slightly ("cinched") to provide stability on PC boards, and connections to panel components should be passed through solder eyelets and lightly crimped.

SOLDERING TECHNIQUES

With a new tip in place, turn on the station (or iron) and wait a few minutes for it to reach the operating temperature. Then apply a modest amount of solder to the tip and let it sit for a moment. Assuming that the work is adequately prepared, you'll be ready to make the first joint. Check the temperature setting before proceeding.

Wipe the solder from the tip onto the sponge. Add a *small* amount of solder to the tip—just enough to coat it—and immediately touch the tip to the junction of the component lead and PC trace (or component lead and eyelet, etc.). Feed solder evenly to the joint until it forms a shallow fillet. Remove the solder supply first, then the tip. Wipe the tip on the sponge, then add a small amount of solder to the tip and return the unit to its cradle. That's all.

Conventional wisdom claims, "heat the work, not the solder," a tenet the above procedure seems to violate. But the minuscule amount of solder added just before contact with the work does not degrade the joint; rather, it ensures maximum heat transfer. Joints produced by experienced technicians using this procedure are indistinguishable from factory wave-soldered joints, except when this procedure works better.

Of course, this example describes treating a single joint. In practice, several joints can be completed, in sequence, before the tip needs to be cleaned by wiping on the sponge. After cleaning the tip there is no need to return the unit to its cradle to "recover." Simply add the minuscule amount of solder required for good heat transfer and proceed to the next joint. It is important, however, to remember to clean the tip and then add a small amount of fresh solder before allowing the unit to idle. This prevents premature oxidation and degradation of the tip.

Proper technique will result in a beautiful, even, lustrous joint. If the joint is dull or grainy—a "cold" joint—the work was not clean, the iron was not hot enough, or the joint was disturbed before cooling. A cold joint should be resoldered. If this has no effect, the joint should be desoldered, cleaned, and resoldered. Excess solder on a joint is undesirable; desoldering and resoldering is preferable. Nonetheless, repeated reheating of a joint is sure to damage both the component and the PC board. It is better to get it right the first time.

FIVE RULES FOR SAFE SOLDERING

- Solder fumes are potentially harmful; always provide adequate ventilation.
- Keep flammable materials away from soldering and de-soldering equipment.
- Cover sores, cuts, or abrasions before handling solder, and wash your hands thoroughly after handling it.
- Don't inadvertently allow solder to contact the eyes, nose, or mouth.
- Keep food and drink out of the soldering area.

▼

It is all too easy to damage a PC board during desoldering.

DESOLDERING TECHNIQUES

Like soldering, desoldering requires equipment in good condition, the right tip, the right temperature setting, and clean work. Poor results almost always come from dirty or worn desoldering tips or the failure to clean the station regularly. It is vital to clean the bore of the desoldering device frequently with a large-diameter rod. Also, be sure to empty the solder receptacle and replace filters *before* they become "backed up."

Proper tip selection is dictated by the diameter of the lead to be desoldered. As with soldering, it is far better to allow the unit to cool and change tips to suit the work than to proceed with the wrong tip. Unlike soldering tips, desoldering tips need to be filed lightly to remove accumulated debris. Use only the light-duty file provided with the unit; a conventional file will damage the tip.

Temperature settings for desoldering are critical, as it is all too easy to damage a PC board during desoldering. Refer to the desoldering station manual for proper settings. To prevent thread seizure, don't forget to loosen the tip when the unit is turned off.

PRACTICE, PRACTICE

We have covered the basic techniques of soldering and desoldering, but mastery requires practice. I strongly recommend the construction (and possibly deconstruction) of simple kits as a learning aid.

EM *contributing editor* **Alan Gary Campbell** *is owner of Musitech.*

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WORKING MUSICIAN

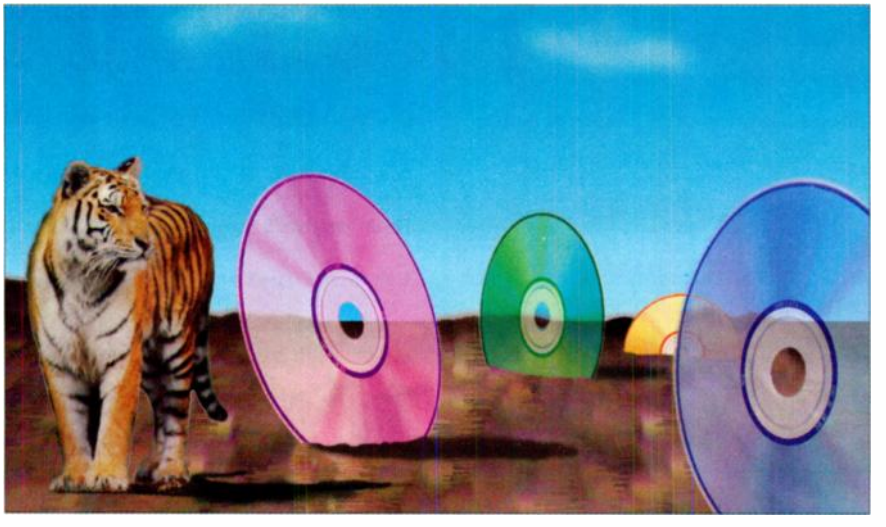
Welcome to the Frontier

Multimedia opens up a brave new world for you and your music.

By Ric Stewart

Have you thought about working in multimedia but haven't been able to pinpoint exactly what the industry has to offer musicians? Or maybe you have a good idea of the type of opportunities that are out there but don't know how to get your foot in the door. The confusing thing about the multimedia industry is that it is difficult to define, but that quality also makes it an area ripe for creative exploration. One certainty is that there is no better time than the present to get started in this fast-growing field, which many liken to the burgeoning recording industry of the early 1960s.

The process of hawking one's goods in the multimedia industry isn't that much different from marketing one's talents in the recording, commercial, and industrial music businesses. Just create a good demo and shop it to the producers, publishers, and developers of multimedia products. Of course, that's the simplified version of the process. There are many paths you can take in creating your demo, and there are a wide variety of products that need your musical talents.



DMITRY PANICH

Some options in putting together a demo include submitting a recording of your musical works to active multimedia developers large and small, learning some programming and putting sound to your own product, or working with a local programmer by providing a multimedia soundtrack. You should consider what the recipient of your demo wants to hear, but as a rule of thumb, you will be hired on the originality and quality of your music, regardless of genre or instrumentation. Don't worry that your work is too obscure or different sounding, because producers constantly seek new and exotic sounds.

If you do not know how to program, don't be daunted. Although taking a course in basic programming provides a good understanding of the production process, it's not always considered necessary. Many large developers/publishers of multimedia are hungry for musical content and have a staff of technical personnel who can take your

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basic track and weave it into the sound of a game or title.

WHAT IS MULTIMEDIA?

The term *multimedia* is usually used to describe the convergence of the communication, music, film, and publishing industries. Although multimedia is considered a fledgling industry, it has already expanded the job market for electronic musicians. The shift to formats such as CD-ROM, 3DO, Sony Playstation, and Saturn continues to increase the opportunities to use sound in new and exciting ways. At the same time, the quickly developing consumer market is creating a strong demand for products with music. These trends have created jobs for talented composers, bands, and solo artists with a knowledge of programming. For those ready to take on the challenge, the new formats represent the dawn of an entertainment era that could lead to richly fulfilling artistic projects. However, those embarking on this bold new adventure should be forewarned of the economic uncertainty currently shaking up the young industry.

CD-ROMs have received a great deal of fanfare because of their capacity to store image, sound, and text, but many consumers find CD-ROMs lacking because they cannot integrate television-quality image and Red Book-quality sound, for example. While these dilemmas are being resolved, the developers and publishers of multimedia continue to churn out thousands of titles despite reports that a vast majority of developers/publishers do not recover their investment costs. A word to the wise: Make certain that payment for a project is not tied solely to its profitability. Do not despair, however, as the experience of working on even a small project with a local programmer and familiarizing yourself with the process, the products, and the people are all steps in the right direction.

THE SOUNDTRACK

One major use of music in multimedia projects is to provide a soundtrack for a game or adventure program. Marc Canter of Canter Technology—whose background runs the gamut from opera to multimedia authoring tools to the recent interactive, music-based title *Meet MediaBand*—has referred to sound as "the orphan child of multimedia." On many projects the soundtrack is accorded only ten percent of the memory. The prevailing logic is that the sound makes the image come alive, but people really expect more from the images. Also, the eye requires more information to be fooled than the ear does. In response, many developers have learned to creatively use 8-bit sound, while the move to 16-bit, 44 kHz audio and better playback equipment is already underway.

Major developers such as Electronic Arts and LucasArts have made a concerted effort to push CD-ROM games

RIC STEWART

Pop Rocket's Kent Carmical says that even though it helps to have some programming skills, nothing replaces musical ability and good, old-fashioned networking.

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MUSICIAN

that operate on PC and Macintosh. At LucasArts, Peter McConnell designs sound for CD-ROM adventure titles. "We try to create a realistic soundtrack for our games," says McConnell. "Our goal is that if someone were in the room next to the one you were playing a game in, they couldn't tell whether they were hearing the game or a television program." The secret to the fluidity of sound created for such impressive projects is using 8-bit sound (still relegated to a small portion of the overall disc) in a way that resembles a feature-film soundtrack.

On the LucasArts title *Full Throttle*, separate cells of ambient sound—such as crickets chirping—may be on a loop, while the player's movements trigger Foley sounds and subtle sound cues, with a recorded rock and roll band kicking in when the game's biker takes to the road. McConnell suggests that musicians interested in multimedia sound design study scores by masters of film and TV such as Ennio Morricone, Elmer Bernstein, John Williams, and Danny Elfman to gain insight into the marriage of music, themes, cues to dialog, and other sounds.

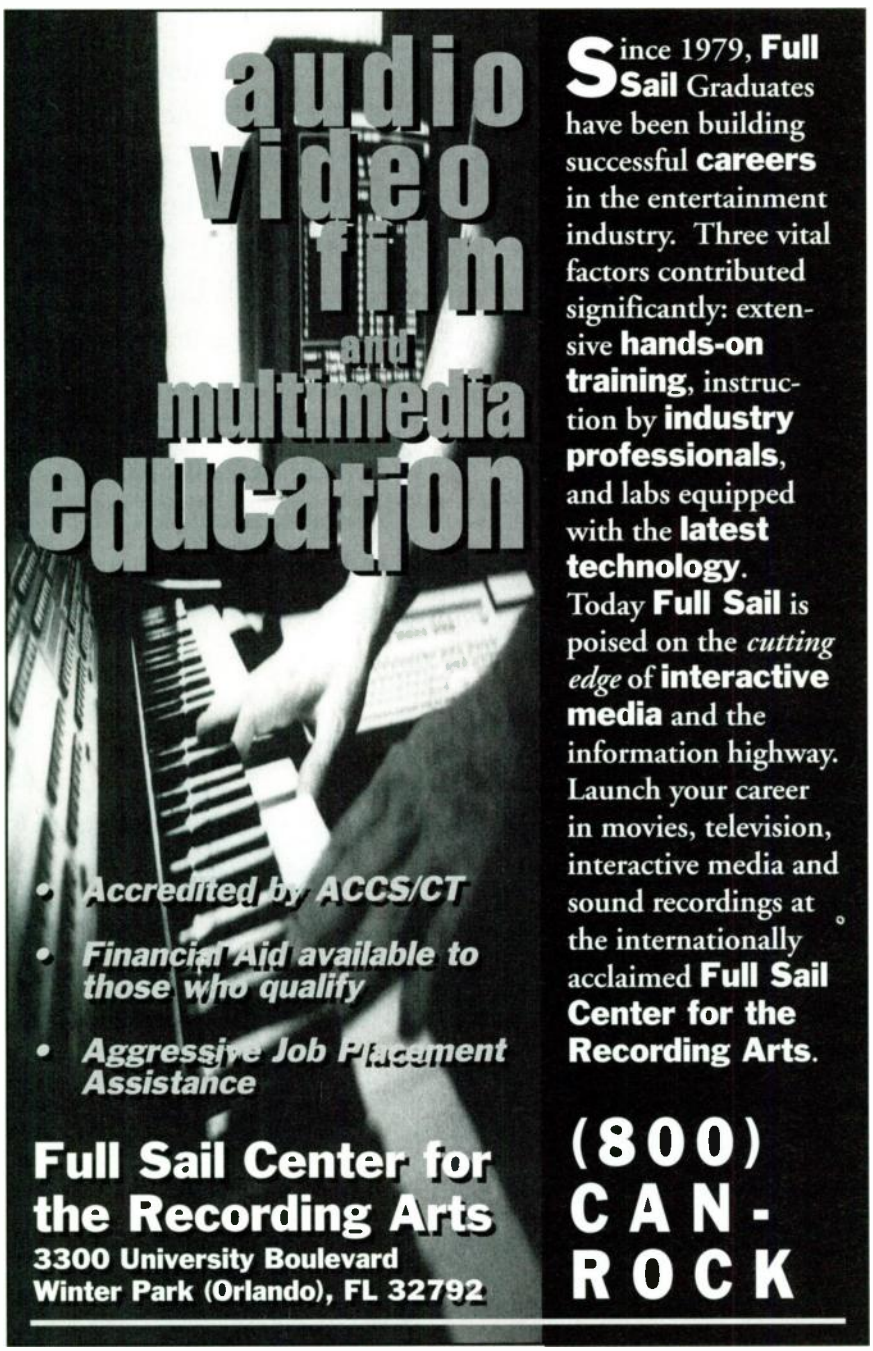
At Electronic Arts, a slightly different approach to sound prevails. Music Director Murray Allen has started to emphasize fidelity by using Red Book standards and showcasing tracks by bands such as Soundgarden on the recent *Road Rash* title. Electronic Arts plans to release an audio CD of music created for its games in the near future, which would join a similar product from Sierra On-Line currently on the market. The theme from *Tetris* epitomizes this cross-market synergy, as the video-game song actually reached number one on the English pop charts two years ago. Other game themes have also hit the Top 10. The boundaries between pop and computer culture are disappearing, offering great incentive to musicians with lofty ambitions. Before long, CD-ROM soundtracking may take on the luster of film and television soundtrack work.

"If you get a job playing any kind of music, it beats digging a ditch."

—Kent Carmical

THE BIG STUDIOS

It may be surprising that music was just a hobby for many of the staff at the music departments of the big developers/publishers such as LucasArts and Electronic Arts (currently the largest CD-ROM publisher) until multimedia created new musical opportunities. In your search for work at a large production house, it never hurts to know about the whole production process, even though a demo that showcases your talent as a composer or performer will make you stand out even without that extra knowledge. According to Allen, only a small percentage of the tapes coming in show true quality and originality; many fail to be exciting because they are too derivative. Allen, who was a saxophone player and recording-studio owner, says, "Quality is becoming aware of what the best is. The best thing is to expose yourself to a



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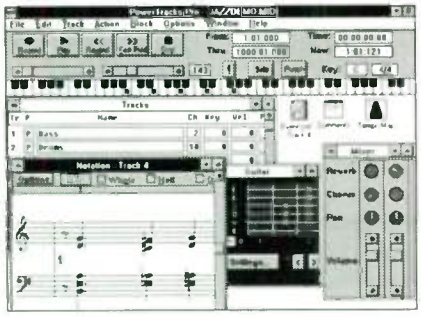

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REQUIREMENTS: PowerTracks for Windows - Windows 3.1, IBM Compatible AT, 386 or higher, 2mb RAM. Supports any device compatible with Windows 3.1 including Roland MPU401, Music Quest MQX interfaces, Key Electronics MIDIATOR, SoundBlaster, AdLib, TurtleBeach, etc. PowerTracks for DOS - DOS 3.3 or higher, 640K, XT, 286, 386 or better. MIDI interface (Roland MPU401, Music Quest MQX series, SoundBlaster MIDI and FM sounds, Midiator, Roland SC7, Yamaha TG100) or AdLib/SoundBlaster compatible sound card.

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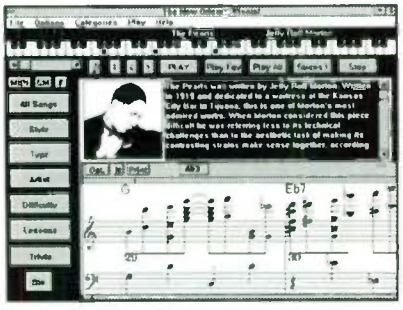

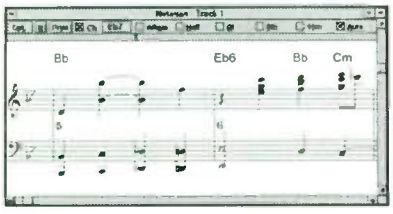

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The New Orleans Pianist is a music program with a huge library of over 65 "New Orleans Style" piano music standards, played on MIDI keyboard by top New Orleans pianists Henry Butler, Jon Cleary, Tom McDermott, Joel Simpson & David Torkanowsky playing a wide variety of New Orleans, R & B, Blues & Ragtime piano music.

INCLUDES: music trivia questions, "Guess the Song" game, program notes, pianist biographies (all on disk) & much more!

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PROFESSIONAL PERFORMANCES & CD-QUALITY: *All pieces are complete performances professionally performed, recorded & saved as Standard MIDI files. All the pieces have been recorded in "real time" by top pianists on an 88 note weighted keyboard. They are never quantized or step recorded. You'll hear the music playing with CD quality through your sound card or MIDI system, just as if the pianist was in your home.*

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OVER 65 FAMOUS NEW ORLEANS PIECES INCLUDING... *St. James Infirmary, When the Saints Go Marching In, Down by the Riverside, Burnt Mouth Boogie, Creole Lament, King Porter Stomp, The Pearls, Bogalusa Strut, My Bucket's Got a Hole In It, John Brown's Body, Margie, Charleston Rag, Maple Leaf Rag, The Entertainer, Raise the Rafters, Dirge for James Black and many more...*

BACKGROUND PLAYBACK: *Listen to the music while you work in other programs. The built-in Juke Box plays the music one song after another. Use the program for great background music, music for presentations, telephone on-hold, etc.*

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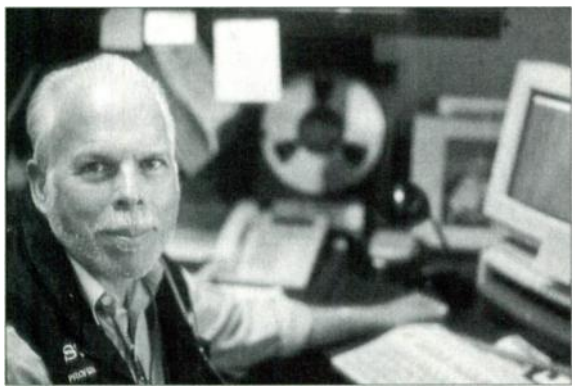
REQUIREMENTS: MACINTOSH 2mb memory, system 6 or 7, MIDI interface + synthesizer/ module with guitar, bass, drums sound, 2mb hard drive space required. WINDOWS (IBM) 2mb RAM memory, Windows 3.1, SoundCard (Roland, SoundBlaster, etc.) or MIDI system with guitar, bass, drums sound, 3.5" or 5.25" high density floppy disk, 2mb hard drive space required. ATARI 1040ST/TT/Falcon with floppy disk drive, mono or color.

wide variety of styles and analyze why artists you admire succeed."

Both Tony Berkeley of EA and Peter McConnell at LucasArts advise interested musicians to familiarize themselves with computer programming, at least through some introductory coursework in the C or Assembly languages. McConnell likens the process to being "both a driver and a mechanic." Marc Canter offered the contrapuntal view that a musician who can use MIDI gear and create a demo on DAT has already shown enough technical mastery to move into multimedia. In the end, the more parts of the process you can understand, the easier it will be to get the results you desire and maybe some you haven't thought of yet.



RIC STEWART

Murray Allen of Electronic Arts says that far too many of the demo tapes he receives lack quality and originality.

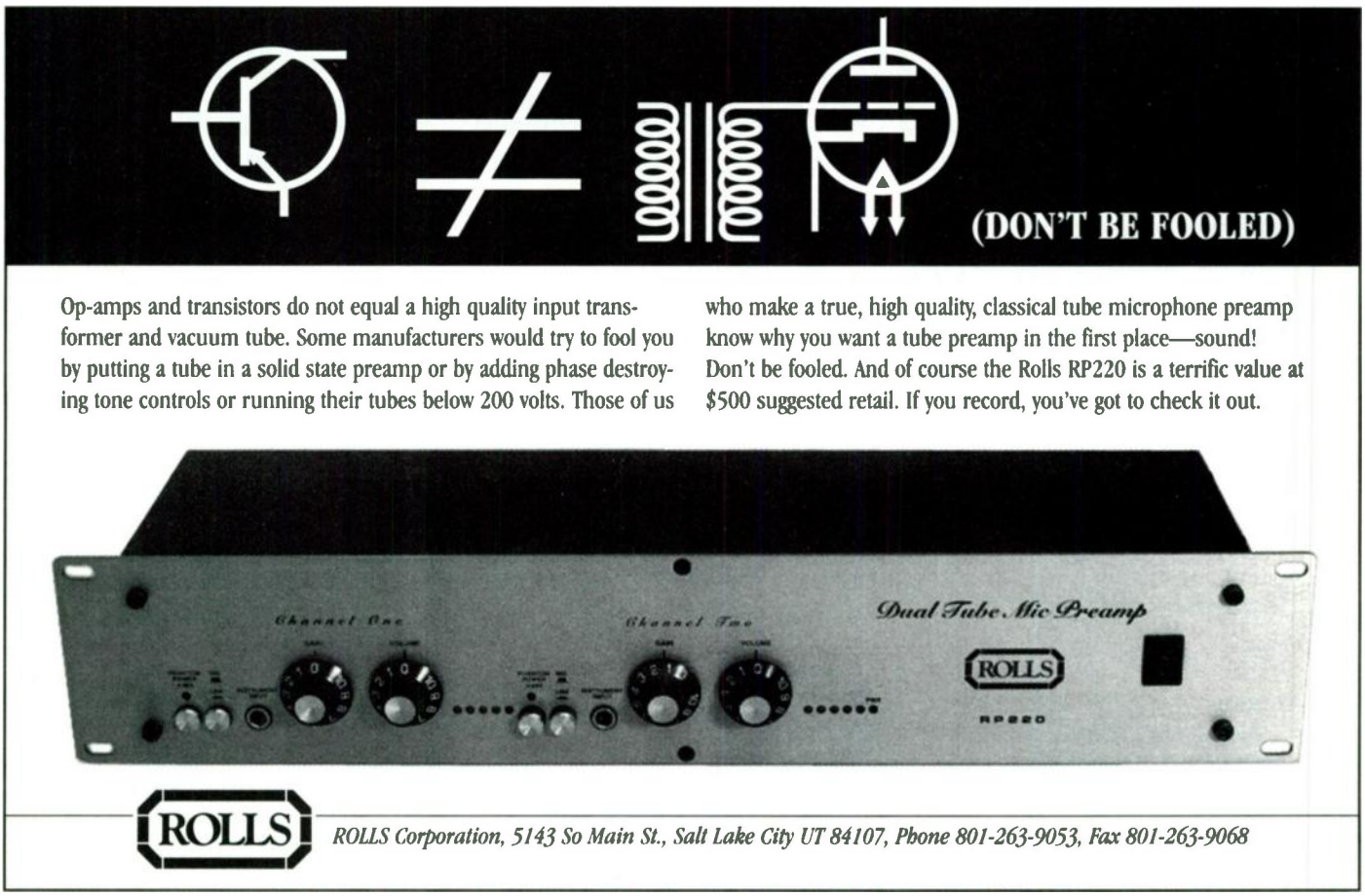
THE INDEPENDENT SCENE

The independent scene may offer more excitement and flexibility than work at studios, but the trade-off is that the paychecks can be less reliable. Kent Carmical, who works at start-up developer Pop Rocket, has just completed work on the company's new CD-ROM, *Total Distortion*. The title fully integrates music into a space-adventure premise by having the player create a music video to pay for the ride back to Earth. A music and philosophy major at San Francisco State University, Carmical has experience ranging from programming to recording-studio work to recording film soundtracks free of charge. He's the perfect example of doing everything you can to get your name and music circulating. Now after composing and performing about 40 songs for *Total Distortion*, he says it is important not to shore up your programming ability, but rather to concentrate on your compositional and recording chops and develop contacts in the business.

"All this technology is not going to change basic human interaction," notes Carmical. You are still going to have to make a demo, knock on doors, and do small projects to get recognition. Whereas the small developers can offer a lot of creative license, the larger companies offer regular hours and a steady paycheck. And, as Carmical puts it, "If you get a job playing any kind of music, it beats digging a ditch."

Steven Rappaport, a guitarist and former attorney, pursues another independent vision in the production of music-related products via his company Interactive Records. On one title, *Radio*

(continued on p. 145)



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Introducing the Yamaha W5/W7. A synthesizer has never—ever—given you this much control of sound. Or been this easy to use. Let's get into it.

The W5/W7 starts you off with superior sound. Proprietary Yamaha technology produces exceptionally clean and realistic voices. 384 of them, to be precise. That includes 8 MB of pre-set, internal and General MIDI voices designed specifically for professional use. And for the first time, the W5/W7 lets you work with all of these voices simultaneously.

The same 32-note polyphony, 16-part multi-timbre synthesizer is available as the 76-key W5 ($2,495 MSRP) and the 61-key W7 ($1,995 MSRP).

No More Compromising On Your Vision.

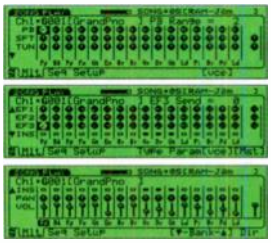
Working on the W5/W7 is like working in a fully-equipped professional studio. Yamaha has loaded this synth with six premium quality effects processors and a powerful, full-function mixer. Here's what they do…

Use the mixer to balance and pan all 16 tracks and put your own personal spin on the voices. You get three independent, fully programmable system effects, each with their own send per track. In addition, the W5/W7 mixer gives you three insertion effects. So, for instance, you get your distortion and wah-rich guitar sound, your rotary speaker organ sound and your carefully EQ-ed drum sound. No more compromises. And no more wimpy voices in your final mix.

In short, the W5/W7 lets you make the music you can't quite get with any other synthesizer.

The W5/W7 16-track, 16-song sequencer is just as powerful as the mixer. A 416 KB sequencer memory stores over 100,000 notes with all the control—pitch bend, modulation, etc.—to make them work. At any point during sequence playback you can drop into voice edit mode and make and store changes without missing a beat. Additional sequencer functions including full event editing, instant auto-locate points, track solo and mute, and automated punch-in/punch-out recording make this synthesizer as versatile as a recording studio.

The icing on the cake is the new W5/W7 Song Voice function. If you've ever created a sequence and replayed it with the wrong voices, you'll appreciate this. Song Voice bundles voices with their sequence. So you always get the sound you want and never get surprised.



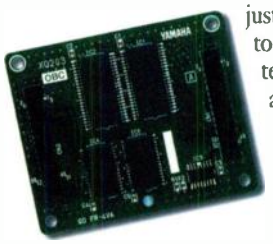
The W5/W7 features an advanced digital mixer and 6 simultaneous digital effects processors.

An Operating System That Actually Simplifies Your Work.

If the W5/W7 sounds incredibly powerful and exciting, it is. And surprisingly enough, the operating system actually makes it easy to access the power.

The beauty of the new OS is that it's skin deep. You are almost always within two key presses of any feature or voice. That means that voices are easier to find than ever before. And effects are easier to apply. At last, a synthesizer that helps you make music instead of getting in the way of it.

Programming is just as easy. 171 ready-to-use, intuitive templates help you apply amplitude envelopes, filters, pitch envelopes and LFOs. Programming has never been easier or quicker.



The W5/W7 is expandable. "Concert Grand", "Vintage Sounds" and "Rhythm Section" wave cards each add 4 MB of exceptional voices.

Of course, you can still program it all by yourself if you want to. And you can even take control of the voices to extremes with W5/W7 Editor/Librarian software for Macintosh and Windows.

So there it is. The W5/W7 synthesizer from Yamaha. It's exceptional sound and control give you the power to make the music you've always wanted.

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To locate the Yamaha W5/W7 dealer nearest you or to receive product literature, call (800) 932-0001 Ext. 720.

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RECORDING MUSICIAN

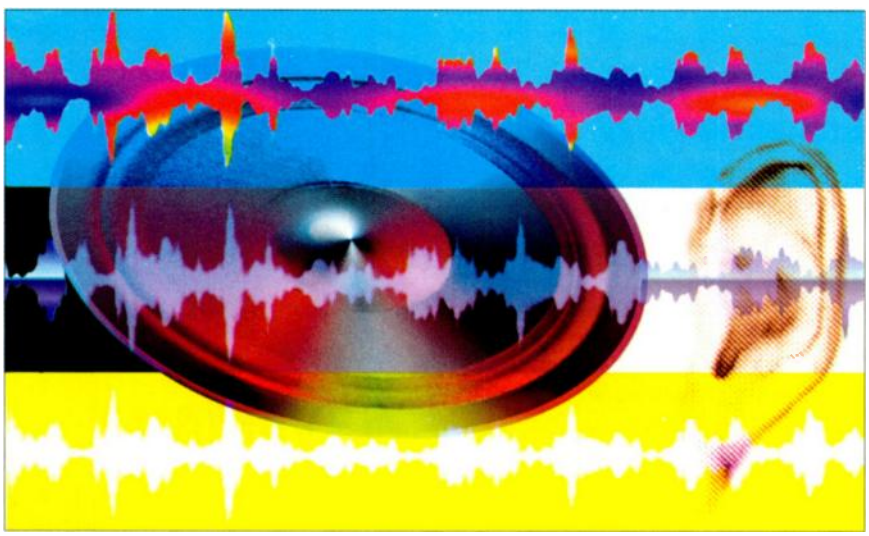
The Listening Room

Optimize your monitoring environment for critical sound sculpting.

By Michael Gore

Many professional and project studios are a mess. I'm not talking about tangled XLR cables or dusty equipment; I'm talking about dysfunctional monitoring milieus. A surprising number of studios are working with monitor systems that are out-of-phase, badly wired, or poorly placed. And in the audio world, neatness counts. If your studio monitors don't provide accurate sound reproduction, it will be difficult to produce master-quality work.

However, improving a poor monitoring situation is relatively easy. Sonic order often can be restored by following a few simple acoustic principles, invoking common sense, and avoiding shoddy work. Let's look at some common monitoring problems and their practical solutions.



DMITRY PANICH

MIRROR, MIRROR

The most important and most overlooked aspect of critical listening is matched speaker placement. If the left and right sides of the monitoring environment are not mirror images, tonal accuracy and stereo imaging are compromised. For example, placing a speaker in a corner increases its bass output. If the other speaker is placed against a flat wall, you will perceive a different frequency response from each monitor. Likewise, a speaker placed near a highly reflective surface (such as a glass window) will seem to produce more mid and high frequencies than a mate positioned in a less-reflective space. Obviously, such tonal variances wreak havoc on critical listening.

It is imperative that you plan monitor placement *before* you start setting up your studio. If one speaker is in a corner of the room, the other speaker should be placed in an opposite corner. And don't forget that good sonic symmetry is vertical as well as horizontal. If one speaker is four feet off the floor, the other should be positioned at the same height.

CLOSE TO YOU

Near-field reference monitors are called "near-fields" for a reason: They're

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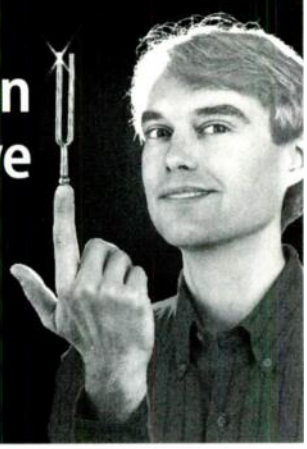
"They LAUGHED when I said they could have Perfect Pitch ...until I showed them the secret!"



The TRUE STORY

by David L. Burge

IT ALL STARTED in ninth grade as a sort of teenage rivalry.

I would slave at the piano for five hours daily. Linda didn't practice anywhere near that amount. But somehow she always seemed to have an edge which made *her* the star performer of our school. It was frustrating.

What does she have that I don't? I would wonder.

Linda's best friend, Sheryl, sensed my growing competition. One day she bragged on and on about Linda, adding more fuel to my fire. "You could *never* be as good as *Linda*," she taunted me. "*Linda's* got *Perfect Pitch*."

"What's Perfect Pitch?" I asked.

Sheryl gloated over a few of Linda's uncanny musical abilities: how she could name any tone or chord—*just by ear*; how she could sing any pitch she wanted—*from mere memory*; and how she could even play songs after only *listening* to them on the radio!

My heart sank. *Her fantastic EAR is the key to her success* I thought. How could I ever hope to compete with her?

But later I doubted Sheryl's story. How could anyone *possibly* know F♯ or B♭ just by *listening?* An ear like that would give someone a mastery of the entire musical language!

It bothered me. Did Linda *really* have Perfect Pitch? I finally got up the nerve and point-blank asked Linda if the rumors were true.

"Yes," she nodded to me aloofly.

But Perfect Pitch was too good to believe. I rudely pressed, "*Can I test you sometime?*"

"OK," she replied cheerfully.

I couldn't wait to call her bluff...

My plan was ingeniously simple:

I picked a moment when Linda least suspected it. Then I boldly challenged her to name tones for me—*by ear.*

I made sure she had not been playing any music. I made her stand so she could not see the piano keyboard. I made certain other classmates could not help her. I set everything up so I could expose Linda's Perfect Pitch claims as a ridiculous joke.

Nervously I plotted my testing strategy. Linda appeared serene.

With silent apprehension I selected a tone to play. (She'll *never* guess F♯!)

I had barely touched the key.

"F♯," she said.

I was astonished.

I quickly played another tone. She didn't even stop to think. *Instantly* she announced the correct pitch.

Frantically, I played more and more tones, here and there on the keyboard, but each time she would somehow know the pitch—without effort. She was SO amazing—she could identify tones as easily as *colors!*

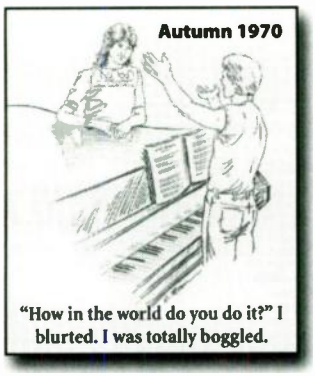
"Sing an E♭," I demanded, determined to mess her up.

With barely a pause she sang the proper pitch. I had her sing tone after tone. But as I checked her on the keyboard, I found that she sang each note perfectly on pitch.

I was totally boggled. "*How in the world do you do it?*" I blurted.

"I don't know," she sighed. And to my dismay, that was all I could get out of her!

The dazzle of Perfect Pitch hit me hard. My head was dizzy with disbelief, yet from that moment on I knew *Perfect Pitch is real.*



"How in the world do you do it?" I blurted. I was totally boggled.

I couldn't figure it out...

"*How does she DO it?*" I kept asking myself. On the other hand, why doesn't *everyone* know musical tones by ear?

Then it dawned on me that *most musicians* can't tell C from C♯, or A major from F major—like artists who brush painting after painting without ever knowing green from turquoise. It all seemed so odd and contradictory. I found myself even more mystified than before.

Humiliated and puzzled, I went home to work on this problem. At age 14, this was a hard nut to crack.

You can be sure I tried it myself. I would sweet-talk my three brothers and two sisters into playing tones for me, then guess each pitch by ear. My many attempts were dismal failures.

So I tried playing the tones *over* and *over* in order to memorize them. I tried to feel the "highness" or "lowness" of each pitch. I tried day after day to learn and absorb those elusive tones. But nothing worked. I simply could *not* recognize the pitches by ear.

After weeks in vain, I finally gave up. Linda's gift was indeed extraordinary. But for me, it was out of reach.

Then it happened...

It was like a miracle. A twist of fate. Like finding the lost Holy Grail.

Once I had stopped *straining* my ear, I started to listen NATURALLY. Then the incredible secret to Perfect Pitch jumped right into my lap.

I began to notice faint "colors" within the tones. Not *visual* colors, but colors of *pitch*, colors of *sound*. They had always been there. But this was the first time I had ever "let go"—and *listened*—to discover these subtle differences within the musical tones.

Soon I too could recognize the tones by ear! It was simple. I could hear how F♯ sounds one way, while B♭ has a different pitch color sound—sort of like "listening" to red and blue!

The realization hit me: THIS IS PERFECT PITCH! This is how Bach, Beethoven and Mozart could mentally envision their masterpieces—and name tones, chords and keys all by ear—*by tuning in to these subtle "pitch colors" within the tones.*

It was almost childish—I felt sure that *anyone* could unlock their own Perfect Pitch by learning this simple secret of "color hearing."

Excitedly I told my best friend Ann (a flutist) that *she* could have Perfect Pitch too. She *laughed* at me.

"You have to be *born* with Perfect Pitch," she asserted.

"You just don't understand how *easy* Perfect Pitch is," I explained.

I showed her how to listen. Timidly, she confessed that she too could hear the pitch colors. From this discovery, it wasn't long before Ann had *also* acquired Perfect Pitch! We became instant school celebrities. Classmates loved to test our abilities, leaving everyone awed and amazed by the power of our virtuoso ears.

Way back then I did not know the impact I would have when years later I explained my discovery to college music professors. I was surprised that many of them *laughed* at me at first. You may have guessed it—they told me, "One must be *born* with Perfect Pitch." Yet once I revealed the simple *secret* to Perfect Pitch—*and they heard for themselves*—you'd be surprised at how fast they would change their tune!

As I continued my own music studies, my Perfect Pitch ear allowed me to progress far faster than I ever thought possible. I even *skipped over* two required college courses. Perfect Pitch made *everything* much easier—performing, composing, arranging, sight-reading, transposing, improvising—and it enhanced my *enjoyment* of music as well! I learned that music is definitely a HEARING art.

And as for Linda?

Oh yes—time eventually found me at the end of my senior year of high school, with my *final chance* to outdo Linda. Our local university sponsored a music festival each spring. I went all out for it. Guess what? I scored an A+ in the most advanced performance category. Linda only got an A.

Sweet victory was music to my ears—mine at last!

THESE DAYS, thousands of musicians and two university studies have already proven my Perfect Pitch method. *Now I'd like to show YOU how to experience your own Perfect Pitch!*

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meant to be close to your ears. Professional studio monitors are measured for optimum signal coherency from a distance of 1 meter (at an input of 1 watt). Therefore, it is critical to keep equal distances between each speaker and your listening position. An ideal monitoring space forms an equilateral triangle (see **Fig. 1**) between your speakers and your head. Also, be sure to give audio signals a clear shot at your ears by placing the monitors above the mixing console. Most studios build a small shelf over the mixer to allow optimum positioning.

If you decide to use conventional 2-way monitors, I recommend laying the cabinets on their sides and pointing the woofers toward the center. Our ears localize midrange and high frequency signals better than bass information—low frequencies are difficult to pinpoint because they are omnidirectional—so finer audio definition is attained when the tweeters are positioned to the outside.

Lastly, confirm that the monitors don't move or rattle anything when blaring out your hot mixes. It's a good idea to place each monitor on some soft rubber padding and mark the speaker position with a grease pencil or colored tape. Now you can move the speakers around or disconnect them to check out a friend's monitors, without having to readjust your optimum listening position.

HOT WIRES

Believe it or not, the size and quality of your speaker wire can also affect monitor performance. However, this doesn't mean you should go out and buy high-priced, custom speaker cables. Inexpensive "zip" wire, which is used as AC wire in lamps and stereo components and can be found at any hardware store, does a fine job. Just be sure to get multistrand copper wire. Small speakers should be connected with no less than 14-gauge wire, and 12-gauge wire is recommended for monitors with 10-inch or 12-inch woofers. (The smaller the gauge, the larger the wire.) If there's a long cable run between your power amp and your speakers, go to an even larger wire.

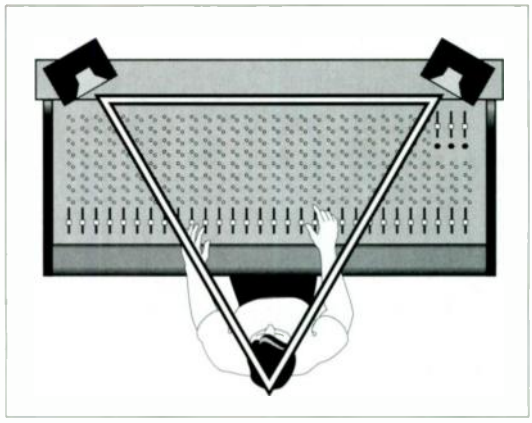

FIG. 1: In an optimum mixing position, your head forms an equilateral triangle with the monitor speakers.

Also, it helps to have some sort of marking on one of the wire cables to identify which wire is positive and which is negative. A simple white or red line on the positive cable provides visual confirmation that your speakers are properly, or improperly, connected. Lastly, be sure that your wiring connections are solid and that no wire strands are hanging loose. You don't want to leave any chance of a loose wire touching anything else.

Regarding custom cables, I have yet to hear an actual difference between these expensive wires and good quality zip cable in the typical project studio environment. Now don't get me wrong, specialized cables are indeed very good—and in certain, extremely critical audio situations, they may be the way to go—but the fine gradations of sound improvements they offer are usually masked by the acoustical anomalies inherent in most home studios. After all, few home recordists have the need (or desire) to pay an audio consultant big bucks to design the near-perfect monitoring environment that warrants exotic cables.

When using 2-way, near-field reference monitors, the best stereo imaging is maintained when the speaker is placed on its side. The woofers should face inside and the tweeters outside.

IN A GOOD PHASE

As I stated earlier, marking your speaker cables can prevent you from hooking up the monitors improperly. Botched connections are no joke. If the wires are reversed—a positive lead from the power amp is connected to the negative lead on the speaker, or vice versa—the speakers will be out of phase. Out-of-phase speakers sound thin and unbalanced, making it nearly impossible to critically audition audio reproduction. Obviously, this is far from an ideal monitoring situation.

The easiest way to check for incorrectly phased speakers is to listen to a commercial CD in mono. Most mixing consoles have a mono switch to check program material for monaural compatibility. But if you *don't* have a mono switch, simply return the left/right output from your CD player on two mixer channel modules and pan both signals to the center (mono) position. If your speakers are in phase, a monaural music track should sound full-bodied with a well-centered bass, kick drum, snare, and vocal. Now, switch to stereo monitoring for a mono-to-stereo comparison test. Listen to the CD in stereo for awhile and familiarize yourself with a track's frequency and spatial relationships. When you switch back to mono from stereo, the stereo image *and all frequency information* should collapse into to a precise center position. If everything is well centered, your monitors are probably in phase.

If you suspect your monitors are connected out of phase, first try to trace the wiring error. Make sure that the speaker wires are hooked up in the same configuration at both the speaker and the power amp. I usually find that someone misconnected the speaker wires to the power amp, because power amps tend to be placed in awkward, dark areas (under equipment racks, etc.) that are hard to see. Fixing a phase problem is often as easy as grabbing a flashlight, finding the misconnected wires, and switching them. If the wiring problem is at the power

amp, *do not* just reverse the leads at the speaker. Down the road, someone will look at the switched leads—with the "marked" wire connected to the negative pole, rather than the positive—and switch them back to the out-of-phase connection. (Thinking, of course, that they're doing you a favor by putting the connections back the "right" way.) Do the right thing, and connect everything correctly from the speakers to the power amp.

Also, be sure to turn off the power amp before you connect or reconnect any speaker wires. If you accidently touch the wires together with the power on, you'll blow up your power amp.

PROTECTION RACKETS

A fused monitor is relatively safe from harm, because whenever the input level gets to a point where transients can fry the speaker, the fuse blows and the speaker survives undamaged. The obvious value of "fusing" monitors is so great that I don't know why more home and project studios don't do it, especially when connecting in-line fuses is so easy. (Maybe some people *enjoy* replacing blown speaker cones!)

First, go out and buy a covered, spring-loaded fuse holder (with bare wires at each end) for each speaker in your system. Now, making sure that your power amp is off before doing any work, connect one fuse wire to the positive speaker terminal and the other to the positive speaker cable from the amp. Solder the connection between the speaker cables and the fuse wires, and cover the exposed wire with electrical tape or shrink tubing. You don't want bare wires touching anything that may cause a short.

At this point, it's just a matter of finding the right fuse and inserting it into the fuse holder. Determining the level of fuse protection for your system requires some math, but the number crunching should be short work for anyone handy with a calculator.

Find out the maximum power rating (in watts) of your speakers. We'll call this number "P." Now, determine speaker impedance. This figure is typically 8 ohms; we'll call it "R." The current rating of fuses is measured in amps, and we'll label this number as "A." To determine the fuse needed to protect your system, simply calculate $A^2 = P$ divided by R. For example, if your maximum power rating is 100

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watts, and your impedance is 8 ohms, the equation should work out like this: 100 divided by 8 = 12.5, so A^2 can be rounded off to 3.5 amps.

The maximum current is equal to 3.5 amps at 100 watts, but don't run out and buy a bunch of 3.5 amp fuses just yet. Fuses do not immediately work at their rating, so the 3.5 amp fuse may still allow enough of a surge through to shred the 100 watt/8 ohm speakers used in our example. A fuse typically allows 100 percent of its rating to pass through for four hours and blows only after 200 percent of its rated current passes through for one full second. Obviously, the 3.5 amp rating must be lowered to a figure that offers definitive speaker protection. In this case, I recommend buying a fast-acting fuse with a value approximately one-half to two-thirds of the 3.5 amp maximum. This works out to anywhere between 1.75 and 2.25 amps, but you might even want to try a 1.5 amp fuse just to be extra safe.

When the fuse is in place, turn up your monitor levels until the fuse works. If you've chosen a low amp rating and the fuses blow too often, increase the rating gradually until loud peaks are passed through, but do not go higher than your target rating. (In our example the target rating was between 1.75 and 2.25 amps.) Although fuses don't offer fail-safe protection, they are a very cheap way to help save your expensive monitors.

OVER AND OUT

The last thing I'd like to discuss is the issue of speaker size. In the typical home or project studio, bigger is not necessarily better. It doesn't do any good to overpower a small control room with huge speakers. In most cases, a quality monitor with a 10- or 12-inch woofer is more than adequate to ensure critical listening levels and sonic accuracy.

Once you've tailored your monitoring system to your room and taken care to make sure everything is hooked up correctly, there is no reason you shouldn't be able to record and mix like the pros. Believe me, when you know exactly what you're hearing, it's easier to make the "right" sound choices. Good luck!

Michael Gore *is owner and chief engineer of Bay Area Studio Engineering.*

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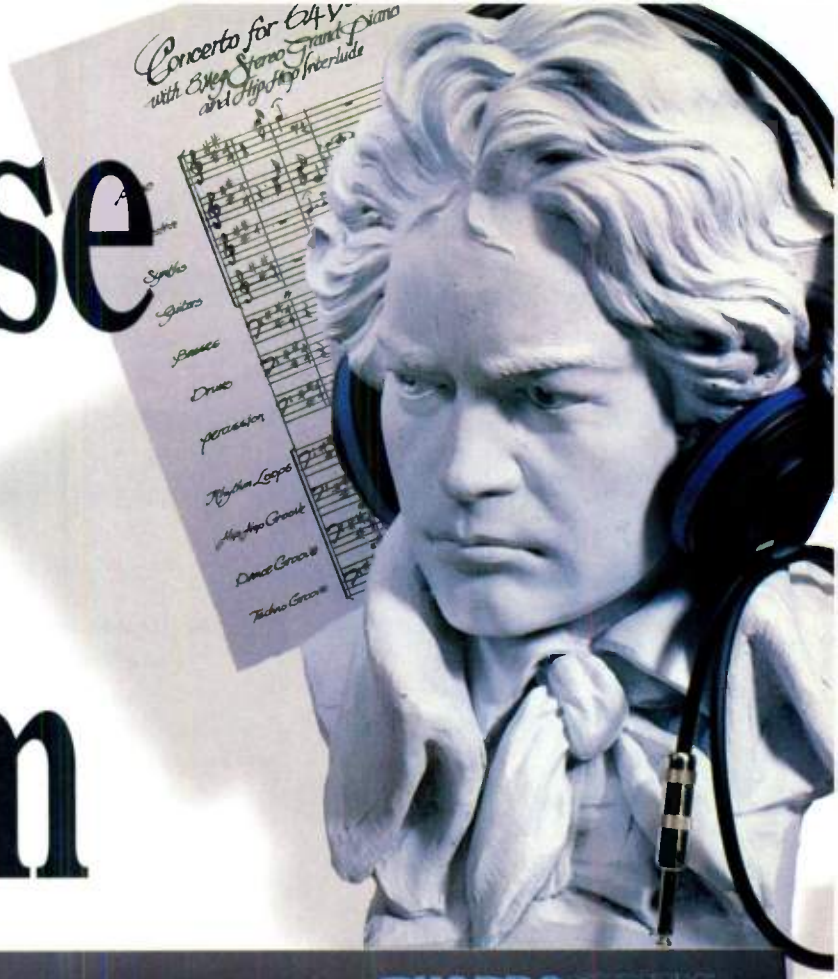

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ALESIS STUDIO ELECTRONICS

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Reviews

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Generalmusic SX3

By Julian Colbeck

An Italian synthesizer aims at a wide audience.

The fate of Generalmusic's SX3 Multimedia Workstation will probably be sealed by whether you see this hybrid instrument as a speakerless home keyboard with synth editing, or as a pro synth with built-in rhythms. Home keyboardists will surely love the simple but powerful sound editing and freshly minted set of professional backing Styles, and most should tolerate the lack of speakers. Professional players, on the other hand, tend to catch the first whiff of auto accompaniment and veer off down the next aisle, lest they be caught dead in what they feel is the Mom and Pop department.

But wait up, all you pros! What do you do with your Korg 01/W and Ensoniq TS-10? Do you noodle about a lot, and get bored, and wish you had some other folks to play with from time to time? Of course you do. Well, instruments like the SX3 simply offer a selection of grown-up grooves, patterns, backings, call 'em what you will, that you can interact with, write to, practice over, and even gig with.

The Generalmusic SX3 is a marriage between a home keyboard and a professional synth. For some users, it's a match made in heaven.

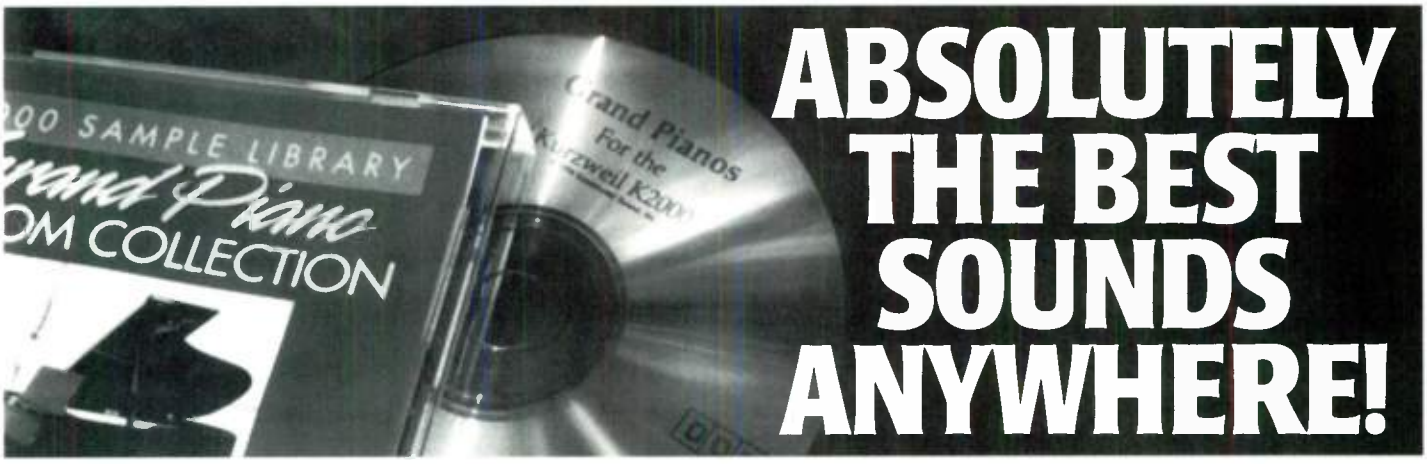
Generalmusic is aiming the SX3 at a wide audience. Pro players are targeted, ranging from those who play in the lounge of the Holiday Inn to those who trash rooms there as they breeze through town on a rock 'n' roll tour. The education and church markets are also squarely in the SX3's sights; the instrument's external "TV" hookup option should prove useful here. Finally, the SX3 is seen as a tool for harassed project-studio players, forever on a deadline, who can use it to instantly summon up styles, sensibilities, grooves, and tone colors in sufficient quantity to satisfy even the pickiest clients.

Although the full genealogy of the SX3 can only be of interest to the keyboard pedant like myself, the instrument owes a considerable debt to a home keyboard called the WS2 (now sold under the Wurlitzer name in the USA) and also to Generalmusic's S2 pro synth. (See the November 1992 **EM** for a review of the S2 and the December 1994 issue for a review of the rackmount S2R.)

THE INS AND OUTS

The SX3 is painted bright pink with green and yellow polka dots and is shaped like a Jerusalem artichoke. Well, no (surprise, surprise); the SX3 is a slim, matte black, oblong unit, its only hint of subversion being the faintly rubberized texture of its gently sloping control panel. The large, backlit, neon display is surrounded by dedicated buttons for all major features and functions. The buttons are lighted, which should make the SX3's controls operable even under the most thoughtless of stage-lighting conditions.

The 76-note keyboard is Velocity- and Pressure-sensitive, with an action that Generalmusic describes as "lightly weighted." (A 61-key version, the SX2, is available for $2,495.) Two fully programmable, disc-type control wheels are provided. One wheel is normally assigned to Pitch Bend and is spring-loaded, with a center detent; the other has a center detent but no spring.



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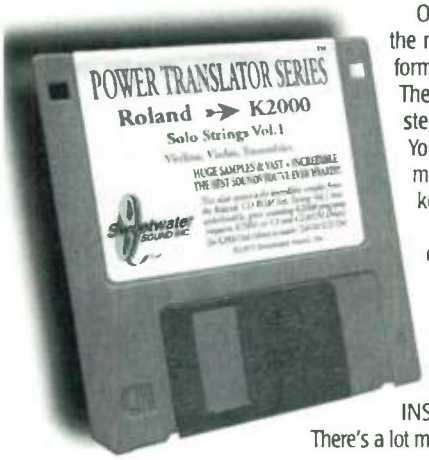

One of the great features of the Version 3-equipped K2000 (and the new 2500) is its ability to read samples in a variety of other formats. Case in point: the great Roland Sample Archives CD ROMs. They feature tons of exceptional samples, many of which are in full stereo. Problem is, the conversion process is not exactly perfect. You still have to build programs that make the Roland samples musically useful, as well as tweak loops and create accurate keymaps. But you should be making music, not programming!

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Holes pepper the rear panel. Not only are there stereo audio outputs, but effects send/return jacks, and external audio inputs for, say, a mic or tape-deck feed. One of the four control-pedal inputs is for a dedicated volume pedal, two inputs are fully programmable as either momentary switches or continuous CV pedals, and the fourth is a programmable momentary-switch input. The unit also has a connector for the optional Generalmusic pedalboard ($225). The usual three MIDI ports are supplemented by a second, independent MIDI Out, which allows the unit to send on 32 channels.

The back panel also holds RGB and composite-video "TV" outputs, primarily offered so the outside world can view your chord changes, lyrics, and what-have-you during song playback. (The video board is a $300 option.) While this application might be the final straw for dyed-in-the-wool synthesists, I did find it helpful, and not a little sexy, simply to have large screen access (in color, too) to the display's information on a day-to-day basis, thanks to my trusty old Atari monitor.

ITALIAN SEASONING

The SX3's sound is based on samples offered in standard subtractive-synthesis style. It houses not only a whopping 472 ROM Sounds, with scope for straightforward Sound editing and relocating, but a sample-loading option (2 MB sample RAM, $195) and the simplest and most encouraging system of sound layering in the business.

With so much choice, a certain amount of button pushing, Bank selecting, and curve learning is to be expected. For the most part, though, because the instrument has so many dedicated controls, you don't tend to get lost for long.

The SX3 conforms to the much-maligned General MIDI specification. Sounds are grouped according to instrument type and have named buttons. You want a piano? Hit the button marked "piano," and a batch of eight piano types comes up on the video screen. You want more? Hit the Page+ button, and another eight pianos appear. For the most part, each instrument Bank has three pages worth of instrument choices; in other words, most Banks offer 24 Sounds.

The Banks comprise piano, chromatic percussion, organ, guitar, bass, string, brass, reed, pipe, synth lead, synth pad, synth effects, ethnic instruments, drums, and samples. Program Change assignments are made according to GM; for example, to access the delights of Wow Clav (the final port of call on the Piano Bank), you would use PG 8 with Bank Select message 3.

The ROM Sounds comprise a highly usable body; some are 32-voice polyphonic, single-oscillator Sounds; others are of the 16-voice, dual-oscillator variety. In-depth analysis of the SX3's several hundred Sounds is inappropriate for a number of reasons, aside from the obvious. The main stumbling block is the fact that the SX3's day-to-day sonic currency is what Generalmusic calls a Performance, which is a catch-all slice of memory containing Sound, effects, and assignment data. It is difficult to pare a Sound down to basics and assess it, because that is not how you are most likely to hear or use it.

The SX3 does excel at certain types of instruments, however. In addition to plenty of rip-snorting section brass patches, the Brass Bank contains surely the world's best selection of sexy, breathy, soft saxes. Other outstanding Sounds include a number of comping keyboard patches; imaginatively styled tuned percussion such as marimbas, glocks, xylophones and the like; and a particularly wide range of nonpitched drums and percussion (More about these in a moment.) I was less enamored with the strings, which were uncomfortably synthetic.

SOUND EDITING

Although Sounds are stored in ROM, you are not shackled to them forever, because, effectively, they can be copied, edited, and stored in another Performance. Editing here is not to be compared to a Wavestation (okay, cue rousing chorus of "Thank the Lord" from embattled Wavestation SR users), but the instrument's meager collection of resonant filter and envelope controls will enable you to turn standard Sounds into custom ones in a matter of seconds. And for even easier feats of instrument-creation you can just layer up Sound after Sound in a current Performance by switching on one Track (a segment or component part of a Performance) after another, progressively building up new tones and textures.

In isolation, this is all great fun and fairly creative. However, the system is less friendly when you want to use a particular Sound, or combination of Sounds, in a particular context. There are restrictions as to the number of variations of a ROM Sound that can be stored internally. (You can, of course, save your Sounds to disk using the built-in 3.5-inch disk drive.) In addition, the process of editing a Sound from within a Performance seems to involve a fair amount of twisting and turning as effects are removed, transpositions revoked, etc.

Drum stuff—Sounds, kits, editing, placements—is carefully thought out to the point of overkill. Not only are there two versions of standard, room, electric, power, and house kits, but there are also jazz, orchestral, and brush kits, all mapped according to GM. In addition, there are M1 and SY77 mapped kits, plus numerous single-instrument patches. Most of the single patches—vibraslap and castanet, for example—are readily understandable and useful, though I was a little disappointed that the exotically named "Kitchen" patch manifested itself as a lone, indeterminate metallic noise, rather than the phalanx of culinary appliances its title might suggest.

By no means must you settle for a fixed menu when it comes to Sounds, though. Individual drum and percussion Sounds can be freely edited using the same filters and envelope generators used to manipulate regular-pitched Sounds. You can also reassemble kits, specifying which instruments to

Product Summary

PRODUCT:
Generalmusic SX3
Multimedia Workstation
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$2,795
MANUFACTURER:
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QUALITY OF SOUNDS	● ● ● ●
VALUE	● ● ● ◖

include, their pan position and transposition, and whether or not to lasso each Sound to either or both of the current effects algorithms. You can even set up a Velocity switch.

Although only a handful of users will ever delve this deep, Generalmusic makes admirable attempts to simplify this often grizzly business with features such as Catchnote (instant access to a Sound via the keyboard), an effects on/off switch, and (sample) transpose.

In general, editing is instant, fun, and riddled with operational aids. Generalmusic seems to have taken a leaf out of Korg's book by offering real-time sound-editing using footpedals. It's a nice idea for those fleet enough of foot to waggle filter cutoff points during solos. I also appreciated the Edit/Compare function, which doesn't just switch Sounds back and forth; you can also see the alterations in parameter values on the display or video monitor. Equally useful is the Library feature, which lists all Sounds in a string that you can scroll through, definitely the quickest audition method.

There are two effects processors. Effects 1 contains sixteen reverb types; Effects 2 has sixteen delay and modulation algorithms. We're not talking Lexicon quality, but the processing comes across as smooth, and you are given a fair degree of control over things like reverb or delay time, feedback, high-frequency decay, and depth. Nervous newcomers to effects editing will appreciate the Restore feature, whereby you can swiftly return an effect to its default values.

PLAYING AROUND

Most of the aforementioned features would be right at home on a dedicated synth. The SX3 is not a dedicated synth, of course; it is a Multimedia Workstation. This somewhat misleading designation has nothing to do with creating computer multimedia productions; rather, it derives from the SX3's ability to incorporate lyrics into a song and for said lyrics and the odd line of music to appear on a remote video monitor. If this is the sort of feature you warm to, you will need the video-display option ($300) as well as the Lyric Editor disk ($49.95), without which you won't be able to use the keyboard to "write" your lyrics.

Not implicit in such a title is the broad range of backing Styles that have been custom programmed for this model, largely by Chris Anthony, who is currently Generalmusic's prime demonstrator in America. A canny programmer at the best of times, Anthony has excelled here with some stunning grooves, backings, and complete songs over and into which you are at all times permitted to play.

Styles, as with Sounds, are grouped in categories, with each category containing eight backings. The categories include R&B, Pop, '50s, Jazz, Latin, Trad, Funk, and Rock. The backings sound modern, at least in auto-accompaniment terms, and include some highly convincing big band/swing moods; blues; the odd blatant copy, such as "Carwash" (an absolute corker) and "Totorock"; plus the ubiquitous fusion and funk patterns. I particularly admired "Soul 1," a lazy and languorous 102 bpm outing with nice punctuating strings and a choppy Rhodes, and the Philly-inspired "70s."

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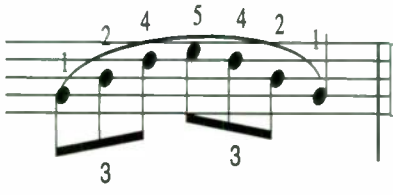

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In the main, these are grown-up backings. The SX3 is not a do-it-all-for-you type of instrument; it will groove along, leaving plenty of space for you to play. Default instrumentation, both within the backing and available for live playing, is clearly displayed but can be changed in real time, as can tempo. Features such as fingered or "one-finger" chord play, Chord Hold, and (the atrocious) Auto Harmony—in other words, the dyed-in-the-wool home keyboard tricks—are wisely hidden under the Arrange button.

There are 64 preset Styles plus the ability to load in from disk or compose and store another 32 Styles. The method for this, as with regular songwriting on the built-in, 16-track, 250,000-event sequencer, is flexible without exactly being intuitive. There is quite a lot of Enter pressing, page flipping, and the need to stop a sequence in order to perform certain tasks.

Sequencing, available in real-time and step-time, is as powerful as you can expect on a keyboard synthesizer. I don't mean to carp, but the unforgiving quantize parameters and knitting-pattern micro editing are features consigned to the history books on even the most basic software sequencer. The point is, for a keyboard synth to be valid, it must surely reclaim some of this lost ground by being immediately available and largely foolproof. The SX3 is not impenetrable, but its operating system is not nearly as fluid and unobtrusive as the sequencing facilities on Korg's i-series instruments.

On the other hand, Generalmusic's large and swiftly increasing library of S-series Song, Sound, and Style disks ($29.95) may have more appeal. The only minor irritation discovered while loading outside SMF data is the SX3's resistance to increasing its pitch-bend range beyond a whole tone. This means that if you have a file with greater movement than this (typically, say, on a guitar or bass part), the SX3 will sound a bit squashed. On Generalmusic's S2 synth, the pitch-bend range is ±12 half-steps, which is more flexible.

CONCLUSION

Thanks to an updated user interface, the SX3 holds up remarkably well for an instrument based on such tried and true hardware. Its physical appearance, coupled with the power of its brand-new music Styles, makes it a powerful contender in this still somewhat ill-defined area of the keyboard market.

The best thing about the SX3 is that it chooses musicality over flash. The smart customer should bear in mind that crash-bang-wallop Sounds and Styles you can listen to but not really *use* quickly pall. Though hardly boring, the SX3's more subdued approach should allow you to eke out many years of solid, professional work.

Julian Colbeck *is a purveyor of music technology in the form of books, articles, videos, music software, and the odd stonking piece of actual playing.*

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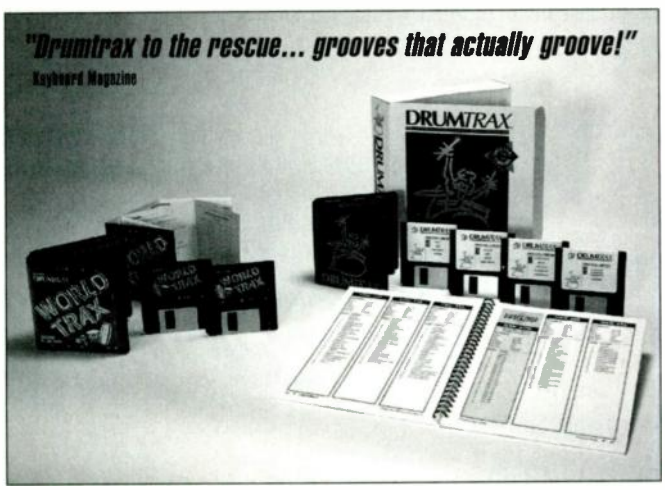

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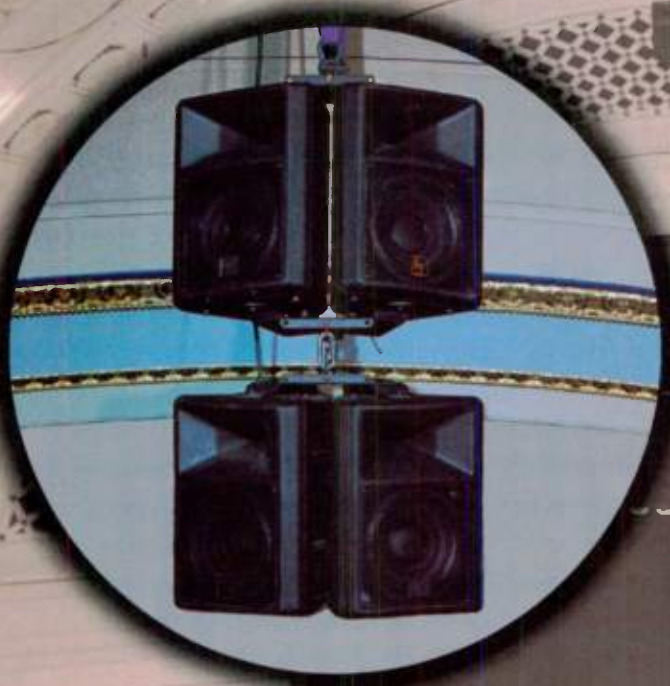

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Bag End Studio System A

By Lawrence E. Ullman

This high-end studio monitor speaker package tells the whole truth.

In his recent face-off of five near-field reference monitors ("Boom Boxes," November 1994), **EM** Editor Michael Molenda succinctly described the role of a professional studio monitor: "As far as audio signals go, a studio monitor is The Truth. Without *really* knowing what an audio signal sounds like, you can't make educated decisions about instrument and vocal timbres, equalization, signal processing, and stereo imaging."

And to that I say, "Amen." Yet the five small studio monitors he went on to compare and laud—indeed, *all* small loudspeakers—can only tell *part* of The Truth. No matter how good they may be in other areas, few of the small 2-way speakers commonly used for near-field monitoring have much usable output below (to be generous) 80 Hz. None go low enough to accurately reproduce the lowest octaves.

In large professional studios, the small near-field reference monitors on the console are supplemented by large, full-range main monitors, which are often soffit-mounted (flush) into the control-room walls. However, such large systems are not an option for studios tucked into a small bedroom or a corner of the living room, nor do they offer the advantages of near-field monitoring. (See "Square One: Nearer My Monitor to Thee" in the June 1995 **EM**.)

Similar problems are faced by designers of high-end, car-audio and home-theater systems. These installations must be capable of powerful bass response, but the speakers must be small due to space constraints. Fortunately, a simple solution is readily available: The restricted low-frequency response of the small "satellite" speakers can be supplemented by adding a separate subwoofer system.

Consisting of a pair of MM-8 near-field monitors, two D10E-S subwoofers, and an ELF-1 integrator, Bag End's Studio System A takes near-field monitoring to new heights by reaching new lows: The system's bass response extends all the way down to 8 Hz.

Adopting the same approach to studio monitoring allows you to have your cake and eat it, too: The small monitors can remain perched above your console, while the relatively nondirectional nature of low-frequency sound allows the subwoofer enclosure to be placed in an out-of-the-way location. In addition, most subs have a built-in highpass filter that relieves the satellite monitors (and the amp driving them) from onerous low-frequency duties. This allows the small speakers to operate solely in the midrange and treble frequencies, where they are the most effective.

For the past month, I've been using a remarkable studio-monitoring system that not only implements the satellite/subwoofer approach but does so at a level of performance way beyond anything I've experienced to date. Bag End Loudspeaker Systems' Studio System A package consists of a pair of MM-8 near-field monitors ($1,788/pair), two D10E-S subwoofers ($568 each), and the company's unique electronic crossover, the ELF-1 integrator ($2,460). Although all of these products are available separately, buying them as a matched set can save you money.

FIG. 1: The 90 DIP switches hidden behind the front panel of Bag End's ELF-1 2-channel Low Frequency Integrator are used to configure both the highpass filter and the ELF. The switches add precision resistors whose value establishes a DC voltage that controls the appropriate circuits inside the unit.

LET'S GET PHYSICAL

The MM-8 monitors have a 2-way, coaxial design with a 1.75-inch aluminum compression driver mounted at the center of an 8-inch woofer. Designed by audio pioneer Ed Long and manufactured by Bag End under a licensing agreement, the MM-8s were engineered using Long's Time Align system.

Originally used in another Long design—the larger UREI Time Align monitors that are a fixture in many professional studios—this approach uses a unique measuring device called a Time Align generator to verify the speaker's performance. The goal is to

ensure that high and low frequencies reach your ears at the same point in time, without the smearing and phase shifting that can occur in some other designs.

Finished in matte black, with solid walnut tops and bases, the cabinets are solidly constructed with thick, medium-density fiberboard (MDF) and measure 17.5 × 12.25 × 8 inches. With its exposed driver, a large, slot-shaped port, and two rocker switches, the baffle (front panel) presents a no-nonsense, industrial look. As is usual with studio monitors, no grilles are provided, and the rather busy graphics on the switch panel leave no doubt that the manufacturer intends a vertical orientation.

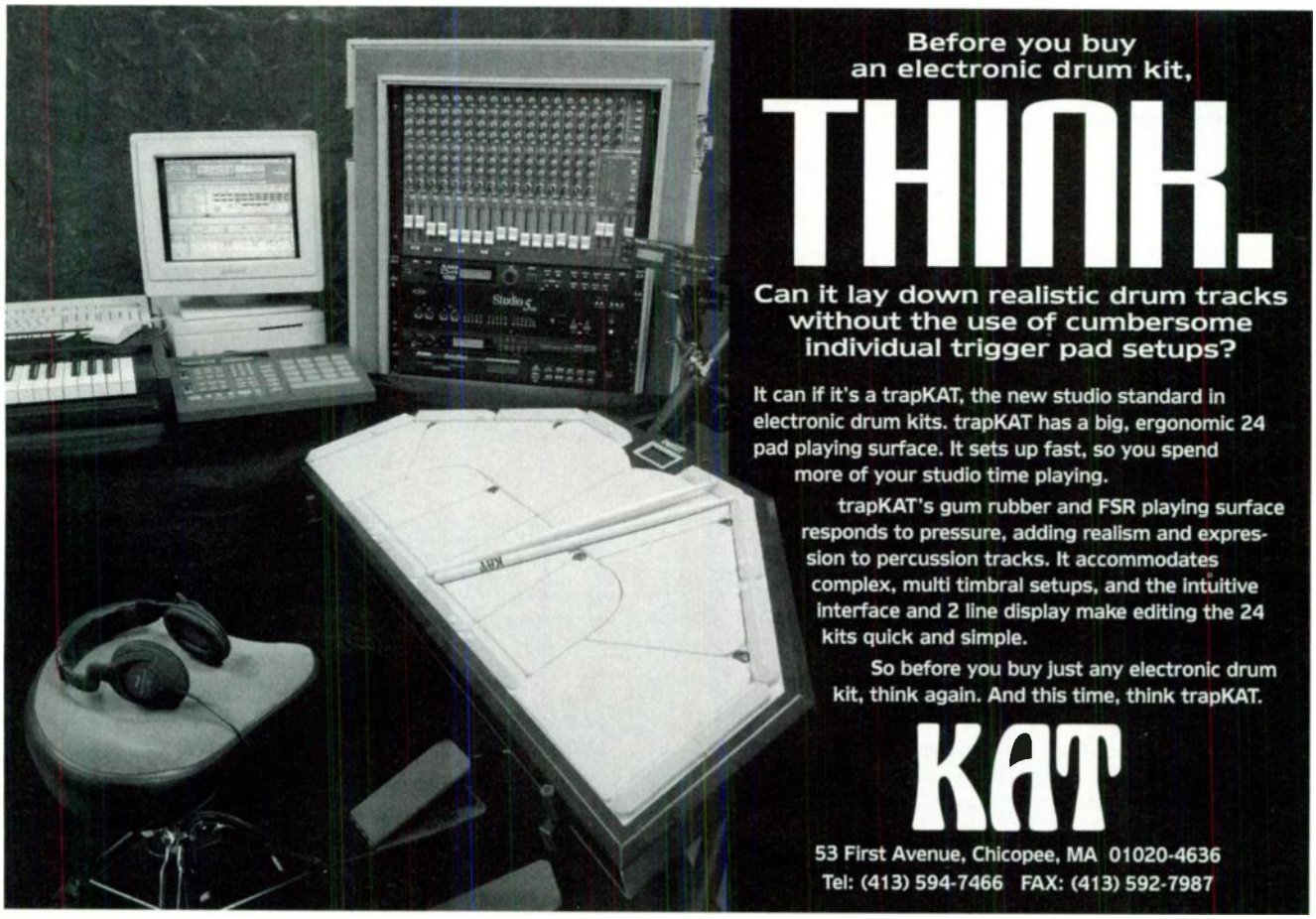
The switches are visible manifestations of two of the MM-8's most distinctive features. On the right is a large rocker that reverses the speaker's absolute acoustic polarity. (Absolute polarity dictates that the polarity of the source signal is maintained intact throughout the recording/reproduction chain. In other words, a compression wave captured by a microphone at the recording session is reproduced as a compression wave by the speaker cone, not as a rarefaction.)

Some experts take the position that, as long as the polarity of *both* channels is reversed, there's no audible difference; others insist that the difference is obvious. Bag End obviously falls into the latter camp, pointing out that the switch can be used to check the polarity of new material before adding it to existing material of an unknown polarity. I was unable to hear any obvious difference with any of the recordings I auditioned. However, those who *can* hear the difference may find the switch useful.

The effect of the other front-panel switch is much more apparent. The equalization switch has three positions: Distant/Final, NFM/Original, and NFM/Final & Distant/Original. The first of these is essentially flat, while the other two introduce varying amounts of rolloff above 5 kHz. According to the manufacturer, the three equalizer settings "create a uniform monitoring environment at different listening distances and different points in the recording process."

The manufacturer's argument goes something like this: Original source signals monitored prior to entering the recording chain are inherently brighter than final recorded material, which suffers high-frequency loss due to the vagaries of the recording process. At the same time, because high frequencies are attenuated by the listening environment, material monitored in the near field will sound brighter than when listening at a distance.

The Distant/Final position is used to monitor final recorded material at a distance (outside the near field). Because both of these conditions cause high-frequency loss, no additional attenuation is necessary; this position is the brightest of the three. The NFM/Original setting is used to monitor original material (bright) in the near field (also bright). It compensates by providing the greatest degree of attenuation. Used in two possible situations, near-field monitoring of final material (bright/dark) or distant monitoring of original material (dark/bright), the NFM/ Final & Distant/Original position



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Bag End MM-8 Specifications

System Type	Woofer	Tweeter	Crossover	Sensitivity	Max. Power	Impedance	Weight
Coaxial 2-way	8″	1.75″	2.9 kHz	84 dB SPL (1V/1m)	100W (continuous)	8Ω	28 lbs.

is, as you may have already guessed, intended as a happy medium between the other two.

SWITCH HITTING

I was initially pretty skeptical about the validity of the EQ switch. As a dyed-in-the-wool audiophile, I found deliberately altering the tonal balance of a speaker sacrilegious. Although I find it easy to accept one part of Bag End's argument—near-field and distant monitoring do impose different requirements on a speaker, and the switch may enable the speaker to do double-duty—I had a little trouble swallowing the idea of using the switch to compensate for losses due to the recording process itself. Even if such losses are still a significant factor in today's direct-to-digital world, aren't they something engineers have been compensating for intuitively all along?

However, the proof is in the listening, and the more I listened to the MM-8s, the more I found myself appreciating the logic behind Bag End's approach. The darker NFM/Original position really is well suited for near-field monitoring of live sources such as synths and microphone feeds. Subtle details such as reverb decays, imperfectly looped samples, and the like are quite apparent without resorting to the excruciating brightness and artificially etched detail so common in many small near-field monitors.

The midbright NFM/Final & Distant-Original position also lives up to its billing. In fact, most of my listening was performed in this position. The slight treble rolloff actually made extended monitoring sessions—in the near field at high levels, no less—a pleasure, rather than a torture.

On the other hand, the Distant/Final position was just too bright for my taste. I suspect this is because my bedroom-*cum*-studio is simply too small to make "distant" monitoring practical. In a larger, more absorbent space, this setting—and the MM-8s' ability to play quite loud without strain—should enable them to pinch-hit quite effectively as small "main" monitors when coupled with an ELF subwoofer system.

THE LOW DOWN

As I said at the beginning of this review, small monitors can only go so low. The MM-8, for example, offers excellent bass response down to about 100 Hz, which is typical of similar models. However, there's a whole lot of shakin' going on below that point, all the way down to 20 Hz and below. This is subwoofer territory, and Bag End knows it well.

Bag End's claim to low-frequency fame is based on a technology called Extended Low Frequencies, or ELF (see sidebar "ELF Magic"). The Studio System A package includes an ELF system with two D10E-S subwoofers driven by the company's top of the line ELF-1 integrator. Used together, these components produce some of the tightest and most articulate low-frequency performances I've heard, all the way down to a remarkable 8 Hz.

Specifically designed to be used with an ELF integrator, the D10E-S subwoofer is smaller than other conventional models. At just 22 × 13 × 13 inches, it's about the size of a large "bookshelf" loudspeaker. Finished in matte black with walnut tops that match the MM-8s, the sealed

ELF MAGIC

Bag End's Extended Low Frequencies (ELF) system consists of two complementary components that work together to provide extended bass response while attempting to avoid the drawbacks of other designs.

Named after the common electronic circuit on which it is based, the ELF integrator is a 2-way, active electronic crossover. Used in a dual configuration in the ELF, the integrator circuit produces a 12 dB/octave rise as frequency is decreased. Unlike conventional lowpass filters, which introduce a frequency-dependent phase shift that can make blending the bass into the upper frequencies difficult, the integrator produces a short, uniform phase shift for which it is easy to compensate.

The low-frequency output of the ELF integrator is connected to a power amplifier, which drives an ELF subwoofer. Unlike typical designs, which use ports, active servo electronics, or other techniques to provide extended bass response, an ELF subwoofer has a relatively small, sealed cabinet. When speaker drivers are operated below resonance in a sealed box, they operate in a linear, predictable way. Their frequency response is just the *inverse* of the dual-integrator circuit's: It rises 12 dB per octave as frequency is increased.

When you combine an ELF integrator with an ELF subwoofer, the result is a flat acoustical response from below the speaker's resonant point all the way down to the low-frequency limit of the integrator, which in this case is -3 dB at 8 Hz.

The ELF approach has several other advantages. The impedance of an ELF loudspeaker is uniform below resonance, presenting an easy load to the amplifier. And with no ports or other resonance peaks in the operating range, the speaker doesn't favor any one note, a common problem with ported or "bandpass" designs. (Manufacturers of car subwoofers often take advantage of port resonance to produce that delightful "boom" you hear going by in the middle of the night.)

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Although Bag End claims the perforated-metal grille is much more acoustically transparent than cloth at low frequencies, it rings when you tap on it and can clearly be felt vibrating during playback. However, the grille's ruggedness outweighs any inaudible, aberrant acoustic behavior when you consider that the sub will most likely be placed on the floor. Of course, you can always remove the grille if the speaker is placed out of harm's way.

The ELF-1 integrator functions as a 2-channel, 2-way electronic crossover. The single-rackspace unit accepts two full-range, line-level signals from your mixer or preamp, processes them through a highpass filter that feeds an amp driving the monitors and through an ELF dual-integrator circuit that outputs to an amp driving the subwoofers. (This is a "biamped" system that requires four amplifier channels.) Additional circuits in the ELF-1 protect the low-frequency channels with a unique form of speaker protection called ELF Concealment, while the highpass channels are protected with another unique circuit Bag End calls a Continuously Variable Recovery (CVR) limiter. (More on these later.)

The back panel of the ELF-1 has six balanced XLR jacks (two inputs, four outputs), a fuse, and a permanently attached power cord. The unit can also be connected to unbalanced lines; a wiring diagram for the necessary cables is provided in the manual and pinouts are screened on the back panel. Because I wanted to connect the ELF-1 to my unbalanced home-theater

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system, as well as the RCA monitor outputs of a TASCAM multitrack machine, I took the plunge and built cables with XLRs on one end and RCA plugs on the other.

DIP-SWITCH HEAVEN

Of course, the front panel is where the action is. Here you'll find no less than 90 DIP switches (45 per channel) that are used to configure both the highpass and ELF sections (see **Fig. 1**). Note that the main signal does not actually pass through the front-panel switches. Instead, the switches add precision resistors whose value establishes a DC voltage that controls the appropriate circuit deeper inside the unit. This approach keeps the signal path clean and allows the settings to be changed while a signal is present without causing noise or pops. In addition, the settings are precise and can be easily read and written down for reference. Once you have the switches set, a cover plate can be installed to keep the uninitiated from screwing things up.

Each channel of the highpass section includes five switches that set the low-frequency limit (cutoff) of the highpass filter. The switches add 80, 40, 20, 10, or 5 Hz to a basic value of 50 Hz. Thus, to select a highpass cutoff of 120 Hz (the value I used), you open the 40, 20, and 10 Hz switches. Put another way, this method allows the highpass-filter cutoff point to be set anywhere from 50 Hz to 205 Hz in increments of 5 Hz .

The next six switches adjust the highpass section's gain. Five values are available, which combine to yield a range of ±15.5 dB in 0.5 dB increments. The sixth switch determines whether the value selected is added to or subtracted from unity gain. (I left my unit set at unity gain.)

Other switches in the highpass section include a polarity-reversal switch, a 10 dB output attenuator, and a channel mute. The final seven switches are concerned with a speaker-protection device unique to the ELF-1. Called a Continuously Variable Recovery (CVR) limiter, this circuit rapidly reduces the gain when a signal exceeds a threshold value set by six DIP switches. (The seventh switch, Stereo/Dual, links the channels so the limiter affects gain equally on each, or allows them to remain independent.)

Unlike typical limiters, however, the recovery rate of the CVR limiter is not a fixed linear or logarithmic slope. Instead, it is dynamically dependent on the amount of limiting called for, with a fast initial recovery that gradually slows as it nears full recovery. The CVR limiter is never activated under normal conditions (a yellow LED on the front panel glows in varying intensity to indicate CVR operation), so to get an idea of its effect, I set the threshold level all the way down and the highpass gain all the way up. For a limiter, it is subtle and benign sounding. Nevertheless, under critical monitoring conditions, you don't want either the CVR limiter or the ELF Concealment circuit (discussed shortly) to activate. If they do, you're not actually hearing what's going down on tape.

Many of the ELF switch settings are similar to those in the highpass section: The gain, polarity, 10 dB pad, and mute switches are essentially identical to their high-frequency counterparts. The Sum/Dual switch is similar to the Stereo/Dual switch: It combines the left and right ELF channels for installations

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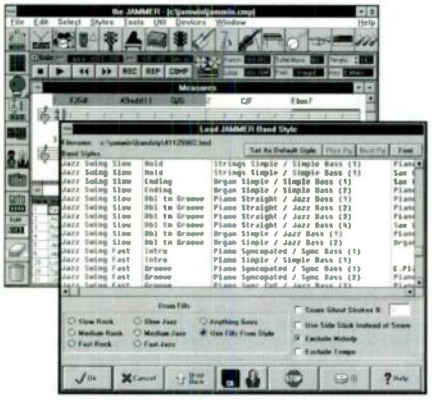

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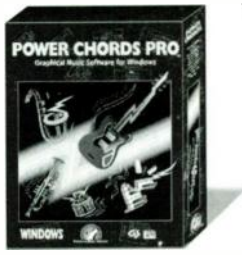

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The ELF cutoff section resembles the highpass cutoff section, but with different frequency settings. The five switches set the ELF cutoff from 8 Hz to 70 Hz in 2 Hz increments. Normally, you want to leave the unit set to its nominal value of 8 Hz, which, according to Bag End, yields the best overall system phase response. However, in some nonstudio applications (bass guitar or P.A. systems, for example) you may want to raise the LF cutoff frequency to eliminate string or mic-handling noise.

Similar to the CVR circuit, the ELF Concealment section contains six switches that are used to set a thresh-

▼

I was initially pretty skeptical about the validity of the EQ switch.

old. Unlike a limiter, which would simply (and, no doubt, audibly) attenuate all low frequencies upon detecting an overload, Concealment works by dynamically adjusting the ELF cutoff point. Thus, if there is insufficient headroom to reproduce a very low frequency signal, the Concealment circuit raises the ELF cutoff point until the low frequency can be reproduced to the fullest level possible without distortion. This approach leaves other, higher frequencies relatively untouched.

During the course of testing, the red Concealment LEDs on the front panel flashed briefly during some extremely dynamic percussive passages, but the Concealment was quite inaudible. The circuit's effect only became apparent when playing very low synth sounds *very* loudly, and then only as a slight lowering of LF gain. This is a musical, effective solution.

GET WITH THE SYSTEM

After spending most of a day breathing solder fumes and building cables, I was ready to get down to some serious listening. The MM-8s are designed to

handle up to 100W/side (continuous), while the subwoofers handle up to 400W/side (continuous). Wanting to use amplification commensurate with the quality of this system, I was fortunate to be able to borrow several amplifiers I had recently reviewed for *Home Theater Technology* magazine. I ended up with three powerful and extremely fine amps from Bryston of Canada: A 2-channel, 250-watt 4B-THX ($2,245) drove the MM-8s, while a pair of 500-watt 7B-THX monoblocks ($2,345 each) served the subwoofers.

The system was set up in my studio with the MM-8s on a riser over my master keyboard and mixer. The drivers were at ear level, as they should be. I placed both of the D10E-S subwoofers on the floor, one to the right of my mixing desk, under a table, and the other to the left, near a wall.

As you might expect, the sound was awesome, with bass seeming to extend down into the abyss. After listening to a few tracks, it became apparent that the bass was a little *too* awesome; instead of seeming to emanate from the satellites, as it should, the low frequencies could clearly be localized as coming from speakers on the floor. Reducing the gain of the ELF section by a few dB took care of this, and the system snapped into focus.

The subwoofers revealed a whole new world of heretofore inaudible sounds. Bass drum hits that had been little more then dull beater thuds were now accompanied by the full body of the drum. Bass guitars suddenly had depth and impact. Male voices were deep and rich, without the boxy coloration so common in small speakers. Room ambience in live recordings was also dramatically evident.

I've heard dozens of subwoofer systems in the last few years, and this is easily the most coherent and musical. You quickly forget about the subs themselves; your near-field monitors just seem to extend all the way down. As a trombonist and bassoonist, I know that low-frequency sounds should have clearly defined pitch. Many of the consumer subwoofers I've reviewed can produce a greater *quantity* of bass than this system, but it's a dull roar by comparison, without much articulation or pitch.

Freed of low-bass duties and supplemented by the subs, the MM-8's excellent imaging was enhanced even

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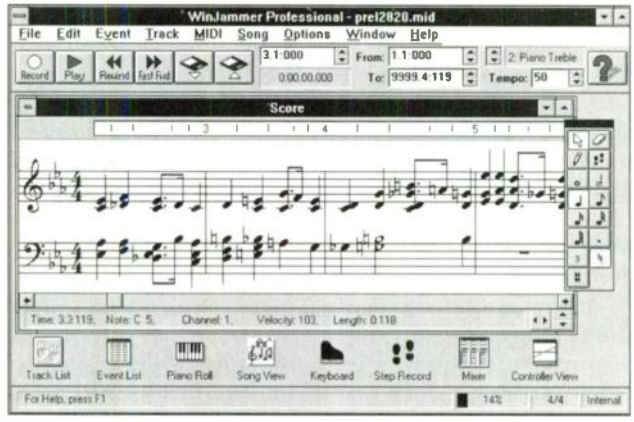

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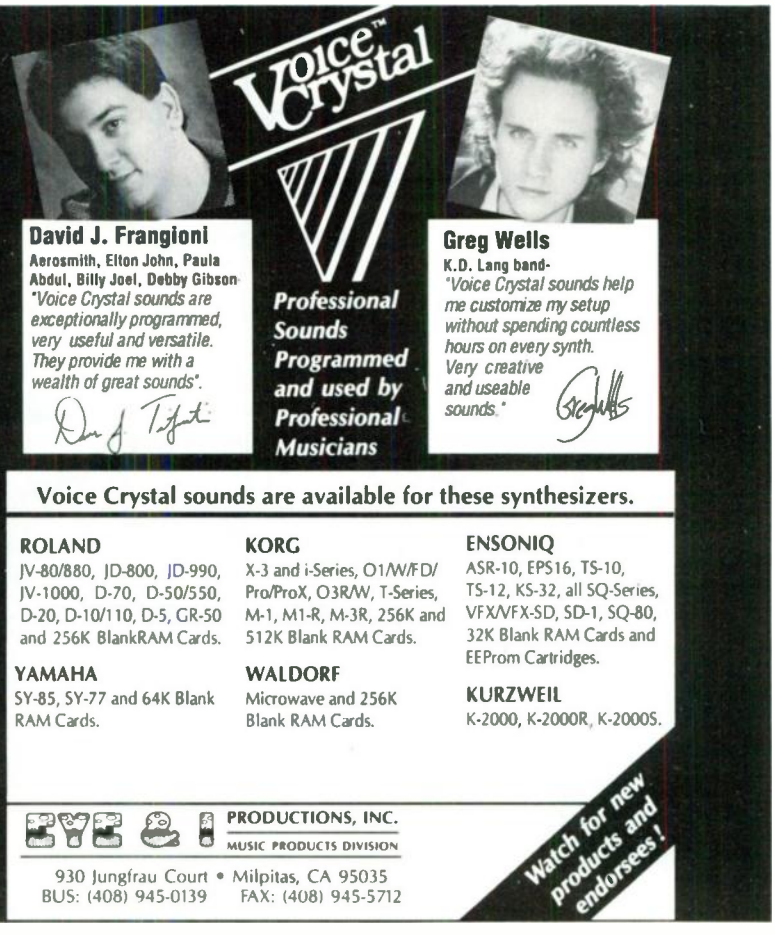

further. Instruments remain solidly defined and stably placed, even in the most complex mixes. Of course, the ELF system can be used with any monitors you own. I experimented with a pair of Tannoy NFM-8s, and although the Tannoys are no match for the MM-8s in terms of high-end detail and dynamic punch, they benefited greatly from the having the low frequencies filtered and directed to the subs.

IN THE BAG

The Bag End Studio A is a versatile, professional-quality system. At nearly $4,906 without amps, it is obviously not for everyone. Fortunately, a less expensive Studio B package is also available for $2,996. It includes a pair of MM-8 near-field monitors and a single D10E-S subwoofer, and it substitutes an ELF-M integrator for the more expensive ELF-1. The ELF-M ($798) doesn't go quite as low (18 Hz vs 8 Hz), has a mono subwoofer output, and is less configurable. (The ELF and highpass cutoff frequencies are preset, for example.) In smaller studios such as mine, the single sub would be plenty.

If you really want to hear The Whole Truth and nothing but The Truth, a pair of small near-field monitors by themselves aren't going to give it to you. Bass is the rhythmic and harmonic foundation of nearly all music, and small speakers just can't go low enough to do it right. If you think it doesn't make any difference, that consumer systems can't reproduce low bass either, you haven't experienced a modern car audio or home-theater system.

Think about it. Your synths and samplers can produce sounds well below 80 Hz; so can drums, bass, and many other instruments. Many objectionable noises, such as mic-handling and air-conditioning rumble, also lie at very low frequencies. Can you afford *not* to hear what's going down to tape or disc at the two lowest musical octaves?

When the neighbors complain, **EM** *Associate Editor* **Lawrence E. Ullman** *assures them that those loud noises in the middle of the night must have been from an earthquake or, perhaps, the space shuttle passing overhead.*

EMAGIC SoundDiver 1.5 (Mac)

By Peter Freeman

This universal editor/librarian plumbs the depths of your gear.

With the vast array of MIDI synthesizers, drum machines, effects processors, and other devices on the market these days, there is an ever-increasing need for high-quality editor/librarian software to archive, organize, and edit the myriad program files they create. After gaining a considerable following with their powerful *Logic Audio* sequencer, the folks at EMAGIC have turned their attention to creating an editor/librarian that incorporates their particular approach to software design. The result is called *SoundDiver.*

SoundDiver is a "universal" editor librarian, meaning it can address just

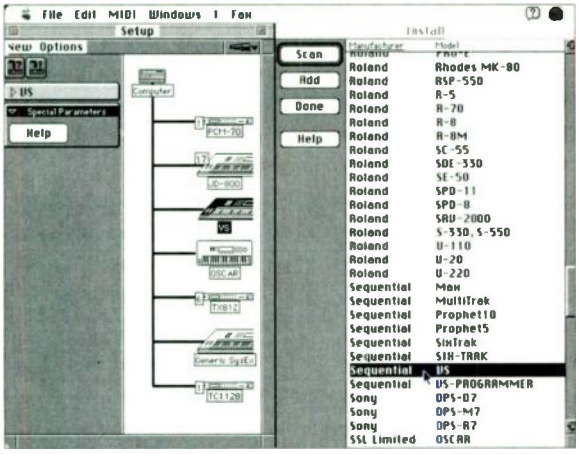

FIG. 1: The Setup and Install windows let you configure the program for your system, much of which is automatic.

about any device. It includes specific support for a long list of MIDI devices and provides users with the ability to create their own custom editor/librarians for devices that are not currently supported by EMAGIC.

The program is also designed to work with *Logic Audio*, thanks to an AutoLink function. This proprietary communications link between *Logic Audio* and *SoundDiver* is available only if they are running simultaneously on the same machine.

SETUP

SoundDiver's user interface consists of four basic windows: Setup, Memory Manager, Library, and Editor. The Setup window is a graphic representation of your MIDI setup, with icons for your Mac and each MIDI device (see **Fig. 1**). Similar to Opcode's *OMS* Studio Setup, this window must be configured the first time you run *SoundDiver*. The process is aided by the program's ability to intelligently scan the MIDI bus for any or all devices, automatically recognize them, and retrieve their current program data, if desired.

SoundDiver supports Apple's *MIDI Manager* System extension, although it can run without it, and support for *OMS* is planned. In terms of hardware, *SoundDiver* supports Mark of the Unicorn's MIDI Time Piece and MIDI Time Piece II and Opcode's Studio 4 and Studio 5 interfaces.

I installed *SoundDiver* on two very different systems: my own setup, which includes mostly older instruments (some of which have primitive MIDI implementations), and a friend's MIDI system, which consists entirely of modern synths and effects processors. I specified most of my instruments "manually" in the Setup window (the Scan feature wouldn't recognize the majority of my stuff), but this was not any trouble. At my friend's studio, it was even easier. *SoundDiver* recognized his entire MIDI setup automatically and got all relevant programs from the respective devices in under three minutes. It was effortless.

SoundDiver is copy-protected using the familiar "installation" scheme. Two authorized installations are provided on the master disk.

MEMORY MANAGER

The Memory Manager window displays the contents of a device's internal memory (see **Fig. 2**). Once *SoundDiver* has received program data from a device, it opens a Memory Manager window displaying the various data types (if applicable) and names of all programs in the device's memory, including any RAM and ROM data. This window lets you copy, exchange, delete,

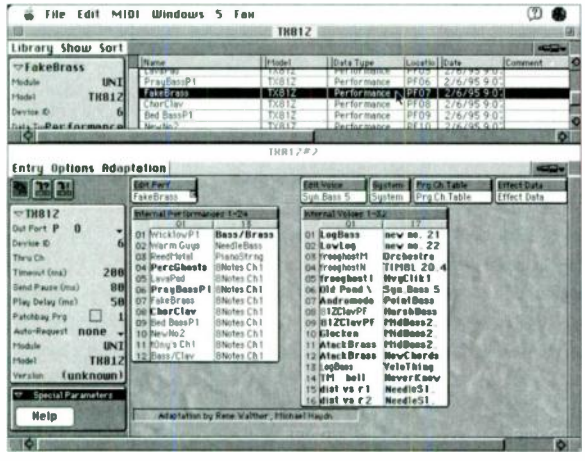

FIG. 2: A Library window (above) can include patches from various devices, while a Memory Manager window (below) reveals the contents of a particular device.

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rename, and perform other operations on the programs in a device. As with all *SoundDiver*'s windows, any number of Memory Manager windows can be opened for any number of devices simultaneously.

The Library window also displays a lot of useful information about each program, such as its location in the instrument's memory, its data type (e.g., Voice or Performance data), the model of the instrument it belongs to, the date it was copied into the Library, and which other programs use it (see **Fig. 2**). This last feature is extremely useful; for example, it lets you know at a glance if a particular Voice in a TX81Z is used by a specific Performance. Furthermore, *SoundDiver*'s Entry Link Management automatically keeps track of this and alerts you if you are about to delete a program that is used by other constructs.

One of the coolest aspects of the Library window (and of *SoundDiver* in general) is that it lets you mix as many different types of programs as you want in the same Library. This means you only need one Library window for an entire project's worth of program data. To my knowledge, *SoundDiver* is the only editor/librarian that currently offers this capability.

You can divide the Library window into Zones, which are user-defined groups of programs within the window that are separated by titles. This makes it easy to locate a particular instrument's programs in a Library window that includes mixed data types. There is also a nice Find function to help you quickly locate a specific entry, either by name, data type, model of device, or other criteria.

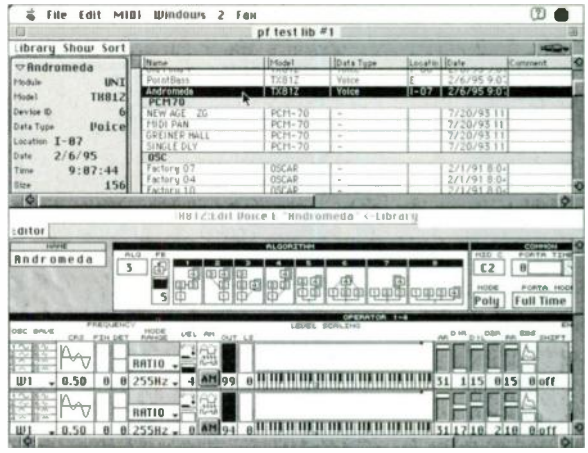
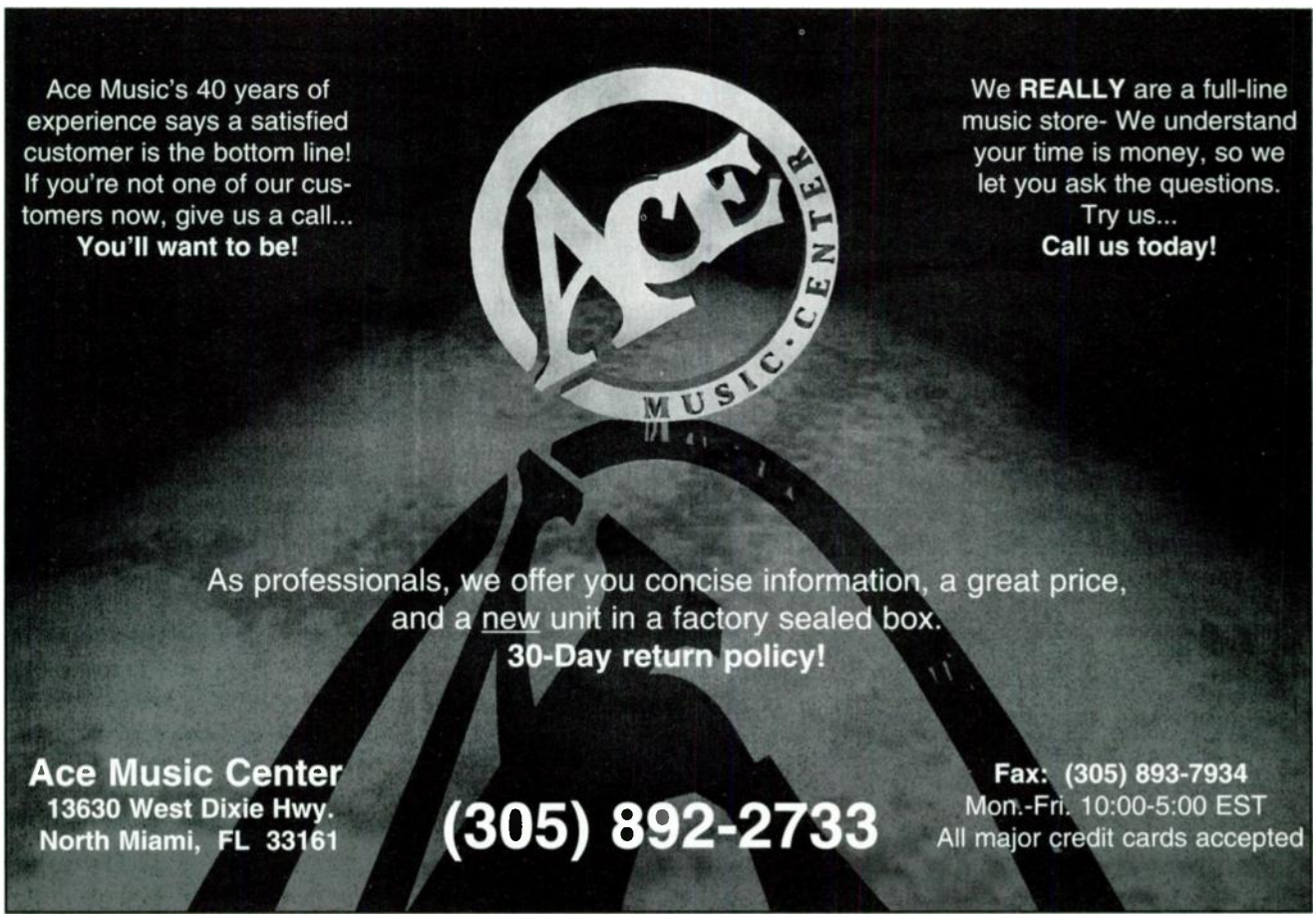


FIG. 3: The lower Editor window is linked to the upper Library window, so changes made in one are reflected in the other automatically.

EDITORS

Double-clicking on a program name in the Library window opens the Editor window for that program's device, if an Editor for the device exists. The Editor displays the program's parameter settings upon opening (see **Fig. 3**). This brings me to another extremely cool feature: window linking. *Logic* and *Logic Audio* users will recognize this term from those programs, but for the uninitiated, window linking is the ability to link a specific window to another one, so that changes made in one are auto-



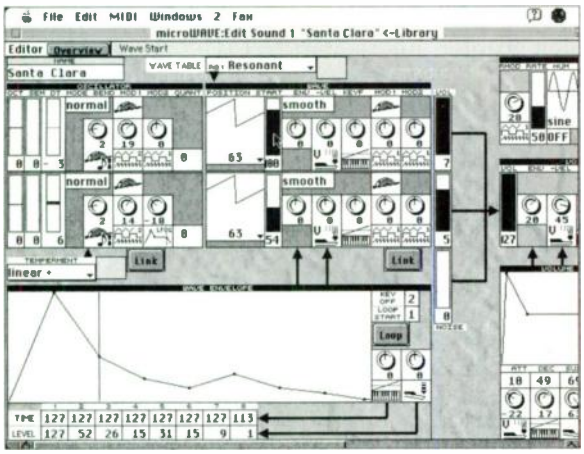


FIG. 4: Parameters in the Editor windows, such as this one for the Waldorf MicroWave, are logically organized.

matically reflected in the other. In *SoundDiver,* you only need one Library window and one Editor window open at any given time; as you select different programs in the Library window, the Editor window displays the correct type of Editor and the parameter values of the selected program.

Working with *SoundDiver*'s various editors is generally an intuitive process. Related parameters are intelligently grouped into different areas of the Editor window (see **Fig. 4**), and there's a useful Overview button (present in Modules only, not Adaptations; more in a moment) that displays a more general view of a program's parameters. The sliders and buttons in the Editors work smoothly, much like Environment objects in *Logic.*

Another *Logic Audio* feature found in *SoundDiver* is the ability to create and save up to 90 Screensets, which are user-defined configurations of windows on the screen. This allows you to customize the way the program's various windows are laid out on the screen so things are exactly where you want them. You can recall these setups instantly with the Macintosh numeric keypad. In addition, you can link Screensets in *Logic* and *SoundDiver;* calling up a Screenset in one program automatically calls up the Screenset with the same number in the other program.

SoundDiver lets you open as many windows as desired, including multiple windows of the same type. The only limitation is the amount of available memory. Once I had created a Screenset with a single Library window and a single Editor, I seldom ever had to change Screensets, thanks to the window-linking capability.

MODULES AND ADAPTATIONS

SoundDiver supports many different MIDI devices, from synthesizers and drum machines to effects processors and MIDI patch bays. However, some of this support is not provided by EMAGIC; many devices are supported with user-created add-ons called Adaptations. (EMAGIC-authored device profiles are called Modules.) All Modules and Adaptations are provided with the main program at no extra charge.

There are a few important differences between Modules and Adaptations. Modules can support different models of one type of device, even if there are minor differences between the models, different software versions exist, and new features are introduced; Adaptations cannot. In addition, Adaptations that don't include their own Editor do not support Link Management (i.e., automatically keeping track of Voices used by a Performance), and

Product Summary

PRODUCT:
SoundDiver 1.5
PRICE:
$249
SYSTEM REQUIREMENTS:
Macintosh II or better;
System 6.0.4 or later
(System 7 recommended);
5 MB RAM minimum
(8 MB with System 7)
MANUFACTURER:
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EASE OF USE	● ● ● ●
DOCUMENTATION	● ● ● ●
VALUE	● ● ● ●

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they do not automatically recognize RAM/ROM cards or expansion boards during the Scan process.

Modules can convert files from related devices (e.g., Yamaha DX7 to SY99), while Adaptations have more limited capabilities in this process. Finally, Modules can support any kind of SysEx communications, while Adaptations have certain limits regarding handshaking, MIDI Sample Dump Standard, and exotic name and checksum formats. The specifics of these limitations are covered in the *SoundDiver* programming manual, which describes the process of creating an Adaptation in detail.

In spite of these limitations, most Adaptations I tried worked just fine. However, a few of them offer only a Librarian, not an Editor. (The PCM-70 Adaptation is a case in point.) If your setup consists mostly of popular, modern devices made within the last five to eight years, *SoundDiver* probably has Modules for your gear.

SoundDiver's AutoSurf function immediately sends any parameter changes made in an Editor window to the device, letting you hear the results of your tweaking. A minisequencer window lets you record and play short "test" sequences while auditioning programs. If *Logic* or *Logic Audio* is running in the background, and its AutoLink function is enabled, the minisequencer's transport controls run *Logic*, so a song can play in the background while programs are auditioned.

OTHER FEATURES

The capabilities of the AutoLink feature are twofold. The Name Provider transfers the names of the programs currently in your devices to *Logic*, so they appear in *Logic*'s Instrument Flip-menu and Event Editor when Program Changes are inserted into a sequence. The MIDI Processing section of AutoLink sends all edits made in *SoundDiver* directly into *Logic* sequences on the current track.

AutoLink is similar in principle to the Publish/Subscribe feature of Opcode's *Galaxy* and *Vision*, but it goes further with the real-time edit-recording capability. Of course, AutoLink only benefits users of *Logic* or *Logic Audio*, but the same could be said of the link between *Galaxy* and *Vision* or between MOTU's *Performer* and *Unisyn*.

SoundDiver has a built-in, context-sensitive, online help feature that displays informative text relevant to whatever is displayed in the currently active window. This acts as an online manual for the program's Modules and Adaptations. However, I rarely needed it.

I was surprised that *SoundDiver* does not use color. The ability to colorize specific controls or parameter types in the Editor, as well as Zones in the Library window, would be invaluable. According to EMAGIC, this is planned for an upcoming version of the program.

SoundDiver comes with two manuals: one for *SoundSurfer* (the librarian-only predecessor to *Diver* that is available separately for $149) and the *SoundDiver* manual itself. Both are attractively organized, and they do a good job of explaining the program's functions. Both include tutorial sections that guide you smoothly through the main functions of the program. I had no trouble learning *SoundDiver* with the documentation. Of course, I had to retrain myself from the methodology of my previous editor/librarian program. Having experience with *Logic Audio*, however, I was already familiar with the concepts of window linking and Screensets, which helped a bit.

▼

One cool aspect is that you can mix different types of programs in the same Library.

CUSTOM APPLICATIONS

EMAGIC also provides a programming manual for those interested in creating their own Adaptations for unsupported devices. This comes in the form of a 166-page Macintosh text-viewer application, which explains the basics of SysEx messages and gives specific examples of the quirks of various devices' MIDI implementations. Tutorial examples are used to teach the process of creating an Adaptation from scratch.

After perusing this manual, I came to a few conclusions. Although *SoundDiver* makes it much easier to create Adaptations than, say, creating editor/

librarians in *Galaxy*'s PatchTalk programming language, making your own Adaptations is not a casual affair. It requires concentrated effort and a solid understanding of the structure of SysEx messages to make a really in-depth editor in *SoundDiver*.

Second, I wish there were *no* functional differences between Modules and Adaptations. If you're going to sit down and create your own Adaptation, it should function identically to a Module when it's finished. Of course, this is not entirely realistic, as certain functions simply require lower-level programming in C, but it would be nice if there was a way of circumventing this.

CONCLUSIONS

After using *SoundDiver* extensively with *Logic Audio* and by itself, I am quite impressed with its capabilities. In particular, I like Screensets, window linking, and the ability to mix program types within a single Library. In addition, since *Logic Audio* is my main sequencer, *SoundDiver*'s AutoLink capabilities are an obvious plus. Would *SoundDiver* benefit non-*Logic* users? Absolutely; its design and functionality make it a good choice for any moderate to enormous MIDI setup.

I found *SoundDiver* generally stable, although it did crash once or twice during the review period. These crashes were nothing fatal, but they were irritating nonetheless.

Both *SoundDiver* and *SoundSurfer* are updated on an ongoing basis. In addition, new Modules and Adaptations for devices such as the E-mu UltraProteus and Morpheus, Roland JV-1080, Korg X3, and Kurzweil K2500 are under development. *SoundDiver* is also available for the Atari ST/TT/Falcon computers, and a *Windows* versions should be ready by mid-1995. Users can download new versions free of charge from EMAGIC's BBS in Germany (49 81 214 9912) and receive answers to their questions.

I enjoyed using *SoundDiver* thanks to its overall design and convenience. It's well worth a look for anyone in need of a serious multidevice editor/librarian.

Peter Freeman *is a freelance bassist/synthesist and composer living in New York City. He has worked with such artists as John Cale, Jon Hassell, Chris Spedding, L. Shankar, Sussan Deihim, and Richard Horowitz.*

Eye & I Steve Reid Percussion Sampler

By Al Eaton

This sample CD offers an hour of primal percussion joy.

You are sitting in a jungle pond listening to the sound of "Crickets" far in the distance when you are suddenly attacked by a giant "Water Gong" that gobbles you up and pulls you under, at which point you are greeted by the sound of huge, electronic-sounding "Monkeys" as they beat you over the head with sheets of "Metal" and "Snake Skin Drums." You wake up to find that you are not in "Strawberry Fields" forever; you are listening to Eye & I Productions' *Steve Reid: The Definitive Percussion Sampler, Vol. 1*. This is not your grandfather's percussion sample CD.

The creator of this wonderful package is percussionist extraordinaire Steve Reid. His list of credits reads like a list of Who's Who in the music business, including work with such greats as En Vogue, Miles Davis, Supertramp, and The Rippingtons, as well as winning the 1993 *JAZZIZ* readers' poll for "Best Percussionist of the Year." This guy really knows his stuff, and it shows.

YOU CAN'T BEAT THIS

Although many of the disc's sounds are easily identifiable, it is difficult to ascertain which instruments generated some of them. Some of the CD's sounds are so far out that it would be easy to think that they came from a synthesizer source, but they didn't.

With close to an hour (78 tracks) of sounds included here, it would be a difficult task to list the number and all of the types of sounds contained on this sample CD. For example, the shaker section alone includes 27 versions of African shakers, ten shekeres, seven cabasas and ganzas, and 21 shakers and caxalls (including maracas, an egg shaker, a vitamin shaker, and a "Wha-Wha" shaker), and that's just a fraction of the shaker category.

The liner notes state that each instrument used contains every sound,

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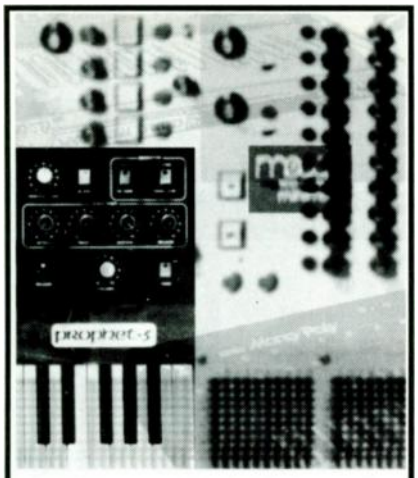

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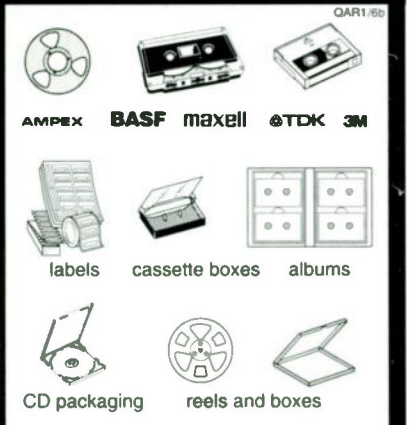

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Eye & I Productions' *Steve Reid: The Definitive Percussion Sampler, Vol. 1* offers hundreds of sampled percussion sounds from a wide variety of continents and cultures.

attack, tone, and nuance available when playing that instrument live. From the sheer number of sounds on the CD, I'm inclined to believe it. All types of instruments seem to be included here, including things that are stroked, hit, banged, dropped, kicked, blown, sucked, punched, and shaken. The CD also includes many standard percussion sounds, such as cymbal crashes, tambourines, cowbells, and a few different types of snares, but this collection really shines in its use of lesser-known instruments.

These instrument sounds are gathered from a number of different continents and cultures, including African, Brazilian, Indian, Peruvian, and Mexican instruments, as well as do-it-yourself types of sounds. Some of the sounds from the DIY category are under the headings of "Trashy Metallic Sounds," "Sheet Metal Effects," "Washboards & Ratchet," and "Metallic Effects in Water."

Some of the more elaborate sounds are recorded in stereo, but as most of the sounds are single hits on single instruments, the majority of the samples are recorded in mono. All samples are recorded cleanly, with no trace of hiss as the samples fade out. Used solo, I found some of the samples could have had a longer, more natural decay, but when used within the context of other instruments, this lack of decay was not a problem.

Of course, if creating rhythm tracks of a world-beat nature is your thing, this disc might be all the ammunition you need for some time to come. I would have liked to hear some rhythmic examples of how some of these sounds are used in their native form, but with some creativity on the user's part, those examples are not a must. Including such examples might have cut into the time needed on the disc for samples, but considering that the total running time for this CD is 54:48, I think there would have been enough room for a few sampled loop ideas. Standard MIDI Files would have been a big plus, too.

Just about the only negative thing I can say about this sampler is that because there is so much information packed in, it is hard to decide which instruments to use. On the plus side, the audio CD's documentation gives some idea of how the samples should be used (e.g., Orchestra Cymbals, Bright Cymbal, Hard Rock Cymbal, etc.) and, in most cases, more detail of what the sample sounds like (e.g., "Low Airy Bird Up, Down, Up Call"). Fortunately, a CD-ROM version is available ($189.95) for the Akai S1000/S2800, Roland S-770, and SampleCell formats.

Product Summary

PRODUCT:
Steve Reid: The Definitive Percussion Sampler, Vol. 1
PRICE:
Audio CD: $89.95
CD-ROM: $189.95
MANUFACTURER:
Eye & I Productions
930 Jungfrau Ct.
Milpitas, CA 95035
tel. (408) 945-0139
fax (408) 945-5712
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EASE OF USE	● ● ●
AUDIO QUALITY	● ● ● ● ●
VALUE	● ● ● ●

THE SPICE OF LIFE

If your tracks need a little percussion to spice them up, *Steve Reid: The Definitive Percussion Sampler, Volume 1* is a good place to start. It's a nice change from the standard cowbell or cabasa, and these sounds add a new, world appeal to an everyday, ho-hum rhythm track. By replacing some of the traditional instruments in my sequences with some of these more exotic instruments, I gave new life to my tracks.

If you have been thinking about using sampled percussion, I recommend that you rush out to find this one. This is a first class job. Oh, and by the way, it's license free.

Al Eaton *is a producer, engineer, and musician in the San Francisco Bay Area and is the owner of One Little Indian Music Productions.*

MediaTech Rhythm Brainz Plus

By Allan Metts

An E-Z way to build rhythm patternz and songz on your Windows PC.

Those who have been playing with MIDI toys over the years will remember an orange-and-white drum machine from Roland called the TR-707. This instrument only made fifteen different sounds and was pretty limited. Nevertheless, I spent many, many happy hours with a TR-707 in my lap, tapping on its non-Velocity-sensitive pads and staring at its LCD grid until the wee hours of the morning.

There must have been many TR-tappers out there, because the ghost of the Roland TR-707 (and machines like it) lives on. Apparently, the electronic musicians of the world like programming drum patterns in a grid with time across the top and instruments down the side. And when they've built their patterns, they want to link them together to make a song.

MediaTech Innovations' *Rhythm Brainz Plus* lets you use your *Windows* PC like a pattern-based drum machine. Of course, *Rhythm Brainz Plus* has much

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more advanced features than the TR-707. You can build patterns with many different sounds and intelligently use all the synthesizers and sound modules in your studio. Then you can build these patterns into songs using its friendly interface.

I installed *Rhythm Brainz Plus* onto my 80486/33 PC without much difficulty. However, the program had trouble finding a default drum kit when I first ran it. I had to enter path names manually into *Rhythm Brainz Plus*' .INI file in order to get started. (I tried out another copy of the program, and it installed fine.)

In its default configuration, the program supports a General MIDI sound module. I had a GM synth handy, so I decided not to mess with all the configuration options just yet. Instead, I loaded some of the demo patterns and songs to hear how they sounded. There are many demos to choose from in many different styles. Most of the songs are short, but they give you a pretty good feel for what the program can do.

PITTER-PATTERN

Rhythm Brainz Plus gives you a capable pattern-editing window (see **Fig. 1**), with time represented as columns and sounds (or musical notes) represented as rows. You can specify up to 64 beats per measure and any number of divisions per beat (vertical columns represent the time divisions per beat), as long as the total number of columns doesn't exceed 64.

You set up rows by building Kits, which contain 128 Parts, one on each row. Each Part can transmit any MIDI note on any MIDI port and channel. Each pattern can use a different Kit, which gives the user a tremendous amount of flexibility. Each time I picked a pattern with a different Kit, I visualized 128 musicians grabbing their instruments to enter or leave the stage. (Some of us have overly vivid imaginations.)

You enter a note event by clicking the intersection of a Part and a column. You can enter sustained notes by dragging the mouse. A Loudness Bar lets you assign one of sixteen user-definable Velocities to the event by picking a color on the bar before inserting your event. (You can also change an existing event's "color" by control-clicking it.) You can select entire beats, Parts, and patterns for setting Velocity, cutting, copying, and pasting. You can

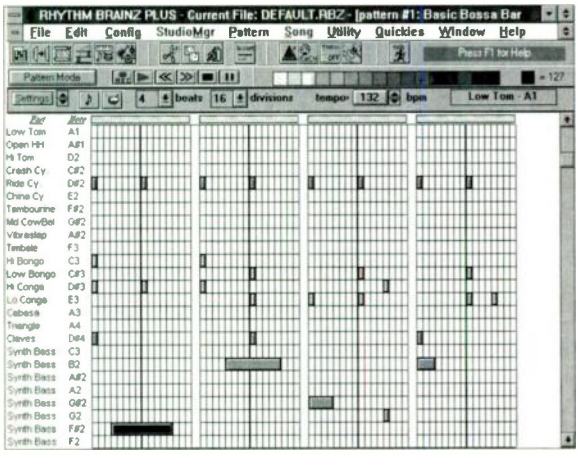

FIG. 1: *Rhythm Brainz*'s pattern-editing window is easy to use, with time across the top and sounds down the side. Loudness is indicated by event color.

transpose patterns or have *Rhythm Brainz Plus* randomly build a Part at a time. (You can't randomly build a whole pattern at once, though.) Everything is 100-percent quantized in *Rhythm Brainz*, so you'll be disappointed if you want to have the snare drum slightly on top of the beat.

Rhythm Brainz Plus has a real-time recording feature that, frankly, doesn't work. Attempting to record to a pattern resulted in MIDI slapback echoes (similar to what happens when you experience an infinite MIDI loop), screen-painting errors, and missing or incorrectly placed notes. MediaTech admitted that the recording feature isn't up to snuff and stated that *Rhythm Brainz Plus* is really intended for the MIDI novice (who presumably prefers step recording). I could find no mention of real-time recording in the current *Rhythm Brainz* advertisement, so it's fair to say that MediaTech isn't selling the product based on this capability. Still, I'm not sure why they would put this feature in *Rhythm Brainz* before it was fully operational.

SET 'EM UP

As you create patterns, they are automatically placed in your current Pattern Set. Pattern Sets hold 100 patterns and serve as a holding place when you're building songs or saving patterns to disk. Because you can only have one Pattern Set associated with a song, I created a new Pattern Set for each project I was working on.

However, sooner or later you're going to want to mix and match patterns between Pattern Sets. That's where the Librarian comes into play. In the Librarian, you can access any Pattern Set file, audition the patterns, and import them into your current Pattern Set. You have to stop and start play each time you want to audition a different pattern, which is kind of a drag. Also, I wish *Rhythm Brainz* had auditioning features in its Pattern Sets. Opening a new Pattern window each time I wanted to hear something in a Pattern Set got a little tedious.

Once you've built up your inventory of patterns, it's time to link them to make that million-dollar hit song. Building a song in *Rhythm Brainz* couldn't be easier. You simply open the Pattern Set window and drag patterns to where you want them in an open Song window (see **Fig. 2**).

You can place Section markers between any two patterns in your song list, one at the start of a section and another at the end. These Section markers look and act just like repeat signs. You can nest these markers up to four levels deep and specify the number of times *Rhythm Brainz* should repeat each section.

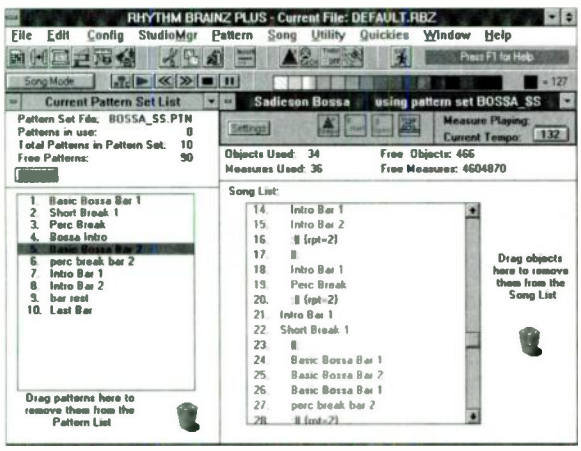

FIG. 2: Songs can be built by dragging patterns from the Pattern Set to the Song window.

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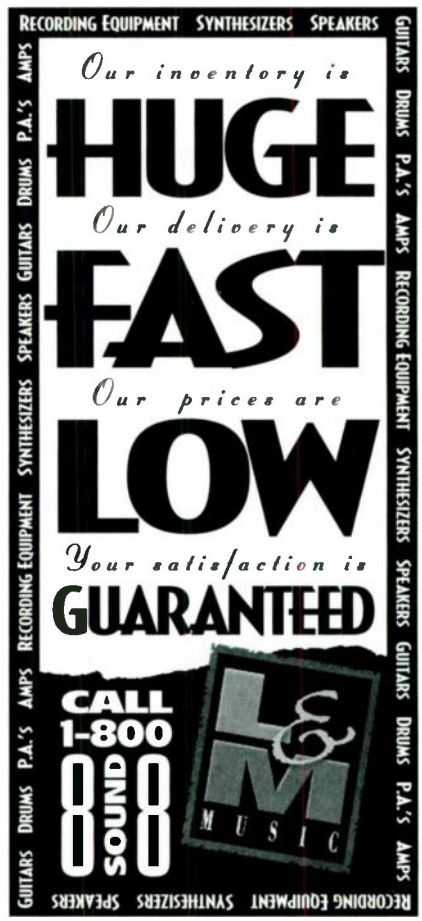

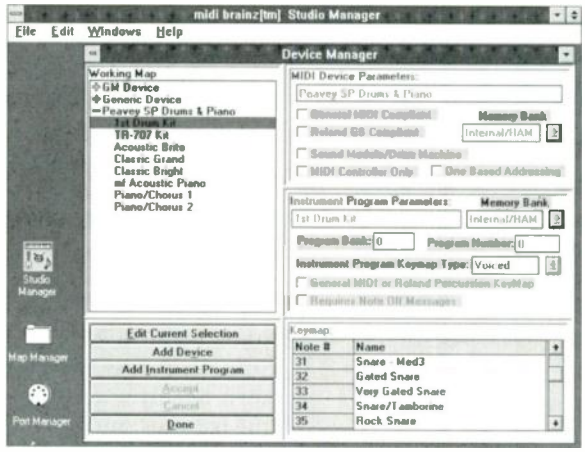

FIG. 3: The Device Manager is only one part of the program's powerful Configuration Manager.

There are other markers, too. A Loop marker tells the program to repeat the song endlessly, and a Tempo marker changes the song's tempo. (When playing songs, *Rhythm Brainz* ignores the tempo stored in the pattern.) All in all, you can store up to 500 patterns or markers in a song. When you consider the nested repeats, your song could play for days!

RHYTHM FEATURZ

Rhythm Brainz Plus can import and export Standard MIDI Files. Standard MIDI Files can only be imported to Pattern Sets (not songs) on a single MIDI channel. Because Pattern Sets can contain a maximum of 100 patterns, you are limited to a 100-measure import from the Standard MIDI File. *Rhythm Brainz*'s SMF exports are more flexible: You can export a pattern, Pattern Set, or a song and can write to multiple tracks.

Rhythm Brainz also has a jukebox feature that automatically loads and plays any or all of the songs in your default song directory. You can build and save song lists and specify how many seconds should elapse between songs, or tell the program to wait for a Start command.

The program can be controlled from an external MIDI controller using MIDI Start, Stop, Continue, Note On, and Program Change messages to change tempo or start and stop play. However, I quickly ran afoul of a problem with the external MIDI controls. I could start play without a problem, but could only stop it with what should have been the Continue message. The program then crashed when I tried to restart play. (Shortly after this review was completed, MediaTech began shipping version 1.11, which supposedly corrects this problem.)

STUPENDOUS SETUPS

My favorite part of *Rhythm Brainz Plus* is *Studio Manager*. Really a separate program that lets you describe your entire studio for use by *Rhythm Brainz*, *Studio Manager* includes four modules. First, you use the Port Manager to specify which *Windows* MIDI device drivers correspond to *Rhythm Brainz*'s four input ports and four output ports.

Next, you use the Map Manager to extract profiles of the devices you own from the master map of devices supported by *Rhythm Brainz*. These profiles include patch assignments and drum kits, as well as other configuration settings, such as whether the patch numbers start with 0 or 1. There are 50

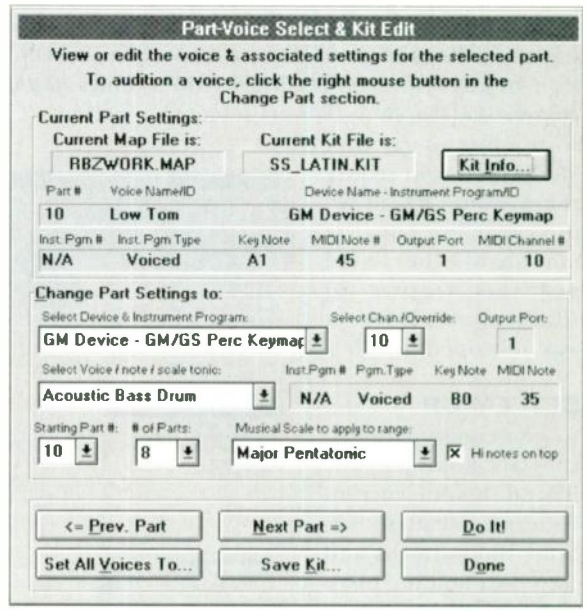

FIG. 4: You can include drum maps and musical scales within the same *Rhythm Brainz* Kit.

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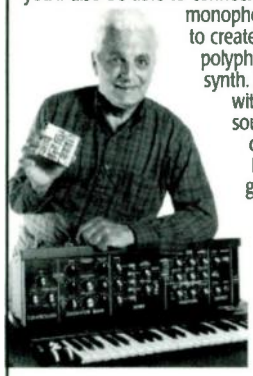

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supported instruments in the Map Manager, plus several additional profiles for generic and General MIDI instruments.

You can view each instrument's patch and drum assignments in the Device Manager (see **Fig. 3**). The Device Manager is also used to add information about synthesizers that weren't included in the Map Manager. I often use my sampler for my drum and piano sounds, so I used the Device Manager to add a drum map and a few piano patches to my *Rhythm Brainz* configuration.

Finally, you use the Studio Viewer to tie everything together. The Studio Viewer lets you assign an instrument and a patch (which were specified using the Map and Device Managers) to every MIDI port and channel. I wish all MIDI programs had these configuration capabilities.

So how does all this configuration information relate to the Parts and Kits in *Rhythm Brainz* patterns? To build a Kit, you specify each Part individually. Once you configure your studio in *Studio Manager*, you no longer have to worry about MIDI port, channel, and Program Change numbers in *Rhythm Brainz*. Instead, you simply tell the program to "play the cowbell on the SY22," and it knows what to do (see **Fig. 4**).

You can save a completed Kit to the Default Kit file (which is used each time you open a new Pattern window), or you can make an entirely new Kit

Product Summary

PRODUCT:
Rhythm Brainz Plus 1.1
PRICE:
$69.95
SYSTEM REQUIREMENTS:
PC-compatible with Microsoft *Windows* 3.1; *Windows*-compatible MIDI interface or sound card; VGA monitor; mouse
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file that you can use with any Pattern. There are many Kit files for common synthesizers and drum machines, but I was surprised to find no Kit file that contained the entire General MIDI drum map. (Some Kit files contained a large portion of it, however.) Many of the predefined Kit files seemed designed for special purposes. Some documentation on the intended purpose of each Kit file would have been appreciated.

Rhythm Brainz Plus is designed for more than just drums. You can have the program build Kits that contain musical scales, too. Eleven scales are available, including major, minor, and blues scales. I built a Kit that included a basic drum set and two octaves of bass using a blues scale. I had no trouble cranking out all sorts of useful rhythms.

THE FINAL BEAT

I appreciate a well-designed user interface, and *Rhythm Brainz Plus* definitely fits the bill. There are plenty of hot keys and tool bars and an excellent use of color. Dragging patterns around is an intuitive way to edit songs, except in one instance: Patterns in a Pattern Set list are edited by dragging them to an empty part of the workspace. A double-click would be more effective.

The online help is excellent, with many hot links and glossary terms. The written documentation consists of two manuals. One describes the basic program, the other is an addendum that contains basic "how-tos" and descriptions of the program's new features. Although the documentation is sometimes too detailed and poorly organized, all in all, it gets the job done. Support for the program is available by phone, fax, and CompuServe.

I like *Rhythm Brainz Plus*. It needs some debugging and polishing in places, but it is well designed and well thought out. The lack of functional real-time recording is a major drag, but hopefully this capability will be added eventually. A basic version of *Rhythm Brainz* is also available for $39.95; it has only 25 rows (parts) as opposed to 128 and offers fewer features than the *Plus* version. Either way, if you like to think in patterns and make music with a mouse, give *Rhythm Brainz* a try.

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

Symbolic Sound Kyma System 4.0 (Win, Mac)

By Dennis Miller

A synthesis workstation with unlimited sound potential.

Until recently, few synthesizers offered the ability to create sound using more than one basic synthesis method. A few select software programs, notably Digidesign's *Turbosynth* for the Mac, provided far greater flexibility, but were totally dependent on the host computer for processing power and had no real links to the outside world.

While *Csound* and other software-based synthesis languages allow you to create sounds with endless variety, they don't work in real time, and their text-based interfaces are too formidable for many users. The Kyma System from Symbolic Sound aims to change all that.

Kyma is a real-time synthesis workstation that combines a highly graphic software interface with a DSP-based hardware component. The new 4.0 software is a massive upgrade over the previously reviewed version (version 1.05, reviewed in the September 1991 **EM**). Available for Macintosh and *Windows* computers, the new software not only provides far more horsepower than its predecessor, but it is vastly easier to use and adds extensive MIDI control.

Providing the raw horsepower of the most powerful hardware synthesizers under the control of a reconfigurable, intuitive graphic interface, the Kyma system allows you to design, play, and save sounds with great flexibility and ease. You can create virtually any sound imaginable.

WHAT'S IN THERE?

Kyma consists of a 3U rack-mount, external hardware unit called the Capybara, a single-slot interface card, and a software component known as the *Kyma Language for Sound Specification*. The Capybara holds up to eight expansion cards, each containing a Motorola 56001 DSP chip running at 33 MHz, and 756 KB of sample RAM. The DSP chips are optimized for synthesizing and altering sound and provide 16

MIPS of processing power each. It's a potent sound engine.

The Capybara connects to the outside world with auto-sensing balanced stereo ins and outs with ¼-inch connectors and MIDI In, Out, and Thru jacks. AES/EBU and S/PDIF digital I/O are optional ($395). The system features stereo, 16-bit, 64× oversampling A/D converters and 16-bit, 2× oversampling D/A converters. It supports sample rates of 11.025, 12.00, 22.05, 24.00, 44.1, and 48 kHz.

All internal processing is done at 24 bits, and because the system does not rely on the host computer for much, a fairly modest computer, such as a '386/40 PC or Mac IIci, is adequate. (A NuBus slot is required for Macs.) A good chunk of RAM—16 MB is recommended—and a large hard disk are desirable, especially if you plan to work with lots of samples.

A basic 3-card system sells for $4,995, and each additional card costs $595. That's a lot of money, but when you consider the huge range of sound capabilities and compare the price to some of the higher end, RAM-packed samplers, it doesn't seem out of line. The price includes one free major software upgrade and lifetime, toll-free support. There's also an option to expand the RAM on each DSP card at standard industry prices.

The Capybara contains the Kyma System's audio I/O and MIDI ports and accepts up to eight DSP expansion cards.

HOW IT WORKS

Using the Kyma software, you design sounds and processes on screen by patching together the numerous modules and specifying values for their parameters. Kyma calls these modules Prototypes and completed designs Sounds. When you've finished building a Sound, the system quickly compiles it and then downloads it to the Capybara for instantaneous playback.

In effect, you're programming the Capybara hardware to do the type of synthesis or processing you've specified, but all the "coding" is done using icons. (You can work with more traditional programming methods, too.) Does the term "virtual synthesizer" sound good? Well Kyma is that and much more.

I prefer to think of Kyma as an elaborate sound-design toolkit. On the workbench are well over 100 different modules that either produce sound directly, process sound, or both. Each of the Prototype Sounds shipped with the system, and dozens more examples on disk, are already setup with useful parameters, so right out of the box there are many sounds to experiment with. Every parameter can be edited, most in real time, and individual modules or complete Sounds can be chained together to provide an infinite number of combinations.

For example, you might design a sound that starts with an oscillator, moves through a waveshaper, splits the left channel off to a reverb, and takes the right through a delay line. You could then "play" this sound by having the oscillator's pitch come from your MIDI controller while at the same time having the reverb's decay time controlled from a slider or fader. The design for this sound, like any number

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