Price Busters: Yamaha's 01V and Fostex's FD-4 • Sound-Check Secrets

JAM the EM Guide to Gigging

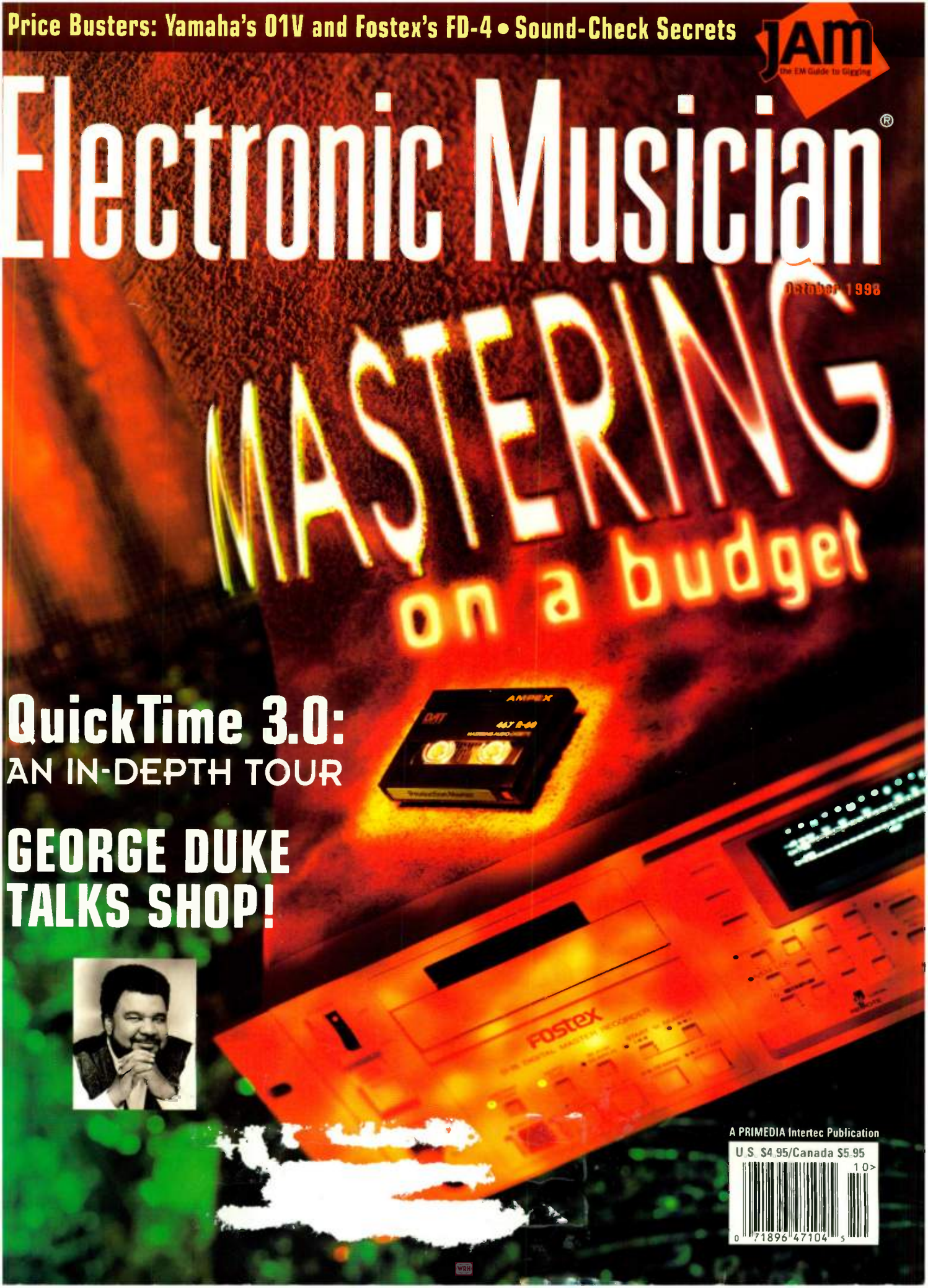
Electronic Musician®

October 1998

MASTERING on a budget

QuickTime 3.0: AN IN-DEPTH TOUR

GEORGE DUKE TALKS SHOP!



A PRIMEDIA Intertec Publication

U.S. $4.95/Canada $5.95

10>
0 71896 47104 5

VETERAN ENGI

THE GROUNDSWELL OF HR82

Everybody makes glowing claims about their monitor speakers. But only Mackie Designs' HR824 Active Near Field Monitors have gotten this amount of acclaim from credible outside sources so quickly.

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

We know you're as serious about your creative product as these folks are. So why compromise with less than the best near field monitors? Visit your nearest Mackie dealer for a demo or call us toll-free for more info.

HR824

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

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

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

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

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

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

* suggested U.S. retail.

EERS AND REVIEWERS CONFRONT REALITY.

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

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

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

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

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

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

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

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

MACKIE

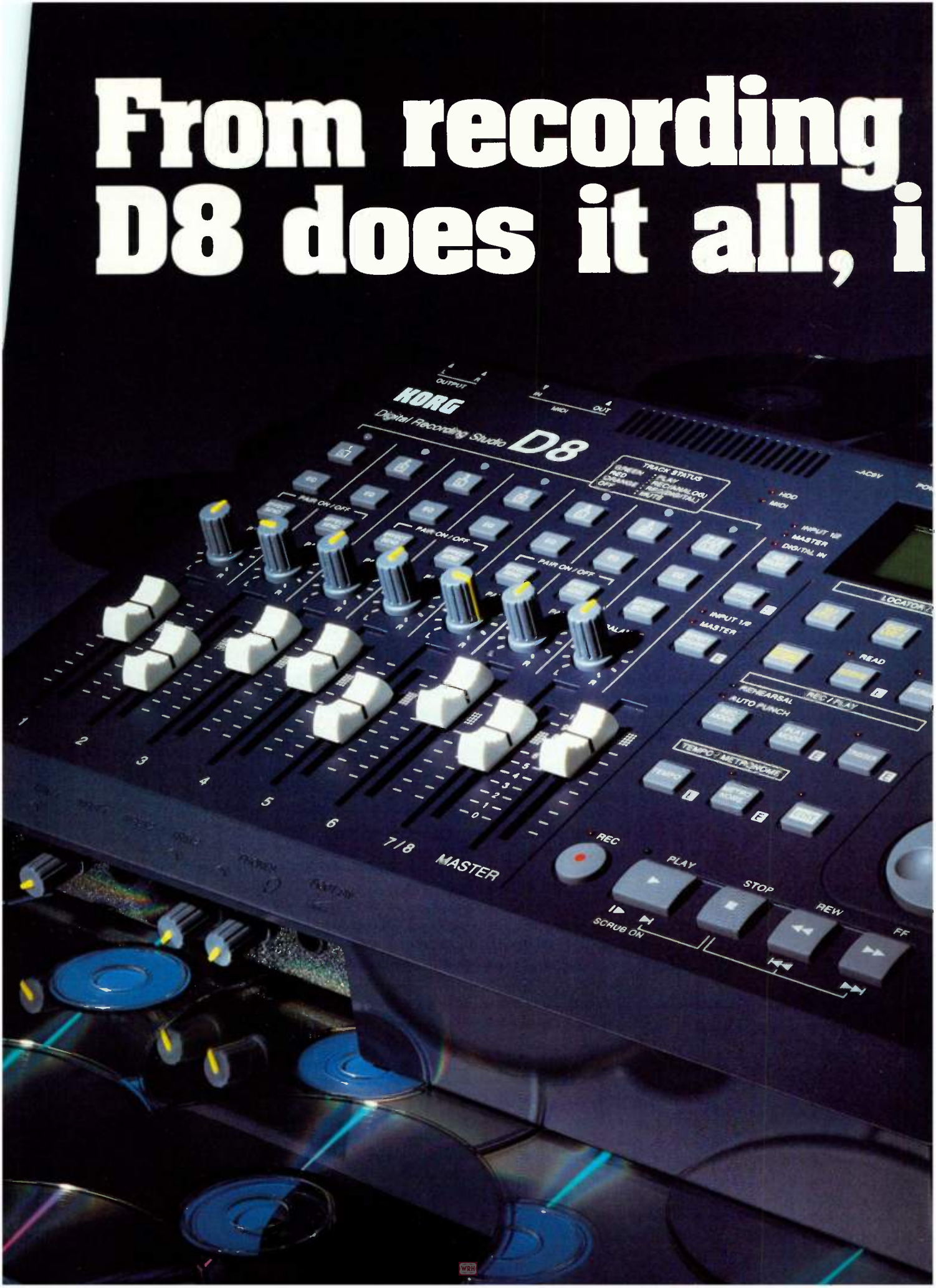
MADE BY THE MACKOIDS IN WOODINVILLE, USA

800/898-3211

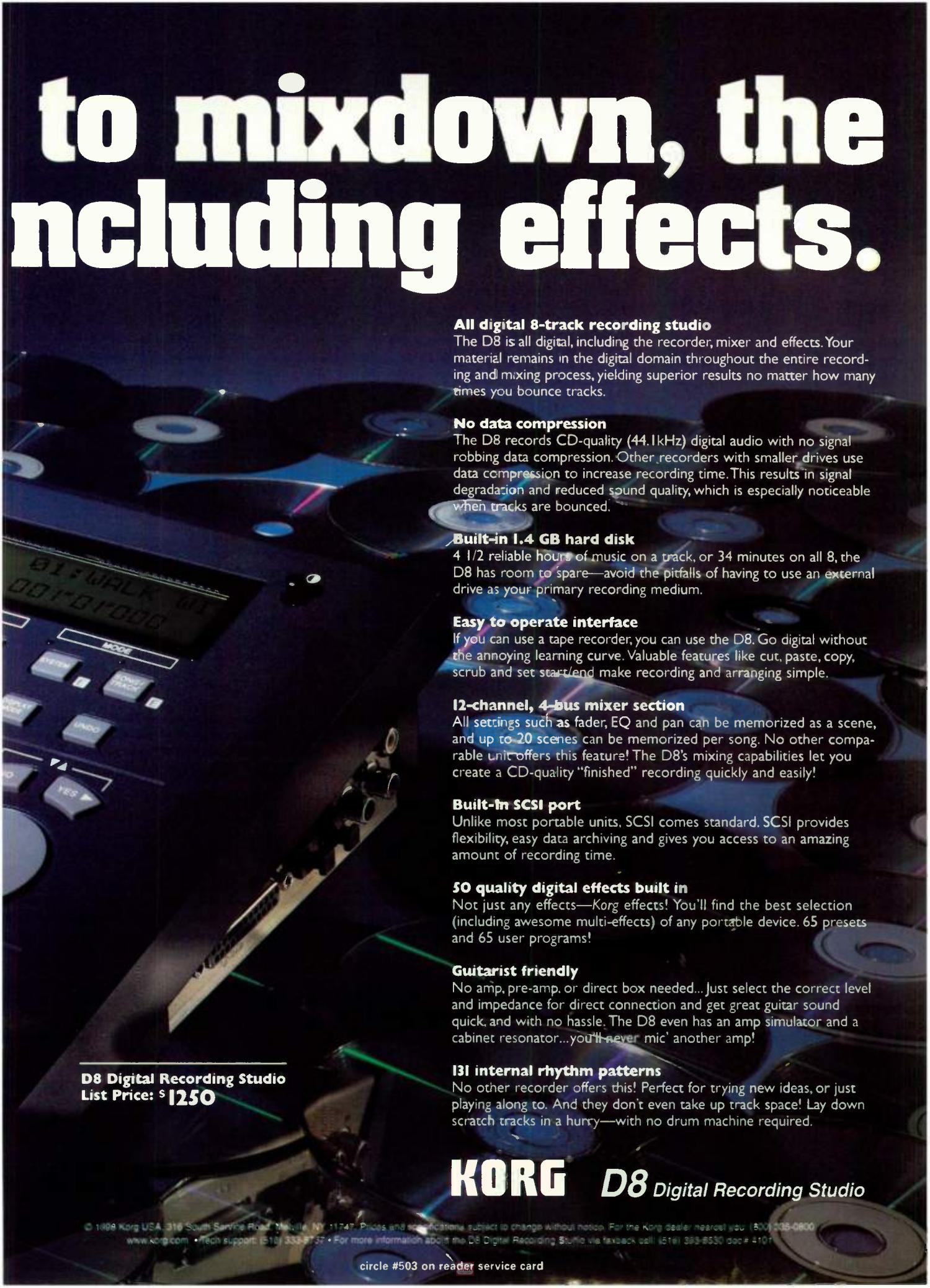
www.mackie.com

circle #502 on reader service card

From recording
D8 does it all, i



to mixdown, the ncluding effects.



All digital 8-track recording studio
The D8 is all digital, including the recorder, mixer and effects. Your material remains in the digital domain throughout the entire recording and mixing process, yielding superior results no matter how many times you bounce tracks.

No data compression
The D8 records CD-quality (44.1kHz) digital audio with no signal robbing data compression. Other recorders with smaller drives use data compression to increase recording time. This results in signal degradation and reduced sound quality, which is especially noticeable when tracks are bounced.

Built-in 1.4 GB hard disk
4 1/2 reliable hours of music on a track, or 34 minutes on all 8, the D8 has room to spare—avoid the pitfalls of having to use an external drive as your primary recording medium.

Easy to operate interface
If you can use a tape recorder, you can use the D8. Go digital without the annoying learning curve. Valuable features like cut, paste, copy, scrub and set start/end make recording and arranging simple.

12-channel, 4-bus mixer section
All settings such as fader, EQ and pan can be memorized as a scene, and up to 20 scenes can be memorized per song. No other comparable unit offers this feature! The D8's mixing capabilities let you create a CD-quality "finished" recording quickly and easily!

Built-in SCSI port
Unlike most portable units, SCSI comes standard. SCSI provides flexibility, easy data archiving and gives you access to an amazing amount of recording time.

50 quality digital effects built in
Not just any effects—Korg effects! You'll find the best selection (including awesome multi-effects) of any portable device. 65 presets and 65 user programs!

Guitarist friendly
No amp, pre-amp, or direct box needed... Just select the correct level and impedance for direct connection and get great guitar sound quick, and with no hassle. The D8 even has an amp simulator and a cabinet resonator...you'll never mic' another amp!

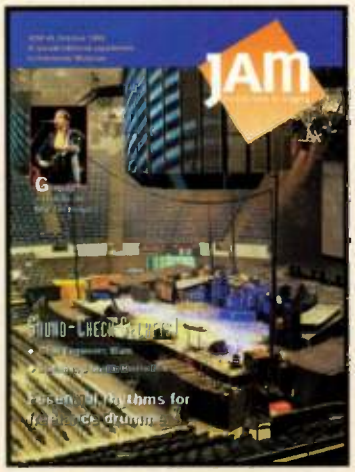
131 internal rhythm patterns
No other recorder offers this! Perfect for trying new ideas, or just playing along to. And they don't even take up track space! Lay down scratch tracks in a hurry—with no drum machine required.

D8 Digital Recording Studio
List Price: $1250

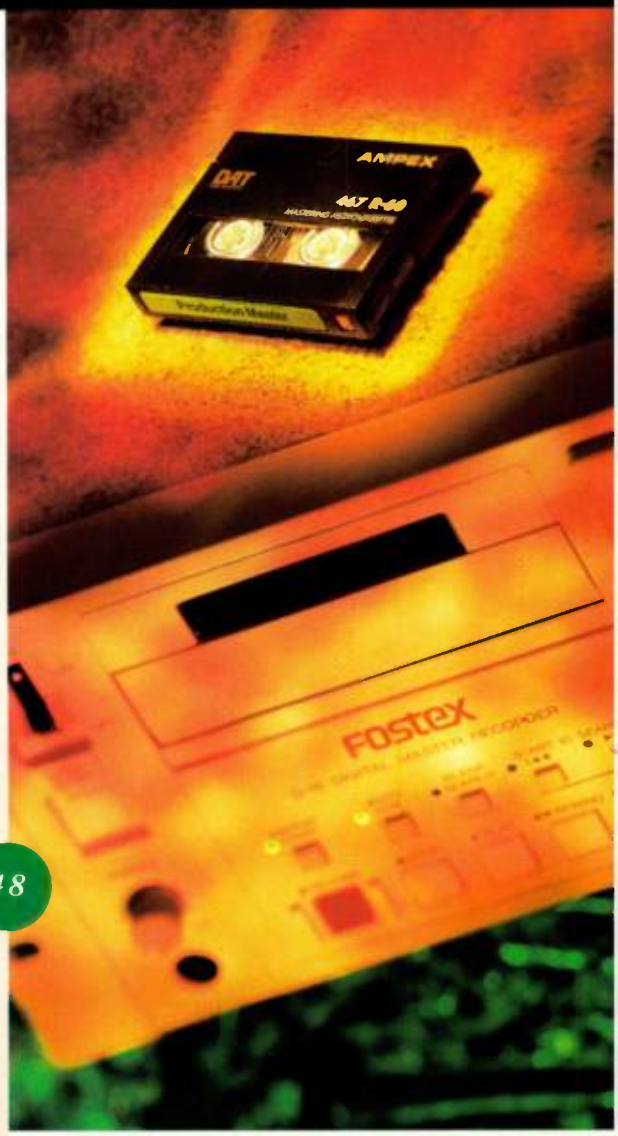
KORG *D8 Digital Recording Studio*

I N S I

FEATURES



This month's *JAM* enlightens musicians and sound engineers alike on what it takes to dial in a perfect house mix. Other highlights include tips for freelance drummers who want broaden their style horizons, how mic technique can make or break a gig, and a performance featuring singer Shafqat Ali Khan and ultra-high-tech musicians David Wessel and Matt Wright.



48

DEPARTMENTS

Electronic Musician®
OCTOBER 1998 VOL. 14, NO. 10

COLUMNS

REVIEWS

Cover: Photo by Joe Maggiore.

Liberation Theology

If it feels wrong, don't do it!

ANTHONY PIDGEON

In this issue's "Riffs" column (*JAM*, p. 120), coauthors Brian Knave and John Hvasta provide a useful list of musical styles with which freelance drummers—and other freelance musicians—should be conversant. After all, you never know what kind of gig you'll be called for, and the more styles you can play, the more gigs you can pick up. This is a sound business idea that can also broaden our musical horizons.

However, this approach is not right for everyone. The danger is that, when you try to play music you only superficially understand, your performances could become the musical equivalent of processed cheese: popular with those of undiscerning tastes, but neither flavorful nor nutritious. Few people can play in multiple genres of music with genuine passion and authority. And to my mind, if you can't bring your best effort to a creative work, you probably shouldn't take the gig. In such cases, it might be wise to reject the "jack of all trades" approach.

When I was in my late teens, I felt that I should try to listen to and understand as many genres as possible, which indeed helped make me a better musician. My music has long been influenced by diverse styles, and being willing to experiment with pretty much anything made sense. Sometimes I even felt guilty about disliking some types of music, as if I had failed somehow.

As a professional musician, I occasionally had to play music that I disliked in order to make a few bucks. I imagine most of us have been there and done that. Sure, I could play every note accurately and with proper technique, and I could even put on a good show while doing it. But good music isn't about technique; technique, like technology, is a tool that can help you achieve the true goal of making music that evokes powerful emotions or communicates meaningful ideas. I felt I was failing in these instances, even if most people in the audience never knew it, because I wasn't able to emotionally commit to the performance.

I eventually came to the liberating conclusion that, if I couldn't "connect" emotionally with a piece of music and pull it off properly, I would not perform it in public. I often experiment privately with new music I don't understand, of course, but I will not perform or record for release anything I don't believe I can deliver with passion and authority.

I knew this decision would reduce my opportunities. Fortunately, I was genuinely fluent in enough genres and styles that I still had plenty of choices. But had this not been the case, I believe I would have made the same decision. Sometimes it pays to make an unsound financial decision if it is liberating for the soul. Thereafter, I felt like I was doing the right thing every time I recorded or took the stage.

So stretch your musical world all you want to. I'm not saying you should limit yourself in any way. But don't let anyone tell you that you'll never work in this town if you can't play reggae and raga, bebop and synth pop, rockabilly and Waylon 'n' Willie. Play all the music that feels right—as long as you play it with full emotional commitment and at the highest level of which you are capable.

Electronic Musician®

Editor Steve Oppenheimer
Managing Editor Mary Cosola
Associate Editors Jeff Casey, Brian Knave, Dennis Miller, Gino Robair, David M. Rubin
Editorial Assistants Carolyn Engelmann, Matt Gallagher, Rick Weldon
Contributing Editors Larry the O, George Petersen, Scott Wilkinson
Art Director Dmitry Panich
Associate Art Directors Tami Herrick-Needham, Laura Williams
Graphic Artist Steve Ramirez
Informational Graphics Chuck Dahmer

Publisher John Pledger

Marketing Manager Christen Pocock
Eastern Advertising
Angelo Biasi
angelo_biasi@intertec.com
200 Connecticut St., Norwalk, CT 06854
tel. (203) 838-9100; fax (203) 838-2550
Northwest Advertising
6400 Hollis Street #12, Emeryville, CA 94608
tel. (510) 653-3307; fax (510) 653-5142;
Southwest Advertising
Erika Lopez
erika_lopez@intertec.com
12424 Whilshire Blvd., Suite 1125,
Los Angeles, CA 90025
tel. (310) 207-8222; fax (310) 207-4082
Sales Assistants Mari Stancati, Kahlil Thompson, Amanda Weeden
Classifieds Advertising Manager Robin Boyce-Trubitt
Classifieds Sales Assistant Jef Linson
Classifieds Assistant Mark Hopkins
Marketing Services Manager Jane Byer
Marketing Assistant Daniela Barone
Director of Operations and Manufacturing Anne Letsch
Production Director Ellen Richman
Advertising Production Managing Coordinator Joanne Zola
Production Assistant/Reprint Coordinator Jeremy Nunes
Computer Systems Coordinator Mike Castelli
Circulation Director Philip Semler
Circulation Associate Heidi Eschweiler
Circulation Assistant Austin Malcomb
Business Manager Cindy Elwell
Human Resources/Facilities Assistant Lauren Gerber
Receptionist Carrie Gebstadt
National Editorial, Advertising, and Business Offices
6400 Hollis Street #12, Emeryville, CA 94608
tel. (510) 653-3307; fax (510) 653-5142;
Web www.emusician.com
Subscriptions, Customer Service, Back Issues
PO Box 41525, Nashville, TN 37204
tel. (800) 843-4086 or (615) 377-3322; fax (615) 377-0525
Intertec Publishing Corp.
9800 Metcalf Ave., Overland Park, KS 66212

PRIMEDIA Intertec
Ray Maloney, President and CEO

Cameron Bishop, President, Communications & Entertainment Division

PRIMEDIA Specialty Magazines
James Warner, President

PRIMEDIA Inc.
William F. Reilly, Chairman and CEO
Charles McCurdy, President
Beverly C. Chell, Vice Chairman

Electronic Musician (ISSN: 0884-4720) is published monthly by PRIMEDIA Intertec 6400 Hollis St., #12, Emeryville, CA 94608. One year (12 issues) subscription is $36; outside the U.S. is $65. Periodical postage paid at Oakland, CA, and additional mailing offices. 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.

Also publishers of *Mix*® magazine.

PRIMEDIA Intertec

Printed in the USA.

BPA

one word says it all...

FIZMO

It's that new sound you're looking for. It's the new toy you crave. It's what's been missing in your life. It's an attitude.

Realtime attitude.

FIZMO – the first interactive, Realtime Transwave Synthesizer. A new word for an entirely new synth.

While other manufacturers were busy recreating sounds of the past, ENSONIQ engineers were redesigning what a synthesizer should be now. Get ready for a wild ride...FIZMO is not just another virtual analog retro synth. The realtime interactive controls make you a part of the instrument...a part of the experience. And the new "Intelligent" Arpeggiator and Vocoder draw you in further as the sounds in your head come alive, from pumping House and Techno to intricate, multicolored soundscapes. The FIZMO sound is as limitless as your imagination.

FIZMO – a new synth for a new generation of musicians. One word says it all.

EMU ENSONIQ

FIZMO – It's everything you've been wishing for, and more. And you can get your hands on it at your local EMU-ENSONIQ dealer now! Be sure to visit our new website at www.ensoniq.com for all the latest ENSONIQ news and info!

- Exclusive ENSONIQ Transwaves
  Create complex moving timbres not possible with static waveforms
- Interactive Realtime Controls
  Twist the knobs and feel the power
- Legendary ENSONIQ 24-Bit Effects
  Totally pro quality using our ESP-2 chip
- New Vocoder with Mic Input
  The elusive sounds of yesterday's coveted vocoders are yours today
- "Intelligent" Arpeggiator
  It's alive with inspiring musical patterns
- 48-Voice Polyphony
  Plenty of FIZMO to go around

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

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

circle #504 on reader service card

GET THE MOTU/WAVES POWER STUDIO BUNDLE

Why is Sweetwater Sound your premium music technology source for the MOTU/WAVES POWER STUDIO and all your other recording and MIDI gear?

1. Convenience — you get the right gear, when you need it!

It's like having a huge warehouse of music gear right outside your front door! One call gets you all the top brands — no chasing around all over town. Why put up with any hassles?

2. Savings — you get our direct "ProNet" prices.

We stock in tremendous quantity to get the lowest possible cost from our vendors. We pass the savings directly to you with our ProNet pricing. Why spend more?

3. Service — you get great tech support and service free of charge!

Need help with an installation? Have confusing problems? We know our stuff cold. We don't pass the buck — we get you back to your music as fast as possible. Why wait?

4. Respect — you get treated with respect.

Shouldn't shopping for gear be easy and fun? We'll do everything we can to make sure you have a great time selecting and building your rig, without pulling out your hair! Why not enjoy yourself?

Get this exclusive bundle from Sweetwater Sound. Our "ProNet" pricing saves you money. And we include free technical support to make sure your rig works flawlessly! Tired of sluggish, high latency consumer audio formats? I/O challenged? Why not call us right now about the many benefits of the POWER STUDIO BUNDLE?

ATTENTION: CURRENT AND NEW 2408 OWNERS!

Want to add MIDI Sequencing?
Upgrade AUDIO DESK to DIGITAL PERFORMER for only $395
(MSRP: $795). Call now and you can have the multiple award-winning Digital Performer tomorrow!

WINDOWS USERS!

The 2408 works great under Windows! And Waves outsells all the other competition combined!

MOTU

WAVES

MUSIC TECHNOLOGY DIRECT — and the Best value Guaranteed!

Why wait another minute to get the Desktop Studio you've been dreaming of? The MOTU 2408 and WAVES Native Pack are shipping now!

Call (800) 222-4700

(219) 432-8176 • FAX (219) 432-1758 • sales@sweetwater.com
5335 BASS ROAD • FORT WAYNE, INDIANA 46808

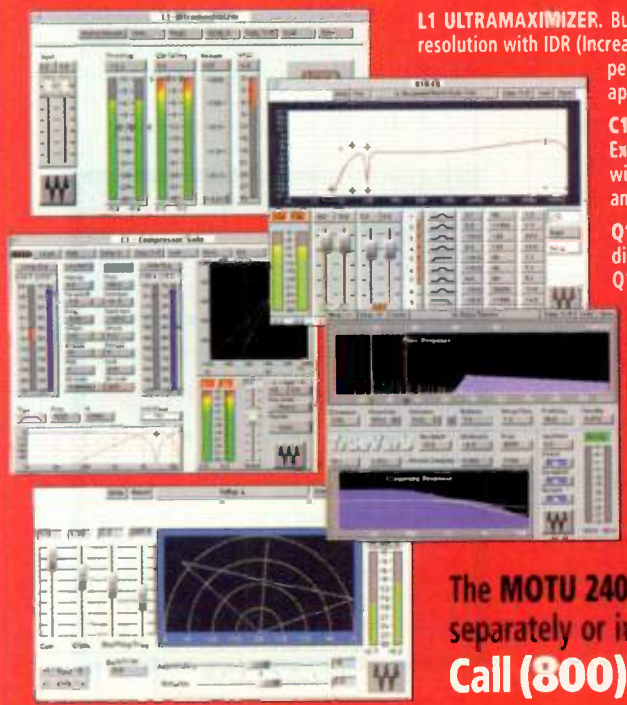
Sweetwater SOUND INC.
www.sweetwater.com

YOU WANT POWER?

Start with a **Power Macintosh** or **G3** computer — more affordable and powerful than ever before, and still the world's best computer for professional MIDI and audio recording . Next, turn your Power Mac in to a true, pro quality audio workstation with the amazing new **2408 Hard Disk Recording System** from **Mark of the Unicorn**. Enjoy 24 inputs/outputs (expandable up to 72 I/O!) and as many simultaneous tracks as your computer allows. The 2408 connects directly to both ADAT and DA-88 recorders and offers advanced features like 24-bit recording capability and sample-accurate audio transfers with no additional hardware. No other system even comes close to offering this much for under $1,000.

The 2408 excels where others fear to tread. Most systems choke you with too few I/O. Not the 2408! Think 24 I/O in the core system! Want sample accurate sync between your computer and your ADAT or DA-88 recorder? Don't even think about it with most systems. The 2408 is perfect for the hybrid hard disk/MDM studio. And it includes **MOTU'S AUDIO DESK** software at no additional charge which includes more than a dozen great MOTU Audio plug-ins including PreAmp-1 tube preamp emulator, eVerb, Sonic Modulator and more! A complete multitrack audio recording environment that offers easy editing, 32-bit plug-in architecture and sample-accurate sync with any ADAT — without additional expensive hardware!

And who better to supply the plug-ins than **WAVES!** You know WAVES as the premiere software pioneer that developed those amazing high-end audio processing tools. Well, check out their Waves **NATIVE POWER PACK for the MOTU Audio System** — a suite of powerhouse plug-ins, fully compatibility with the MOTU 2408 and Digital Performer (and 14 other platforms, as well)! The **L1-Ultramaximizer**, **C1 Compressor**, **Q10 ParaGraphic EQ**, **S1 Stereo Imager** and **TrueVerb** all run real-time with no additional hardware. Best of all, these are the very same pro quality as WAVES' award-winning TDM plug-ins at a fraction of the cost.



L1 ULTRAMAXIMIZER. Burn hot CDs, with maximum resolution! Maximize levels with minimum distortion, and maximize resolution with IDR (Increased Digital Resolution) dithering/requantizing system. The Ultramaximizer combines Lookahead™ peak limiting with advanced requantization for maximum level and highest resolution in all audio applications, from CD mastering to multimedia.

C1 COMPRESSOR / GATE. The ultimate dynamics processor! It is a Parametric Compressor/Limiter/Expander. You can select any frequency range you want to process dynamically or use it as a traditional wideband device. High-frequency limiters, midrange expanders, hiss gates, and more. An expert tool for any application requiring compression, expansion or gating. C1 offers mono or full stereo capabilities.

Q10 PARAGRAPHIC EQ. Surgical-precision 10-band parametric equalizer with select-and-drag graphic display. Huge 200+ setup library with EQs, design tools, de-emphasis curves, too much to describe. Q10 provides precision control of EQ from subtle to extreme. Ideal for any aspect of audio production. Q10 works in mono or stereo with 1 to 10 bands of equalization.

TRUEVERB. This virtual space room-acoustics emulator combines two separate modules: an Early Reflections simulator and a Reverb to produce high quality, natural-sounding room effects. You can define room size, decay time and frequency response, and even the distance (beyond the speakers) to the sound source. Flexible, informative graphic interface plus comprehensive setup library.

S1 STEREO IMAGER. Unmatched imaging tools: widening, rebalancing, re-centering, and MS functions. Includes phase-compensated Blumlein shuffler. The S1 is a unique set of tools for re-mastering stereo mixes by enhancing and altering the stereo effect, designed for use whenever the best stereo effect from a stereo track, mix or recording is required for mixing, mastering or remix applications.

The MOTU 2408 with AudioDesk and Waves Native Power Pack are available separately or in an exclusive Power Studio Bundle from Sweetwater Sound!

Call (800) 222-4700 now for your direct "ProNet" price!

circle #505 on reader service card

MAGNETIZED MUSIC

Hats off for the thought and consideration put into the July 1998 "Building a Personal Studio on Any Budget," especially the studio for under $4,000. It's a subject dear to my heart (and wallet), and I was pleased to see that you chose to bark under some of the same trees I have. Roland's VS-840, for instance, sounds like a great machine for the money.

But dig this: I called Roland and spoke with one of their tech support guys. He said that the 37 minutes per Zip disk (50 minutes in the first compression mode) was *total track time*—i.e., divide those numbers by *eight!* If he knows his stuff (and why shouldn't he?), you have about enough room on a disk for one song. Can you confirm this for me and the other readers?

Joel Baird
joelbaird@aol.com

Joel—Yes, our friend at Roland does know his stuff. The 37 minutes per Zip disk is indeed your total track time at a 44.1 kHz sample rate, when using the VS-840's first recording mode (MT1). But dig this: in addition to a proprietary data-compression system called RDAC (Roland Digital Audio Coding), the VS-840 uses dynamic allocation of recording time. Dynamic allocation optimizes recording time by taking the unused memory from, say, your sparse backing-vocal track, and allocating it to meatier tracks like your drums or guitar. That means that, unless all eight tracks are absolutely jammed with 12.5 MB worth of audio data, you're likely to get more than just an eighth of the total track time on your 100 MB Zip disk.

With the VS-840, you can get a total track time of up to 75 minutes at 44.1 kHz, depending on the RDAC recording mode, and at 32 kHz, you get 50 to 103 minutes. So you should have ample memory to fit one or two songs on a disk.—Carolyn E.

SOUR NOTES

I liked the article in the June 1998 issue, "The Buzz on Tuning," except for a couple of off-key notes. The mean-tone tuning gets its name not from the "mean" (nasty) sound of some of its intervals, but from its arithmetic ratio of the major second, which is the geometric mean between a unison and the just major third.

The article also says that "Western music has used [equal temperament] exclusively for the last 200 years." This is wildly incorrect. Performing musicians in all styles, but especially in jazz and blues-based styles, adjust pitch for better harmoniousness and/or expression on any instrument that permits it. Equal temperament is (well, nearly) universal only on keyboard and mallet instruments.

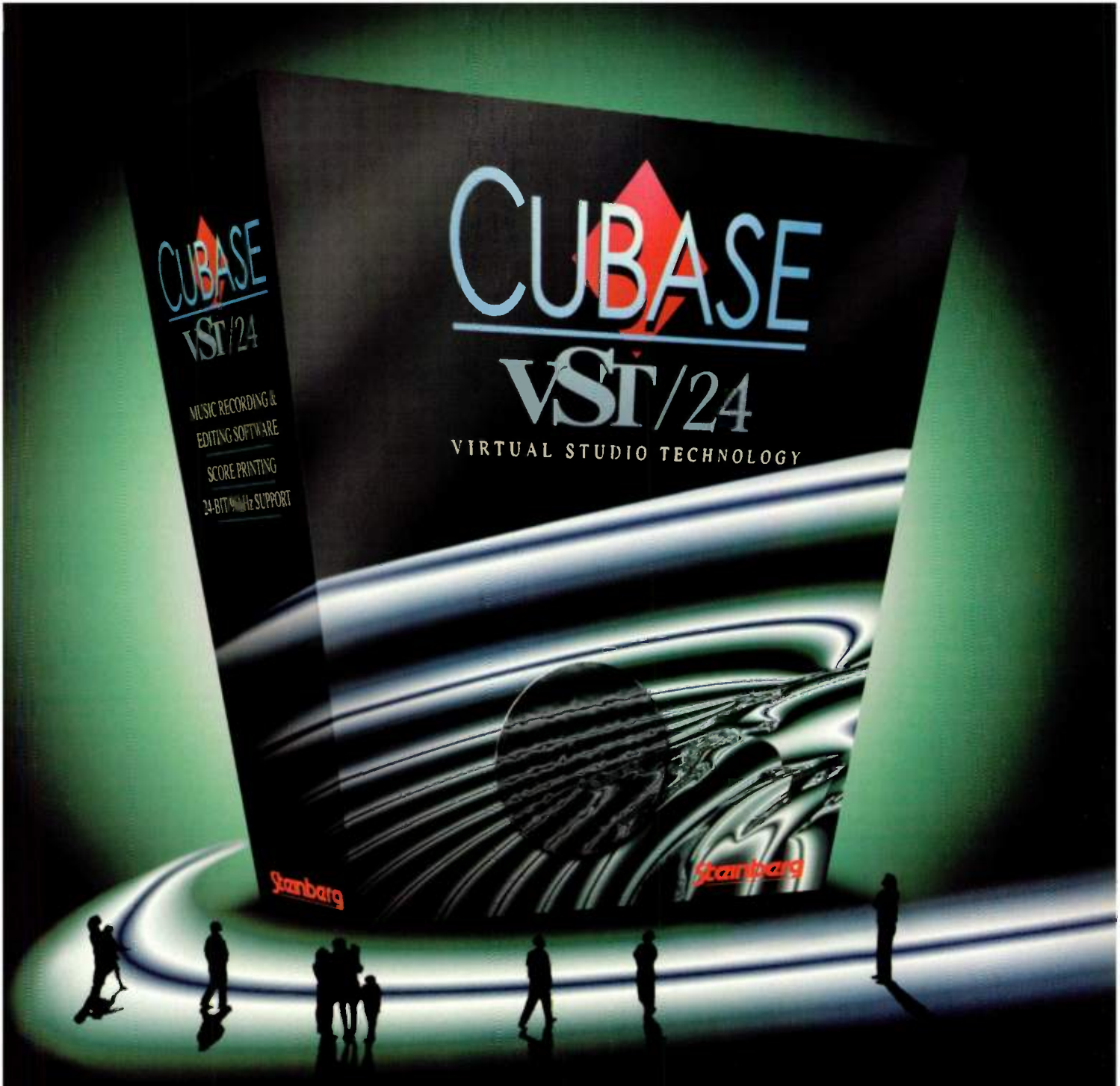
There are many common instruments that naturally or traditionally play in just intonation, such as pedal steel guitar, dobro, standard guitar in open tuning, diatonic harmonica, and Appalachian dulcimer. Brass instruments have a strong tendency toward just thirds, because their pitches are formed from the harmonic series. There are experimental composers, such as Harry Partch and Wendy Carlos, who have abandoned equal temperament entirely.

Finally, I have some questions about the Buzz Feiten approach to tuning the guitar as described in the article. Certain tuning errors on the guitar result from increased string tension due to finger pressure. To compensate for this, Feiten moves the nut, though this is nothing new—Mosrite guitars had adjustable nut saddles in the early 1960s. Like a piano's, a guitar's tuning should be "stretched" slightly to account for the out-of-tuneness of the strings' harmonics. An optimized "stretch" would involve slight adjustments to the positions of all frets. Feiten may have systematized these corrections, but I'm not sure whether the statement that Feiten is tuning the guitar to "compensate for the evils of equal temperament" represents Feiten's intent or a misunderstanding by the author of the article. Such compensation would make the guitar sound better in some keys and worse in others, and put it out of tune with keyboard instruments. I'll leave my comments at that, because the article didn't give the specifics of Feiten's compensations.

John S. Allen
Waltham, MA

Author Matt Blackett responds: *I consulted with you via e-mail while preparing this article, as I've never claimed to be an expert on intonation history. I think that I acknowledged the use of just intonation in modern music, but if my "fretted bias" showed through, I apologize.*

As for Buzz Feiten's nut placement being "nothing new," clearly the patent office doesn't agree. When I asked Feiten about changing the placement of frets, he replied, "That's not the problem." And while it's not my place to speak for Feiten on his



Making your music better, bit by bit.

Introducing Cubase VST/24* for Windows and Mac OS platforms. Same user-friendly layout and powerful plug-in architecture as before, but now with the uncompromising audio quality of 24-bit. Top it off with the flexible integration of hardware from manufacturers like Lexicon, Apogee, Korg, Yamaha and Event, and it's easy to see why Steinberg towers above the rest. New Cubase VST/24 from Steinberg. The future's sounding better all the time.

21354 Nordhoff Street, Suite 110, Chatsworth, CA 91311 (818) 993-4161 Fax: (818) 701-7452 Fax On Demand: (800) 888-7510
Steinberg Canada: (416) 789-7100 Fax: (416) 789-1667
www.us.steinberg.net

*Version 3.6 for Windows and Version 4.0 for Mac OS.

Steinberg
NORTH AMERICA

S12CD

No, We Didn't Forget A Zero.

Introducing the **TASCAM TM-D1000 Versatile Digital Mixer**. It's fully loaded, has incredible specs and will arrive at your dealer this summer. At this price, you've gotta go all-digital!

• 8 analog inputs with 4 balanced XLR mic inputs with phantom power • 8 channels of digital I/O via TDIF • AES/EBU and S/PDIF digital inputs and outputs — expandable to 16 with optional card • Compatible with Light Pipe converters • 16 channel strips with long-throw faders, 3-band sweep EQ, 4 Group/AUX faders, a stereo master fader, complete monitor section, analog inserts, and more • Snapshot automation with 128 scene memory recalled via the front panel or from your favorite sequencer via MIDI • Synchronization with word clock (send/receive) and complete MIDI Machine Control. You can even control your DA-88 or DA-38 directly from the front panel with 16 memory locations • On-board dynamic effects processors with 10 stereo effects

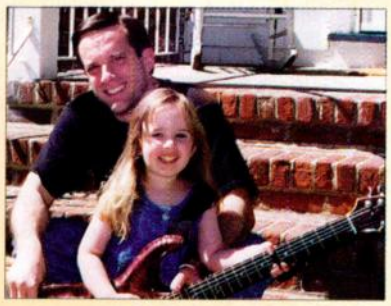
Once you get your hands on a TASCAM TM-D1000 you'll forget about how you used to mix and begin to experience the promise of an all digital studio. Get more details at **www.tascam.com** and get the full story via **TASCAM Faxback** at 800-827-2268. Request document #8010.

TASCAM®

Take advantage of our experience.

circle #507 on reader service card

MEET THE "JAM SESSION GEAR GIVEAWAY" WINNER!



Congratulations to Joe Guidi, winner of *Electronic Musician*'s "JAM Session Gear Giveaway"! Joe's name was drawn on July 15 as the winning entry for a prize totaling $21,892.90 in live sound gear! According to Joe (pictured here with daughter Emma), his musical time is "spent sneaking into the basement with my guitar." He started playing guitar at age 7 and has played in several bands and taught guitar at a local music store. He resides in Scotch Plains, New Jersey, with his wife and two children and works as a district sales manager for Johnson and Johnson's Oncology division. Congratulations to Joe on winning the sweepstakes, and special thanks to all the participating manufacturers: Allen & Heath, JBL, Sabine, Sennheiser, TC Electronic, and Whirlwind.

"intent," I can say that he has read the article and was satisfied with its accuracy. I suggest that guitar players try this system and judge for themselves. It is not just intonation; it does make the guitar's intervals beat more pleasingly, but it's not so drastic that you won't be able to play with other instruments.

MIX IT UP

In your July 1998 "Letters," Andy Bouc wrote that he didn't like the acoustic-instrument slant of the "In-Your-Face Mixing" article (May 1998). He said it would have been more informative had it dealt entirely with electronic music. I must disagree.

So many of us are combining acoustic instrumentation with sampling and sequencing that the article was relevant to a lot of recordists. And even for pure electronica, there were relevant comments on fattening up tracks and on using compression to create heavy slabs of sound and balance different kinds of sound. One definitely could not say that the article "had nothing to do with electronic music."

I think the mix is good, and it was evident when you picked studio equipment in the July issue: some studios focused primarily on electronica, while others mixed it up with "acoustica." Keep up the good work.

Michael Porter
Austin, TX
ra3035@email.sps.mot.com

COMPUTER VS. SAMPLER

I am considering investing in a sampler soon, and I will also buy a new computer. I am wondering if there are ways I can accomplish with my computer what would normally require a sampler (e.g., transposing a sound across the keyboard, using drum loops).

If so, what are these ways? In my local music store, I've seen a card called the Turtle Beach Pinnacle. It boasts up to 48 MB of sample RAM. Is this used like the RAM in a sampler, or is it some sound board-specific feature? Is there an **EM** issue about this kind of stuff? I'm wondering what I would gain or sacrifice by using a computer versus a sampler.

Jeb
jebbono@aol.com

Jeb—Your question comes up often. With so much power available in today's computers, it is possible to do many things on a PC or Mac that formerly were only possible with dedicated hardware. However, there are tradeoffs when using a computer as a sampler.

An increasing number of sound cards include onboard sample RAM, which does indeed allow you to create and load your own samples. Turtle Beach, TerraTec, Guillemot, and Creative Labs all make cards with this capability. (The new E-mu Audio Production Studio will make extensive use of computer-based sampling; see the May 1998 "What's New" column for details.) Each uses software to assign your samples to different ranges of the keyboard.

Not surprisingly, some of these programs are easier to use than others. (For more on this, see "Card Games" in the January 1998 issue.) Once you've built keymaps for your sounds, you can typically save them and then reload them each time you need them.

I have several problems with using a computer as a sampler, however. First, noise is generated inside the computer that generally can't be totally eliminated from your audio signal.

Ideally, all sound cards would use converters that were located outside of the PC case, but this is true only of high-end systems, such as Event's Layla. If you have a card with digital I/O, you can send digital audio directly into and out of the PC and use an external converter (e.g., those in a DAT machine). That would accomplish the same goal.

My next qualm is that the amount of polyphony varies depending on the speed of your computer and the other tasks the computer is called upon to perform while you're playing music. This makes it hard to predict precisely what type of response you'll get from your equipment. I don't like that uncertainty. There's also the fact that computers crash a lot more often than hardware samplers.

For these reasons, if you can afford a hardware sampler, I'd suggest that you consider that option, perhaps in addition to the computer-based variety.—Dennis M.

ERROR LOG

July 1998, "Build a Personal Studio on any Budget," p. 52: The Roland VS-840 can back up its memory using its internal Zip drive, so you don't need a separate backup drive.

August 1998, "Discovery Firm *Discovery Keyboards,*" p. 176: The correct spelling of that unusual, early electronic instrument is Ondes Martenot.

WE WELCOME YOUR FEEDBACK.

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

ALESIS synthesizers

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

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

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

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

QS6.1 New Features

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

QS6.1™
64 VOICE EXPANDABLE SYNTHESIZER

circle #508 on reader service card

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

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

ALESIS

WHAT'S NEW

By The EM Staff

EARTHWORKS Z30X

Best known for its omnidirectional mics, Earthworks has expanded its line to include directional condenser mics. The Z30X cardioid ($750) and Z30XL hypercardioid ($900) are designed for use in both studio and live-sound applications. Earthworks claims that both mics deliver transparent on-axis sound, very little off-axis coloration, and low handling noise, with excellent rear rejection. Maximum rejection is at 180 degrees for the Z30X and 130 degrees for the Z30XL. The microphones are also designed for exceptional time coherence, transducing all frequencies equally.

The two microphones operate on 48V phantom power. Earthworks rates their frequency response at 30 Hz to 30 kHz (±1.5 dB @ 15 cm), maximum SPL at 145 dB, and self-noise at 22 dB (A weighted). Earthworks; tel. (603) 654-6427; fax (603) 654-6107; e-mail earthwks@jlc.net; Web www.earthwks.com.

Circle #401 on Reader Service Card

AKAI S5000 & S6000

Akai is currently shipping its newest sampler, the S5000 ($1,999); its big sibling, the S6000 ($2,999), will become available in late October. The two samplers feature DOS (FAT32) and WAV files as their native format, and WAV files can be loaded directly from any PC hard drive. A stereo file can be treated as a single sample, rather than two mono samples. Samples can be recorded into RAM or directly to a hard drive, and they can also be played directly from a hard drive. The samplers also offer digital resampling. The units ship with 8 MB of RAM, expandable to 256 MB.

The S5000 offers 64-voice polyphony, upgradeable to 128 voices ($599); the stock S6000 is 128-voice polyphonic. Both units are 32-part multitimbral, with two independent sets of MIDI ports. Up to 128 multitimbral programs can be loaded into RAM at a time. Processing includes time compression and expansion, bpm tempo matching, digital fade in/out, and 3-band, parametric EQ.

Both samplers feature stereo AES/EBU and S/PDIF digital I/O, two SCSI ports, and a word-clock input. The S5000 features eight analog outputs on unbalanced ¼-inch jacks, upgradeable to sixteen ($399), which can be configured as stereo pairs.

The S6000 comes equipped with sixteen outputs and a stereo master I/O on balanced, XLR connectors. It also includes stereo input on balanced, ¼-inch TRS jacks, which are available both on the front and back panels. The back-panel inputs remain functional until you plug into the front.

A 320 x 240-pixel LCD and sixteen dedicated buttons allow for convenient viewing of settings and access to common

programming functions. On the S6000, the entire front panel detaches from the main unit to act as a remote control.

A 16-channel ADAT Optical I/O board ($399) is optional, and you can choose between onboard floppy and Zip drives. The S6000 also can house an optional Iomega Jaz drive. The optional 20-bit, 4-channel multi-effects processor ($399) includes two channels of distortion, EQ, ring modulation, rotary-speaker simulation, autopanning, and mono and stereo delays, in addition to two channels dedicated to reverb programs. There are 50 multi effects and 50 reverb effects in all, and you can save all program settings to disk. Akai Musical Instrument Corp.; tel. (800) 433-5627 or (817) 831-9203; fax (817) 222-1490; Web www.akai.com/akaipro.

Circle #402 on Reader Service Card

DIGITECH STUDIO QUAD 4

DigiTech's Studio Quad 4 ($479.95) packs four signal processors into a single, 1-rackspace unit. Using its four discrete, ¼-inch inputs and outputs, you can independently process four mono or two stereo sources simultaneously. The effects—which include compression, envelope filter, multiple modulations delays, vocoder, and reverbs—can be chained in any order. The unit includes 100 preset effects and 100 user-program locations. The parameters can be modulated in real time via MIDI.

The Quad 4 includes 20-bit, 128x oversampling A/D/A converters. The front panel, with its large LCD, includes a selector for automatic input leveling. Output level is switchable between +4 dBu and -10 dBV. Frequency response is rated at 20 Hz to 20 kHz, ±0.5 dB and signal-to-noise ratio at >96 dB. DigiTech; tel. (801) 566-8800; fax (801) 566-7005; e-mail customer@digitech.com; Web www.digitech.com.

Circle #403 on Reader Service Card

BIG BRIAR MOOGERFOOGERS

Bob Moog's latest offerings, sold under the "Moogerfooger" moniker, are all-analog, voltage-controlled effects modules. The Moogerfooger Ring Modulator ($289) multiplies two audio signals, thereby producing sum and difference frequencies. In addition to the ring modulator, the unit has a wide-range carrier oscillator (2 Hz to 4 kHz) and a dual-waveform LFO (0.1 Hz to 25 Hz). Using expression pedals, external control voltages (via ¼-inch TRS jacks), or rotary controls, you can control signal mix, carrier frequency, LFO rate, and LFO amplitude.

The Moogerfooger Lowpass Filter ($299) is a 2-pole/4-pole, variable-resonance, voltage-controlled filter with a fast-acting envelope follower. Users can control signal mix, cutoff frequency, resonance amount, and envelope amount. Like the Ring Modulator, the Lowpass Filter's parameters can be controlled with expression pedals, external control voltages, or rotary controls.

Each mono unit has a ¼-inch audio input and ¼-inch audio output. Input level may be set from -16 to +4 dBm via a rotary level control; nominal output level is -4 dBm (0.5V RMS). LED meters monitor input level, LFO/Envelope level, and bypass/active status. Designed for floor or table-top use, the Moogerfoogers are encased in sturdy metal chassis with hardwood side panels. Big Briar, Inc.; tel. (800) 948-1990 or (828) 251-0090; fax (828) 254-6233; e-mail info@bigbriar.com; Web www.bigbriar.com.

Circle #404 on Reader Service Card

BSS OPAL DPR-944

BSS Audio continues to expand its Opal Series of signal processors, adding the new DPR-944 2+2 Parametric Compressor/Gate ($899) to the fold. The DPR-944's Parametric Compressor function utilizes the onboard parametric EQ to enable frequency-selectable compression, which is especially useful for click and pop removal, de-essing, and control over a microphone's proximity effect.

Each channel of compression comes with separate knobs for EQ center frequency and bandwidth (from full range to 0.4 octave), compression threshold, compression ratio, and makeup gain. Attack and release times are set automatically, or you can set the compressor for fast release only. The two compressors can be used as mono channels or can be stereo-linked. Two 12-LED meters monitor gain reduction.

The noise-gate channels are derived from the company's DPR-504 gate, a processor designed for use in sound reinforcement. In addition to knobs for threshold and release settings, each channel has a knob for adjusting the center frequency of the gate's sidechain filter. There are buttons on each channel that allow you to listen to the sidechain signal and to choose slow or fast attack times. The gate channels can also be stereo-linked.

Input and output are on balanced, XLR connectors, and sidechains are on unbalanced, ¼-inch jacks. For the compressor section, BSS Audio rates frequency response at 20 Hz to 20 kHz, dynamic range at >120 dB, EIN at -100 dBu, and THD at <0.005%. For the gate section, frequency response is rated at 20 Hz to 20 kHz, dynamic range at >117 dB, EIN at -97 dBu, and THD at <0.05%. BSS Audio/Harman Pro North America; tel. (615) 399-2199; fax (615) 367-9046; e-mail pfreuden@harman.com; Web www.bss.co.uk.

Circle #405 on Reader Service Card

WAVES RENAISSANCE EQ

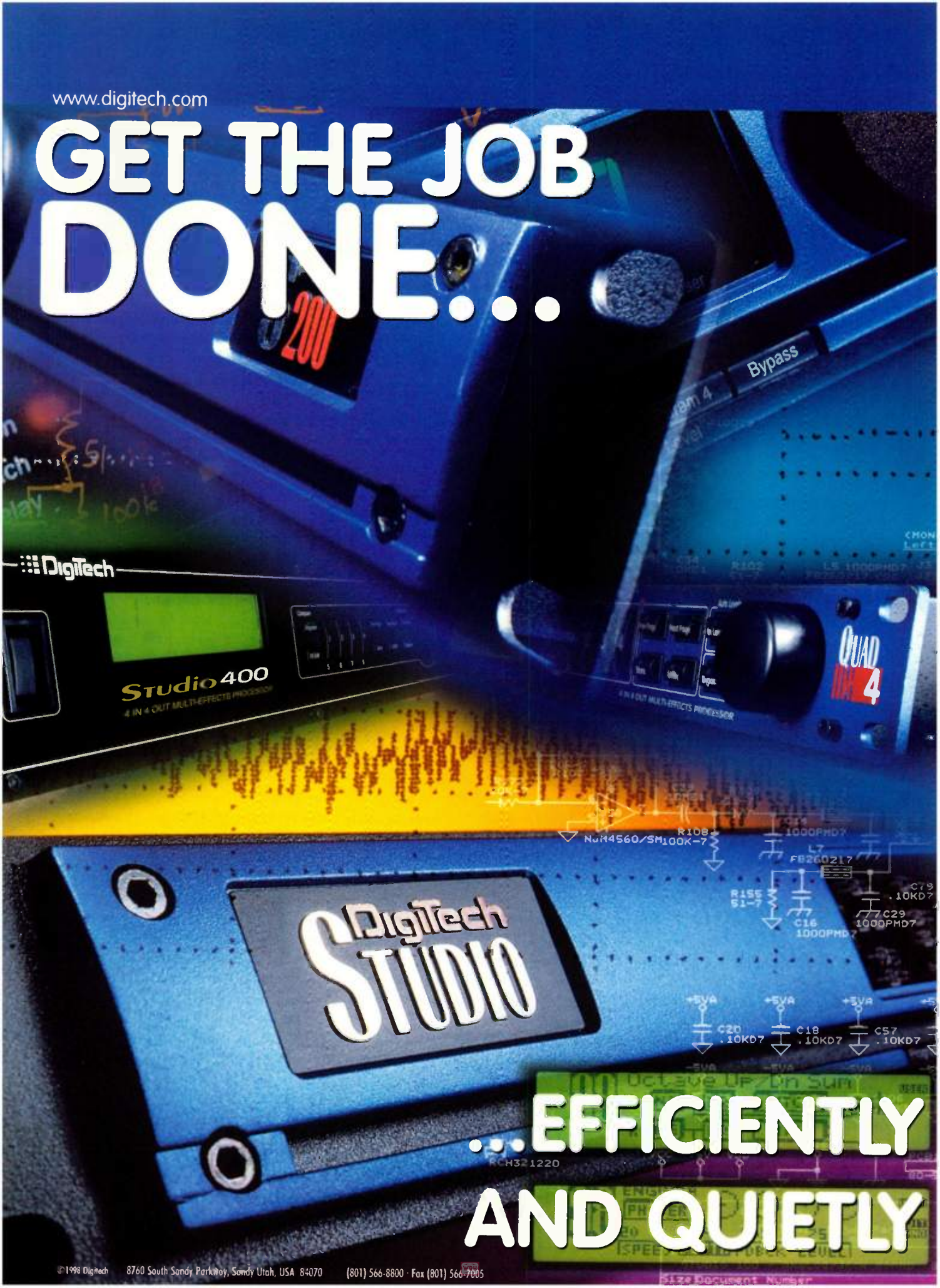
Don't you just love the simple, elegant functionality of classic analog gear? And, oh, that sound! The *Renaissance Equalizer* ($300), now shipping, is the second in Waves' Renaissance line of DSPplug-ins designed to simulate the sound and operation of such devices.

The Macintosh-based plug-in is available in a number of formats, including Digidesign TDM and Sound Designer II, Adobe Premiere, Steinberg VST, and Waves' own Multirack format. Users of Digidesign Audiomedia III cards and TDM-compatible applications can listen to EQ changes in real time.

The paragraphic equalizer can be configured as 2-, 4-, or 6-band, and it features resonant shelves and bell-filter curves based on vintage Pultec equalizers. You can change multiple parameters simultaneously, which allows you to change the overall EQ while maintaining the same EQ curves. A real-time EQ graphing function allows you to view how the EQ curve changes as you make individual adjustments.

Two channels of audio material can be processed in stereo, dual mono, or linked mono modes. The plug-in features 48-bit internal processing. Waves; tel. (423) 689-5395; fax (423) 688-4260; e-mail waves@waves.com; Web www.waves.com.

Circle #406 on Reader Service Card


www.digitech.com
GET THE JOB DONE...
DigiTech
Studio 400
4 IN 4 OUT MULTI-EFFECTS PROCESSOR
Bypass
QUAD
DigiTech STUDIO
...EFFICIENTLY AND QUIETLY
©1998 Digitech 8760 South Sandy Parkway, Sandy Utah, USA 84070 (801) 566-8800 · Fax (801) 566-7005

DigiTech STUDIO

Setting up your signal processing shouldn't get in the way of making music. The DigiTech Studio Series was designed to help you get the job at hand done efficiently. Our intutive interfaces and full graphics displays are designed to inspire you, not intimidate you.

Whether you are selecting programs or editing parameters, using any of the Studio Series products is easy. Our one goal is to help you unleash your creativity... Not stand in it's way.

S-DISC II® is a registered trademark of DIGITECH

S100

- Dual Engine Processor
- 26 Effects Available
- Stereo Inputs and Outputs
- MIDI Selectable Programs
- 20-bit A/D D/A Conversion
- 96dB Signal to Noise Ratio

S200

- Dual Engine Effects Processor
- Stereo Inputs and Outputs
- Full Graphics Display
- 5 Effects Configurations
- MIDI Controllable
- Footswitch Compatible
- Noise Gate and EQ
- 20-bit A/D and D/A Conversion
- 96dB Signal to Noise Ratio

QUAD 4

- 4 Signal Processors in 1!
- 4 Independent Inputs and Outputs
- Easy-to-Use Interface
- Multiple I/O Signal Path Routings
- S-DISC II® powered
- Large Custom Display
- Dynamic Parameter Modifiers
- Full MIDI Implementation

STUDIO 400

- Balanced 1/4" and XLR Inputs and Outputs
- Dual S-DISC II® Processors
- Up to 8 different effects at one time
- Unlimited Internal Routing Capability
- Large Custom LCD Display
- Internal Power Supply
- Optional Digital I/O

With the advent of digital processing, today's recording musician are more critical than ever about quality signal processing. They are in need of products that give them the ease of use that only Custom Graphics Displays provide, true 24-bit Internal Processing for superior sounding effects, and Signal to Noise specs that exceed even CD standards. With this philosophy in mind, the DigiTech Studio line of products delivers the performance and features the working professional needs. And when you compare what the competition has to offer, we are sure you will agree.

...UNLEASH YOUR CREATIVITY

H A Harman International Company

circle #509 on reader service card

SOUND ADVICE ▲ ▲ ▲ ▲

▼ SONIC FOUNDRY

Sonic Foundry is offering a new line of sample-loop libraries for its *Acid* software for Windows. The special feature shared by all of these CD-ROMs ($59.95 each) is a built-in synching capability allowing for both time stretching and pitch adjustment.

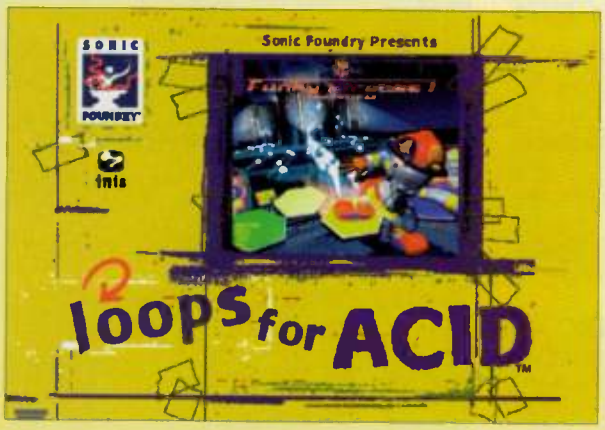
Inis' *Funky xTreams*, volumes 1 and 2, contain beats to back up dance music. Volume 1 includes a wide selection of grooves, from the latest techno and hip-hop rhythms to samples of classic analog beatboxes, as well as loops of individual drums and hi-hat for custom groove construction. The loops on volume 2 are vintage beats from the Korg Rhythm55 drum machine.

For dance-music sounds other than drums, there are two volumes of inis' *Signals Analog Synth Dance Loops*. These collections include sounds taken from many old favorites, such as the Sequential Prophet 5, Moog Minimoog, and Roland Jupiter-8.

On Q Up Arts' *Street Beats by poogie bell*, this master of beats puts out live and studio samples, as well as actual street sounds, mostly designed for hip-hop and R&B.

Rounding out the offerings is Sound Werx's *Syntonic Generator*, an electic assortment of both drum and synthesizer loops for house, techno, dance, jungle, and industrial music styles. Sonic Foundry; tel. (800) 577-6642 or (608) 256-3133; fax (608) 256-7300; e-mail sales@sonicfoundry.com; Web www.sonicfoundry.com.

Circle #407 on Reader Service Card



▲ CHRISTOPHE CARVAJAL

Christophe Carvajal is offering three sound-expansion cards ($185 each; $390 for all three) for Korg keyboards and synth modules. "Synth Legend," released last year, and the new "Techno & HipHop" and "Rock & Pop" are PCM cards loaded with samples of drum machines, synth pads, and other synth sounds. The 2 MB cards are compatible with the 01/W, 01/WFD, 03R/W, Wavestation SR, X2/X3, and X3R.

Each card comes with a bonus SysEx file on floppy disk with 100 extra programs. When you purchase the 3-card bundle (called the Double EX Pack because its 6 MB double the synthesizer's memory size), your bonus SysEx library will contain 6,000 programs. Demos of samples on "Synth Legend" can be heard on Carvajal's Web site; you can also order a demo CD-ROM by mail for $20, which will be credited toward your PCM card purchase. Christophe Carvajal; tel. and fax 33-2-3510-0743; e-mail christophecarvajal@compuserve.com; Web ourworld.compuserve.com/homepages/christophecarvajal.

Circle #408 on Reader Service Card

YAMAHA

Broaden the sonic capabilities of your MU100-series XG module or SW1000XG sound card with Yamaha's new series of user-installable plug-in expansion boards, the PLG100-VH Vocal Harmony ($169.95), the PLG100-VL Virtual Acoustic ($199.95), and the PLG100-DX Vintage FM Synthesis ($349.95).

The PLG100-VL features the same physically modeled, solo acoustic instruments found in the VL-70M tone generator. It has 256 preset sounds and 64 user-editable sounds, and it allows you to load 6 of your own physical models into the Custom Voice slots. The bundled voice-editing application allows you to customize the voices for use with any MIDI controller.

The PLG100-VH can add up to three parts of vocal harmony to the external input on the MU modules. Volume, vibrato, panning, and gender can be controlled independently for each part. The PLG100-VH is compatible with the library of Tune 1000 MIDI harmony sequences.

The PLG100-DX is a complete emulation of a DX7. The expansion board offers 812 presets and 64 user-programmable memory locations and is fully compatible with the huge library of DX7 patches. Yamaha Corporation of America; tel. (714) 522-9011; fax (714) 739-2680; e-mail info@yamaha.com; Web www.yamaha.com.

Circle #409 on Reader Service Card

TC UNIT·Y

SIGNAL PROCESSING ENGINE

PLUG-IN CARDS FOR YAMAHA O2R

PHOTO COURTESY NOVA STAR DIGITAL SOUND SERVICES, LA, CA

TC INSIDE

From one of the world leaders in signal processing technology comes UNIT·Y, a dual engine effects plug-in card for the Yamaha O2R digital mixer. UNIT·Y delivers the kind of high quality effects TC Electronic is famous for - right inside the O2R. Completely integrated. Fully automatable. The ultimate solution for anyone who is truly serious about recording.

NO COMPROMISE

An optional 8 channel AES/EBU I/O expansion board provides access to the O2R's digital I/O, (as you might normally do with a basic I/O board in one of the O2R's four expansion slots). As a result, you don't have to sacrifice your card slot or a single input on your mixer to get these premium effects right at your fingertips

EVERYTHING YOU WANT

UNIT·Y gives you a wide selection of the most dense, natural sounding reverbs you can imagine... shimmering plates, lively halls and ambient rooms, they're all there - plus a lot of extras including TC's famous Chorus, Pitch Shifting, Delays, Phaser and more.

ULTIMATE TECHNOLOGY

At the core of every UNIT·Y is a powerful 100 million-instructions-per-second processor, making it possible to run two full-blown 24 bit effects simultaneously, stereo or surround - for the most pristine and transparent audio processing you've ever heard.

Plug-in the ultimate reverb today. UNIT·Y. It's at your local TC Electronic/Yamaha O2R dealer.

t.c. electronic
ULTIMATE SOUND MACHINES

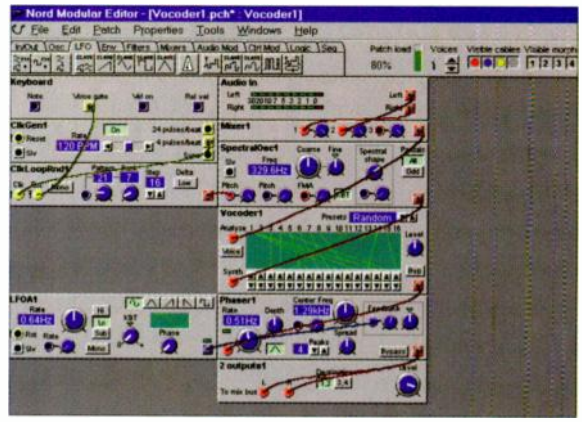
TC ELECTRONIC INC., 790-H HAMPSHIRE ROAD, WESTLAKE VILLAGE, CA 91361, USA · PHONE: (805) 373 1828 · FAX: (805) 379 2648
EMAIL: INFOUS@TCELECTRONIC.COM · HTTP://WWW.TCELECTRONIC.COM
TC ELECTRONIC A/S, SINDALSVEJ 34, DK-8240 RISSKOV, DENMARK · PHONE: + 45 8621 7599 · FAX:+ 45 8621 7598

circle #510 on reader service card

▶ CLAVIA MICRO MODULAR

The Micro Modular polyphonic synth ($899) from Clavia, essentially a pared-down version of the company's Nord Modular synth, can play up to four voices, depending on patch complexity. Sounds can be generated by the synth's onboard digital oscillators, and you can also use the synth as a signal processor by using its ¼-inch, stereo analog input and output. The unit uses 16-bit A/D and D/A converters.

The synth has a master volume knob and three assignable parameter-editing knobs, but it is controlled mainly with object-oriented editing software (available for Windows 95 only). The software is designed to re-create the look and function of modular analog synths and allows you to construct your own virtual synths using digital oscillators; highpass, lowpass, and parametric shelving filters; envelope generators, including an ADSR, a multistage envelope, and an envelope follower; three digital signal processing modules for distortion; a 14-pole phase shifter with peak spread and feedback control; stereo expander/gate and compressor/limiter; and a 16-band vocoder. A 10-band parametric equalizer with ±18 dB gain and control over Q and bandwidth is also included.



The unit ships with 100 patches; many more are available for download from Clavia's Web site, and any Nord Modular patch can be used by the Micro Modular. A drum synthesizer with step sequencer and preprogrammed templates rounds out the Micro Modular's total feature set. Armadillo Enterprises; tel. (800) 793-5273 or (813) 796-8868; fax (727) 519-9703; e-mail armadillo@packet.net; Web www.armadilloent.com/music.

Circle #410 on Reader Service Card

▼ GENERALMUSIC EQUINOX

Generalmusic's 61-key Equinox 61 ($1,995) and 76-key Equinox 76 ($2,195) keyboard workstations feature 16 MB of waveform ROM, over 1,000 preset patches, and 8 MB of battery-backed RAM (expandable to 40 MB). The synth engine is 64-voice polyphonic and has 128 resonant, digital filters. Each sound can be modulated using up to six waveforms, three LFOs, and 21 envelopes. Control of these parameters can be assigned to any of eight sliders.

The instruments can import Kurzweil K2000, Akai S1000, WAV, and AIFF files. Additional formats, such as Roland S-760 and E-mu E4, will be available soon.

The Equinox also includes a 16-track sequencer that can handle up to 250,000 events in 16 songs with 1,192 ppqn resolution. An onboard "Groove Machine," with over 1,200 editable rhythms, is provided for constructing beats. The synth's "Random Groove Generator" can hatch infinite combinations of patterns.

The Equinox is 32-part multitimbral; however, unlike many keyboard workstations, the keyboard and sequencer each address an independent set of sixteen MIDI channels, so the two sections do not steal parts from each other.

The keyboard can be split or layered into sixteen zones. The unit also has two modulation wheels, eight sliders, and three assignable footpedal inputs. Generalmusic; tel. (800) 323-0280 or (630) 766-8230; fax (630) 766-8281; e-mail gmail@generalmusicus.com; Web www.generalmusic.com.

Circle #411 on Reader Service Card

▶ CAKEWALK OVERTURE

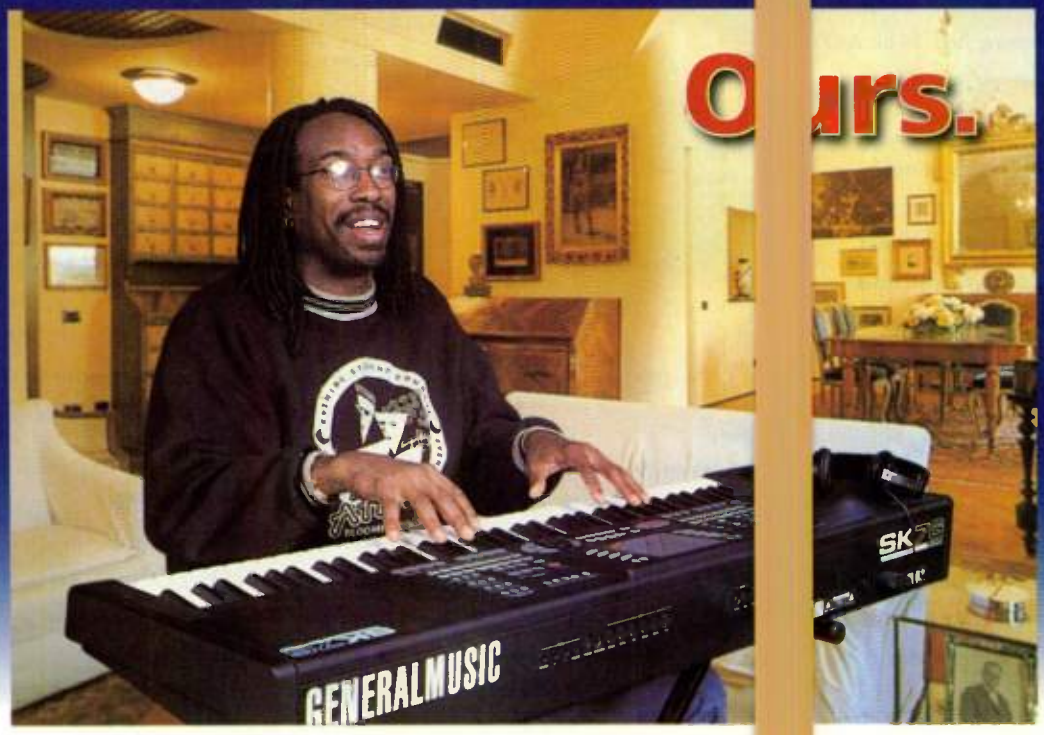
Cakewalk Music Software's *Overture 2* ($269) is a dual-platform (Mac/Win 95), upgraded version of a notation program that was formerly offered by Opcode for the Macintosh. *Overture 2* offers publishing-quality formatting, and notation can be input with a mouse or computer keyboard, or via MIDI. The user can edit many performance parameters, such as Attack Time, Pitch Bend, and key Velocity. Notation elements, such as beams, ornaments, and expressive marks, are also editable. MIDI playback is complete with all dynamics.

Mac users with previous versions of *Overture* can upgrade to *Overture 2* for free. Cakewalk has implemented full technical support for all *Overture* users.

For the Mac, *Overture 2* requires Mac OS 7.0 or later and a Mac II (68020 CPU) or better with 2 MB RAM. (The program requires 4 MB of RAM on a Power Mac.) The Windows version requires a Pentium 100, 16 MB RAM, and Windows 95/98. Cakewalk Music Software; tel. (888) CAKEWALK or (617) 441-7870; fax (617) 441-7887; e-mail sales@cakewalk.com; Web www.cakewalk.com.

Circle #412 on Reader Service Card

T eir idea o a project studio...



O rs.

"This is a superb songwriting tool and highly addictive."
Julian Colbeck
EM

"The SK76 is a sophisticated, powerful and imaginatively designed workstation with plenty of depth and flexibility. Its sonic capabilities are impressive and versatile."
Simon Trask
Sound On Sound

"The SK76 has an array of connections and options that would make many a synth turn green with envy. If you are thinking about a keyboard which is versatile and programmable with a good set of sounds and automatic accompaniments, then you're thinking about the SK76."
John Bates
Keyboard Player

So you finally have your own project studio.
Now if only you could get everything to work together properly, you'd be ready to start letting your ideas live and breathe.
It doesn't have to be this way, you know.
Consider the new **Generalmusic SK series** - simple, versatile and inspiring. Over 600 professional quality sounds plus the ability to import new samples from Kurzweil™, Akai™, WAV, AIFF and other formats with up to 32MB of Sample RAM. Up to 32 sounds can be layered together using 32 simultaneous MIDI channels.

The ing style section lets you take a simple idea and pro professional sounding sequence in just minutes with no amming, (selecting from the 96 on-board styles which automa detect the chords you play anywhere on the keyboard). Add to e most powerful on-board sequencer in the industry, (250,00 ts, 32 tracks, 16 songs) and the ability to store everyth u create on the optional internal hard disk, it's not difficult why Generalmusic's new SK series is the dream solution ose project studio nightmares.

SK88
88 piano-weighted keys

SK
76 ligh ed keys

GENERALI SIC®

See Generalmusic's new line of digital mixers & our new synth workstation The EQUINOX at AES booth #1788

GENERALMUSIC CORP: 1164 Tower Lane - Bensenville, Illinois 6010 e 630/766-8230 - Fax 630/766-8281
Internet: http://www.generalmusic.com - CompuServe: GO GMUS ail: gmail@generalmusicus.com

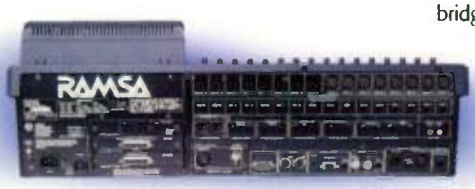
circle #511 on reader service

Advanced Digital Mixer

Panasonic is taking digital further today with the DA7 digital mixer, an entirely new standard in quality, flexibility, affordability, ease-of use and value: 24-bit converters, 32 inputs, 8 buses, 32-bit processing, moving faders, instantaneous recall of all settings, surround sound mixing...nothing this fully featured has been this easy to use or affordable... and it's available NOW! Incredible sound quality, Internal 32-bit processing and 24-bit A/D and D/A converters give this mixer sound worthy of consoles costing several times its price.

Easy-to-use. The DA7 is one powerful mixer. If you know how to run a traditional mixer, you already know how to run a DA7, since it has a smart, user-friendly design. To access any of the 32 channels, just press its select button and all parameters for the channel-EQ settings, bus and aux assignments, and dynamics and delay settings come up on the large backlit LCD screen. To access individual parameters, just touch the appropriate knob in the console's master section. This automatically calls up the sub-menu on the LCD screen and zooms in on the appropriate function. No more digging through menus or getting lost in functions; just adjust EQ, Pan/Assign, Dynamics/Delay, or Aux... and you're there.

The power to control. The EQ section offers 4 true overlapping parametric bands active on every channel (with the top and bottom bands switchable to low or high peak/shelving, or low pass, or high pass filters). Each Aux return also provides two bands of fully parametric EQ. The dynamics section offers variable attack/release times and levels for threshold and ratio on each channel, and delay is adjustable up to a maximum of 300ms. 50 Memories each are provided for EQ, Dynamics and individual channel settings. In addition to full dynamic moving fader automation of 32,000 events, there are 50 "snapshot" or "scene" memories. Plus, a Macintosh and windows software package (that greatly expands the capabilities of the DA7), will soon be available.



Surround sound at your command. You'll be mixing surround soon. The DA7 is equipped to mix 5.1 channel today. The DA7 has 3 built-in panning modes, and all modes provide full dynamic control of panning, and can be copied, stored, and transferred to any other channel. An optional MIDI joystick gives you yet a fourth method of surround control.

MIDI and more. The DA7 features 4 up/down/left/right cursor keys that can be switched to output MIDI Machine Control commands to MDMs, sequencers, or workstations. Data entry is done through the large parameter dial or an alphanumeric keypad. There's also an undo/redo button, a solo-mode set, and a built-in Talkback mic.

Take on the world. The rear panel sports 16 analog mic/line inputs (8 XLR with individual software-switched phantom power, and 8 with TRS); 16 channel inserts (pre-A/D); and 6 auxiliary send/return jacks (1,2 use S/PDIF; the rest use +4dB 1/4inch connectors). Along with the 2 digital and 4 analog Aux returns, the DA7 has 38 total inputs. Digital I/O, provided via XLR connectors switchable between AES/EBU and S/PDIF, offer the master out signals and they can be assigned to inputs 15 and 16.

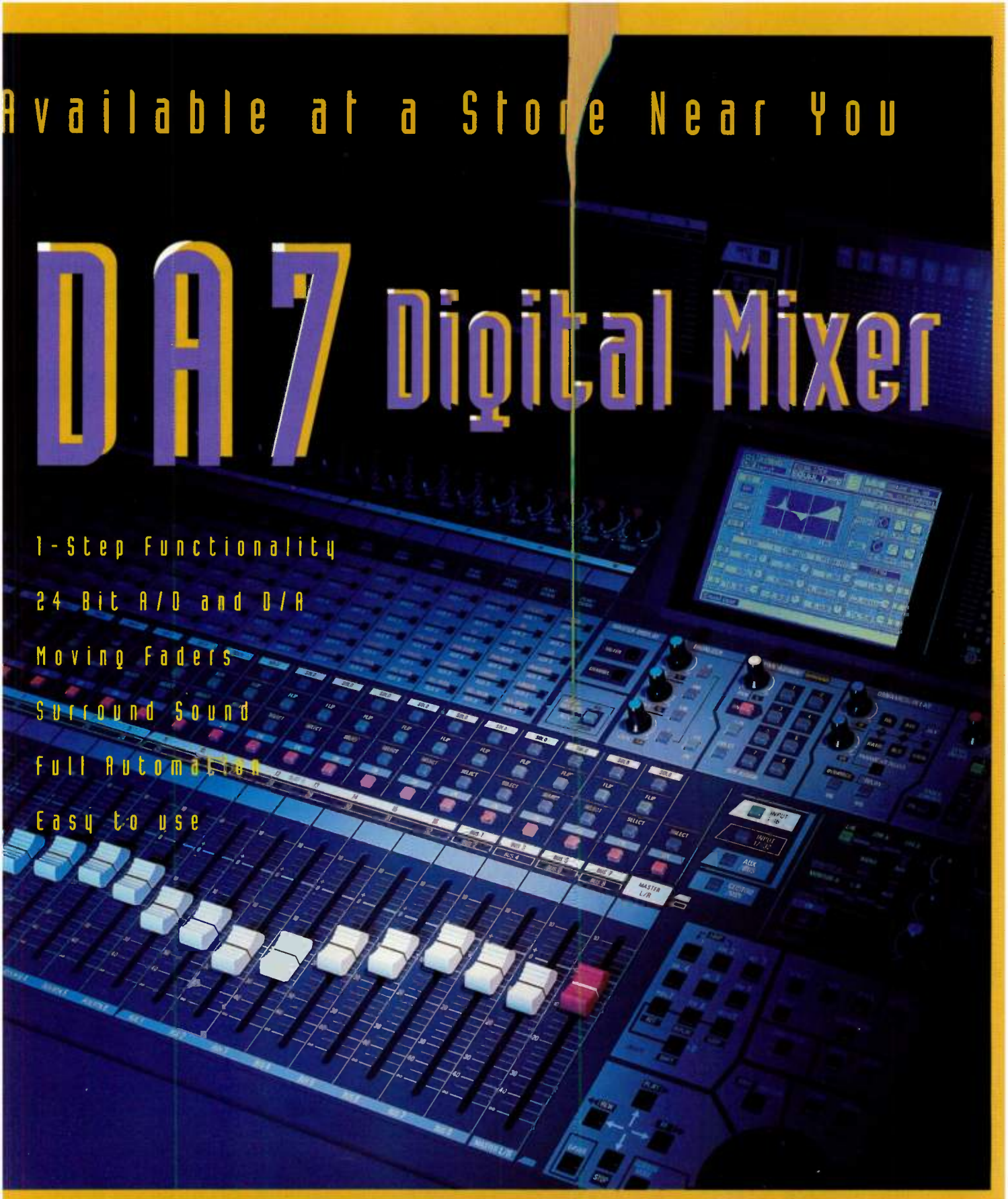
The DA7 rear panel also offers MIDI In and Out, word clock I/Os, both a 9-pin RS-422/485 serial port and PC port for Mac or Windows with software support for both, a 1/4 inch footswitch jack for controlling Talkback on/off or automatic punch in/out, and a D-15 subconnector for the optional meter bridge. So, take your digital mixing further today by going to the nearest Panasonic dealer and auditioning the DA7 for yourself!

PANASONIC PRO AUDIO
TAKING DIGITAL FURTHER

For more information call:
1-800-777-1146 or visit our website at
www.panasonic.com/proaudio

Available at a Store Near You

DA7 Digital Mixer



1-Step Functionality

24 Bit A/D and D/A

Moving Faders

Surround Sound

Full Automation

Easy to use

Taking Digital Further

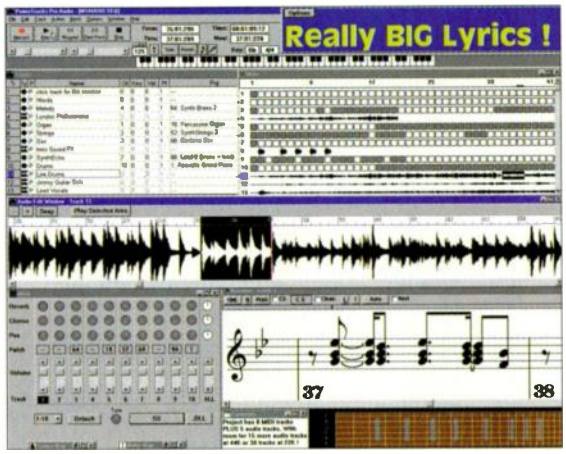
Panasonic

Broadcast & Digital Systems Company

▶ PG MUSIC POWERTRACKS 4.0

PowerTracks Pro Audio 4.0 (Win 3.1, 95, 98, and NT; $29), a programmable digital audio sequencer that comes with a large number of functions and DSP effects, can be downloaded from PG Music's Web site. Users of sound card–equipped PCs can record up to 48 tracks of 16-bit audio at sample rates of 22.05 and 44.1 kHz. You can adjust level and pan setting for each track, and tracks can be processed using included reverb, chorus, delay and equalization DSP effects. A deglitch function performs a 5.8 ms crossfade between any segments that have been cut and pasted together.

The sequencer features 960 ppqn resolution and SMF support (Types 0 and 1) and provides standard sequencer operations such as cut, copy, paste, and quantize. MIDI tracks can be synched to SMPTE, MTC, and MIDI Clock. Any MIDI file can be displayed as keyboard notation, guitar tablature, or as notes and chords on an onscreen guitar fretboard, and notes can be entered and edited in notation view. In addition, users can view notes on the onscreen keyboard or guitar fretboard as they are played. A Big Lyrics window shows chord symbols and lyrics for karaoke-style use. A SysEx editor/librarian and a Roland Sound Canvas editor are included.



You can augment and customize the *PowerTracks'* audio or MIDI features by reprogramming the application in C, Visual Basic, or Delphi, using either EXE or DLL files. The program ships with a CD-ROM containing online tutorials. PG Music; tel. (888) PG-MUSIC or (250) 475-2874; fax (250) 475-2937; e-mail sales@pgmusic.com; Web www.pgmusic.com.

Circle #413 on Reader Service Card

▶ ALESIS/GT ELECTRONICS MICS

Alesis Corporation announced that it has acquired Groove Tubes' microphone, amplifier, and signal processing technologies and is founding a new division, GT Electronics.

GT's first products will be four large-diaphragm (1-inch) condenser mics. All four microphones feature a large, hand-tooled capsule; -10 dB attenuation switch; low-frequency rolloff switch; mesh screen; hard-shell case; shock mount; and stand adapter.

Two of the new mics use Class A FETs (a type of transistor that behaves somewhat like a triode tube) and require 48V phantom power. The AM51 ($549) is a fixed cardioid mic with a single-sided capsule. The AM52 ($699) has a double-sided capsule and features a switchable polar pattern (cardioid, omni, and figure 8). The FET-based mics can handle signals up to 144 dB SPL, and their frequency response is rated at 20 Hz to 18 kHz (±1.5 dB).

The other two mics use mil-spec, subminiature, Groove Tubes-brand vacuum tubes instead of FETs, and they can handle signals of up to 140 dB SPL. Each tube mic comes with an external power supply and custom mic cable and uses a 6-pin Neutrik connector. The AM61 ($999) is a cardioid mic with a single-sided capsule. The AM62 ($1,299) has a double-sided capsule and a switchable polar pattern (cardioid, supercardioid, omni, and figure 8). Frequency response is rated at 20 Hz to 20 kHz (±1.5 dB). GT Electronics; tel. (800) 525-3747 or (310) 255-3400; fax (310) 255-3401; e-mail gtmics@alesis1.usa.com; Web www.gtelectronics.com.

Circle #414 on Reader Service Card

▼ DRAWMER MX50

Drawmer's MX50 Dual De-Esser ($735) has a number of features designed to do more than just control sibilant peaks. Using the Frequency knob, you can fine-tune the unit to process only the frequencies that contain sibilance. Then, using the De-Ess knob, you can adjust the amount of gain reduction at the selected frequency by up to 20 dB.

Users can choose Full De-Essing, in which the unit reduces the total signal level in response to sibilant peaks, or Split-Band De-Essing, in which the signal level is reduced only above a user-selectable frequency upon peak detection. Drawmer's patented Air function applies makeup gain to the reduced signal at selectable frequencies above the sibilant band. The company's Floating Threshold changes in response to the dynamics and level of the incoming signal to produce more natural-sounding de-essing than with a manual threshold control.

A 9-LED bar graph on each channel monitors gain reduction, and each channel can be bypassed independently. Input and output for each channel is on a balanced, XLR connector and an unbalanced, 1/4-inch jack. The MX50 is switchable to accept signals of both +4 dBu and -10 dBV: at +4 dBu, I/O is balanced; at -10 dBV, unbalanced. Drawmer rates the frequency response at 12 Hz to 51 kHz (@1 dB) and noise is -95 dB (22 Hz to 22 kHz, +4 dBu operating level). Transamerica Audio Group; tel. (805) 241-4443; fax (805) 241-7839; e-mail transamag@aol.com; Web www.proaudio.co.uk/drawmer.htm.

Circle #415 on Reader Service Card

▼ STEINBERG

Steinberg's *Cubase VST/24* 4.0 for Macintosh ($799) gives you 96-track recording and supports 24-bit, 96 kHz digital audio with 32-bit floating-point internal processing. Two other upgrades for Mac, *Cubase VST* 4.0 ($399) and *Cubase Score VST* 4.0 ($549), have also been released, each offering 64 tracks with 16-bit resolution and sample rates up to 48 kHz.

All three versions of *Cubase VST* supply four equalizers and four insert effects per audio channel, eight auxiliary effects sends, and eight global master effects. The mixer has full automation. Basic notation editing and layout are included with *Cubase VST; Cubase Score VST* and *Cubase VST/24* give you more advanced scoring capabilities.

New features shared by all three 4.0 versions include new tools, folder tracks, and increased internal resolution of 15,360 ppqn for higher accuracy in audio editing. The MIDI-Track mixer now features drag-and-drop manipulation of MIDI events and audio segments. The scoring section has a new symbol palette and additional choices available for layout, notation style, and entering lyrics.

All three varieties of *Cubase* 4.0 require a Power Mac 604e (G3 recommended), a minimum of 24 MB RAM, and Mac OS 7.6.1 or higher. Steinberg North America; tel. (818) 993-4161; fax (818) 701-7452; e-mail info@steinbergna.com; Web www.us.steinberg.net.

Circle #416 on Reader Service Card

▲ OPCODE

Opcode has upgraded its *Vision* sequencer to *Vision DSP* 4.1 for Macintosh ($495). The software supports all ASIO-compatible sound cards and includes many MIDI and digital audio features from *Studio Vision Pro* 4.0, including nested looping, a MIDI arpeggiator, and the Pulse Edit drum window. The main differences between *Vision DSP* and *Studio Vision Pro* are that the latter has pitch-to-MIDI and MIDI-to-pitch conversion and supports Pro Tools hardware.

The new version supports VST plug-ins and comes with an assortment of them, including reverb, chorus, compression, and multitap delay. Several new DSP functions from *Studio Vision Pro,* such as pitch shift, formant shift, and customizable crossfades, are included in the package. *Vision DSP* also comes with a new 4-band, parametric EQ. The EQ edit window gives you a graphic representation of each band with access to all parameters.

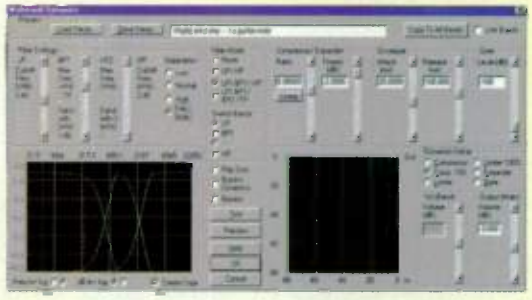
The program offers four DSP inserts per channel, as well as four aux sends for each, feeding into sixteen buses. The new interface allows for more labeling of channel info.

For audio applications, *Vision DSP* requires a Power PC 604 or higher with Mac OS 7.5.3 or later, and a minimum of 16 MB RAM is recommended. It comes bundled with BIAS *Peak SE. Vision* users can upgrade for $99.95. Opcode Systems; tel. (650) 856-3333; fax (650) 856-0777; e-mail info@opcode.com; Web www.opcode.com.

Circle #417 on Reader Service Card

▼ SEK'D

SEK'D's *Samplitude 2496* (Win 95 and NT; $1,499) is a beefed-up version of the company's popular multitrack recording software for Windows that supports 24-bit, floating-point processing and can record at 96 kHz (assuming compatible hardware). In addition to all the DSP features and effects of *Samplitude Studio* 4.5, this program comes with DirectX compatibility,



multiband dynamics processing, and direct, real-time CD-burning capability.

The multiband dynamics processor allows you to divide a signal into four bandwidths and process them independently. *Samplitude 2496* employs a special filter technique that is designed to reassemble the bands with no phase shifting or loss of frequency response.

Mastering Red Book CDs can be done on the fly, with all DSP parameters applied in real time.

Samplitude 2496 runs on Pentium PCs with at least 16 MB RAM. SEK'D America; tel. (800) 330-7753 or (707) 578-2023; fax (707) 578-2025; e-mail info@sekd.com; Web www.sekd.com. ❦

Circle #418 on Reader Service Card

Introducing PLX.

High

Introducing a new line of amplifiers that defines high impact. Up to 3,000 watts in a 2 rack-unit chassis. Only 13" deep and 21 lbs.

Model	Watts per channel		
PLX	2Ω*	4Ω	8Ω
1202	600	350	200
1602	800	500	300
2402	1200	700	425
3002	1500	900	550

20Hz-20kHz, *1.0Hz, 1% T.H.D.

Our exclusive PowerWave™ Technology used in our PowerLight™ Series for chest pounding bass and crystal clear highs. A hum-free noise floor of -108 dB (20Hz-20kHz) and ultra-low distortion of .03% THD.

An advanced thermal management system for true 2-ohm performance. And not to mention QSC's 30 year reputation for reliability. They're called PLX. And at a low impact price, you'll definitely want to find a dealer near you. Call (800) 854-4079.

"PowerLight", "PowerWave", and "Hear the Power of Technology" are trademarks of QSC Audio Products, Inc. "QSC" and the QSC logo are registered with the U.S. Patent and Trademark Office. Powerlight Patents Pending. © QSC Audio Products, Inc. 1675 MacArthur Blvd. Costa Mesa, CA 92626 USA

circle #514 on reader service card

SEE US AT AES BOOTH #133

Impact Power.

QSC™

AUDIO

www.qscaudio.com

PRO FILE

Sound but No Picture

David Slusser's sonic delights never end.

By Gino Robair

David Slusser leads a true musical double life: when he's not doing film and television sound (he won an Emmy for *The Adventures of Young Indiana Jones* and has enhanced the films of George Lucas, Francis Ford Coppola, and David Lynch), he's on stage or in the studio with artists such as avant-garde impresario John Zorn or Mr. Bungle vocalist Mike Patton.

A commission from Zorn's Tzadik label gave Slusser the impetus to create his first solo release, *Delight at the End of the Tunnel*, a work that straddles the line between instrumental music and sound collage.

The best example is "Angelo," a melody of springlike sounds that morph into a lounge-core, Mancini-esque main theme, before changing again into a soundscape of insect drones and crying saxophones. It's the kind of music that brings filmic images to mind.

Slusser says some of *Delight* derives from his library of source material—some almost 25 years old. "I'd saved bits and pieces of post-production effects that I thought could be turned into musical pieces. It wasn't until the recent availability of inexpensive digital workstations that it became possible for me."

But most of *Delight* was assembled on the go. Partly because he lacks a formal personal studio, and partly because of his background in field recording, Slusser devised a number of ways to record sources in the field.

"I did overdubs by taking a portable DAT recorder to the desired environment or musician and recording along with a click," Slusser explains. "Sometimes, I would use a second portable DAT machine to play one of the basic tracks into headphones," as on the dance-influenced "Hip Replacement," where a pastiche of guitars, trumpets and clarinet were added to a collage of mutated drum-machine rhythms. The overdubs were then loaded into a digital editor and married to the basics. The entire project lived on a few DATs that Slusser carried around in his briefcase for two years prior to completion.

"The digital domain allowed me to start things in one system, store them on DAT, and work at a later time on another platform, with no generational deterioration," Slusser explains. This was useful whenever his film industry connections provided opportunities to record and manipulate sounds in sophisticated environments, including tracking on Skywalker Ranch's cavernous scoring stage.

Most of his field recordings were done on a Sony DAT 2000, using either a Sanken MS stereo mic, a pair of Schoeps, or a shotgun mic, depending on the nature of his subject. Often, the subject was himself on a number of instruments, including sax, theremin, accordion, dulcimer, guitar, and more unusual things like the Muson ("A kiddie electronic toy from the early '80s") and his namesake, the Slussomatic. "It's a homebuilt synth made of Radio Shack parts," notes Slusser. "The Slussomatic is so rude, it's hard not to love it." His live performance rig includes the Slussomatic, a Roland JS-30 sampler, and a single-antenna theremin.

Throughout the creation of *Delight*, his main goal was to explore the gray area between sound effects and music. Slusser notes, "My work takes its form from the individual sound components I choose to use. They influence rhythm, melodic material, and the juxtaposition of adjoining material. The sound comes first, though."

For more information, contact Tzadik, 61 East Eighth Street, Suite 126, New York, NY 10003; Web www.tzadik.com/cdsections/composerseries.

David Slusser

Introducing Cakewalk® Pro Audio™ 7

NEW! Put the power of a professional mixing console on your desktop. The new Console view enables you to record, edit, and mix all your MIDI and audio tracks from a centralized window.

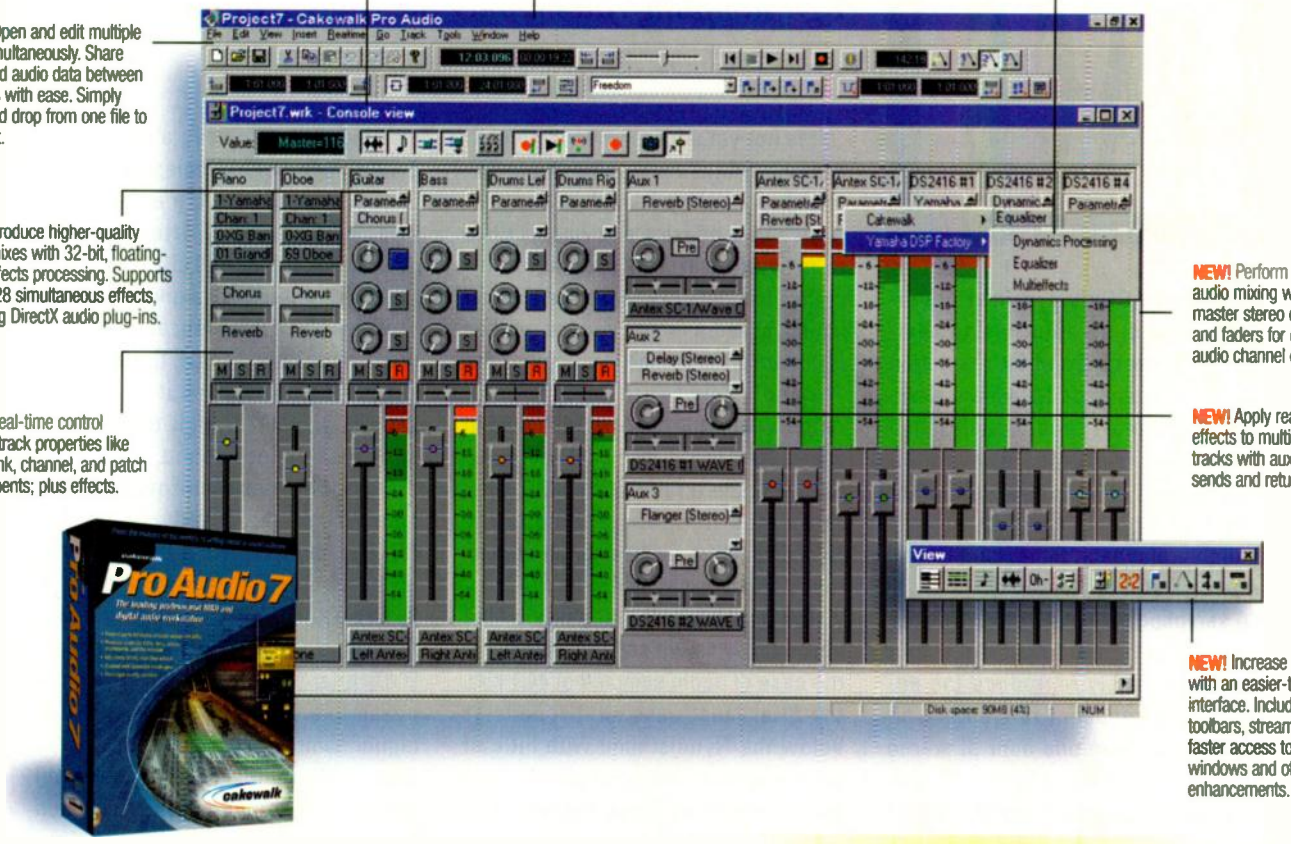
NEW! Get more help with online tutorials, context-sensitive online help, and a redesigned User's Guide.

NEW! Access the Yamaha DSP Factory's on-board, real-time effects processing.

NEW! Open and edit multiple files simultaneously. Share MIDI and audio data between projects with ease. Simply drag and drop from one file to the next.

NEW! Produce higher-quality audio mixes with 32-bit, floating-point effects processing. Supports up to 128 simultaneous effects, including DirectX audio plug-ins.

NEW! Real-time control of MIDI track properties like port, bank, channel, and patch assignments; plus effects.



NEW! Perform final audio mixing with master stereo effects and faders for each audio channel output.

NEW! Apply real-time effects to multiple tracks with auxiliary sends and returns.

NEW! Increase productivity with an easier-to-use interface. Includes dockable toolbars, streamlined menus, faster access to editing windows and other enhancements.

The #1-selling MIDI and digital audio software is now hotter than ever. With more recording and effects processing power. New editing tools. New online tutorials. And an enhanced interface that lets you produce music and sound faster and more efficiently.

Introducing Cakewalk Pro Audio 7, the newest edition of the world's top solution for CDs, film and video soundtracks, multimedia applications, game titles, live stage productions, and Internet content.

Whatever the application, Cakewalk Pro Audio 7 is for you. Pick it up today at the music or computer store nearest you.

UPGRADE ONLINE!

Upgrade today at incredibly low prices. Save even more when you upgrade online. Check out other great Web specials. **Visit www.cakewalk.com or call 888 CAKEWALK.**

Key Features

- Up to 64 simultaneous tracks of audio; 256 tracks of MIDI
- Up to 128 simultaneous real-time effects
- Supports DirectX audio plug-ins, including Cakewalk Audio FX 1 dynamics processing effects and QTools/AX 3D audio effects
- Control and automate studio gear
- Supports multi-channel audio cards and hard disk recorders
- Fast, flexible notation editing and printing
- Advanced MIDI and audio editing commands
- Chase-lock MIDI and audio to film/video via SMPTE/MTC
- Save MIDI and audio tracks in RealMedia format for streaming on the Internet
- Native support for Windows 95/NT

Also available— Home Studio 7 and Professional 7. Visit our web site or call for details!

SEE US AT AES BOOTH #312

Future Music Platinum Award

Post Magazine Professional's Choice

Mix Magazine Technical Excellence and Creativity Award

Music and Sound Award

Boot Magazine's Kick-Ass Award

New Media Awesome Award

cakewalk

circle #515 on reader service card

TECH PAGE

I Want to Take You Higher

High sampling rates reduce the ringing in your filters.

By Scott Wilkinson

When CDs were first developed, an appropriate sampling rate and bit resolution were needed to balance two opposing factors: audio quality and storage requirements. Higher sampling rates and resolutions yield better sound quality, but they reduce the available playback time from a fixed amount of storage capacity.

A sampling rate of 44.1 kHz was determined to be the lowest rate that would accurately reproduce the entire audible frequency range while allowing more than one hour of stereo playback time from a 650 MB CD. The Nyquist Theorem states that a digital audio system can accurately represent audio frequencies up to half the sampling rate; this is called the Nyquist limit. Therefore, a sampling rate of 44.1 kHz can accurately represent audio frequencies up to 22.05 kHz, which is slightly above the highest frequency that humans can perceive.

This has worked well for more than a decade, but people are now talking about sampling rates of 96 or even 192 kHz. Even though 44.1 kHz can accurately represent the entire human hearing range, listening tests indicate that many people hear a qualitative improvement in audio quality at higher rates. They report better spatial resolution, more high-frequency detail, and more "air" in the sound. But why does a higher rate make an audible difference if no one can hear above 20 kHz?

It is not yet understood why higher sampling rates make an audible difference, but one possibility is the phenomenon of aliasing and what is done to prevent it. If an audio signal includes frequencies above the Nyquist limit, a strange thing happens when it is digitized: these high frequencies are "folded" downward into a lower range, where they distort the intended signal. As a result, all digital audio systems include a filter at the A/D input that stops frequencies above the Nyquist limit from entering the system, thus preventing aliasing.

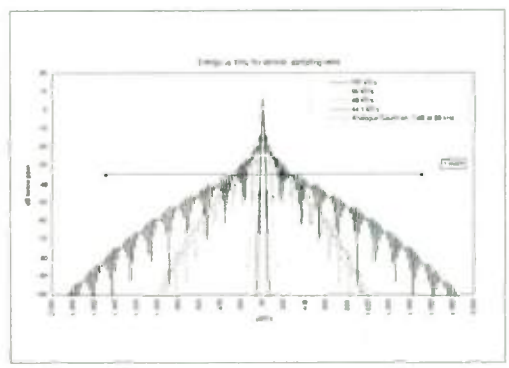
Unfortunately, this anti-aliasing filter introduces its own set of problems. In the case of audio sampled at 44.1 kHz, the filter must pass all frequencies below the Nyquist limit with little or no attenuation while completely stopping frequencies above the limit. This kind of filter is described as being a "brick wall" because its slope is almost vertical.

A brick wall filter is very difficult to design and always introduces anomalies into the signal. These anomalies include *ringing* in the transient response, in which the energy of a quick transient at the filter's input is spread out over a much longer period of time at the output, much like the sustained ringing of a bell from a single, momentary strike. This tends to "defocus" the sound, leading to perceptions of "muddiness" and poor spatial localization.

Using higher sampling rates means that the anti-aliasing filter can have a much more gentle slope. For example, with a sampling rate of 96 kHz, the anti-aliasing filter can gradually attenuate frequencies starting at 20 kHz and ending at 48 kHz, where the signal is attenuated by 100 dB or more. The more gradual the filter's slope, the less ringing transient response it will exhibit (see **Fig. 1**), which seems to result in a more well-defined sound.

Technology has improved significantly since the introduction of the CD. The bandwidth of audio electronics has increased, allowing the use of 96 kHz without being cost-prohibitive. Also, storage capacity has increased: DVDs offer a minimum of 4.7 GB as opposed to a CD's 650 MB. As a result, higher sampling rates will become increasingly common in professional and consumer audio products, which will ultimately improve the audio experience for everyone. ●

Thanks to Mike Story of dCS, Ltd., for his help with this article.



COURTESY DCS LTD

FIG. 1: As the sampling rate is increased, the duration of the anti-aliasing filter's ringing transient response is reduced.


N1/N5
Powerful synthesizers that sound simply awesome. Over 1700 sounds (including GM, and GS/XG soundmaps), 18MB of ROM in the 88-weighted key N1 controller and 12MB in the 61-key N5 synth, 64-voice polyphony, 4 knobs for realtime control, MIDI-syncable arpeggiator, 32-part multitimbrality, 2 dynamic stereo effects processors, computer interface...
free
Every N1 and N5 synth is bundled with Mark of the Unicorn's Unisyn N1/N5 and Freestyle LE software — a $490 value!
Offer valid July 1, 1998 through December 31, 1998 or while supplies last.
KORG
Super sonic.
© 1998 Korg USA, 316 S. Service Rd., Melville, NY 11747. For the Korg dealer nearest you: (800) 335-0800 • www.korg.com • For more info via fastback call: (516) 393-8530 doc # 3601.
circle #516 on reader service card

Illustration by Stuart Bradford

Doing the String Thing

By Sam Molineaux

String parts are among the easiest parts to score; surprisingly little can be written on a staff that a good string player can't perform beautifully. This is great news for composers, arrangers, and orchestrators, but it's the sort of thing that makes synth players break out into a sweat. Trying to emulate all the nuances of a good string performance using a sampler or a sample-based synth is at best very difficult and at worst downright impossible, a situation that is not helped by the fact that many synths and sample libraries fall short when it comes to solo string samples.

Happily, performing string sections from a keyboard is relatively easy. Bunch those pesky string players together, and many of the finer points of articulation and expression tend to get lost in the crowd. They're reasonably easy to sample *en masse* and forgiving when controlled from a keyboard. (For information on sampling string ensembles, see "All Together Now" in the June 1998 **EM**.)

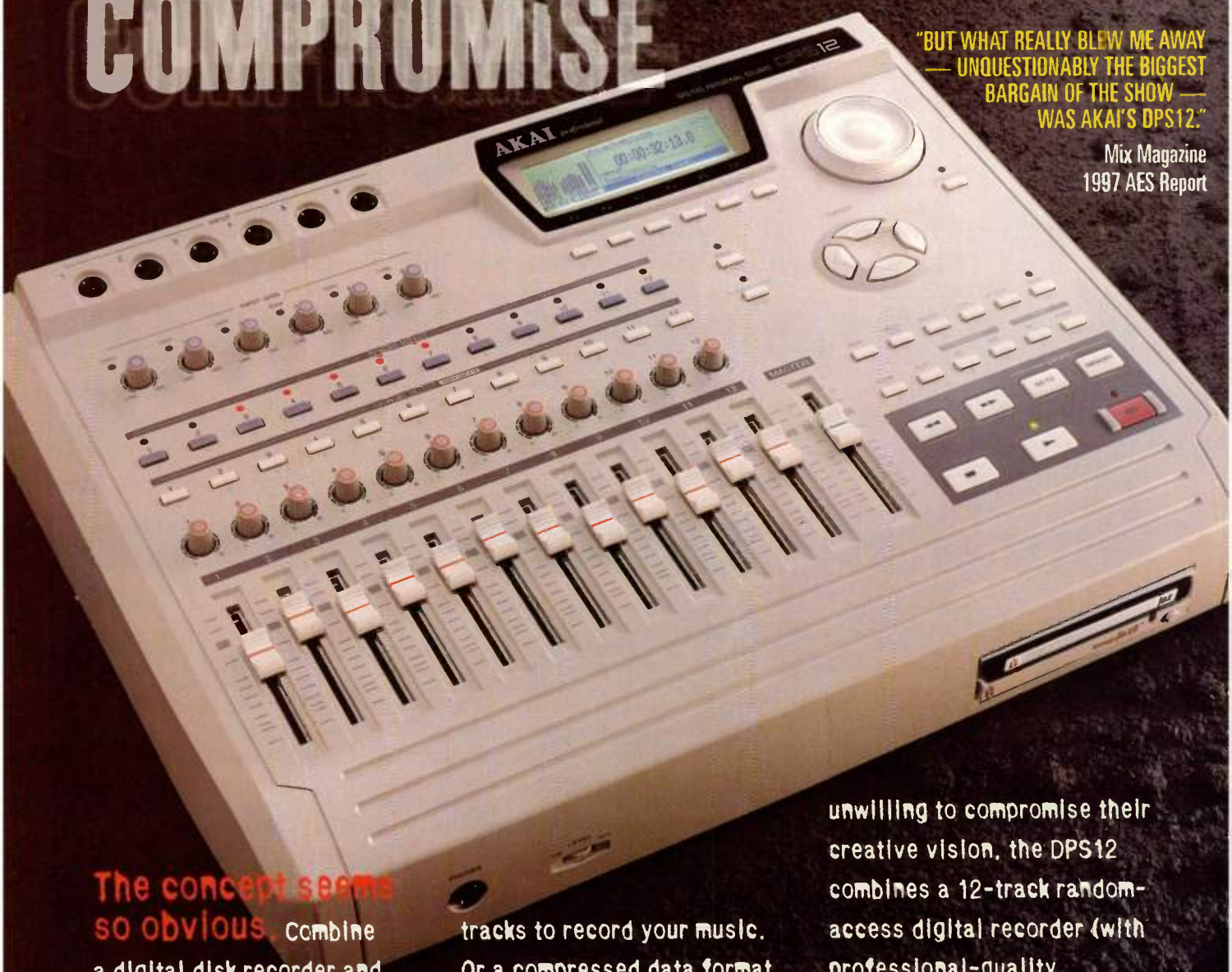
Perform realistic solo string parts with a keyboard synth.

But solo strings are an altogether different story. For one thing, due to memory constraints, the average synth only offers one kind of articulation on a solo string patch. "Many synths don't even have different samples for violin, viola, and cello," points out composer orchestrator, and keyboard player Tom Zink, who specializes in programming orchestral emulations for individual clients and companies such as Coda, Kawai, and Yamaha. "They'll maybe have one sample and just change the timbre a little bit and call it something else."

CREATIVITY WITHOUT COMPROMISE

"BUT WHAT REALLY BLEW ME AWAY — UNQUESTIONABLY THE BIGGEST BARGAIN OF THE SHOW — WAS AKAI'S DPS12."

Mix Magazine
1997 AES Report



The concept seems so obvious. Combine a digital disk recorder and a digital mixer in one convenient box. Eliminate complex interfacing and keep everything in the digital domain. Add optional internal effects. **Creative heaven.** But **up until now,** buying anything that you could afford meant settling for almost enough tracks to record your music. Or a compressed data format that sounded almost as good as CD quality. Or a user interface that you could almost make sense of.

Now, finally, the concept of integrated digital recording and mixing lives up to its promise with Akai's DPS12 Digital Personal Studio. Designed for those unwilling to compromise their creative vision, the DPS12 combines a 12-track random-access digital recorder (with professional-quality uncompressed 16-bit sound and powerful non-linear editing) and a 20-channel MIDI-automatable digital mixer in one compact, incredibly easy-to-use package. All at a price that is nothing short of spectacular. It's **creativity without compromise.**

DPS12

Since its founding in 1984, Akai Professional has consistently pushed the boundaries of affordable recording technology. From the original MG1212 12-track recorder/mixer, to the breakthrough A-DAM digital multitrack, to the DR4/8/16 professional disk recorders and the DD family of audio post-production tools, each Akai recording product has established new levels of performance and value.

Now, with the DPS12, Akai builds on this experience to bring professional-quality digital recording and mixing to the personal and project studio at a price that's truly unexpected. (Not to prolong the suspense, it's $1499 msrp.)

More Is Better

At the heart of the DPS12 is a powerful random-access disk recorder capable of simultaneously playing 12 (that's **twelve**) tracks of uncompressed 16-bit linear audio from convenient removable JAZ cartridges or SCSI hard disks. More tracks for more recording flexibility. More control of individual parts. Less need for track bouncing.

And speaking of more tracks, the DPS12 also lets you record a whopping 250 virtual tracks. At mixdown, you can assign any virtual track to any of the twelve physical tracks for playback. This gives you the freedom to compare multiple takes, experiment with alternative arrangements, even combine parts of different virtual tracks on a single track.

At the front end, the DPS12 lets you record on up to 8 tracks simultaneously through six high-quality balanced analog inputs and a S/PDIF stereo digital input at sampling rates of 48kHz, 44.1kHz or 32kHz.

The Wait Is Over

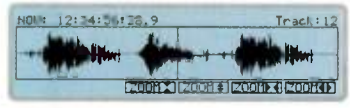
Since the DPS12 is a random-access recorder, waiting for tape to wind is a thing of the past. The DPS12's locating functions let you move instantly to any of 12 quick-locate points and 100 stack memory points. The stack points can even be named, so you can identify locations by the part of the song (FIRST VERSE, CHORUS, etc.) or even by specific lyrics.

An optional internal JAZ drive allows quick access to all your work.

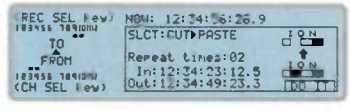
Easy Editing

Ever wonder how people managed to write anything before word processors? Well, after experiencing non-linear editing on the DPS12, you'll wonder the same thing about audio. Insert, Delete, Erase, Copy or Move sections of single- or multi-track audio from anywhere to anywhere within your project. This is stuff you just can't do with tape.

The DPS12's high-quality jogging and graphic waveform display let you zero in on your precise edit points.



Then call up an edit screen (complete with a graphic representation of your selected operation) and Do It.



Next, use the special Play To and Play From keys to confirm that seamless edit. Changed your mind? 256 levels of Undo are only a button press away.

Mix Master

The DPS12's digital mixer is a model of flexibility.

During mixdown, for example, the inputs can be used as an additional 8-channel Thru Mix, perfect for adding tracks from sequenced MIDI modules to the 12 recorded tracks for a true 20-channel mixdown. Two AUX sends and digital EQ are also included.

Found the perfect mix? Mix setups can be saved as snapshots and recalled at any time. And since all of the DPS12's faders and panpots generate MIDI controller data, you can record your mix moves into an external MIDI sequencer (like our MPC2000, for example) and play them back in sync with the DPS12 for a fully automated mixdown.

Effects Inside

If you want the added convenience of integrated internal effects (not to mention keeping your mix entirely in the digital domain), add the EB2M multi-effect processor board. The EB2M gives you two independent studio-quality effects processors with a wide variety of programmable effect types.

It Wants To Be Your Friend

It's one thing to give you all the tools you need to do the job, but it's another thing entirely to make them useable. Here, the DPS12 really shines. It is, quite simply, **really** easy to use.

At the heart of its friendliness is its informative graphic display. Backlit and easy to read, it always gives you a clear picture of what's going on with your DPS12. Frankly, it's all so simple that most of you may never have to take the manual out of the box.

Check It Out

There's a lot more to the DPS12 than we could fit in this ad, so head down to your local Akai Professional dealer for some quality hands-on time with a DPS12. And don't forget, that's

$1499.00 msrp.

circle #517 on reader service card

SEE US AT AES BOOTH #168

AKAI professional

Akai Musical Instrument Corporation
4710 Mercantile Drive, Fort Worth, Texas 76137
[phone] 817 831 9203 [fax] 817 222 1490 www.akai.com/akaipro

WRH

As a result, your choice of pitch range, articulation, and instrumental effects is considerably limited before you've even played a note. The obvious solution, Zink suggests, is to "use a very good sample library such as the Miroslav Vitous *Symphonic Orchestra Samples* [reviewed in the September 1995 **EM**] or the Denny Jaeger *Master Violin Library*."

In short, the situation isn't ideal, particularly for keyboardists who can't hire a real string player or buy a fully expanded sampler and high-end sample library. Nevertheless, there are steps you can take to improve your solo string parts to the point where you can achieve an acceptable level of realism.

(Almost) Anything Goes

Obviously, you always need to be aware of the pitch range of the instrument you're writing for (see **Fig. 1**). Don't go below the range of the instrument, but also watch out for your sample's realism in the upper part of the instrument's range. This may be a little restrictive with violin and cello parts, but not so much with viola, which is rarely played high in its range. "Stick to the low or middle portion of the instrument's pitch range," offers programmer Terry Wilson, whose synthesized instruments are used by such film composers as Georgio Moroder, David Kitay, and Anthony Marineli.

Other than pitch constraints, however, it's virtually a case of anything goes. "Strings are extremely versatile, especially cellos," explains Zink. "Because their instruments are tuned in fifths, string players can jump all over the place, and they can do incredibly fast lines, slurs, or very quickly repeated bowing on a note. It's actually the opposite of what you might expect: there's pretty much nothing that you can do on a keyboard that you couldn't do on a stringed instrument—except play ten notes at once!"

Violinists and cellists might not be able to play ten notes at once, but they can play two, three, or even four notes with relative ease. However, cellist Matthew Brubeck points out that double-stopping intervals of a fifth is somewhat difficult for a string player, and 4-note chords must be "spread," or arpeggiated. (The son of famed jazz master Dave Brubeck, Matthew leads the Matthew Brubeck Quartet, plays with the Berkeley Symphony, and has backed up such pop singers as Jewel and Tom Waits.)

Keyboard players should be cautious when playing chords with string sounds, because the results often sound unnatural. "It's strange, but you even have to be careful about synthesizing effects that are common on the real instruments," says Zink. "Double stops can work great if they're short and bowed strongly *[detaché]*, as is common in cello lines, but if you're playing them from a keyboard, they tend not to work when sustained or played legato. I generally avoid playing more than two notes at once, and I try not to use double stops that often."

Think Differently

In any attempt to emulate another instrument, half the battle is working out how to translate the idiosyncrasies of phrasing and articulation on that particular instrument into an appropriate keyboard line. That usually means adjusting your playing technique. "With strings, it's good to play with an even touch; dynamics should generally be controlled with the master volume rather than by how hard you strike the keys," suggests Wilson. "You can actually sound more realistic by prevention," adds Yamaha sound designer and style programmer Nate Tschetter. "For example, try playing with the articulation that's sampled into the sound."

"The biggest thing that makes strings sound synthy is that keyboard players put both of their hands on the keyboard and just start playing," states Zink. "I recommend always playing or programming string parts individually, one line at a time. That way you can approach it like a real player does and concentrate on articulating it right."

In addition, with only one hand on the keyboard, your other hand is free to operate the modulation wheel or another assignable controller so you can make real-time changes to add natural-sounding expression to your string line. "I regularly use Controller 7 [Volume] and Controller 11 [Expression] at the ends of phrases to drop the volume slightly, like real string players do before they release or lift the bow," reveals Zink, who does a lot of orchestral emulation for the Yamaha Disklavier library. "Controller 11 is good for emulating swells," he adds, "and in XG synths, there's a dedicated controller for changing the attack and decay rate, which can be extremely useful on solo string sounds."

Altering attacks from note to note can really help your string line sound realistic. Real string players alternate downbows and upbows, and they rarely play consecutive notes with the same attack. Subtle changes such as these contribute greatly to the expressive nature of the instrument. To slightly alter the attack rates on a Yamaha XG instrument, you can use CC 73 (Attack Time), assigning it either to a physical

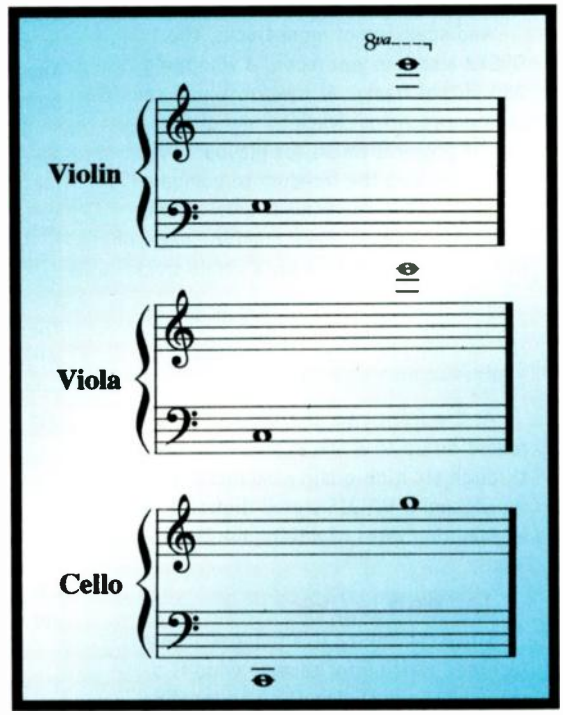
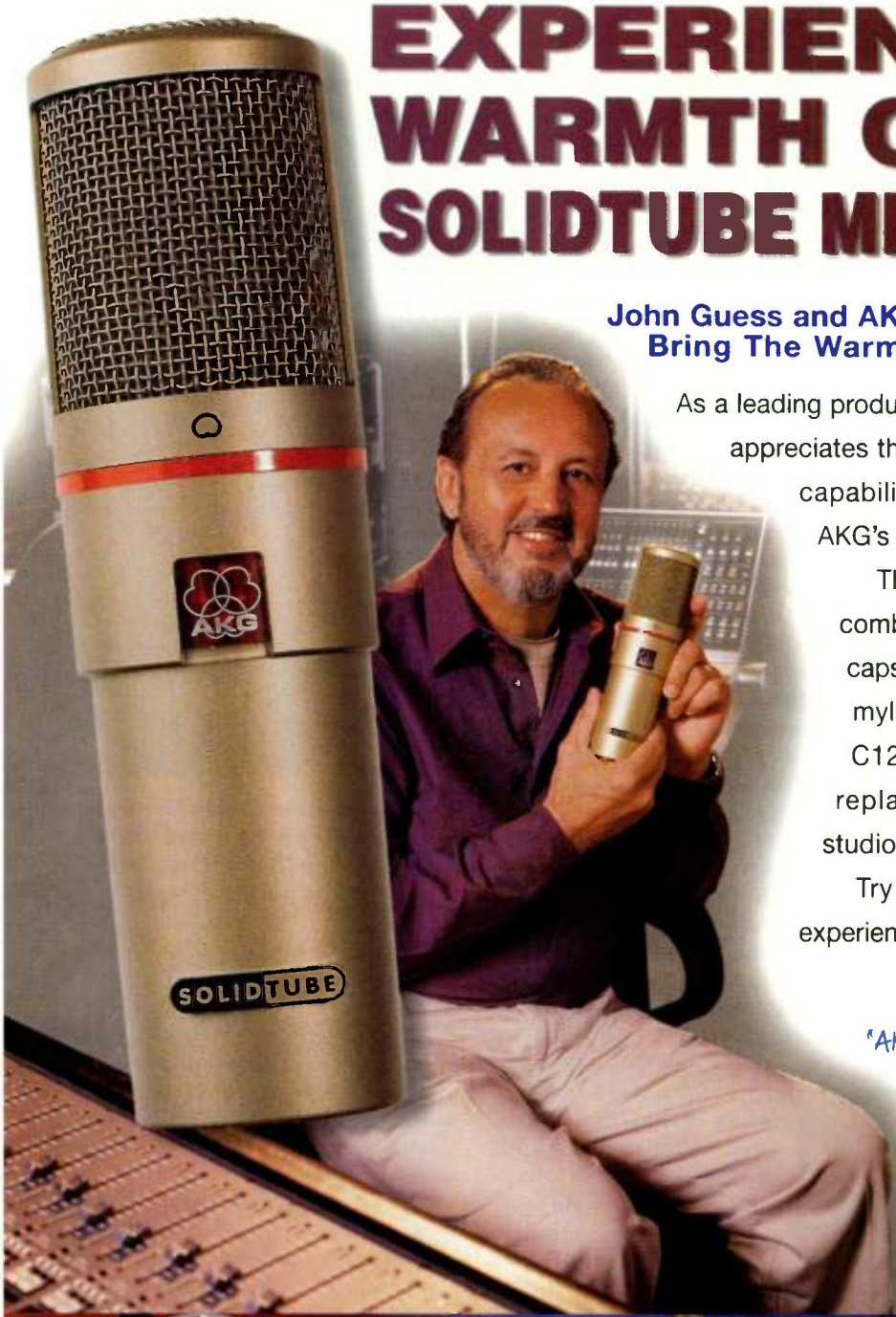


FIG. 1: These string ranges are shown on a grand staff, but when written for string players, they always appear on single staves. Violin uses a treble clef. Viola primarily uses an alto clef but changes to a treble clef for high notes to avoid excessive ledger lines. Similarly, cello uses the bass clef but changes to tenor and even treble clef, as needed.

EXPERIENCE THE WARMTH OF AKG'S SOLIDTUBE MICROPHONE.



John Guess and AKG's SOLIDTUBE Microphone Bring The Warmth of Sound to The Studio.

As a leading producer and studio engineer, John Guess appreciates the rich sound, ruggedness, high SPL capability, and extremely low self-noise of AKG's new SOLIDTUBE microphone.

The heart of AKG's SOLIDTUBE is the combination of the capsule and tube. The capsule features the same gold-sputtered mylar material as used in the legendary C12. The ECC 83 (12Ax7) tube is field replaceable and available at most pro studio dealers.

Try out the new AKG SOLIDTUBE and experience the warmth.

"AKG's SOLIDTUBE is the best overall value of any high performance condenser tube microphone that I've ever used."

John Guess

LEGENDARY STUDIO QUALITY BY

1998 Nominee

AKG

AKG Acoustics U.S., 1449 Donelson Pike, Nashville, TN 37217,
phone: 615-360-0499, fax: 615-360-0275.
AKG Acoustics G.m.b.H. Vienna/Austria, http://www.akg-acoustics.com

H A Harman International Company

ADV 5/1/98

circle #518 on reader service card

controller such as a slider or to key Velocity. If you're using a sampler, you can do a similar thing with the Sample Start function, moving the start time slightly with a wheel, slider, or Velocity.

You could also emulate Terry Wilson, who loads up his Roland S-760 with several different, sampled attacks on separate MIDI channels. "There's a feature in Emagic's *Logic Audio* that allows you to randomize the MIDI channels. When I'm programming a string line, using that feature to switch between different sampled attacks really helps," says Wilson. "I'll take maybe a couple of attacks from the Denny Jaeger library, one from Best Service's *Peter Siedlaczek's Advanced Orchestra* sample CD library [reviewed in the September 1998 **EM**], and perhaps one or two others that sound similar from elsewhere. Then I'll trim them up so they're the same length, but each with a slightly different tonal color. You have to randomly switch between them, though, because if you formed a pattern, it would sound almost as unrealistic as just playing the same sample over and over."

That's a sophisticated way to go, but even alternating between two samples—say a heavy attack for a downbow and a lighter attack for an upbow—can work. "If your instrument supports a key rotation scheme, you can use that to switch between two samples from one key press to the next," suggests Tschetter.

The biggest telltale sign of a synthesized string line is when you hear an initial attack with every note. A real string player commonly plays several notes in the same bow stroke to get a legato effect, or slur, but this simple musical figure is difficult to achieve using string samples controlled from a keyboard. One possible solution is to alter the level of your sample's attack in real time, using one of the aforementioned controllers.

Alternatively, if your synth or sampler supports Mono mode (whereby the attack portion of the sound only retriggers when you play distinct, detached notes), you can experiment with that. Beware, though, as even this can sound unnatural. "I have never had much luck with Mono mode," warns Zink. "For one thing, strings *can* play more than one note, and a lot of times they do. When performers phrase between notes on different strings, they might not lift their finger up from the last note, and there can be quite a lot of overlap. Mono mode has an unnatural cutoff; even when two notes don't overlap, if the notes are slurred, your ear can fool your mind into hearing a very slight overlap."

Zink gets around this problem by purposefully using a short overlap, which has the psychoacoustic effect of diminishing the amount of attack on the second note. This is something that's far easier to do in a sequenced string line than in real time, where simply moving a controller to reduce some of the sampled attack is perhaps more practical.

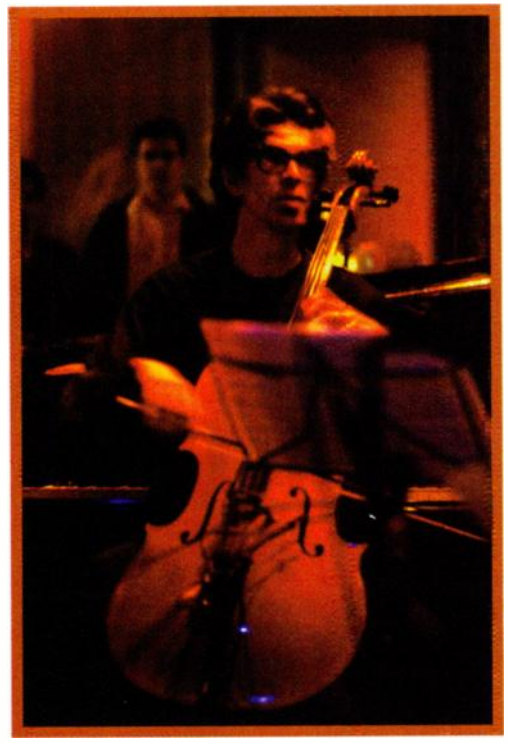
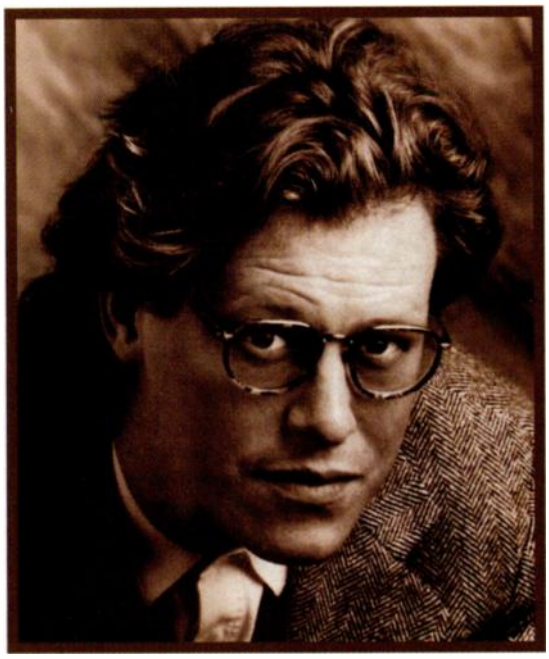


PHOTO BY J. THACKRAY

Cellist Mattew Brubeck, leader of the Matthew Brubeck Quartet, advises that, if you want a string part to sound orchestral, you shouldn't use techniques that have been developed by non-orchestral (e.g., jazz) musicians.



Tom Zink, who specializes in programming orchestral emulations, notes that you should use caution when synthesizing common stringed-instrument effects such as double-stops.

Common String Techniques

Some of the easiest things to play on a stringed instrument can be the hardest to emulate from a keyboard. Vibrato is a good example: most solo string samples include vibrato in the sample, which is by far the best way of achieving maximum realism. However, it can also be very restrictive.

"The problem with having vibrato sampled into the sound is that you have no control over it," notes Tschetter. "If you can control it yourself using an LFO, you'll have more freedom to use and assign it as you wish, depending on the style of music you're performing or programming. For example, country fiddle players have a very wide pitch depth on their vibrato, so you want to set that parameter accordingly. It's nice to control filter, amplitude, and pitch for vibrato; if you can control the depth with the modulation wheel and the rate with Aftertouch, it can sound really good."

"It's quite important to change the vibrato rate depending on the style of music and also the dynamic," agrees Brubeck. "String players in general vibrate faster when they play louder, and in earlier styles of music, such as baroque, vibrato would only be used as

THE TECHNOLOGY THAT MADE WAVES FOR TITANIC CAN MAKE .WAVS IN YOUR PC

For more than 25 years, E-mu Systems has been one of the most respected names in the music industry. Our sampling and synthesis technology is found in post-production and project studios worldwide. You'll hear the results in many major Hollywood films including *Titanic*, *Independence Day* and *Hunt for Red October.**

E-mu's sampler products set the standard for excellence in sound. Now you can put E-mu technology in your computer with the E-mu Audio Production Studio (APS)—the first sound card designed as an instrument, not a game card. And, like an iceberg, there's more to APS than meets the eye. APS is a PCI audio system that gives you **sampling**, 64-voice wave-table **synthesis**, multi-track **hard-disk recording**, and **real-time effects** in an easy-to-use, plug-and-play, music-making package.

APS allows you to create professional audio for sound design and multimedia content using your computer's RAM so you don't need to buy additional, proprietary memory.

APS lets you integrate up to 32MB of SoundFont® samples while playing stereo digital audio from your hard drive. SoundFonts are the most widely-used downloadable sample format. Thousands are available from E-mu, third party developers or on the Internet. You can even create your own with the Audio Production Studio.

E-Card—the heart of APS

The E-Card allows full duplex, 16-bit CD-quality streaming audio that can be augmented with programmable hardware-based real-time effects including reverb, chorus, echo/delay, compression and parametric EQ.

E-Drive—convenient drive bay access

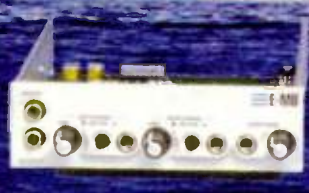
APS includes E-Drive, an audio access panel that installs in the drive bay of your PC. It has switchable mic/line inputs, studio-quality preamps, balanced 1/4" connectors and switchable microphone types (with internally-selectable 12V phantom power). There's also an extra S/PDIF I/O and headphone output with volume control. E-mu's E-Control software for Windows® 95 lets you easily manage all of your mixing and routing tasks.

Professional Features and Capabilities

- 64-voice wave table synth/sampler
- Professional balanced input/output connectors
- Supports 32 internal MIDI channels and 16 external channels
- Records stereo audio at eight common sample rates
- Powerful DSP engine for mixing, routing, and real-time effects processing
- Complete with software from E-mu Systems, Sonic Foundry, Cakewalk and compatible with most other audio/MIDI software and hardware

APS is the future of digital audio. So whether you use APS as a standalone digital audio system or as an addition to your existing studio, APS's professional features will add new flexibility and fidelity to your creations—**all for less than $700.**

To find out more about how the E-mu Audio Production Studio is just the tip of the iceberg, see E-mu's desktop music site at www.emu.com, or visit your local dealer.



E-mu Audio Production Studio E-Drive

E-mu Audio Production Studio E-Card

E-Control software for APS

E-MU SYSTEMS

P.O. Box 660015, Scotts Valley, CA, USA, 95067-0015
Tel. 408.438.1921 • http://www.emu.com
London Sales Office: Pinewood Studios, Pinewood Road, Iver, Buckinghamshire, SLO ONH England • Tel: +44 1753 630808

circle #519 on reader service card
SEE US AT AES BOOTH #858

an ornament, whereas in later styles it's more of a constant."

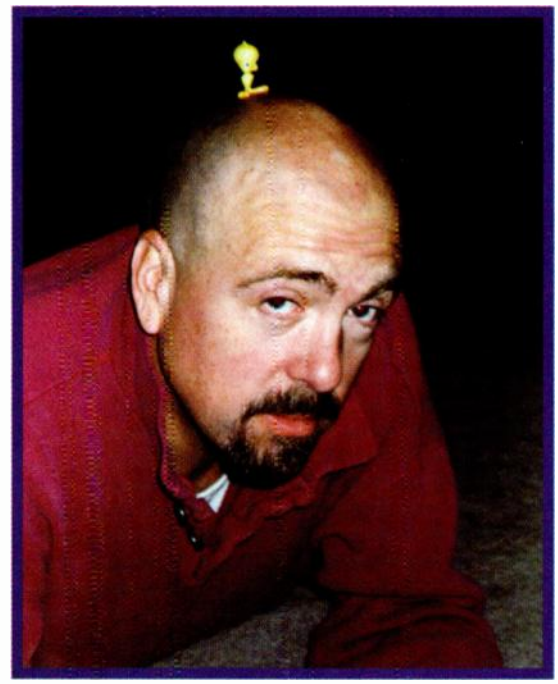
It's also worth bearing in mind that the lowest note on any stringed instrument is always played sans vibrato. The same thing is true if you're emulating a string player tuning up, where they would be bowing or plucking only the open strings.

On the subject of plucking, or pizzicato, most orchestration books note that string players generally can't do fast pizzicato runs, and that's something to bear in mind if you're playing or programming in a classical idiom. However, there are exceptions to that rule, as Brubeck explains: "If you want something to sound orchestral, you can't use techniques that nonorchestral players have worked on. Acoustic bass players who are schooled in jazz, for example, can play pizzicato a lot faster than classical players simply because they spend more time doing it. The same is true of cello; I can play pizzicato much faster than most cellists because I use a 2-finger technique, whereas most cellists are trained just to use one finger."

Another common string effect is tremolo, which is rapidly repeated, short-bowed notes. Because it's impossible for a keyboard player to restrike the keys as fast as a string player can play tremolo, this is another effect that works best when recorded as part of the sample. But what if your synth doesn't have that sample? "Try using an amplifier and filter LFO with a square wave shape going really fast and deep," suggests Tschetter.

Occasionally your string line may call for a glissando; simulating that is almost impossible. Depending on the style of music, there are two ways to go. Using regular Pitch Bend can work for the cliché, *Psycho* effect. However, string players often perform glissandi by fingering and playing each note individually. A standard keyboard glissando is the only way to attempt this, although you're restricted to a diatonic scale along the white keys (and exact pitches), which isn't altogether ideal.

"A glissando is something I wouldn't even try to play live!" says Zink. "I'd program it into a sequencer and probably draw in the bend. If you listen to a string glissando or pitch bend, you'll find they tend to start off slowly, and then they'll go faster, so you should draw a curve that is not completely linear. There are often some other things going on, though, such as volume changes and tonal changes, so you want to use a filter as the bend occurs. On the XG, for example, I'd use Controller 74 [Brightness] to control the timbre on this effect."



Terry Wilson (bottom), whose synthesized instruments are used by numerous film composers, recommends playing mostly in the low or middle portion of the stringed instrument's range and using an even touch, controlling dynamics with Volume (CC7) rather than key Velocity.

Really Subtle Stuff

One major stumbling block when performing stringed instruments from a keyboard is that, unlike keyboard instruments, fretless orchestral strings aren't constrained to playing only twelve divisions of the scale. Fiddle players and jazz/blues players use this to great effect, so using Pitch Bend freely in those styles can be good. Classical players rely more on vibrato for this type of expression; however they misfinger notes sometimes, accidentally or deliberately.

"Most string players at least try to center the pitch if they miss, so you can assign a pitch EG that subtly detunes each note and slowly draws itself back in. The rate at which it does this can be your player virtuosity factor," suggests Tschetter. "Then you assign the pitch EG depth to Velocity to give you control over it. A simpler way would be to just assign small amounts of fine tuning to Velocity or Aftertouch, but that's not as convincing."

"Good string players are actually very deliberate about their mistunings, and part of what makes strings unusual is that they don't play in tempered tuning, like a piano or other keyboard does," remarks Zink. "There's a cool program called Justonic Tuning *Pitch Palette* [described in the January 1997 "What's New" column] that looks at a MIDI file, analyzes every chord, and then retunes each note within each chord to just tuning. It only works on synths that accept microtunings, though, because it uses System Exclusive microtuning information. I've used it with my XG module, and it's really pretty happening—definitely the next step toward instrumental realism."

Specialissimo Effects

String players regularly employ an assortment of special effects to vary the tonal color and add musical interest. For example, they play near the bridge *(sul ponticello)* to create a pinched sound, rich in high frequencies. To simulate this, try using a sweepable bandpass or highpass filter. They can also mute the strings *(con sordino)*, which produces a quieter, rather muffled sound. If your synth or sampler doesn't have its own solo muted string patch, applying a lowpass filter with resonance might work. Another well-known special effect is snapping the string back onto the fingerboard (Bartók pizzicato), which you could attempt to emulate by layering an unpitched percussion sound to your pizzicato sample.

One common effect involves the use of harmonics. Finding a good harmonic sample could be a problem, and as with all of the aforementioned effects, you'll have to come up with some

We move the information that moves your world.™

adaptec

Toast lets you create your own data, audio, or multimedia CDs with just a few mouse clicks.

Jam lets you produce your own commercial audio and professional-quality demo CDs.

Adaptec®'s Toast and Jam™ are the easiest way to make your own music CDs. CD-Recording is here. And we're serving up the hottest new Macintosh based CD-Recording software just right to sink your teeth into. So whether you're a studio professional or just a juke box music lover, Adaptec will have you drooling.

Toast makes CD-Recording a snap. Toast's easy audio recording functions are perfect for compiling your own customized CDs. And for multimedia masters, Toast will record data and fully-featured multimedia CDs in both Mac and PC formats.

For serious soundsmiths, Jam's high-end audio applications create professional quality CDs. Jam works with or without a sound card to give industry-standard "Red Book" quality recording. Advanced features like PQ subcode editing, cross fades and BIAS Peak LE™ make Jam ideal for musicians, sound engineers and professional sound designers.

BandWidth™ ADAPTEC

Call your waitress over and get yourself a side of Toast or Jam,
1-800-442-7274 ext.8488
visit www.adaptec.com/easycd/emusic

WRH **circle #520 on reader service card**

convenient way to bring it in and out when required.

"I would use sample Velocity-switching and assign high-Velocity notes to play the harmonic sample and the lower-Velocity notes to play the regular string sound," says Tschetter. "You can then use yet another controller, such as a footswitch, to bring the samples in and out."

The Finishing Touch

A little reverb can go a long way on a solo string line, but the easiest way to make a string sample sound unrealistic is to drown it in reverb. So don't overdo it. "In a concert hall, the strings are close to you, and they don't seem to put out the kind of timbre that bounces off the wall," explains Zink. "I always use a separate reverb for strings and use far less of it than I would on, say, a brass or woodwind sound. I also mute the high end of the reverb so it's more midrangey, and I make it shorter."

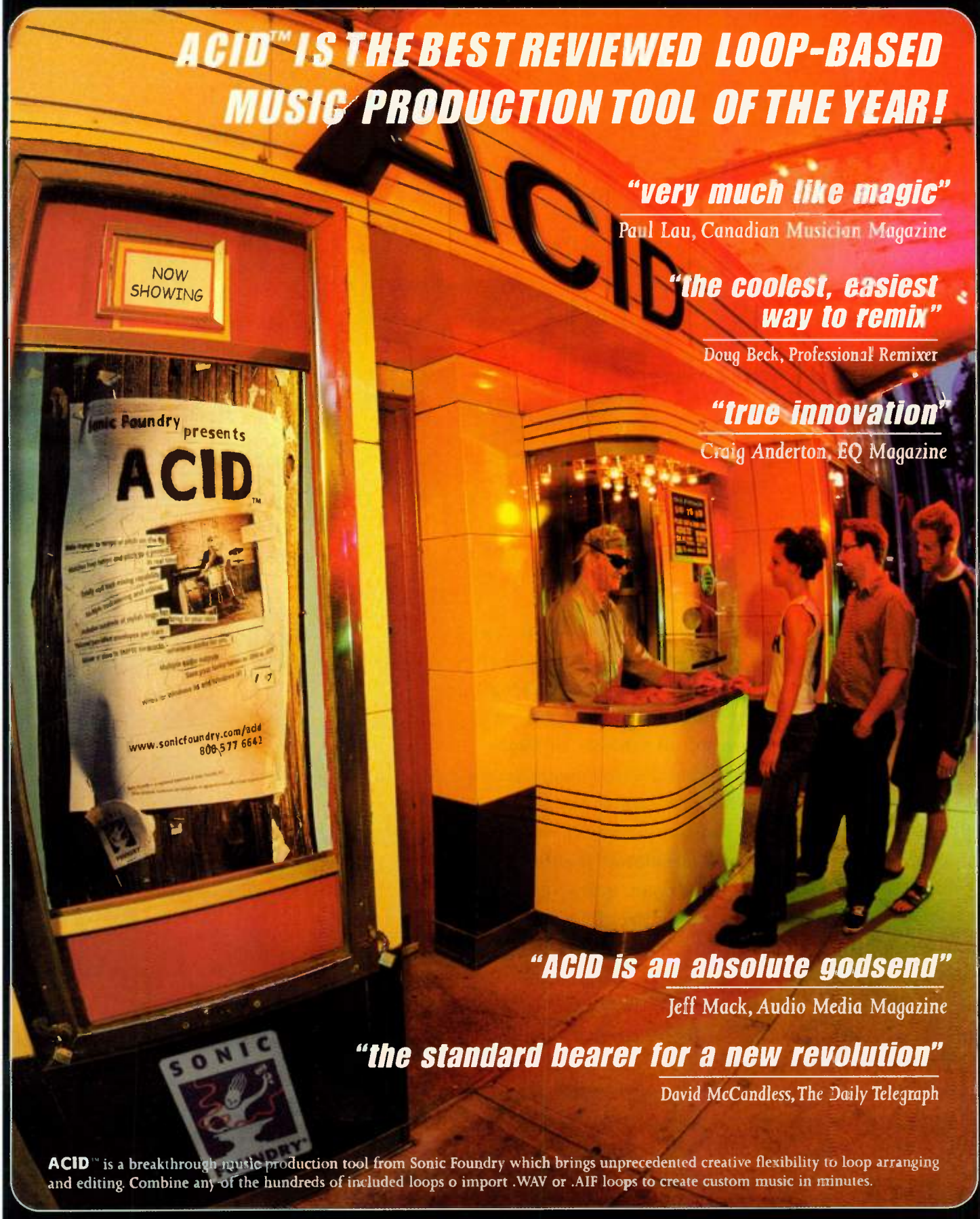
"For country fiddle, an amp simulator with a very slight amount of distortion can sound cool," adds Tschetter.

Of course, the oldest trick in the book for achieving a convincing sound is perhaps the easiest and quickest one to implement: hire a real string player. "Think about how much time you actually spend getting a really good sound and all the effort it takes to do all that programming. If you just stick a microphone up in front of somebody's instrument, that's the closest you'll get to realism," concludes Brubeck.

But hey, who wants to take the coward's way out? Not me.

(Note: Visit the **EM** Web site at www.emusician.com during the month of October to hear a sample of Tom Zink's solo string lines.)

Sam Molineaux *became semiproficient at the violin, viola, and cello before she reached puberty, at which point she switched to the synth, which was far more rock 'n' roll. She'd like to thank Matthew Brubeck, Nate Tschetter, Terry Wilson, and Tom Zink for their invaluable help with this article.*



NOW AVAILABLE EVERYWHERE

Call 1 800 57 SONIC for a dealer near you or visit our Web site at www.sonicfoundry.com

Madison, WI 53703 Tel: (608) 256 3133, Fax: (608) 256 7300, CompuServe: 74774,1340 or GO SONIC, Internet: sales@sonicfoundry.com. Sonic Foundry and Sound Forge are registered trademarks of Sonic Foundry, Inc. Other products mentioned are trademarks or registered trademarks of their respective manufacturers.

circle #522 on reader service card

MASTERING

Learn the secrets to creating a professional master in a personal studio.

You've spent every spare moment for the last two months polishing your mixes to perfection. You've finally put all your songs on one tape, and you're ready for the moment of truth: your first listen to the material all the way through.

You press Play, and the first song sounds pretty good. But at the very end of the fadeout, the sound seems to drop off abruptly, and you think, "I never noticed *that* before." Just then, the second song comes slamming in, quite a bit louder than the first. You turn down your monitors, but by now you've also noticed that this song, which was mixed a few months ago, sounds a bit duller than the first, which you mixed just the other day.

And so it goes, with each successive song seemingly crying out for its own little adjustments. Is it time for despair, time to chuck these mixes and start from scratch? No! It's time for mastering, a critical step that every professional project goes through.

on a budget

By Philip De Lancie

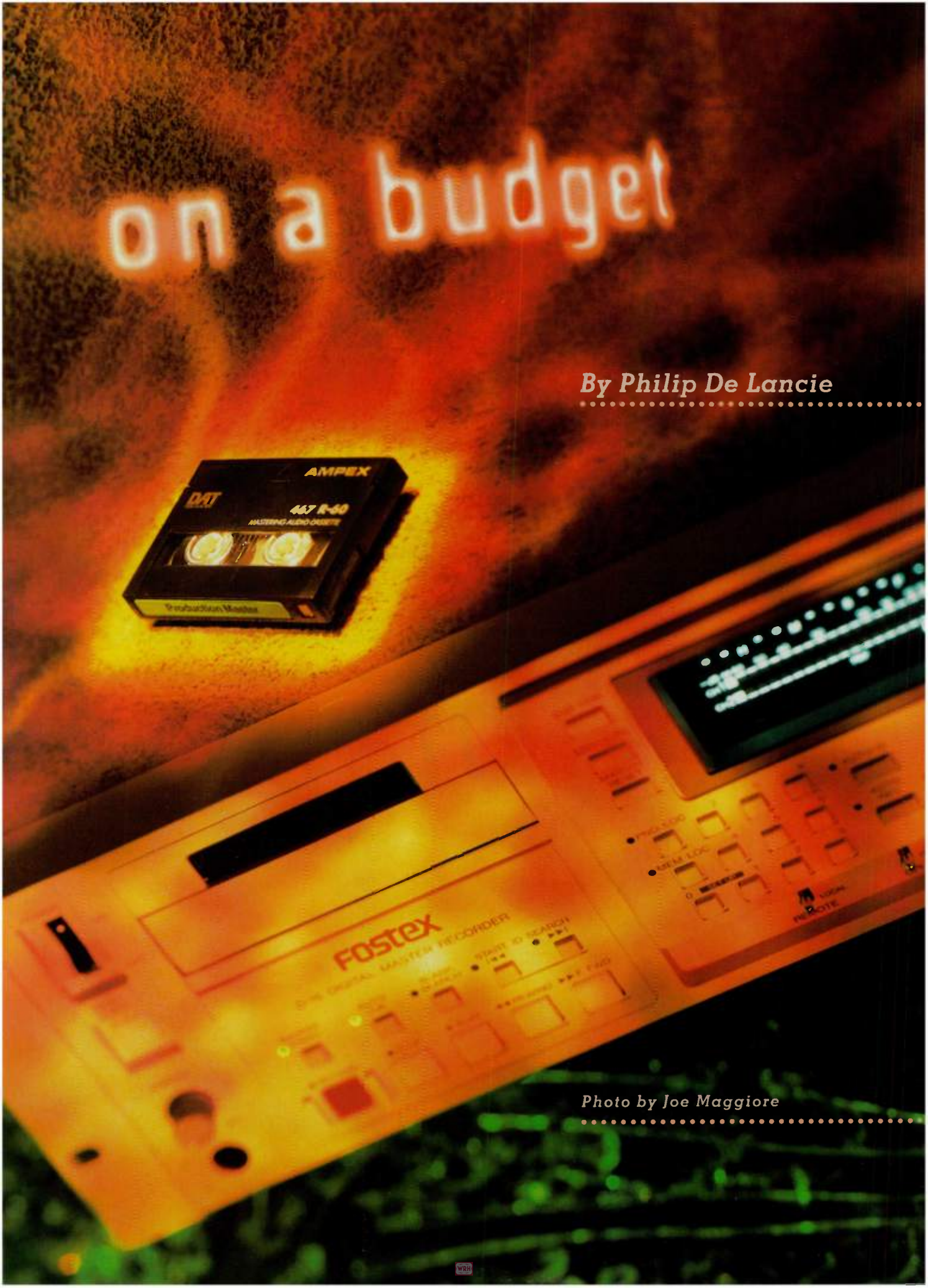
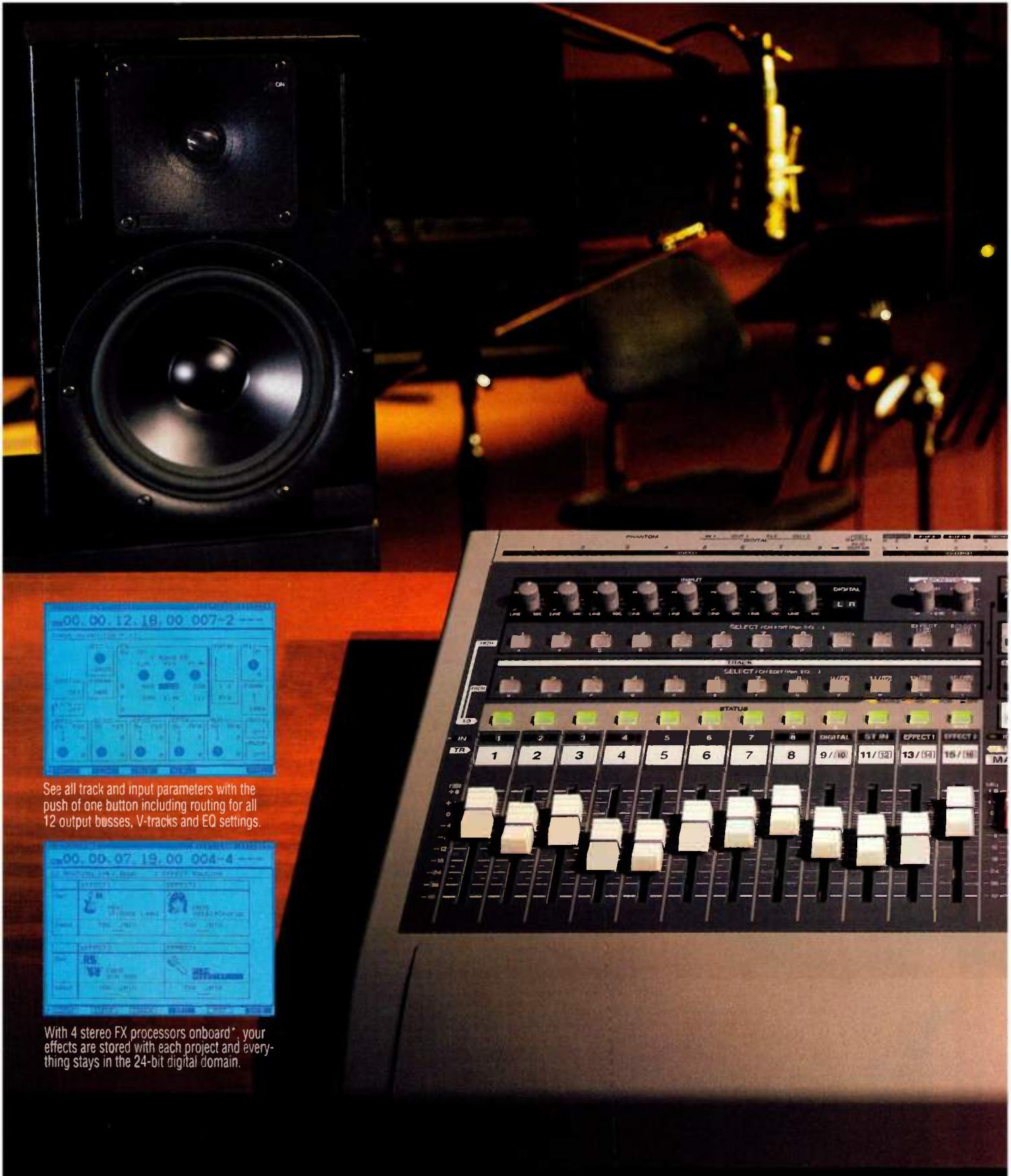


Photo by Joe Maggiore



See all track and input parameters with the push of one button including routing for all 12 output busses, V-tracks and EQ settings.

With 4 stereo FX processors onboard*, your effects are stored with each project and everything stays in the 24-bit digital domain.

The VS-1680. It's huge. Make room.

Finally, the studio of your dreams is within your reach. With 16 tracks (8 simultaneous record), 4 stereo or 8 mono effects processors*, 26-channel automated digital mixer, 256 virtual tracks, direct CD burning capability and MT Pro 24-bit recording mode, the VS-1680 looms large in any room. Make it yours.

Call (800) 386-7575, ext. 595 for your Demo Video ($5.00).

* With two optional VS8F-2 Dual Stereo Effect Expansion Boards

Roland

VS-1680 Digital Studio Workstation

http://www.rolandus.com Fax-Back Information: (213) 685-5141, ext. 271 (Doc. #10259)
Roland Corporation U.S., 7200 Dominion Circle, Los Angeles, CA 90040, (213) 685-5141
Roland Canada Music Ltd., 5480 Parkwood Way, Richmond, B.C. V6V 2M4, (604) 270-6626

circle #523 on reader service card

WHAT IS MASTERING?

Mastering serves as a link between production (recording and mixing) and product manufacturing (CD replication, cassette duplication, etc.). The goal of this process is to compile the individual mixes into a smoothly flowing album, so that the listener, having adjusted the volume and tone on the first few bars of the first song, can listen to the entire program without having to readjust those playback settings.

Mastering is a three-step process. In a professional facility, a DAT copy of the final mixes is presented to the mastering engineer, who first edits the tracks into the desired sequence and adjusts the spacing between the songs. Once this is done, the engineer then processes the audio, coaxing the best possible sound out of each mix, unifying the sonic characteristics of the individual selections, and creating a consistent listening level.

Finally, the material is transferred onto a "production master," which is presented to the manufacturing facility in an appropriate format. (For CD replication, this master can be delivered on a Sony PCM-1630 tape, an Exabyte 8 mm tape, or a CD-R; for cassette duplication, a DAT is the most common format; and for vinyl record pressing, a master lacquer is required.) The production master embodies the record exactly as it will be heard by the consumer.

While practically anyone can sequence their mixes and transfer the material to the proper format, the skills needed to perform the sonic unification of an album are very specialized. Even those artists who are fortunate enough to work with the industry's best mix engineers rely on professional mastering engineers to put the final blessing on their work.

However, not everyone is in a position to take advantage of professional mastering. If you're a personal studio owner working on a limited budget, spending a few thousand dollars to "touch up" your project is probably not the most practical plan. But there is an alternative—mastering in-house.

Inspired by the wealth of software editing programs and DSP plug-ins on the market, many small-studio owners have begun mastering their own material. While in-house mastering certainly won't generate the same results as what you'd expect from a professional facility (see the sidebar, "Master of the Universe"), it is a decent, cost-effective solution. If you are adding the role of mastering engineer to a list that already includes artist, producer, recordist, and mixing engineer, knowing as much as possible about how and why professional engineers do what they do will help you make more informed mastering decisions and consequently turn out a better-sounding product.

WHAT YOU'LL NEED

Before you can think about mastering a record, you'll need to make sure that you have all the essentials. While you may already own the required gear, some of the other necessities may be a bit more difficult to acquire.

The tools. The tools commonly used in mastering are: a console or DAW (to make level adjustments), an editing medium (e.g., editing software, DAT machine, or analog 2-track), a 2-channel parametric EQ, and a 2-channel dynamics processor (usually a compressor).

Major mastering houses typically employ expensive digital mixing consoles (with onboard digital EQ and compressors) to process audio and rely on computers mainly for editing. However, for the personal studio owner, working in a self-contained desktop environment is a much more practical approach; every necessary tool resides within the computer, eliminating the need to transfer audio from one device to another. This doesn't mean that you can't master a project with a Mackie console, dbx 160A, and a Rane EQ. Of course, analog processors have the inherent tendency to introduce some amount of noise into the signal path, and since mastering is all about audio quality, this is something you should be aware of. If you own a digital console and feel comfortable with its onboard processors, you might explore that route, too.

Should you wind up mastering with analog processors, it's extremely important that all the equipment be free of hum and buzz (i.e., properly grounded), low in hiss (i.e., high signal-to-noise ratio), and operated at levels that won't introduce distortion into the signal. If you're using an analog mixing console to route signals and correct levels, make sure you maintain proper gain staging at the mixer's inputs and outputs.

For those mastering on the desktop, there is a variety of high-quality DSP plug-ins available, and you probably already know what's out there for your particular DAW. One of my favorites for general compression applications is AnTares *MDT* (see **Fig. 1**), available for SDII and TDM, because I find its user interface to be very intuitive. For

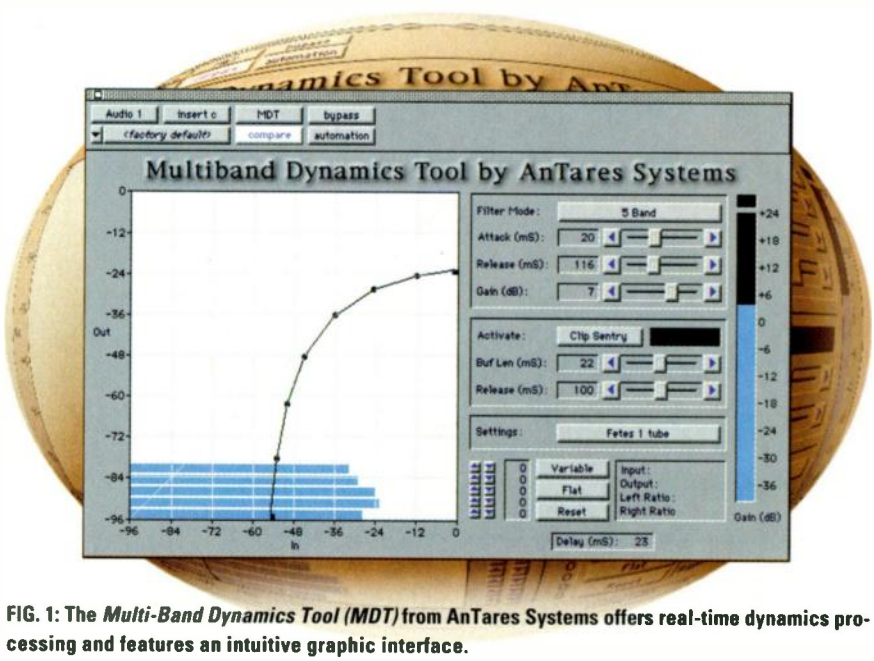


FIG. 1: The *Multi-Band Dynamics Tool (MDT)* from AnTares Systems offers real-time dynamics processing and features an intuitive graphic interface.

Roger Sanchez – world renowned remixer/producer and Sony recording artist.

"I've tried them all..."

...and nothing gives me the flexibility, power and accessibility of Logic Audio. I use it on every project because Logic Audio is definitely the future in recording and sequencing software."

Multi-Platinum artists demand complete and reliable solutions. That's why more professionals use Logic Audio Platinum than any other digital audio sequencer.

The most comprehensive cross-platform, integrated feature set available: multiple hardware support, a myriad of plug-in options, real-time DSP, high powered MIDI sequencing, DTP quality scoring, the list seems endless...

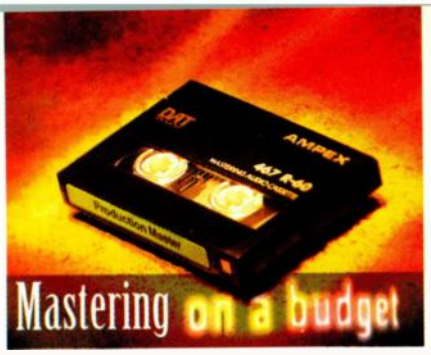
Logic Audio is the only choice for those who demand the best. Available at finer music stores worldwide.

emagic

Technology with Soul.

Emagic Inc.
Tel. +530.477 1051
Fax +530.477 1052
E-mail: info@emagic.de
http://www.emagic.de

circle #524 on reader service card



EQ, full parametric control is essential for mastering. I happen to like Waves' *Q10* (see **Fig. 2**), available for a number of different PC and Mac formats.

When adjusting the various plug-in parameters during mastering, you'll have to be monitoring in real time, so you might need to increase your DAW's RAM allocation to get a decent preview length. (A 4-second loop doesn't cut it for setting EQ.) Depending on your setup, you may also want to look into utilities that let you use plug-ins in a live play-through mode, such as Waves' *MultiRack*, or *HyperEngine* from Arboretum.

If you plan on delivering your production master on a CD-R, you'll also need to have dedicated CD-recording software capable of producing a Red Book standard disc. (For an in-depth look at CD-R programs for both Mac and PC, check out "The CD-R Software Cook-Off" in the March 1998 **EM**.)

Decent monitoring. It goes without saying that you need to have a decent

MASTER OF THE UNIVERSE

Although there is certainly no shortage of mastering engineers working in the industry today, there is only a handful whose names constantly appear on chart-topping albums. If you check out the mastering credits on ten CDs in your collection, chances are you'll consistently come across the same people—and I guarantee that Bob Ludwig is one of them.

With a career spanning more than 30 years and a total project count of more than 7,000 records, Ludwig is unquestionably a giant in the industry. In fact, many major artists refuse to work with anyone else. Ludwig was gracious enough to take a break one afternoon to answer some of **EM**'s questions on mastering.

What do you consider to be the ultimate goal of the mastering process, and what are the key elements in realizing it?

To me, the goal of mastering is to maximize the musicality of every tape we receive. Many of the tapes that come in already sound excellent, but sometimes our job is to make a bad tape sound "normal" or a mediocre tape sound good.

The key element in achieving this is to have the ability to hear a raw tape, imagine how it *could* sound, and then know what knobs to turn to make it sound that way!

Given that a large number of personal studio owners are working on a limited budget, what are your thoughts on desktop mastering?

Professional mastering is expensive for a good reason, but desktop mastering is a decent alternative for making the final improvements to your project. Mastering by professionals is usually the step that makes a commercial CD *sound* commercial and competitive, and it's done by individuals who are dedicated to the craft. Mastering engineers either have many years of experience or work with people who do—seasoned engineers who can help them when the going gets rough. Professional mastering is done in acoustic environments that are technically accurate and well known to the engineer.

All decisions in mastering involve what one hears through speakers, so the quality of those decisions depends on how well one knows those speakers and how high their resolution is. Not surprisingly, you can detect more defects and make better musical judgements on a $60,000 monitoring system than you can on a $1,000 system! Also, the better the room's acoustics are, the better the sound that's produced by those speakers will be.

Professional mastering engineers do use desktop mastering computers—systems like Sonic Solutions, *ProTools 24*, etc.—as part of our arsenal, but I'd be hard-pressed to master professionally with those as my only tool.

If you could only afford to have one high-end piece of gear in your studio, what would it be?

This is a difficult question, but I guess it would be our Weiss bw102 digital console, which runs 24-bit at 96 kHz. It is made by Daniel Weiss in Switzerland. It has the world's best-sounding digital equalizers, compressor, and de-esser—I'd be lost without it.

What are some "rules of thumb" to follow when working with EQ and compression?

"Less is more" is the first one that comes to mind. A mastering engineer's job to is improve the sound of the final product. I am lucky enough to work with the very best mixers around (I won't mention a name or I'd have to mention them all!), and tapes sometimes come in already sounding perfect, in which case doing *something* to it to justify one's existence would be criminal.

When you mix your project, remember that you can undo EQ in mastering, to an extent, but it's impossible to undo compression. Once it's there, the only option is to add more or leave it as is!

What is your advice to people mastering in-house?

Take your time. That's the one advantage personal studios have over us! Professionals not only need to be great at their job, they need to be very fast, as well. Think about what you are trying to accomplish. Listen to flat copies of your work in many environments: the car, the boom box, your friend's audiophile setup, etc. Compare it to professionally mastered CDs, and experiment with lots of tools.

I would like to point out that ever since grunge music came into popularity, we have been going through a phase of making everything *loud*. While this is fine, in its place, it is difficult to master a loud CD without having a great dynamic mix to begin with. Don't ruin your music in an attempt to make it unnecessarily loud; dynamics are one of the best parts of music. Dynamics can add longevity to your music, so you'll want to hear the piece again and again and not be worn out when you're finished listening.

—Jeff Casey

Four track digital recording

ATRAC version 4.5

On the road with Davey Johnstone and John Jorgenson, the red lights always mean go.

MIDI time code for multi-machine sync

Individual track editing

10 input mixer

Sometimes it's hard to tell where the road ends and a song begins. That's why Davey and John are recording every chance they get during their world tour with Elton John. Their new acoustic release is going from the Sony MDM-X4MKII MiniDisc multitrack direct to CD. "The editing features make the possibilities endless," says John, "but the sound quality was really the determining factor for this project." Hear what the Sony MiniDisc multitrack recorder can do and you'll be running some red lights, too. And to find out more about their new CD, Groovemasters Vol. 2, visit www.acousticmusicresource.com.

Hot Start instant playback

To get a **FREE CD** sampler of their MiniDisc recording call 1-800-635-SONY ext. MD

www.sony.com/proaudio

SONY

MiniDisc MD DATA

WRH

monitoring environment to master a project. You can't make informed judgments about how to improve a song's sonic quality if you are basing those judgments on a misleading representation of the material's actual sound.

A full exploration of studio monitoring is beyond the scope of this article. However, it should be noted that proper monitoring is not just a matter of buying a good pair of speakers. It also involves the correct placement of those speakers in relation to the listening position and the walls of the room, as well as the proper acoustic treatment of the room itself and, in some cases, the EQ of the monitor signal path.

A frame of reference. One of the invaluable traits that mastering engineers bring to the table is a frame of reference—in other words, they know how the sound of any given material compares to the sound of other material they've worked on. They also know how their studio environment sounds as compared to the typical listening environments where their work is heard. (Unlike recordists and mixers, mastering engineers almost always do all their work in the same room.) These skills are developed only through experience.

However, you can give yourself a crash course on referencing. Pick a CD of material that you think is similar to the music you will be mastering in terms of style, instrumentation, and dynamics. Listen analytically and get familiar with the way it sounds in your studio. Are the lows full, or are they light? The midrange thick, or edgy? The highs dark, or airy?

Listen to the same CD in as many listening situations as you can (living room system, boom box, car, etc.), and keep mental notes about how the sound differs from what you heard in your studio. For instance, if you learn that the low end tends to sound boomier in the "real world" than it does in your studio, you can factor that in as you work, try not to overcompensate when you doen't hear enough bass, and thereby avoid making your music too muddy. If you have a CD-R of your mixes (cassettes are not accurate enough for this purpose), you can go through the same comparative listening process with your own material to get a feel for how it will sound in the world outside your studio walls.

A good mix. Let us pay homage to the wisdom of a couple of timeworn proverbs: "garbage in, garbage out," and "an ounce of prevention is worth a pound of cure." The point of these aphorisms for mastering is that the foundation of a good mastering job must be laid in the mix, and the foundation of a good mix must be laid in recording. Because most problems are much easier to deal with before individual tracks are combined in a mix, the most important thing you can do to make your mastering job a success is to steer clear of trouble earlier in the production chain. The "fix it later" attitude is a prescription for regret—not only postponing problems but compounding them.

Some common problems carried over from the recording process include loud hums or buzzes on guitar tracks and harshness or distortion on vocals. If it's not practical to re-record these tracks, or the performance is too priceless, tools such as tunable de-essers can be used on an individual track to selectively downplay the frequency range most affected by the problem. At that point, you'll have to remix the song—it's much harder (sometimes impossible) to use such tools effectively when you are dealing with a complete mix, because every instrument with content in that frequency range will be affected by your fix.

Remember that mastering does not afford you control over the sound of individual instruments; instead, you are working primarily with frequency ranges. So, any EQ applied to address one instrument's issues at a given frequency will affect all instruments in that range. Let's say, for instance, that you've ended up with a mix in which the snare sounds somewhat dull or masked, but the vocals sound harsh and edgy. If it weren't for the vocals, adding snap to the snare would be, well, a snap! But you've mixed yourself into a situation where fixing the snare would make the vocals sound worse. While you are mixing, to avoid tying your hands in mastering, think about whether the

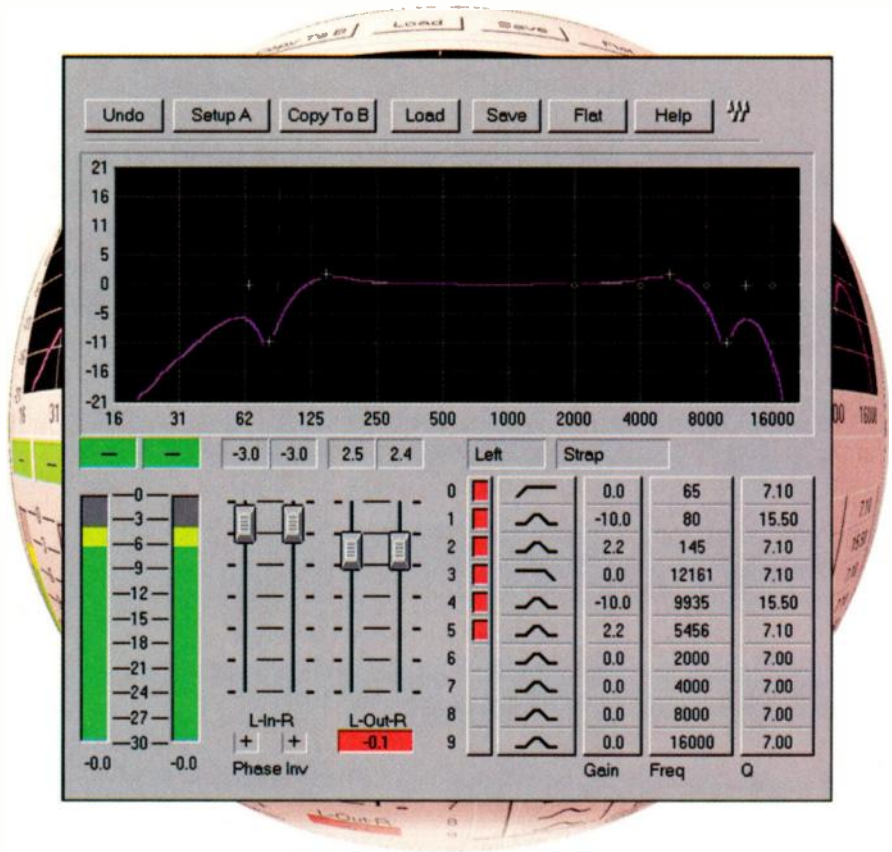
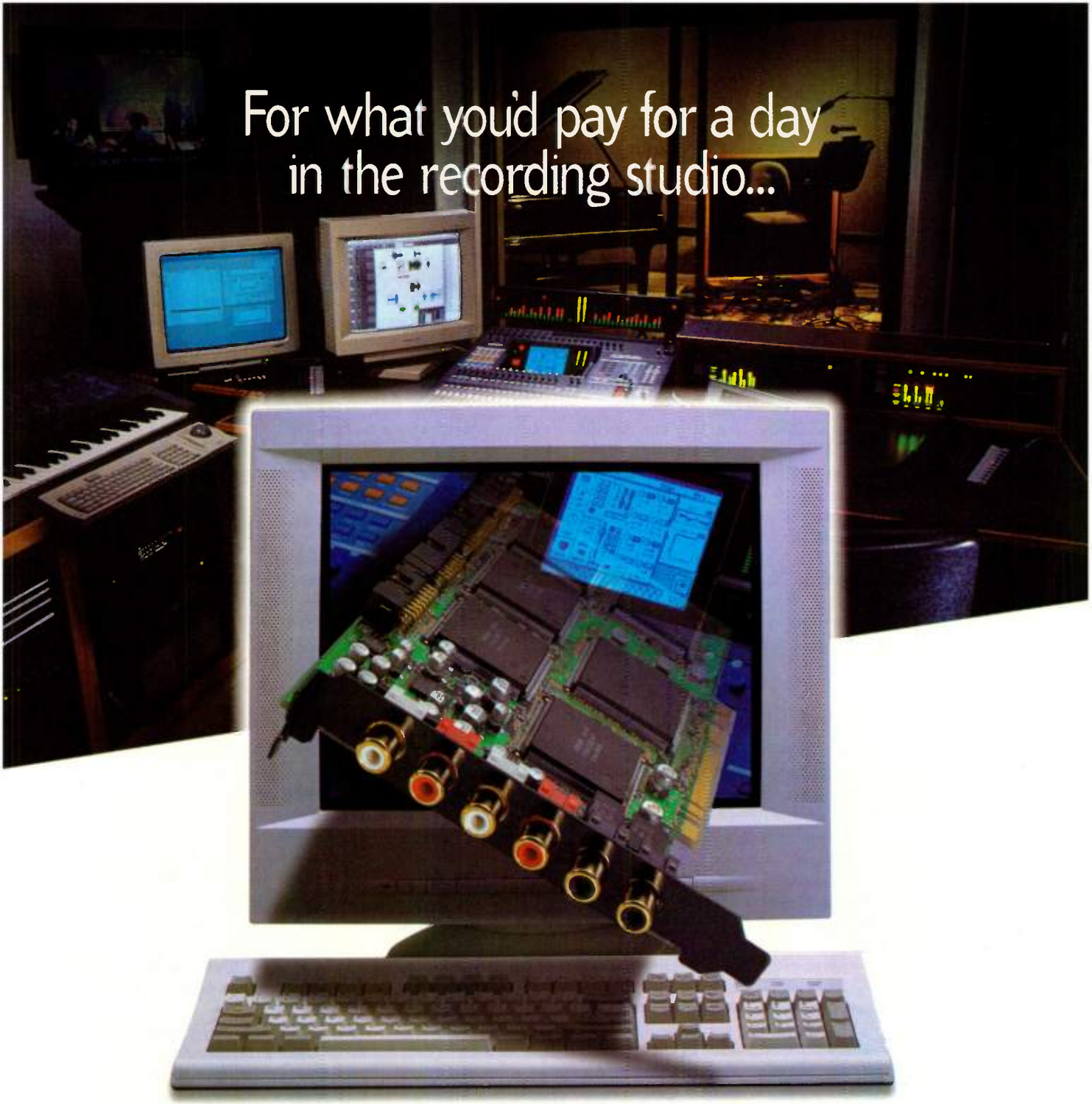


FIG. 2: Offering up to ten bands of stereo parametric EQ, the Waves *Q10* plug-in provides five filter types (bell, low shelf, high shelf, lowpass, and highpass), in addition to 200 preset curves.



You can own the studio!

DSP FACTORY

Imagine having the mixing power of the acclaimed Yamaha 02R and 16 tracks of tape-less recording inside your computer. Under the control of popular recording software, the DS2416 digital mixing card—the star component of Yamaha's DSP Factory—gives you 24 mixing channels, more than 100 bands of parametric eq, 26 dynamics processors and two effect processors operating simultaneously with no strain on your computer's CPU.* Plus 16 tracks of tape-less recording. All for less than you'd pay for a day in the studio. The Yamaha DSP Factory—a virtual studio inside your computer.

YAMAHA

Minnetonka cakewalk emagic Musicator Steinberg

These companies have announced support for DSP Factory in their Windows® products. Macintosh software coming soon.

Visit our Web site @ www.yamaha.co.jp/product/proaudio or call us at 1-800-937-7171 ext. 683 • ©1998 Yamaha Corporation • Yamaha, DSP and DS2416 are registered trademarks of Yamaha Corporation. *Not all software supports all of DS2416's features.

circle #526 on reader service card

WRH

characteristics of instruments in similar frequency ranges are consistent or pulling in opposite directions.

Also, keep an eye on the overall level while you're mixing. The sound enhancements used in mastering are much more likely to add to the level rather than subtract from it. Don't try to mix so that your peaks are at digital zero; a target for peaks of -2 or -3 will keep your mix plenty hot, while allowing some headroom for mastering.

PUTTING IT ALL TOGETHER

Before getting down to processing the audio, you'll need to edit and assemble your track sequence. It is possible, of course, to do this after you've processed the tracks. But because a big part of mastering concerns the flow of material from the end of one song to the beginning of the next, it's a much better idea to assemble a master of finished mixes first, then do a rundown (decide what you are going to do to each song), process it, and transfer everything to a production master. Hearing the transitions from song to song will help you make better mastering decisions.

The specifics of putting together your master will vary, depending on whether you have mixed to a hard drive, DAT, or analog 2-track. Obviously, there are several advantages to working in a random-access environment when editing, but a compilation sequence can be assembled with linear tape decks as well.

Regardless, there are a few basic standards to uphold in creating a professional master. The space between songs may vary from zero to about four seconds; the mood and tempo of the material will determine the most effective pacing. However long they are, the spaces should be silent, with no extraneous noises (ticks, buzz, hiss, etc.). Hiss immediately before a song starts is distracting and should be removed by editing or noise gating. This is also a good time to assess whether your fades are gradual and smooth or too abrupt. (Unfortunately, the fix for a too-short fade usually is remixing the song.)

If you are making a master by assembly-editing to a DAT machine, keep in mind that every time you put the machine in Pause or Stop mode, you create a break in the control track. On playback, these breaks will be interpreted by the machine as uncorrectable errors, possibly causing either a mute or a noise where there should

IT'S THE PLAYER, NOT THE GUITAR

We asked renowned mastering engineer Denny Purcell to impart some advice on how to approach mastering at home. Purcell has been a mastering engineer for 25 years and has earned well over 500 gold and platinum albums. He currently owns Georgetown Masters in Nashville, where he and his staff master more than 200 albums a year. Here's what he had to say.

People on tight budgets aren't the only ones doing in-house mastering. Some very well-known folks are doing it, too, both because of time constraints and simply because they enjoy doing it. Remember: it's the player, not the guitar; great things have been done on small budgets. With that in mind, here are some tips for mastering—be it analog or digital—that are not dependent on expensive gear or acoustically correct rooms.

Before you begin, make sure the equipment that will be directly processing your audio is the very best your budget will allow: buy the best D/A, A/D, EQ, and compressor you can, and work at the highest bit rate and sampling rate you can afford.

Although working with a pair of high-resolution speakers is definitely an asset in mastering, as long as you are intimately familiar with your own monitoring chain, you should be able to turn out an accurate project. To that end, know your room, your monitors, your speaker wires, and your amps and preamps.

The night before you begin, get plenty of rest—you have work to do. Be relaxed and at peace with yourself and others. Get up early and focus on what you're about to do. When you start, do what you hear and feel—your reputation is on the line here.

You're ready to begin: check a tone for L/R balance, check D/A polarity for your specific mixdown format, listen to the entire album, uninterrupted, and note your first impression of each song (e.g., bass content, mid- and high-frequency content, level, compression, etc.). Do a second pass, song by song, and make changes based on your immediate impressions. Play the entire album back and listen to the changes, again noting your immediate impressions. Repeat the process, making adjustments based on your notes.

When you're satisfied, make reference copies for yourself and your client, and listen to it where you're comfortable. Talk with your client and make any necessary changes. When you're done, transfer the material to whatever format the manufacturing plant needs, or have a professional mastering house do it for you. (It's important to give the plant *exactly* what they need to cut a glass master.) You're done—relax!

Those who like your what you do will be back; those who don't, will not. Adjust to this. It's art. It's pressure. It's fun.

No matter what technology provides, a professional mastering house will always be a place to listen to a project, with a person who listens in the same room every day. All I do every day is listen and maybe EQ. I couldn't do without my assistant, Jonathan Russell; he sets up, tears down, lays each cut down, and cards each cut. I leave the room when my client listens. I don't edit, I only EQ. My point is, if you're working alone, don't do everything in one day; the body can have only one head. It's always the player, never the guitar. *(Denny Purcell would like to thank Doug Sax for making independent mastering possible. He was the first!)*

Beauty is in the Ear of the Beholder

Some of the Best Beholders

TRM8

Bernie Grundman,
Grundman Mastering

"I was able to get exactly what I wanted. ...TRM8's do not sound boxy, the bottom end is clear and defined."

EQ Magazine
February 1998

Bruce Swedien
Producer/Engineer

"The Hafler TRM8 is an excellent monitor. Of all the self powered monitors I have heard, this is the best one."

EQ Magazine
February 1998

Roger Nichols
Producer/Engineer

"When I heard about the TRM8 I begged for a pair to listen to. Nothing more to be said."

EQ Magazine
February 1998

9505

Tom Jung
DMP Records

"It's ridiculous! Excellent bass control, great harmonic detail, the 9505 Trans•nova is another level up in overall performance."

John Gatski
Editor, Pro Audio Review

"The Hafler 9505 is as fine an amplifier as I have ever heard, consumer or pro, when compared to products in or significantly above its price range."

George Petersen
Editor, Mix Magazine

"The Hafler trans•nova 9505 breaks Hafler out of the "good for the money," Chevrolet image and takes the company to the next step, with a high-performance model that stands up to esoteric units costing two to three times as much."

circle #527 on reader service card

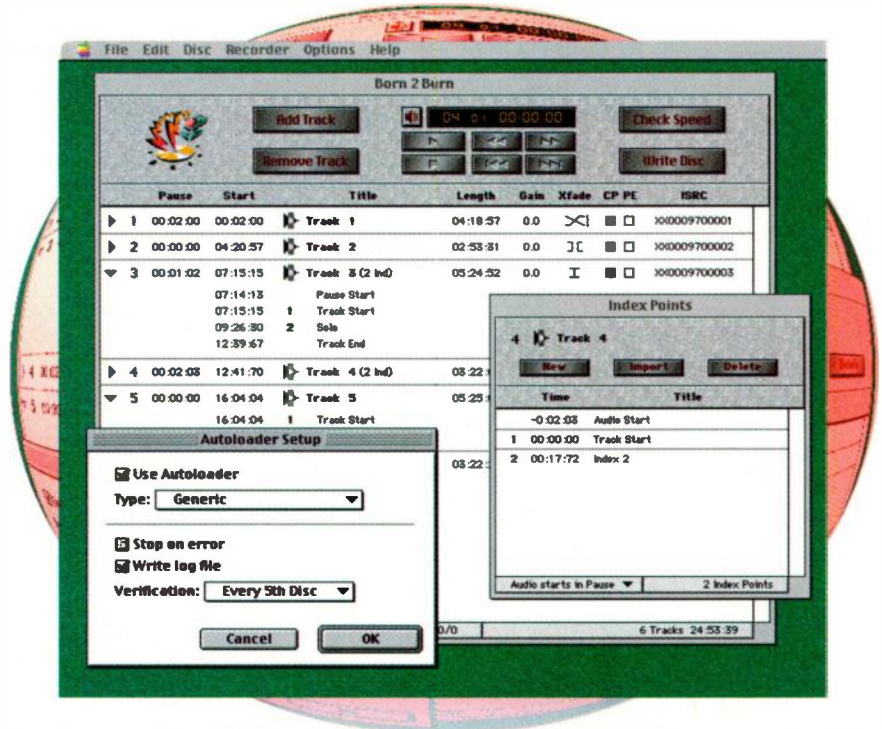
Hafler®

546 South Rockford Drive • Tempe, AZ 85281 • 888-Hafler1 • Fax 602-894-1528
www.hafler.com

WRH

be silence. Since different machines handle errors differently, you can't really predict how long it will take the deck to recover from the mute. So if your edit point is too close to the start of the incoming tune, the beginning of the music may be cut off.

Even if the tape plays fine on the machine it was recorded on, it is still a good idea to avoid problems down the road by taking the time to digitally transfer the assembled DAT in one continuous pass to another DAT machine or to a hard drive, listening carefully for errors the whole time. Assuming the program plays without problems during this transfer, you now have a more reliable assembled master, with no control track interruptions.



Featuring drag-and-drop playlist assembly, Adaptec's *Jam* supports all major file types, including SDII, AIFF, and WAV. The product comes bundled with the BIAS *Peak LE* audio editor.

SPICING IT UP

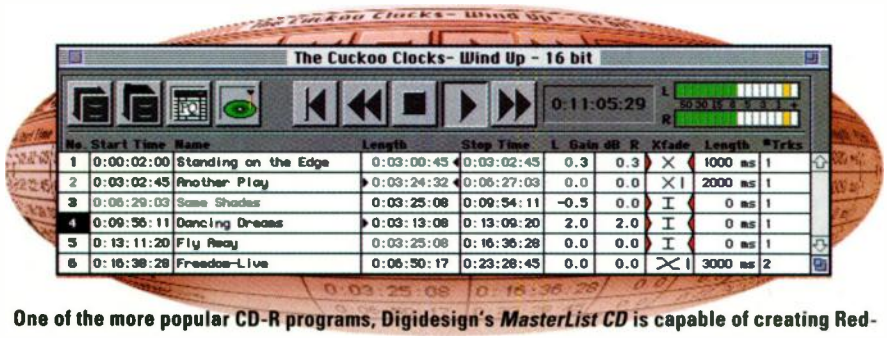
With a clean, professionally assembled master in hand, it's time to enhance and unify the sound. Don't start this process at the end of a long mixing or editing session; you need to be able to approach the project with fresh ears and an objective attitude, just like a professional mastering engineer would.

Compression. Compression changes the relationship between a program's peak and average levels, boosting apparent loudness by bringing up lower-level signals without increasing peaks. Too much compression, of course, can destroy dynamics, squashing the sound and leaving it flat and lifeless. But if used properly, compression can make a song more lively, present, and full, bringing out subtleties in the backing tracks and filling out the foundation on which the lead tracks rest.

Compression settings for such applications vary quite a bit, depending on the type of music and the desired effect. In mastering, the compression employed is generally quite a bit subtler than what you would apply to individual tracks during mixdown. Typical parameter settings are a ratio between 1.1:1 and 1.25:1 at a threshold of around -20 dB (below digital zero), with an attack of 1 ms and a release between 10 ms and 100 ms.

EQ. Like compression, EQ settings vary a lot depending on the needs of the material—there is no typical setting. There are, however, frequency ranges within which different types of equalization needs are addressed (though they are very subjective, based on the ear and experience of the individual mastering engineer). These ranges can give you a starting point, but finding a setting that achieves what you're after comes from slowly sweeping frequencies in that range, with the bandwidth control narrow and the amplitude high. When you find the frequency you want to bring out or cut back, adjust the amplitude accordingly and broaden the bandwidth.

There's generally not that much done with the frequencies below 50 Hz, except perhaps to roll them off with a low-cut filter if they are excessive. The area from about 60 to 120 Hz gets a lot more attention. If your music sounds thin, this is the range to boost to bring out the richness and fullness of instruments like the kick drum and the bass guitar. Likewise, if the bass instruments sound boomy, you may be able to clear things up by cutting frequencies somewhere in this range. In particular, if the bass guitar sounds muddled and ill-defined, you can often bring it out by cutting frequencies in this range (to eliminate its boominess), while boosting frequencies in the next range up,



One of the more popular CD-R programs, Digidesign's *MasterList CD* is capable of creating Red-Book standard CDs or one-off reference discs. A comprehensive level adjustment feature displays the peak audio level within a selection and allows you to make amplitude adjustments in 0.1 dB increments.

SKIMP ON EVERYTHING BUT THE MUSIC. There's no shame in driving a '64 Crapola, just as long as your music travels in style. We'd suggest using the tape more gold records are recorded on, so you have every opportunity to sound your best. Ask for the Quantegy Professional Studio Series.

QUANTEGY
Professional Media

Phone: 800-752-0732 Website: www.quantegy.com.

circle #528 on reader service card

WRH

somewhere between 120 and 200 Hz. This can add definition to the bass line and keep it audible, even on small speakers that don't reproduce low bass.

In the low mids, cuts in the 200 to 400 Hz range may be useful for clearing out thickness or muck that gives the overall sound a masked quality. Boosts in this area, meanwhile, can bring out the lower foundation of a guitar or piano, provided it's a solo instrument (i.e., there are no bass instruments in the mix). Slightly higher, from 400 to 700 Hz, is an area you can boost to bring out the richness, or "meat," of midtone instruments—particularly vocals—that sound too thin or tinny.

The frequencies from about 700 Hz to 2 kHz are commonly boosted to add definition and presence to all kinds of midrange instruments. A lead vocal that is already a bit edgy, but still needs to be brought out somewhat, can often be helped in the 900 to 1200 Hz area. Between 1.4 and 2 kHz is the range that can add or subtract the crunchiness of a rock guitar. In jazz, the same range can subtly bring out comping instruments, such as piano or guitar, unless harshness in horns or vocals is a problem. If that is the case, you'd be safer bringing the piano out a little lower down (around 700 to 800 Hz).

Higher in the midrange, from 2 to 5 kHz, is where you can find the snap in percussive sounds, like a snare drum. As mentioned above, it's also where you will find the harshness that comes from distorted or poorly EQ'ed vocal or sax tracks (you'll feel the pain, particularly between 3 and 4.5 kHz). If you have to compromise the snap at 3.5 or 4 kHz to minimize unpleasant edginess, you may still be able to avoid an overall impression of dullness by compensating with a little boost around 1.5 kHz or in the "sizzle" range (hi-hat territory) of 5 to 9 kHz. Above 9 kHz, you're into the high frequencies, where a gentle nudge can often add brilliance or "air" to tired-sounding cymbals.

All these tips are both subjective and situational—what works one day on a

given instrument with a given type of music won't necessarily work the next time. And with all these uses for EQ, it's easy to forget your better judgment and go overboard, so it's always a good idea to continually A/B your EQ settings against the flat material.

Also, remember that adding EQ increases the overall volume of the song, which could potentially drive you into an overload situation. Depending on your headroom, you may need to pull back the level to make room for your EQ. In some cases, your EQ'ed version may sound better to you simply because you have added level. To avoid this, check your meters when you A/B, and pull back the fader to compensate when listening to the processed signal.

Levels. It's extremely important that you listen to the last part of each track going into the beginning of the next to ensure that the levels match. If you

find yourself reaching for your volume knob when the incoming tune starts, your listeners probably will too. Your job is to make those adjustments for them, on the master.

If you were careful to record your mixes at comparable levels, the compression used in mastering should compensate for any level discrepancies, and you may not need to make any further adjustments. Otherwise, you'll have to add or subtract a little gain here and there. Software editors usually provide an amplitude adjustment feature, and several CD-R programs offer track-by-track level adjustment for quickly creating a consistent listening level.

TAKE A LISTEN!

If, when all is said and done, you are reasonably happy with the sound (perfectly happy would be too much to ask!), you are ready to transfer your material to the production master that will be sent to the plant. Hopefully, by this time, you will have checked with the manufacturing facility regarding specific requirements they may have for the layout of the master, as well as any information—such as a timing log—that should accompany it. However, before you send anything off, try to listen to the production master in several different environments to be sure the sound still comes across as you intended.

If you are not happy with the results, you may need to ask yourself whether the sources of your dissatisfaction could be addressed by remixing any of the tunes. That may not be an appealing prospect, but at least you have the option of trying to make things better, which wouldn't be the case if you had paid for a professional mastering session. It may wind up being one of the few times in life when you'll get to say "let's fix it in the mix"—and it actually turns out to be a sensible strategy!

Philip De Lancie *is a freelance writer, mastering engineer, and multimedia designer in Berkeley, California.*

PRODUCTION VALUES

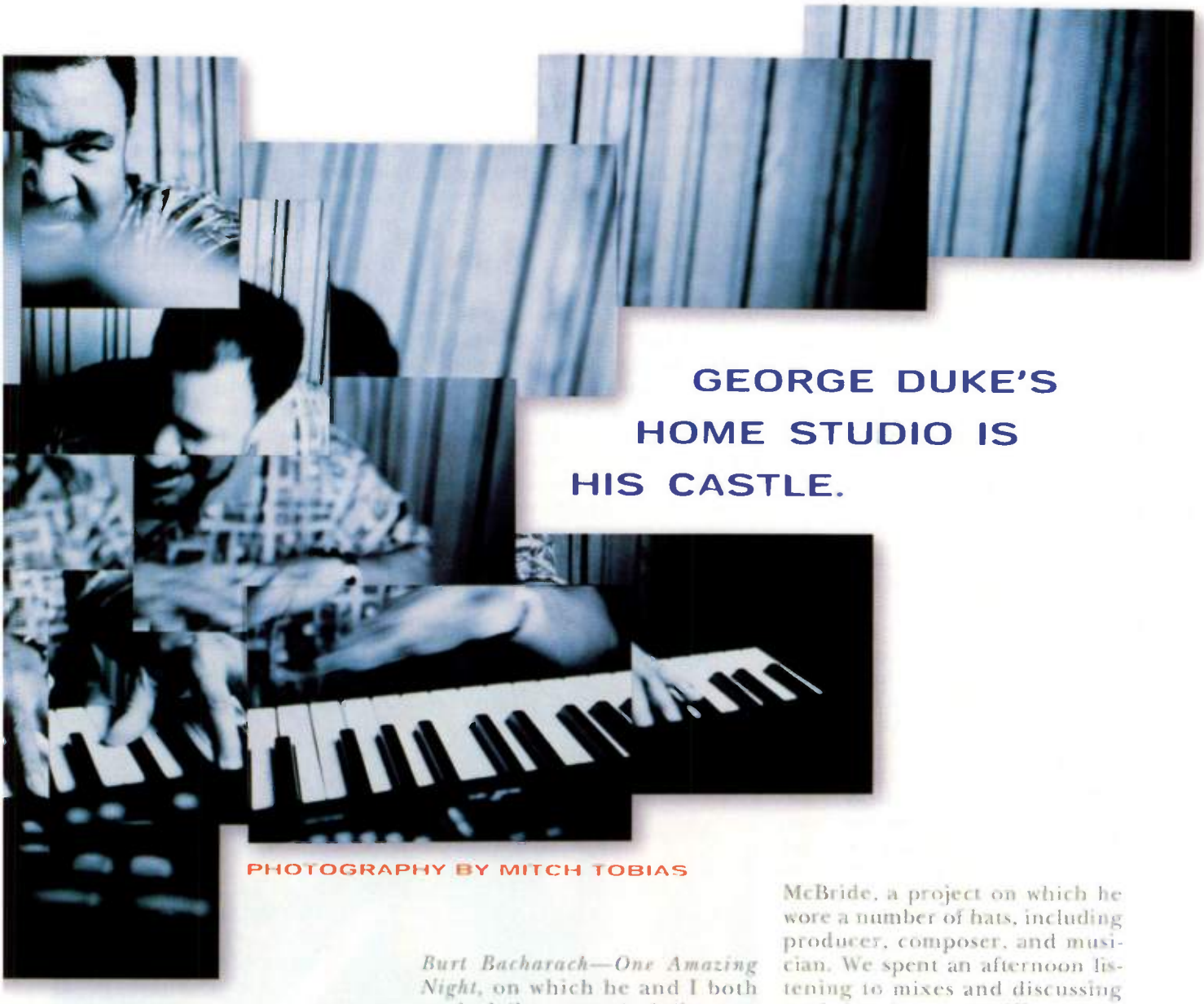
IN THE STUDIO

BY ROB SHROCK

If you ever have the opportunity to meet George Duke, you'll notice there's one thing about him that stands out the most: he's *genuinely* a nice guy. Although he is a truly phenomenal jazz piano player, a brilliant composer and arranger, a commercially successful producer, and a great singer (yeah, he sang all those parts on "Sweet Baby"), George Duke is a humble man who also knows how to make others around him shine.

You can hear it in the way he talks—the words *we*, *us*, and *ours* emanate from him more than *I*, *me*, and *mine*. You can't help walking away from an encounter with Duke feeling better than you did before;

WITH GEORGE DUKE

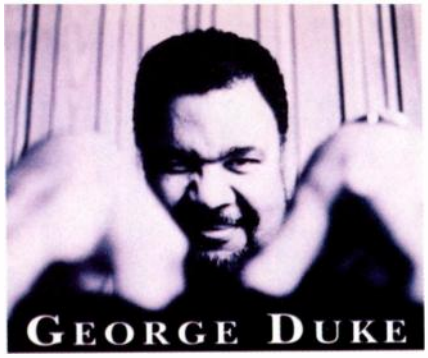


GEORGE DUKE'S HOME STUDIO IS HIS CASTLE.

PHOTOGRAPHY BY MITCH TOBIAS

there's just something about him that makes you relax and know that everything is going to be all right.

Duke and I met at his personal studio in Los Angeles a few weeks after the taping of the TV special *Burt Bacharach—One Amazing Night*, on which he and I both worked (he as musical director, and I as performer and arranger). He had recently completed production on the forthcoming Verve release by jazz bassist Christian McBride, a project on which he wore a number of hats, including producer, composer, and musician. We spent an afternoon listening to mixes and discussing myriad topics over a stiff espresso.



Where was Christian McBride's record tracked?
The whole thing was done here at my studio. We put Christian in an isolation area, Ndugu [Leon Chancler, the drummer] down at the other end, and the guitar player and myself in the middle of the room. We used gobos for isolation and cut everything live, with the exception of a few synth overdubs. Joe Sample let me use his Fender Rhodes for the sessions. My Rhodes is doctored up with hardened tips, and I wanted a stock Rhodes sound on this album, so I used Joe's.

For this type of record you really need a section playing together—it just feels better. I normally don't do this kind of live tracking here—it's usually only drums in the live room and some electronic stuff in the control room. If I need to do strings or something bigger, I'll go to Ocean Way or Conway Recording.

The drums sound very intimate and detailed. Is this a drum sound you tend to go for a lot?
It depends on the song. For this record, I wanted things to sound intimate. It's supposed to be a warm, fuzzy record. Well, not necessarily *fuzzy*, but at least warm! [*Laughs.*] If it's pop or rock stuff, I might not mic the kit quite as closely, or I'll use samples instead.

I had the isolation booth built especially for these rhythm-section dates, and the amount of separation we got was amazing. Christian's acoustic bass sounded great in the isolation booth. I was scared to death before we actually heard the bass in combination with the rhythm section—I didn't know if it would work out.

We stereo-miked it with a pair of new Sony 800 G microphones. I love recording acoustic bass in stereo, but there can be problems if you have to edit the tracks later. For example, if you need to do any pitch corrections, many DSP programs can't process phase-locked stereo files. Fortunately, I didn't have to fix any of Christian's parts on this record, but I did on a session some time ago where I had to pitch-correct a stereo recording of an upright bass; we ended up having to lose one of the tracks.

I talk to the different software companies a lot. I think the best pitch-correction program is Antares' *AutoTune*. I've talked to them about the stereo-phase issue, and they're aware of it. I use that program to death, especially for vocals.

How do you mic your Yamaha grand piano? Do you have mics built-in?
Nah, we just open it up and stick mics in it. Then we'll move the mics in closer or farther away, depending on the song and the sound we're looking for. We usually use AKG C 12s, but for this last record we used a pair of Telefunken ELAM 251s.

What monitors are you using?
We like to track with Meyer HD-1s and use Genelec 1031s for mixing. Eric [Zobler, George's longtime engineer] rolls off a little of the Genelec's top end when we mix, so that we push the higher frequencies a bit more. Over the years we've found that if we don't push the top end when we mix in this room, we wind up adding it during mastering. So, we'd rather just do it here, even though it's not quite as flat of a response.

Do you do this specifically because of your control room?
Probably; also, just to make the mixes clearer. I don't even listen to mixes on the HD-1s anymore; I think they're a little too bright overall. But I like them for tracking with no EQ.

Does Eric do all of your mixes?
Yeah, for about nineteen years. I mean, when I work with somebody, boy, they're here for a long time!

Are you involved in the mixing, too? Are you making most of the mix decisions?
Oh, yeah. Eric and I, together. We just sit in here and go to work. Everything is automated, so it's fairly easy if we have to recall something later.

Is Eric simply executing your wishes, or is he involved in some of the creative decisions, too?
He came up with this idea for the McBride record, where the first tune starts with a guy listening to his car radio on the way home from work. As the song ends, you hear these sound effects as he pulls into his driveway—the car door slam, footsteps, crickets, all these different sounds—until he gets into his house and expresses a sigh of relief. That segues into cut number two, which actually sets the mood for


MITCH TOBIAS

With a career spanning more than three decades, George Duke has played, produced, and arranged for some of the greats—Frank Zappa, Miles Davis, and Quincy Jones, to name a few.

vision dsp

Whatever Groove You're Into

Compare other software closely and you'll choose Vision DSP.

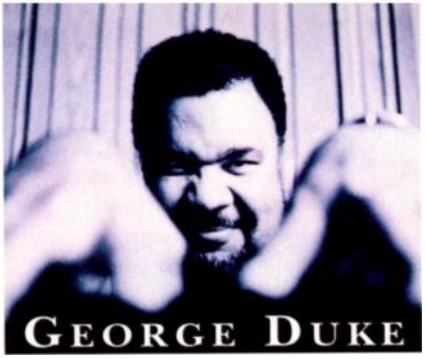
Thinking about finally getting a software-based digital studio? Tired of the over-hyped software you're using? Enter Vision DSP for Power Macintosh. Multi-track digital audio recording, MIDI sequencing and real-time effects make whatever beat you do, the killer groove. Try 4 bands of extremely high-quality EQ on every channel with a graphic EQ curve display and 16 flexible busses to massage your mix. And our Graphic Editing shows you the most musical display of your tunes, that's why we call it *Vision*.

From backbeats to breakbeats, soundtracks to trance tracks—whatever groove you're into, get Vision DSP. Compare Vision DSP at your local Opcode dealer today, or visit www.opcode.com for more information.

- Hosts on-board real-time Steinberg VST™ compatible effects—comes with reverb, chorus, flange, echo, compressor, phasor, ring mod, EQ
- Supports Steinberg ASIO™ compatible sound cards including Korg 1212 I/O, Sonorus STUDI/O, Lucid PCI 24, (Event, Lexicon, Alesis soon!)
- Transparent 4-band EQ with parametric, hi/low pass, hi/low shelving settings and graphic display of EQ curves
- Easy-to-use MIDI Arpeggiator locks to grooves and sequence tempo for brilliant techno effects
- Paint drum grooves effortlessly in the new Pulse Edit window
- OMS Timing for superior synchronization of audio and MIDI tracks
- Includes dozens of new features from Studio Vision Pro 4.0
- *Includes Bias Peak™ sample editing software, EastWest Drum Groove CD, MaCthugha visual jamming software and more...*

OPCODE

phone 650.856.3333 fax 650.856.0777



the rest of the record. I thought that was brilliant. Occasionally, Eric will come up with stuff, and if I don't like it, he just takes it out. We have a real interplay, and I've worked with him for so long he knows what I like.

What format did you mix to?

We normally mix analog, but we decided not to on this album because a lot of the material is pretty quiet. I didn't want all that hiss to come through, and Eric really wanted to mix to a 24-bit medium. I was okay with that, as long as we could mix to a medium that could easily be taken directly to mastering. We ended up going to Pro Tools 24 through a dB Technologies 24-bit A/D converter. We did an A/B comparison of the dB Technologies box and the stock Pro Tools converters and thought the dB Technologies sounded better.

Will you give those 24-bit mixes to the mastering facility?

Yeah, we ended up mixing at 24-bit, 44.1 kHz. Actually, we wanted to go 96 kHz, but dB Technologies hadn't released that converter yet.

"Being able to mix at home saves me a lot of money." –George Duke

Who will master the album?

Doug Sax at Mastering Lab. Doug will do a conversion from 24-bit to 16-bit, and Eric will also do a conversion on Pro Tools 24. We'll burn a CD of Eric's transfer and compare it to what we get from Doug to hear exactly what the differences are. I like what Doug does, especially for this kind of record, but I'd also like to hear how Pro Tools will do the conversion.

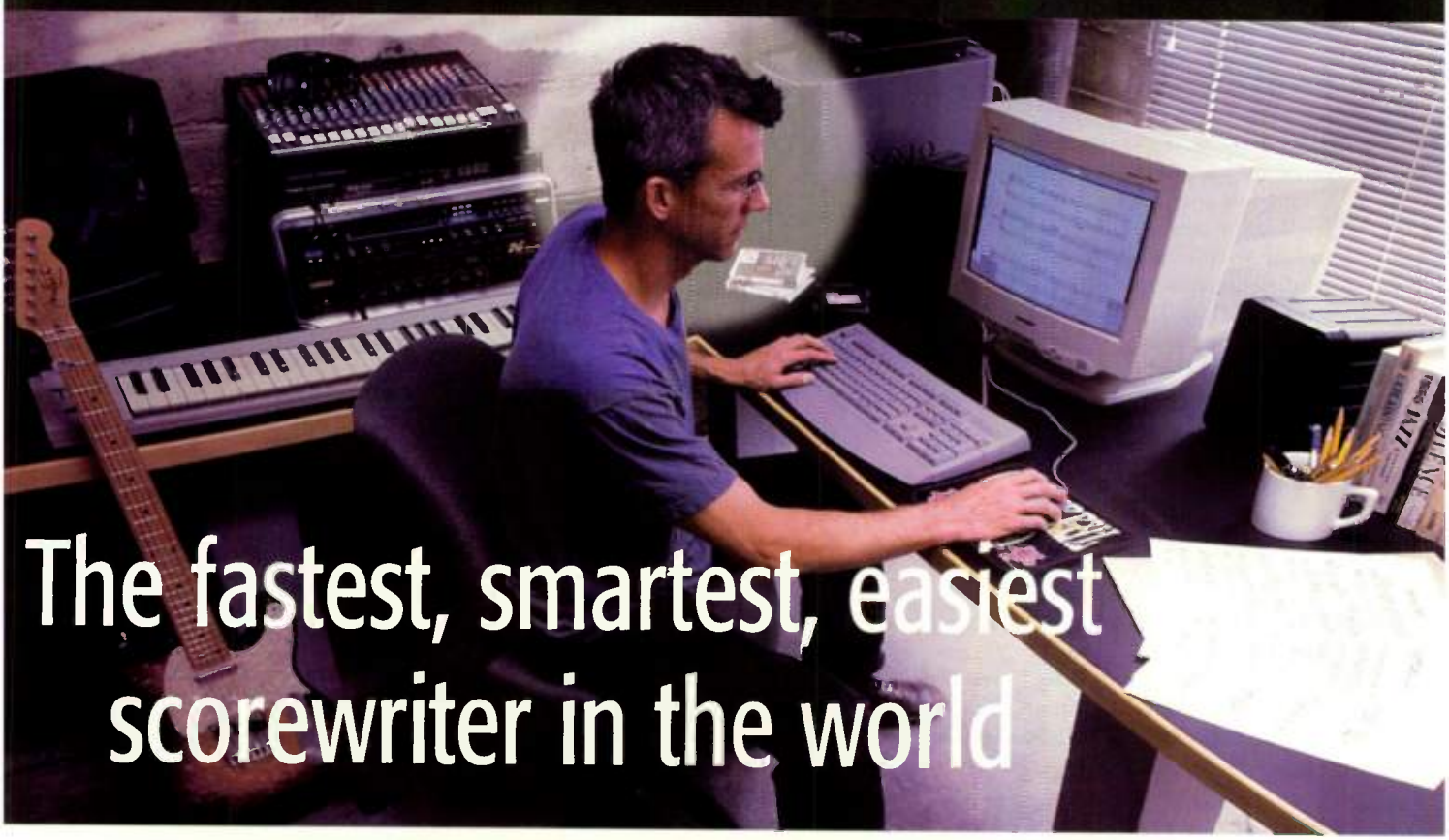
Has the private studio allowed you to take on projects you normally wouldn't be able to?

Yes. Even before I had my Euphonix console, Diane Reeves's first record for Blue Note was done here—very inexpensively. That allowed us to spend money on some great players, like Herbie Hancock and Tony Williams. She's writing right now with a bunch of different composers, and we'll start on that project in a few weeks. In her heart she knows what she wants, and it's my job to make sure that vision comes to life. At the same time, I'll be doing a couple of things with your old friend, Dionne Warwick.

Do you like having several projects going simultaneously, or do you like working on just one thing at a time?

I prefer to work on only one thing at a time, although it hardly ever happens.

SIBELIUS



The fastest, smartest, easiest scorewriter in the world

For scoring, playing back and printing absolutely any type of music–from basic lead sheets to complex orchestral compositions–Sibelius, now for Windows™, is the music professional's new tool for the seamless interface of inspiration and technology.

Simple to understand, intuitive to use, Sibelius takes just a few hours to master. There are no voluminous manuals to decipher, no labyrinthine menus to navigate, no difficult hurdles to overcome.

Sibelius unites expert notation capabilities with scanning, artificial intelligence and sophisticated MIDI playback–and all of it is fully customizable. What's more, Sibelius elegantly adheres to the highest professional engraving practices and standards.

If you are inspired to produce expertly notated music, just plug into Sibelius. We'll help bring your score to light.

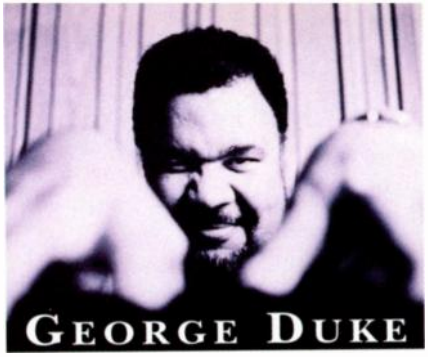
For a free information pack and demo CD-ROM, call us today at **888-4-SIBELIUS**.

Tel: **888-4-SIBELIUS** toll-free (888-474-2354 / 972-930-9552)
Fax: 972-713-6327 email: infoUSA@sibelius.com
website: www.sibelius.com
Sibelius for Macintosh coming soon

SIBELIUS®

THE MUSIC NOTATION SOFTWARE

circle #534 on reader service card



MITCH TOBIAS

Centered around a Euphonix console and a Mitsubishi X-850 digital multitrack, Duke's personal studio also includes a Pro Tools 24 system as well as an elaborate MIDI rig.

Has the investment in your home studio been worth it?

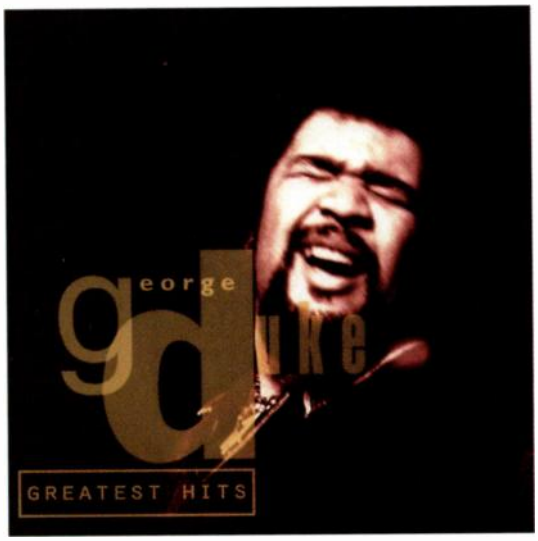
Absolutely. Being able to mix at home saves me a lot of money. I figured out what I was spending working at other studios: the average studio lockout here in Los Angeles is $2,000 a day, not including peripherals. I thought, "Why am I spending $2,000 a day and working six days a week?" That's $12,000 a week! The monthly payment on this console is not $12,000. I can also save my projects here, so if I need to go back to a mix, I can do it without trying to fit my schedule in between other acts at a commercial studio. Other than my house, the Euphonix console is the best investment I've made.

Which is the price of another house, by the way.

I've bought several "houses" over the years! The first is the one you're sitting in, and the second was a Synclavier.

Where is your Synclavier?

It's gone—sold. And I didn't get my investment back, either. The Mitsubishi X-850 digital multitrack recorder is a house, too.



Duke has released fifteen solo albums, served as musical director for several television specials, and scored the feature film *Leap of Faith*.

Or at least a very expensive condo. So do you track everything on the Mitsubishi?

Yes, we use that for everything. If we need to edit—you can't really edit on that machine—we digitally transfer to an Otari RADAR system and edit there. But we usually commit everything to tape pretty early on. If, on the rare occasion, I need to change something, we'll just go back and reprint it. I play it safe and don't stay virtual. Occasionally, a guitarist might come in and cut to the Mitsubishi with the MIDI tracks running virtual, but that's only when there's a time constraint.

We record vocals flat, but we'll blend and EQ keyboards as needed before printing them. I have my whole MIDI rig hard-wired to the Euphonix, so I can recall the basic tracking setup at the push of a button.

What is your MIDI rig like these days?

In addition to Eric's Pro Tools 24 setup, I have a 16-bit Pro Tools TDM system with a few plug-ins. I'm running Emagic *Logic Audio* on a Power Mac 9600, with three Emagic Unitor MIDI interfaces. I have a Roland A-90 controller and a bunch of E-mu samplers and modules—the usual stuff that everyone has. I also keep a lot of old stuff around.

Do you create all your charts in *Logic*?

Yeah, just like for the Bacharach TV show. I have become fast with it for notation.

Do you have sampler and synth templates for writing?

I do, but I don't use them all the time; sometimes I'll just start from scratch. I have a huge sample library and not enough time to go through it all. I don't have a sound-design tech—I do it all myself. I organize my samples into separate folders: basses, kicks, snares, harps, guitars, etc. I have a 9 GB external hard drive that all my samplers can access, in addition to CD-ROM and Jaz drives. The E-mu samplers can read all the various sampler formats, no problem.

If I'm going to keep MIDI drums and not replace them with live drums, I'll break them out into separate tracks on the sequencer. Same thing for everything else I plan on keeping. I'll get the sequence finished and have *Logic* up and running for Eric, who will then do his thing for a while—EQ, compression, whatever. That gives me a chance to get something to eat or watch a game on TV for a minute. When he's ready to go to tape, I'll come back in and check that everything sounds all right.

or

Pinnacle Project Studio—no other product does it all. For about the price of a four-track tape recorder, you can transform your Windows PC into a complete digital studio with over 1,000 tracks of MIDI and digital audio, dual Kurzweil synthesizers, a Kurzweil sampler, two FX processors and S/PDIF digital I/O.

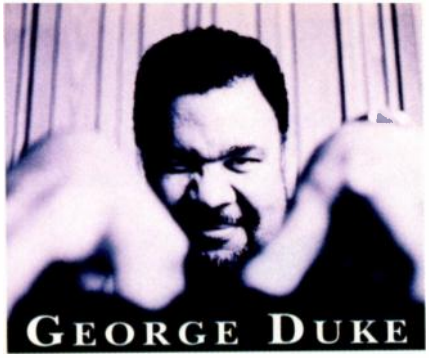
The alternative? Spend thousands of dollars on outboard gear and processors, string them together with noisy cords and *try* to make it all work together.

The best part is, you can get started immediately—everything's included: a complete suite of recording/production software centered around Voyetra's award-winning Digital Orchestrator Pro, Turtle Beach's Multisound Pinnacle sound card, cables and connectors, an instructional video tape and more! At a suggested retail price of 599.00, the Pinnacle Project Studio is the most affordable recording solution available. Call today, and begin recording tomorrow!

Turtle Beach™

Turtle Beach Systems • 5 Odell Plaza • Yonkers, NY 10701-1406 **circle #535 on reader service card**

www.tbeach.com • 1-800-233-9377



The most important thing, for me, is to have the whole studio totally synched together. I have all the gear locked to video at 29.97 fps nondrop, so we can make digital transfers between everything. If we're doing film, then we'll use 29.97 fps drop code. Even the 2-tracks are normally locked when we run our mixes. That way, if the artists wants to make a small change to a vocal, we can just pull up the 2-track instrumental mix and make the vocal change from the multitrack. Or we can change a line in the MIDI stuff and run it live. As long as everything is synched, all our bases are covered.

What are you using in your live rig?

I just got another E-mu E-64, and this next trip will be the first time I take it out on the road. I have two Roland A-90s, one for orchestration and one for playing piano parts. I really only use them as controllers, though. I actually use a Roland JV-1080 a lot, as well as an E-mu Vintage Keys and Korg Wavestation SR.

What do you think of the vintage sound emulation technology in a lot of today's synths?

I have no problem with it; it really makes life easier for me. Because old gear doesn't have MIDI, I can do my sequences and still kind of have that vintage vibe in there, which I think is cool. If I truly need the real instrument with all its unevenness, then I'll just go ahead and use it. But sometimes I want more of an even, smooth sound. I remember one time we tracked a real Fender Rhodes along side the bass and drums. When we listened back, it just didn't sound the way I wanted it to. So I saved the drum track, called the bass player into the control room, and pulled up the Korg "Suitcase Rhodes" patch that I like—it's really smooth and has vibrato going back and forth. It was just what the song needed.

You've been at this for a number of years now. What is your average turnaround time for a pop song?

Around five days. If it takes a week, something's wrong. I usually take a day to put it in the computer, then I come back the next day to make sure everything sounds good. Then I'll print the MIDI stuff to tape, which usually takes about four hours. If I want to bring in a drummer, that's another three hours, plus a few more to record bass and guitars. Then we do background vocals. At that point, you should be finishing the third day. Lead vocal plus a comp on the fourth day, and mix on the fifth. Five days, and you're outta there. Then maybe you can relax a little and catch a basketball game.

Composer/producer **Rob Shrock** *is currently in the studio with Dionne Warwick, playing keyboards, writing string arrangements, and producing a remake of the Burt Bacharach/Hal David classic "All Kinds of People." He is Burt Bacharach's musical director, and recently recorded with Bacharach and Elvis Costello on their upcoming release.*

A Windows 95/98 PC

formula

+

for

PC Recording Software

+

success

Elite Studio Hardware
10 x 10 Breakout Box
20-bit Conversion
32-bit PCI Card
ASIO and Windows Drivers
ADAT I/O Upgrade

=

Recordings that delight even the most discerning ears.

Elite Studio Hardware
delivers it now.

World class digital audio hardware that works perfectly with your Windows recording or editing software.

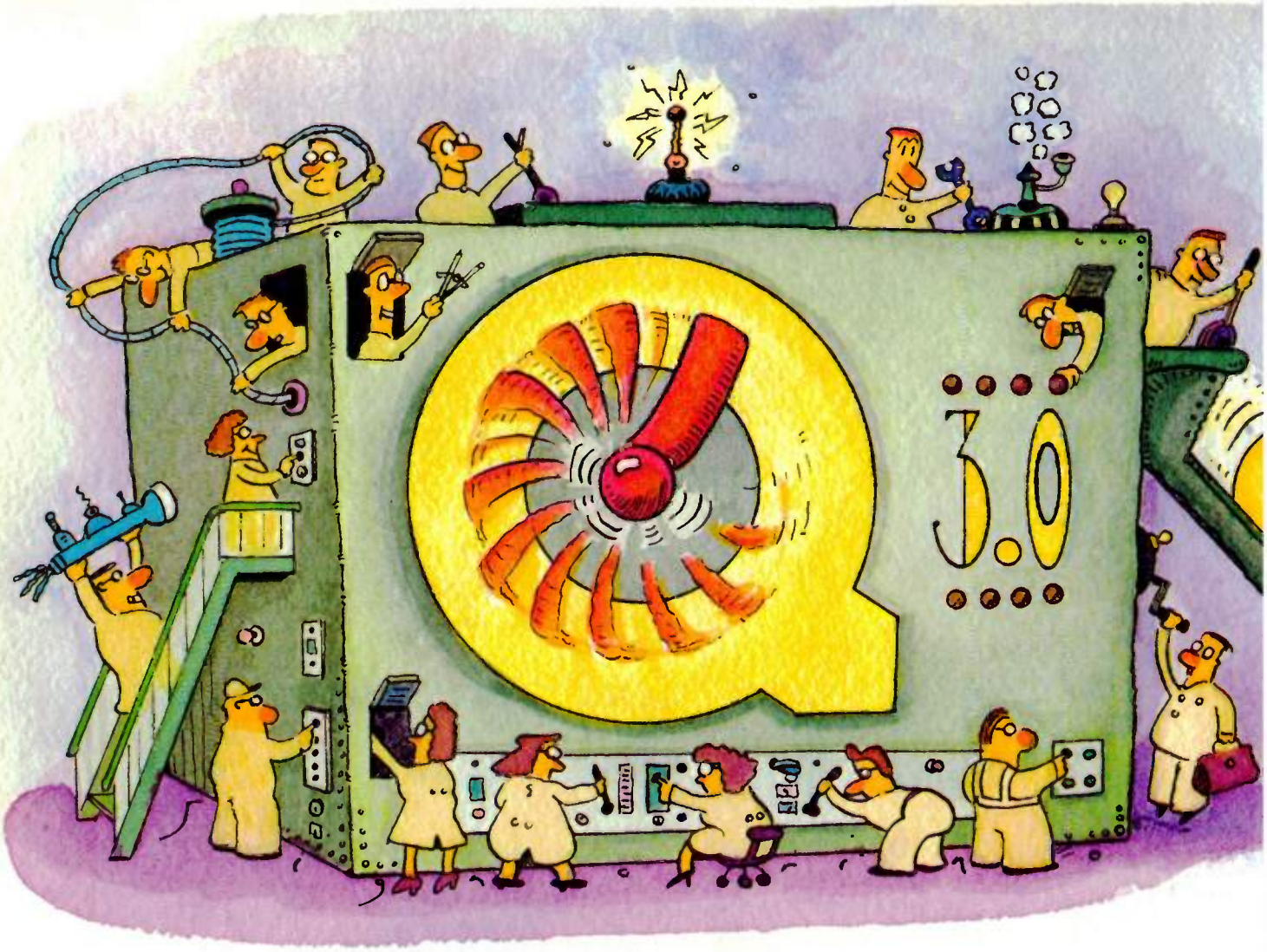
Elite's 32-bit PCI card includes reconfigurable hardware, so new features are just a software upgrade away. A single card can control two 10 x 10 Breakout Boxes so you'll never run out of I/O. Precision components and advanced engineering give the Elite System an ultra-clean signal path, with specifications that rival systems costing many times more.

META-LITHIC

find out how sweet it can be.

1.800.550.1255

www.metalithic.com



QUICKTIME CLOSEUP

Apple's multimedia dynamo makes

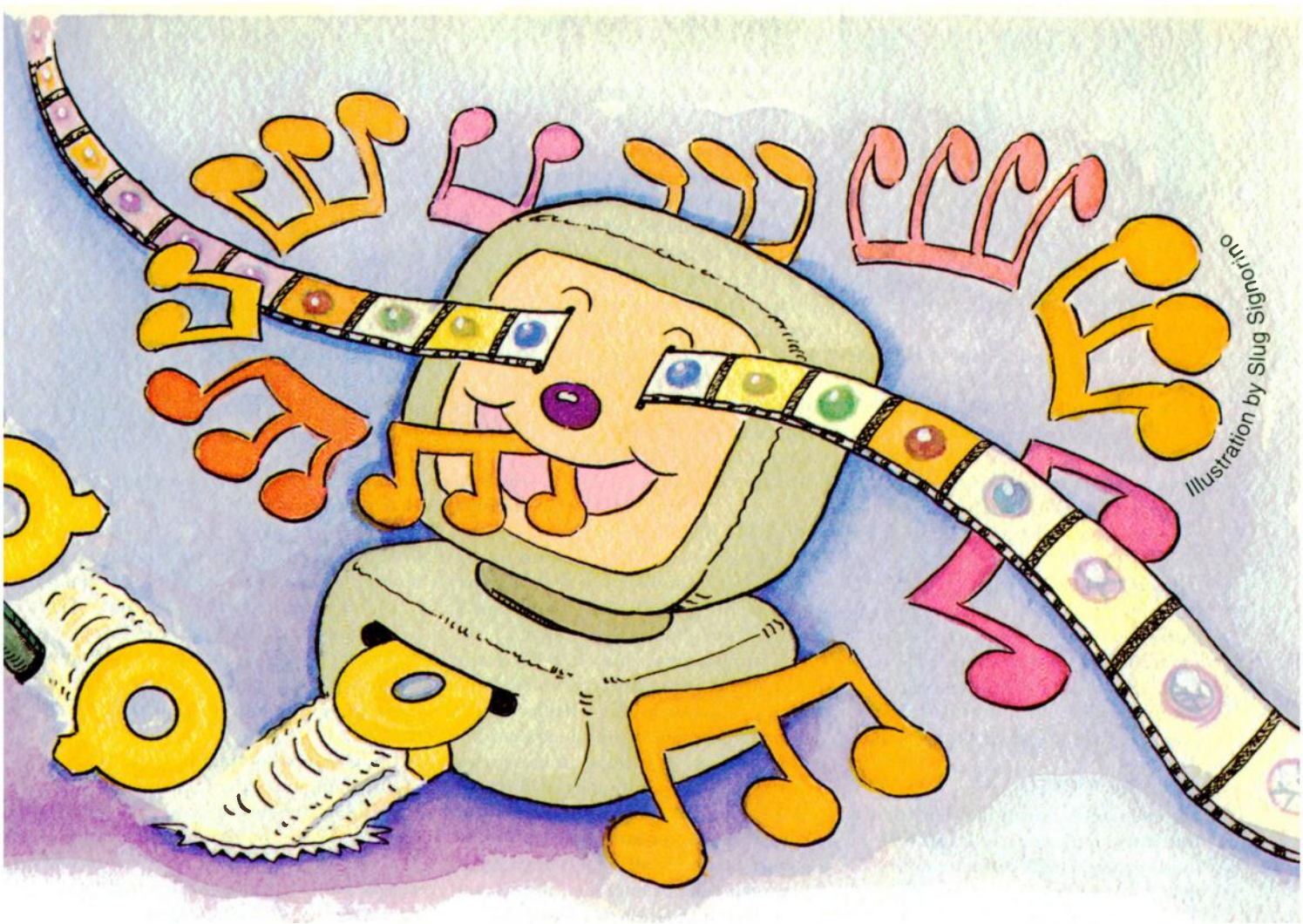


Illustration by Slug Signorino

a quantum leap in power.

By Neil Leonard III

QuickTime 3 is finally out, and you might be wondering what all the hubbub is about. After all, there are other technologies for playing synchronized audio and video—namely AVI, DV, and MPEG. Isn't QuickTime just another set of operating system drivers and a standard file format? Quite the contrary! QuickTime is a suite of over 175 different software components that include a wide range of tools for the presentation of music and other audio. At present, there over 11,000 products based on QuickTime, including Microsoft's *Encarta* encyclopedia and many popular interactive CD-ROM games, such as Cyan's *Riven*. In addition, there are over 80,000 Web sites that currently offer QuickTime content. According to Apple, over 50 million computers employ QuickTime in some fashion. It took 100 in-house programmers to create QuickTime 3, and it's a major upgrade in every respect. Within the first month of its release, Apple reported a staggering one million downloads of the product. If you'll be creating music and audio for CD-ROM or Web delivery anytime soon, chances are you'll need to consider using QuickTime 3. The new version of QuickTime supports MIDI-triggered software synthesis and a wealth of audio codecs that keep Web bandwidth requirements and audio file sizes to a minimum. Included in QuickTime's array of audio tools are leading-edge codecs by QDesign and Qualcomm. By using these codecs in combination with the Sorenson video codec, QuickTime delivers near full-frame and full-motion video, without specialized video hardware.

On the Mac, QuickTime 3 is implemented as a collection of system extensions. Although Mac OS 7.0 or later is required, QuickTime 3 can run on a CPU as old as a 68020, provided that Color QuickDraw is installed. Under Windows 95/NT, QuickTime 3 is implemented as a dynamically linked library (DLL) that works with Microsoft's DirectDraw and DirectSound. A 66 MHz 80486 or faster processor is required, along with a sound card (a Sound Blaster is recommended). With Java, QuickTime is implemented as a set of classes and methods that programmers can use when writing applets.

HOW TO GET IT

QuickTime is downloadable for free from www.apple.com/quicktime. Downloading the 7 MB self-extracting file gets you the latest versions of QuickTime, *MoviePlayer*, *PictureViewer*, and the *QuickTime Plugin* for Web browsers, in addition to a few sample files. Documentation is not included in the download, but there is a wealth of it on Apple's Web site.

If you would like to gain access to the Save and Export features of *MoviePlayer*, or if you want to save movies that are embedded in Web pages, you must purchase QuickTime 3 Pro, available online for $29.99. The basic version of QuickTime is actually an encoded version of QuickTime Pro; when you upgrade to the Pro version, you buy a decryption code that unlocks all of its features. If you do not purchase the Pro version, QuickTime will display a dialog box (no more than once a day) prompting you to buy it.

Software publishers can distribute QuickTime free of charge with their products, provided that they sign a licensing agreement and allow for a QuickTime 3 Pro promotional banner. The banner runs during software installation and when you use the provided *MoviePlayer* and *PictureViewer* utilities or the *QuickTime Plugin*. Publishers can spare users the inconvenience of sitting through promos by paying Apple a $1 licensing fee for each copy of QuickTime that they distribute.

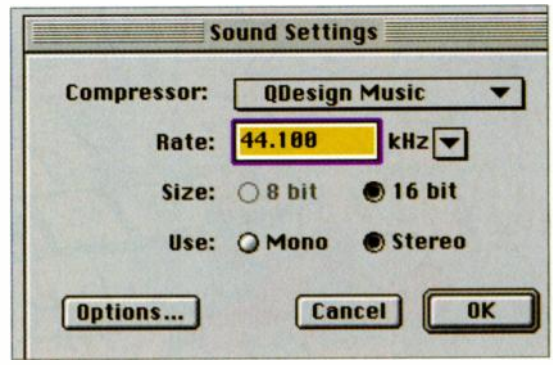


FIG. 2: QuickTime's Sound Settings dialog box gives you formatting options for exporting sound.

MAKING MOVIES

To get a feel for what you might expect from an application that supports QuickTime 3, lets look at *MoviePlayer* 3, which comes bundled with QuickTime. This application is only 238 KB in size and showcases standard media-handling features and user-interface tools.

MoviePlayer imports and exports data in more than 70 formats. It can create movies using many types of data, including digital video, still images, low-bandwidth vector animations, multiple sound channels, MIDI, 3-D objects, virtual-reality panoramas and objects, and text. Media in all these formats can be synchronized with minimal effort.

MoviePlayer can play an unlimited number of audio tracks simultaneously. Each track has an independent audio format, resolution, and sample rate. *MoviePlayer* also has tracks for time code and MPEG audio, although the latter is supported only on Power Macs at present.

When *MoviePlayer* imports an audio file, it creates an audio-only movie. QuickTime provides separate software "components" to import AIFF/AIFC, Red Book audio (CD), DV, MPEG Layers 1 and 2 audio, Sound Designer II, Mac OS 7 sound resources, µLaw (AU), and WAV files. The movie playback window has Play/Pause buttons, as well as a pop-up volume slider and frame jog buttons.

If QuickTime Pro has been installed, the playback locator is displayed as a hollow rectangle, indicating that QuickTime editing functions are enabled. You can then Shift-drag with the mouse to select a region to cut, copy, or paste (see **Fig. 1**).

FIG. 1: *MoviePlayer*'s playback window for an audio-only QuickTime movie displays a selected region in black.

Copying and pasting data within *MoviePlayer* does not immediately increase the file size, because *MoviePlayer* uses pointers to selected regions in the audio data instead of actually duplicating the data. In QuickTime parlance, files that employ pointers are said to have "dependencies." Saving a file with the "Make movie self-contained" option will eliminate dependencies and increase the file size.

The Get Info command in the Movie menu brings up a track-by-track description of the movie's contents. Each audio track can be examined separately to obtain a readout of its resolution, sample rate, duration, byte allocation, data type, compression algorithm, and data transfer rate. Within the Info dialog box, you can individually set the volume, pan, and mute settings for each track.

MoviePlayer 3 can be used to export tracks and provides options for saving them in a variety of file formats using different codecs. That makes it a powerful utility for authoring. Audio tracks can be exported in AIFF, System 7 resource, µLaw, or WAV formats. Selecting different file types yields different compression, sample rate, resolution, and channel number options (see **Fig. 2**).

Selecting the AIFF format yields the widest range of compression options: IMA-ADPCM, MACE, µLaw, Qualcomm PureVoice, QDesign Music Codec, or none. Selecting the Qualcomm and QDesign encoders opens an additional dialog box for entering encoding options. System 7 resources can be encoded with IMA-ADPCM, MACE, µLaw, or no compression. *MoviePlayer* does not provide any way to encode a WAV file.

SOUND MANAGEMENT

QuickTime 3 also ships with Apple's Sound Manager 3.3, which handles all

For manufacturer information, please see Contact Sheet, p. 195.

MUSICIAN'S FRIEND DECLARES WAR ON HIGH PRICES!

CALL 1-800-776-5173 AND JOIN THE CAUSE!

BEST PRICES ON PRO GEAR FROM:

- Akai
- Alesis
- Behringer
- Ensoniq
- Fostex
- JBL
- Mackie
- Marantz
- Neumann
- Roland
- Sennheiser
- Sony
- Tascam
- Yamaha
- and much, much more!

Arm yourself with a FREE issue of Musician's Friend catalog and join the fight against high-priced music gear. With more than 3,000 top-name guitars, amps, keyboards, stage and studio gear available at the best prices you'll find anywhere, Musician's Friend is your trusted ally in the music gear trenches. Short on funds? No problem. Our exclusive Easy Payment Plan can help you capture the gear you need to make your music happen today.

- Money Back Guarantee
- Best Price Guarantee
- Our Easy Payment Plan
- 2-Day Express Delivery

CALL FOR YOUR FREE CATALOG TODAY!

OPEN 24 HOURS A DAY, 7 DAYS A WEEK

SHOP ANYTIME ONLINE AT:
www.musiciansfriend.com

☐ **YES, SEND IT!**

Rush me the next 3 editions of Musician's Friend **FREE!**

Musician's Friend

Join hundreds of thousands of satisfied musicians in receiving the #1 music catalog, absolutely free! CALL 1-800-776-5173, subscribe online at www.musiciansfriend.com, or mail this coupon to:

Musician's Friend, Dept. 36-005 • P.O. Box 4520 • Medford, OR 97501

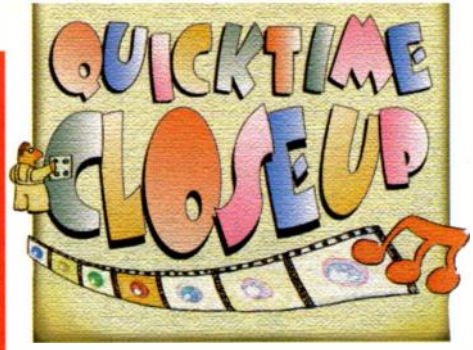
NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

MAIN AREA(S) OF INTEREST: ☐ GUITAR ☐ BASS ☐ KEYBOARDS ☐ DRUMS ☐ STAGE & STUDIO

circle #538 on reader service card



digital audio playback functions. On the Macintosh, Sound Manager is a separate system extension file. Installing QuickTime on this platform will also update the Sound Manager extension in the System folder.

We interviewed Peter Hoddie, the chief QuickTime architect at Apple. Regarding the Windows version, Hoddie explains, "Sound Manager is part of the QuickTime library delivered on Windows, but it is not implemented as a separate file. On Windows, QuickTime uses either WaveOut or DirectSound for the final audio output. However, all other audio processing [on both platforms], including decompression, compression, rate conversion, and mixing, is done by Sound Manager."

Sound Manager can mix together and synchronize an arbitrary number of audio channels in real time. The exact number of channels is only limited by the performance of the host computer. Sound Manager also contains software services to mix down any number of audio tracks to stereo on the fly. Furthermore, Sound Manager can work hand-in-hand with hardware accelerators for enhanced performance.

While Sound Manager is most commonly used for real-time tasks, these same functions are also available in offline mode. For example, even if an application cannot mix down 32 channels of QuickTime audio in real time, it is conceivable that the same application could render a version of the same music to a stereo file.

WHO'S IN THE DRIVER'S SEAT?

Software developers reap immense benefits by using QuickTime's Application Programming Interfaces (API) to perform audio services. An API is a collection of software utilities that programs can use to make the operating system perform low-level tasks. QuickTime's API is comprised of approximately 1,200 system-level C functions and is essentially the same in the Windows, Macintosh, and Java versions.

By using QuickTime's API, programmers avoid spending hours reinventing audio and MIDI features. In addition, they provide the user with an interface that is identical to those of all other QuickTime programs across platforms. That drastically improves the learning curve for musicians.

For example, let's look at QuickTime's Apple CD-ROM driver. How many Macintosh programs would let you import audio from a standard audio CD before the widespread use of QuickTime? I used only one such program, and it was not cheap. Now, a music software developer who wants to build this feature into an application does not have to learn how to directly access an Apple CD-ROM drive. Instead, the program can request that QuickTime import the audio by using its API functions.

QuickTime's toolbox presents the user with a series of standard dialog boxes to help choose the track, region, resolution, sample rate, and number of channels. It then makes the sound available as a QuickTime movie and/or saves it to an AIFF file. The programmer can accomplish all

FIG. 3: Shown alongside *MoviePlayer*'s Get Info dialog box is QuickTime's instrument selection box, offering General MIDI instruments with additional Roland GS patches.

If you think all CD-R media are the same, think again.

(Yes, they're real discs. The upper surface of each disc was cleaned for the same length of time with a lint-free cloth soaked in 91% isopropyl alcohol – a recommended cleaning technique for CD-R media. Ours, of course, is on the right.)

FRIGHTENING, ISN'T IT! Your CD-R master could be reduced to a pile of gold dust, leaving a transparent disc, as the reflective layer and dye is rubbed off—and all this while using an *approved* cleaner!

The simple act of wiping off a fingerprint could result in the catastrophic failure of some CD-R media, such as the disc on the left. And all because, despite the tens of thousands it cost you in studio time, you skimped when it came to the master CD-R.

Now is that false economy, or what?

Here at Apogee, we understand the technology of CD-R. You should too... because not all CD-R media are the same.

Our discs may sometimes cost a little more—but in the long run, isn't your master worth "a little more"?

Your most valuable recordings deserve the Apogee treatment – we care as much about your masters as you do.

Apogee digital media. Ask for us by name.

The Apogee CD-R Advantage

- Gold *phthalocyanine dye* layer: proven to be more durable than green cyanine or blue azo dyes*.
- Significantly lower Block Error Rates
- Archive life in excess of 100 years – compared to 25 years for green discs*.
- Two reflective layer options:
  - *GOLD—The longest life of any CD-R on the market. Ideal for archiving;*
  - *SILVER—Highest output for lowest error rates. Ideal for mastering applications.*
- Unique *DataSaver* and new mirror-smooth *Datasaver II* resin films shield the reflective and dye layers from damage, protecting the disc from handling, solvents, markers and stick-on labels (unlike the disc on the left).
- Higher reflectivity means higher output: CD-writer laser power is reduced for longer operating life of your mastering system.

DAT Digital Audio Tape · adat · DTRS Digital Tape Recording System · COMPACT disc DIGITAL AUDIO

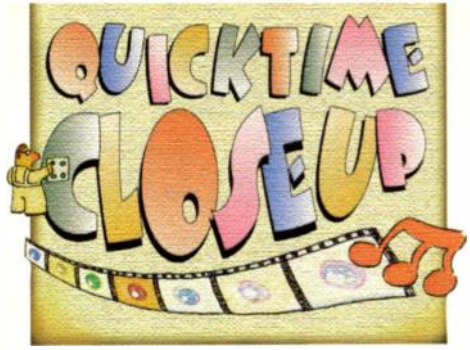
Understanding the Technology...

APOGEE ELECTRONICS CORPORATION, 3145 Donald Douglas Loop South, Santa Monica, California 90405, USA.
Tel: +1 310/915-1000 Fax: +1 310/391-6262. Email: info@apogeedigital.com.

APOGEE DIGITAL MEDIA PRODUCTS

SEE US AT AES BOOTH #117

circle #540 on reader service card



this without directly accessing the CD-ROM player, designing an interface, or creating code to write an AIFF file.

THE HOUSE OF MIDI

QuickTime Musical Architecture (QTMA) includes a note sequencer, music synthesizer architecture, instrument library, and MIDI importer and exporter. Because these tools are defined at the OS level, musicians can now expect their MIDI files to sound exactly as written on any computer that supports QuickTime.

The desktop synthesizer uses QuickTime Musical Instruments (QTMI). Its wavetables are licensed from Roland and are the same ones found in Roland's popular Sound Canvas synthesizers (see **Fig. 3**). This is a collection of 128 General MIDI instruments, seven GM drum kits, and more than 100 additional GS sounds. (For more on the GS standard, see the sidebar "Extending the Orchestra with GS.")

Consider how this standard architecture affects game composers who have been writing music for Windows machines. Until now, these musicians could not count on a particular sound card or synthesizer being available. As a result, they sometimes created multiple versions of their General MIDI files, with different Velocity values tailored to match different synthesis cards or external sound modules. By using QTMI, the same musicians can be sure that each user's system will be able to access the exact same instrument set, regardless of the system configuration or location.

The combination of a laptop computer and a good desktop synthesizer has the potential to change the way musicians and composers think about music, in much the same way as the portable cassette recorder did two decades ago. For example, while on the train from Boston to New York, I used a laptop computer and MIDI sequencer to compose a rhythmic motif for a QuickTime drum kit. I saved this polyrhythm as a Standard MIDI File and then loaded *MAX*, a graphical programming environment for interactive music. Using *MAX*, I enhanced my algorithmic music software to use QuickTime's GM instruments and created variations of this rhythm.

EXTENDING THE ORCHESTRA WITH GS

One of the most exciting developments in QTMI is the adaptation of the Roland GS standard, which is a superset of the General MIDI Level 1 specification. GS instrument banks comply with the instrument maps of GM but add extra sounds and standardized controller values for expressive performance.

MIDI Bank Select messages are used along with Patch Change messages to select sounds in the additional banks. The new GS patches are bank-aligned with the original 128 GM sounds and are closely related to the sounds in this original bank. If QTMA receives a request for a bank or program number that is not supported, the corresponding instrument in the master GM bank will be substituted.

The GS specification supports expressive control in ways that are impossible on non–GS-compliant GM instruments. As you'd expect, this extra real-time control is implemented via continuous controller messages. However, the GS specification uses Non-Registered Parameter Numbers (NRPN) 98 and 99 to select one GS-specific synthesis parameter. After the parameter has been chosen, it can then be modulated in real time by a stream of Data Entry continuous controller messages.

For example, the pitch envelope of a GS instrument can be modulated in real time. By increasing the pitch envelope slightly, it is possible to have an instrument start playing an individual note slightly flat and gradually raise the pitch during the attack. One of the best synthesized saxophone sounds I have heard was from an inexpensive Sound Canvas using this GS parameter.

Introducing TANGO & ZULU: Digital Audio Converters Done Right

There's plenty of great audio software for computers these days, but if you've used an analog sound card you already know the sad truth — high-speed digital computers can really mess up your sensitive analog signals. And if you can't get audio in and out of the computer without adding lots of noise, then why bother? Exactly. Enter Tango and Zulu, from Frontier Design Group.

Eliminate disk drive pops, monitor hum, and video board buzz from your mixes. Tango and Zulu keep the audio converters outside the PC, taming radiated electrical noises. And to eliminate conducted noise, Tango and Zulu are optically isolated and have independent power supplies.

Both Tango and Zulu feature:

- 20-bit delta-sigma converters
- Freq. resp. ±0.1dB, 20Hz–20kHz
- S/N ratio greater than 98dB
- THD+N 0.002% unweighted
- Dynamic range >98dB A-weighted

These pro-quality A/D and D/A audio converters start at just $598 and come with our 30-day money-back guarantee. And overnight delivery is available, too! *Be sure to ask about special pricing for bundled products!*

adat OPTICAL The world's most popular multichannel digital audio I/O format provides instant compatibility with a multitude of digital tape machines, mixers, signal processors, and of course WaveCenter, our own digital I/O card for the PC. Up to 33-foot cables available!

starts at **$698**

+4dBu or -10dBV levels, selectable per channel
balanced audio I/O on professional ¼" TRS jacks
8 outputs and 0, 4, or 8 inputs (upgrade kits available)
level meters selectable to inputs or outputs
internal (44.1 or 48kHz) or external clock selection
word clock in/out • ADAT optical in/thru/out
rugged 1U rackmount enclosure

only **$598**

-10dBV on pro-grade ¼" jacks • 4 inputs, 8 outputs
input level indicators • ADAT optical in/out
compact half-rackspace enclosure

WaveCenter™

Our acclaimed multichannel digital I/O card with ADAT optical, SPDIF and MIDI interfaces for Windows 95 & NT PCs (DA-88 solutions also available) ~~$698~~

now **$498**

To order or find out more

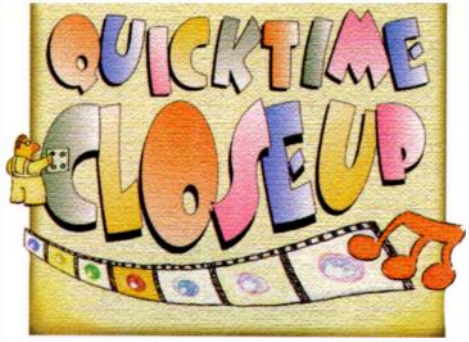
30-day money-back GUARANTEE

800•928•3236

603•448•6283 outside the USA

http://www.FrontierDesign.com

FRONTIER DESIGN GROUP



When I arrived in New York, I played my algorithmic music for a group of musicians that included Ornette Coleman. At their suggestion, I made modifications on the spot. Later that night, I connected the audio output of my laptop to a standard car stereo and generated algorithmic music for my drummer and I to listen to as we drove home. Granted, QuickTime's synthesizer and the audio outputs on my laptop do not sound as good as my Kurzweil K2000. However, I could never play my Kurzweil while driving down the Merritt Parkway.

QTMA supports stereo wavetables and synthesis parameters. Surprisingly, QuickTime can use QTMA to render a MIDI track as a digital audio file by substituting the Sound Canvas sounds for MIDI note messages.

As you'd expect, the number of simultaneous notes is only limited by the CPU. In regard to the practical limitations on today's machines, Hoddie mentions, "Multiple MIDI tracks can be present in one movie. On older machines, it might be as few as six, but on newer machines it can be several dozen."

If you do not want to listen to the QuickTime instruments, use the QuickTime Settings control panel to route the MIDI data to an external GM synth. Try making this change prior to launching games like Disney's *Toy Story*, and you can hear the same music played on your favorite hardware synthesizer.

ATOMIC SYNTHESIS

At present only one editor is dedicated to creating QuickTime Musical Instruments: the *QTMA Atomic Editor* 0.971 (see **Fig. 4**). QuickTime's internal data structures are referred to as Atoms by programmers; hence the name. The editor can be downloaded from www.quicktimefaq.org/software.

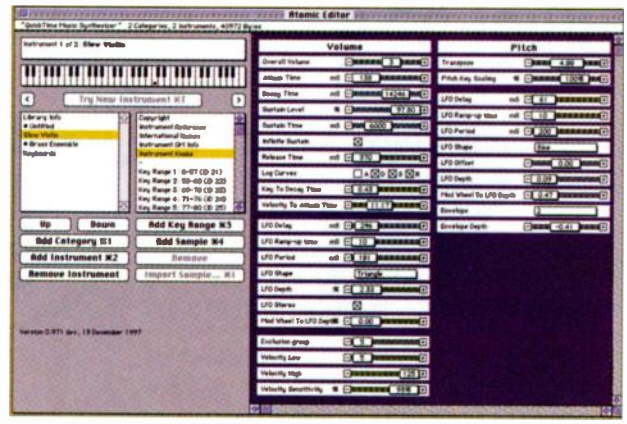


FIG. 4: Apple's *Atomic Editor* allows you to edit QuickTime Musical Instrument Knob parameters.

The updated *Atomic Editor*, which is now available, allows you to import DLS instruments (see the sidebar "Beyond General MIDI Wavetables"). This is how the Roland Sound Canvas instrument set was created. Apple believes that, with the new DLS standard, third-party vendors will be providing the tools to create custom instruments. As Hoddie points out, "The *Atomic Editor* is a tool we developed internally to support our instrument development. We make it available to our developers as a way to help jump-start their products, but it was never intended to be used as a professional production tool."

Apple provides no documentation for the editor, and there are no links to it on Apple's Web site. Earlier versions were said to be prone to crashes, but I had no trouble getting the latest version of the editor to work on first try.

To edit a QuickTime instrument that is already part of the QTMI instrument library, simply launch the *Atomic Editor*. Select Pick Instrument from the Instrument menu. After you have edited the instrument's parameters, select Save from the File menu, and the editor will output a system extension with your instruments in it.

Rather than distributing your movie with an extension, it would be ideal to store the sounds in the movie itself and have QuickTime download the sounds to the synthesizer in real time. This would make distribution easier and eliminate the need for restarting the computer to load sounds.

According to Hoddie, it is possible to save the instruments as part of a QuickTime movie. Unfortunately, there are no good tools available to do that right now. It isn't necessary to reboot to hear the sounds, though. You can simply drop the extension on Reinstaller (available on the QuickTime Web site) to make the instruments immediately available. Although the Mac system extension doesn't work on Windows, a similar file can be created that will work there. Clearly, the lack of tools is currently the main obstacle to fulfilling QuickTime's true potential.

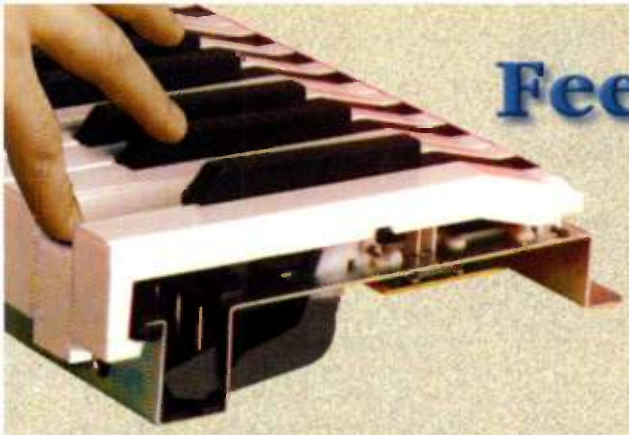
While the QTMA synthesis engine is not as feature-laden as a high-end GM synthesizer, it is still a great stride forward. For example, it supports a separate amp, filter, LFO, and envelope generator for each instrument. "We

BEYOND GENERAL MIDI WAVETABLES

The Downloadable Sounds (DLS) spec was created by the MIDI Manufacturers Association (MMA) in 1996. It enables game developers and musicians to add their own wavetable-based instruments and sound effects to PC sound cards, rather than being limited to the standard GM instrument set. Previous efforts to establish a standard desktop wavetable synth were stalled due to inconsistent architectures and proprietary designs in sound cards.

DLS synthesizers can play back custom instruments using a standard, multisampled wavetable architecture. Like the QuickTime synthesizer, a DLS-compliant synthesizer has standard synthesis parameters and can be modulated by a standard set of LFOs, envelope generators, or external controllers.

The full specification and a Windows-based editor are available from the MMA (www.midi.org). Sonic Foundry is one of the manufacturers responsible for defining this standard, and the company has announced plans to provide tools for creating DLS instruments.



Feeling Even Better...

Experts around the world have called the Fatar action *"...the closest thing to a real piano yet."*

Not the type of company to rest on its laurels, Fatar takes the modern keyboard to a new level of playability and dynamic response by introducing the next generation of master keyboard controllers—STUDIOLOGIC.

It all starts with the hammer, redesigned lighter but longer, to distribute mass exactly as it is in an acoustic piano hammer. Its increased travel through a wider arc results in unprecedented control through the spectrum from *ppp* to *fff*, while the dynamic resistance (or inertia) it provides makes for a truly sympathetic and responsive instrument—playable for hours without fatigue.

What hasn't changed is the tremendous performance vs. price ratio pioneered by Fatar. STUDIOLOGIC improves upon that high-value tradition by providing even more for your money.

Add to the new hammer action a host of new features requested by professional users from all over the world and you have the best feeling, most responsive master controllers available—STUDIOLOGIC.

SL1100

88 weighted keys with STUDIOLOGIC hammer-action • velocity sensitive with aftertouch • pitch/mod wheels • 4 zone, 2 assignable sliders, 32 memories • 2 MIDI outputs 1 MIDI input

SL880

88 weighted keys with STUDIOLOGIC hammer-action • velocity sensitive with aftertouch • pitch-bend wheel and modulation wheel • 4 zones for splits and programmable layers

SL760

76 weighted keys with STUDIOLOGIC piano style • velocity sensitive with aftertouch • pitch-bend wheel and modulation wheel • 3 zones for splits and programmable layers

SL161

61 non-weighted keys, synth type • velocity sensitive with aftertouch • pitch-bend wheel and modulation wheel • 2 zones for splits and programmable layers

SL 2001 shown below.

For a complete catalogue or to locate retailers in your area, contact Music Industries Corporation at 800-431-6699. www.musicindustries.com

STUDIOLOGIC

OX7

Return to forever...

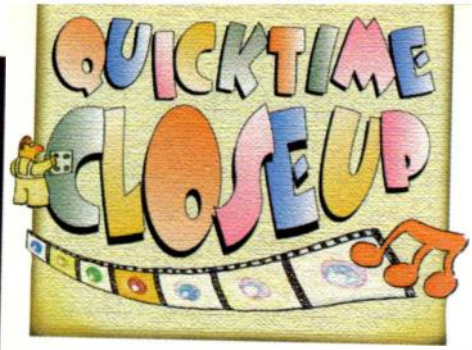
A new generation of organ sounds is here. Every MIDI keyboard, MIDI organ, sequencer, and computer can now have full control of and access to the classic analog organ sounds of the 60' & 70's!! And there's so much more... For more information contact a Music Industries Sales Rep at 800-431-6699 or fax 516-352-0754. www.musicindustries.com

circle #543 on reader service card

You've got to hear this vocal harmonizer to believe it! It's the G7 from Farfisa.

For a video demonstration of the FARFISA G7, as well as the 7X-II Auto Orchestra, please send $6 check or money order to Music Industries Corporation, Suite 101, 99 Tulip Avenue, Floral Park, NY 11001 or call 800-431-6699 for details. The FARFISA G7 is available in silver (shown), red, or black.

www.musicindustries.com



don't try to emulate the top-of-the-line Sound Canvas," explains Hoddie. "That would be impossible in real time on today's CPUs. We have had to make a number of trade-offs to provide acceptable performance on a range of CPUs. Of course, we scale the synthesizer feature set, so it does sound better on a newer, more powerful machine than on an old Quadra."

While the new version of the QuickTime synthesizer feels like a quantum leap beyond the one that was included with QuickTime 2.5, it is not yet as bulletproof as a hardware Sound Canvas. I found that sending MIDI Program Changes to QuickTime 3's synthesizer while notes were sustained could result in hung notes. The MIDI message for All Notes Off (CC 123) did not always cause it to release these notes. To remedy this situation, I found it necessary to either send a Note Off command for every possible hung note or reset the computer.

Interestingly, many of the aforementioned parameters that can be applied by the *Atomic Editor* can be accessed in real time. QuickTime 3 implements parametric controls, called Knob events, that can be embedded in a sequence to perform tasks, such as modifying the envelope or LFO parameters of an instrument.

COMPONENT CULTURE

The power and flexibility of QTMA is largely based on the *component* architecture of QuickTime. Components are software tools that perform very specific tasks, such as compressing an audio file or directing MIDI to a particular synthesizer. This component-based architecture will make it easy for Apple, or third-party developers, to extend QuickTime's functionality in the future.

Components can interact with each other to accomplish tasks that a single component cannot execute alone. The QTMA components work together to provide a robust set of MIDI playback features. Key components of QTMA include a sequence player, a single note allocator, and several synth drivers.

For example, the QuickTime sequence player outputs its MIDI event list to the note allocator, which in turn sends each note to one of four components that drive different synthesis engines. These four synth drivers send MIDI events to QuickTime's built in synthesizer, an external General MIDI synthesizer, a non-GM synthesizer, or a PCI-based synthesizer.

The note allocator keeps track of how many voices are currently being used by each synthesizer and manages global voice allocation. So, if a PCI synthesizer has been designated as the primary synth, additional notes could be directed to QuickTime's software-based synthesizer when the PCI synth's polyphony has been exceeded.

Support for external synthesizers is quite impressive. There are components to route MIDI to Opcode's Open Music System (OMS), Apple's MIDI Manager, and Mark of the Unicorn's FreeMIDI. Each one of these MIDI drivers is referred to as a separate MIDI transport mode. The Music Control panel comprises two dialog boxes, one of which is found under QuickTime Settings. Selecting Edit List from this window calls up a second panel that lets the user edit and configure the list of choices.

FIG. 5: *MoviePlayer* provides several transmission rate options for encoding sound with the QDesign Music Codec (QDMC).

record guitar...?

seek POD.™

POD FROM LINE 6 - THE FIRST GREAT SOUNDING DIRECT RECORDING TOOL FOR GUITARISTS—DESIGNED TO DELIVER A WIDE RANGE OF LEGENDARY AMP TONES AND REALISTICALLY RECREATE THE SOUND OF MIC'D SPEAKER CABINETS.

NOW, FOR $399, YOU CAN RECORD TONALLY MINDBLOWING GUITAR TRACKS WITH FULL VOLUME PUNCH AND "AIR" WITHOUT DISTURBING THE NEIGHBORS, WAKING THE KIDS, OR DRIVING YOUR SIGNIFICANT OTHER UP THE WALL.

THANK POD. AND LINE 6'S EXCLUSIVE A.I.R. DIRECT RECORDING OUTPUT—AN ACOUSTICALLY INTEGRATED CABINET/SPEAKER/MICROPHONE EMULATION TECHNOLOGY THAT BRINGS UNPRECEDENTED TONAL LIFE TO DIRECT RECORDING.

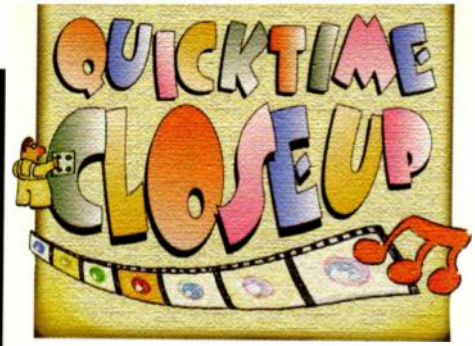
A PORTABLE, FULLY PROGRAMMABLE DESKTOP UNIT, POD PROVIDES THE RECORDING GUITARIST WITH A DEEP INSPIRATIONAL SONIC PALETTE USING THE SAME PATENT PENDING MODELING TECHNOLOGY THAT IS THE TONE GENERATING SOUL OF LINE 6'S REVOLUTIONARY AX2™ 212 AND FLEXTONE™ SERIES DIGITAL GUITAR AMPLIFIER SYSTEMS, AS WELL AS THE ACCLAIMED AMP FARM™ PLUG IN FOR PRO TOOLS TDM.

EXPERIENCE POD.

TONE IS THE TRIP. DIG IT.

CALL NOW FOR A LINE 6 DEMO CD!
1-877-To Line6
www.line6.com

LINE 6
11260 Playa Court
Culver City, CA 90230



THE POWER OF PERCEPTION

To deliver audio at low transfer rates and reduce disk space, several approaches to encoding audio data have evolved. The piece of software that encodes and decodes sound is called a *codec*. (For more on codecs, see "Square One: Space Savers" in the July 1998 issue of **EM**.) Until now, QuickTime's primary music codec has been IMA-ADPCM. It can sound fantastic, and it reduces the size of 16-bit files by 75 percent. (It was used as the primary audio compression algorithm in *Riven*.)

IMA-ADPCM and all the older QuickTime codecs, including ALaw, µLaw, and MACE, were waveform codecs. These were well suited to delivering audio via CD-ROM but inadequate for Web delivery, where greater data reduction ratios are required. Perceptual codecs, such as Dolby Labs AC-3 and MPEG, employ a psychoacoustic model of the human auditory system to determine what parts of the signal are masked, or inaudible. These parts of the audio signal are eliminated to reduce the amount of stored data. Perceptual codecs are called "lossy" because some data is "lost" during the compression/decompression process, reducing audio quality in favor of increasing transmission rates.

Until recently, access to perceptual codecs was often expensive and frequently required a dedicated server for delivery. By contrast, QuickTime Pro is affordable, requires no special server software, and supports perceptual encoding, which dramatically raises the ante for Internet audio delivery.

In addition to MPEG, QuickTime 3 ships with two perceptual codecs that Apple has licensed from established developers. The flagship codec, QDesign Music Codec (QDMC), is designed to deliver the highest possible audio quality at the lowest possible bit rates. It claims to support the transfer of 16-bit, 44.1 kHz, stereo audio over a 28.8 Kbps modem connection.

With QuickTime 3 installed, *MoviePlayer* can play and encode QDMC-compressed files; however, encoding files requires the version of *MoviePlayer* that comes with QuickTime 3 Pro. There's also a professional version of the QDesign encoder, which is available through QDesign.

The QDesign encoder that is included in QuickTime 3 Pro compresses sound to one of nine data transmission settings, between 8 and 48 Kb, and seven sample rates, from 8 to 48 kHz (see **Fig. 5**). According to QDesign, Opcode's *Studio Vision* 4.1 is being written to take full advantage of QuickTime 3's audio export features, which makes *Studio Vision* an excellent tool for Web-audio development.

Another new QuickTime-related product comes from Terran Interactive. Its *MediaCleaner Pro* 3 is among the first post-production tools designed specifically for use with QuickTime 3. In addition to supporting all available QuickTime audio codecs, it provides media protection keys and batch support for use with the professional version of the QDesign Music Codec.

QuickTime 3 also supports Qualcomm's PureVoice, a codec that is optimized for the delivery of spoken word. PureVoice is already used in digital cellular phone systems and delivers near land-line voice quality at extremely low transmission rates. It is also well suited to be used in electronic mail, and Qualcomm has announced plans to include it in upcoming versions of its *Eudora* software (see **Fig. 6**).

WHAT TIME IS IT?

QuickTime movies can be synchronized to QuickTime's internal clock, another application's clock, or even an external device, such as a SMPTE track on an analog videotape. With QuickTime 3, movies can now have multiple time-code tracks. These tracks can contain information on the timing source, format information, and individual frame numbers.

Data is stored in tracks using QuickTime's own time-code format, which is compatible with all current time-code

NO OTHER CABLES

SOUND BETTER

LAST LONGER

ARE QUIETER

& COST LESS

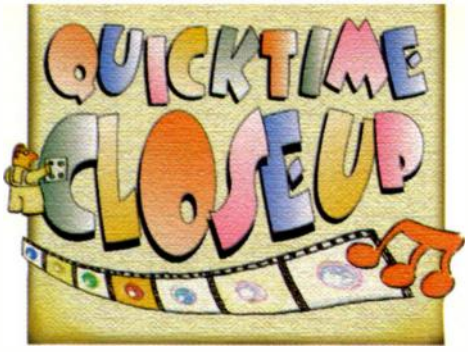
It's easy to pay more and get less, but why not let somebody else do it? Whirlwind cables outlast most bands and most record contracts. They also outperform the fantasy hi-fi and flavor-of-the-month brands you find at lots of dealers these days. From guitar cords to mic cables to snakes, we have more than twenty years of delivering the real thing to musicians who can hear the difference.

If your dealer doesn't stock them, call us toll free or send us an email for the current technical info and the name of a dealer who does. After all, it's your sound we're talking about.

whirlwind™

Toll Free: 888-733-4396 email: thebestcables@whirlwindusa.com

circle #547 on reader service card



standards, including SMPTE, PAL, SECAM, and NTSC. A movie could contain data in each one of these formats; QuickTime would perform the necessary drop-frame tricks to synchronize the content in all tracks.

HEAR ME TALKIN' TO YA

QuickTime's text track can be used to display subtitles and lyrics, and even to direct HTML codes to a browser. Apple's online documentation for *MoviePlayer* outlines a few dozen control codes, or Text Descriptors, that control the display and usage of the track. QuickTime lets you set text display parameters, including font, alignment, and display colors. The timing of text display is controlled by time stamps that can be specified in either absolute or relative time. Time stamps have four fields: hours, minutes, seconds, and up to 1/600 of a second.

You can also import karaoke MIDI files (KAR) and create a movie that displays lyrics as the music plays. A KAR file is a Standard MIDI File of Type 1. KAR-compliant files use one text track to contain standard control codes that are preceded by the @ symbol. For example, @KMIDI KARAOKE FILE identifies the file type. Text events in a second track contain the actual song lyrics.

This format was designed by the Tune 1000 Corporation, which no longer supports it. There are a number of software programs that allow you to add karaoke lyrics to a Standard MIDI File to create a KAR file. To get information about KAR specifications, karaoke software, and KAR files, check out the Computer Karaoke Homepage at www.teleport.com/~labrat/karaoke.shtml

If you are interested in creating KAR files, you might want to download a KAR file from the Web and load it into your sequencer to find out how text events are used.

Not impressed by the karaoke feature? The text track is not limited to controlling a simple text display. You can also embed HTML commands in this track, which could cause a browser to display your Web page or go to the next bullet of a slide presentation. If you do embed HTML in your movie, and it is copied and redistributed, subsequent copies will continue to send users back to the predesignated Web location.

The online *MoviePlayer* 3 documentation describes how to create a text track and set it up to interact with a browser. Check out the following two Web sites: www.apple.com/quicktime/information/macmovieplayer/mp5m.html and www.apple.com/quicktime/authors/auth-docs.html#web.

BORDER CROSSING

QuickTime has been running on Windows for over five years as playback-only technology. With QuickTime 3, all the features and functions available on the Mac now work with Windows as well. That makes it possible, for the first time, to create QuickTime content in Windows. With the Windows version of *MoviePlayer*, you can add tracks of audio, text, and MIDI to an existing AVI file, and even play it backwards. For a few Pentium cycles, QTMA provides an excellent alternative to FM sounds on a sound card.

Apple has taken pains to be sure that QuickTime behaves like a standard Windows application as opposed to a bunch of ported Mac OS tools. Apple is hoping that Windows developers will become even more attracted to the technology, now that they can use QuickTime for media capture, editing, delivery, and playback on several platforms, without leaving Windows.

Unlike Windows, however, the Mac OS uses a "forked" file structure. For example, audio and MIDI data are stored in a partition called the data fork, while resource-related elements, such as dialog box designs, are stored in a resource fork. Because Windows uses a single-fork file format, it cannot load QuickTime movies created on the Macintosh, unless the file has been converted to a single-fork, or "flattened," file: the "Make movie self-contained" command puts all the necessary data in the data fork and leaves the resource fork empty.

You might occasionally find a QuickTime Movie for Windows that is distributed across two files. The movie data is stored in a standard Windows movie file with the MOV extension. The QuickTime resource data is stored in a file with the QTR extension. QuickTime will automatically look for a matching QTR file if it does not find the necessary resources in the main file.

A QUICK LOOK INTO THE FUTURE

To continue gaining momentum with developers, QuickTime will have to continue to grow. At present, QuickTime does not fully support streaming. True streaming includes the broadcast of a live signal. At present, QuickTime uses a technique that Apple has dubbed "Fast Start." It begins playing previously digitized or sequenced files as soon as they begin to download. Apple plans to release a true streaming technology for QuickTime this year, which will make it a robust tool for Web radio broadcasting and video conferencing.

Apple continues to aggressively court industry alliances. In February 1998, the International Standards Organization (ISO) adopted the QuickTime file format as the starting point for the MPEG-4 specification. The specification is being developed by the ISO's Moving Picture Experts Group (MPEG) with input from Apple, IBM, Oracle Corporation, Silicon Graphics, Sun Microsystems, and Netscape. The ISO expects to publish this new specification in 1999.

MPEG-4 will support real-time video and audio streaming. Already, MPEG-4 products are in the developmental stage. Included in this upcoming round of tools are hardware from IBM, Java

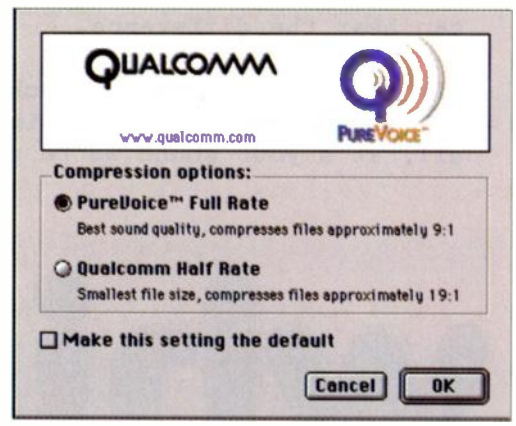


FIG. 6: QuickTime supports Qualcomm's PureVoice codec, which is optimized for spoken language.

support from Sun, video server products from SGI, and media software from Oracle.

Content developed using QuickTime today will be compatible with MPEG-4 tools when they become available. In addition, products that support QuickTime 3 can easily be updated to be MPEG-4 compatible.

When asked whether anyone is doing surround sound using a 5-channel QuickTime movie, Hoddie responded, "There are authoring tools that use QuickTime and create 5-channel content. At the moment, there are a number of system-level problems on PCs that need to be worked out before this can be done correctly. QuickTime can easily support 5 channels of audio (or more). The problem is how to map these to audio outputs on the user's system. We're working on this, but it's really an industrywide problem."

QuickTime currently supports the 133 standard video effects defined by the Society of Motion Picture and Television Engineers (SMPTE). Standard effects include wipes, fades, and slides. Months ago, Apple began looking into the possibility of supporting a similar library of real-time audio effects in version 3.

Hoddie explains, "We had hoped to [support audio plug-ins] in QuickTime 3, but we realized that we didn't have time to do this as well as we wanted. We did a great video effects architecture, and pieces of that will be used in our audio effects architecture. We want to do a great audio plug-in design, something that we can live with for a long time. In starting on that work, it became clear we couldn't achieve that in QuickTime 3. We're still working on this, and I hope we can talk about the details publicly soon."

QuickTime 3 is an excellent addition to today's tools for multimedia development and delivery. Cross-platform development tools and content are already available. Computer politics aside, we would all benefit from continued widespread adaptation of this versatile standard.

Neil Leonard III *received this year's award for the most valuable contribution to the Music Technology Division curriculum at Berklee College of Music. This spring he created sound for Maria Magdalena Campos-Pons's multimedia installation at the Museum of Modern Art in New York.*

DIY:

Build the EM Pop Filter

INTERCEPT NASTY PLOSIVES WITH THIS EFFECTIVE, EASY-TO-MAKE POP FILTER.

BY BRUCE POROPAT

You've just recorded a killer vocal track, but when you listen to the playback, you discover that certain sounds explode from the monitors way out of proportion to the rest of the track. These are the sounds of certain hard consonants, which are called *plosives;* the worst culprits are the letters *p* and *k*.

When someone sings or speaks close to a microphone and comes to a word with a plosive, the resulting blast of air bumps against the surface of the mic. This can produce an audible thump or pop. Even when the thump is not all that noticeable, this low-frequency burst can fool a compressor/limiter into producing an unwanted response.

The severity of the problem varies from one vocalist to another. Some singers push a lot of air and snap out those p's and k's, while others naturally or deliberately back off on these sounds.

The problem also varies with different microphones. All mics have some sort of built-in windscreen, but its effectiveness is limited by size, type, and proximity to the diaphragm. The mic's frequency response also plays a role because the bulk of the pop happens near the bottom of the audio spectrum. A condenser mic with a simple mesh in front of a 1-inch, gold-sputtered diaphragm can be thump city. An inexpensive dynamic mic with a more rugged mesh and foam windscreen and a frequency response that drops like a stone below 80 Hz presents less of a problem.

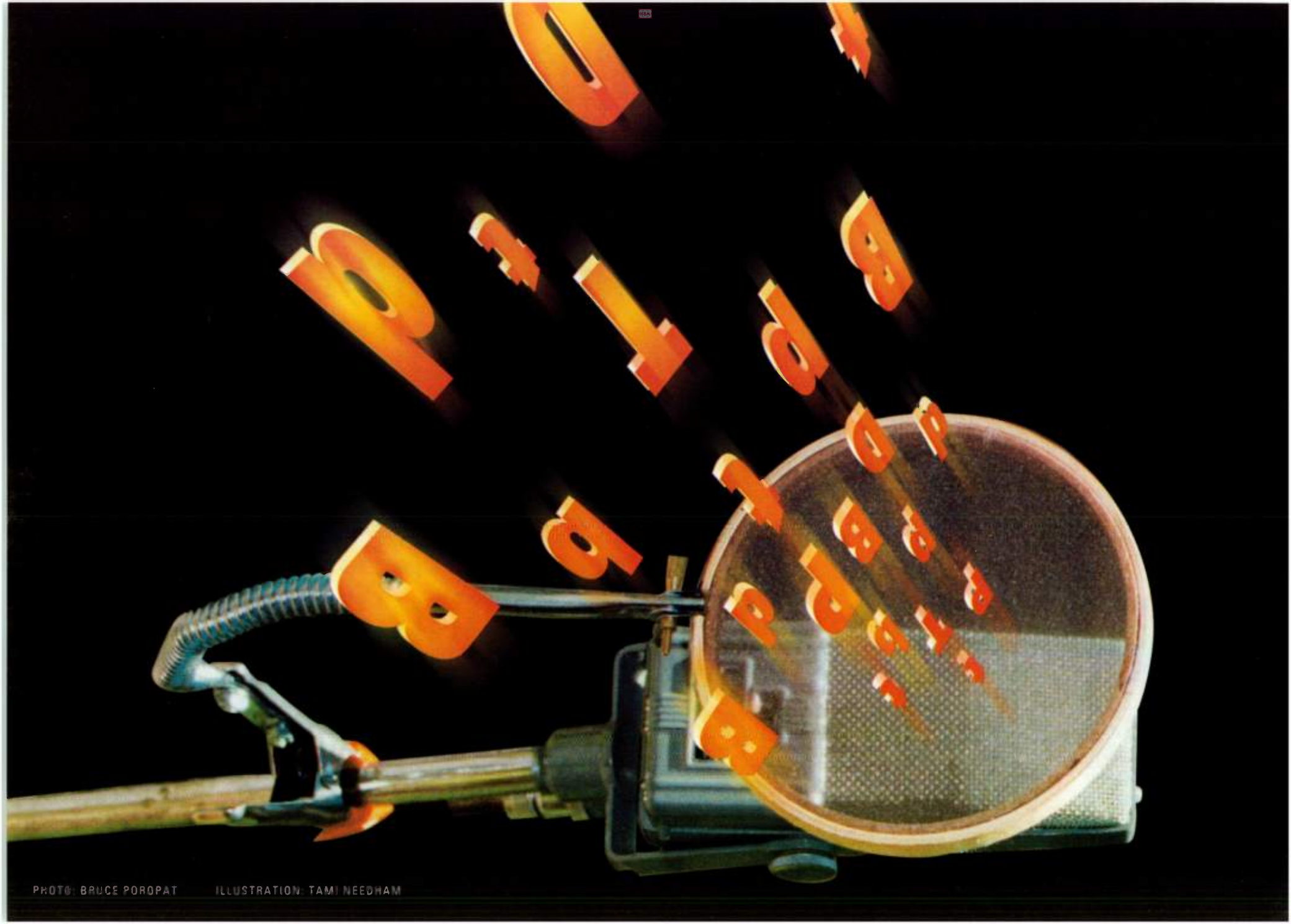


PHOTO: BRUCE POROPAT ILLUSTRATION: TAMI NEEDHAM

Build the EM Pop Filter

POP GOES THE FILTER

You can try to fix pops with EQ and gain, but as with many other recording problems, the best place to stop pops is before they reach the mic. The simple solution is to put something between the mic and the vocalist to absorb and dissipate the plosives far enough from the capsule to make them inaudible.

A pop filter is just such a thing. Commercially available pop filters are typically made with a thin, nylon fabric stretched over one or both sides of a circular frame, which is mounted on a flexible "gooseneck" that clamps onto a mic stand. A low-budget, in-a-hurry alternative is a nylon stocking stretched over a bent coat hanger. Although this will work pretty well in a pinch, is it ugly, flimsy, and hard to adjust.

A better homemade solution is to spend a little time to make a sturdier pop filter. It's easy to make a rugged, professional-looking pop filter in about an hour for a fraction of the cost of buying one. The parts for this project can be obtained at hardware and variety stores (see the sidebar "Parts List").

One of the components that is especially economical is the flex connector. A conventional electrical-gooseneck fitting costs $12 or more, but a flex connector, which is designed to connect a bathroom faucet to the water feed, can perform the same task for a quarter of the cost. The only possible disadvantage is that it might not take the thousands of bendings that a real gooseneck would. However, unless you are constantly changing the distance from the filter to the microphone, this shouldn't be a problem. And if it does break, it's cheap and easy to replace.

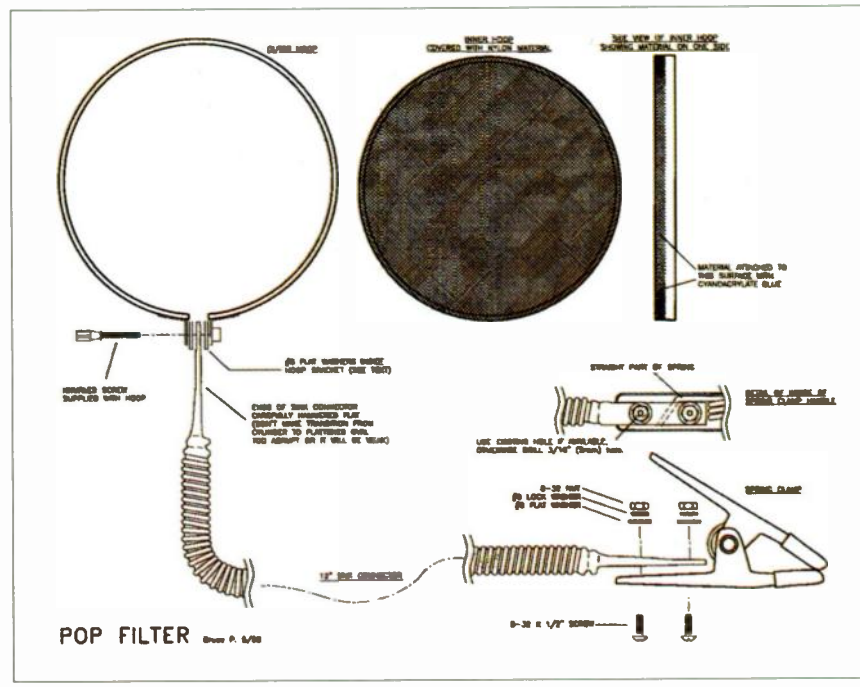


FIG. 1: The EM Pop Filter can be easily constructed using an embroidery hoop, some nylon stocking material, a flexible sink connector, and a spring clamp.

To begin, get the parts together and put the assembly drawing (**Fig. 1**) where you can see it while you work. The necessary tools are a hammer, a center punch (or sharp nail), a drill with a 5/16-inch (5 mm) bit, an adjustable wrench, a screwdriver, cyanoacrylate adhesive (Super Glue, Krazy Glue, etc.), and safety goggles.

ASSEMBLY

Start with the flex connector. First, you need to flatten a section at each end to attach the clamp and hoop. Depending on the brand you buy, the straight, inflexible part at one end might be longer than the straight part at the other end. Use a hammer and gently tap the short end flat, leaving it about 3/16 inch (5 mm) thick. It should gradually flatten between the unaltered, round section and the flat end, because if it becomes abruptly flat, you will have a weak point where it will be likely to break. Flatten a section about 3/4 inch (2 cm) long at the other end in the same way.

Now put on your safety goggles. All the holes to be drilled are 3/16 inch (5 mm). To safely drill clean holes through metal, use a vise to firmly hold the object and start by making a little dimple with a center punch. Let's begin with two holes in one handle of the spring clamp. Pull the plastic cover off one of the handles. Find the best position for the flattened short end of the flex connector inside the clamp handle; note that it will be off-center because it has to share the inside of the handle with the straight part of the spring.

Drill a hole near the hinge end of the handle (see **Fig. 1**). The exact placement of the hole is not critical, but pay attention to the following points:

1. Don't drill it too close to the coil of the spring, or you won't have room for the nut and washers.

2. Center it in the space between the straight part of the spring and the side of the handle that will hold the flex connector, not between the two sides.

Parts List

Quantity	Item	Source	Cost
1	5" to 6" embroidery hoop with a tightening screw	variety store, drug store, fabric store	$0.50
1	4" spring clamp	hardware store	$2.30
1	12" flexible sink connector	hardware store	$2.90
2	8-32 x 1/2" pan-head screws	hardware store	$0.50
2	#8 lock washers	hardware store	$0.50
4	#8 flat washers	hardware store	$0.50
1	nylon stocking or panty hose	drug store, or use an old pair	$0 to $2.00
Total:			**$7.20 to $9.20**

digidesign®
A division of Avid

Credits

Michael Jackson
Rolling Stones
Blackstreet
Whitney Houston
Stevie Wonder
Aretha Franklin
Janet Jackson

"Pro Tools makes my whole life complete"

– Teddy Riley

We're blushing. Coming from Teddy Riley, whose credits include more than 30 platinum and multi-platinum records, that's a pretty powerful statement. How could Pro Tools® possibly make this superstar's life more complete?

"If you could see me, you'd think I was a real wiz. I do everything in Pro Tools. I track directly into the system...take a guitar part and loop it. I do fade ins, cross fades. I put together the whole *Blackstreet* album so fast — mixing, effects, and everything. And I really dig some of the TDM Plug-Ins like Drawmer and Focusrite. There's always new stuff that truly amazes me... like the 24-bit, 32-track system."

Now, you're probably thinking we had to pay Teddy to say all this. But the truth is, he's been using Pro Tools on every project since Michael Jackson's *Dangerous* — simply because it's the best tool for the job. Based on the number of hits he's cranked out, his career and life have been nothing short of remarkable. Or, as Teddy would say..."*complete.*"

For more information about Pro Tools and Third-Party development products, call **1.800.333.2137 ext. 324** for a free Pro Tools video, or to schedule a free demo.

www.digidesign.com
www.avid.com

SEE US AT AES BOOTH #623 & #424

TEDDY RILEY, PRODUCER | ARTIST
Uptown Records/Future Recording Studios, VA

circle #550 on reader service card

3. Make sure you don't drill into any part of the spring.

Some spring clamps already have a usable hole near the end of the handle. If there isn't one, drill a hole there, too.

Next, drill two holes in the flattened short end of the flex connector, corresponding to the holes you just drilled in the spring clamp. Measure the positions for these holes by placing the flex connector inside the clamp handle and marking it with a laundry marker or scribe through the holes you drilled in the clamp. Center-punch and drill where you marked, making sure to drill through both layers of metal. Drill a single hole at the other end of the flex connector, about ¼ inch from the end for the embroidery hoop.

Reposition the flex connector inside the spring clamp handle and attach the screws from the outside of the handle, with the lock washers and nuts on the inside (see **Fig. 1**).

SEWING IT UP

An embroidery hoop is actually a pair of hoops: a smaller one inside a larger, adjustable one. Pull it apart and put the larger, outer hoop aside. Stuff the smaller hoop inside the nylon stocking and stretch the material around it until it looks even. Hold the excess material gathered in your fist at the back of the hoop and apply cyanoacrylate adhesive lightly but continuously around the outer edge of the hoop. Do not glue your fingers to the hoop.

When the glue has dried, *carefully* trim the excess stocking material away by cutting along the center of the hoop's outside surface with a matte knife or other razor-sharp blade.

If you want to make a double-layered pop filter, repeat the procedure for the other side of the hoop. After the material is affixed, put the outer hoop back on and use the screw that came with the hoop to attach it through the flex connector. Use flat washers between the flex connector and the hoop's clamp. The washers increase the amount of surface area being pressed together by the little screw, which helps the hoop stay in place when you position it. **Figure 1** specifies #8 flat washers, but anything that fits is okay.

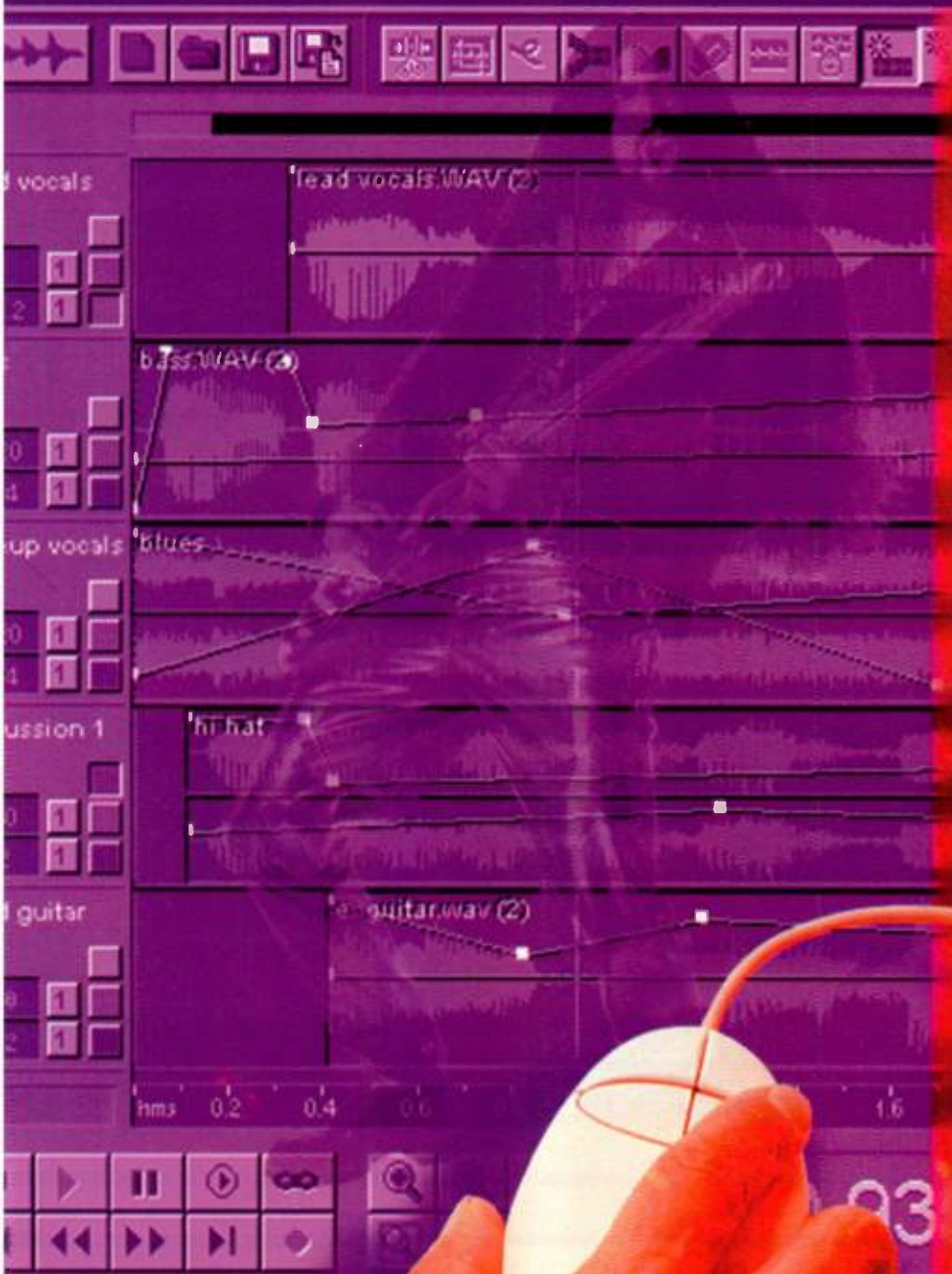
READY TO USE

To check your filter's effectiveness, blow on one hand while moving the filter in and out of the way with your other hand. You will feel virtually none of the air on the other side of the filter. If you blow too close to it, you will hear a sound bounce off it, just as you would with a mic screen. That's why it's important to position the filter the proper distance from the singer and the mic.

Clamp the filter to a mic stand or boom and adjust it so the screen is one to four inches from the mic. The vocalist should be four to six inches from the filter. If the vocalist is more than eighteen inches from the mic, the screen might not be necessary, but it doesn't hurt to leave it in place. You can now begin pop-resistant vocal tracking.

Bruce Poropat *is a freelance technical writer/illustrator and fretted string player who lives in Berkeley, California, with his wife, two children, and a hodgepodge of musical stuff.*

COOL EDIT PRO JUST GOT HOTTER



Introducing Cool Edit Pro 1.1

64 tracks. Awesome waveform editing power. More than 30 DSP effects. DirectX® plug-in support. 32-bit recording capability. Unparalleled ease of use.

Now let's turn up the heat. Up to 300% greater speed. Crash Recovery (so even if your lights go out, you can rescue your session). Envelope Follower, Vocoder, Pan/Expander, and Clip Restoration tools. And more new features to spark your creativity.

Licensed users of Cool Edit Pro 1.0 can upgrade to version 1.1 free of charge by downloading the upgrade patch from Syntrillium's web site at http://www.syntrillium.com. Check it out. It's getting hotter all the time.

Syntrillium Software
http://www.syntrillium.com
Sales: 1-888-941-7100 or +1-602-941-4327
Fax: +1-602-941-8170

circle #552 on reader service card

EXPOLATINA...

The Direct Route from Latin America to the Technology of Tomorrow

From the producers of LDI, North America s largest trade show for entertainment technology and design, comes ExpoLatina—the fast track to the 21st century. An exciting combination of cutting-edge technology and up-to-the-minute industry information. Produced in Miami Beach for easy access from all of Latin America.

With in-depth seminars and hands-on training sessions in Spanish or Portuguese, ExpoLatina gives you direct access to the best in the business. Sharpen your competitive edge and position yourself on the digital horizon of the future.

Best of all, the ExpoLatina show floor at the Miami Beach Convention Center is packed with the latest technology for all aspects of production:

- live performances (theatre, opera, dance, music)
- concert tours
- film and television production
- themed environments: theme parks, themed restaurants, themed hotels
- professional audio recording
- musical instruments
- club design
- museums and heritage sites
- retail design
- casino design

Brought to you by these leading PRIMEDIA Intertec entertainment industry publications & by ESTA (Entertainment Services and Technology Association):

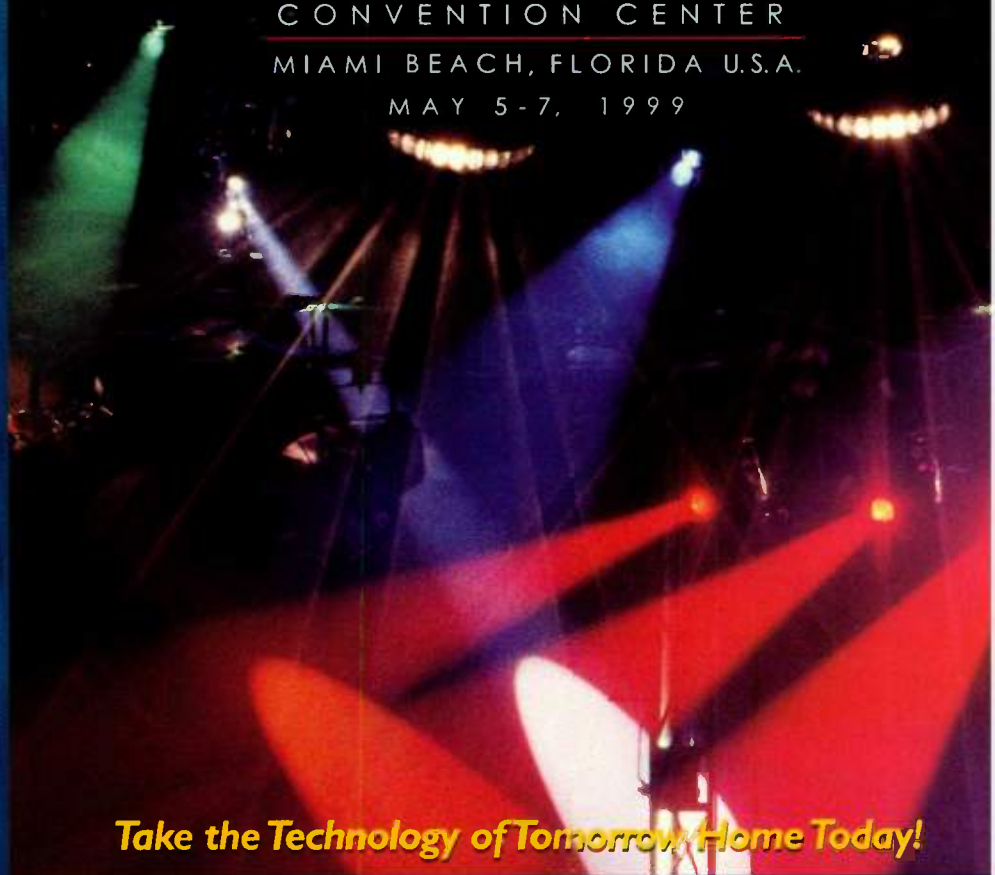
Lighting Dimensions • TCI—Theatre Crafts International • Millimeter • Mix • Mix En Español • Sound & Video Contractor • Electronic Musician • Video Systems • Broadcast Engineering • World Broadcast News

expo LATINA

MIAMI BEACH CONVENTION CENTER

MIAMI BEACH, FLORIDA U.S.A.

MAY 5-7, 1999



Take the Technology of Tomorrow Home Today!

For complete information on ExpoLatina 1999 return this coupon today.
Or call FAX-ON-DEMAND at +1-732-885-6723 or 1-800-601-3858 (U.S. only). Or Intertec Trade Shows & Conferences at +1-303-220-0600.

☐ Contact me about exhibiting.	Address:
☐ Contact me about attending.	City:
First Name:	State: Zip:
Last Name:	Country
Title:	Phone:* Fax:*
Company:	E-mail:**

* International guests, please include country and city codes.
** If you do not wish to receive email from us, please leave blank.

MAIL OR FAX TO: Intertec Trade Shows & Conferences • ExpoLatina '99 • 9800 Metcalf Avenue
Overland Park, KS 66212 U.S.A. • 1-800-288-8606 or +1-303-220-0600 • FAX: +1-913-967-1900 • www.etecnyc.net

A special editorial supplement
to Electronic Musician

JAM

the EM Guide to Gigging

Getting a Handle on Mic Technique

Sound-Check Secrets!

- What Engineers Want
- Dialing in a Stellar House Mix

Essential rhythms for freelance drummers

setList

Original Art Design Linda Birch

Cover Photo Steve Jennings

CR1604-VLZ®

It's in more pro recording studios and on more major tour stages than any other compact mixer.

It's created more albums and demos, produced more TV and radio spots, taken sound for more major motion pictures, and broadcast more network news and sporting events than all of its competition combined.

Yes, there are compact mixers with more channels, compact mixers with even redder, whiter and bluer knobs, and compact mixers with ads that are almost as wordy as our own.

But the CR1604-VLZ® 16x4x2 mixer has one important thing that sets it far ahead of the pack: Tens of thousands of extremely satisfied owners. In fact, all the comments in this ad came from a single week of product registration cards!

Why not join them?

MADE BY MACKOIDS IN WOODINVILLE, WAH, USA

800/898-3211

www.mackie.com

MACKIE

tools

By Carolyn Engelmann and Rick Weldon

D.A.S. Audio DS-15

The 2-way, biamped DS-15 Active Power speakers from D.A.S. Audio ($979 each) are built to be tough while delivering high-quality sound. The amplifiers are rated at 150W (RMS) for the low end and 50W (RMS) for the high-frequency amp, with the crossover set at 24 dB/octave. The low-frequency transducer features a 15-inch, rigid, moisture-resistant cone that combines composite fibers and resins.

Each loudspeaker has controls for line and mic volume, as well as master volume and adjustable mic gain. LEDs on the back of the unit show power on, overload, and signal present.

The DS-15's enclosure is lightweight, but it is engineered to be durable. The speakers are easily stackable with their integral slots, and they can be hung with their built-in rigging points, mounted on a stand, or used as floor monitors. D.A.S. rates the DS-15's frequency response at 50 Hz to 20 kHz and THD at 0.01% (8Ω impedance). D.A.S./Sennheiser (distributor); tel. (860) 434-9190; fax (860) 434-1759; e-mail jalexander@dasusa.com; Web www.dasaudio.com.

Circle #419 on Reader Service Card

Audio-Technica 7000 Series

The 7000 Series UHF wireless microphone systems from Audio-Technica are available in two packages, the ATW-7375 UniPak ($975) and ATW-7376 Handheld Transmitter System ($995). The UniPak system provides an unbalanced, high-impedance, ¼-inch input for instrument-level signals, and it is designed for use with A-T's Wireless Essentials line of microphones and cables. The Wireless Essentials line includes lavaliere mics, handheld dynamics, headset mics, and more. The Handheld Transmitter System comes with an ATW-T76 wireless mic.

Both systems use the ATW-R73 diversity receiver, which uses an all-metal housing designed for superior shielding against interference. There are 100 switch-selectable, phase-locked loop channels. The ATW-R73's output is on balanced, XLR and unbalanced, ¼-inch connectors. Also on the receiver are a ground-lift switch, volume and squelch knobs, a channel number display, and 5-segment meters for monitoring audio frequency and radio frequency levels.

Audio-Technica rates the systems' frequency response at 100 Hz to 15 kHz and operating range at 300 feet (typical). For the ATW-R73, signal-to-noise is rated at >100 dB (IEC weighted) and THD at ≤1%. Audio-Technica; tel. (330) 686-2600; fax (330) 686-0719; e-mail pro@atus.com; Web www.audio-technica.com.

Circle #420 on Reader Service Card

QSC PLX Series

QSC has released the PLX Series of dual-channel, 2U rack-mount power amplifiers. The PLX 1202 ($798) is capable of providing power of up to 600W per channel; the 1602 ($1,198), 800W per channel; the 2402 ($1,498), 1,200W per channel; and the 3002 ($1,798), 1,500W per channel (each into 2Ω). Each amp in the series can operate at 2, 4, or 8Ω impedance. Each amp features a detented gain knob for each channel and clip-limiting indication on 4-segment LED ladders.

According to QSC, its PowerWave technology, which charges the supply rails 230,000 times per second, enables PLX Series amps to eliminate 60 Hz hum, deliver excellent bass response, and employ a lighter transformer than is used in comparably powered amps with conventional power supplies. The amps also feature 33 and 50 Hz low-frequency filters (12 dB/octave) and a user-defeatable clip limiter.

Input for each channel is on balanced XLR and balanced, ¼-inch connectors, and output is via Neutrik Speakons and 5-way binding posts. Damping factor is 500 or greater (at 1 kHz and below). QSC Audio Products; tel. (714) 754-6175; fax (714) 754-6174; e-mail info@qscaudio.com; Web www.qscaudio.com.

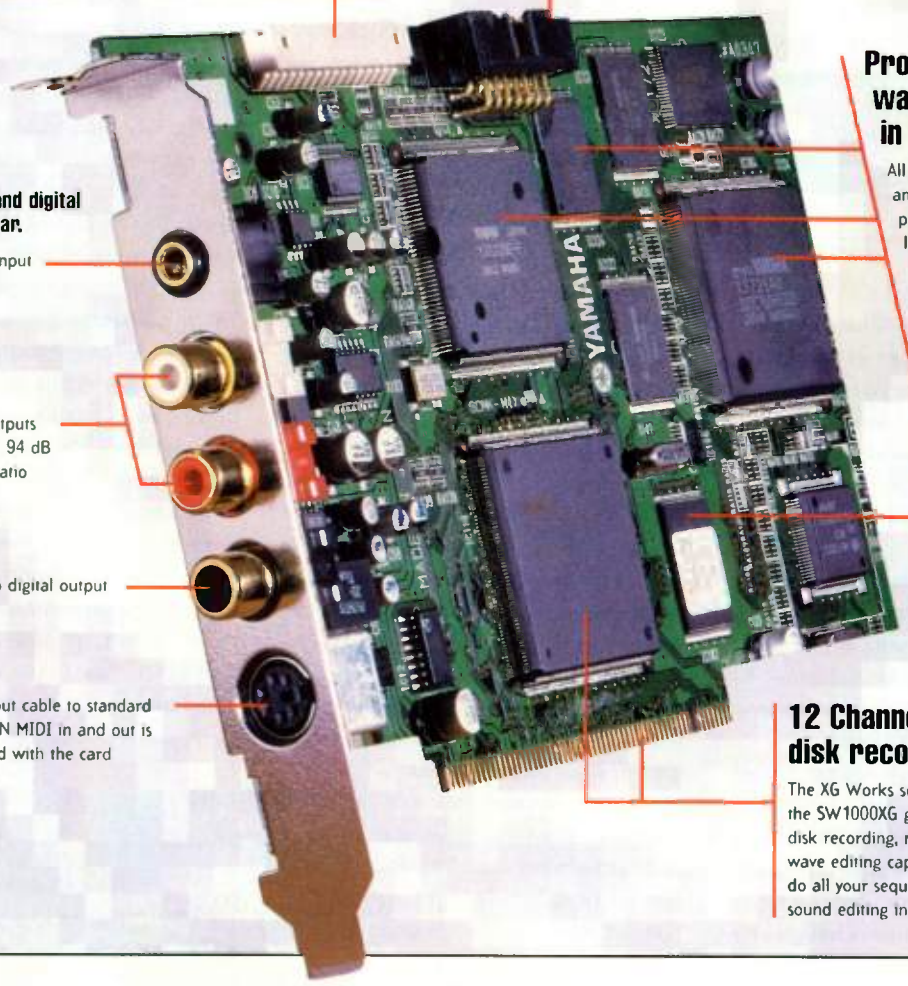
Circle #421 on Reader Service Card

If you're serious about your music, don't play games with your computer sound card.

You need a MIDI/audio sound card that's as committed to making great music as you are. The Yamaha SW1000XG fits the bill perfectly. Actually, calling it a sound card doesn't do it justice—IT'S A COMPLETE, TURNKEY MIDI PROJECT STUDIO THAT FITS IN YOUR COMPUTER. It has a 64-note poly XG synthesizer, 6 fully programmable effects processors, 12 channels of accelerated hard disk recording and a robust package of sequencing, recording and editing software, all for just about $699 MSRP. After all, when it comes to creating music, Yamaha doesn't play around.

Expand the SW1000XG's capabilities with plug-in boards! You can add the equivalent of a DX7 synthesizer (PLG100-DX), VL70m virtual acoustic synthesizer (PLG100-VL) or 4-part vocal harmony (PLG100-VH) to the AWM2 XG voices on board.

Add the power of a Yamaha 32-bit digital mixer. Cascade the SW1000XG with the incredible Yamaha DSP Factory card for unprecedented digital mixing power in your new computer "studio."



Connect to analog and digital instruments and gear.

Stereo 20-bit analog input

Stereo analog outputs with exceptional 94 dB signal to noise ratio

SPDIF stereo digital output

A breakout cable to standard 5-pin DIN MIDI in and out is included with the card

Professional quality wavetable synthesis in the hardware.

All of the SW1000XG's synthesis and effects are created using proprietary Yamaha chips that leave your computer's CPU free to fully utilize your favorite audio processing software.

- 64 Note polyphonic AWM2 tone generation with 1267 voices and 46 drum kits.
- Huge 20MB Yamaha XG WaveROM
- 6 programmable effects processors

12 Channel hard disk recording.

The XG Works software bundled with the SW1000XG gives you PCI bus hard disk recording, non-linear editing and wave editing capability. So now you can do all your sequencing, recording and sound editing in one simple package.

YAMAHA

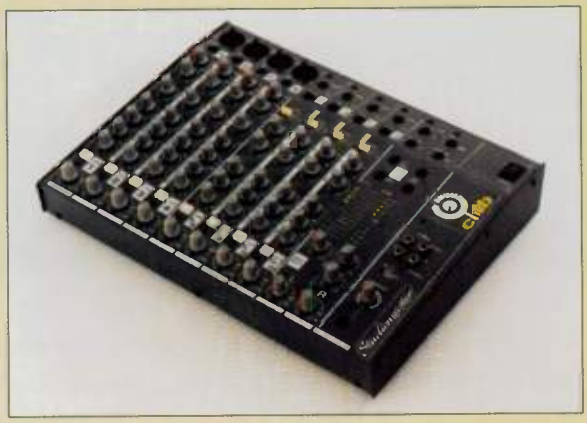
For more information about the SW1000XG visit www.yamaha.com

circle #555 on reader service card

Studiomaster Club RC-12

Studiomaster offers a space-saving, lightweight mixer with the new Club RC-12 ($359.95), ready for action with live bands or DJs or for recording. This console packs four mono channels, four stereo channels, and a stereo auxiliary loop into its 13.5 x 9.9 inch frame.

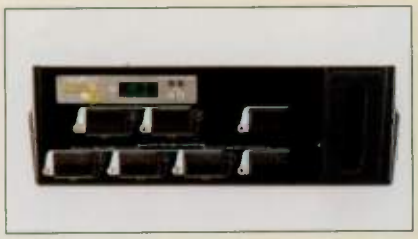
The mono channels offer both balanced, ¼-inch line inputs and balanced, XLR mic inputs with 48V phantom power. Each mono channel has 3-band EQ with 15 dB of boost/cut, as well as gain control. The stereo channels have 2-band EQ and switchable input level. All of these inputs have level controls, prefader and postfader aux sends, and pan or balance control. All controls on the unit are rotary knobs.



The Club RC-12 provides ¼-inch, balanced, +4 dBu left and right outputs. Twelve-segment LED bar-graph meters are situated near the left and right main level knobs. Additional outputs are available for recording, and there is a headphone jack with its own level knob. Each channel has a solo button for headphone monitoring.

Input noise ratings are -129 dBu (mic), -100 dBu (line), 91 dBu (stereo line), and -95 dBu (stereo aux). The unit's frequency response is rated at 10 Hz to 50 kHz (+0/-1 dB) and THD at 0.004% (+18 dBu @ 1 kHz). Studiomaster, Inc.; tel. (714) 524-2227; fax (714) 524-5096; e-mail sdmaster@studiomaster.com; Web www.studiomaster.com.

Circle #422 on Reader Service Card



DigiTech Control 8

DigiTech's Control 8 MIDI foot controller ($149.95) is an enhanced replacement for the company's Control 7 that is especially useful for toggling between two mapped parameter values, sending Program Changes, and toggling On/Off parameters on guitar multi-effects processors.

Built into a rugged metal chassis, the unit is designed for ease of use onstage. Its seven footswitches can send any Program Change number on any MIDI channel. Its expression pedal can be assigned to send any MIDI Control Change message.

In Foot Switch Toggle mode, five of the Control 8's footswitches send On (127) and Off (0) values for MIDI CC 21 to 25 instead of sending Program Changes. The other two footswitches change between Program Change and Foot Switch Toggle modes and allow you to step through Program Changes and Control Change numbers. DigiTech; tel. (801) 566-8800; fax (801) 566-7005; e-mail customer@digitech.com; Web www.digitech.com.

Circle #423 on Reader Service Card

Spirit PowerStation Series

Designed as an all-in-one solution for live sound in small venues and rehearsal studios, the PowerStation powered mixer by Spirit comes in three models: the 350 ($999.95), the 600 ($1,499.95), and the 1200 ($1,999.95). The PowerStation 350 comes with six mono inputs and two 175W amplifiers, the 600 has eight mono ins and two 300W amps, and the 1200 has sixteen mono ins and two 600W amps. Mono inputs are on balanced, XLR and impedance-balanced, ¼-inch, TRS jacks.

Each mono input has a 3-band EQ with sweepable mid, 48V phantom power, and a Spirit UltraMic preamp, which has a 60 dB gain range and +22 dBu headroom. Each mixer in the series also comes with two stereo inputs (on balanced RCA connectors). An unbalanced, TRS insert jack is included for each mono-input channel, and there are two aux sends, one prefader and one pre/postfader (globally switchable). Another dedicated, postfader aux send feeds the onboard effects unit. There's also an 18 dB/octave highpass filter at 100 Hz on each mono input.

The onboard Lexicon effects section has sixteen reverb, chorus, and delay programs, including dual effects. Each program has two editable parameters, and settings can be stored. The effects section also features a rotary input-trim control with clip indicator.

The master section includes L/R master faders, two 7-band graphic EQs, an EQ bypass switch, an 18 dB/octave highpass filter at 40 Hz for speaker protection, stereo inserts on unbalanced TRS jacks, stereo output on impedance-balanced TRS, and a 10-segment LED level meter. There is a stereo Record out on unbalanced RCA. Speaker output is on Neutrik Speakon connectors and on four 5-way binding posts. Spirit rates THD for the mixers as <0.009% (mic, line, or stereo input, +20 dB at outputs, any input gain), aux output noise at -83 dBu and main output noise at -80 dBu (both measured RMS, 22 Hz to 22 kHz bandwidth), and EIN at 129 dBu (mic input at maximum gain). Spirit by Soundcraft; tel. (800) 255-4363 or (916) 630-3960; fax (916) 630-3950; Web www.spiritbysoundcraft.com. ◆

Circle #424 on Reader Service Card

Multichannel PC Hard Disk Recording System.

ANALOG

20 Bit A/D 20 Bit D/A
Eight 1/4" Analog I/O
Input/Output Level Meters
.002% THD+n

DIGITAL

24 Bit Digital 24 Bit DSP
S/PDIF I/O
Word Clock In/Out
Video Sync (optional)

Aark 20/20

FEATURES

10 Inputs 10 Outputs
Simultaneous Rec/Play
Digital Router & Patchbay
Monitor Mixer Controls

NOW SHIPPING

Aark 20/20
PCI Host Card
Cables & Drivers
$ 995.00

20/20

The Perfect Vision...

Scanning the horizon for the PC workstation designed specifically for multitrack recording? Visualize this: Easily record and play eight analog channels direct to disk, all while keeping the digital connection to your DAT. Achieve a superior sound quality with shielded 20-bit converters that are far away from any noisy computer. Add to that a full digital router, volume control, individual level meters and a powerful software control panel that virtually eliminates sync and sample rate errors, and you've got the slickest multitrack system ever envisioned.

Well that vision has come into view, and at $995.00 it's something to focus on. Now, cover your right eye and check out our specs...

cakewalk · Steinberg · SEK'D · SONIC FOUNDRY · Cool Edit PRO

SEE US AT AES BOOTH #100

Also from Aardvark...
Studio88!
Connects DA-88™ TDIF, S/PDIF and analog to PC

circle #556 on reader service card

Aardvark
http://www.aardvark-pro.com

Ph (734)665-8899 • Fax (734)665-0694 • 202 E. Washington Ste 306 • Ann Arbor, MI 48104 U.S.A.

S·o·u·n·d·s

You've done thousands of gigs and more sound checks than you can count. What is there to know that you don't already know about doing a sound check? First, you hit the drums one by one while the sound engineer tweaks the drum sound. Then, you dial in the other instruments one at a time. Next, you make sure the monitors aren't feeding back and that everyone is happy with his monitor mix. And last, you let the sound person make final adjustments while the band runs through a tune or two. Right?

If this scenario sounds familiar, that's because it is. But if you think it's the most effective and efficient way to perform a sound check, think again. Actually, many musicians don't know the best way to do a sound check. This widespread ignorance takes its toll because, more often than not, the sound engineer is forced to accommodate the band rather than the other way around. In an effort to quickly and effectively accommodate the band's need to acclimate to a room, sound techs often compromise the quality of their work by grotesquely modifying the ideal—dare we say optimal?—means of sound-checking. It takes only one lame band member—typically someone more concerned with image than sound or professionalism and punctuality—to prevent a sound engineer from doing his or her best job.

So the first rule is to be respectful of the sound person and leave your bad attitude and unprofessional habits at home. After all, sound technicians are not only responsible for making your band sound as good as possible, they also might be the people who recommend to the club owners that you play there again.

The general procedure commonly called "sound check" is actually divided into two parts. The first, which is sometimes called the "line check," consists of testing the individual instruments and mics. The second is the sound check proper, in which the stage sound is established and a rough house mix achieved.

BY BRETT RATNER

Like a Winner

Forget everything you thought you knew about sound check.

Photo by Cathy Sheen Hewitt.

Sounds Like a Winner

WHO'S ON FIRST

Who should go first? Unfortunately, it's the one who only has to bring a mic, yet somehow always finds a way to be late. In this case, the stereotype all too often holds true: it's the singer. What most singers don't know about sound check can hurt them—and everyone else.

"Ironically, the drummer—the guy who has to bring the most gear—is usually the first one set up and ready to go on stage," says Mike Willemain, chief audio engineer at Nashville's Wildhorse Saloon. "That's the only reason drums are traditionally sound-checked first. The problem is, if you build a mix around the drums, the mix tends to be much louder. If you check the vocals first, you have a much better shot at keeping the stage volume under control, thereby making it easier for the vocalist to sing and for the sound person to get a punchy vocal mix."

Jim Wakefield, proprietor of Production Services, Inc., agrees. "Most of the P.A. EQ I do is on the vocals," says Wakefield. "If I get the instruments EQ'd before the singer sound-checks, I run the risk of having to re-EQ everything and wasting a lot of everyone's time."

So the second rule of a professional sound check (i.e., a sound check that doesn't make you come off as a bunch of wannabes) is to show up on time. Call ahead to find out when you are scheduled to load in and sound check. Also, be sure to ask about parking and the best (and hopefully most direct) path for loading in.

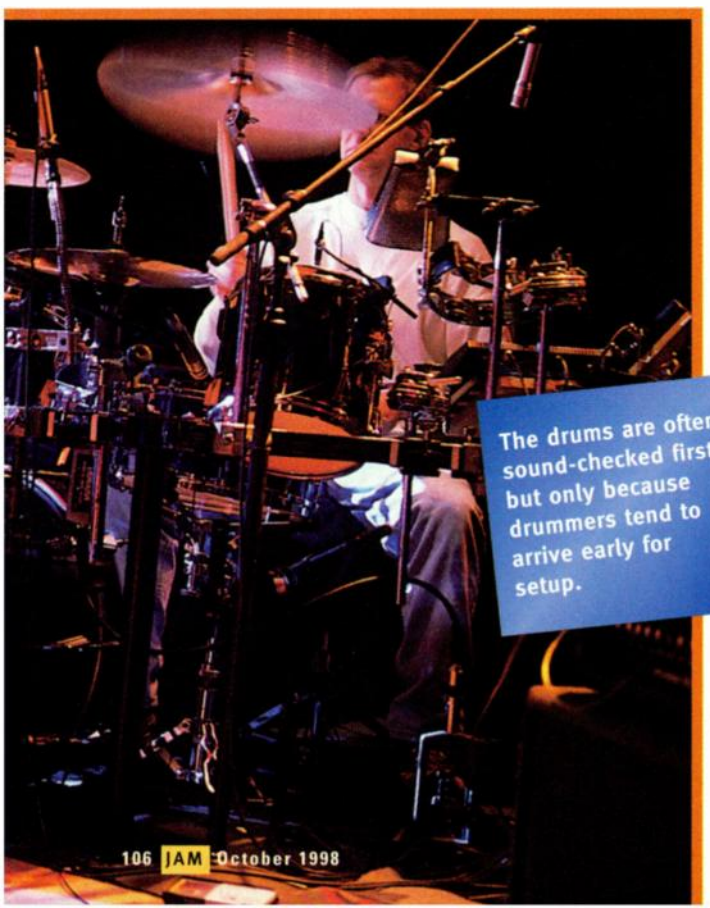
EFFICIENT SETUP

Rule number three is to bring a stage plot (see **Fig. 1**). A stage plot is simply a drawing of how you prefer to arrange your gear on stage, with each piece of gear clearly identified. This makes everyone's job easier: the band members and crew (if you have any) know where to place everything, and the sound tech can anticipate possible miking, cabling, and acoustics issues. A stage plot should always be accompanied by an input list (see **Fig. 2**).

Load-in is usually the time when the engineer is on stage setting up microphones. Use this opportunity to communicate with the engineer. Deliver the stage plot and volunteer any information you think might be helpful. If there is a specific microphone or active D.I. box you want to use, try not to make the engineer wait for you to fish it out of a bag or replace the unit's batteries.

"Also, discuss what the band's sound is like, because this affects how I engineer," remarks Wakefield. "For example, is it a guitar band? A vocal band? Are the bass and drums the fundamental elements? These are issues that need to be settled."

There is also information specific to each instrument that needs to be addressed with the engineer. We'll get down to these issues next.



The drums are often sound-checked first, but only because drummers tend to arrive early for setup.

THE VOCALISTS

During load-in, the engineer needs to be made aware of who is the lead vocalist, who the backing vocalists are, and who is singing which parts (i.e., high and low harmonies). This information helps in mic selection.

During the line check, the engineer is listening for peaks in the singer's vocal range, how to EQ the voice, possible compression settings, and proper mic selection. Therefore, it is important that vocalists attempt to replicate their full-volume singing voice to the extent possible without the band playing. "Sing right into the mic," Willemain advises. "And you have to really *sing*."

THAT KIT CAT

Singing drummers can create special problems for the engineer. "Don't sing," Willemain pleads. "But if you must sing, sing really loud. If there's anything that will hurt a drum sound, it's a live vocal mic hanging overhead." A headset mic is the obvious solution here.

It's wise for drummers to bring two or three snares that differ in dimension and material (e.g., birch, maple, or metal). This gives the engineer the option of choosing the snare tone that best fits the room. New heads help, too.

Willemain feels that it's okay to play during load-in; it gives him a chance to hear the natural sound of the drums on stage. However, not every engineer shares this opinion, so before you start banging, ask. But all agree that once load-in is completed and line check starts, it's important that you wait for instructions. Each engineer has their own method and order for dialing in a drum kit (or any other instrument). Nothing is more annoying than a drummer practicing Neil Peart fills while the engineer is trying to tweak a tom sound.

THE BOTTOM-LINER

During load-in, bass players should inform the engineer of their playing style. Do you pop and slap? Do you use a lot of effects, or do you play dry? Is the amp tone integral to your sound, or is it okay to take a direct signal right off the bass? This all affects whether a direct box is used and how the bass is miked, cabled, equalized, and compressed.

Ideally, Willemain likes to take a direct signal off the bass and mix it with a miked speaker, preferably a 10-inch speaker. That way, the D.I. box provides the highs and lows, and the 10-inch speaker provides the cut and definition. Interestingly,

Upgrade

TO ADAT MASTER TAPE

No Matter which ADAT system you use.

Why? It's because **BASF** is introducing a new adat tape specifically designed to give you the ultimate performance from any adat system. **ADAT *Master*** delivers consistently lower error rates than other brands of tapes on the market — translating into fewer errors on your critical master recordings. And a specially constructed ABS shell provides precision tracking and reduces risk of dropouts caused by static or dirt. A convenient sliding erase-lock tab provides a simple means to safeguard important masters. Available in 40 and 60 minute lengths.

SEE US AT AES BOOTH #968

EMTEC Magnetics

BASF

Distributed in North America by EMTEC Pro Media, Inc. US 1-888-295-5551 Canada 1-800-205-0070 or visit our web site at www.emtec-usa.com

circle #557 on reader service card

Sounds Like a Winner

he notes that a Fender Precision "in the right set of hands" rarely requires much tweaking at the board.

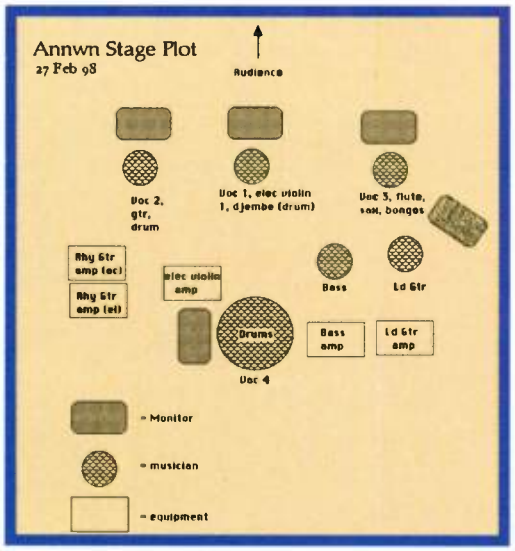
Once a signal is flowing, it helps to play with the kick drum, because typically the bass guitar and kick drum are mixed to complement each other.

THE GUITAR HERO

With the electric guitar, the front-of-house engineer needs to know whether the guitar rig is in mono or stereo and whether separate amps are used for clean and dirty sounds. Let the engineer know if you want a favorite speaker miked. Note that many engineers prefer that the amp be pointed sideways rather than out into the house, thus providing more control over volume at the board.

Be sure to play through all your major changes in tone (clean, dirty, lead, etc.). To give the engineer maximum control over the mix, keep your levels as even as possible. Although a small boost for lead is acceptable, a "thicker" sound of approximately the same volume (to compensate for playing single-note lines instead of chords) is even better. Try stressing the mids and not overdoing the highs and lows. The mids are where a guitar's "cut" resides, and an overabundance of lows in the guitar sound can make the bass guitar sound muddy. Too much emphasis on highs usually results in an ear-piercing, painfully shrill sound that is simply awful.

Playing style makes a big difference when engineering acoustic guitar parts. Is the acoustic guitar mainly strummed, or will you do some soft fingerpicking? This especially affects the compression setting at the board. It is important to play at a consistent volume and as evenly as possible during the line check. In other words, play as you would during the gig.



COURTESY LARRY THE O

FIG. 1: Providing a stage plot helps ensure the band's equipment is placed quickly and properly, and it helps the sound person anticipate possible miking, monitoring, cabling, and acoustics issues. This is the stage plot for the San Francisco–based, "gonzo Celtic" band Annwn.

The tone knobs featured on even the best acoustic/electric guitars pale in comparison to the equalizers used at the board. Therefore, Willemain stresses that

Twice the audio tracks. Half the price.

Introducing Cakewalk Metro 4 for the Mac, the new leader in professional MIDI and digital audio software for project studios.

The new Metro 4 provides up to 64 tracks of stereo digital audio recording and editing – twice as many as other brands. You get real-time audio effects processing, support for third-party Adobe Premiere and VST audio plug-ins, plus powerful multi-track MIDI sequencing. All for a price half that of competing products.

So if you want to produce more for less, put Cakewalk Metro 4 to work in your project studio today. Now available at music and computer stores worldwide.

For more information visit www.cakewalk.com or call 888.CAKEWALK.

Less than $200
(estimated street price)

Feature Highlights:

- Record and edit up to 64 tracks of audio along with MIDI
- Real-time audio effects processing
- Support for third-party plug-ins
- Professional MIDI recording and editing
- Unique MIDI compositional tools
- SMPTE/MTC support for film and video
- Import & export audio for QuickTime movies
- Supports optional Korg 1212I/O, Digidesign AudioMedia III, and Sonorus STUDI/O cards

SEE US AT AES BOOTH #312

Mac OS

BONUS

Includes BIAS SFX Machine Lite multi-effects audio plug-in. Comes with 20 unique special effects presets like Pitch-Shifting, Sitar Drone, and Swept Bandpass.

cakewalk

circle #559 on reader service card

Sounds Like a Winner

the acoustic guitarist should keep the tone knobs of the guitar flat and give the engineer control over the sound.

This next bit of advice sounds like a no-brainer, but be sure to warn the sound engineer when you are about to plug or unplug a guitar. This allows the engineer to mute the channel, avoiding that nasty, speaker-destroying, snap-crackle-pop we all know and hate.

THE KEYBOARD WIZARD

Of all the instruments, it is perhaps most crucial for the keyboard player to hip the engineer to the workings of his rig. Keyboard players sometimes use as many as four synths (or more) and often devise elaborate signal paths for stereo submixes and personal monitor systems. The engineer is most interested in achieving maximum control over volume and needs to know how to take a signal from each separate tone module *before* it reaches the submixer. The submixer's sole purpose should be to control the keyboardist's personal monitor system on stage, not to feed the main mixing console.

Note that there are legitimate exceptions to this, and some keyboardists will not permit this type of setup, whether the sound engineer likes it or not. Sometimes, you have designed specific sounds that require calculated, tightly controlled layering of multiple synths. The sound engineer cannot possibly achieve at the gig what has taken you months of sound design and testing. In this case, you will just give the engineer a stereo feed from the submixer. However, that means you have much more responsibility for balancing your levels during the performance, and if you blow it, you will have a very unhappy sound engineer, not to mention an unsatisfactory band sound. If you choose this approach, be

Annwn Input List

27 Feb 98

1	Vocal 1	mic
2	Vocal 2	mic
3	Vocal 3/Flute	mic
4	Vocal 4	mic
5	Electric Violin	DI or mic (amp)
6	Sax	mic
7	Rhythm Gtr (acoustic)	DI*
8	Rhythm Gtr (electric)	DI or mic (amp)
9	Ld Gtr	DI or mic (amp)
10	Bass	DI*
11	Bongos	mic
12	Djembe	mic
13	Kick	mic
14	Snare	mic
15	Rack Tom 1	mic
16	Rack Tom 2	mic
17	Floor Tom	mic
18	Hi-Hat	mic
19	Drum Overhead L	mic
20	Drum Overhead R	mic

NOTES:

1. DI* = has built-in DI w/XLR out.
2. Others marked "DI" have line level TS jacks built-in or, at engineer's discretion, amps can be miked instead.

COURTESY LARRY THE O

FIG. 2: A stage plot should always be accompanied by an input list. This input list accompanies the Annwn stage plot shown in Figure 1.

SONIC ROCKET

creamw@re
fidelity at work.

There are many cards that give you I/Os.

There are some cards that provide mixing.

But there is nothing like PULSAR.

The Pulsar DSP board brings it all together - integrating mixing, effects, sampling and synthesis, all at the highest digital standards, in one ultra-powerful and compatible DSP environment. We just brought desktop audio to a new level.

A world of DSP modules.

- fully featured 24 channel digital mixer
- EQs, Dynamics, Delays and more
- sensational synthesizer devices
- high performance sample player
- powerful Third Party platform

Ultra powerful DSP Engine.

- PCI board for PC and MAC
- 4 x 60MHz Analog Devices SHARC
- zero latency multi processing
- multi channel, polyphonic

I/Os and - ultimate quality.

- 20 channels In
- 20 channels Out
- 2 x ADAT, S/PDIF + analog
- 96kHz support
- 24 bit resolution
- 19" analog expansion via optional A8, A16
- int. SCOPE bus connector
- MIDI interface
- MME- and ASIO-drivers

PULSAR

COMPATIBLE

Much more than I/Os and mixing. Pulsar is the ultimative audio engine to drive your audio sequencer.

ALL for just $1,298 US MSRP!

Available: September '98

http://www.creamware.de
http://www.creamware.com

You´ll never guess where our latest idea came from.

CreamWare US Inc / Sales 1-800-899-1939 / Fax (604) 435-9937 email: info@creamware.com
circle #561 on reader service card

S*o*u*n*d*s Like a Winner

prepared to shoulder the responsibility.

Once signals are established, it is important to play scales that run the entire length of the keyboard. This allows the engineer to check for "hot spots" in the frequency range. As long as the synth player has programmed approximately equal volume levels between patches, few EQ adjustments and added effects are typically necessary from the board.

If you play through a Leslie speaker, however, be sure to inform the engineer of this—as if the engineer can't see the huge wooden box next to your keyboard! More importantly, let the sound guru know how you want the beast miked. For example, miking the rotating horn on opposite sides and panning the signals hard left and right enables the engineer to create a powerful stereo sound. On the other hand, placing one mic on the horn maximizes the vibrato.

FIDDLING ABOUT

As with bass guitar, it is important to tell the engineer where to take the fiddle signal off your rig. Some players like a miked-amp sound, whereas others want to preserve the acoustic quality of the instrument by using a D.I. box.

According to Willemain, if a violin, for example, is played through an amp, it's good to provide a sample of the amp tone while the engineer is still on stage. This allows the engineer to make a mental note of the sound and try to re-create it through the house mix. Willemain says that he notices more variance in tone between fiddle players than with any other instrument. If there is common ground, however, it's that players who use an amp typically dial in too much bass.

It's also good to keep in mind that the acoustics of the stage and room affect your sound and might unexpectedly reinforce or cancel certain frequencies. Standing near your stage amp, you might hear a fat sound, but other band members and people in the audience could be hearing mud.

STEELIN'

Of all the common band instruments, a steel guitar is the most dynamic, because a volume pedal is constantly used to create swells and other effects. This makes the instrument a challenge to mix.

Steel guitar is almost always miked, and the engineer's goal is to re-create the original tone through the house mix. The most important piece of information an engineer wants about the steel guitar is where the top end of the volume swell is going to be. That way, the engineer can prevent too hot of a signal from coming into the board.

BLOW HARDS

Horns are tricky because there are many peaks and dips in volume throughout the range of a wind instrument. In addition, horns have a wide dynamic range. When sound-checking any horn, it is important to play a scale that spans the instrument's range. This helps the engineer to discover hot spots.

On the saxophone, a common technique is to "pop" the reed to achieve a pronounced attack. This can easily clip a microphone, so if you use this technique, be sure to give the engineer a sample. This helps when choosing the proper mic and compression setting.

Trumpet and trombone players are often advised to provide a "shield," which is typically a circular piece of plexiglass that fits around the microphone. If the engineer provides one for you, use it; it allows you to face the audience without tearing their ears off.

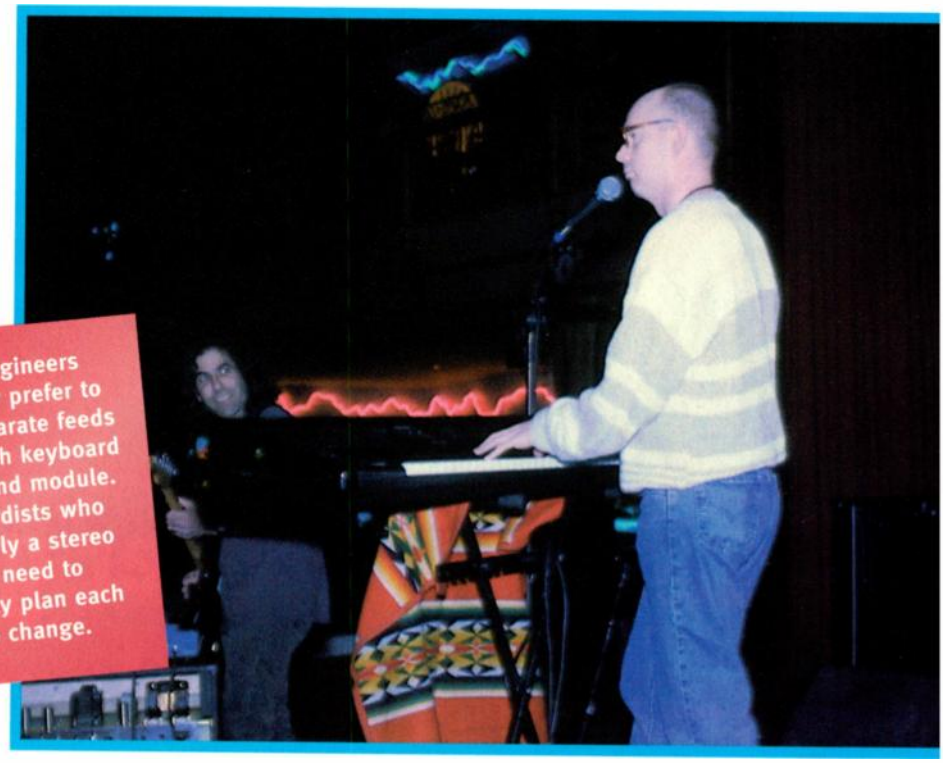
According to Wakefield, flutes are most often played by a vocalist through the vocal mic. It's a good idea to inform the engineer that a flute is to be used on selected songs. Be sure to both sing and play through the mic, giving the engineer an opportunity to compare levels.

PRACTICAL PERCUSSION

The key to a good percussion sound is reproducing the nuances of the instruments. A percussionist should play around the kit as he or she would during a performance. Play through the entire dynamic range, and hit various percussive devices simultaneously. The engineer is listening to see if, for example, the timbale is obscuring the conga. In an effort to help the engineer allow all instruments to cut through, play with a crisp attack and beware of excessive ringing.

THE SOUND CHECK

Now that line check is completed, it's time to start the actual sound check. Because a mix reacts differently in an empty room than it does when a room



Sound engineers generally prefer to take separate feeds from each keyboard and sound module. Keyboardists who send only a stereo submix need to carefully plan each volume change.

A real pro is pro Reality™

"I'm a big fan of the concept of software, the concept of synthesis, and the concept of Reality."

Rob Arbittier, co-founder of Noisy Neighbors Productions, writes and records music for TV and for movie trailers and has numerous album production credits. Much of this work is done in his state-of-the-art digital home studio. With a busy schedule of music production at multiple levels, Rob counts on the best tools to complete his work. He needs power, reliability, and performance. That's why he chose Reality as a crucial part of his studio.

"I've always been fascinated with the original synthesizers, the modular patchable synthesizers, and the evolution from those giant Moog modular systems to what we have today. The thing that got me excited about Reality was that I knew it was going to be very flexible and that it would model in software the types of synthesis that I've always loved in hardware. It's a new approach to the kinds of sound generation that I've used for many years.

"I love the fact that it's so easy to design sounds on the screen. I use it the way I would have used a modular synthesizer 20 years ago. It's a very quick, easy way for me to design a sound from scratch.

"I use Reality as a stand-alone synthesizer because I don't like having my computers multi-task during a session. I like being able to look up at any one screen and see everything that computer is doing during the session. I keep it on the PC that's right next to the Cubase VST™ PC, so while the sequencer is playing I can be fiddling with the sounds on the Reality PC. I have Reality installed on a machine that has a high quality digital output. When you hear Reality through a digital out, the richness of the sound it generates is just amazing."

Works with most soundcards!

Rob's work can be heard on albums by many artists, including Stevie Wonder, Michael Jackson, Whitney Houston, Ray Charles, Stevie Ray Vaughan, and Diana Ross. He has scored hundreds of television commercials for companies such as Coca Cola,® Anheuser-Busch,® Kodak,® and the four major television networks. Recent film trailers include *Godzilla*, *Les Miserables*, and *One Night Stand*.

For more information about Reality professional synthesizer software and Rob, visit our website at www.seersystems.com or call us toll-free at 888.232.7337.

Seer Systems™

301 South San Antonio Road, Los Altos, CA 94022

circle #562 on reader service card

Sounds Like a Winner

is filled with screaming, carbon-based life forms, achieving the perfect mix the engineer's goal is not to at this time. The sound person wants to achieve a decent working mix, and more importantly, know what sound to expect from the stage. Every engineer's preferences are different, so ask when to play, whether the band should play an entire song or just a verse and a chorus, and what type of song to play.

According to Willemain, most engineers want to hear the dynamic range of the band. "I usually want the band to play a medium-tempo song first," he says. "An average, middle-of-the-road song lets me get the bugs out of the monitor mix. Once we have the monitors where everyone is happy, I'll ask them to hit me with their loudest song. Then I'll ask them to play a ballad for contrast."

Within these parameters, try to incorporate songs that feature a variety of instruments, such as that flute solo the singer plays during the epic closer. Guitarists should attempt to sound check songs that allow them to play through as many of their effects and distortion presets as possible. Also, be sure to sound check songs that provide an opportunity for each backing vocalist to sing.

SETTING THE STAGE

Stage volume is an issue for all instruments because if too much sound is coming from onstage, it's impossible to create a house mix. Too much direct sound from the stage is only part of the problem here; mic bleed can make it impossible to separate the signals, so you cannot process and balance the various instruments and voices.

Keep stage amp volume down to a level where the instrument can be clearly heard by those onstage, but not necessarily by the entire audience. "Quiet is the key; use just enough volume to do your job," Willemain says. "I think that a lot of musicians forget that they're playing for the audience and not themselves. Guitar players should be especially volume-conscious. It's also important not to take offense at requests for lower volumes. The engineer knows the room and is mixing for the benefit of the entire band."

STICKING POINTS

Remember, sound check isn't rehearsal. The engineer needs the smoothest performance possible. If you want to teach the bassist a new tune, ask if it's okay after sound check is over.

According to Willemain, the most common problem with inexperienced bands is something he calls "sandbagging," which means playing quietly during sound check to appease the engineer, then cranking up the amps at show time. In the eyes (and ears) of the sound person, few things demonstrate a greater lack of professionalism.

"When sound check is done, I always ask the band to glue their volume controls so they can't turn up any more," Willemain concludes. "They laugh, but they know I'm serious, too."

Brett Ratner *is a Nashville-based freelance writer and musician. He can be reached at ratocaster@mindspring.com.*

circle #563 on reader service card

Pure Gold Sound Investment

THE ULTIMATE SOLUTION TO DIRECT-TO-DIGITAL RECORDING

Gold Channel

DIGITALLY ENHANCED MIC. PREAMP

HIGH-END
TWO-CHANNEL MIC. PREAMP

CUTTING-EDGE
24 BIT AD/DA CONVERSION

POWERFUL
48/96 KHZ DIGITAL PROCESSING

INPUT

- Stereo/Dual Mono Mic preamp
- True 48V Phantom power
- 24 bit AD Converters
- Lo Cut Filter
- Soft Limiter
- AES/EBU
- S/PDIF
- ADAT™

PROCESSING

- 48/96 kHz internal dynamics processing
- Expander/Gate
- Compressors
- EQs
- De-esser/Dynamic EQ
- DRG™ Digital Radiance Generator
- Microphone Time Alignment Delay
- M/S Encoding/Decoding

OUTPUT

- 24 bit DA Converters
- AES/EBU
- S/PDIF
- ADAT
- Analog XLR
- Simultaneous Analog and Digital Outputs

RECALL THE MAGIC: Versatile factory presets and custom user banks enable you to save the exact settings from your favorite recordings and recall them at will, saving you hours of work in the studio.

t.c. electronic
ULTIMATE SOUND MACHINES

TC ELECTRONIC INC., 790-H HAMPSHIRE ROAD, WESTLAKE VILLAGE, CA 91361, USA · PHONE: (805) 373 1828 · FAX: (805) 379 2648
EMAIL: INFOUS@TCELECTRONIC.COM · HTTP://WWW.TCELECTRONIC.COM
TC ELECTRONIC A/S, SINDALSVEJ 34, DK-8240 RISSKOV, DENMARK · PHONE: + 45 8621 7599 · FAX:+ 45 8621 7598

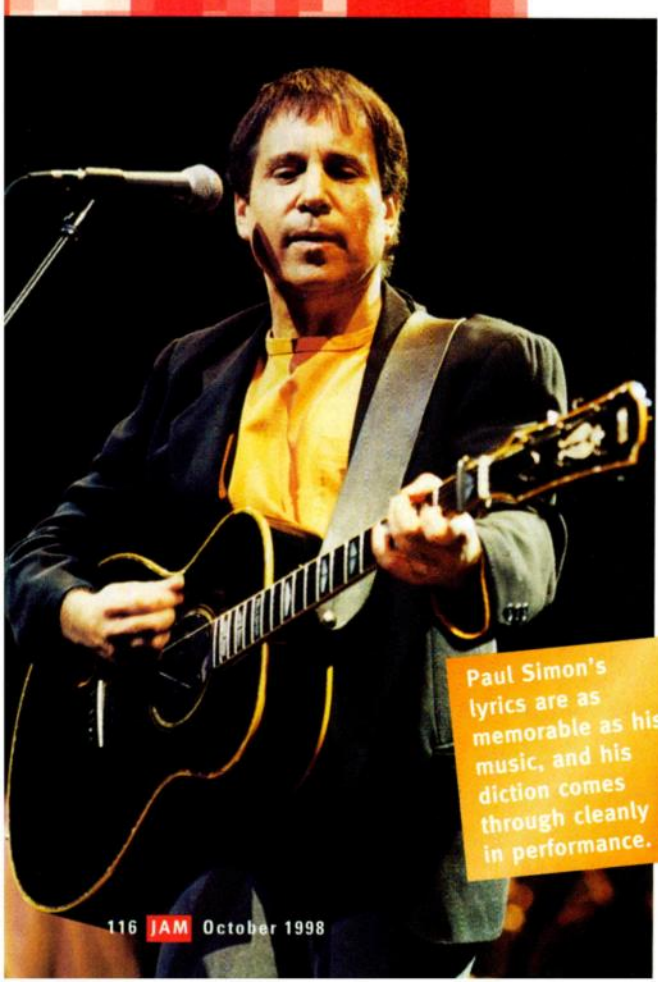
Vox

By Joanna Cazden

Perfect Mic Technique

As the house lights go dark, I look up from the program to see the first performer of the evening, a solo singer/songwriter, stride onto the stage. The artist moves to the mic, strums her guitar, and tests her foot-pedal drum sounds. She starts her first number, and suddenly I'm frowning, puzzled. It's not that I can't hear her voice; her tone is gutsy, sincere, and adequately balanced with the instruments. A few of the lyrics are clear, but most of the words are mushy or simply missing. The only thing I'm sure of is the hook, which repeats a lot. I figure the sound person will have things cleaned up soon, but the second song is no better.

By now, I've gone from relaxed listener to vocal analyst. What's wrong? The sound engineering? The performance? The hall? I can't quite peg the problem until the set is over and the next act—a duo—starts in. I'm effortlessly drawn into their stories. Even with their British dialect, every word is audible and understandable.



Paul Simon's lyrics are as memorable as his music, and his diction comes through cleanly in performance.

Getting the message across. Maybe you have the best mic in the world, a great P.A. system, and an engineer who knows every nuance of the hall and your material. Still, all of this is useless if your words don't make it into the mic in the first place. Your mic position, diction, and attitude must all come together so your lyrics fly through the P.A. and into the hearts of your audience.

Unless you're using a headset microphone, the first challenge is to position the mic so it captures your voice but doesn't hide your face. Generally, pointing the mic toward you from slightly below your mouth—aiming at your chin—lets you communicate easily over the top of it without sacrificing tone quality.

Placement is easy if you use a handheld mic. But for those of us who play an instrument as we sing, coping with a mic stand might be unavoidable. Don't place the mic so high that you have to stand unnaturally tall to reach it, but don't set it so low that you'll slouch. Instead, adopt your best, most confident onstage posture, with your instrument in place, and then bring the vocal mic in to meet you.

Each mic has its own sensitivity pattern and ideal distance from the sound source. In some situations, you need to "eat" the mic, nearly touching it with your lips. Other gear and environments allow you to be several inches away. It's most important to be consistent; once you've established an effective distance during the sound check, maintain the same position throughout your set.

"But," you protest, "that's so boring! How can I communicate my emotions while standing still?" I'll tell you how: by feeling the truth of every word you sing and making sure that the meaning of the words—as carried by your unique vocal style—is clearly audible and intelligible to listeners. If your lyrics are well-written, sung with honesty and commitment, and easily understood, people will pay attention. Unless it is specified that your job is to dance, to provide visual entertainment, think of stage movement as an accompaniment to the song. It should be an extension of your voice and lyrics, not an excuse for garbled words and sloppiness.

PHOTO BY STEVE JENNINGS

Plug in a QCard...It's a Whole New Synth

Alesis synthesizer

You don't have to install complicated circuit boards or download sounds from a disk to expand your Alesis synth. QCards offer hundreds of new sounds that are set up and ready to use the second you plug them in. You can also use the expansion slots to bring in your own samples or play sequences using our SoundBridge® software, included with all expandable Alesis synths.

You can hear the QCards in action on the new QCard Audio Demo CD. Pick up a free copy at your Alesis dealer, or call us and we'll send it to you. It's packed with songs created using only QCards and internal sounds from Alesis synths.

Obsolescence is ugly. When you run out of new sounds in your synthesizer, you may run out of new ideas for compositions. Worse, you may not find the inspiration you need for your best performances.

The answer: QCards™. Much more than simple program cards, QCards are powerful, innovative sound ROM expansions for compatible Alesis synthesizers. Each card holds up to eight megabytes of completely fresh, brand new samples, allowing you to customize your synth sounds for the precise style of music you play. Plus, at a fraction of the cost of a new keyboard, QCards offer the one thing that every musician needs most: superb creative inspiration.

Think you need a whole new synth to motivate your creativity? Try a QCard instead. Plug one in at your Authorized Alesis Dealer today.

Pick a card, any card. There's a QCard for every performance and composition style...choose from Vintage Synthesizers, Vintage Keyboards, Stereo Grand Piano, EuroDance, Sanctuary, Hip Hop, Rap Techno Dance or Classical, with new cards being developed all the time. Plus, they're compatible with all expandable Alesis synths, including the entire QuadraSynth® family and QS Series™.

To check out the QCards for yourself, see your Authorized Alesis Dealer. Or, call us at 800-5-ALESIS to get a free copy of the QCard Audio Demo CD. If you're on the net, visit the Alesis site to check out QCard audio files.

ALESIS

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

circle #565 on reader service card

How do you get to Carnegie Hall? An excellent way to practice is to set up a mic stand in front of a full-length mirror at home. (Doesn't every recording star have a childhood memory of holding a hair brush like a microphone and singing in front of the mirror in their parents' bedroom?) Go through your material and watch yourself from a detached, nonjudgmental point of view. Simply observe and identify what you want to improve step-by-step.

Do you appear comfortable, or awkward? Do you tend to back away from the mic, or sneak up too close as you loosen up? Do you keep your body in a comfortable, close relationship to the mic stand but scatter the lyrics by moving your head a lot as you sing, causing fluctuations no engineer could fix? Do you keep your eyes closed, thus losing visual orientation to the mic and limiting communication with the audience? These habits can be corrected with careful observation and practice.

Once you've established a consistent, comfortable posture, you can try variations for different emotional effects: whisper closer to the mic during more intimate phrases, or shift your head so the mic picks up the corner of your mouth for a change of tone or a "throw-away" comment. Most experienced vocalists pull away from the mic at their highest dynamic levels or to help shape a fade-out ending. You can learn to "play" the mic and its surrounding space, just as you play your instruments.

If you have access to a video camera, ask a friend to tape you performing, then critique yourself as you watch the tape. Force yourself to observe your technique, such as your diction and mic placement, instead of focusing on your bad hair day or other distractions. Look out for showcases or karaoke clubs where you can be videotaped with a live audience. This service is rarely free, but it can be a valuable eye-opener. Some voice teachers routinely use video feedback, so ask around. And *always* do a test video—or several—and work on your weak areas before producing any kind of video demo tape.

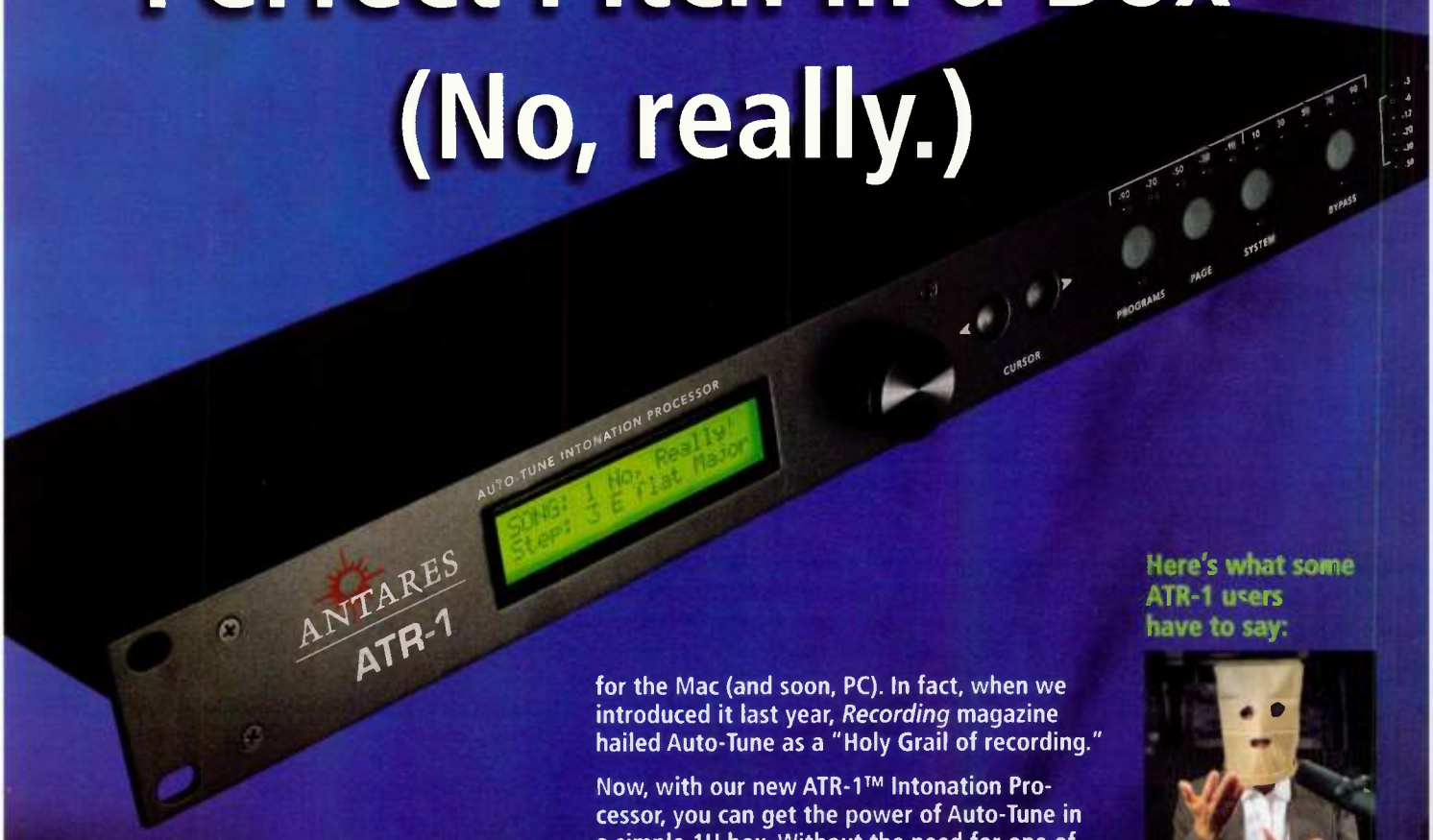
If you must dance or move a lot on stage, invest in a wireless headphone mic system. Otherwise, *channel that physical energy into the message of the song.* Concentrate on sending a clear, crisp, honest vocal signal from your gut, throat, and lips, funneling it through that small mic to reach the full sweep of the sound system. Practicing this type of performance discipline demonstrates your professional attitude. It shows that you're willing to meet the needs of your listeners in addition to your own needs for spontaneous self-expression.

Backstage. Back at the music festival, I see the unfortunate soloist after the show, and she looks fidgety and restless. She talks rapidly in short bursts, and darts her head forward and back, bird-like, as she chats with friends. No wonder her lyrics had not come through well. She'd probably spent half of her set off-mic and the other half either rushing or swallowing her words. On a personal level, I'd guess she was nervous and hadn't had much training. We all start somewhere.

When I was a novice performer, I remember viewing the stage equipment as if I was in the dentist's office: lots of metal thrust at my mouth and not all of it friendly! So I tip my hat to anyone who dares to sing their own truth in front of strangers. But if you're going to take on that challenge, you might as well do the extra work to be understood.

To order **Joanna Cazden's** Vocal Health *booklet or* Visualizations for Singers *guided-imagery tape, call toll-free (888) 522-9336.*

Introducing Perfect Pitch in a Box (No, really.)



OK, let's be honest. For most of you, "Perfect Pitch in a Box" is right up there on the credibility scale with Elvis sightings and miracle three-day weightloss. Unless, of course, you happen to be one of the thousands of audio professionals who already depend on Antares's amazing Auto-Tune™ pitch-correcting software for the Mac (and soon, PC). In fact, when we introduced it last year, *Recording* magazine hailed Auto-Tune as a "Holy Grail of recording."

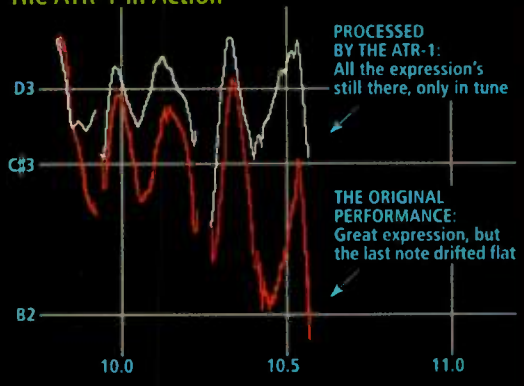
Now, with our new ATR-1™ Intonation Processor, you can get the power of Auto-Tune in a simple 1U box. Without the need for one of those pesky computers.

Simply stated, the ATR-1 corrects the pitch of a vocal or solo instrument, **in real time**, without distortion or artifacts, while preserving all of the expressive nuance of the original performance. Really. All the rest is just details.

Naturally, even those details are cool. Like the ability to eliminate vibrato from a performance. Or add it. Like being able to provide target pitches in real time via MIDI. Like a Song Mode that makes the ATR-1 as easy to use live as it is in the studio. Or a pristine 20-bit data path with 56-bit internal processing, so the only difference between what goes in and what comes out is the intonation.

Of course, words are cheap (well, actually, when printed in a magazine ad like this they're fairly expensive). But hearing is believing. Try out the ATR-1 at your local Antares dealer or call us for a free demo CD. Either way, we're confident you'll be convinced. No, really.

The ATR-1 in Action



Here's what some ATR-1 users have to say:

"With the ATR-1, vocal sessions can focus on attitude, not intonation."
~MADAME MARIE CURIE*

"Nothing helps your peace of mind on tour like an ATR-1 in the rack."
~FRANZ KAFKA*

*not their real names

SEE US AT AES BOOTH #400

ANTARES AUDIO TECHNOLOGIES 11768 Atwood Drive, Suite 13, Auburn, CA 95603 | www.antares-systems.com
Distributed by Cameo International, Inc. | US and Canada: 888 332 2636 | from Overseas: 408 399 0008

ANTARES
REALLY COOL STUFF FOR MAKING MUSIC

circle #567 on reader service card

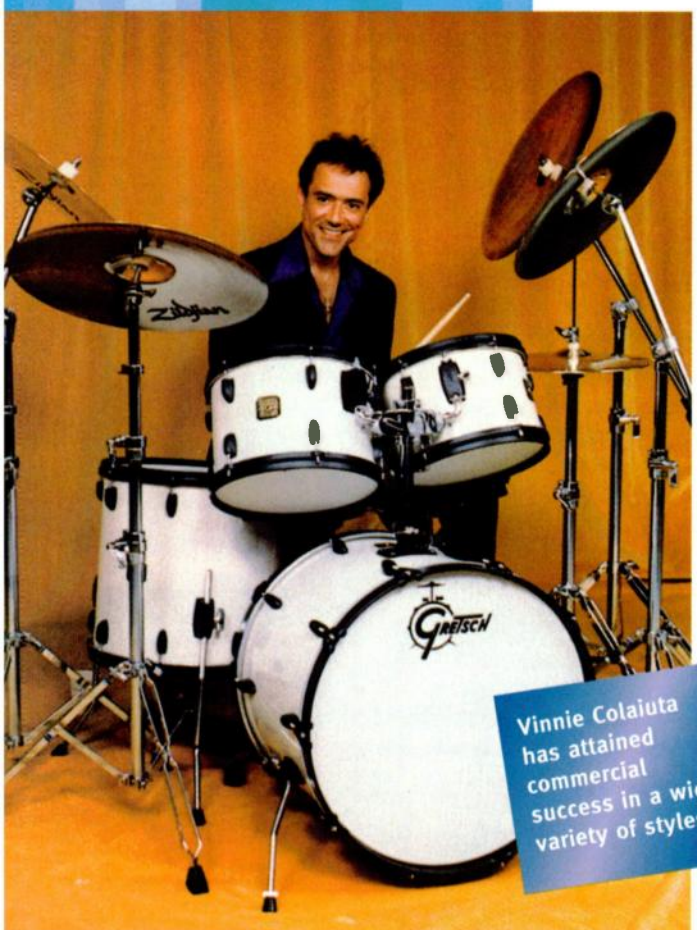
riffs

By John Hvasta and Brian Knave

Drum Style Checklist

Versatility is one of the freelance drummer's strongest suits. It means being able to go from a light "dinner jazz" set played with brushes to a hard-hitting dance set by night's end, as well as knowing how to groove with a different rhythm section every night of the week. To be prepared for any call, you should have a strong background in all forms of American music, as well as in certain non-indigenous styles commonly played here.

The styles you should be able to cover include blues, country, jazz, funk, rock, reggae, ballroom, Cajun and Zydeco, and certain rhythms of Latin, Cuban, Caribbean, and African origin. Of course, some styles overlap, and many beats can be used in more than one setting; but no matter how you slice it, that's a lot of ground to cover! Let's go down the list and touch on the beats that comprise each style.



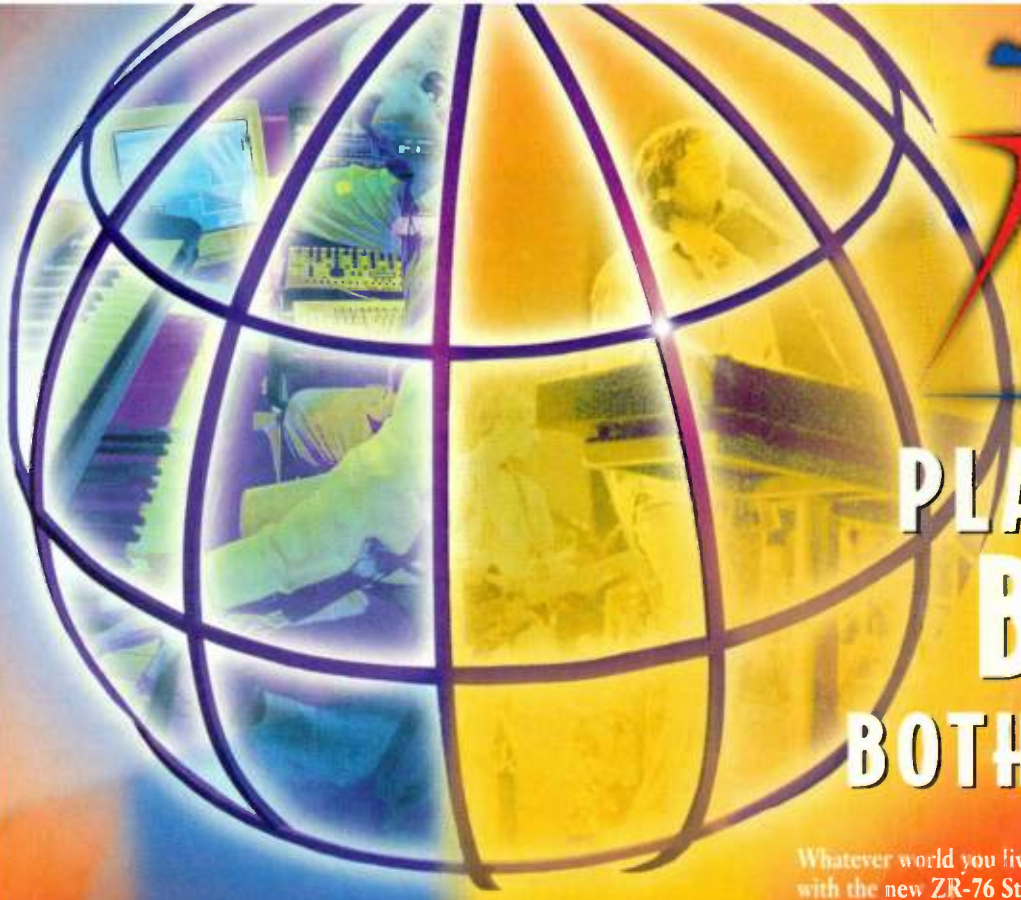
Vinnie Colaiuta has attained commercial success in a wide variety of styles.

Blues, country, and Cajun. Traditional blues beats include shuffles, 12/8 beats, the "Bo Diddley" beat (both tom and backbeat varieties), and the blues rumba. Shuffles can be further broken down into rock style, Chicago "two-fisted" or "double-pump" style (in which both hands play the shuffle pattern, typically over a "four-to-the-floor" kick-drum ostinato), and half-time shuffles (á la Bernard Purdie and John Bonham). More modern blues styles include straight-eight backbeat grooves, funk, and just about anything else imaginable. You can check out traditional blues drumming styles on a blues anthology such as Alligator Records' *20th Anniversary Edition of the Blues.*

Among the traditional country beats are bluegrass, country swing, and rockabilly. The basic bluegrass beat, with accents on the two and four, is often played with brushes or Hot Rods but can also be played with sticks. A variation is the "train" beat, a sixteenth-note pattern with accents on beats one and three. Traditional country swing is similar to certain early jazz styles, with a consistent, unadorned beat (check out Bob Wills's records). Rockabilly was well exemplified by the Stray Cats. Modern country styles are primarily rock- or shuffle-based and can be heard on many radio stations.

New Orleans–based drum styles evolved in part from parade drumming, but they also draw from blues and country traditions. The basic Cajun beat, for example, is similar to a bluegrass beat but is typically played with sticks and has a different emphasis. Zydeco is a mix of Cajun and blues, and uses Cajun, rock, and blues beats. Second-line drumming involves march-style snare parts loosely interpreted (typically with triplet subdivisions) over a syncopated kick drum. Baby Dodds and George Wettling were great exponents of the old school of New Orleans drumming; contemporary players you should check out include Herlin Riley and Johnny Vidacovich.

Jazz, bop, and big band. A helpful way to think of jazz drumming styles is in terms of the music's historic development from early Dixieland and big band



ZR-76

PLAY the BEST of BOTH WORLDS

The Studio is your creative domain. Find the perfect sound, compose a hot lick, and record it whenever inspiration strikes... the ZR-76 is ready.

The Stage allows no second chances. When the crowd is hanging on every note, you need power, speed, and reliability... you need the ZR-76.

Whatever world you live in, ENSONIQ brings out your best with the new ZR-76 Stage and Studio Keyboard. The ZR-76 packs the essential features that will take your performing and recording to the next level.

- 76-key Weighted-action Keyboard
  Lay your hands on it and see the response
- Perfect Piano™ by William Coakley
  Fire it up – and prepare to be amazed
- Sound Finder and Favorites Buttons
  Navigate the 1200 world-class ROM sounds with ease
- Drum Machine
  Feel the power of some of the best grooves on earth
- Idea Pad
  It's always on, so you'll never lose that killer riff
- Standard MIDI File
  The ZR-76 is compatible with musicians worldwide
- EXP Expansion Boards
  Update your instrument with inspiring new tones

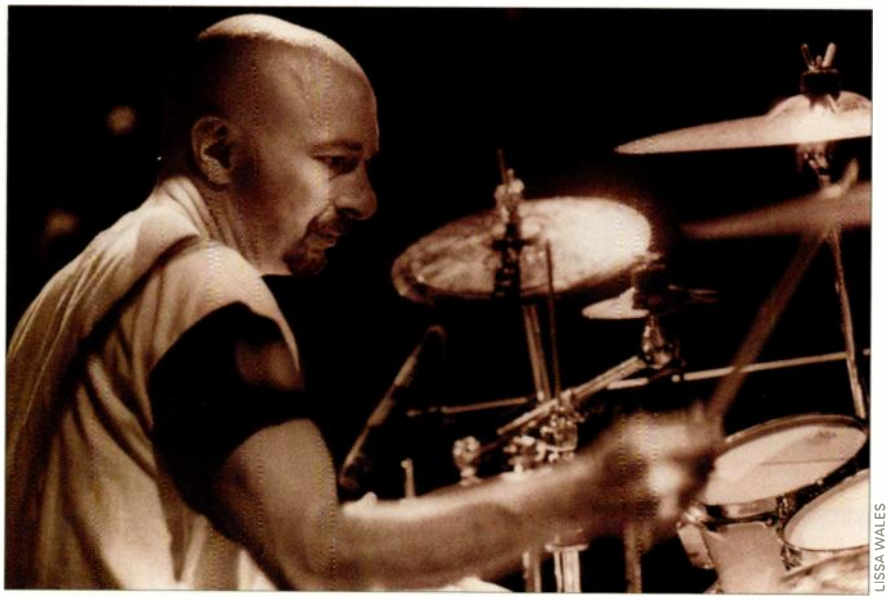
ENSONIQ™

LEADING THE WORLD IN SOUND INNOVATION

Rule your world with the ENSONIQ ZR-76. For the whole scoop check out www.ensoniq.com. Or better yet, spend some time with the new ZR-76 at your local ENSONIQ dealer.
You deserve to play the best!

ENSONIQ Corp 155 Great Valley Parkway P.O. Box 3035 Malvern, PA 19355-0735 (610) 647-3930 *fax:* (610) 647-8908

circle #568 on reader service card



LISSA WALES

Whether it's straight-up rock or straight-ahead jazz, former "Journeyman" Steve Smith covers all the musical styles with aplomb and finesse.

through bebop, post-bop, and modern. Dixieland is characterized as much by instrumentation (the "traps": cowbell, woodblock, splash cymbals, etc.) as syncopation, and it incorporates New Orleans second-line–type licks in the context of a rollicking swing beat. It overlaps to some extent with big-band styles.

Big band drumming relies predominantly on a solid swing feel punctuated by fills designed to "set up" instrumental sections and soloists. The primary concerns are to hold the band together (classically, there are eighteen players) and to create energy, playing authoritatively and with solid, steady time. Big band also typically requires strong reading skills. You must be able to read and execute exact figures in unison with the trumpets, trombones, and saxophones, while texturally complementing each section. Big band drummers to listen to include Chick Webb, Buddy Rich, Louis Bellson, Mel Lewis, and Ed Shaughnessy; also check out bands led by Benny Goodman, Glen Miller, Stan Kenton, Dizzy Gillespie, Billy Eckstien, Woody Herman, Duke Ellington, and Count Basie, to name a few. An excellent book that explains how to read and interpret big-band drum charts is *Studio & Big Band Drumming* by Steve Houghton.

Later jazz styles—bebop, post-bop, and modern—are typically played in smaller groups and allow for more interaction and improvisation. Often, the drummer must play from a "fake book" chart or simple lead sheet, which provides only the chord progression, melody, and basic form of the song. It's also important that the drummer be able to play comfortably at all tempos, both with sticks and with brushes, and with good control of dynamics.

Bebop drumming is characterized by kick and snare drum syncopations played independently beneath a steady swing beat on hi-hat or ride cymbal, with stepped hi-hat on beats two and four. Suggested listening includes recordings by Charlie Parker, Dizzy Gillespie, and Miles Davis, circa 1949 to 1955. (Look for examples with Kenny Clarke, Max Roach, or Art Blakey playing drums.) The bible of bop drumming is Jim Chapin's *Advanced Techniques for the Modern Drummer.*

In post-bop drumming, which evolved after 1955, the drums are not confined to rhythm-instrument status. Specifically, the right hand and left foot (ride cymbal and hi-hat) are no longer restricted to ostinato parts; rather, they intermix freely with the other limbs to play time and interpret the music. Recommended examples are mid-1960s Miles Davis with Tony Williams on drums, and Bill Evans with Paul Motian or Jack DeJohnette on drums. In modern jazz drumming, of course, practically anything goes, from free-form to straight- up rock and funk beats.

Rock, funk, and fusion. Rock styles include not only contemporary pop beats but numerous "periods" of rock drumming as well. Bandleaders have a huge inventory of rock songs to draw from, any of which may require a distinct beat, sound, or "attitude." The best approach is to familiarize yourself with as many "schools" of rock as possible. Consider, for example, the many different drum styles represented by the following artists: Buddy Holly, the Beach Boys, the Beatles, the Rolling Stones, Aretha Franklin, James Brown, Jimi Hendrix, the Allman Brothers, Led Zeppelin, Yes, The Who, The Band, the Bee Gees, the Talking Heads, the Red Hot Chili Peppers, U2, and Metallica. The better you can replicate the feel of "classic" rock songs, the more valuable you'll be as a freelancer.

"Funk" can describe many different grooves but generally refers to rhythms with a displacement of snare and/or bass hits: that is, putting them in unexpected, "funky" places within the measure. Check out Tower of Power with David Garibaldi, Sly Stone with Andy Newmark (especially the album *Fresh*), and anything by James Brown and George Clinton. An excellent book is *Advanced Funk Studies* by Rick Latham.

Fusion is another category that encompasses many kinds of music; typically, though, it refers to rock "fused" with jazz. The patterns tend to be busy and complex. Fusion beats may also be written in odd time signatures, most often 5/4, 7/4, or 9/4. An excellent book on odd time-signature playing is *Even in the Odds* by Ralph Humphreys.

Nonindigenous styles. Traditional (or "roots") reggae places the kick drum where rock places the backbeat (snare drum) and includes one-drop, two-drop, and four-drop patterns—i.e., patterns that put the kick drum on one, two, or all four beats per measure, respectively. (Four-drop patterns are commonly heard in ska.) Roots reggae drumming is further characterized by the frequent use of cross-stick accents on the snare and distinctive fills on toms and timbales. Modern reggae, however, is commonly played rock-style (often on electronic drums), with pronounced downbeat kick drum hits and snare drum backbeats.

Common nonindigenous styles for the drum set include bossa nova, samba, rumba, tango, cha-cha, and merengue. Less common are guaguanco, songo, soca, baion, and 6/8 Afro-Cuban or African nanigo. Many of these beats require multiple drummers to play them authentically; therefore, the set drummer usually plays them "ballroom" style rather than traditionally. (Ballroom style simply means a streamlined adaptation for the drum set that captures the essence of the authentic pattern.)


TRINITY V3
The world's most dazzling workstation and the widely acclaimed Z1 synth have just joined forces. The new V3 gives you Trinity's PCM and Z1's sound modeling architectures in one keyboard. Plus, new combinations and an additional 64 programs. The Z1 board is also available as an option for current Trinity owners.
new
Now you can get the FlashROM and SCSI options, plus a CD-ROM of the industry's best drum loops (a $900 value) for only $500!
See your Korg dealer or www.korg.com for details. Offer good while supplies last.
KORG
Super sonic.
© 19[illegible] Korg USA, 316 South Service Road, Melville, NY 11747. For the Korg dealer nearest you: (800) 335-0800 • For more info via faxback call: (516) 393-8530 doc # 3901
circle #569 on reader service card

riffs

For authentic band-style samba, Chick Corea's recording of "Light as a Feather," with Airto Moreira playing drums, is illuminating. Also, Moreira's book, *Spirit of Percussion,* provides a comprehensive understanding of Brazilian rhythms. Another highly recommended text is *Afro-Cuban Rhythms for Drumset,* by Frank Malabe and Bob Weiner. It comes with an audio tape demonstrating how the rhythms sound, both with their traditional instrumentation and as adapted for the drum set. For an instructional video on Latin and Caribbean drum styles, *Funkifying the Clave,* by Lincoln Goines and Robby Ameen, is an excellent choice.

Other ballroom styles you'll need to know are the waltz, ballad, and polka. Listening to other drummers live is a great way to learn ballroom patterns. Also, listen to recordings of artists such as Peggy Lee, Vic Damone, Frank Sinatra, Tony Bennett, Nat King Cole, and Ray Charles.

Bringin' it down. One point we want to emphasize is the importance of brush playing. Obviously, certain styles will require brush work (e.g., jazz ballads); because you will occasionally have volume constraints, you should be able to make *any* style of music happen using only brushes. So, practice playing rock and funk beats, as well as rudiments, with brushes. Some great brush stylists to study are Ed Thigpen, Philly Joe Jones, and Clayton Cameron. Each of these players has also produced an instructional method: *The Sound of Brushes,* by Thigpen (book and cassette tape); *Brush Artistry,* by Jones (book); and *Living Art of Brushes,* by Cameron (videotape).

For an excellent set of texts that covers most of the styles discussed here and more, check out *Essential Styles for the Drummer and Bassist,* by Steve Houghton and Tom Warrington. There are two volumes, and each one comes with its own play-along CD that demonstrates the various styles. Whether you use a comprehensive course like this one or go digging through record bins, develop a well-rounded background and you'll be the most sought-after drummer in town.

John Hvasta *is vice president of Drummer's Helpers, Inc., creators of "Air Stix" quick-warmup sticks and other products for drummers, and the author of* New Age Drum Set Movement. *He has been playing drums for 40 years and teaching drums for 27 years.* **Brian Knave** *has been playing drums for 23 years and teaching drums for 10 years.*

new waves in digital audio

"... it's unbelievable, these are monsters"

A swell has been building out west signaling a new era in digital audio. Although some attribute it to El Niño, those in the know credit Midiman for this exciting new wave of digital audio products.

The Pipeline 8x8, a 24 bit ADAT audio converter, combines 24 bit A/D and D/A with wordclock and exclusive "BitRazor" technology which automatically encodes and decodes 24 bit audio onto ADAT tracks.

Our newest digital audio product, SAM, is the world's most affordable ADAT to S/PDIF, S/PDIF to ADAT format converter with an integrated 8 channel mini mixer featuring 24 bit throughput in all modes.

As with all Midiman products both are guaranteed for life and available at music and pro audio dealers worldwide.

SAM - ADAT to S/PDIF & S/PDIF to ADAT format converter/mixer


Pipeline 8x8 - 8 channel, 24 bit ADAT A/D and D/A converter with wordclock and BitRazor Technology

midiman

circle #572 on reader service card

USA: 800-969-6434 www.midiman.net info@midiman.net
UK: +44 1205 790680 Germany: +49 7941 987000

tech

By Bean

Strange Bedfellows

An odd assortment of instruments litters the Persian carpet in the middle of the floor: Buchla's Thunder controller, a giant Wacom graphics tablet, and an Apple PowerBook laptop computer. An 8-channel Meyer Sound system hangs overhead, and it is clear the evening holds many musical surprises.

Pakistani vocalist Shafqat Ali Khan seats himself in the lotus position and introduces Matt Wright, a musical applications programmer at the University of California, Berkeley, Center for New Music and Audio Technologies (CNMAT), and David Wessel, director of CNMAT. Ali Khan describes this trio as one of the most inspiring he's ever come across—a surprising claim from a classical singer who is following a traditional path of devotional singing. But Ali Khan enjoys performing in nontraditional musical environments, as well.

CNMAT's David Wessel prepares his Peavey PC 1600 and Buchla Thunder MIDI controller.

Ali Khan's Indo-Pakistani singing embraces a range of notes ("sa-re-ga-ma-pa-dha-ni") that can be thought of as the Indian equivalent of "do-re-mi-fa-sol-la-ti." He describes these as the foundation upon which the energetic, yet devotional, ragas are built. This evening's ragas promise to evoke a wide range of emotional modes, from sadness to enlightenment.

Cloning drones. A key traditional element of this 600-year-old musical genre is the tamboura drone. In this performance, it will be generated automatically by a Silicon Graphics Indy computer with an R4600 processor. Another Indy, with a faster R5000 processor, is used for the resynthesis of Ali Khan's voice. (An SGI O2, which is capable of producing both the drone and the vocals, could be substituted for the pair of Indy machines.)

Hunched over a Wacom UD-1212-R graphics tablet, Wright uses the input device, an UltraPen, to send data to his Power Macintosh G3's serial port. Wright has written customized Opcode *MAX* programs that interpret "raw" Wacom data to produce MIDI and other musical-control information. This information triggers sixteen beat cycles of rhythmic sequences and drone layers in support of Ali Khan's vocalizations.

CNMAT Additive Synthesis Tools (CAST), which is available on the Web at www.cnmat.berkeley.edu/cast, includes harmonic analysis software that extracts data from analyses of Ali Khan's prerecorded vocal phrases and produces "timbral prototypes" from frequency and amplitude trajectories over time. These trajectories result in a set of sine waves that combine to form a close approximation of Ali Khan's original vocalizations. Wright manipulates these frequencies as part of his real-time performance, in tandem with Ali Khan's mesmerizing live vocals.

By placing the pressure-sensitive Wacom UltraPen along the time axis of the timbral prototypes, Wright is able to "scrub" through phrases, playing them back faster or slower than the music was originally sung, sliding between notes, and applying vibrato and other real-time

Key Bored?

Play In Concert!

If you miss the excitement of playing keyboards with other musicians, try Cakewalk® **In Concert**™—the software that turns your solo act into a full-band performance!

In Concert is a virtual backup band that follows your lead, instantly matching your tempo, dynamics, and place in a song. It makes practice realistic, live performances complete, and recreational playing fun.

So if you want your solo act to be more exciting, start playing **In Concert** today!

- Includes 40 song files with sheet music
- Works with standard MIDI files
- Great for rock, jazz, classical, or any style of music
- Mac & Windows 95

Now available at music and software retailers worldwide.

For more information:
Visit **www.cakewalk.com** or call **1-888-CAKEWALK**

cakewalk

circle #573 on reader service card

SEE US AT AES BOOTH #312

effects. The harder the pen is pressed, the richer the timbre of the vocalizations.

In addition to accessing prerecorded or resynthesized sequences of Ali Khan's voice, the pen modifies the pitch, volume, and timbral qualities of a Gibson Nighthawk guitar and other drone-like sounds. "The whole point of what I'm doing is to give myself malleability and musical control far in excess of what you get when you trigger a sequence," states Wright.

Doom-boom-pow-pop. Although Wright is able to navigate through preconfigured setups from the Wacom-tablet interface, he occasionally looks up from the tablet to check the graphic user interface of *CNMAT Rhythm Engine (CRE)* software, which appears on his laptop computer. *CRE* was developed by researchers at CNMAT to notate, compose, and perform rhythmic music with fractional quantization.

Wright has invented a sonic notation palette of "doom-boom-pow-pop-tock-tick-tsit" in order to orchestrate the percussion timbres being controlled from *CRE*. He places a map of each raga on top of the Wacom tablet so he knows where he needs to end up on the pad to be in tune with the other players. Despite the extremely high resolution of the tablet (which detects up to 30,000 gradations of position along the *x* and *y* axes, rather than the 128 values sent by standard MIDI controllers), Wright says he is still searching for ways to make his tablet interface more complex.

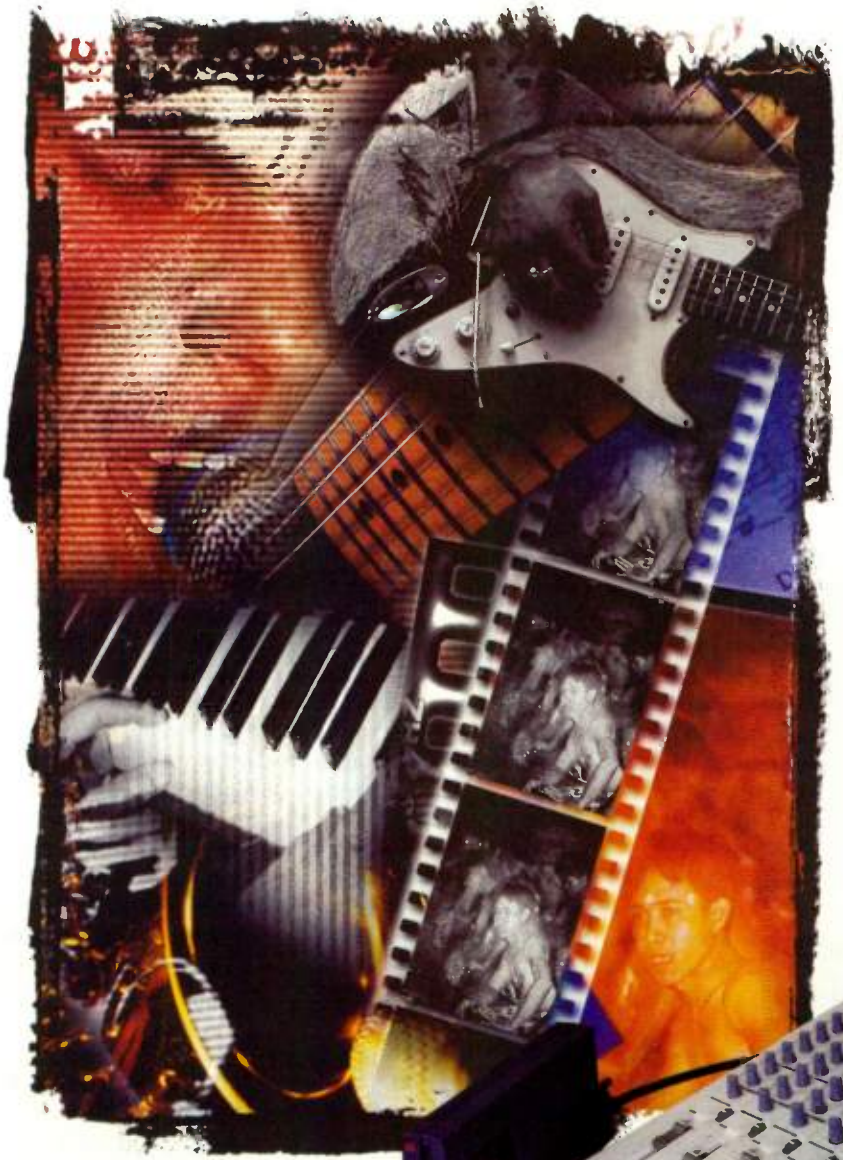
Both Wright and Wessel use *CRE* to rhythmically synchronize their computers via MIDI. They use *CAST, MAX,* and Opcode's OMS system extension to integrate the rest of their configuration. *CRE* programs tempo, velocity, and timbral information relative to the drum/percussion sounds triggered by the Thunder and Wacom-tablet interfaces. Additional sounds are stored offstage in an E-mu E4 sampler and a Power Mac G3/266 with Digidesign's SampleCell II PCI card. A Peavey PC 1600 MIDI fader controller is employed to control volume.

Controlling the elements. Obviously transported by the music, Wessel plays the Thunder controller as if it were a magical Ouija board. Thunder was chosen because of its unusual combination of continuous control and polyphony. "Keyboards are polyphonic," says Wright, "but even if you have Poly Pressure, that's still only one continuous dimension per finger. On the Thunder, each finger controls two dimensions [Pressure and Position], and if desired, all ten fingers can work simultaneously."

As Wessel's hands dance around the pads, percussion sounds fire in rapid succession at a seemingly superhuman pace. Occasionally, the music sounds amazingly synchronous and at other times, hopelessly out of control. Because one of the goals of this configuration is to explore expressive timing in rhythm-oriented music, playing ahead of or behind the beat can have dramatic consequences. At any point in time, Wessel might be directing and orchestrating eight to ten layers of rhythmic and melodic events.

This complex world of rhythm is created by the union of tradition and technology. In the end, the task of interleaving these sonic and rhythmic textures requires so much attention that the execution of the music either suffers or soars, but the journey is its own reward.

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



It's Everything You Can Do With A 4-Track

Forget any preconceived notions about 4-track recording. The Fostex FD-4 digital 4-track multitracker opens a world of possibilities never before available in a single, self-contained recorder. Two "virtual tracks" allow you to bounce all four tracks into a stereo mix with no generational loss. This enables you to stack tracks as you go, adding to your heart's content. When you're happy, you can use the two virtual tracks to master your masterpiece. All with 16-bit, CD-quality audio.

Add to this a full-function 4-channel mixer that offers a pair of balanced XLR inputs, as well as 3-band EQ with wide-band parametric mid control, and two AUX sends per channel. Of course you get the advantage of full non-linear random-access editing with Undo/Redo of Copy, Paste, Move and Erase functions, as well as a suite of tools for Auto Location and Auto Punch In/Out. For storage, the FD-4 lets you choose virtually any SCSI-II media you'd like – Zip™, Syquest ez-flyer™ – or have an optional E-IDE drive factory-installed right into the FD-4. You never find yourself locked into a proprietary storage system.

Visit your Fostex dealer today and see why the FD-4 is like no 4-track you've ever imagined.

First Digital Multitracker for under $600!*

SCSI-II RECORDING — Choose your own SCSI or IDE hard drive or removable drive, such as Zip™ and ezflyer™ drives

4 CHANNEL MIXING — With 4 input channels, 2 Aux sends, 2 stereo Aux returns, 2 balanced XLR mic inputs with trim control, and 3-band EQ per channel

2 VIRTUAL TRACKS — For extra takes, rehearsals, mastering, and additional choices at mixdown

SYNC OUTPUT — MTC Slave, MIDI Clock, SPP & MPC allow you to sync to external sequencers and programs

DIGITAL EDITING — Copy Paste, Move, and Erase digital editing with Undo/Redo

2 DIGITAL INS/OUTS — Digital input from 2-track source (CD, DAT, etc.) and 2-track digital output

*MSRP Not Including Drive

FD-4 LIMITLESS

FOSTEX

FOSTEX CORP. OF AMERICA • 15431 BLACKBURN AVE • NORWALK, CA 90650
TEL: 562-921-1112 • FAX: 562-802-1964 http://www.fostex.com • e-mail: info@fostex.com

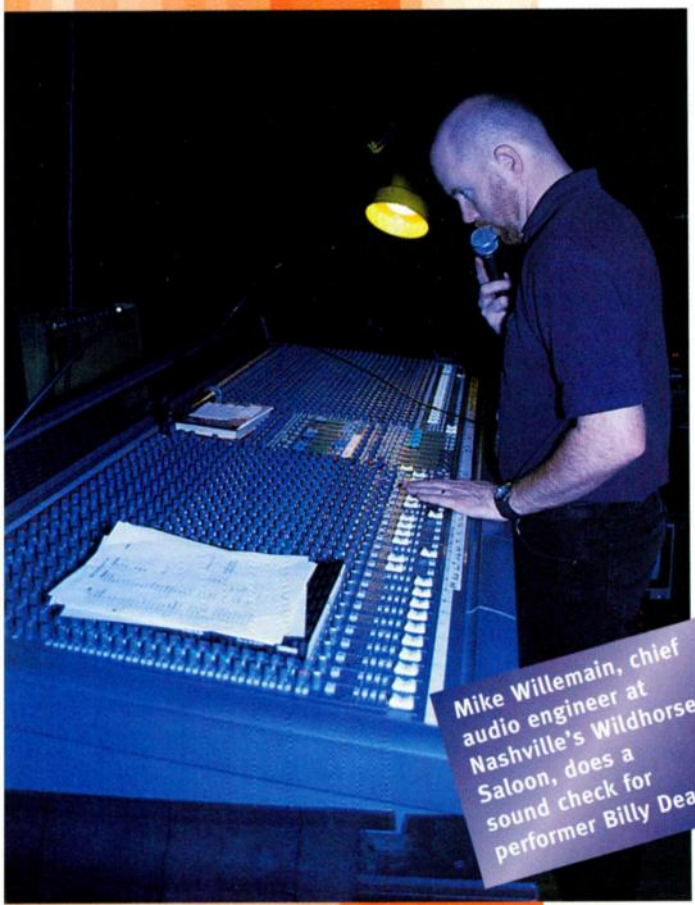
house

By Brett Ratner

Sound Check: Dialing in a Stellar Mix

As a self-respecting, front-of-house engineer, you are well aware that the sound check involves more than just making the vocals louder than the drums. Indeed, for the purposes of this article, let's assume you are fully capable of pulling up a good mix during sound check and then further refining it once the set is under way. That leaves only one problem: good is not good enough. What you're after is a *stellar* mix!

To help you achieve that goal, I've elicited some tips and insights from two Nashville-based live-sound pros, Mike Willemain and Jim Wakefield. Willemain is chief audio engineer at Nashville's renowned Wildhorse Saloon. Wakefield is head honcho at Production Services, Inc., a thriving audio-production and sound-reinforcement company in business since 1985. Their perspectives should help you hear and "see" the music differently, enabling you to quickly conjure up your best mix during sound check—and all the sooner learn to achieve a stellar mix.



Mike Willemain, chief audio engineer at Nashville's Wildhorse Saloon, does a sound check for performer Billy Dean.

PHOTO BY CATHY SHEEN HEWITT

Euclid's Box

First, you must know where each instrument "fits" in the mix relative to the others. One of Willemain's tricks is to visualize the soundscape in terms of simple Euclidean geometry. "I think in terms of a 3-dimensional image of the sound," he explains (see **Fig. 1**). "The height represents the frequency range, the width is the stereo field, and the depth is created by time-based effects such as reverb and delay."

Visualizing the sound in this manner helps Willemain position the instruments so that they won't obscure one another. He's especially careful to leave ample space for the vocals. That way, he can create a crisp, punchy, and fully intelligible mix at a minimal volume level. (Keeping the volume under control is crucial at the Wildhorse—a large, very reflective room frequently used for television broadcasts.)

Tone's Throw

Familiarity with a broad range of instruments and mics is critical to dialing in a great mix. Not only should the mix engineer know each instrument's characteristic tonality, but he should also be familiar with a wide variety of mics and their individual "frequency affinities." That way, he can better match each sound source to the most appropriate mic.

"Obviously, it's good to know which mics work best with each instrument," says Wakefield. "The mic selection in most clubs is pretty limited, though, so it's important to know how to work with what you have."

Take horns, for example. According to Wakefield, small condenser mics such as the Shure SM98 and Sennheiser 409 and 609 are ideal. But not all clubs have these mics on hand. More likely, you'll have to make do with a common dynamic mic such as the Shure SM57. In that case, he says, you can expect to roll off some highs when using an SM57 on horns.

Of course, more experienced horn players are likely to bring their own mics.

THE NEWEST TECHNOLOGY IN MONITORS FROM THE FIRST NAME IN SOUND

• Dynamic Braking
• Low Power Compression
• Differential Drive®

• Neodymium Motor Structure
• 2" Edgewound Voice Coil
• Butyl Rubber Surround

New multichannel formats are challenging old monitor concepts. While traditional stereo is still prevalent, 4, 5 or more channels are being monitored in modern production environments, daily. The LSR Family applies new technology to meet these requirements. By going beyond traditional design techniques with Linear Spatial Reference performance, JBL has literally redefined how a system is created. The LSR concept helps to dramatically expand the listening area, creating a larger, more accurate mixing space.

The LSR32 introduced the world to the Linear Spatial Reference philosophy. This 12" 3-way mid field monitor offers maximum performance in both vertical and horizontal configurations.

The LSR28P is an 8" bi-amplified near field monitor, ideal for multichannel mixing in small to medium-size production environments.

The LSR12P is a 12" powered subwoofer that easily integrates into a wide variety of stereo and multichannel formats, and complements both the LSR32 and LSR28P.

• Ultra Low Distortion
• Controlled Dispersion
• High Power Capacity
• Maximum Transient Response

• High Rigidity
• Ultra Low Resonance
• Reduced Diffraction and Reflection

LSR
Hear Every Thing

JBL PROFESSIONAL

H A Harman International Company

For more information on the LSR Family
www.jblpro.com

circle #576 on reader service card

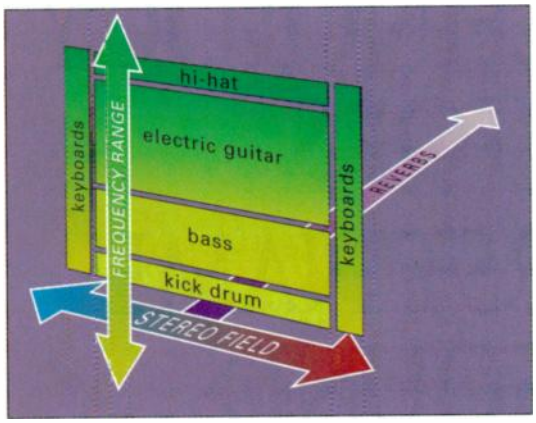


FIG. 1: To create sufficient "space" for each instrument in the mix, try visualizing the soundscape 3-dimensionally.

In that case, be sure to make a mental note of the microphone, its particular sound on the instrument, how well it rejects other sounds, etc.

When sound-checking a Latin percussionist, suggests Wakefield, pay very close attention to whether the nuances of the playing are coming through. Keeping a delicate conga rhythm from being drowned out by the other percussion instruments requires not only the appropriate mic, but careful mic placement as well. (Wakefield favors the Sennheiser 409 for this Latin percussion application, too.)

Here's another tip: be aware of instruments (other than bass) that produce an abundance of low end, such as keyboards, organs, and guitars playing through Leslie speakers or other big speaker cabinets. Again, the idea is to allow sufficient space in the low end so the bass guitar isn't obscured by the other instruments. Therefore, when miking these bass-heavy sources, it may help to engage a low-cut filter on the mic (or the board). Equalization may also be necessary to reduce rumble and other low-end frequencies so as to leave the sound of the bass wide and clear.

Character Range

After mic selection, EQ is the main tool for "creating space" for all of the instruments in the mix. Wakefield has developed a formulaic approach to equalization that has proven a good starting point for instrument-specific tonal enhancement.

"Each instrument has what I call a character range," he explains. "The sound check is my opportunity to focus on and enhance those ranges." Increasing the frequencies that are fundamental to the instrument's tone—and reducing those that aren't—can work wonders to clean up a muddy mix. However, Wakefield warns that every situation (and room) is different and that one's ears must be the final arbiter.

Drum Tweaks

For example, Wakefield sets the kick drum at around 60 or 70 Hz. Although this frequency range is relatively inaudible in the context of a full band mix, it happens to be the resonant frequency of a person's chest. Therefore, although audience members may not distinctly hear the low end of the kick drum, they are sure to feel it. To emphasize the "click" or attack of the kick drum, Wakefield also boosts somewhere between 3 to 4 kHz, again depending on the drum, the room sound, and the overall mix.

For toms, Wakefield typically cuts between 400 and 800 Hz and boosts between 3 to 4 kHz. The snare also gets a boost in its character range (between 200 Hz to 1 kHz) and usually a cut in the 400 to 500 Hz range. The hi-hat is boosted from 6 to 8 kHz to increase articulation, while frequencies around 200 Hz are cut to eliminate cymbal roar as well as noise from the pedal mechanism.

Bass

The "click" of the bass guitar also resides between 3 to 4 kHz and may benefit from a boost as well. But for Wakefield's purposes, the character range of the bass resides between 80 and 125 Hz, which is where he is most likely to boost.

Willemain, on the other hand, tends to boost bass frequencies between 250 and 500 Hz and—for increased note definition—at 800 Hz. Experiment to see which approach sounds best to your ears, taking into account the sound of the bass in the room as well as in the overall mix.

Guitars and Keys

The character range of an electric guitar is fairly broad, stretching from 100 Hz to 4 kHz. Wakefield therefore rolls off frequencies that are higher or lower than this range. For acoustic guitar, on the other hand, he cuts below 100 kHz and between 3 and 4 kHz, and boosts at 8 kHz to emphasize pick attack.

Full-range (88-key) keyboards cover the lion's share of the frequency range. Fortunately, most synth patches are well equalized at the factory, reducing the amount of tweaking required at the board. One trick that Willemain employs, however, is to pan the keys hard left and right. This not only creates a broad stereo field, but it also helps keep the keyboard sound out of the vocalist's way. Using this basic arrangement as a starting point should leave plenty of space for the vocals, which, depending on the singer, typically fall between 400 Hz and 5 kHz.

Depth Enhancement

The last piece of the 3-D image is depth, which is created by reverb, delays, and other time-based effects. There are no rules for using of these devices except that one must take into account the room's acoustics and the style of the band. Obviously, a bluegrass band is unlikely to want a flanger effect on the banjo. But aside from such obvious ill appropriations, practically anything goes—as long as it makes the mix sound stellar! ◆

Jammin' over the Net

Make music with anyone from anywhere around the globe!

By Scott R. Garrigus

Until a few years ago, collaborating on music over the Internet meant laboriously swapping MIDI and audio files via e-mail, FTP, or the World Wide Web. Sharing ideas in this way is still popular in many quarters, but it can never provide the same stimulating interaction that you get when working with someone "side by side" in a joint effort.

Spontaneous communication is the key to effective collaboration, and the Internet has actually provided this type of interaction for quite some time in the form of IRC (Internet Relay Chat) and Web-based chat rooms. Using these chat facilities, people from around the world can send text messages back and forth in real time.

Of course, exchanging text is hardly a substitute for trading your latest and greatest licks. That's why a few pioneering companies decided to expand on the Internet chat concept. Two such companies, Res Rocket and Full Tilt Design, provide products that allow anyone with an Internet connection and a multimedia-equipped computer to quickly exchange MIDI (and soon audio) data with fellow bandmates, no matter how far apart they live. Even though the current state of technology doesn't offer true real-time, long-distance, interactive musical collaboration, we're getting closer to that goal all the time.

STEVE RAMIREZ

ROCKIN' WITH RES ROCKET

Consisting of client and server software components, Res Rocket is based on the MUD (Multi-User Dimension) or MOO (Multi-user-dimension, Object-Oriented) online environment. Gamers have been using MUDs or MOOs since before the Internet was opened to the public. These MOOs are basically enhanced chat environments that consist of more than just a single virtual meeting place for people to gather. Instead, they provide a whole virtual atmosphere with multiple meeting areas that are interconnected.

EDIROL Introduces the USB Next-Generation Digital Audio Solution

Roland® AUDIO Canvas™

UA-100

One cable, one unit, a complete, desktop recording studio.

USB

UNIVERSAL SERIAL BUS

Simply plug a UA-100 into your USB-capable PC or laptop and everything you want is yours:

- *20-bit External Digital Audio Conversion for CD-quality recording without the computer noise found in internal Sound Cards*
- *2 Port MIDI Interface for perfect MIDI/Audio synch to external synths*
- *24-bit Digital Signal Processing containing over 70 multi-effects*
- *High-quality Reverb, Compression, Noise Suppression & EQ for a truely professional mix*
- *Pitch Harmonizer/Corrector for three-part harmony and perfect note correction*
- *Microphone Simulation to emulate professional microphones*
- *Guitar Multi-effects with Amp Simulation*
- *"Digital Domain" Effects looping for infinite effects processing without generation loss*
- *Mic, Guitar, Stereo aux & 2 MIDI inputs*
- *Stereo aux & 2 MIDI outputs*
- *20-bit S/P DIF Optical output for direct digital connection to pro recording media (DAT, Minidisk)*
- *Supports Microsoft DirectX® Sound to ensure compatability with audio software*
- *Simple Plug and Play USB Installation so you can start recording immediately*

Distributed by

EDIROL

Member of the Roland Group

AUDIO Canvas™

VIDEO Canvas™

SOUND Canvas™

1-800-380-2580

www.edirol.com

Dealer inquiries welcome

circle #580 on reader service card

The Res Rocket system is actually a modernized MOO, which its creators call the MUSE (Multi-User Studio Environment). The MUSE consists of dozens of interconnected virtual studios in which people can meet and share their musical sequences via "live" jam sessions. As of this writing, the system has a population of over 11,000, and with more than 1,000 new members being added each month, you're guaranteed to find someone who shares your musical interests.

To gain access to the MUSE, you must first create an *avatar* (the online persona used to represent you in the MUSE) by submitting your name and e-mail address to the Res Rocket Web server. After you receive your assigned password via e-mail, you must download a copy of the Res Rocket proprietary client software, called *DRGN (Distributed Real-time Groove Network)*. It's currently available for Windows 95/NT and Macintosh operating systems. There is no charge for using the *DRGN* software in the public studio areas because this part of the MUSE system is sponsor-supported.

For serious musical collaboration, Res Rocket also supplies lockable, private, virtual studios that include secure server storage for jams. For $5 you get a 24-hour lockout, $25 buys you a month, and $99 provides a whole year.

As soon as you've registered, downloaded, and installed *DRGN* and received your password, you can sign on and start jamming. Just log on to the Internet, and start up *DRGN*. The software automatically hooks you up to the MUSE, and once you're there, a chat window pops open allowing you to navigate the virtual studio complex (see **Fig. 1**). You can see who's online, discover where they are located, and "talk" back and forth via text. As you move from studio to studio, you'll eventually find one with a jam in progress. At that point, a number of new windows pop open. They include the Arrangement window, the Sequence Library, and the Transport window (see **Fig. 2**). These windows provide the same functions that you would find in a basic MIDI sequencer, but with a few twists.

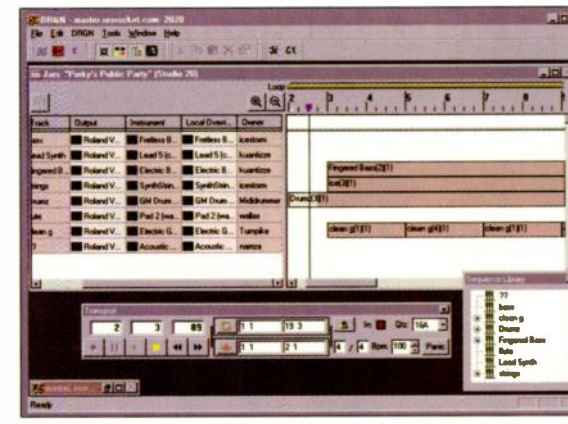


FIG. 2: The *DRGN* Arrangement, Sequence Library, and Transport windows provide the same functions as a basic MIDI sequencer. In addition to your own tracks, you can see the tracks of everyone else in the current jam session.

The tracks that you see in the Arrangement window include the ones that you create as well as those created by the other members in the current jam session. You can edit any of the tracks that you create, but you can't alter someone else's tracks. The owner of each track is listed in the left pane of the Arrangement window, along with the usual track name, track instrument, mute status, etc. All of the sequences in all of the tracks in the current jam are listed in the Sequence Library. This window provides access to any sequence (even those recorded by the other members) for cutting and pasting into your own tracks, if you'd like.

To create a new track, you simply click on the *DRGN* menu at top of the screen, and select New Track. Then just name the track and select an instrument for it, and the track will appear in the Arrangement window, with your avatar name listed in the Owner column. You can now record a new sequence into the track the same way you would with any MIDI sequencer: click the Record button, and start playing your MIDI instrument. There are no step-entry or notation-entry functions, so you'll have to perform all your parts, but you can slow down the tempo, and quantizing is available.

Once you've finished recording a sequence, you can play it back to make sure it sounds right, and then you can let everyone else hear your contribution to the jam by clicking the Send Changes button. *DRGN* will then send your sequence over the Net to the Res Rocket server, which will send your sequence back out over the Net to everyone else who is participating in the current jam. This process usually takes only a few seconds, depending on Internet traffic at the time.

The beauty of the Res Rocket system is that, instead of trying to stream MIDI data and thus having to compete with the inevitable Internet-related delays, it simply sends small sequences when instructed. Once these sequences reach a user's computer, they can be manipulated and played back locally. This means that Res Rocket can be used with any type of modem and with any baud rate. It also gives each member the freedom to set up individual mixes without altering the original sequence data and without affecting how the jam will play back on everyone else's computer.

Res Rocket isn't perfect, however. Although the *DRGN* software provides many of the features found in most basic MIDI sequencers, it lacks most of the more sophisticated editing functions, so you are limited to Cut, Copy, and Paste commands. Furthermore, even these commands only apply to whole sequences, rather than individual MIDI events. And while the software allows you to export the jam session data to a MIDI file for offline handling, it won't let you import MIDI files.

Another drawback is that, as of this writing, *DRGN* supports only MIDI data with no official support for audio data. However, a few users have been experimenting with ways to get around this current limitation. Members of a jam who use samplers can exchange audio

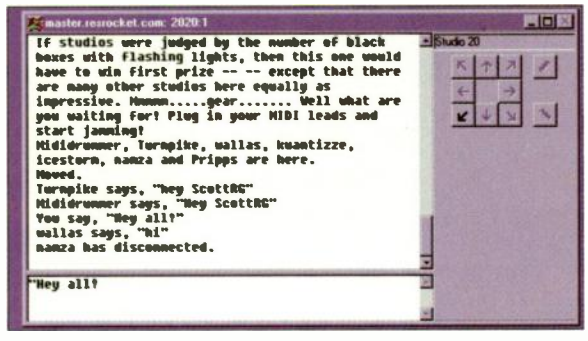


FIG. 1: With the Res Rocket system, you can use *DRGN*'s chat window to discuss changes with other members of the current jam and to navigate through the MUSE.

WHAT DOES ALL OF THIS SOFTWARE HAVE IN COMMON?

cakewalk · SEK'D samplitude studio · WaveLab · OPCODE SYSTEMS INC · CUBASE VST · Steinberg · SPECTRAFOO · emagic · INNOVATIVE QUALITY SOFTWARE · Mac OS · Metro 4 · COOL EDIT PRO · MSP · SONIC FOUNDRY · Musicator

STUDI/O

16-CHANNELS 24-BITS

- Brings 24-bit digital audio in and out of your favorite program
- Connects to all ADAT lightpipe and SPDIF equipment
- Simultaneous 16 channel record and 16 channel playback
- Real-time stereo sample rate conversion
- PC And Mac compatible PCI (short card)
- Up to four cards per computer (64 channels)
- Ships with Windows95/98, Windows NT, Macintosh, and ASIO (Mac/PC) drivers
- Four optical cables included
- Optional studi/o-sync backplate for sample-accurate synchronization
- Available at your favorite music store

NEW LOWER PRICE!

Coming soon! 96KHz

SONORUS

Sonorus, Inc., 111 E. 12th St., NY, NY 10003, USA;
Phone: +1-212-253-7700; Fax +1-212-253-7701
http://www.sonorus.com; info@sonorus.com

circle #581 on reader service card

SEE US AT AES BOOTH #126

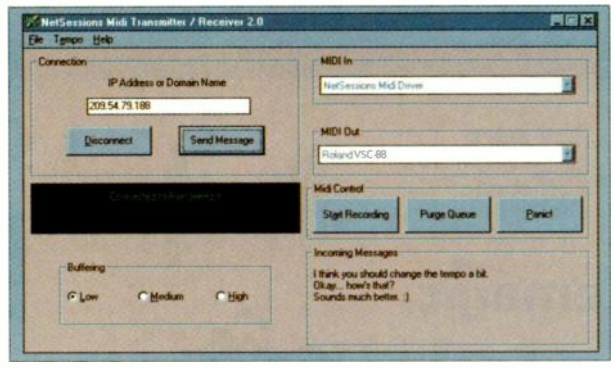


FIG. 3: NetSessions acts like a virtual MIDI port for the Internet. Just select your input and output devices, and you can use whatever MIDI sequencer you like.

files beforehand, and these samples can then easily be triggered by MIDI events. According to Res Rocket, a digital audio system is just around the corner, so adding vocals and acoustic tracks during jam sessions may be possible very soon.

THE NETSESSIONS SWING

NetSessions, from Full Tilt Design, is quite a bit different from Res Rocket. Instead of relying on a separate server to relay MIDI data, users are hooked up directly to one another using the IP addresses furnished by their ISPs (Internet Service Providers). Of course, this also means that the software only works on a one-to-one basis, but that may actually be the perfect solution for songwriting duos that want to conduct private jam sessions.

Unlike the Res Rocket system, NetSessions costs a one-time fee ($40). After that, you can hold as many private jams as you want. Of course, both you and your partner need to own a copy of the software, so if you're purchasing as a team, the cost is really $80. If you're just looking to jam with anyone, you should be able to find a partner out of the currently installed base of more than 2,000 owners. Full Tilt Design has a simple contact page on its Web site where you can find other musicians. You can also enter your personal information so that other people can find you. The company is working on a new Web site—dedicated solely to NetSessions users—where people can interact and see who is online at any given moment.

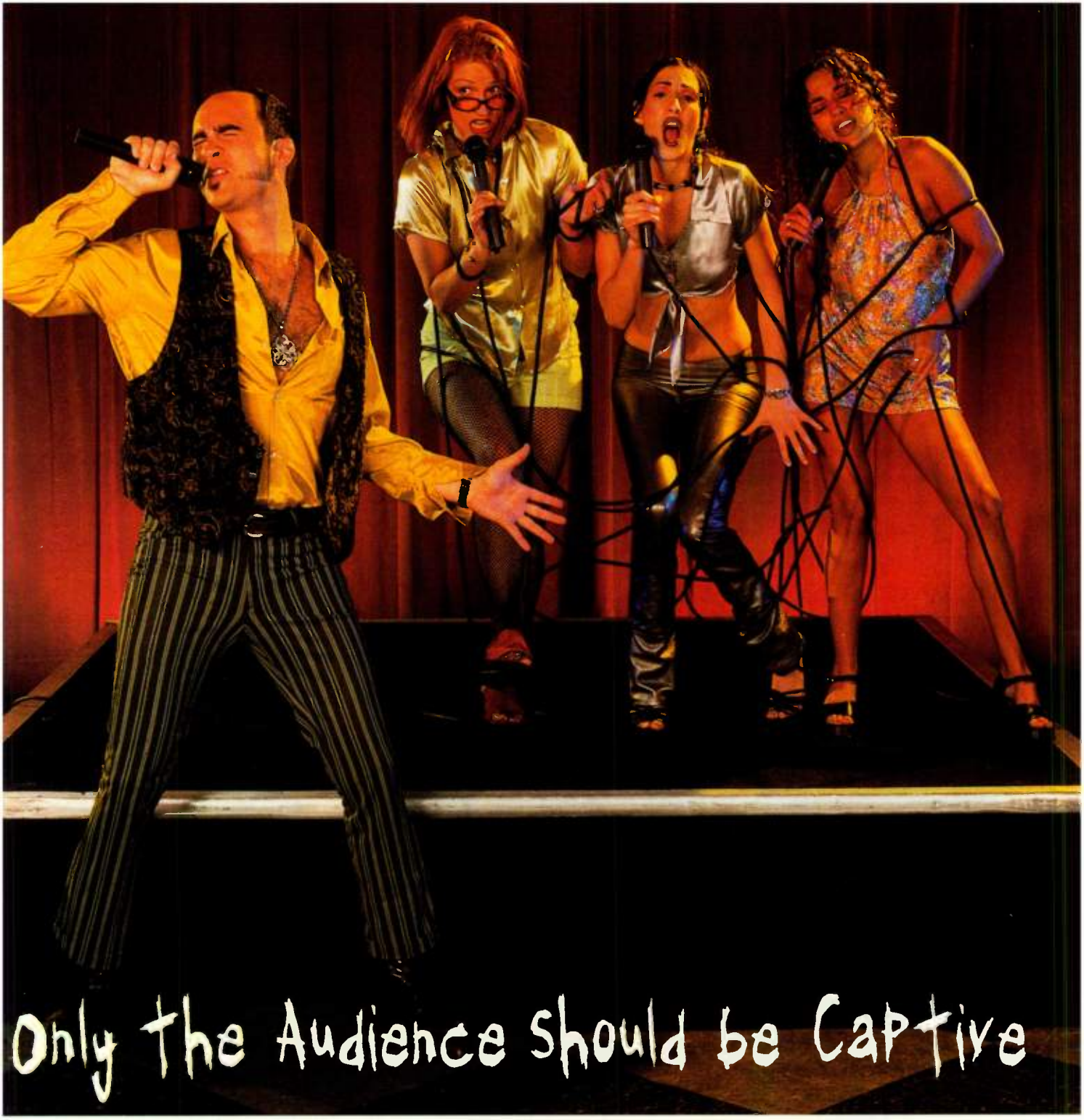
To use NetSessions, you'll need a Windows 95 computer; no Mac version is available. You'll also need a Windows-based MIDI sequencer. Instead of tying you to proprietary sequencing software, as Res Rocket does, NetSessions lets you work with your own, full-featured MIDI sequencer. The software functions essentially like a standard MIDI port but for the Internet. When you hit Play in your sequencer, NetSessions takes the MIDI data from your sequencer and streams it over the Internet. Both you and the person on the other end of the line can hear the results nearly instantaneously. I say nearly because there is always a slight delay due to Internet traffic. Through its use of a data buffer, however, NetSessions

COPYRIGHT GUIDELINES

If you are planning commercial use of any of the material you (or another person) develop during an online jam session, you had better come to some agreement beforehand. Both Res Rocket and Full Tilt Design have chosen to steer clear of copyright issues that may arise from disputes between users. Res Rocket even goes so far as to state a few community guidelines. For example, it points out that any sequences that you share should be your own original work, and any tracks that you borrow from others can only be done so during the current jam session.

As a reminder, you'll see the following message every time you sign on to the system: "Remember, ownership and protection of the musical compositions, arrangements, or other works being created—including rights under copyright—are solely your responsibility and that of other contributors. Res Rocket Surfer bears no responsibility." In other words, when it comes to copyrights, you're on your own.

For manufacturer information, please see Contact Sheet, p. 195.



If you think wireless technology is out of reach for the rest of your group, it's time to rethink your options... Jensen Wireless Systems deliver megaband looks, feel, and sound at garage band prices. It's Jensen's Emancipation Proclamation: freedom from wires for all! From the club circuit to weekend jam sessions, Jensen brings professional-quality sound and dependability together with wireless technology and affordable prices to rock your world.

- Wireless systems for every need or budget
- Wireless mics, guitar transmitters and in-ear monitor systems
- Transmit up to 16 channels simultaneously
- Up to 40 frequencies to select from
- Street prices from the low- to mid-$200 range
- Guaranteed Jensen quality

Let There Be Freedom

JENSEN® Pro Audio WIRELESS

Jensen Music Industries, A division of RECOTON AUDIO CORPORATION
Call toll free (877) 853-6736 or fax (425) 744-1052. www.jensenmusic.com
circle #583 on reader service card

enables the receiving party to start hearing music after only a few seconds, in most cases.

Though NetSessions is easy to use, you must go through a few extra steps for first-time setup. After you establish an Internet connection, start the NetSessions software, then select your input and output devices directly on the NetSessions main screen (see **Fig. 3**). To use a MIDI sequencer to send your data, set the NetSessions input device to the NetSessions MIDI Driver. Next, start your sequencer and select the NetSessions MIDI Driver as its output device. After that, all MIDI output from the sequencer will be channeled through NetSessions and out over the Internet. Rather than using a sequencer as your NetSessions input device, you could select any other MIDI In port in your system, such as a Sound Blaster external MIDI input, and send

▼

NetSessions functions like a standard MIDI port for the Internet.

data directly from your keyboard. This would allow you to have a "live" performance with your partner.

For receiving data, the NetSessions output device should be set up to reach your playback hardware. This can be anything from the sound card synthesizer on your computer to an external sound module. (You cannot receive data directly into your sequencer; more on this later.)

The final and most important step is to establish a connection with your receiving party. Because NetSessions uses IP addresses to make a connection, you and your partner must determine this information before you can transmit any data. Unfortunately, the process is not automatic, although Full Tilt Design is working on improving this aspect of the software for a future release.

Another problem is that most ISPs don't provide a static IP address unless you pay extra for one. In other words, every time you log on to the Internet, your IP address will likely be different. You can determine the current address

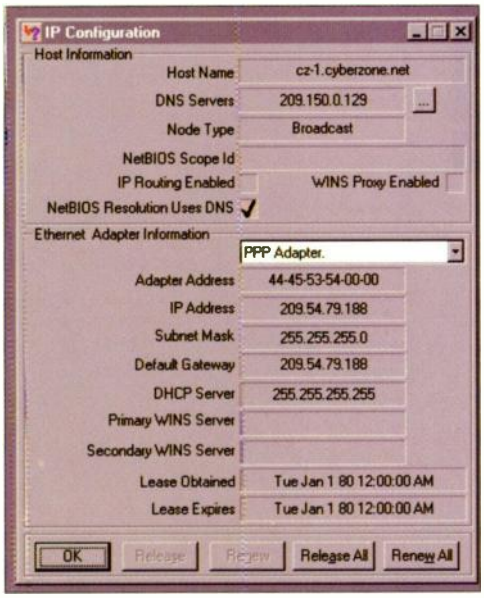


FIG. 4: Finding and setting your IP address is easy in NetSessions, but getting that information to your partner on the other end of the line can be a bit of a hassle.

by using the "What's your IP address?" feature in NetSessions (see **Fig. 4**), but that still leaves the problem of how to communicate that information when both you and your partner are already tying up the phone lines. At the moment, the only alternative is a quick e-mail exchange after you both log on.

Once you're connected, NetSessions provides a simple chat window in which you and your partner can send text messages back and forth for discussion during a jam. You can also start making music the same way you would during any MIDI recording session, except whatever you play is also transmitted over the Internet and heard by your collaborator. The only thing that needs to be handled differently is the actual recording of MIDI data. Because most sequencers have their own way of handling incoming MIDI data, you must use NetSessions' built-in recording function to record the output of your colleague. You can then save the data as a Standard MIDI File and import it into your sequencing program for editing and playback. This method of recording is a bit awkward at times, but Full Tilt Design is currently working with many of the top MIDI software manufacturers to make NetSessions compatible with their recording protocols.

FUTURE MUSIC

Because of the current nature of the Internet, neither Res Rocket nor NetSessions can provide the ideal long-distance environment, which is true real-time interaction. At the moment, in order to have someone in a different location record a new track for your composition, they have to record the track locally so they can stay in sync with any existing tracks. In a true real-time environment, data would be transferred instantaneously and you could just punch in a performance right over the wire. There is simply no way to eliminate the inherent delays that plague today's Net. Perhaps when the next Internet protocol (IPv6) is implemented, its provisions for time-sensitive multimedia data and higher-speed local connections from homes and studios can solve the problem.

In the meantime, these companies are forging the future of online musical relationships. Res Rocket is currently beta testing the new version of its system that will allow the transfer of audio in addition to MIDI data. This new feature may be available by the time you read this. The company is also looking into updating its *DRGN* software to allow musicians the use of their existing sequencing software during jam sessions. As mentioned earlier, Full Tilt Design is also working to improve its product with easier connection and recording features.

The uses for this technology range from casual, "get together" jam sessions to professional milieus. As a matter of fact, the first professionally recorded Res Rocket project (produced by Tim Bran, one of the system's founders) was released on Warner Records in May. NetSessions is making a name for itself in the music education community by providing a means for teachers and students to attend instrument lessons no matter where they are located. As time goes on, the popularity of this technology will surely grow, so don't be surprised if someone asks you to join them in a jam with a few friends from Canada, Russia, Japan, and Italy.

You'll find **Scott R. Garrigus** *hangin' on Res Rocket as ScottRG. He's also listed on the NetSessions user Web page. You can reach him via e-mail at garrigus@pan.com. When he's not jammin' online, he's updating his Web site at www.pan.com/garrigus.*

Making Contacts

How to network your way to success in the music industry.

By Mike Levine

For aspiring musicians, there is at least some truth to the saying "It's who you know." While the main prerequisite for becoming a successful player is talent, you need contacts to advance your career. Most of the plum gigs, in both live performance and recording, are obtained when somebody on the inside knows who you are and recommends you for a job. Certainly, some positions get filled through auditions or demos alone, but most of the time you get the gig because you know someone or, more importantly, because someone knows you and thinks highly enough of your ability to recommend you.

So how do you go about acquiring these all-important contacts? Fear not. It's not about sucking up to everyone you think is important in the music business; actually, it's much easier and more palatable than that.

BEN FISHMAN

EXISTING CONTACTS

You may already have more contacts than you think. Consider all the people you know who are in any way associated with the music business. Family and friends are obvious choices, but also think about people that you know from college, especially if you were in a music program. More than likely, some of your fellow students have become successful in the business on some level. Call your college, get a list of alumni, and see if you recognize any of the names on it. Attending alumni functions in your area is an easy way to meet and connect with people.

Of course, even if you do know some people in the business, it is possible that they will be involved in a different area of it than you are. So, even if you can't come up with any friends, family, or school associates who are working in the area of the business you are interested in, don't worry. The most fruitful contacts are often the ones that you go out and make yourself. Let's examine some of the best ways to do that.

DigiTech
A TRADITION OF INNOVATION

WE'VE GOT YOUR BASSES COVERED ... AND SOPRANOS TOO

VOCALIST HARMONY SERIES

Your voice is uniquely yours. It's your instrument, your signature. Your style may be loud and proud, bluesy or soft and sultry but no one else in the world sounds quite like you.

DigiTech now offers you a dazzling array of vocal harmony and effects processors tailored to suit your individual needs. From the easy to operate live performance models to the more in depth studio versions with editable parameters, pitch correction and digital I/O options, there is a Vocalist for you.

Whether you're a performer, a singer/songwriter with a MIDI studio or you operate a professional recording facility, we've got what you need. Each member of the family has the same outstanding sound quality with separate features for your specific applications.

But don't just go by what we're saying. Let your ears be the judge. Check out the Vocalist Harmony Series at your DigiTech dealer today.

VOCALIST WORKSTATION EX

The ideal tool for musicians, singer/songwriters and MIDI/project studios, the Vocalist Workstation EX lets you create up to 4 harmony voices that have fully editable MIDI parameters, reverb and effects. The Workstation's built-in mixer can be can be controlled easily from the front panel faders and the desk-top format makes editing a snap.

VOCALIST PERFORMER

Affordable and easy to use, Performer is a natural sounding 2 voice vocal harmony processor with reverb. Performer does not require MIDI control and comes with a handy micstand mount for live performance.

VOCALIST ACCESS

New to the Vocalist family, Access is a great solution for musicians, producers and engineers who rely on MIDI for control. Access gives you the same great 4 harmony voices, reverb and effects neatly tucked in an attractive 1U package.

STUDIO VOCALIST EX

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

...DEFINE YOUR VOICE

NETWORKING

Although it is overused, the word *networking* simply means developing a network of contacts. What is the best way for a musician to network? Not by schmoozing with people at parties (although that couldn't hurt) but through working. Getting yourself out there, in any way you can, will increase your visibility and can lead to other, better gigs.

Let's say you are playing in a local band, doing a few gigs a month, and not making much money. Is this a dead end? Not necessarily. Some of your band mates may eventually be in a position to help you out. Suppose your keyboardist moves on to join a busy regional touring band. Through him, you now have a contact with that group, and if they ever need someone on your instrument, your ex-bandmate might recommend you for it (assuming that he respects you as a player and as a person). Or, imagine that someone from a band you used to play with makes it as a record producer. You then have a great inside contact who might be able to get you gigs or sessions associated with his clients.

Of course, there is no guarantee that anyone you work with will become well-known or even end up with a higher-level gig, but it can and does happen, which is why it's crucial to maintain good relationships and stay in contact with just about everyone you have worked with. Also, you need to put yourself into as many musical situations as possible. Even if your aim is only to move up to a better class of wedding gigs, the more people you know in your musical circuit, the greater your chances are of finding new and better opportunities. Remember, the more work you do, the more work you will get.

BE RELIABLE, BE GOOD

It isn't enough, however, just to be out there on the scene. You need to impress the people you meet in working situations in order for them to respect you enough to recommend you. After all, when someone gives your name out, they're putting themselves on the line, and they have to be confident that you will be able to handle the job. If you screw up, it hurts not only your reputation, but theirs as well. With that in mind, there are two important traits you must possess if you want to make solid connections in the industry.

First, you must be talented. You don't have to be a virtuoso, but you need to be a solid player and know what is expected of your instrument, no matter what the genre. You should also know how to play in an ensemble context. If you sound good and can make those around you sound better, you are much more likely to engender the respect of your bandmates.

Secondly, you need to impress your fellow players with your professionalism. Showing up on time (or better yet, early), staying sober during your gigs, and always bringing the proper gear will build your reputation as a solid pro. You will also help yourself immensely by treating the musicians around you with respect, as well as keeping your ego under control. This combination of talent, professionalism, and a high level of visibility will help you make the kinds of solid contacts you need to keep your career moving forward.

GREASING THE WHEELS

In addition to the above advice, there is more you can do to help increase the amount of contacts you make. For one thing, you should get in the habit of passing out your business card to people you meet on gigs and sessions. Don't do it the minute you meet them; rather, hand them your card when the job is over, and say something like, "If you hear of anyone looking for a guitar player [or whatever your instrument is], I'm always looking for new situations."

You should also get their card so you can stay in touch with them. Every once in a while, you can call to see what's new and subtly inquire as to whether they have heard of any new playing situations you might be suitable for.

If you have a demo highlighting your talents, you might want to pass those out to potential contacts as well, but only after you get to know them a bit.

IT'S HERE!

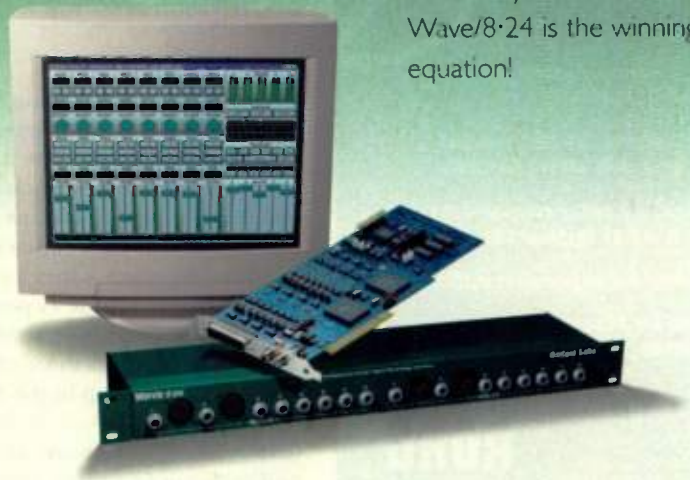
New from EMBooks is *The Independent Working Musician*, a compilation of EM's "Working Musician" columns. From publishing to copyright law to financing your band to harmonious collaboration, *The Independent Working Musician* shows you how to tackle the business side of music on your own terms. (Available from PRIMEDIA Intertec Publishing, 800/543-7771 or 913/967-1719, and at music and book stores through Hal Leonard Corp.)

8 ins
+ 8 outs
x 24-bits
= $499.95

Do the Math... Introducing the Wave/8·24

Professional 24-bit Digital Recording Interface

Now, you can afford to record music like the pro's — with 24-bit resolution direct to your PC's hard disk. What's more, we didn't skimp on quality or features (give credit to our great engineers who came from companies like Intel & Mackie). We invite you to do the math — we think you'll find the Wave/8·24 is the winning equation!



- ☐ PCI bus adapter and external patch bay
- ☐ 8 input channels, 8 output channels
- ☐ 24-bit converters with 105 dB dynamic range
- ☐ Professional Balanced inputs and outputs via 1/4" TRS phone jacks with XLR jacks for 2 stereo pairs
- ☐ Professional +4 dBu levels or consumer -10 dBv selectable via software
- ☐ MIDI interface with in and out connections
- ☐ Optional 24-bit S/P DIF digital interface
- ☐ Clock Sync 2 cards for 16 channels
- ☐ Drivers for Windows 95/98, Windows NT, DirectSound, ASIO (Q4/98)
- ☐ Compatible with popular software such as Cakewalk, Cubase, Sound Forge, Acid, Cool Edit Pro, SAW, Samplitude, Quartz and more

Order Online BUY 24-hours a Day

Gadget Labs™

Order Direct

1.800.660.5710

Order Online

www.gadgetlabs.com

Your demo may not always get heard, but in the right hands, it can help increase your visibility. And you never know who might check it out.

OTHER OPPORTUNITIES

Contacts made through working are usually the best, but you can employ some other methods for making new connections. If you are looking to get more gigs, a good approach is to attend as many jam sessions as possible. At jams, you are guaranteed to meet plenty of musicians. The downside is that many of them will be in the same boat that you are. Nevertheless, you will at least be out there making yourself visible, and you may end up meeting players you will eventually work with. If you are new on the scene and have no other musical work, going to jam sessions can be a valuable way to plug yourself in.

The most common way of finding jam sessions is through word of mouth. The Internet is also a valuable resource for listings of jam sessions. One site you can try is the Listing of Open Musical Jam Sessions. Point your browser to www.landfield.com/faqs/music/jam-sessions. You can find blues jams listed at the National Blues Pages site: world.std.com/~bstahl/bluesjams.html.

Another way to make contacts on the live music scene is to hang out at the clubs on the circuit that you are trying to get into. Try to talk to the musicians who are playing, and see if they can give you any leads that might help you get some work. If you can establish a rapport and convince them that you're on the level and genuinely talented, they might eventually let you sit in for a song or two. You can also use this "hanging out" method if you are trying to get involved in the studio scene.

STUDYING FOR SUCCESS

Yet another potential way to make a valuable contact is to study with someone who is well established in the business. One of the sad realities of the music business is that many well-known players still have to give lessons to supplement their income. Go to one of their gigs, approach them on their break, and ask if they teach. If you can't find them playing anywhere, get a copy of the Musician's Union directory and find their number that way.

By studying with a well-known musician, you not only get the benefit of their knowledge, but you might impress them enough to recommend you for a gig. If nothing else, they might give you some names of people to call. Another route you can take is to enroll in music classes given at night through a college in your area. Both the instructors and the other students are potential networking sources for you.

THE BOTTOM LINE

The most important thing to remember is that success is unlikely to come to you—you have to go after it. Get yourself out there, work as much as you can, and meet as many musicians as you can. Remember that each contact you make can lead to many other contacts, so keep as high a profile as possible. The more people you impress with your talent and attitude, the more chances you will have to move up in the business.

Mike Levine *is a composer, session player and author of four books, including* How to Be a Working Musician, *recently published by Billboard Books. Visit his Web site at www.mikelevine.com.*

Reconstructive EQ

We've all been there. You're mixing down your band's latest demo session. The percussion tracks sound like they were recorded with oatmeal boxes. Your console's on-board EQ is not helping. Your one-time-only groove is toast right? Wrong. The doctor is in. A R T's Dual Tube EQ offers superior sound and flexibility that most mixer's on-board EQ stages simply cannot deliver. Each 12AX7a-based channel features precision-tuned overlapping bands, with two fully-sweepable mid ranges. That means no frustrating holes in the audio spectrum. Don't leave any more of your recorded performances to chance. Whether it's a routine check-up during tracking, or a full-blown surgical procedure at mixdown, the A R T Dual Tube EQ is your audio doctor-on-call. Visit your A R T dealer today.

DUAL TUBE EQ

PROFESSIONAL STEREO TUBE PARAMETRIC EQUALIZER

Four-Band, Tube-Based Stereo Parametric EQ, with Cascade Switch for 8-Band Mono Operation

Hand-Selected 12AX7a Vacuum Tubes

Smooth, Musical Equalization

Overlapping Hi-Mid and Low-Mid Bands Sweepable From 20Hz to 20kHz

Switchable High and Low Shelving Bands

Independent Input and Output Gain Controls

Detented Pots for Precision Tuning

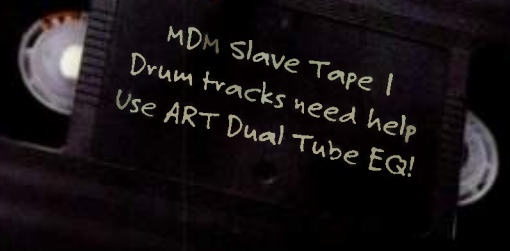
±12dB Cut and Boost

Balanced XLR and Unbalanced 1/4" Inputs and Outputs

Internal Transformer

Aircraft-Quality Extruded Aluminum Chassis

"The Dual Tube EQ is AWESOME - just unbelievable. I can't get over how FAT it can make a kick drum sound. I'm hard-wiring one into the insert of my kick drum channel!"
~ Mark Zonder: Drums, Fates Warning; Owner, Bill's Place Rehearsal Studios



the Doctor is IN

APPLIED RESEARCH AND TECHNOLOGY, INC, 215 TREMONT STREET, ROCHESTER, NY 14608
VOICE: 716/436.2720, FAX: 716/436.3942, http://www.artroch.com

A R T
APPLIED RESEARCH AND TECHNOLOGY

circle #591 on reader service card

SERVICE CLINIC

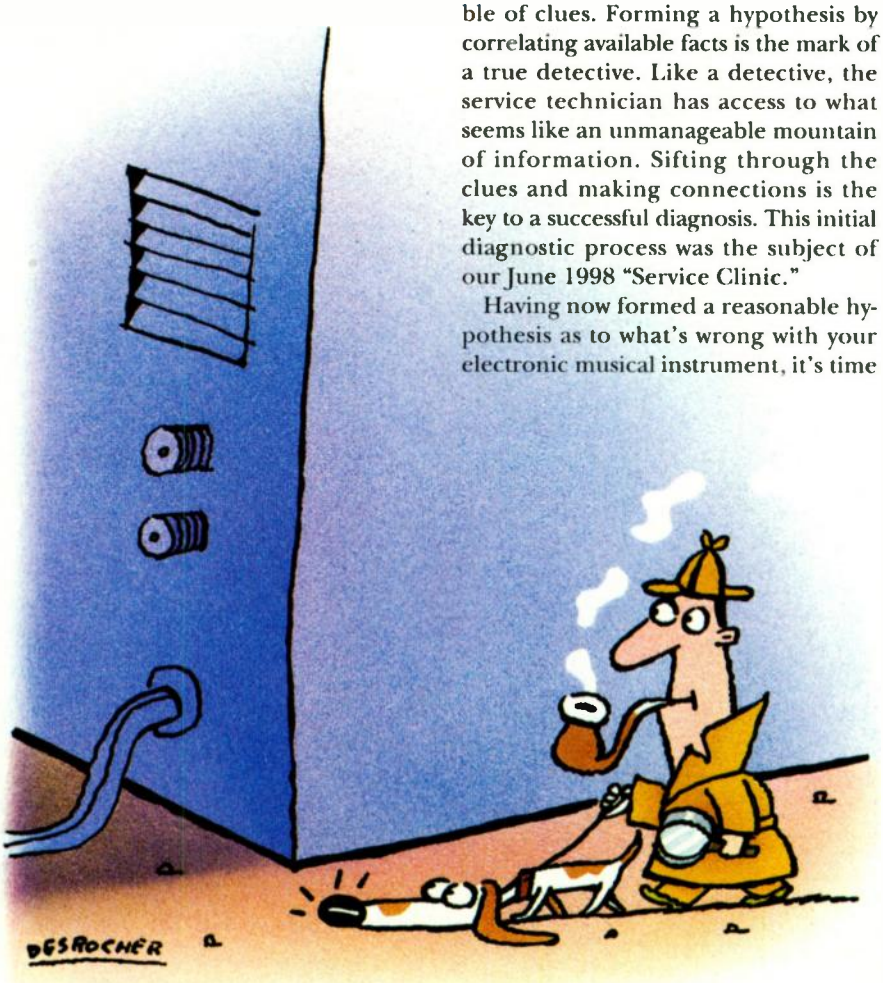
Eliminating the Obvious

The first step in troubleshooting is to develop objectivity.

By Peter Miller

Imagine you are Sherlock Holmes, and you have just arrived at the scene of a fiendish crime. The crime scene presents a nightmarish jumble of clues. Forming a hypothesis by correlating available facts is the mark of a true detective. Like a detective, the service technician has access to what seems like an unmanageable mountain of information. Sifting through the clues and making connections is the key to a successful diagnosis. This initial diagnostic process was the subject of our June 1998 "Service Clinic."

Having now formed a reasonable hypothesis as to what's wrong with your electronic musical instrument, it's time to get on with verifying the hypothesis through troubleshooting.



JACK DESROCHER

FROM REACTION TO RESPONSE

Successful troubleshooting requires getting past conditioned responses to problem solving. Think about driving your car. Every time you drive, you are making hundreds of highly complex decisions, mostly without consciously thinking. When you put the key in the ignition and turn it, you expect a certain response—the engine starting—based on past experience. If nothing happens, you react with surprise, then anger or frustration.

Once these feelings subside (if they do), an entirely different mindset presents itself. You begin to analyze the situation. You think about the condition of the battery, the starter motor, or perhaps the ignition system. You ask yourself, "Did I leave the lights on, or is the battery getting old and tired?" You might turn on the headlights to check the battery.

Congratulations! You have just made the transition from reacting to responding. You're no longer running on autopilot, and you have put aside your knee-jerk reactions. This is the first step to becoming an effective problem solver.

One of the clearest signs of responding (instead of reacting) to problems is objectivity. I am reminded of Sgt. Friday of the television series *Dragnet*,

HOT STUFF from PG MUSIC!

DOWNLOAD IT NOW !!!

WWW.PGMUSIC.COM

You can order & download PowerTracks Pro Audio, Band-in-a-Box & many other PG Music products immediately at http://www.pgmusic.com

Mac OS

ProPAK $88 *including Styles Disks 1–3, Harmonies Disk 1 & Soloist Disk 1*

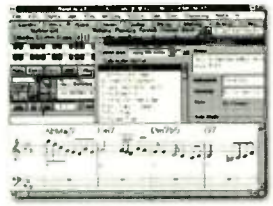
BAND-IN-A-BOX™ 7.0

INTELLIGENT SOFTWARE FOR WINDOWS & MACINTOSH

Version 7 for Windows & Macintosh is here. Automatic Accompaniment has arrived!

Type in the chords to any song, using standard chord symbols like C or Fm7b5, choose the style you'd like and Band-in-a-Box does the rest... Automatically generating professional quality five instrument accompaniment of bass, drums, piano, guitar & strings in a wide variety of styles.

Band-in-a-Box 7.0 is here! This major upgrade includes over 60 new features. We've added an amazing new feature called "Automatic Soloing". Choose the type of soloist you'd like (from 100 available) and the program creates and plays a solo in that style, along to any song! Or create your own soloists. This is **HOT**! These solos are of the highest professional quality, rivaling solos played by the greats! And there's lots more in 7.0 – improved notation, step time/notation edit of StyleMaker patterns, style changes at any bar, scroll ahead option for notation, improved synth support, over 60 new features in all!



CUSTOMER COMMENTS ABOUT VER.7.0... *"Wow! The soloing sounds amazing... how can it do that?" "I love the notation improvements" "You guys have added everything I wanted!"*

NEW! Band-in-a-Box MegaPAK $249

Do you have the **ALL** of the available add-ons for Band-in-a-Box? Many customers have asked for an all-inclusive package, with the latest version of the program and **ALL** of the add-ons. We've made the **"Band-in-a-Box MegaPAK"**– this includes the Band-in-a-Box 7.0 program (latest version) and **ALL** styles disks (1-11), **ALL** soloist disks (1-7), over 300 demo songs and PowerGuide video instruction CD. The latest version of the program with **ALL** of the add-ons in one convenient CD-ROM package.

First-time purchase $249 • Upgrade from Band-in-a-Box Pro $149

Band-in-a-Box Add-on Soloist Disks *each* $29

- **Soloist Disk Set #2: Killer Jazz Swing Soloing**
- **Soloist Disk Set #3: Specialty Jazz Soloing**
- **Soloist Disk Set #4: Rock Soloing**
- **Soloist Disk Set #5: Bluegrass Soloing**
- **Soloist Disk Set #6: Killer Pop & Older Jazz**
- **Soloist Disk Set #7: Blues, Pop, Funk & More**
- **Bluegrass PAK: Soloist Disk 5 (Bluegrass) plus Bluegrass Fakebook (50 standards) for $49**

SOLOIST PAK - ALL 6 Soloist Disks PLUS Bluegrass MIDI FakeBook on disks or CD-ROM $99

An exciting aspect of the Soloist feature in Band-in-a-Box Version 7 is that the program is able to increase its musical intelligence by analyzing new solos it is exposed to. It learns by "ear" and constantly gets better and better! Then the Soloist can incorporate the soloing we expose it to into its own playing. We've now created brand new soloist KnowledgeBases with dramatically enhanced results. We've created stunning new soloists in the jazz, rock and Bluegrass styles, and are offering them as new Soloist Disk Sets for Band-in-a-Box 7. The packages include **BONUS STYLES** (some also include demo songs) to augment your Band-in-a-Box with your favorite types of music. (**NOTE:** Soloist Disk Set #1 is included with Band-in-a-Box 7.0 and upgrade, so is not offered as an add-on.)

Band-in-a-Box Add-on Styles Disks *each* $29

Styles Disk #9 (Latin). Twenty authentic Latin and Salsa styles as designed by top Latin pianist **Rebeca Mauléon-Santana**. Including Salsa, Conga, Cumbia, Merengue, Son, Mambo, Cha-cha-cha, and many more.

Styles Disk #10 (Pop). Twenty 4-5 instrument Pop & Rock styles, incorporating live MIDI drums for authentic feels! Includes 50 original demo tunes with chords/melodies.

Styles Disk #11 (Classical) & Classical MIDI-FakeBook. Combination of 20 new classical styles for Band-in-a-Box, along with Classical MIDI-FakeBook of songs. Over 200 performances of well known Classical standards.

SPECIAL StylesPAK Styles Disks #4-11 only $99

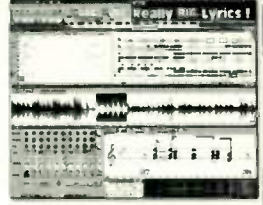
Styles Disks 4, 5, 6 (Jazz), 7 (Country) & 8... each $29

PowerTracks Pro Audio 4.0™

INTEGRATED DIGITAL AUDIO & MIDI SEQUENCER FOR WINDOWS

New version! Cool Features. Same Low Price. $29

PowerTracks Pro Audio 4.0 is a professional, fully featured digital and MIDI workstation, packed with features for musicians, students and songwriters. With seamlessly integrated digital audio/MIDI recording, and built-in music notation, PowerTracks turns a typical soundcard equipped Windows PC into a music production powerhouse! **Includes free PowerGuide video instruction CD. (NOTE:** Not available for Macintosh.)



2 Volumes of MultiTracks CD-ROMs! Each volume is a 3 CD package with over 3 hours of live Jazz, Blues & Rock tracks for playalong or use in PowerTracks. Available separately for $20 per volume.

PRICING: PowerTracks Pro Audio $29, Upgrade $19; PowerPAK (program & Volume 1 MultiTracks CD-ROMs) $49, Upgrade to PowerPAK $39

The Bluegrass Band™ $49

Virtuoso live performances of 50 Bluegrass standards! These MIDI files are great! As you listen to the tunes, you can single out any of the instruments using the on-screen fretboard display, tablature or notation. **PLUS...** Lots of Bluegrass pictures, biographies, trivia (all on disk) and much more. Our most "feel good all over" program so far. **INCLUDES:** Wildwood Flower, Sally Goodin, Cripple Creek, Fire on the Mountain, Pigtown Fling, Red Haired Boy, Jesse James and many more!

The Jazz Soloist™ *per volume* $49

Vol. 1 (50 pieces) $49 • Vol. 2 (50 pieces) $49 • Vol. 3 (60 pieces) $49

The Jazz Soloist is a music program with professional jazz quartet arrangements. Each song features a great jazz solo played by top jazz musicians, as well as piano comping, bass & drums. Vol. 3 of the Soloist series features Latin, Blues, and Jazz Waltz stylings. Includes Jazz Soloist program with MIDI files plus files in Band-in-a-Box format. On-screen notation makes sight-reading fun! (**NOTE**: Macintosh users get on-screen-notation only when running the files in Band-in-a-Box. Volumes work together or as standalone programs.)

The Pianist Series *available for Windows, Macintosh & Disklavier*

Each program contains piano music performed by world-class pianists. PLUS memos, trivia questions, biographies, Guess the Song games and more. They are ideal for learning to play the piano, or for background music while you use other programs. Windows versions also display and print standard music notation and chord symbols for pieces. Available for **WINDOWS, MACINTOSH**, and also in **Yamaha Disklavier & Roland SoundBrush** format. (...sounds spectacular with the Roland Virtual Sound Canvas!)

NEW! The Modern Jazz Pianist™ $49

Top Modern Jazz pianists play over 50 tunes in Modern Jazz styles! Jazz/studio pianists **Renee Rosnes, Miles Black, Ron Johnston** and **Brad Turner** play over 50 tunes in a wide variety of Modern Jazz Piano Styles. Emulating styles made famous by Herbie Hancock, Fred Hersch, Cedar Walton, Mulgrew Miller and more. Full of information on the masters of Modern Jazz piano! Includes player program to see and study the music using notation and on-screen piano.

NEW! The Latin Pianist™ $49

Over 50 "Latin" and "Salsa" piano and trio pieces by famed Latin pianist **Rebeca Mauléon-Santana** (editor of Sher Music's Latin Real Book). Including authentic Latin/Salsa piano songs and styles including Conga, Cumbia, Merengue, Son, Mambo, Cha-cha-cha, Guaracha, Samba, Partido Alto, and more. Includes player program, song memos, descriptions/analysis of styles and real-time piano score.

The Pianist™ *per volume* $49

The original Pianist now offers nearly 900 of the world's most popular Baroque, Classical and Romantic piano works! Performed by world-class concert pianists and featuring the internationally renowned, award-winning pianist **Valerie Tryon!** The repertoire is so comprehensive that if you can think of it, you'll probably find it, both solo works AND duets. Features **ALL** the Beethoven and Mozart sonatas, huge amounts of music by Bach, Handel, Scarlatti, Haydn, Chopin, Brahms, Schumann, Schubert, Liszt, Debussy, Ravel, Fauré, Rachmaninov and much more! **PLUS...** Music Trivia game, Guess the Song game, program notes, biographies, music dictionary (on disk) and more!

"The Pianist is indispensable" Sandra Bowen, Piano & Keyboard

NEW! VOLUME 4. We've added 200 fabulous selections to The Pianist program. Along with the companion volumes, there are nearly 900 of the world's classical masterpieces available in The Pianist series! More music by your favorite composers such as Haydn, Mozart, Liszt, Debussy, Fauré, Schumann and Schubert. Now listen to the complete Mozart Piano Sonatas, Chopin Etudes, Preludes, Ballades & Scherzi, Schumann Carnaval & Album for the Young (complete), Debussy Preludes (complete) and much more! **INCLUDES... ALL NEW** program notes!

NEW! VOLUME 5 – THE 32 BEETHOVEN SONATAS. For the first time, **ALL 32 Beethoven Piano Sonatas** are available on **NEW** "must have" MIDI performances for The Pianist program. The greatest sonatas ever composed for the piano have been performed by world-class pianists including Valerie Tryon, Robert Silverman, Jane Coop, Steven Lubin and Mark George for your study and enjoyment. **INCLUDES...** detailed program notes about the sonatas!

Vol. 1 (215 selections) • Vol. 2 (200 selections) • Vol. 3 (170 selections)
Vol. 4 (200 selections) Vol. 5 (complete Beethoven Piano Sonatas) • Each volume $49
Vol. 1-3, $99 • Vol. 1-5, $149

The Blues Pianist™ *per volume* $49

Each volume contains over 50 great down-home blues piano stylings by top professionals. Playing in a wide variety of blues piano styles... Boogie Woogie, Slow/fast boogies, jazz blues, New Orleans style, Chicago blues and more. These are the styles made famous by Pete Johnson, Albert Ammons, Jelly Roll Morton, etc. Hours of listening pleasure! Full of information and trivia on the great masters of piano blues. Slow them down and learn the licks! The perfect gift for any blues lover.

Volume 1 (50 pieces – older styles) $49 • Volume 2 (50 pieces – newer styles) $49

Other Pianists... *each* $49

NEW AGE PIANIST. Over 50 "New Age" and "New Age-Jazz" style piano pieces, played by top performers. This is a beautiful collection of solo piano compositions inspired by the natural world. Full range of "New Age" piano techniques are presented: "ambient" performances in the style of **George Winston** and "New Age-Jazz" performances in styles of **Chick Corea/Keith Jarrett**. Includes song memos, biographies and information on important New Age musicians. Includes photo album of stirring nature scenes & real time piano score. Over 3 hours of music!

CHILDREN'S PIANIST. Over 70 of the best-loved children's songs for listening & sing-along! Lyrics to all songs displayed on screen in large type. Chords, lyrics and music notation. On-screen lessons explain the techniques of piano accompaniment. Examples of Alberti bass, embellishments, syncopation, stride style and many more techniques! Over 4 hours of music! Words and music for 70 songs: London Bridge, Camptown Racetrack, Home on the Range, My Bonnie Lies Over the Ocean, and many more!

NEW ORLEANS PIANIST. Over 60 "New Orleans Style" piano music standards, played on MIDI keyboard by top New Orleans pianists **Henry Butler, Jon Cleary, Tom McDermott, Joel Simpson** and **David Torkanowsky** playing a wide variety of New Orleans, R & B, Blues & Ragtime piano music.

GOSPEL PIANIST. Over 50 Gospel style piano pieces played on MIDI keyboard by top Gospel pianists **Louise Rose, Davell Crawford, Henry Butler, Sam Berfect, Derrick Bethune, Joel Simpson** and **Jon Cleary**. The "Gospel Piano" style underlies much of the blues, jazz and popular music played today.

CHRISTMAS PIANIST. This software includes great piano performances of over 50 all-time favorite Christmas songs and carols – ideal for listening or sing-along! On-screen lyrics, notation and piano keyboard, piano notation printout, background playback, Music Trivia game, Guess the Song games and more!

"Virtual Sound Canvas VSC-55" $20*

The Roland Virtual Sound Canvas ...sounds spectacular"

Pentium/Windows 95/98 users with a soundcard can dramatically improve their MIDI sound with Roland's software-only solution. (* *with purchase of another PG Music product $29 or more)*

Phone Orders: 1-888-PG MUSIC

1-800-268-6272 or 250-475-2874 — **24 HRS**

SALES, ORDERS & INFO FROM OUR WEB PAGE: www.pgmusic.com

VISA/MC/AMEX/check/mo/po#/Western Union Fax: 250-475-2937 Toll-Free Fax: 877-475-1444
E-mail: sales@pgmusic.com Add $5.00 Shipping/Handling per order ($10 outside USA/Canada)

PG MUSIC INC. 29 Cadillac Avenue, Victoria, BC, Canada V8Z 1T3

30 DAY UNCONDITIONAL MONEY BACK GUARANTEE ON ALL PRODUCTS

who would coolly interview a witness while writing constantly in a little notebook. Sgt. Friday didn't let his feelings get in the way of the investigation. He just wanted to get to the bottom of the case. You, too, must maintain objectivity when it comes to equipment repair, recording your observations and the conditions under which you made them.

LOOK BEFORE YOU LEAP

Now that you are responding instead of reacting and you can be objective, how do you verify your hypothesis? For that matter, why take the time to verify your theory? Why not just dig in and fix the instrument?

The reason is simple: wading into an instrument, replacing components here and there until everything appears to be fine, wastes your precious time and your (or your customer's) hard-earned money. Even a well thought-out theory should be empirically tested. Remember that a hypothesis is nothing more that an untested assumption based on available facts.

MULTIPLE-CHOICE TEST

Verifying a hypothesis is like taking a multiple-choice test. The correct answer to each question is selected from a list of a half-dozen possible answers. Of course, the people who graded the tests you took in school had a key listing the correct answers, whereas with a malfunctioning electronic musical instrument, there is no answer key. But as with a multiple-choice test, the solution to what is wrong with the equipment at hand can be selected from no more than a half-dozen choices that are well-known among competent technicians.

This is so because for a given type of electronic musical instrument, the vast majority of failures can be attributed to only a few *failure modes*. The failure mode is the problem inside the instrument that made it stop working—say, a bad solder connection or corroded traces on a printed circuit board.

Failure in electronics is a highly predictable event and only seems random to the casual observer who is reacting and not responding. The inherent predictability of failure is a tremendous advantage to experienced service technicians. This is what permits us to do four or five successful repair jobs in an 8-hour day.

In fact, much of my job as a service technician consists of familiarizing myself with what makes a given type of instrument go bad. For instance, when power amplifiers go south, output transistors (which are high-stress components) are high on my list of what may be wrong. If a synthesizer freezes, a software bug is the likely cause. Some failure modes are specific to a given instrument or manufacturer; I'll discuss this in detail in future columns.

IF YOU ARE CLUELESS

The most common question my technician trainees ask is what to do when they have no clue where to begin. Getting back to the analogy of a multiple-choice test, if you don't know the correct answer, you can greatly improve your odds by identifying answers that are clearly wrong. There is a penalty for guessing. Begin by eliminating what the problem is not.

A good place to start is with the most fundamental operations of electronic devices. A partial checklist is provided in the sidebar "Get a Clue." Going through this list takes little time and helps you focus on the real problem by eliminating what is not at fault.

START WITH THE OBVIOUS

Diving into an instrument, replacing components willy-nilly, is a poor practice that wastes valuable resources. Failure in electronic musical instruments is usually predictable. As we have seen, the cost-effective method for testing a hypothesis is to start by checking the obvious.

I have one last point to make here, and it's an important one: the discussion so far assumes that the gear at hand worked until recently, so that you are looking for a limited number of relatively new problems. Fixing an electronic musical instrument that has not worked in years and could have numerous complex problems can be a tremendous challenge and should be left to experienced technicians.

Of course, if it's your own unit, and you want to take a shot at it, that's up to you. But unless you know exactly what you are doing, be aware that you could be wasting your time and might even be courting disaster.

GET A CLUE

When you have no clue where to begin troubleshooting, start by reviewing the most basic possibilities and eliminating the obvious. You might be surprised how many times you can solve the problem at this level of investigation.

For example:

√ Have you carefully read a written statement of your customer's complaint (or documented the problem yourself, if it's your own gear)?
√ Is the instrument plugged into an AC socket? Yes, this sounds silly, but forgetting to plug in a unit is a common goof.
√ Does the instrument draw excessive current from the AC line?
√ Do indicator lights illuminate appropriately?
√ Is there a blown fuse?
√ If the fuse is not blown, does it show signs of passing current near its limit?
√ Are there signs of physical abuse, such as dents?
√ Does the instrument show readings on its display (if it has one), and do the readings make sense?
√ Is there an odor of burnt components?
√ Is carbon present on any surfaces inside the instrument (indicating burnt components)?
√ Is there evidence of chemical contamination due to spilled liquids?
√ Does the instrument pass signal or produce an audio or MIDI output?
√ If the instrument is computerized, what is the effect (if any) of reinitializing it?
√ If the instrument is programmable, what happens (if anything) when you reload the factory programs?

Peter Miller *has specialized in the repair of electronic musical instruments for over 30 years. He owns and operates CAE Sound (in San Mateo, California) and has designed custom audio electronics for such groups as Counting Crows and the Grateful Dead.*

REVIEWS

YAMAHA

01V

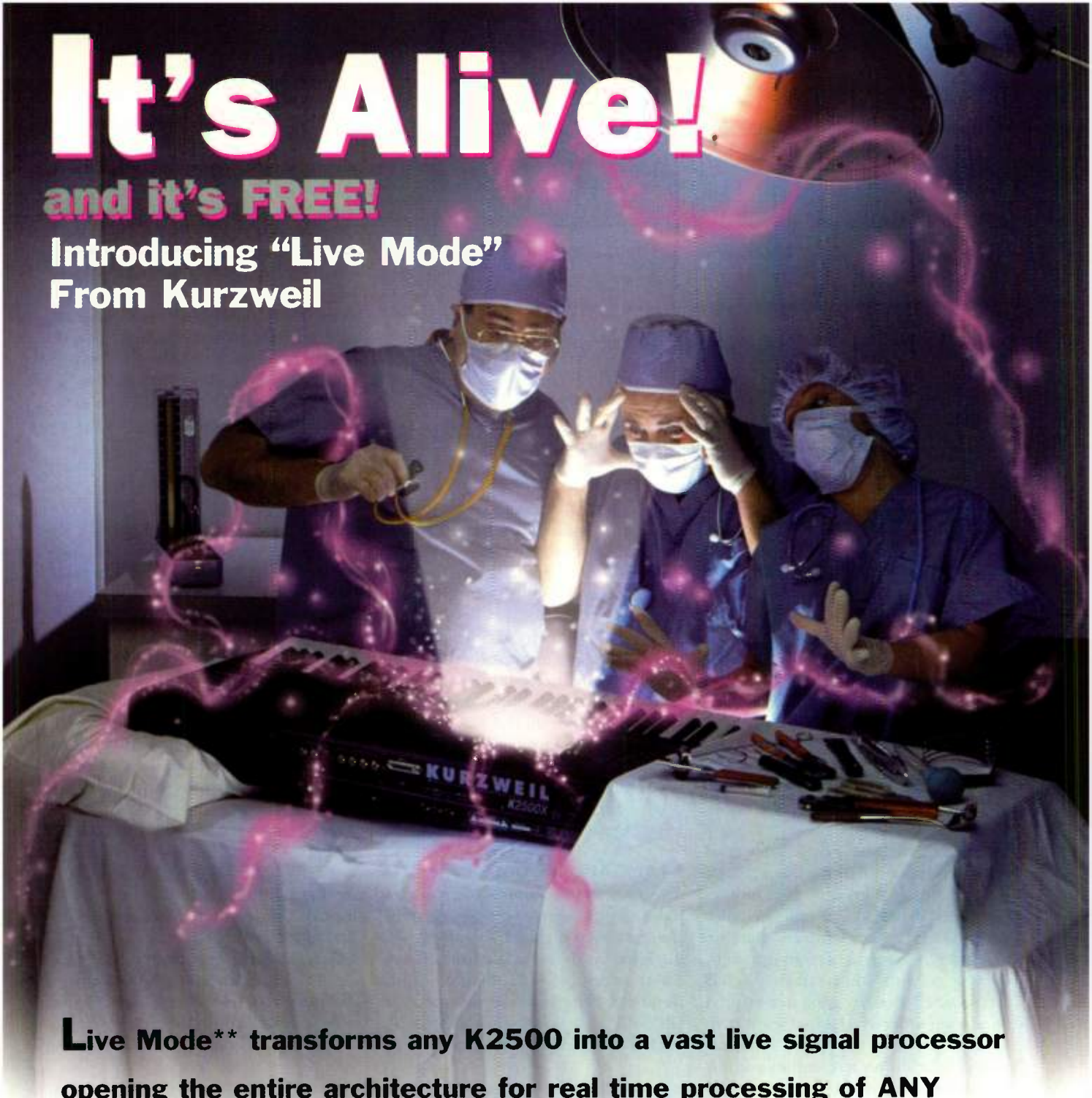
Digital mixing becomes ever more affordable.

By Rob Shrock

When Yamaha debuted the ProMix 01 in 1994 (reviewed in the February 1995 **EM**), the product dazed and amazed consumers, delivering an affordable hardware digital mixing solution with much better sound quality than the company's earlier DMP7. However, it had no digital inputs, only one S/PDIF output, no inserts, no direct outs (only a stereo bus output), and no dedicated tape returns, so the ProMix was commonly relegated to use as a submixer, not as a main console. A few years later, Yamaha addressed these shortcomings and more with its 02R and 03D consoles. But, until recently, the 8-track personal studio owner on a limited budget had to skimp and save a long time in order to come in from the cold of the long analog winter.

Enter, stage right, the Yamaha 01V. The smartly designed, long-anticipated replacement for the ProMix 01 incorporates many of the professional features found in the higher-end 02R and 03D consoles, while costing the same as the ProMix. Aimed at the smaller personal studio, the 01V can potentially deliver 24 channels of digital mixing. It provides sixteen analog inputs, with expansion options for adding eight digital inputs; four analog bus outputs, with expansion options for adding eight assignable digital outputs or four more analog ones; 24-bit digital I/O; and four aux sends. In the way of amenities, it offers

FIG. 1: Targeting the single-MDM studio, the Yamaha 01V incorporates many features of the company's higher-end 02R and 03D consoles, while costing no more than the ProMix 01.



Live Mode transforms any K2500 into a vast live signal processor opening the entire architecture for real time processing of ANY external signals, including all algorithms, effects, modulators, etc. for only $299.00 MSRP.**

*Live Mode, KB-3 Mode and soft manual can be downloaded at no cost to existing K2500 owners at our FTP site. Factory installed MSRP $598.00

You can purchase hard versions at Kurzweil Accessories 1-800-400-6658

** Requires sampling option.

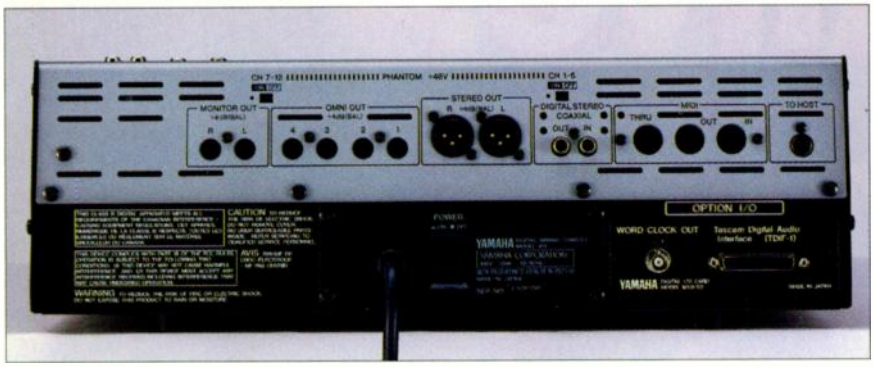
SEE US AT AES BOOTH #184

At Kurzweil, we don't think you should have to buy a new synthesizer every time our award winning engineers have a new idea. We continue to support our buyers long after the sale. So that's why Live Mode is Free* to all existing K2500 owners.

KURZWEIL... IT'S THE SOUND

Kurzweil Music Systems
(253)589-3200
P.O. Box 99995
Lakewood, WA 98499-0995
www.youngchang.com/kurzweil

circle #594 on reader service card



In addition to a pair of XLR stereo outputs, the 01V offers four Omni Outs, which can be used as bus outputs, aux sends, additional stereo outputs, or direct outs for channels 1 to 16. Monitor outputs are also provided, in addition to 24-bit digital I/O, MIDI connections, and an 8-pin mini-DIN jack for cascading multiple consoles.

onboard EQ, effects, and dynamics processing; snapshot automation; a very good MIDI implementation; and the ability to cascade multiple consoles.

In short, although the 01V doesn't possess *all* of the flashy features of its big siblings, it clearly is loaded.

A FAMILIAR FACE

Although the 01V bears a striking resemblance to the Yamaha 03D (see **Fig. 1**), this new mixer also embodies many features of the ProMix and 02R. If you've had the pleasure of working with any of these consoles, you'll feel right at home with the 01V.

Fourteen channel strips and a master fader grace the unit's front panel. Each channel offers a 60 mm motorized fader, as well as Channel On, Solo, and Channel Select buttons (used for making processing and routing assignments). As with other Yamaha digital mixers, the faders are used to control a number of different channel levels (two dedicated effects sends and four aux sends) in addition to channel output. These assignments are made with the Fader Mode selection area on the mixer's left-hand side. Above this section is a bank of main function buttons that provide access to the 01V's global controls (Utility, MIDI, EQ Attenuation, etc.) and to its dynamics, delay, and pan/routing sections.

There are two Effects Return channels, each offering a rotary level control and Channel On, Solo, and Select buttons. Like the 02R, the 01V provides dedicated front-panel knobs and buttons for controlling the EQ and pan settings. The data-entry wheel is conveniently located on the mixer's lower right side (unlike the 03D's), and fine-tuning buttons are provided for making adjustments in ±1 increments. As with the 02R and 03D, you can scroll through parameter pages with the data-entry wheel or with the four directional cursor buttons located beneath it.

Stereo L/R meters are present, and monitor and headphone level controls round out the user interface. Unfortunately, the 01V's display is much smaller than the ones on the 02R and 03D, and the computer mouse port—one of the coolest features of the 03D—is sorely missed. On the other hand, the 01V does offer more dedicated controls (e.g., EQ, pan, solo) than the 03D does.

STANDARD MODEL

The stock 01V features sixteen analog inputs and six analog outputs, in addition to stereo digital I/O and various monitor and 2-track connections. There is no AES/EBU digital output, but the S/PDIF coax output carries an IEC958II signal, which is essentially "unbalanced" AES/EBU. It's nonstandard, but it's there if you want it.

Channels 1 to 12 offer both line- and mic-level input connectors (¼-inch TRS and XLR, respectively), making the 01V a bit more efficient than the 03D for rhythm-section recording. (The 03D offers only eight XLR jacks.) Each channel features a 26 dB pad and gain pot that affect both XLR and ¼-inch inputs. These settings are not automated and must be either left in a "set and forget" position or notated to ensure proper level recall when using snapshot automation. Phantom power is available in banks of six channels (1 to 6 and 7 to 12).

Analog inputs 13/14 and 15/16 are designed as stereo pairs, each controlled by a single fader. Inputs for each pair are on two balanced, ¼-inch TRS jacks. You can change the pan positions for each channel within each L/R pair, but all EQ, dynamics, effects-send and aux-send levels, and fader moves affect both channels simultaneously. Practically, this means that the stereo channels must be used for either stereo material or tracks that don't require much internal processing. (I had to patch around this configuration several times while mixing a previously recorded 24-track project.)

You can switch the channel 13/14 pair to the digital RCA inputs with a software switch, and channels 15/16 can be hardware-switched to accommodate a pair of RCA, analog 2-track inputs. (Unfortunately, there are no dedicated 2-track channels, as there are on the 03D.) This setup can be a bit cumbersome, especially if you want to use channels 13 through 16 in a mix while simultaneously monitoring a CD, DAT, cassette, or other external source.

EFFECTS LIST

The 01V has two identical stereo effects processors, which can be addressed by all 24 input channels. The effects can be designated prefader or postfader, and the processors can be routed into one another. Each effects return has a 4-band EQ and a pan control.

Each of the two processors can independently create any of 42 effects, including: reverb (hall, room, stage, plate, early reflections, gate, and reverse gate), delay (mono, stereo, modulated, 3-tap, and echo), chorus, flange, symphonic modulation, phaser, auto pan, tremolo, pitch change (mono and stereo), rotary, ring modulation, modulation filter, distortion, amp simulation, dynamically controlled effects (filter, flange, and phaser), multifilter (3-band, 24 dB/octave parallel filter), freeze (2.9-second sampler), and twelve multi-effects.

For manufacturer information, please see Contact Sheet, p. 195.

Resistance is Futile

For NT 98/95

SAW Pro

The Next Generation

SAWPro - Software Audio Workshop for the Professional. IQS introduces the ***Fourth Generation*** of the award-winning SAW software, with features too incredible to resist! SAWPro incorporates more power than ever with 24-bit/96 kHz record and playback capabilities, and Direct-X support, allowing you to now use your favorite plug-ins ***LIVE*** in the SAW MultiTrack environment!

- 32 Real-Time Mono/Stereo Tracks
- Support of 12 Stereo Devices Equaling 24 Physical Ins/Outs
- High Resolution 3-D Graphics
- All DSP FX Processing Maintained at the 24-Bit Depth Level with 64-Bit Spillover Registers
- Complete Automated Virtual Mixing
- SMPTE Sync & Generate Capabilities with Sub-Frame Accuracy

Whether your professional audio needs lie in theatre, radio, film, recording studios, audio for video, live sound, or multimedia productions, reward yourself with the tool that will turn your creative visions into reality. Evolve into the next dimension of digital audio with SAWPro!

SAWPro Minimum System Requirements: Windows NT/98/95, Pentium II-266 or higher, 128 Mb RAM, XVGA video 1024x768 at 65000 Colors, 16-bit or higher Windows compatible sound card(s), EIDE or ultra-wide SCSI hard drives.

SAWPro is the ultimate value in 24-bit digital audio solutions, featuring non-linear, non-destructive editing and direct hard disk multitrack recording.

SAWPro can and will change the way you work with audio *forever*.

Professionally Record, Mix, and Master a Session Using High-Quality Built-In FX!

Built-in Emulated DSP Effects Include: Graphic EQ, Compressor/Gate/Limiter/Normalizer, Echo/Delay, Vari-Pitch/Speed, Reverse Audio, Reverse Phase, and Center Channel Eliminator on EVERY TRACK!

New higher-resolution graphics bring a distinctive look to the screen designs.

Mix and master an entire session in SAWPro, effectively replacing the entire console, patchbay, outboard effects gear, and all associated cables, hums and buzzes. SAWPro, hosted by a high-end Pentium II computer with a multi-channel optical sound card can deliver up to 24 channels of I/O with full 24-bit resolution. SAWPro truly represents the complete digital tapeless solution! Record, overdub, and mix... *SAWPro does it all*, potentially saving you tens of thousands of dollars!

Once you've realized the SAWPro experience, there IS NO turning back. Resistance is futile.

SAWPRO PRICE $950

Special upgrade pricing available for registered SAW users!
Call 1-800-844-1554 for details.

Free demos available for download at www.iqsoft.com!

Other Incredible Digital Disk Editing Solutions from IQS

SAWPLUS32 FOR NT/98/95 $700
SAWPlus32 represents the ***Third Generation*** of the SAW design, giving you superior performance in Windows NT/98/95, with simultaneous playback of up to 32 mono or stereo tracks and support of up to 12 stereo sound cards. Tons of new features and enhancements, now including Direct-X support, make SAWPlus32 an invaluable investment for everyone from recording professionals to audio enthusiasts.

SAW32 FOR NT/98/95 $500
Identical in design to SAWPlus32, but less resource intensive. SAW32 offers simultaneous playback of up to 16 mono or stereo tracks and supports up to six stereo sound cards. If you want all the features but don't need all the tracks, SAW32 is for you.

SAWPlus FOR WIN 3.x $300
You won't find this value anywhere in digital editing software. Turn your PC into a full-fledged DAW with 16 tracks of real-time playback! Being used in thousands of radio stations and recording studios, SAWPlus is still a favorite.

INNOVATIVE QUALITY SOFTWARE

circle #595 on reader service card

4680 S EASTERN AVENUE
LAS VEGAS, NV 89119
WWW.IQSOFT.COM

(800) 844-1554 - ORDERS
(702) 435-9077 - PHONE
(702) 435-9106 - FAX

Another drawback to this design is that all internal processing (EQ, effects, dynamics) applied to the stereo channels remains active after the input is switched. The workaround is to establish an automation snapshot for 2-track playback, with the parameters of both stereo pairs set to normalled positions.

In addition to a stereo pair of analog XLR outs, the 01V provides four assignable Omni Outs (¼-inch, TRS), which can serve as analog bus outs, aux sends, stereo outs, or direct outs for channels 1 to 16. In addition, the Omni Outs can be individually delayed by up to 300 ms, a useful feature if you're using the 01V for sound reinforcement.

A pair of ¼-inch, TRS monitor out jacks are also provided on the rear panel, as is a headphone jack and a pair of analog 2-track outputs (RCA). An 8-pin mini-DIN jack marked "To Host" allows you to link two 01Vs together and synchronize their software. As with the To Host port on some Yamaha synths (e.g., the MU100R), this port can be used as a serial-port MIDI interface for Macintosh, Windows PC, or NEC PC9800 series computers. Of course, you also get MIDI In, Out, and Thru ports, which can be used in combination with the To Host port.

The 01V features 20-bit A/D converters on all channel inputs, 20-bit DACs on the main stereo out, and 18-bit DACs on the Omni and monitor outs. The digital output delivers up to a 24-bit signal, which can be converted (with dither) to any word length down to 16 bits. (Put very simply, dithering—adding low-level white noise—to the signal before conversion to a lower sample resolution reduces the amount of audible conversion artifacts. For a detailed explanation, see "Square One: Dithering Heights" in the December 1996 **EM**.)

OPTIONAL EXPANSION

Although the 01V is technically a 24-channel mixer, channels 17 to 24 can be accessed only if you install an optional I/O card in the console's single slot. Three digital format expansion cards are currently available (ADAT Optical, TASCAM TDIF, and AES/EBU). Each provides eight additional inputs and eight assignable bus outputs, which is great for working with multiple MDMs. A 4-channel analog XLR output card is also available for those folks working with analog multitracks. For some reason, Yamaha changed the format of the expansion card for the 01V; the YGDAI cards for the 02R and 03D are not compatible with the new mixer.

Here's where things get a bit dicey. Unlike channels 1 to 16, channels 17 to 24 are not full-featured: the EQ is only 2-band instead of 4-band, only aux buses 1 and 2 are accessible (auxes 3 and 4 are not), and there is no dynamics processing at all. However, all is not lost. Yamaha has provided the ability to swap channel inputs 17 to 24 with channel inputs 1 to 8 to provide the digitally transferred signals with more bands of EQ, dynamics, and more flexible routing capabilities. Even better, this can be done globally (all eight at once) or on a channel-by-channel basis.

Of course, this means that, while the digital inputs get full doses of EQ, aux sends, and dynamics, their analog counterparts are relegated to poor-cousin status. It's not a perfect solution, but it is a decent workaround that can be helpful if you carefully plan ahead with your track assignments.

EQUAL EQ

The 01V employs the same 44-bit, 4-band parametric EQ as the 03D and 02R consoles, and it can be applied to input channels 1 to 16, the effects returns, the aux sends, and the stereo outs. (Channels 17 to 24 have the aforementioned 2-band EQ.) Each band is adjustable from 20 Hz to 20 kHz, has a selectable bandwidth between Q-factor 0.1 and 10, and provides ±18 dB of gain. Having complete overlap between all four bands allows you to do everything from mild tonal shaping to pretty serious notching. The low EQ band also features a highpass filter and several low-shelf curves, and the high band offers a lowpass filter and high-shelf curves.

Using the EQ is simple: after pushing a channel's Select button, you can automatically call up the EQ window for that channel by pushing or turning one of the console's dedicated EQ knobs (Frequency, Gain, or Q). You then select a frequency band (Low, Low-Mid, Hi-Mid, or High) and make adjustments with the rotary knobs.

Any adjustments made via the console's physical EQ controls are reflected in the onscreen display. The EQ window also shows a graphic representation of the EQ's frequency curve, a feature I found very helpful. (It's important to be reminded how much of the frequency spectrum is being affected when you start adjusting several bands at once.) Pressing the High and Low buttons simultaneously resets the EQ to its initial values—another nice feature.

01V Features

Number of Input Channels (stock/fully expanded)	16/24
A/D Converters	20-bit linear, 128x oversampling
D/A Converters (stereo out)	20-bit linear, 8x oversampling
Faders	60 mm motorized; resolution +6 dB to -90/∞ dB
Display	Backlit, graphic LCD; 320 x 80 dots; contrast control
Level Meters	2 x 12-segment LED bar graph (stereo out)
Channel 1–12 Inputs	(12) XLR and (12) ¼" TRS (balanced)
Channel 13–16 Inputs	(4) ¼" TRS (balanced)
Channel 17–24 Inputs	Optional, via expansion card (ADAT Optical, TASCAM TDIF, or AES/EBU)
Stereo Output	(2) XLR, +4 dBu
2-Track Input/Output	(2) RCA, -10 dBV
Monitor Output	(2) ¼" TRS, +4 dBu (balanced)
Omni Outputs	(4) assignable, ¼" TRS, +4 dBu (balanced)
Digital I/O	Coaxial 24-bit (RCA)
Other Ports	8-pin mini-DIN; MIDI In, Out, Thru
Weight	27.5 lbs.
Dimensions	16.9" (W) x 5.8" (H) x 20.4" (D)

The EQ Library contains 40 preset programs and 40 user program locations. The presets are acceptable as reference points, but I found that I never really used them. I would have preferred to see fewer presets and more user locations because the latter allow you to perform copy-and-paste editing of EQ parameters: you simply save a particular channel's settings and recall them later for use with another channel or even with a completely different mix.

The sound of the 01V's EQ is smooth and transparent, and I found it better suited for subtle corrective equalization and blending of tracks than for distinctive timbre coloration. This seems to be true of practically all digital EQs. That said, the 01V's digital EQ (along with the EQ in the 03D and 02R) is among the finest I have ever used.

01V Audio Specifications

Frequency Response	20 Hz–20 kHz (+1/-3 dB)
Dynamic Range	105 dB typical (channel in to stereo out)
THD (input gain minimum)	<0.1% (20 Hz–20 kHz @ +14 dB into 600 Ω) Channel in to stereo out: <0.02% (1 kHz, +18 dB into 600 Ω)
Equivalent Input Noise	-128 dB (2 Hz–20 kHz)
Crosstalk (adjacent channels)	-70 dB @ 1 kHz (channels 1–12)
Sampling Rate	44.1 kHz (-10/+6%, internal)
Internal Processing	32-bit
EQ Processing	44-bit
Signal Delay	<2.5 ms (channel in to stereo out)

DIGITAL DYNAMICS

The 01V's dynamics-processing section is the same as the dynamics section in the 03D. Compression, limiting, gating, ducking, and compander functions are available to channels 1 to 16, the aux send buses, and the stereo out bus. When used on Channels 1 to 16, the processors can be triggered by the corresponding channel input or by a signal fed from a different channel (essentially a key, or sidechain, insert).

In addition to displaying virtual parameter knobs (Threshold, Ratio, Knee, Attack, Release, Range, Hold, Decay, and Width), the dynamics window shows a graphic representation of the currently active dynamic curve, as well as a meter for monitoring input level and gain reduction. As with the EQ section, there is a Dynamics Library that contains 40 presets and 40 user locations. A lot of the presets are very good, and I found myself auditioning them quite a bit before deciding on compression settings for particular tracks.

Overall, I'm less fond of the 01V's compressors and limiters than its EQs.

The processors can easily be pushed into generating unpleasant artifacts and pumping sounds, and none of them are as forgiving as their analog counterparts. (I wouldn't throw out my dedicated outboard compressors, by any means.) However, they *are* useful for taming erratic levels, and once you get a feel for them, they will definitely be a useful tool in your kit. Expect to dedicate some time to learning how to use them properly, though.

EFFECTIVE PROCESSING

Like the 02R and 03D, the 01V contains two internal multi-effects processors that are based on the Yamaha ProR3 DSP chip. Each stereo processor can generate 42 different types of effects (see the sidebar "Effects List"). Thankfully, all 24 input channels can take full advantage of the 01V's effects processors.

Each channel's fader also serves as its effects send. Pressing either Effect 1 or Effect 2 in the Fader Mode area snaps all faders to their appropriate send level for that effect, with the master fader serving as the master send. In addition, the processors can be routed into one another (the 03D is unable to do this), making them extremely flexible. The effects returns are also versatile: each has a 4-band EQ and a pan control and can be routed to any of the four Omni Out buses or aux sends. Both effects can also be designated pre- or postfader. The only drawback is that the effects returns do not offer any dynamics processing.

Each effect has between five and fourteen editable parameters, which are saved along with automation scene snapshots. The Effects Library contains 42 presets and 57 user programs for storing your favorite effects. The presets are good reference points and sound quite nice. The number of algorithms in each type of effect is slightly different than with the 03D, but the quality is the same. These studio-level processors add a lot of overall value to the 01V; the price of the mixer is almost justified by them alone.

The 01V is a great bang-for-the-buck mixer.

SNAPPING SHOTS

Probably the coolest feature of any Yamaha digital mixer is its automation. Although the 01V does not do real-time mixdown automation per se, you can automate most of its parameters via MIDI, allowing real-time control from a sequencer. In addition, it performs snapshot automation that can be stepped through with MIDI Program Changes. The 01V can store up to 100 Scenes, which can be renumbered and reordered as needed. Aside from peripheral data, such as monitor level or channel gain, almost all of the 01V's settings can be stored in a Scene. There is an Undo function (in case you haven't saved your current mix status before recalling another snapshot), and Scenes can be memory-protected.

Although you can't record a constant stream of fader moves, mutes, or parameter changes, you can set a fade time between 0 and 25 seconds going from one Scene to another (affecting individual channels, effects returns, aux sends, bus masters, and the stereo output), which enables you to perform limited types of crossfades and pseudo–real-time moves. This is done by storing a fade time with the upcoming Scene: when that Scene is recalled, the enabled faders move to their next location in a linear fashion over the designated time. Although all enabled faders must share the same fade time, this feature can be very effective for complex mix passages that require a lot of drastic moves.

SIBLING RIVALRY

Considering that the 01V and the 03D might appeal to the same end user, and that the sonic specifications of the two mixers are practically identical, I think it's important to summarize the differences between the two. As compared to the 03D, the 01V is missing an AES/EBU digital output, a mouse port, a dedicated 2-track channel, word clock I/O, full-featured expansion-card channels, channel inserts, real-time dynamic automation, and surround-sound capabilities.

However, the 01V isn't below the 03D in every category: it has more effects algorithms, more XLR microphone inputs, a console-link feature, and physical knobs for the EQ and pan controls. Also, its internal multi-effects processors can be routed into each other. Considering that its list price is only about half of the 03D's, there really are few significant drawbacks in return for a killer price break.

LET'S WRAP THIS SESSION

I like the Yamaha-style user interface, but it is not a traditional "one feature, one control" approach, so it is not everyone's cup of tea. It takes some getting used to, but once you solve its mysteries, you can accomplish an awful lot. If you can't afford one of the 01V's big siblings—and perhaps even if you can, because the 01V has some advantages—the new mixer is compelling. I love the sound quality, and Yamaha has certainly hit the mark with a tremendous feature/price ratio. I'm certain that the 01V will be a great mixer for a large base of users.

Composer-producer **Rob Shrock** *recently realized that the music business can be an endless black hole for a person's energy. He is spending more time with his wife and less time in the studio and, interestingly, has become more productive as a result.*

YAMAHA
01V digital mixing console
$1,999

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

PROS: Superb sound. Excellent, dedicated 44-bit EQ. A wealth of EQs and compressors. Effects processors are studio-level and can be routed into each other. Snapshot automation and extensive, real-time MIDI control. Up to 24-bit digital I/O. Multiple 01Vs can be cascaded.

CONS: Only one I/O expansion-card slot, which is not compatible with 03D and 02R cards. Expansion channels are not full-featured. Display is small. No AES/EBU digital output. No BNC word clock I/O. No channel inserts. No dedicated 2-track channel.

CIRCLE #436 ON READER SERVICE CARD

THE POWER AND THE FURY...

WITHOUT THE SMOKE AND FLAMES

Studiomaster

VISION 700
8 & 12 Channel
700 Watts
350x350

Prices starting at $1595

HORIZON 1200
8 & 16 Channel
1200 Watts
600x600

Uncompromising sound quality, extraordinary professional features, durability and reliability are the solid foundation that the VISION 700 and HORIZON 1200 stereo powered mixers are built on. Both units are a combination of a full featured, studio grade Studiomaster mixing console perfectly matched up with Studiomaster's ultra high specification 700D and 1200D amplifier components. To complete the package, we've added an onboard 166 program, digital efffects processor with 19 user programs, 15 of which are controllable via MIDI.

FEATURES INCLUDE –

- 3 band 'British' EQ w/mid sweep
- Stereo sub-group
- Dual 7 band graphic equalizers
- Channel and main inserts
- Amp 'split' to monitor
- 48v phantom power
- Optional 'plug-in' crossover
- Headphone bus
- 60mm calibrated faders
- Stereo return w/send to monitor
- 166 memory - digital reverb/effects
- 19 user programs – 15 w/MIDI
- Alpha numeric display window
- Built-in electronic processor 'help' menu
- Programmable System mute, Auxillary mute, 4 point processor EQ, Reverb on/off & Delay on/off

SERIOUS POWER + SERIOUS PROTECTION

The VISION and HORIZON power amps employ STUDIOMASTERS' AMCS (Amplifier Management Control System)
Featuring –
SIGNAL LIMITING
Makes it virtually impossible to overdrive the amplifiers
THERMAL & LOAD SENSING FAN COOLING
The sensing circuitry anticipates heat build-up and applies cooling in advance
CROWBAR SPEAKER PROTECTION

STUDIOMASTER, INC.
3941 Miraloma Avenue, Anaheim, CA 92806
PHONE (714) 524-2227 • FAX (714) 524-5096
WEBSITE http://www.studiomaster.com

FOSTEX

FD-4

Fostex halves the price of hard-disk recorder/mixers.

By Bob O'Donnell

Like many people, my introduction to multitrack recording was in the world of cassette-based portable studios. In fact, the first multitrack recorder I ever bought and used was a 4-track Fostex 250 back in the mid-1980s. Through it, I learned the ins and outs of multitrack recording.

I mention that because, using Fostex's latest entry into the world of low-cost multitracks, the impressively low-priced FD-4 digital recorder, I couldn't help but be reminded of those initial experiences. Of course, a great deal has changed. The FD-4's four tracks of uncompressed, 44.1 kHz, 16-bit audio offers tremendously better recording quality than you got with the old 4-track cassette recorders. The stylish, sloping front panel of the FD-4 is much more modern looking than the boxier design of the old 250. Best of all, the price of the new equipment is about half of what I paid for the old recorder (taking inflation into account).

Still, it's easy to see the heritage from the 250 and its successors in the overall design of the FD-4. The unit basically looks and works like the cassette-based products that have dominated the low-end recording market since around the time of the 250. Working with it reminded me of what I liked—and didn't like—about how those types of units operate. But I'm getting ahead of myself: let's cover the straightforward stuff first.

TRACKS AND PORTS

The FD-4 consists of a 4-track digital recorder and 4-track analog mixer. You can record two tracks simultaneously and have two virtual tracks for bouncing, mixing down to stereo, or any number of other applications. The FD-4 can record compressed audio at a rate of 32 kHz (Normal mode) or uncompressed, 44.1 kHz audio (available in either of two Mastering modes).

You get a good selection of inputs and outputs, both digital and analog. The front panel offers four unbalanced, ¼-inch, mic/line (switchable) inputs. On the back (see **Fig. 1**) are two balanced, XLR, mic/line inputs, as well as a pair of RCA inputs for returning signals from a stereo recorder. (The RCA inputs bypass the channel faders and EQ.) You also get stereo S/PDIF optical digital input and output. (For those who need to interface with their DAT recorders or other digital gear via RCA coax S/PDIF, Fostex offers the COP-1 coaxial/optical S/PDIF converter for $95.)

Fostex's FD-4 is a great-sounding hard-disk recorder that looks and feels like a cassette multitrack but offers many digital amenities.

THE SCSI STORY

The FD-4's SCSI-2 port uses a Macintosh-style, 25-pin, D-sub connector, so you will need a Mac SCSI cable. The unit allows you to record onto any of several supported SCSI drives, which include the Iomega Zip; SyQuest EZ Flyer; a selection of Fujitsu, Konica, and Olympus magneto-optical drives (640, 540, and 230 MB); and any external, fixed SCSI drive.

Interestingly, the popular Iomega Jaz and SyQuest SyJet are not on the official list, which doesn't mean they won't work, just that they haven't been tested and approved by Fostex. Unofficially, this baby *ought*—there are no guarantees—to work with any standard SCSI fixed, removable-cartridge, or MO drive (but not with CD-R drives).

One noteworthy limitation is that you can only use one SCSI device at a time, which is not so great. However, if you can use the FD-4 with, say, a 1 GB Jaz or 1.5 GB SyJet, you should have plenty of storage space. Remember, if you record on all four tracks at 44.1 kHz, you'll only consume 20 MB of disk space per minute.

The FD-4 doesn't come with a built-in hard drive or other recording media. In other words, you have to buy something else before you can start to use the unit, which raises its true cost. True, some people already have external, removable-media drives for their computers. But how many are willing to shut down their computer and move and reconnect their removable drive every time they want to use the FD-4? Not me!

Fortunately, the FD-4 has an internal drive bay that fits a 2.5-inch EIDE hard drive (not included). If you add one, you will have at least some type of recording media available at all times. Note that, according to Fostex, installation must be done at the factory.

MIXING TRADITIONS

Unlike some other digital recording devices (but like previous Fostex hard-disk recorders), the FD-4's mixer is analog. This hybrid analog/digital design prevents the unit from having advanced features offered by digital mixers (such as snapshot or real-time automated mixing), it shouldn't affect the quality of your recordings. In fact, the FD-4's mixer boasts an impressive 105 dB signal-to-noise ratio and, in my testing, was extremely clean.

For manufacturer information, please see Contact Sheet, p. 195.

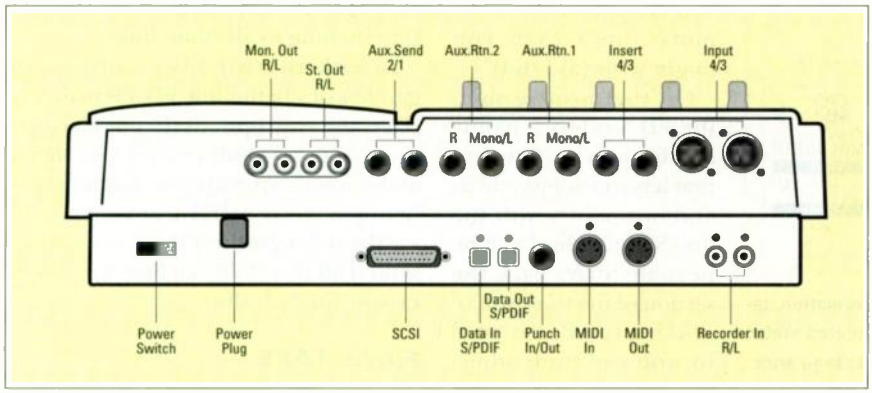


FIG. 1: The FD-4's impressive array of rear-panel connectors includes two balanced XLR mic inputs; stereo recorder ins; S/PDIF optical digital I/O; MIDI In and Out; and a Macintosh-style, 25-pin SCSI connector.

Even better, the mixer's analog EQ is very rich and musical sounding, not to mention quite flexible. This flexibility comes from the fact that, in addition to the standard high and low shelving EQ (set to 80 Hz on the bass end and 12 kHz on the treble), the FD-4 also offers a sweepable midrange band that ranges from 200 Hz to 5 kHz. This makes it easy to significantly change the timbre of your tracks.

Like the recording section (which I'll get to in just a bit), the FD-4's mixer supports four channels, although it also has four separate level and pan controls for monitoring existing tracks. You route and listen to different signals based on the settings of each channel strip's Input Select switch, the master channel's Monitor Select switch, and the Monitor Level Control knob (which can control either the input or the track) on each channel strip. This arrangement allows for a great deal of flexibility and is similar to the systems that have been offered on cassette and MiniDisc-based multitracks in the past. However, this arrangement can also be a bit confusing to the novice multitrack user.

Channels 3 and 4 have switchable trim controls that you can use to adjust either incoming levels for microphones, a direct guitar input, or line-level signals. If you take advantage of the four aux returns, separate track-monitor controls, and four channel inputs, you can actually mix up to twelve channels of audio on the FD-4's mixer, which is pretty impressive. In fact, with a bit of finagling (sending the monitor outputs to the recorder inputs) you can send all twelve of these inputs out the FD-4's digital output when it comes time to finish a particular song's mix.

Each channel strip includes a 2-way aux send control, which means you can send a track to one auxiliary output or the other, but not both. The FD-4 does not come with onboard effects, and the fact that you can only use one aux send per channel at a time is a limitation worth noting for those who want to do more elaborate processing on their tracks.

LET'S GET DIGITAL

The right half of the FD-4 includes the unit's recording "transport" controls, handy jog/shuttle wheel, function buttons, and the backlit display. The display includes level meters for the four tracks and the stereo bus; a position counter that can be switched between absolute time, MIDI Time Code (MTC), and bars/beats/clocks; and a 9-character message section for displaying parameters, settings, and dedicated messages that show the machine's current status (see **Fig. 2**). Taken together, it offers quite a bit of useful information and is relatively easy to figure out.

The FD-4's recording functions operate in the conventional manner. You can record one or two tracks at a time. Using the unit's Input Select switch, you can even do ping-pong recording by bouncing one or more tracks to another track. When you ping-pong tracks, the signal does not pass through the mixer and stays in the digital domain.

The FD-4 offers both manual and automated punch in and out, complete with a Rehearsal mode and six autolocate points per program, or song. You can store 99 different programs, although you'll probably run out of recording space well before you hit that limit. The FD-4 also has a Variable Pitch mode for adjusting the playback speed of any recording by ±6 percent.

All of these functions are essentially similar to what you would find in a well-equipped analog recorder, and they operate similarly to analog machines. As a result, anyone who wants to make

FD-4 Specs

Real Tracks	4
Virtual Tracks	2
Simultaneous Record Tracks	2
Analog Inputs	(4) ¼" unbalanced mic/line; (2) balanced XLR mic/line; (2) RCA
Analog Mix Outputs/ Monitor Outputs/Headphone	(2) RCA/(2) RCA/(1) ¼" TRS
Aux Sends/Insert	(2) ¼" unbalanced/(2) ¼" TRS
Digital Inputs/Outputs	1/1 (stereo S/PDIF optical)
Additional Connections	MIDI In and Out; footswitch jack (punch in/out), D25-pin SCSI-2
A/D Converters	18-bit, 64x oversampling
D/A Converters	20-bit, 128x oversampling
Sampling Rates	44.1 kHz, 32 kHz
Sampling Resolution	16-bit linear
Frequency Response	20 Hz–20 kHz (@ 44.1 kHz)
THD	0.008% (@ 44.1 kHz)
Dynamic Range	recorder >90 dB; mixer 105 dB
Channel Crosstalk	>80 dB
Nominal Input Level	-50 dBV to -10 dBV
Nominal Output Level	-10 dBV (aux sends and master out)
Dimensions	15.83" (W) x 4.33" (H) x 13.98" (D)
Weight	8.8 lbs.

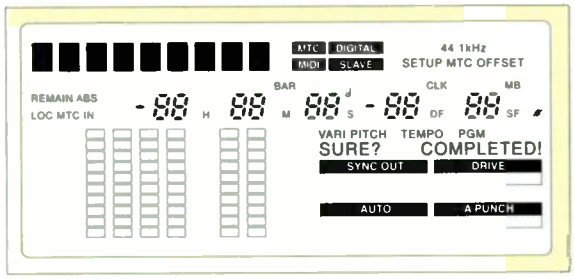


FIG. 2: The backlit display shows a variety of information, including level meters, a switchable counter, dedicated status indicators, and a general-purpose, 9-character message area.

the jump from analog to digital should find the FD-4 quite easy to operate.

SLICING AND DICING

Of course, the FD-4 is digital, so one would rightly expect it to provide editing capabilities that aren't possible with analog recorders. And, of course, it does, through the unit's Edit button, which lets you cut, copy, paste, move, and erase entire chunks of tracks via the Auto Punch In/Out and Clipboard In/Out buttons. Unfortunately, except for erasing, you're limited to editing one track at a time, and the process is a lot more complicated and takes a lot more button pushes than it should. In addition, unless you properly set all four points (Auto Punch In/Out and Clipboard In/Out) before you begin the procedure, you may end up looking at the confounding "Void Data!" message on the display a few more times than you might wish (as I did).

On the positive side, the FD-4 offers a handy audible preview function that lets you adjust edit in and out points with the Jog/Shuttle wheel as it repeatedly plays back the section of the track you're working on. If you need to, you can even adjust the preroll time up to ten seconds. All in all, it's not as fast or as intuitive as graphic editing, but it certainly does the job. If you make a mistake, a one-level Undo/Redo command lets you get back to where you started.

The other nifty feature of the FD-4's recording section is the ability to use two virtual tracks. You can use the virtual tracks to store alternate takes that you want to try in your mix, or you can use them to store a stereo digital mix of your other tracks. This allows you the flexibility and convenience of keeping your original tracks and stereo master in the same place. In conjunction with the unit's ability to backup and restore its data onto a DAT recorder via the optical digital outputs, this can be very useful.

GETTING IN SYNC

Another important advantage of digital devices is the inclusion of multiple synchronization options, and the FD-4 delivers here, as well. For example, you can create a tempo map that is stored with each program and use that to generate a metronome click to which you can record your parts. The FD-4 doesn't offer a Tap Tempo function, which would have been nice, but it does let you program multiple tempo changes at any point in a song. The tempo map is used by the unit's bars/beats/clocks counter, which allows you to keep track of where you are in a song in musical terms. You can also use the tempo map in conjunction with the unit's MIDI synchronization features to generate MIDI Song Position Pointer messages to synchronize with an external MIDI sequencer.

If you prefer to have the sequencer act as the master, the FD-4 can synchronize to incoming MIDI Time Code and can be controlled remotely through MIDI Machine Control (MMC). The FD-4 can also generate MTC and MMC messages. It even offers an MTC Offset for synching to absolute time.

As with all hard-disk recorders, regardless of whether the FD-4 is master or slave, the sync options do not take up a track. You can easily re-cord four digital audio tracks, sync up your sequencer to bring in your MIDI tracks, mix the synths through the FD-4's mixer, and send it all to a DAT machine for a high-quality final product.

FINAL TAKE

The FD-4 is suitable for existing home studio recordists who are used to working with analog multitrack recorders because it combines the comfortable, familiar operation of a typical cassette multitrack recorder/mixer with many of the benefits that digital recording can provide. The audio quality of both the mixer and the recording section are very good. The selection of inputs and outputs also makes the unit flexible and should help it fit in quite nicely with home studios that already have some existing equipment, such as outboard effects processors.

The mixer's analog EQ is very rich and musical sounding.

The digital editing features are nice to have, and the signal routing options are very flexible, although both of these features could be confusing at first to new users. Fostex's idea of letting the user decide which type of media to record onto is also a good one, but it can raise the real cost of the unit. The single-device limitation is a minor drag, but as I noted earlier, it isn't all that bad.

All things considered, the value that the FD-4 provides—a 4-track digital recorder priced under $600—is hard to argue with.

Bob O'Donnell, *former editor of* **EM,** *hosts the* O'Donnell on Computers *radio show, which you can hear via RealAudio at www.everythingcomputers.com. He also writes a weekly column for* InfoWorld Electric, *the online version of* InfoWorld *magazine, at www.infoworld.com.*

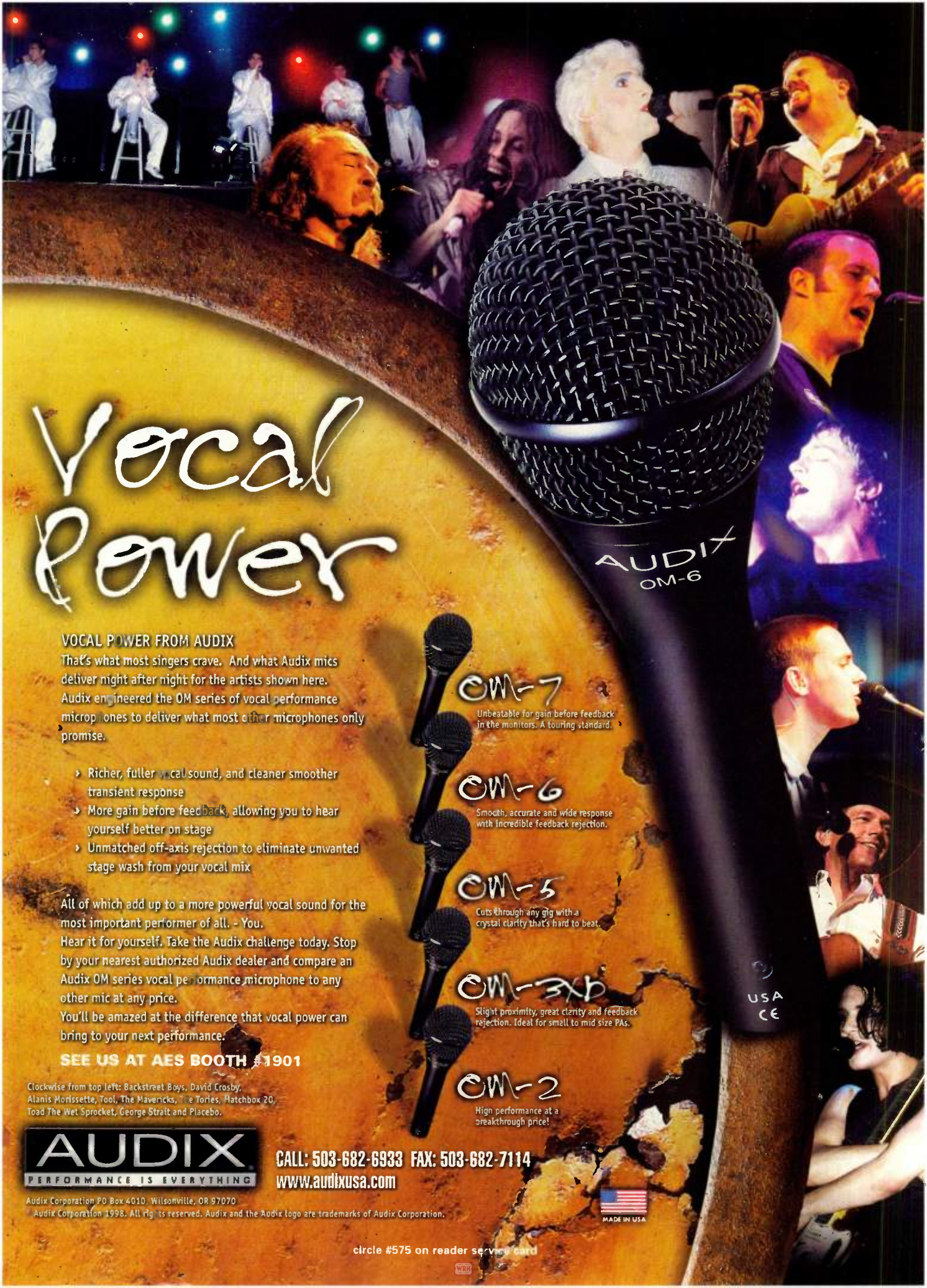
FOSTEX
FD-4 multitrack hard-disk recorder
$599

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

PROS: Excellent overall value. Good-sounding mixer with flexible EQ. Good range of inputs and outputs.

CONS: Lack of built-in hard drive raises real cost of unit. Cutting and pasting audio is confusing and cumbersome. Mixer signal flow can be confusing to beginners. Only one aux send can be used at a time per channel.

CIRCLE #437 ON READER SERVICE CARD



Vocal Power

VOCAL POWER FROM AUDIX

That's what most singers crave. And what Audix mics deliver night after night for the artists shown here. Audix engineered the OM series of vocal performance microphones to deliver what most other microphones only promise.

- Richer, fuller vocal sound, and cleaner smoother transient response
- More gain before feedback, allowing you to hear yourself better on stage
- Unmatched off-axis rejection to eliminate unwanted stage wash from your vocal mix

All of which add up to a more powerful vocal sound for the most important performer of all. - You.
Hear it for yourself. Take the Audix challenge today. Stop by your nearest authorized Audix dealer and compare an Audix OM series vocal performance microphone to any other mic at any price.
You'll be amazed at the difference that vocal power can bring to your next performance.

SEE US AT AES BOOTH #1901

OM-7
Unbeatable for gain before feedback in the monitors. A touring standard.

OM-6
Smooth, accurate and wide response with incredible feedback rejection.

OM-5
Cuts through any gig with a crystal clarity that's hard to beat.

OM-3xb
Slight proximity, great clarity and feedback rejection. Ideal for small to mid size PAs.

OM-2
High performance at a breakthrough price!

Clockwise from top left: Backstreet Boys, David Crosby, Alanis Morissette, Tool, The Mavericks, The Tories, Matchbox 20, Toad The Wet Sprocket, George Strait and Placebo.

AUDIX
PERFORMANCE IS EVERYTHING

CALL: 503-682-6933 FAX: 503-682-7114
www.audixusa.com

Audix Corporation PO Box 4010, Wilsonville, OR 97070

MADE IN USA

USA
CE

circle #575 on reader service card

SONORUS

StudI/O (Mac/Win)

Sixteen channels of PCI-based ADAT optical I/O.

By Rob Shrock

Although today's desktop computers typically come with digital audio hardware built in, the I/O connections are generally limited, and the A/D/A converters are often of inferior quality. As a result, many desktop musicians are left without the means to fully exploit the capabilities of today's powerful digital audio software.

Enter the Sonorus StudI/O interface card. With four optical connectors on a single PCI card, the StudI/O allows sixteen channels of ADAT or eight channels of ADAT plus two channels of S/PDIF digital audio to be transferred back and forth using your favorite (compatible) audio application. The StudI/O card works on both Macintosh and Windows platforms (appropriate drivers are included), and an optional StudI/O-Sync Backplate (see **Fig. 1**) is available, which provides BNC word clock I/O and ADAT Sync input for additional synchronization capabilities.

StudI/O
Minimum System Requirements
PC: Pentium 133; 32 MB RAM; Windows 95/98/NT
Mac: Power Mac 132; 48 MB RAM; Mac OS 7.5.5

EVERYTHING IN ITS PLACE

Installing the StudI/O PCI card into the computer is a breeze and takes only minutes. In addition to the four optical connectors on the card (ADAT A in/out; ADAT B in/out), there is an 18-bit D/A converter feeding a ¼-inch, TRS, stereo output jack. A setting in the control panel allows you to adjust the level of this monitor output, and the sound quality is very good. (I would have no problem using it to monitor tracks while making EQ and compression decisions.) Sonorus also helpfully includes four 6-foot optical cables for connection to ADATs, DAT machines, or CD players.

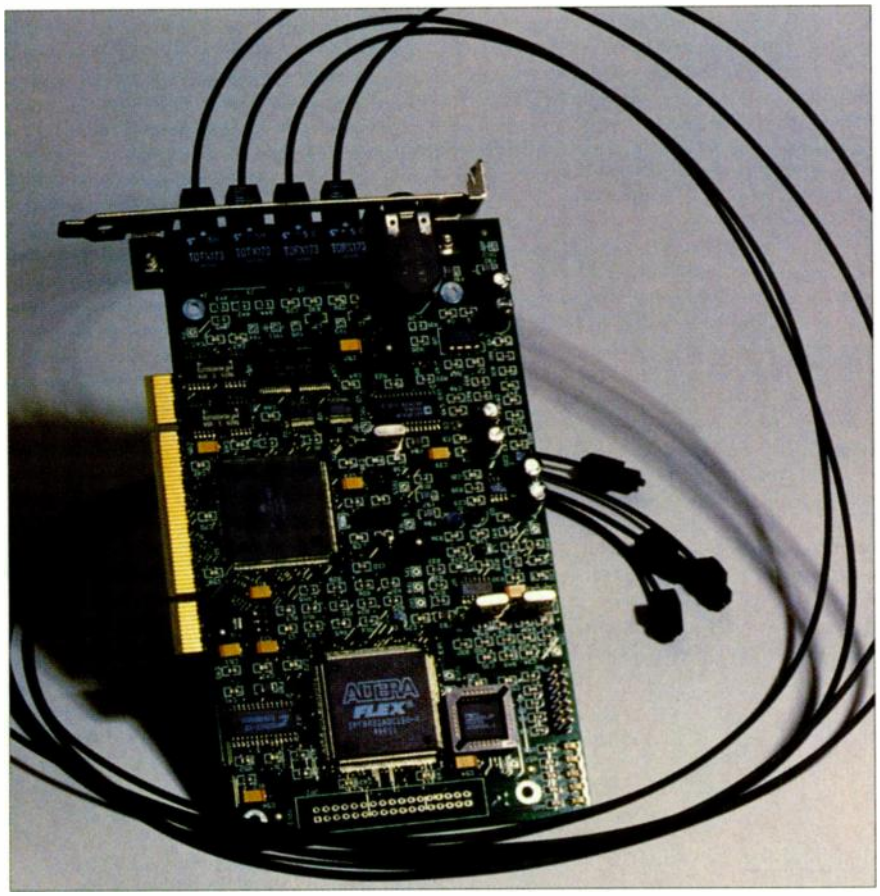
The optional StudI/O-Sync Backplate (see **Fig. 1**) offers BNC word clock in and out, and an ADAT Sync In connects to the Sync Out of the last ADAT in the chain. The Backplate provides these additional connectors for deriving MTC, as well as allowing the StudI/O to transfer digital audio with sample accuracy in certain situations. (See the sidebar "Synchronization.") The StudI/O-Sync Backplate attaches to the StudI/O PCI card with a ribbon connector—it doesn't actually connect to the computer—and takes up an additional PCI slot. (There are a couple of possible places on the StudI/O card to attach the ribbon connector, so care must be taken to follow the instructions when finding the proper connection point and orientation of the ribbon cable.)

Ideally, I would have preferred the StudI/O-Sync Backplate to exist as an external box rather than use an additional PCI slot. But I don't know how Sonorus could make the physical connection to an external device with the current design of the card. If you're short on slots, you can disassemble the Backplate and mount it into the DB25 and DB9 punchouts on the back of PC cases. That's a fairly simple operation. In either case, the additional connections are welcome.

AN ISSUE OF COMPATIBILITY

Currently, only a limited number of Mac applications support the StudI/O interface card, but the list is growing. (Check the manufacturer's Web page for a current list of supporting applications). For Macintosh, Steinberg's *Cubase VST*, Cycling '74's *MSP*, and Metric Halo's *Spectrafoo* are on the support list. All compatible Macintosh software will support sixteen channels of digital audio.

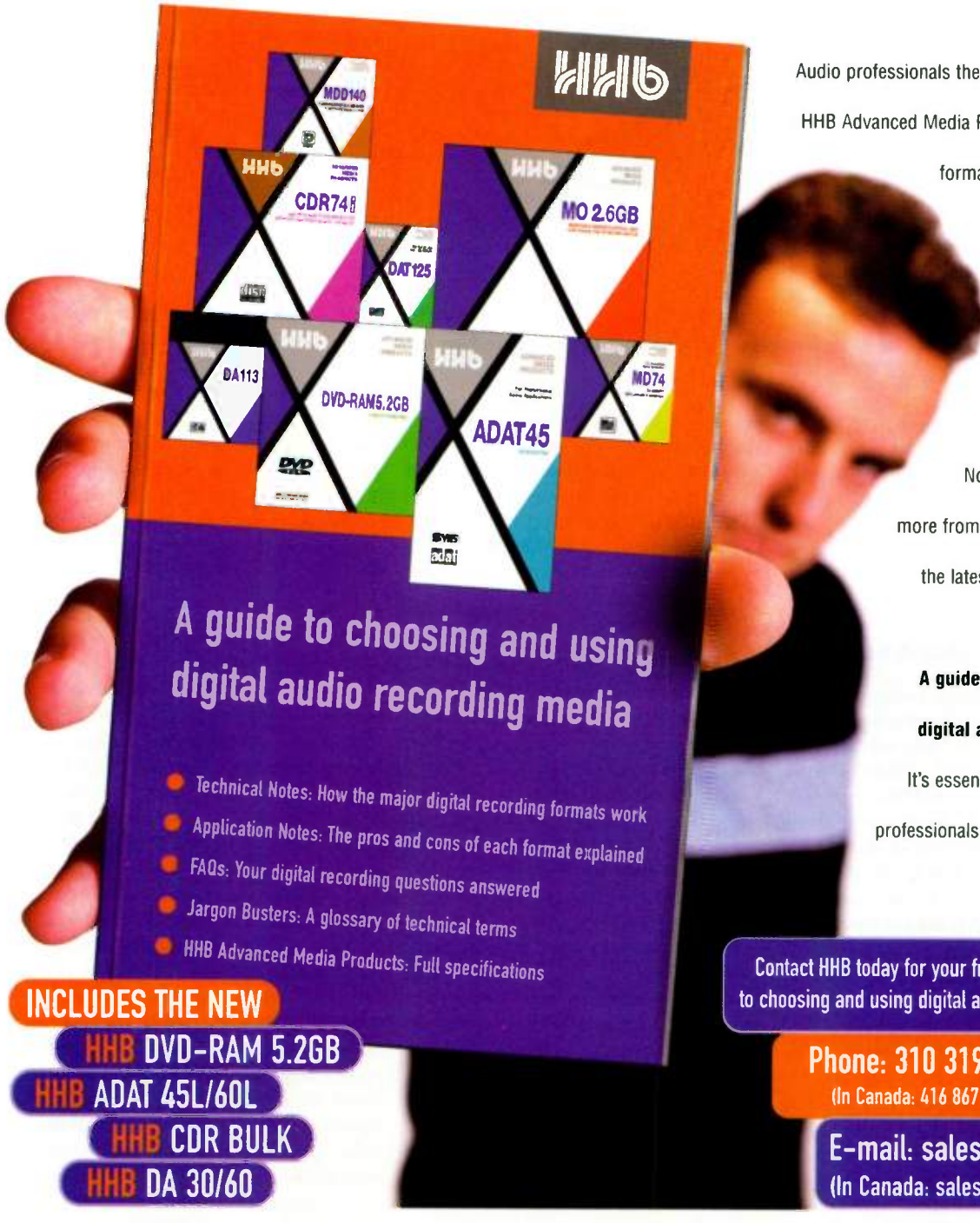
Because the card ships with standard Wave (MME) drivers, Windows users



The Sonorus StudI/O card is a versatile, multichannel audio card that provides sixteen channels of ADAT I/O or eight channels of ADAT and stereo S/PDIF I/O.

For manufacturer information, please see Contact Sheet, p. 195.

ASK HHB ABOUT DIGITAL RECORDING MEDIA AND WE'LL THROW THE BOOK AT YOU.



Audio professionals the world over rely daily on HHB Advanced Media Products. In every major format, HHB digital recording media sets the standards for performance, compatibility and long term archival security. Now, to help you get even more from your digital recordings, the latest HHB Advanced Media Product is a book – **A guide to choosing and using digital audio recording media.** It's essential reading for all audio professionals. Contact HHB today for your free copy.

INCLUDES THE NEW
HHB DVD-RAM 5.2GB
HHB ADAT 45L/60L
HHB CDR BULK
HHB DA 30/60

Contact HHB today for your free copy of 'A guide to choosing and using digital audio recording media'

Phone: 310 319 1111
(In Canada: 416 867 9000)

E-mail: sales@hhbusa.com
(In Canada: sales@hhbcanada.com)

HHB Communications USA · 626 Santa Monica Boulevard, Suite 110, Santa Monica, CA 90401, USA · Tel: 310 319 1111 · Fax: 310 319 1311 · E-Mail: sales@hhbusa.com
HHB Communications Canada Ltd · 260 King Street East, Toronto, Ontario M5A 4L5, Canada · Tel: 416 867 9000 · Fax: 416 867 1080 · E-Mail: sales@hhbcanada.com
HHB Communications Ltd · 73-75 Scrubs Lane, London NW10 6QU, UK · Tel: 0181 962 5000 · Fax: 0181 962 5050 · E-Mail: sales@hhb.co.uk
Visit HHB on line at: http://www.hhb.co.uk

SEE US AT AES BOOTH #1668

HHB

circle #599 on reader service card

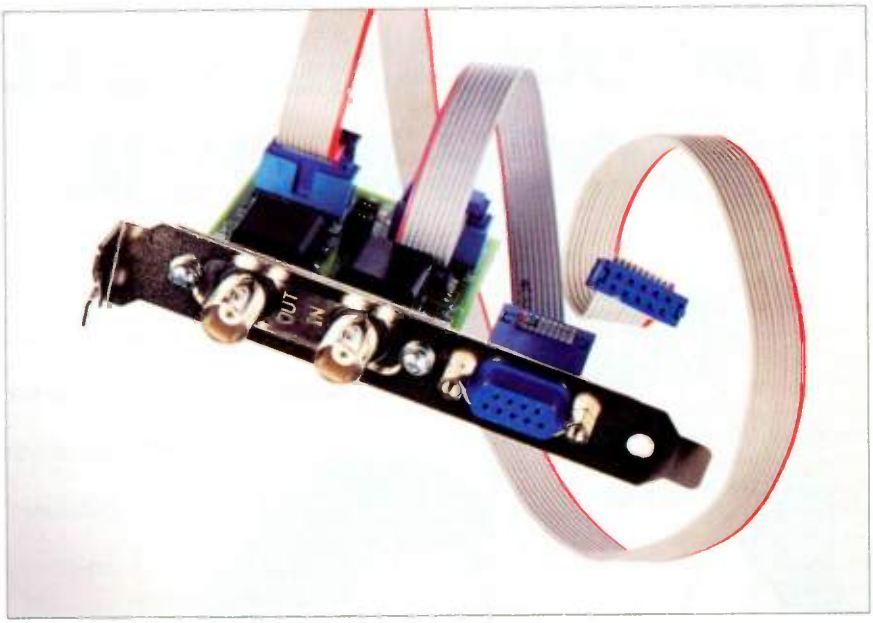


FIG. 1: The optional StudI/O-Sync Backplate connects to the StudI/O PCI card, not the computer, and takes up an additional PCI slot.

have a larger list of supporting applications. In fact, any Windows audio software that works with Wave drivers (I can't think of any that don't!) should provide at least two channels of audio I/O, and most recent multitrack programs will provide even more. For example, *Cakewalk Pro Audio* 6.0 and 7.0 and SEK'D's *Samplitude Studio* 4.0 and *Samplitude 24/96* all support the full sixteen channels offered by the card. Even better support is offered by Steinberg's *Cubase VST* 3.553 via a special ASIO driver, which bypasses the Wave driver entirely and connects directly to the 32-bit low-level code of the card. This allows it to operate with one-tenth or less of the latency of other applications. Again, check the Sonorus Web site for up-to-date information on Windows support.

I tested the StudI/O card running *Cubase VST* 3.52 on a Macintosh G3/233 MHz with 64 MB of RAM. Installation for Macintosh *Cubase VST* users is incredibly simple. All you have to do is drag the contents of the ASIO.MAC folder from the included floppy into the ASIO Drivers folder of *Cubase VST* (version 3.5 or higher) and start the application—that's it. All of the software configurations are handled within *Cubase*.

In *Cubase VST*, the Audio System Setup window handles the settings for the StudI/O card (see **Fig. 2**). Depending on how you want the StudI/O card to behave, a drop-down menu allows you to select either 16-channel or 10-channel operation. Sixteen-channel operation turns both sets of optical connectors into ADAT Optical (lightpipe) jacks (both A and B groups). The

SYNCHRONIZATION

With the exception of Ensoniq's PARIS and a few other high-end systems, most audio cards can't actually execute sample-accurate transfers of data between the computer and an ADAT (or other, similar devices). The timing between the two is extremely close, but it is not phase-accurate. Most of the time, the discrepancies are not large enough to be a problem, but there are times when you need completely phase-accurate data transfers. The StudI/O hardware and drivers actually can transfer data with sample-accuracy; however, their ability to do so is limited by the capabilities of the program running with the StudI/O card. This deserves a bit of an explanation.

The StudI/O card locks to the sample clock (speed of incoming samples) through the optical input coming from the ADAT or, if the StudI/O-Sync Backplate is installed, via the BNC word clock input. This guarantees that both devices will be running at exactly the same speed once they begin playback together (a situation similar to the way most digital audio cards operate). So far, so good.

Windows currently has no way of communicating sample-accurate time code and is limited to MIDI Time Code's quarter-frame messages to derive sample playback start times. Once the start time is defined, there is no standard way of knowing exactly when the play command will actually be issued within that quarter-frame message. What this means, in practice, is that there will be an inconsistent start point within the audio with as much deviance as 50 to 200 samples, which can translate into a few milliseconds of "slop." And worse, the start point will be different every time.

Sonorus provides a small applet called *PunchI/O* that allows applications that support it to derive sample-accurate playback by directly reading the ADAT ABS code, thereby providing perfect, sample-accurate synchronization. Currently, a number of Windows applications support *PunchI/O*, which is not available for Macintosh at this time. Among these are IQS's *SAW+*, SEK'D's *Samplitude Studio*, Sonic Foundry's *Sound Forge*, Steinberg's *WaveLab*, Syntrillium's *Cool Edit* and *Cool Edit Pro*, and Chris Craig's *GoldWave*.

What is needed for both computer platforms is a standardized way for each application to read the ADAT ABS code directly. *PunchI/O* serves as a temporary solution to the bigger problem. Steinberg has plans to eventually build this ability into its ASIO driver, but no actual release time has been established. Sonorus is currently working with Opcode to include this ability in OMS; once again, there is no scheduled release date.

Until the time that more applications support *PunchI/O* or gain the ability to read ADAT ABS code directly, StudI/O users will be limited to the applications listed above.

StudI/O Specifications

Digital I/O Format	24-bit ADAT (8-channel) or S/PDIF (2-channel)
Sample Rates	44.1, 48 kHz
I/O Connectors	ADAT/Toslink optical In (2) and Out (2); ¼" stereo phone jack monitor output
Dynamic Range of Sample Rate Converter	96 dB
THD+N (D/A converter for the monitor out)	-84 dB
Interchannel Phase Deviation	0°
Power Dissipation	3W
Dimensions	6.85" x 3.85" (standard short card)
Slot Type	PCI

10-channel setting turns group B into 2-channel S/PDIF optical I/O and leaves the A group of I/O set for ADAT Optical transfers. The control panel allows you to choose either 16- or 24-bit recording (for both A and B groups simultaneously), set latency time, and adjust the output level of the 18-bit D/A stereo monitor output on the StudI/O card (see **Fig. 3**).

For Windows users, the software setup is, naturally, a bit more complicated and potentially more time-consuming. (The rather skimpy, but informative, 27-page manual devotes a full fourteen pages to Windows setup but only three and a half pages to Macintosh setup.) I will not detail the PC setup, but I will mention that there is an advantage to the more complicated PC installation: you get more hands-on control of the StudI/O card.

According to the manual, the Windows control panel gives you greater customization and routing possibilities, including Meter and Mix windows, graphic routing, and a status indicator for the StudI/O card if these features are not available in your chosen software application.

Notably, there is a checkbox in the Advanced Format Settings window of the Windows control panel (not available in the Mac version) that allows for individual phase reversal of each A and B input and output for use with original blackface ADATs. The original ADATs flipped the phase before A/D conversion and storage to tape, and then re-flipped the phase after D/A conversion before output. This means that audio transferred digitally from the ADAT would be out of phase with the original ADAT tracks played back through the ADAT D/A converters. The control panel setting provides Windows users a permanent correction at the setup level. If the tracks were to be digitally transferred back to the ADAT and played back through the ADAT's D/A converters along with the other tracks,

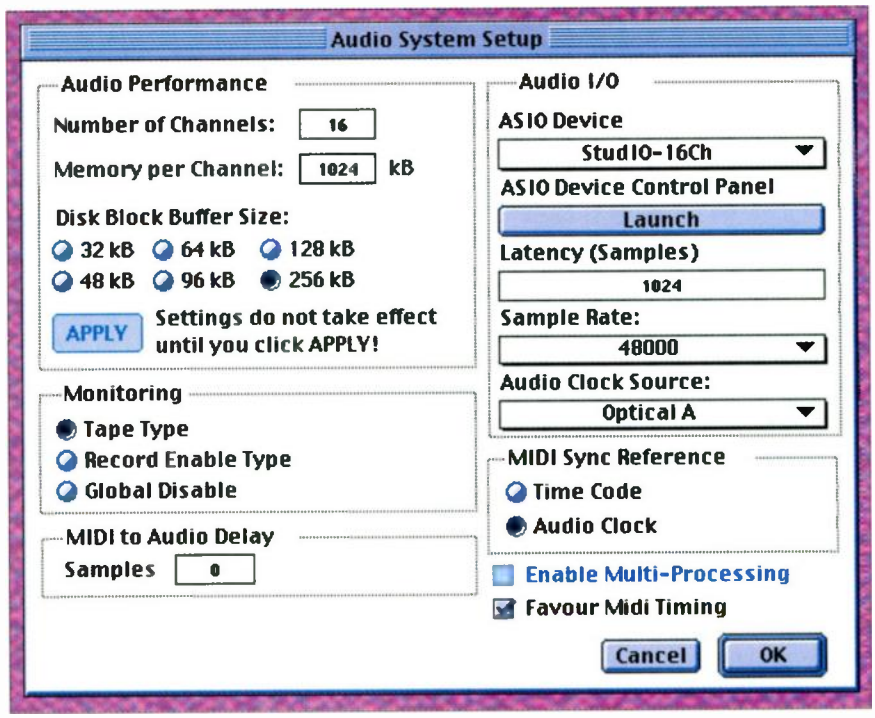


FIG. 2: Many performance settings of the Sonorus StudI/O card can be set in the Audio System Setup window that appears in *Cubase VST*.

the correct phase relationship between all tracks would be restored. This idiosyncrasy was corrected from the ADAT-XT model onward.

Although the printed documentation included with the StudI/O card is not exhaustive, Sonorus has established an excellent Web site. This is the primary place to find general information, technical support, updates, and tips with detailed instructions for setting up the StudI/O card with specific Mac and Windows programs. The application notes for my particular review setup alone (*Cubase VST* 3.52 for Mac) totaled eleven printed pages. There are plenty of full-color screenshots to help you get audio properly transferred to the computer (although the application notes don't detail audio transfers back to ADAT). I hope that Sonorus continues to provide detailed setup information for all compatible software programs; the process helped me tremendously in getting the StudI/O card up and running.

Unfortunately, I had problems with *Cubase VST* crashing quite a bit during one weekend of the evaluation period. Further investigation showed that the problems with *Cubase* strictly involved my particular computer setup and had nothing to do with the StudI/O card. A helpful call to Steinberg the following Monday solved the problem, which was actually covered in the Sonorus application notes on *Cubase*. I learned that both Sonorus and Steinberg have a cooperative attitude toward each other's products and are committed to having the products work together properly.

MOVE IT IN, MOVE IT OUT

When I finally had all the software settings correct and all my connections

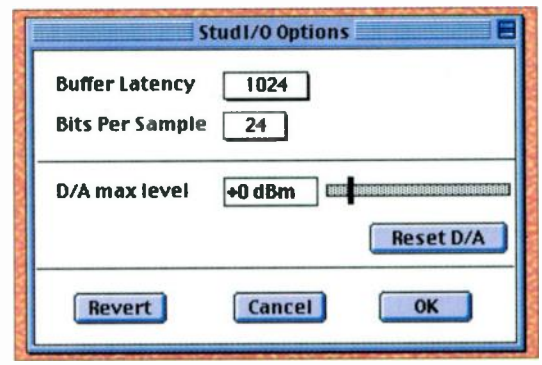


FIG. 3: The StudI/O's performance can be improved by determining proper settings for latency. User-adjustable bit resolution and output monitor level can also be adjusted in the card's control panel.

set up properly, I could easily transfer sixteen tracks of recorded ADAT material into the computer in a single pass. There was not a glitch, pop or other anomaly on the tracks transferred into *Cubase VST*, and I was able to perform all sorts of cool audio processing, courtesy of Steinberg's excellent collection of VST plug-ins. Of course, transferring audio to a digital audio sequencer is not a new concept by any means, but the StudI/O card provides a convenient way to digitally import up to sixteen audio tracks at once into a computer, and it does it well.

After importing audio into your computer, the card has done the first half of its job. It's then up to you, your sequencer, and your therapist to do something interesting with the results. After you've tweaked away in your chosen audio editor, the StudI/O card gets reenlisted if you choose to transfer the audio back to the ADATs or whatever else may be connected to the card's optical outputs.

The outbound audio transfer is not as clearly detailed in either the documentation or the Web site, but the principle is the same as with the inbound transfer. The audio editing software receives timing information from a MIDI interface device, and the card follows the clock of the ADAT, BRC, or word clock master, depending on your setup. (For original blackface ADATs, this entails holding Set Locate and pressing Dig In to set the source to Internal.) Once the computer sees MIDI Time Code, it will lock to the clock of the optical input of the ADAT and start playing the audio in the correct spot.

STUDLY I/O

The StudI/O card does what it is intended to do and does it very well. Because the card has no onboard A/D converters (only optical connectors), it is assumed that you will be using an ADAT, DAT, or other device with an optical output to perform the A/D conversion before sending data to the computer. The StudI/O can record with up to 24-bit resolution, which widens your options as to which device can be used as a front-end converter. This feature gives the Sonorus card a much longer life span in an industry fraught with short-lived products.

The ability to configure the StudI/O card in either 16-channel or 10-channel mode further adds to its flexibility and allows you to transfer S/PDIF signals just as easily as ADAT Optical information. The StudI/O-Sync Backplate option provides additional BNC and ADAT Sync connections for those using a word clock master such as an Alesis BRC or MOTU Digital Timepiece.

At first glance, the StudI/O card may appear to be a bit on the expensive side. However, there aren't many hardware systems in this price range that provide you with this much I/O flexibility, this many tracks, and this many sync options (assuming that you already have the A/D front end). Depending on your current system and needs, Sonorus's StudI/O may be just the thing you need to keep the tracks flowing.

SONORUS
StudI/O interface card
$849
StudI/O-Sync Backplate (optional)
$149

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

PROS: Does 16- or 24-bit recording through ADAT Optical connectors. Provides transfers of up to sixteen ADAT tracks to or from computer in one pass. Can also pass S/PDIF signals. High-quality stereo analog Monitor output. Easy setup. Optional StudI/O-Sync Backplate provides BNC word clock I/O and ADAT Sync In. Can provide sample-accurate sync with certain applications. Excellent Web site.

CONS: Not yet compatible with all major digital audio sequencer packages. Printed documentation is minimal. StudI/O-Sync Backplate takes up additional PCI slot. ADAT Sync In is not yet implemented for Macintosh format. Sample-accurate sync is currently limited to a few applications.

CIRCLE #438 ON READER SERVICE CARD

K O R G

SGproX

A great sounding keyboard with plenty of power.

By Julian Colbeck

The SGproX is the current model in a line of professional stage pianos and master keyboard controllers that Korg has produced since 1986. Like Korg's SG-1D from thirteen years ago, the SGproX, with its black metal case, isn't going to win any awards for flashy exterior design. On the other hand, at 53 pounds it's almost 22 pounds lighter than its predecessor, which makes it easier to handle than some of the more overweight keyboards on the market.

The new model offers 64 sample-based Tones, an effects bank, and a 64-patch Performance memory in which internal Tone combinations can be stored along with sophisticated external MIDI configurations. You get quality effects processing and a good amount of MIDI control over external devices. There's plenty to discuss, so let's get to it.

THE TOP VIEW

The main controls flank a generously proportioned, 40-character backlit display with adjacent cursor buttons, increment/decrement buttons, and a value slider.

To the display's right, you'll find a matrix of Mode and Select switches. The page names of each mode are printed on the top panel, so you can pinpoint even relatively obscure features in a matter of seconds. For example, there's no sustain pedal in the package, and my own pedal operates at reverse polarity to the SGproX's default. That wasn't a problem, however, because even as I banged away on the first piano Tone, I was able to call up the necessary global page and alter the pedal polarity.

To the display's left sit two groups of sliders, one dedicated to EQ, the other assignable. Far to the left, as on the original SG-1D, lie a pair of controller wheels. These are both assignable, but they default to Pitch Bend and Modulation. Beneath these lie a pair of assignable momentary switches.

THE PORT VIEW

The back of the instrument sports MIDI In and Thru jacks and a pair of independent MIDI Outs (see **Fig. 1**), allowing the unit to send on 32 MIDI channels. The SGproX also has three pedal jacks: the first is an assignable footswitch, the second an assignable continuous controller. The third jack is dedicated to damping—either "regular" damping, or if you're using a Korg DS-1H pedal, half-damping. The remaining audio outputs on the rear panel are offered as simple L/Mono and R. A headphone socket is sensibly placed on the front edge of the instrument.

Given the SGproX's generous MIDI splitting/coordinating capabilities, I was sorry to see that there was no audio input. When you're writing or doing some hotel-room practice, you don't want to cart an entire mixing rig around. It can be very helpful to plug a secondary sound module or drum machine into your main keyboard so you can listen to two sound sources on headphones.

FEELIN' GOOD

I expected nothing less than a smooth ride from the SGproX, and that's what I got. The 88-note keyboard (which has standard Yamaha weighted action) offers untroubled performance. It's a tad sluggish at first until the action beds in and loosens up a bit, but it's very even and well balanced.

The SGproX doesn't employ quite the sophisticated triggering of some modern digital pianos, which allow you to press a key almost imperceptibly without producing a sound. With the SGproX, no matter how gently you depress a key, you'll still produce a sound. This might be an issue for classical pianists and some jazz pianists.

The feel of the instrument can be altered by changing the Velocity curve in Global mode or by altering the strength of response (-99 to +99) per Tone, which you can set individually in Program mode. Global mode provides four Velocity curves: a smooth, but light, response at medium strength, which rises steeply at high strength; a high response at medium-strength playing, which flattens out thereafter; a "standard" curve somewhere in between; and an almost flat response during medium-strength playing.

Among its keyboard-controller functions, the SGproX has no less than eight Aftertouch curves, including a couple of handy, memory-saving "rough" curves, where pressure generates Aftertouch data in small chunks of 12 or 24 steps. There's also a random curve. It's fun if not altogether useful.

SOUNDS LIKE?

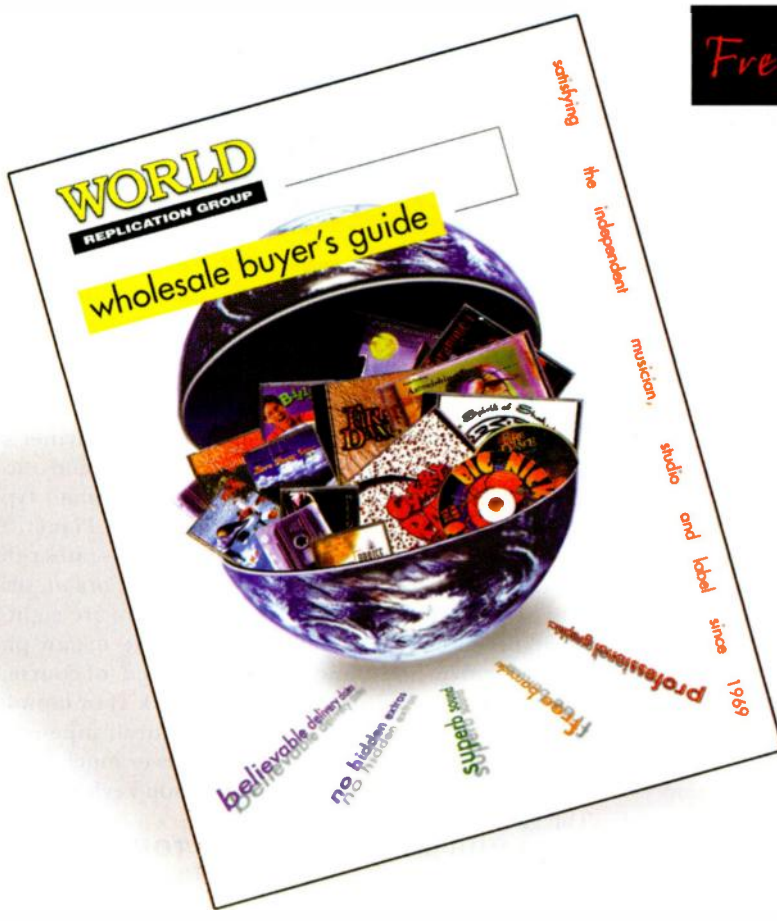
There are four banks of basic Programs, each containing sixteen Tones laid out so that similar sounds inhabit

Korg's SGproX combines a full-size, 88-note, weighted keyboard with high-quality piano sounds and lots of MIDI control.

Get Your Full Color Buyer's Guide Now!

Call 1-800-463-9493

Free 24 hours a day



Your wholesale connection for CD's, cassettes mastering, graphics and packaging.

500 Complete CD Packages
Full Color 2 Page Insert
Includes Graphic Design and Film
only **$1295.00**
No Hidden Extras!

300 Cassettes
Full Color J Cards
Includes Graphic Design and Film
FREE BARCODES
only **$597.00**

* all quantities subject to 10% over/or under run

WORLD REPLICATION GROUP

908 Niagara Falls Blvd. North Tonawanda, N.Y. 14120-2060
1-800-463-9493

In Canada: WORLD REPLICATION GROUP 1712 Baseline Road W. Bowmanville Ontario L1C 3Z3 (905) 433-0250

circle #603 on reader service card

FIG. 1: The SGproX's modest rear panel offers a set of pedal jacks and two independent MIDI Out ports.

adjacent locations. (The first three Tones in a bank are all based on acoustic piano sounds, the next two are electric pianos, etc.)

Some Programs use stereo samples, some mono. The stereo samples provide 32-note polyphony, and the mono samples provide 64-note polyphony. Two words sum up the SGproX's tally of 64 basic Tones: balanced and luscious.

In lieu of physical modeling, a good deal of liveliness, variation, and interest has been created using a combination of FFT techniques and general slicing and dicing between a range of old and new samples. I especially like the new stereo Steinway samples used for the instrument's main attraction, the grand piano preset called "Concert."

This Program has all the right things in place: no damping from note A6 up, a rich and vibrant bottom end (although the tonal change between A1 and G#1 is fairly dramatic), a beautifully natural decay all around, and—even with 32-voice polyphony—the impression that hardly any note-stealing is occurring. There is note-stealing, of course, but you'll only notice it if you hold down the sustain pedal and gliss from top to toe. To the extent that you're ever going to feel that you're playing an acoustic piano instead of an electronically generated, polyphony-sensitive instrument, this preset—which accounts for a large part of the instrument's 24 MB waveform ROM—is only a whisker away from perfection.

Other noteworthy patches include "Bright," which is perfect if you're still looking for a natural acoustic quality but with a bit more cut. On the other hand, "Classic" is suitably muted, making it ideal for those Chopin moments. "Studio" is an intimate, fairly dead acoustic patch with little ring and a bit of boost in the midrange. In contrast, the monophonic "DancePiano" is bright, almost jangly. It's more natural than the Korg M1 piano, which became the trick of the trade for a generation of dance producers in the late 1980s, but it's unnervingly edgy all the same. It makes for some good fun.

In most cases, digital pianos today offer a fairly standard palette of sounds, and the SGproX deviates little from the norm. Because every manufacturer offers Rhodes, Wurlitzer, and Yamaha DX electric piano; Hohner Clavinet; Yamaha electric grand; Hammond organ; vibes; piano+strings; acoustic bass; and voices, it's a wonder that they don't all get together and come up with a General MIDI-like agreement on patch numbers.

The SGproX is exceptionally strong on electric pianos. I loved "DynaStage," a modified Rhodes 73; "FM EP3," which is a nod toward the classic DX7 Rhodes patch (the sort of sound Phil Collins could play into his grave); and "EPMagic," a sound with heavy chorus that rings out majestically.

Although the electric pianos are amply represented (in spite of a lone Wurlitzer), the Clavinet—that most underrated and oversimplified of sounds—is not. The SGproX offers only three Clavs, and even these are only variations in terms of processing. For example, one of them adds a phaser and another one, "Mutronics," mimics the classic, white-water flanging effect of the once excessively hip Mutron effects pedal.

Too bad Korg didn't explore more of the Clavinet's subtle range of timbres. I would also have preferred more classic piano types—Korg M1 piano, Hohner Pianet, Yamaha CP-80, for example—rather than such a large selection of organ, string, and wind sounds. (There are eight in each category.)

The organ patches are well produced, of course, and they range from rock Hammond to cheesy gospel to church pipe organ. However, I have never much liked using a weighted action keyboard for organ sounds.

TONE TWEAKING

Tone mixing is your most direct route into custom sounds, and the SGproX makes the process easy while it still maintains a good level of sophistication.

SGproX Specifications

Synthesis Method	AI² synthesis (PCM sample playback)
Polyphony	64-note w/mono Programs; 32-note w/stereo Programs
Keyboard	88-note, weighted; Velocity- and Pressure-sensitive
Waveform Memory	24 MB PCM
Storage	64 Programs; 64 Performances (all in RAM)
Effects	2 digital multi-effects units: Effect I (12 types), Effect II (11 types)
Effects Types	Reverb, Early Reflection, Delay, Chorus, Flanger, Overdrive, Phaser, Rotary Speaker, Auto Pan, Wah, Flanger-Delay, Hyper Enhancer
Control Inputs	damper pedal, assignable pedal, assignable footswitch
Audio Outputs	(2) ¼" main; (1) ¼" TRS headphones
MIDI Connections	(1) In, (2) independent Outs, (1) Thru
Display	20-character x 2-line LCD
Dimensions	52" (L) x 5.5" (H) x 15.4" (D)
Weight	53.13 lbs.

A single button toggles through Single, Layer, and Split modes. In Layer mode, the screen displays two Tone names, one of which flashes. Using either a slider or buttons, you can endlessly change your combinations and even (by cursoring over to the numeric value alongside a Tone's name) change the relative balance.

I was glad to discover that you can combine an organ sound with a piano sound, for example, and have the organ part of the combination ignore Velocity and sustain-pedal information. This produces some wonderful sounds and effects, because if you do use sustain pedal, an initially fat and powerful organ-piano combination becomes instantly rendered light and spacey on its sustain portion. (Look for this one on a 1999 Phil Collins hit, too!)

Immediacy was one of the SG-1D's best features, and the SGproX is admirably up front for an instrument in this obsessively software-oriented age. At the most basic level, you can switch the current effect on or off with a dedicated switch. You can also change the EQ of a Tone with the built-in, 5-band graphic EQ. (You need to be careful, however, because the altered settings will remain in place on the currently selected Tone.)

Even minor editing is available using the assignable wheels and sliders. The default setup on the sliders is brightness, decay time, effects depth, and effects modulation, though the range of control possibilities is extremely wide. (More on this a little later.)

The full range of sound-editing parameters comes under the Prog Edit heading (see **Fig. 2**). In this mode, you can drastically alter a sound by exerting control over its brightness, level, attack, decay, and release. You're also provided with extensive control over the two banks of effects that are available for each Tone.

After you twist and tweak a nice acoustic piano sound into something quite weird and nasty, what do you do with it? You could save it, of course, but that would overwrite your nice acoustic piano sound. Alternatively, you can save it in a different location, which would mean overwriting one of the less interesting, effects-laden Clavs, for example.

However, unless you are careful to program new Tones that sound similar to the original Tones, you'll quickly find yourself staring at a front panel with patch names that bear no relation to the sounds therein. Genuine presets plus "empty" RAM locations would have been better.

Perhaps I'm just a barbarian, but I've lasted 25 years as a professional keyboard player without ever using a Pythagorean tuning temperament (at least, not intentionally). But manufacturers have long decided that a basketful of different temperaments is *de rigeur* for digital pianos, so who am I to question the practice? The SGproX offers equal temperament ("normal" to you and me), pure major, pure minor, that Greek guy's (Pythagorean), Werkmeister (good for Baroque harpsichord pieces), Kirnberger (also good for harpsichord stuff), and stretch.

EFFECTS GALORE

Ever since the days of the M1, I have found Korg's effects to be creamy in the extreme. I guess they just ring my bell. The SGproX provides two effects banks: Bank 1 offers a choice of twelve effects, and Bank 2 offers eleven.

For manufacturer information, please see Contact Sheet, p. 195.

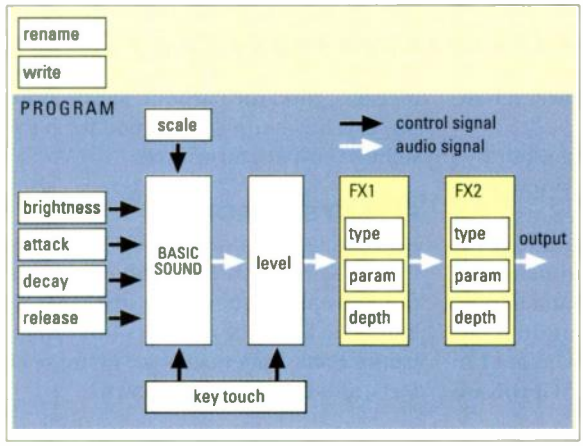


FIG. 2: In Program Edit mode, you can modify the sound of a Program and change keyboard touch and scale settings.

Maintaining the fine Korg tradition, the SGproX's reverb is organic and natural sounding with tight, well-controlled early reflections. Other effects include stereo delay, stereo chorus, stereo phaser, and stereo flanger. The Overdrive effect produces a variety of overdrive Tones by enabling you to adjust the center frequency of a band-boost filter along with the gain.

Auto Pan is always fun for pingy electric pianos. Wah is cool for Clavinets. Flanger-Delay is another radical trick that also works well on Clavs. And then there's the new kid on the block, Hyper Enhancer, which brings a sound out by boosting presence and enhancing the low end.

The degree of control that is offered on the effects varies for each one, but in general, it's typical of most good effects units. Reverb, for instance, offers control over time, high-frequency damping, predelay, early-reflection level, high and low EQ, and depth.

Two effects banks offer identical effects except for Hyper Enhancer, which is only available on the first bank. The two banks are connected unalterably in series, which is a bit restrictive.

Korg has, nonetheless, done well in offering adequate flexibility for Programs in layered or split combinations. For example, you can apply both effects to Tone 2 and Tone 1, just use the second effects bank on Tone 2, or bypass the effects altogether for either Tone.

I also like the way you can apply Modulation to an effect, such as Rotary Speaker or Wah. For Rotary Speaker, this manifests itself as a slow and fast Leslie effect that is controllable with a wheel or slider. It even includes a natural-sounding speed-up and slow-down factor. For Wah, you can get quite expressive through real-time control over the cutoff frequency.

IN CONTROL

The SGproX is primarily a digital stage piano. But it is also a sophisticated controller keyboard with numerous assignable sliders, switches, and wheels for immediate, on-the-fly MIDI control over external devices. It also offers many layers of control over MIDI setups that can be built into what the SGproX calls Performance memories.

For an instrument that is essentially piano-based, I can't think of what else you would need unless you are into ribbons and other more esoteric controllers. In day-to-day use, I mainly tweak the Tones (using both the Brightness slider and/or the EQ) and nudge back the effect-depth slider. Pitch Bend is seldom an issue for me on piano voices, and neat though it was to have a handy Pitch Bend controller, I don't think it's something that I would use very often—but you might.

The great thing about the SGproX is that the power under the hood is definitely under the hood. It's not shoved in your face, as it is on some dedicated controllers. Even so, control and assignment possibilities seem endless, and they are interestingly categorized into three types: Individual, Set, and Internal.

The Individual settings are for external devices (sequencers, sound modules, etc.). They range from essential items, such as Program Change, Volume, Stop/Start, Inc/Dec, Hold, and Bank Select, to more rarely used settings like Portamento Time, and MIDI mode selection.

Some MIDI messages invariably work together with other messages (Bank Select and Program Change, for example), and such pairings comprise the Set group of MIDI message combinations. Aside from Bank Select and

Program Change, they include Data Entry with Pitch Bend range, Fine Tune, Coarse Tune, and Clock Stop/Start.

The Internal group of settings enables you to tap into the current Tone's volume, effect modulation, sostenuto, brightness, attack and decay, effects level for both effects generators, Pitch Bend, and LFO modulation.

WRAPPING IT ALL UP

You may be one of the three people in the world who can boast that they have the combination of smokin' piano chops and a deep love of programming. For the rest of us, however, the SGproX really starts to make sense once a number of Tone combinations, modes, effects, and external control assignments are all safely wrapped up in an SGproX Performance.

Let's say you've created a sexy electric-piano/strings combo that also triggers a couple of samples at the top of the keyboard and a couple of Velocity-switched string sounds from your external sound module at the bottom of the keyboard. With an SGproX Performance, you can switch—with the touch of a button—to a killer church organ sound made up of four- or five-zoned organ patches from both internal and external sound devices.

You can store an impressive number of parameters in a Performance, so setting up a Performance is not going to be an instantaneous affair, unless you only want the most basic of setups. Under the heading Timbre A/B you can assign a pair of internal Tones complete with customized Volume, pan position, Pitch Bend range, zone, and pedal data. This can run alongside settings for up to eight connected sound sources/devices under the heading Timbre 1–8. For these external units, you can specify MIDI channel, keyboard zone, split point, Velocity zone, and enable or disable for every SGproX wheel, button, and pedal. Global settings (for both internal and external sounds) also include wheel, button, and pedal assignments and Velocity and Aftertouch curves.

Setting up a complex Performance takes a little time, but kudos to Korg for features like Timbre Copy and Control Copy that help you speed through like-minded settings for a number of external devices. Thanks also for the "Macros" that provide a number of standard setups into which you can simply slot your own instruments.

The usual caveats remain: remember to write a new Performance to a location after programming, or you'll lose the setup once you switch the unit off. Less immediately obvious: a change made to an SGproX Program will manifest itself in all Performances that use the Program. It's obvious when you think about it but something to keep in mind. If you're reasonably familiar with Korg's *modus operandi*, you won't have to spend too much time reading the SGproX's succinct, yet tip-laden manual.

Without being the freshest set of piano-based Tones on the block, the SGproX nevertheless delivers top quality, trouble-free sounds and a reasonably high level of MIDI control at a fair price. It's a very worthy successor to its SG ancestors and should amply satisfy any gigging piano player who would like to update his or her rig and gain an increased level of MIDI control in the bargain.

Julian Colbeck *has spent donkey's years playing piano for Charlie, ABWH/Yes, and Steve Hackett, though currently, his fingers spend more time tweaking Keyfax Software's Twiddly Bits.*

KORG

SGproX stage piano/master controller

$2,600

FEATURES ■■■■

EASE OF USE ■■■■■

QUALITY OF SOUND ■■■■

VALUE ■■■■■

1 2 3 4 5

PROS: Smooth, well-balanced keyboard. Good-sounding collection of presets. Excellent concert grand piano patch. Plenty of controller power under the hood. Powerful effects.

CONS: Patch storage is inflexible. No unique or unusual sounds. No audio input.

CIRCLE #439 ON READER SERVICE CARD

CYCLING '74

MSP (Mac)

A breakthrough in real-time synthesis and MIDI-controlled DSP.

By Thomas Wells

Cycling '74's *MSP (MAX Signal Processing)* for Power Macintosh could prove a milestone in the field of electronic music. To my mind, it may even be as significant as Moog's modular synthesizers or Pierre Schaeffer's first musique concrete pieces. This set of extensions to Opcode's popular *MAX* MIDI- and multimedia-programming environment permits completely integrated, real-time synthesis and signal processing with MIDI control. It makes *MAX* into a total environment for the development of new audio applications—one that is amazing in its scope, depth, range of application, and ease of use.

An outgrowth of ten years of real-time systems research at IRCAM, *MSP* is based on the freeware program *Pd* by Miller S. Puckette. (*Pd* runs under IRIX and Linux and has also been tested successfully under Windows NT. Currently, it is available in beta and can be downloaded at cybermed.ucsd.edu/mdanks/gem/pd-0.23b.zip).

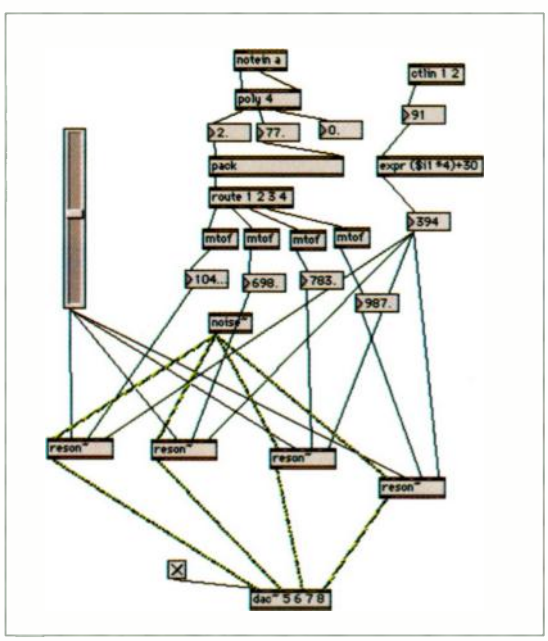


FIG. 1: The *MSP* patch shown here uses a noise generator as its source. The noise is routed through four filters (reson~), whose input gain is controlled by a slider in real time.

WHAT YOU NEED

MSP requires no hardware except a Power Mac. However, if you want to take advantage of its multichannel capabilities (up to 16-channels), a sound card is definitely in your future. Currently, *MSP* supports cards from Korg, Digidesign (Audiomedia II and Audiomedia III), Sonorus, and Lucid Technology. Because *MSP* uses plug-in drivers, support for future audio cards is greatly simplified.

The software can be purchased from Cycling '74's Web site or from IRCAM's Web site (see sidebar "Max Values"); you won't find it at your local retailer. It is available in a full version and a run-time version. The full version allows you to create your own patches or edit existing ones. It can be downloaded free of charge, but the free version won't play any sound after the signal processing has been turned on and off once. For unrestricted access, you need *MAX* 3.5 or higher and an authorization that can be purchased online or by fax for $295. The free run-time version, which does not require *MAX*, lets you play preexisting patches but does not permit editing or creating patches from scratch.

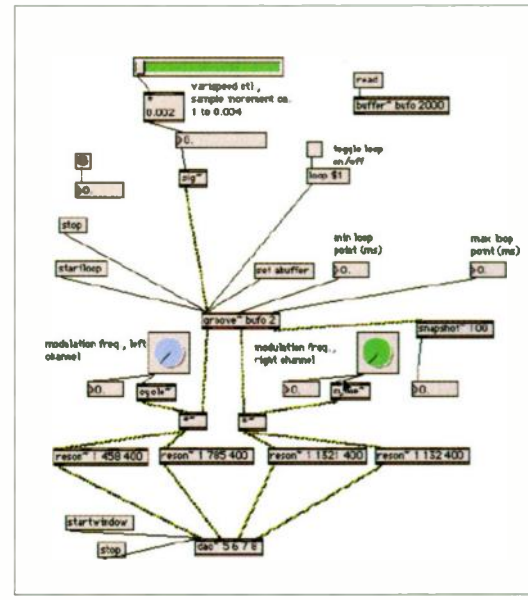


FIG. 2: The playback rate of a sound file can be altered by using the slider at the top of this patch. Ring modulation will occur as the signal is multiplied by two sine waves (cycle~).

LOOK AND FEEL

One of the best aspects of working with *MSP* is the feel of the program. Using *MSP* is highly reminiscent of working in a modular analog studio, with knobs, buttons, switches, sliders, and virtual "rubber band" patch cords. Added to that are a host of fantastic graphic controllers, not to mention all the sliders, keys, ribbons, and gloves from the world of MIDI alternate controllers. And, to paraphrase its developer, it is a lot easier to dust than an analog synthesizer!

A user with little or no DSP chops can use *MSP* for gigging as easily as a more advanced programmer can put together, say, an application for FFT-based spectral manipulation of sounds. Users at any level will have no trouble building a single-sideband frequency-shifter or programming their own specialized tools (which are called Objects in both *MAX* and *MSP*).

The more than 60 Objects provided with the *MSP* package provide a wonderfully complete foundation for most synthesis and signal-processing work, and additional, user-created Objects are appearing on the Internet. Like regular *MAX* patches, *MSP* patches can be saved as run-time applications that can be used on Macs that don't have *MAX* or *MSP* installed.

I give two thumbs up to the set of tutorials, written by Christopher Dobrian, who directs the Electronic Music Studio at the University of California, Irvine. This tutorial is a series of 25 lessons of progressive difficulty (with more promised in the future) that illustrate the use of *MSP* in basic synthesis procedures. The tutorials are easy to follow, are obviously the work of an experienced and thoughtful teacher, and are appropriate for use in courses in sound synthesis. (I used them successfully in a course I teach and intend to do so again next year). They assume previous experience with *MAX*, and except for some minor errors (for example, confusion of the terms *partial* and

For manufacturer information, please see Contact Sheet, p. 195.

THE HHB CDR800. #1 IN CD RECORDING.

When we launched the world's first affordable pro quality CD recorder, we thought we might have a hit on our hands. But even we've been amazed at the popularity of the CDR800. Thousands of machines are now in daily use around the world in every conceivable application (and some we could never have conceived of!).
You're kind enough to tell us how you love the way it sounds, that superior build quality makes the CDR800 exceptionally reliable, and that pro- features like balanced analogue inputs, an AES/EBU digital in and 5 simple record modes with built-in sample rate conversion are essential for the ways you work. So we'd like to say thanks for making the HHB CDR800 #1 in CD recording.

SEE US AT AES BOOTH #1668

HHB

HHB Communications USA · 626 Santa Monica Boulevard, Suite 110, Santa Monica, CA 90401, USA · Tel: 310 319 1111 · Fax: 310 319 1311 · E-Mail: sales@hhbusa.com
HHB Communications Canada Ltd · 264 King Street East, Toronto, Ontario M5A 4L5, Canada · Tel: 416 867 9000 · Fax: 416 867 1080 · E-Mail: sales@hhbcanada.com
HHB Communications Ltd · 73-75 Scrubs Lane, London NW10 6QU, UK · Tel: 0181 962 5000 · Fax: 0181 962 5050 · E-Mail: sales@hhb.co.uk
Visit HHB on line at: http://www.hhb.co.uk

circle #607 on reader service card

circle #608 on reader service card

circle #609 on reader service card

harmonic in Tutorial 5), are accurate, complete, and a pleasure to use.

MSP
Minimum System Requirements
PowerPC 604/150 MHz processor; 16 MB RAM (32 MB needed to run all demos); Mac OS 7.5.3; Apple Sound Manager 3.1 or later.

PATCH IT UP

MSP Object names include tildes at the end to distinguish them from *MAX* patches, some of which have the same names. The program also uses a different color-coding scheme for its patch cords to indicate audio-rate signals, as opposed to *MAX*'s control-rate signals. The *MSP* environment makes it easy to design tools for sound synthesis and save them as subpatches. You can then call up multiple copies of a process without cluttering the screen.

Let's have a look at some *MSP* patches. **Figure 1** shows a simple patch with an *MSP* noise~ Object (located in the center of the figure) as its signal source. The noise~ Object's output is connected to each of four bandpass filters (reson~), which in turn are routed to the 4-channel dac~ Object. The reson~ Objects' inlets are, from right-to-left: signal input, signal input gain (controlled by a slider), center frequency, and MIDI-controlled Q.

The center frequencies of the bandpass filters are controlled by MIDI pitch information processed by the usual notein, poly, pack, route, and mtof *MAX* objects. A mod-wheel signal (ctlin) is used to control Q. To keep the example simple, no amplitude envelope was applied. Note the floating number-boxes, used as control-signal monitors, that appear below the mtof objects.

The slightly more complicated *MSP* patch in **Figure 2** performs some good, old-fashioned, analog-style manipulation of recorded sounds. In this example, each output of a stereo sound file is multiplied by a sine wave that is generated by the cycle~ Object (near the bottom of the patch). This produces so-called "ring modulation." (We used to call it "double-sideband, suppressed-carrier modulation.") The frequencies of the sine waves (cycle~ Object) that are multiplied by the sound file can be controlled by the dials in the center of the patch but could have just as easily been controlled via MIDI.

Each multiplier output is routed through two bandpass filters (reson~) with their inputs in parallel, and the output of each filter is sent to a separate channel of a 4-channel dac~ Object for output to, in this case, a Korg 1212 I/O card. The pitch of the sound file can be changed over several octaves, using the slider Object at the top of the patch. The bandpass filters' center frequencies, gain, and Q are also available for interactive control, but to keep the example simple, I opted to hard-wire the values within the filter-object box.

MAX VALUES

When you buy software from Cycling '74 or from IRCAM, you might consider purchasing a membership in IRCAM's Real-Time forum, which will give you access to powerful software that runs in the *MSP* environment. However, this membership is expensive at $330 per year.

The IRCAM software for *MSP* consists mainly of two packages, both of which are fine additions to the electronic musician's toolbox. *Spat* is an incredibly rich and detailed spatial-effects processor that is more accurately described as an environment for designing 3-D audio processing.

The "Jimmies" is a set of DSP Objects for *MSP* that were developed during the early 1990s on the IRCAM Signal Processing Workstation. This set of Objects includes some really terrific *MSP* patches, such as a harmony processor, a single-sideband frequency shifter, and various conversion and mathematical Objects. Electronic musicians who are involved in real-time performance will find the "Jimmies" *MSP* Objects extremely useful.

For details, visit IRCAM's Web site (www.ircam.fr/produits-real/msp-e.html).

Let's examine this patch in more detail, starting with the sound-file input. *MSP* has a wealth of Objects for reading and writing sound files to memory (one, two, or four channels) or to disk (up to eight channels). These Objects, along with the virtually limitless control possibilities of *MAX*, make *MSP* potentially the ultimate sampler. And the interactive and real-time nature of *MSP*, not to mention its stability, makes it fun to tweak a sound to get interesting results.

In this patch, I chose the groove~ Object, which reads sound stored in RAM (read in by the buffer~ Object) and can output it single-shot or looped. (Note the loop-control toggle.) Notice that groove~ has three inputs, or inlets, and two, three, four, or five outlets. The outlets are composed of one to four output channels and a sync out. In this example, we are using two output channels, giving us a total of three outlets. The bottom-right outlet is for Loop Sync, which we are monitoring here with the snapshot~ Object.

Groove~'s three inlets are Sample Increment on the left; Minimum Loop Time, in milliseconds, in the middle; and Maximum Loop Time, in milliseconds, on the right. Note that the left inlet also serves as a port for control messages. The words "startloop," "loop," and "set" in message boxes tell groove~ to begin playing, loop, and change its playback buffer, respectively. The two outputs of groove~ are connected to inputs of the dac~ Object, which in this patch has four channels.

If you forget which inlet or outlet is which, a *MAX*-like help facility is there to

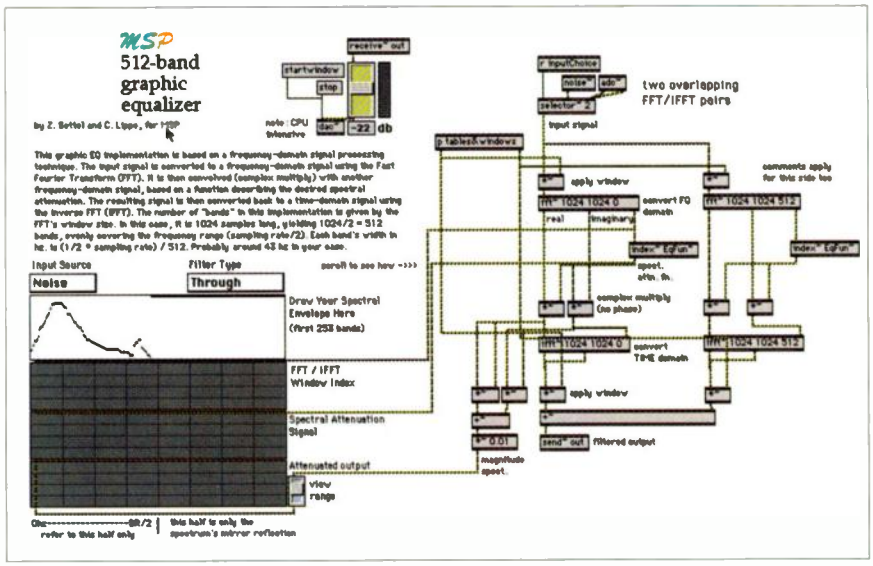


FIG. 3: This powerful graphic equalizer is included in the *MSP* package. You can draw a spectral envelope using a mouse and choose both input source and filter type.

help you. Unlock the patch (available only if you are running the full version), highlight the Object, and press Command-H for a Help page that is a working example of the Object in question. *MSP* patches are simple to debug, thanks to the program's real-time operation: you can "sound-out" the signal path using the dac~ Object or use any number of indicators and probes, the best of which is a terrific-looking oscilloscope. And though it initially takes a while to internalize all this information, early frustration soon turns to gratitude for the software's flexibility and well thought out control structure.

If you're not quite ready to build your own patches, you can study the exciting and formidable examples that come with the system. Many of these are guaranteed to impress even the most grizzled veteran of computer music. Outstanding among them is "Cross-Dog," a real-time convolution patch by Zack Settel and Cort Lippe that performs an interesting spectral transformation by filtering one sound with the spectral envelope of the other. There are various examples of patches for building synths and samplers, including Settel and Lippe's real-time, FFT-based filtering patch "Forbidden Planet" (see **Fig. 3**). With this patch, the user simply draws a filter-response curve on the Slider Object to control filtering. And this is just the tip of the FFT-based, signal-processing iceberg!

CYCLING '74
MSP audio extensions for MAX
$295

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

PROS: Real-time performance. Wide range of applications. Complete MIDI integration. Advanced example patches included. Excellent tutorial.

CONS: Full version requires *MAX*, which is a significant added expense. Without previous *MAX* experience, learning-curve is steeper.

CIRCLE #440 ON READER SERVICE CARD

KEEPING IN TOUCH

A DSP Status window shows you how much CPU power *MSP* is consuming. The window also allows you to adjust global parameters such as sampling rate and vector size (number of samples processed as a group), both of which affect *MSP*'s CPU demands. According to the manufacturer, latency (delay between audio input and output) is 46 milliseconds when using an Audiomedia III card and 294 milliseconds using the Apple Sound Manager, as measured on a Power Mac 9600/300. According to the manufacturer, the latency using a G3 and Sound Manager has been measured at 30 ms, and the latency of a Korg 1212 I/O is especially good, clocking in at only 23 ms.

Given that *MSP* is as extensible as your computer is powerful, the question arises: how much *MSP*-ing can a CPU handle? The answer varies, but on a Power Mac 8500/180 (which uses a 604e CPU), you can expect to get approximately 84 floating-point oscillators running simultaneously before encountering clicks in the audio output. Check Cycling '74's Web site to see the latest performance specifications, and don't be surprised if the specs improve from time to time; the developers are bent on enhancing performance.

WRAPPING IT UP

It's often easy to get worked up about new software. It's not so often, however, that one is simply stunned by a new product. Even though I've known this one was on the way for years, I was still stunned by just how well it performs on the Macintosh. *MSP* makes writing pieces that react to MIDI performance data much more simple and straightforward. The program also gives a new dimension of control and interaction to pieces that use real-time manipulation of live instrumental sound.

There is a purity and artistic quality of design to *MSP*, that, combined with the software's sheer power and flexibility, make it one of the most significant contributions to the computer music world in decades. Visionary David Zicarelli, the founder of Cycling '74 and principal architect of *MSP*, deserves enormous credit for his work.

Thomas Wells *is a composer, author, and professor at Ohio State University and has been involved with electronic music and audio production for over 25 years.*

XAVIER SERRA

SmsTools (Win)

Mix, match, and morph your audio files.

By Dennis Miller

Most desktop musicians are familiar with common synthesis methods, such as additive, subtractive, and FM, but less well-known is the powerful technique called analysis/resynthesis. With this method, you break a sound file into its component parts, use specialized tools to alter those components, and then "reconstitute" the sound using the transformed data. *SmsTools*, from Xavier Serra and the Music Technology Group of the Audiovisual Institute of the Pompeu Fabra University of Barcelona, is a free PC program. It offers a new approach to resynthesis that enhances the techniques provided by other applications. (There are several Macintosh programs based on this method; see the sidebar "Mac Options.")

SmsTools is a graphic interface to the powerful Spectral Modeling System created by Serra and his colleagues. (A nongraphic version that offers a number of enhancements, including support for the IRIX and Linux systems, is also available.) The program analyzes standard WAV files and separates the stable, pitched components from the noise elements of the sound. It then creates an analysis file for both types of information and allows you to manipulate the analysis data before resynthesizing the sound. For example, you can isolate the noise portion of a flute sound or the non-pitched elements of a vocal sample and apply various types of processing to each. The results can be fascinating.

GETTING FRAMED

As with other synthesis programs, *smsTools* breaks your sound file into

smsTools
Minimum System Requirements
Pentium 75; 16 MB RAM; Windows 95/98

For manufacturer information, please see Contact Sheet, p. 195.

small chunks called "frames" and detects the amplitude peaks in the spectrum of each frame. These peaks represent the harmonic partials of the sound, and by tracking the peaks from frame to frame, the program can determine the individual amplitude envelopes for each partial it detects (see **Fig. 1**). By using additive synthesis to generate a large number of sine waves under the control of these envelopes, you could, in theory, accurately resynthesize any sound that you've analyzed. Of course, the point is not simply to create a replica of the original sound, but to modify the envelopes before performing the resynthesis. *SmsTools* offers many functions for this purpose.

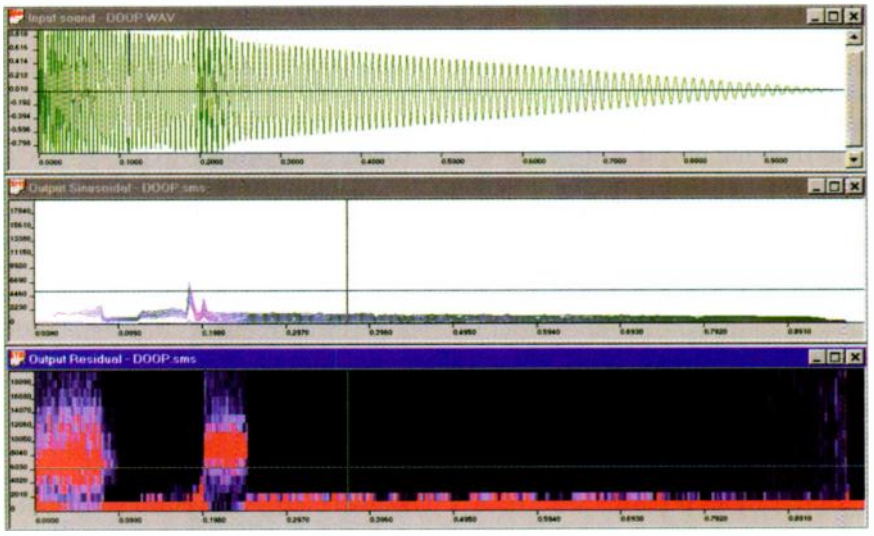


FIG. 1: *SmsTools* can analyze any Windows sound file and allows you to manipulate the analysis data before resynthesis. Here are the original WAV file (top), the sinusoidal analysis (middle), and the residual, or "noise," portion of the sound (bottom).

In addition to detecting the stable partials, *smsTools* also keeps track of the additional noise components of the sound, which it calls the *residual*. The residual typically includes elements such as the key clicks of a wind instrument or the bow noise of a string instrument. Even the human voice contains both pitched and noise components. Using filtered white noise, *smsTools* can resynthesize the residual data as well, and, as expected, you can apply many transformations to this material before you resynthesize it. I isolated and resynthesized just the residual of my voice, and the result had a sort of scratchy, grainy quality that reminded me of Marlon Brando's Don Corleone character in *The Godfather*. You can hear the results at

MAC OPTIONS

Macintosh has long been the platform of choice for advanced sound synthesis, and it's no surprise that several Mac programs offer tools for exploring the spectral components of a sound. (You'll find a number of Mac analysis/resynthesis programs, including the two mentioned here, at shoko.calarts.edu/~tre/compmusmac/.)

Among these are Tom Erbe's *Sound Hack* ($50 shareware registration) and *Lemur*, written by Kelly Fitz and his colleagues at the University of Illinois. *Sound Hack* will read and write numerous types of files, including AIFF, SDII, and WAV, and offers extensive options for configuring your analysis. Once your sound is analyzed, there are numerous alterations that you can make, such as spectral dynamics processing, phase vocoder–based time stretching and pitch shifting, and crossing the spectra of two different files (convolution). The program has excellent documentation and produces high-quality results.

Lemur (free) also provides numerous configuration and processing options, but its main functions are high-quality time stretching and pitch shifting. The program shows a "sound print" as it performs its analysis (see **Fig. A**) and can also create data files that can be used by "third-party" applications. For example, the program's analysis files can be manipulated in real time by the Kyma System from Symbolic Sound.

Speaking of the Kyma System, sound designers on either Mac or PC who are looking for total immersion should explore this hardware-accelerated synthesis workstation. (For a review of Kyma, see the January 1998 **EM**.) Kyma has the most powerful, real-time analysis/resynthesis features I've ever seen and can perform such mind-boggling feats as time-stretching live audio input as it comes into the system. If resynthesis is on your mind, you'll definitely want to look into the Kyma System sound-design workstation, available from Symbolic Sound.

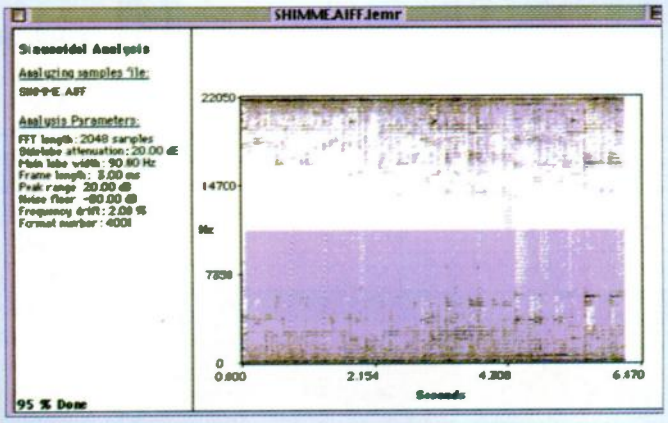


FIG. A: *Lemur* displays a sound print as it analyzes a sound file. The actual processing is done using drop-down menus.

EM's Web site, www.emusician.com.

SmsTools offers a well-integrated, graphic interface and works equally well with periodic (pitched) and nonperiodic (unpitched) source material. The Help file provides tips on how to get a good analysis, and the program includes numerous options for accomplishing that goal. (You should also check out an excellent primer on analysis/resynthesis, written by Serra, at www.iua.upf.es/~sms/docs/msm.)

First, it recommends that you use a clean, unprocessed sample that is normalized to maximum amplitude. Next, you can improve the analysis by telling the program whether your source is pitched or unpitched, and if it is pitched, what the sound's fundamental frequency is. You can specify how large a frame size *smsTools* should use (smaller is better) and also determine what the threshold for detecting a peak will be.

TWEAKS

Once you have a good analysis file, the fun really begins. There are numerous ways to transform the analysis data, including amplitude and frequency-based modifications, Modulation, time stretching, and Hybridization. The amplitude modifications include scaling the amplitude of the entire sound, just the odd or even partials, or even single partials. Using a 2-dimensional grid, you specify how much the scaling factor will affect any range of partials throughout the duration of the sound (see **Fig. 2**).

Similar transformations are possible for the frequencies of the partials. For example, you can scale all or any of the partials, or stretch the partials so they move progressively away from the fundamental. Applying a stretch value of 2, for example, would shift all frequencies upward so that the highest frequency would end up at double its original value.

The Modulation feature allows you to perform frequency and amplitude modulation on both the partials and the residual. Low modulation rates will produce vibrato effects, and higher values will generate sidebands, as with FM.

Finally, the program's Hybridization option allows you to morph or "clone" components from different sounds. This feature is particularly effective on sounds that have stable harmonic partials (i.e., most pitched sounds), but it can also produce interesting results using unpitched source material. You can control how the morph will occur over time, what section of each file to use, and most importantly, how much of each sound's frequency and amplitude composition will be used.

For example, you could use just the amplitude envelopes of sound A and apply them to the frequencies of sound B, or you could use 50 percent of each. There is an endless number of combinations for you to try out, and the range of sounds you can produce is enormous.

EVEN MORE TOOLS

Time stretching is a popular technique in audio software these days, but it is also notoriously difficult to get good results with this. That's why many programs limit stretching to a maximum of two or three times the length of your original file. *SmsTools* allows you to stretch your sound as much as you want and also lets you create a graph that will vary the amount of stretching over time. The results are just about the best I've heard.

Using the time-stretch feature, you'll hear things in your sounds that you've never encountered before. For example, I stretched a saxophone note to twenty times its original length, and the pitch fluctuations in the attack segment of the note were absolutely incredible. Other long stretches produced similarly interesting effects, and noticeably lacking were the artifacts that are normally produced with this type of processing.

CHECK IT OUT!

Overall, *smsTools* offers a very powerful tool kit that enables you to modify sounds in ways that you won't find on even the most expensive sampler. It would be easy to go on and on about its numerous settings, helpful shortcuts, excellent documentation, and the high quality of its processing routines. But for this price (it's *downloadable freeware*, remember!), there's no reason not to check it out for yourself. It's a great device for creating startling new sounds.

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

XAVIER SERRA
smsTools resynthesis software
freeware

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

PROS: Powerful resynthesis features. Intuitive graphic interface. Free of charge.
CONS: Advanced features can be overwhelming.

CIRCLE #441 ON READER SERVICE CARD

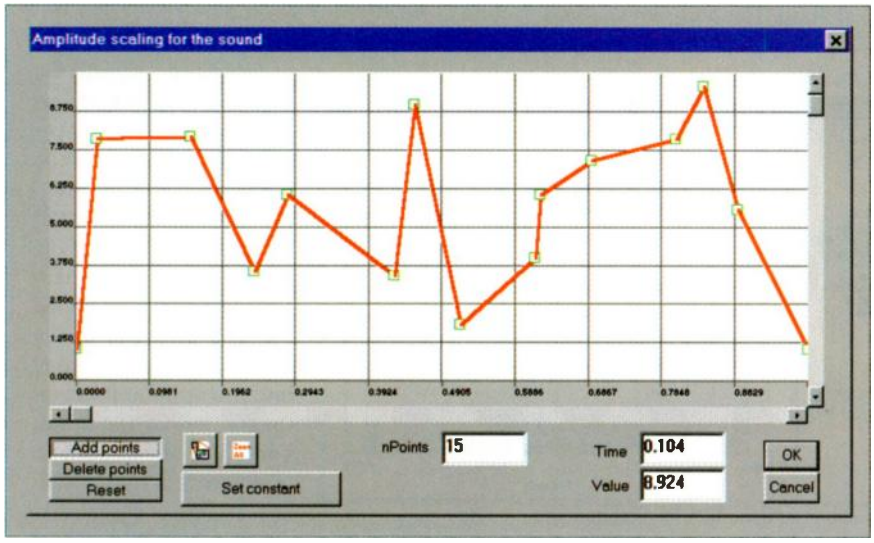
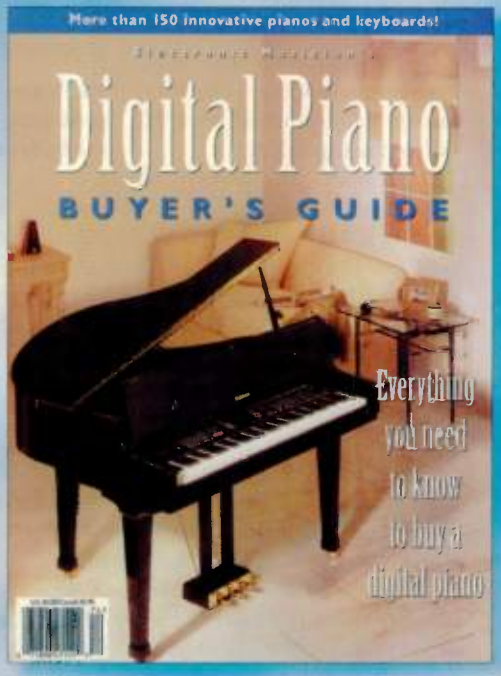


FIG. 2: Graphic envelopes can be created by the user to determine how a sound will be transformed before it is resynthesized.

WHEN IS A PIANO MORE THAN A PIANO?

Today's digital pianos give you everything you'd demand from a fine acoustic piano—and more!

In addition to sound and feel that is comparable to acoustic models, the new digital pianos offer more: MIDI capabilities, portability, headphone compatability, and even built-in educational help. They're great for professional or home performance and recording, and best of all, they never need tuning.



You'll find information on:

- Grands, Uprights & Portables
- Personal & Professional Use of Digital Pianos
- Customizing Preprogrammed Styles
- MIDI Devices, Applications and Resources
- Exploring Music on the Internet
- Learning to Play...Again
- Accessories, Sheet Music and Educational Tools
- Manufacturer Directory

Electronic Musician's **1999 *Digital Piano Buyer's Guide*** will be filled with information about this year's upright, grand, and portable digital pianos and acoustic MIDI pianos, including comparative charts and advice on choosing the right keyboard for your musical needs. The 1999 Seventh Edition offers expanded editorial features!

The 1999 *Digital Piano Buyer's Guide* is the *only complete guide* to the new digital pianos as developed for personal or professional use in performance, composition, recording, or education

Available in October at Piano & Organ Dealers, Bookstores, Newsstands, Computer Stores and wherever *Electronic Musician* is sold!

Electronic Musician

ELECTRONIC MUSICIAN'S
Digital Piano
BUYER'S GUIDE
1999 EDITION

OPCODE

Studio 64 XTC

A box to tie everything together.

By Walt Szalva

The Studio 64 XTC marks the latest entry into Opcode's popular line of studio interfaces. Billed as both a sync box and a 4-in/6-out, 64-channel MIDI interface/patch bay, the PC/Mac-compatible XTC resolves a number of studio connectivity issues, and it makes the task of synchronizing several devices a great deal easier.

The XTC can sync to SMPTE (LTC) or blackburst, and it can generate SMPTE, word clock, Digidesign SuperClock, MTC, MMC, and ADAT Sync. The ADAT Sync port allows for instant connection to an Alesis ADAT without the need for additional breakout boxes. Opcode also plans to offer a 9-pin synchronization option that will allow the unit to connect to professional-level video decks. (Pricing and availability had not been announced as of press time.)

Any combination of the XTC's MIDI Ins can be routed to any combination of its MIDI Outs, and the unit can be configured from either the front panel or from your computer, using Opcode's Open Music System (OMS). The Studio 64 XTC can also be connected to a Studio 128X through the network port on the back of the unit. (Mac users can also chain the XTC to a Studio 4 interface.)

CONFIGURING THE UNIT

The Studio 64 XTC's front panel is simple and straightforward. Red LEDs indicate MIDI inputs and green LEDs indicate MIDI outputs. There are various other LEDs, including indicators for sample rate, sync reference, SMPTE, and frame rate. The large size of the indicators is an added bonus—they enable clear readings from across the room. You can program MIDI and sync options from the front panel and store up to four programs for easy recall, or you can use OMS (with compatible software) to program the XTC from your desktop. (The XTC can be programmed on a PC without using OMS.)

On the PC, the Studio 64 XTC appears as seven individual ports: the four MIDI ports, ADAT In/Out, Sync In/Control Out, and Broadcast Out (see **Fig. 1**). Each port can be renamed, and though it is possible to delete ports, you cannot delete them in any arbitrary order; in other words, the first port to go will be the broadcast port (Port 7), then the Sync port (Port 6), then the ADAT port (Port 5), etc. You cannot, for example, simply choose to delete MIDI ports 1 and 3 and keep all the others. (Deleting ports is beneficial when working on Windows 95, because there is a limit of eleven MIDI drivers. This is not a problem with Windows 98, where the limit has been raised nearly threefold.)

When used with a Mac, the Studio 64 XTC provides capabilities not available on the PC, for creating complex filtering and routing schemes. Any number of "studio patches" containing these settings can be stored and recalled. (In fact, studio patches provide a wide range of programming capabilities that are far beyond the scope of this review.)

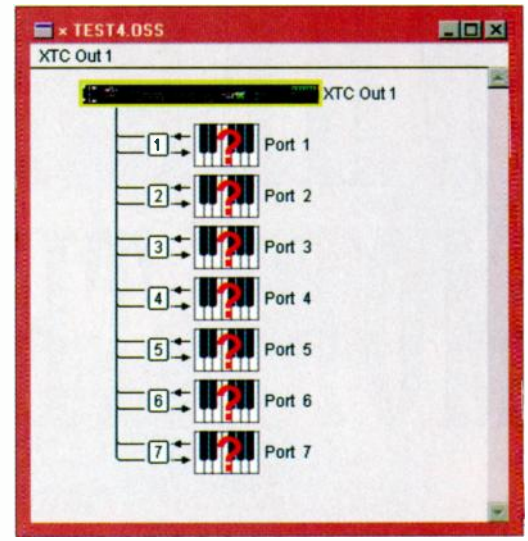


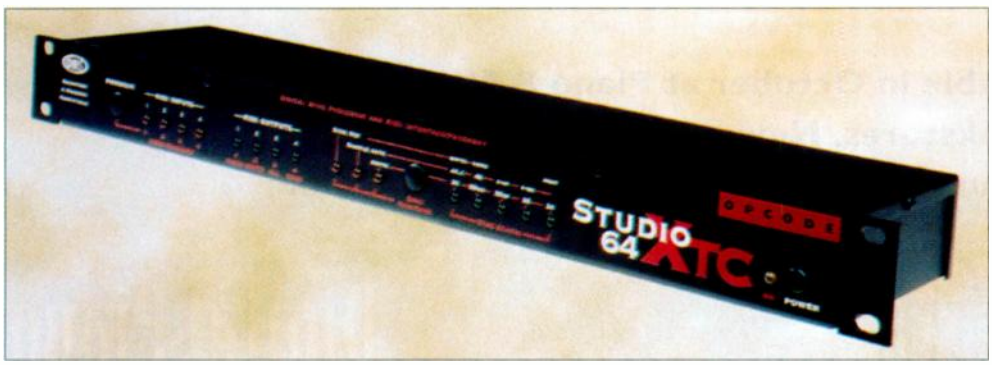
FIG. 1: The Studio 64 XTC appears as seven individual ports under OMS. Each port can be renamed, and ports can be deleted when necessary.

Configuring the unit with the included Program Editor (available for both the Mac and PC) is much easier than using the front panel, and allows the user to select MIDI filtering criteria and audio synchronization parameters (see **Fig. 2**). You can filter out any or all of the various MIDI data types to streamline the amount of data. Though most high-end sequencers have this option, it is especially helpful when used with sequencers that don't offer MIDI filtering.

INS AND OUTS

The Studio 64 XTC is a multiport MIDI interface and each of its four discrete input/output ports supports sixteen MIDI channels, for a total of 64 MIDI channels. Two MIDI outputs (A and B) are provided for ports 1 and 2. Therefore, devices connected to ports 1A and 1B (as well as 2A and 2B) can either receive identical MIDI information or a channel split of the same MIDI stream (for example, channels 1 through 15 on port 1A and channel 16 on port 1B).

I would have liked it if the two extra outputs were additional streams of MIDI



Opcode's Studio 64 XTC provides an all-inclusive synchronization solution for small- to medium-size MIDI studios. The XTC can be networked with an Opcode Studio 128X or Studio 4 (Mac only) for use in larger studios.

data, instead of just mirrors of ports 1 and 2. It would be even better if the unit were configured as an 8 × 8 matrix. This limitation precludes the XTC from being used as a stand-alone interface in a MIDI environment with more than six multitimbral devices. However, a solution for larger setups would be to use the unit's network port to connect with another interface.

THE TEST DRIVE

The unit ships with all the cabling, software, and documentation necessary to get up and running quickly. Within minutes of configuring it on my PowerMac 8500, I was strolling along the MIDI/digital audio pathway. I had the good fortune to review a unit with a brand new ROM update, as well as a new version of OMS (v. 2.3.4) and PC driver. This update is available for free to all registered Studio 64 XTC owners and comes with installation instructions.

My first level of testing was based on MIDI only—no audio at all was introduced. My setup included Emagic's *Logic Audio* 3.0 with a Korg Z1 employed as an input controller. I also enlisted an Akai S2800 sampler and E-mu's Orbit the Dance Planet as sound modules.

Recording and playback were tight, with the Studio 64 XTC and *Logic Audio* flawlessly handling a heavy stream of multitimbral note data, Pitch Bend, and Aftertouch information. I then turned up the heat with some real-time controller data via the Korg Z1's front panel control knobs. Again, not even a cough from the XTC.

For round two of the MIDI games, I decided to bring out the heavy hitters—three Korg Wavestation A/Ds daisy-chained off of MIDI port 1, along with the aforementioned E-mu Orbit and the Akai S2800. To make things even more interesting, I put the three Wavestations and the Planet Orbit (as well as *Logic Audio*) in MIDI Clock sync slave mode, with the Z1's arpeggiator acting as the master.

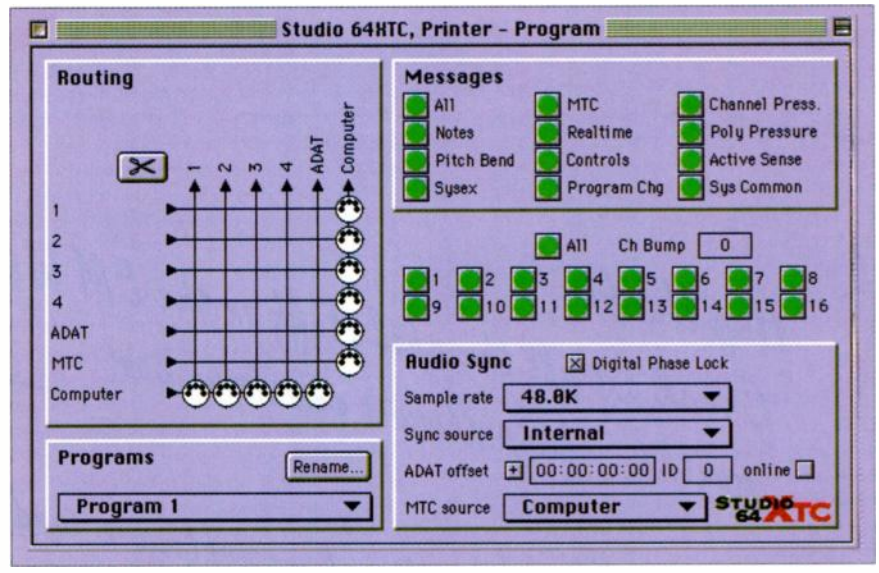


FIG. 2: The Program Editor is an application that allows users to perform a number of tasks not available from the unit's front panel.

For more than an hour, I did everything I could to bring the Studio 64 XTC to its knees—from rapid acceleration/deceleration of the arpeggiator, to excessive Pitch Bend information, to massive Z1 controller data. There were a few times when the unit stumbled at the start of playback, but nothing more than I've experienced using a comparable sync box (MOTU's MTP AV). In all fairness to Opcode, this could easily have been the fault of the receiving devices.

AUDIO UP

Next, it was time to let the unit do what it was born to do. The MIDI elements were the same as above, but now I introduced hard-disk recording into the mix.

Again, using *Logic Audio* as the interface, with a Pro Tools Project card and 888 I/O, I connected the Studio 64 XTC to the 888 (via its SuperClock output) and configured it using the OMS control panel. After a message from Emagic *Logic Audio* telling me that the frame rate on the XTC didn't match the frame rate selected in *Logic Audio* (user error on my part), I was up and running. The XTC had no problems at all handling eight channels of audio and a moderate amount of MIDI data.

Feeling bold, I kicked things up a notch with some heavy MIDI data and the addition of a 2-minute QuickTime movie (via *Logic Audio*'s View Movie function). Again, the sync was relatively tight. Every time I stopped and started the sequence, the Studio 64 XTC brought everything together quickly and efficiently, after only the slightest pause.

Having no mercy, I then enlisted two TASCAM DA-38s, with a DA-88/SY-88 combo acting as the synchronization source. As expected, I ran into problems until I connected the Studio 64 XTC to a blackburst signal box, a device I've consistently had to use when synching to tape. At this point, all was bliss in the world of synchronization—quickly shuttling the DA-88 back and forth caused no more than a brief delay before the two DA-38s locked in,

Studio 64 XTC Specifications

Size	1U rack-mount
Platform	Macintosh, Windows 95
MIDI Ports	4 In/6 Out
MIDI Channels	64
Setups/Patches	4 factory or 4 user-definable from front panel (additional programs accessible from host computer)
Sync Types	SMPTE In/Out, MTC, Video Sync In (blackburst and composite), ADAT Sync Out, Digidesign SuperClock Out, word clock Out
Other Features	front-panel LEDs, front-panel Program Select, can operate without computer, can be networked with other interfaces

For manufacturer information, please see Contact Sheet, p. 195.

followed by the audio and MIDI combo of *Logic Audio*.

I felt the power—32 digital audio tracks and endless MIDI possibilities, with the Studio 64 XTC boldly holding it all together like a conductor leading a well-seasoned orchestra. And all the while, red and green LEDs blinked away in a perfectly synched rhythm.

A FINAL NOTE

As is always the case with Opcode, the XTC's included documentation is simple and easy to understand, with the manual uncluttered and clearly presented. Opcode also includes a document with instructions on configuring the unit for use with each of the major sequencers currently on the market. The handy "How to Contact Tech Support" section of the manual provides a phone number for the Opcode faxback information line, which saved me a long wait in tech-support hell.

OPCODE
Studio 64 XTC MIDI interface/patch bay/synchronizer
$495

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

PROS: Simple front-panel switching. Synchronization is tight. Very easy to configure with OMS.
CONS: Not enough MIDI ports. Not currently compatible with Windows NT.
CIRCLE #442 ON READER SERVICE CARD

CONCLUSION

The Opcode Studio 64 XTC is a solid player in the rapidly evolving world of MIDI/digital audio synchronization, and it's a fine addition to the Opcode Studio line of products. It's very easy to configure and use, and most importantly, it's rock solid—keeping everything synched up and rolling smoothly.

Walt Szalva *was born and raised in America.*

TELEX

Cobalt SE60

A rugged electret condenser mic for everyday use.

By Jim Miller

When I set up my first personal studio way back in the early 1970s, there were few options when it came to affordable mics (or any other gear for that matter). If you wanted really great sound, you had to spend a lot of money. The budget-priced mics available at the time were often barely acceptable in sound quality. But all that has changed. Now, musicians who own even modestly priced gear can typically expect very good performance.

Apparently, it occurred to Telex Communications that a rugged, affordable electret condenser mic was something that working musicians might find useful. Telex designed the Cobalt SE60 condenser mic to be, in the company's words, "durable, accurate, and cost-effective." Considering the fact that the SE60 is priced in line with many dynamic mics, I was quite interested to see what kind of sound quality this mic would deliver.

LET'S GET PHYSICAL

The Telex Cobalt SE60 is a sleek-looking mic with a somewhat unusual, cobalt-blue, matte finish. It comes packaged with a mic clip in a soft plastic, foam-lined carrying case. Upon opening the case, my first impression was that this had to be a more expensive mic than what I was supposed to be reviewing (which forced me to double check that I had indeed received the right mic). Picking up and handling the SE60 did nothing to change that first impression; the SE60 seemed a sturdy little mic that could take the kind of knocks my precious Shure SM57 has taken over the years.

The SE60 is a cardioid condenser mic with a permanently charged back plate (meaning that it is an electret mic). It can run on 48V phantom power or a AA alkaline battery. Life expectancy per battery is in the neighborhood of 1,000+ hours. According to specs, the SE60 can take sound pressure levels of up to 141 dB—a range more in keeping with dynamic mics and some higher-priced condensers. There is no on-off switch, bass rolloff, or pad switch, making this a "no-frills" condenser.

PROOF IN THE PUDDING

Of course, looks can be deceiving, and printed specs don't even begin to tell the whole story. So I slid the mic into the clip and prepared to give it a spin. For a mic preamp, I started with an Earthworks LAB102, which delivers an unusually transparent sound to tape with an extended frequency response of 2 Hz to 100 kHz (±0.1 dB). Later, to confirm my findings, I also tested the SE60 using the mic pres in an Oram MWS and a Mackie CR-1604 VLZ.

For my first test, I recorded an Ibanez 12-string acoustic guitar direct to DAT. What I heard through my AKG 240M headphones (and later through my Tannoy monitors) was a nice, bright, punchy guitar sound that, again, seemed to belie the mic's price tag. There was a nice, upper-midrange clarity that gave the guitar track a robust, woody tone.

This presence boost (in the 3.5 to 9 kHz range) is easy to see in the frequency-response graph that accompanies the mic (see **Fig. 1**). Note that, compared to the response at 50 Hz, the SE60 is up by about 10 dB at 6 kHz. That's quite a bump.

The only negative at this point seemed to be the mic's sensitivity to position: if I moved the guitar very far

The rugged and versatile Cobalt SE60 electret condenser microphone is priced competitively with dynamic mics.

to the left or right, the sound changed rather noticeably. However, that response is typical of a unidirectional microphone.

So, how did the Cobalt SE60 sound on acoustic guitar as compared to some of my other mics? Well, it may be unfair to compare a $175 mic with a $1,200 AKG C414 B-ULS, but that's what I did. The first thing I noticed was that the 414 was quite a bit louder at the same level settings on the LAB102, indicating that the SE60 is not a particularly hot mic. (This may also account, at least in part, for its ability to handle thunderous SPLs.) The second thing I noticed was that there were more upper harmonics present in the 414 recording, and that moving the guitar around didn't cause such dramatic shifts in timbre.

Still, I can't say that the sound of the 414 was light years better than the SE60. Compared to the 414, the SE60 sounded less open and airy and, thanks to the high-mid emphasis, slightly edgier. I also noticed a slight lack of body in the mic's bass response (which I easily compensated for with a little EQ). But overall, the SE60 fared remarkably well.

METAL METTLE

For my next test, I recorded a Zildjian crash/ride cymbal. This particular cymbal has some rather interesting and complex overtones and is truly difficult to capture on tape.

I immediately noticed the lack of high-end zing when using the SE60. Though the mic captured a nice sense of splash and good dynamics from the crash, I found that the ride and bell tones lacked the delicate upper harmonics I like to hear.

The next morning, I had to record a new set of tubular bells for a sample library. In this case, I wanted a stereo recording, and because I only had one SE60, I couldn't really A/B it with the Crown SASS-P stereo mic I chose for the session. Still, at the end of the recording, I pulled out the SE60 and recorded a few high and low bells to listen to later.

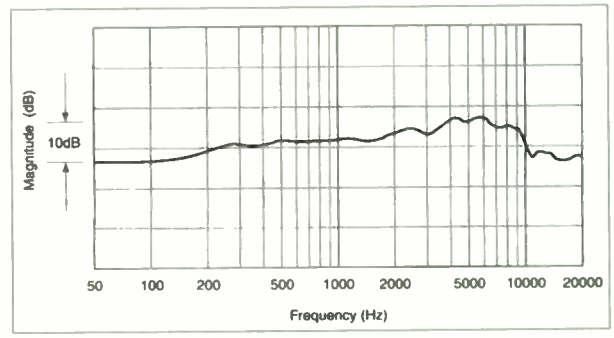


FIG. 1: Far from being flat, the frequency response of the SE60 has a noticeable bump in the 3.5 to 9 kHz range.

In some respects—particularly in the initial sound of the hammer hitting the chime—I almost preferred the SE60 to the Crown; however, the extraordinary overtones that followed the initial strike really came through on the SASS-P, even when summed to mono. In addition, the SE60 didn't capture quite as much body in the low- to mid-bass range as the SASS-P.

What I heard through my headphones seemed to belie the mic's price tag.

ROCK AND RULE

My next two tests were designed to determine just how much rock 'n' roll the SE60 could handle. First, I dragged out my old Ludwig snare drum, positioned the mic next to the snare, and proceeded to whack away. The SE60 never flinched. Thanks to the proximity effect, I easily compensated for the mic's slightly rolled-off bass response, and once I had zeroed in on the best position, the mic delivered a fat, well-saturated snare sound to DAT.

Compared to the 414, the SE60 sounded crunchier and more compressed. Also, it sounded great as the close mic in a multiple-mic setup that included a matched set of 414s or the SASS-P.

Next, I fired up my Peavey Classic 50 amp to record some screaming electric guitar and thumping bass. I always put the Classic 50 in a closet along with whatever mic I'm using (placed right up against the grille cloth) and cover the entire thing with a blanket to avoid irritating my neighbors.

The SE60 performed well, never breaking up or distorting, even when hit with explosive bass pops. The tracks sounded slightly brighter than the same recorded with the SM57.

VOCAL VIM

My next test was conducted during a session with a local musician who had come to my studio to produce a demo CD. His requirements were minimal: just an electric/acoustic guitar routed direct (no mic) and his vocals. He was kind enough to let me record a second take of one of his songs using the SE60 on the vocals instead of his preferred Audio-Technica 4050/CM5.

Later, we compared the tracks and agreed that the 4050 produced a more open, detailed sound and was clearly the "winner." To my ear, the SE60 sounded a little more "live and on stage"—a sound which might prove to be good for certain singers.

Finally, for a live application, I went to a local club where some friends were performing and let the female vocalist use the SE60 through the house P.A. Admittedly, this was not a world-class P.A. system; however, it was representative of what most small clubs can afford.

SE60 Specifications

Capsule Type	permanently charged back plate (electret) condenser
Polar Pattern	cardioid
Frequency Response	30 Hz–19 kHz
Self/Output Noise	29 dB SPL, A weighted
Sensitivity	-50 dBV (phantom)/-52 dBV (battery)
Maximum SPL	141 dB (phantom)/137 dB (battery)
Weight	8.8 oz.

For manufacturer information, please see Contact Sheet, p. 195.

The singer loved the sound of the SE60. She also commented on the color ("It's sort of purple") and the nice matte finish ("I didn't feel like it was going to slip out of my fingers and hit someone in the head"). Handling noise was minimal.

COBALT GESTALT

Though it doesn't provide sonic superiority to condenser mics costing three or four times as much money, the Telex Cobalt SE60 is a really nice microphone—especially considering its low price. I really liked its sound for certain applications and could quite easily live with its limitations were I on a tight budget.

The SE60 would probably appeal to just about any gigging musician for its durability, good looks, and sound. Certainly, the price puts it right in line with many of today's popular dynamic mics. Also, the SE60's presence boost gives it a definite advantage in situations where you need vocals to stand out over bright guitars and cymbals.

What's more, the SE60 can pull double duty—without apologies—in a variety of studio applications. For the personal-studio owner needing a versatile condenser mic at a very modest price, the Cobalt SE60 is a no-brainer.

Jim Miller, *a frequent contributor to* **EM**, *is a session guitarist and sound designer, whose credits include products and libraries from Stratus Sounds, Alesis, Roland, Kurzweil, and Sweetwater Sound.*

TELEX
COBALT SE60 electret condenser microphone
$175

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

PROS: Inexpensive electret condenser microphone. Rugged housing. Versatile. Very little handling noise. Choice of phantom or battery power. Handles high SPLs.
CONS: Considerable presence peak between 2 and 9 kHz. Lacks on/off switch (which would be nice for stage applications.)
CIRCLE #443 ON READER SERVICE CARD

circle #602 on reader service card

circle #602 on reader service card

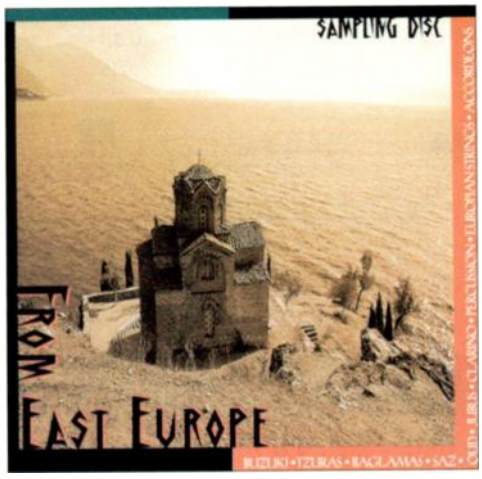
QUICK PICKS

DISCOVERY FIRM

From East Europe

By Jeff Obee

The land between the Aegean and Adriatic Seas has spawned some truly wonderful world music. This exotic terrain is explored on *From East Europe* ($59.95), a new audio sample CD from Discovery Firm.



From tzuraz to tsifteteli, an exotic arrary of instruments and rhythms can be found on Discovery Firm's *From East Europe* audio sample CD.

Oudles of Strumming

The main focus of this collection is strummed and plucked instruments. Oud, saz, and the traditional Greek tzuras and baglamas are some of the featured instruments, and on some tracks these are presented in typical Greek rhythms such as tsifteteli, rumpa, and zeibekikos. The names of these instruments might be foreign to you, but you will recognize their distinctive sounds.

Everything was played live and recorded direct to ADAT with no effects processing; editing and mastering were done using Sonic Foundry's *Sound Forge* and Steinberg's *WaveLab*. The majority of the samples are in stereo, with a plucked melody on one side and a corresponding strummed accompaniment on the other. Some of them have a sound that seems to be derived from a lo-fi, monophonic source, as with the bouzouki on track 5, which was played through a Marshall amp. Approximately half of the tracks are chromatic stereo, and others contain examples of various playing styles, such as glissandi, tremolo, pizzicati, or free (no tempo) phrases.

There are some tasty dumbek and bongo loops on the final track, with triple finger rolls and a nice feel, but there aren't nearly enough of these. Unfortunately, the instruments within the track aren't indexed, and the tempos aren't given. This makes it difficult to match them to another loop from this CD or any other source—a serious oversight in my book.

Sampling the Jubus

I sampled the jubus-tzuras loops on the first track immediately upon hearing them. It was tricky trimming the four samples perfectly to synchronize the bpm using only my Kurzweil screen, but digital audio users with computer-based sample-editing and time-stretching capability will have an easier time locking the sounds in perfectly.

I created two programs with the samples: one unprocessed, the other using a flanger and panning to create a combed, shifting effect. It was serious fun creating a sequence with some dumbek samples I have, a pulsing Gypsy bass line, and the jubus-tzuras chiming wildly along.

Saz Who?

On a sample CD of this nature, it would be tremendously helpful to provide users with in-depth descriptions of the instruments, where they are from, and some of their history. Discovery Firm provides nothing like this on *From East Europe*, a fact which I bemoaned fervently.

The only information that's listed in the documentation is the track number, the instrument, the bpm (where applicable), and whether it is chromatic stereo, pizzicato, etc. The ensuing loops and samples on that track are not listed, and the lengths of the samples aren't given. You just have to listen, see what's there, and guess at the amount of sampling time to assign.

To Conclude

With its mélange of exotic instruments, I enjoyed using *From East Europe*. I recommend it to world-music fans and home sampling hobbyists who seek something a little different. I hope Discovery Firm puts out a companion vocal collection from this part of the world.

Overall EM Rating (1 through 5): 3.5

CIRCLE #444 ON READER SERVICE CARD

AMG

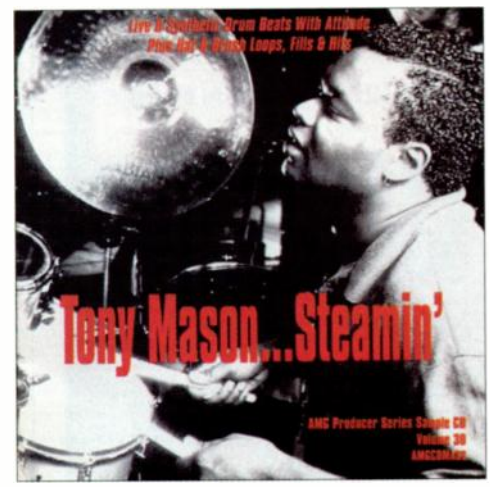
Tony Mason...Steamin'

By Dan Phillips

Drummer Tony Mason's credits are impressive—he has played with the likes of Teddy Riley, Al Green, George Michael, and Fine Young Cannibals—and at its best, his playing overflows with funk and groove. *Tony Mason...Steamin'*, his new disc of drum grooves from AMG (audio CD; $99.95), lives up to his reputation part of the time, but the sounds would benefit from more consistent quality.

Half and Half

Steamin' is evenly divided into electronic and acoustic drums ("Trigger Happy" and "Real Deal," respectively). AMG seems to be going for somewhat quirky, vibey sounds as opposed to picture-perfect, crystal-clear textbook examples. Recording and mixing techniques vary a good deal from track to track, which gives the user many sonic textures to choose from. Tempos are on the slow to medium side: almost all are between 58 and 110 bpm, with the bulk of the loops in the 90 to 100 bpm range.



Drummer Tony Mason delivers some of his trademark grooves on AMG's *Tony Mason...Steamin'* audio sample CD.

For manufacturer information, please see Contact Sheet, p. 195.

PHOENIX

INNOVATION & IMAGINATION

November 13-15, 1998

AUDIO @ LDI98...

HEARING IS BELIEVING!

Break the sound barrier and take audio beyond the cutting edge at LDI98, North America's largest trade show for entertainment design and technology. See the best in professional audio equipment by the world's leading manufacturers - past and current LDI exhibitors include: Aphex Systems, Clear Com, Crest Audio, Sennheiser/DAS Audio, Eastern Acoustic Works, EVI, GEM Sound, Level Control Systems, Meyer Sound, Neutrik, Professional Audio Systems, Soundcraft/Harman Group, Numark, BGW Systems, Community Professional Loudspeakers, QSC Audio, Samick, Turbosound and Cerwin-Vega. From hot new products to in-depth workshops and hands-on design tutorials, LDI98 puts the sound in entertainment.

LDI 98 PHOENIX

PHOENIX CIVIC PLAZA
Nov. 13-15 (Exhibits)
Nov. 12-15 (Workshops)
NEW! LDInstitute Nov. 9-13

www.etecnyc.net

Sponsored by: *Lighting Dimensions, Theatre Crafts International, Sound & Video Contractor, and ESTA/Entertainment Services & Technology Association*

Together with these other INTERTEC®/PRIMEDIA Publications:
MIX, Millimeter, Broadcast Engineering, World Broadcast News, Video Systems, Electronic Musician and *Shopping Center World*

PLEASE SEND ME MORE INFORMATION ABOUT LDI98

☐ Exhibiting ☐ Attending

Name _____

Title _____

Company _____

Address _____

City _____ State _____

Country _____ Zip _____

Phone* _____

Fax* _____

E-mail _____

* Include country and city codes.

LDI98 • Intertec Trade Shows & Conferences • 9800 Metcalf Ave. • Overland Park, KS 66212 • 1-800-288-1606
Fax: 1-913-967-1900. For programming updates as they occur, call FAX-ON-DEMAND at 1-800-GDI-3858. (Available after June 1st, 1998)

WRH

Mason's playing has character aplenty. When he gets grooving, as on the cross-tom patterns of the 91 bpm shuffle "Tom-Tom Club," the effortless ride of "Jazz Swing 1," the Bonham-esque heavy funk of "Shootin'," and the straight-ahead "Movin' 1-4," the loops are a pleasure to work with.

Brilliant Brushes

Although there aren't many of them on this disc, his brush patterns are outstanding, with a casual and fluid delivery. One of them, "Brush Off," immediately found its way into an ambient pop song I was working on.

The same character that builds Mason's distinctive groove can sometimes get a little too loose on this disc for my taste. Also, many of the electronic drum patterns lack the rhythmic ease that Mason demonstrates elsewhere; their feel sometimes seems stilted or awkward.

Steamin' doesn't have the sterling consistency of some other loop libraries, but all in all, this is a decent collection of loops. It's worth digging through some of the lackluster material to get to the good stuff.

Overall EM Rating (1 through 5): 3

CIRCLE #445 ON READER SERVICE CARD

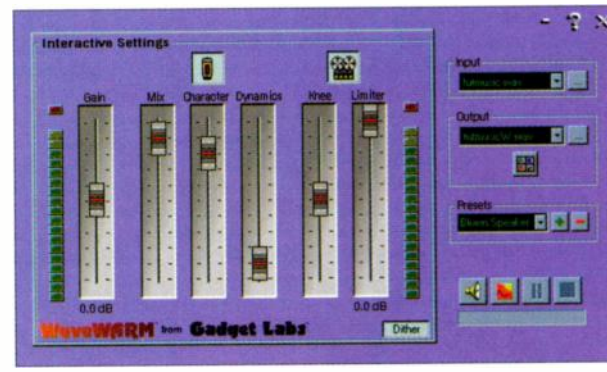
GADGET LABS

WaveWARM (Win 95/NT)

By Scott R. Garrigus

There has long been a debate among audiophiles over the effects that digital audio has on recorded music. Some favor the crisp, clean fidelity that comes from digital recording. Others claim that analog tape adds a wonderful warmth to the sound that digital audio cannot match. In response to this dilemma, quite a few software companies offer products that simulate the familiar sound of analog warmth and richness without leaving the realm of digital audio.

WaveWARM ($99.95), from Gadget Labs, is one such product. It's a digital-audio processing program that simulates the effects of vacuum-tube overdrive and analog tape saturation. The program can run as either a stand-alone application or a DirectX plug-in for use within digital audio host software, such as Sonic Foundry's *Sound Forge* or Cakewalk's *Cakewalk Pro Audio*.



As a stand-alone application, Gadget Labs' *WaveWARM* displays all of its controls in a single window with meters for monitoring levels. The plug-in version relies on the host application's meters.

In stand-alone mode, the interface consists of a single display, which shows all controls available for each of the program's functions. Processing is done on source and destination files, which are set using the Input and Output lists. At the moment, only the WAV file format is supported. You can configure the program to use a particular sound-card driver if you have more than one card available, and there is a real-time Preview mode.

Control Room

You can elect to use either the vacuum-tube overdrive, analog tape–saturation, or both effects by activating the appropriate buttons at the top of the display. Each effect comes with its own set of controls in the form of onscreen sliders. The vacuum tube overdrive effect can be adjusted via the Mix, Character, and Dynamics sliders. Knee and Limiter controls are available for analog tape–saturation adjustment. In addition, there is an overall gain control with a range of +6 dB to –∞ dB.

The graphic meters show the overall volume level of your audio. Unfortunately, even though the documentation states that each "LED" segment represents a 1 dB change (from –18 to 0 dB), these measurements aren't displayed alongside the meters.

Any adjustments made to the effect controls can be saved and later recalled as a preset; the program includes eight presets covering a range of effects. Because files are internally processed with 32-bit resolution, a Dither option is provided to reduce artifacts when output files are reduced to their initial 8- or 16-bit formats.

After you're finished setting parameters, you can preview the file. Your audio file loops from beginning to end until you click on the Stop button. You can also adjust any of the effects parameters in real time as the file plays. When you're satisfied with what you hear, simply click the Warm button to permanently apply the effect.

When running *WaveWARM* as a DirectX plug-in, the parent program is responsible for saving and recalling the presets and for providing a level-meter display. You also don't need to set input and output files because the plug-in uses the currently selected audio within the parent program.

Getting Warm

During my tests, I found *WaveWARM* to be an easy-to-use, great-sounding effects program with a lot of versatility in terms of features and the dual operation modes. I was able to get a wide range of effects, from a subtle warming and tape saturation to a full-blown overdrive that I swear sounded just like a real guitar amp. This thing can Mesa Boogie, baby!

The eight presets provided with the program cover some of the classic sounds: "Blown Speaker" for those distorted, thumping drum tracks; "Mellow Blend" for smooth-sounding tape saturation; and

more. My only minor gripes are the absence of meter markings and the lack of additional audio file–format support. Otherwise, the program is a wonderful tool and definitely deserves a place in your bag of audio effects tricks.

Overall EM Rating (1 through 5): 4

CIRCLE #446 ON READER SERVICE CARD

ZERO-G

Deepest India

By Dan Phillips

Part sample library and part musicological overview, Zero G's *Deepest India* (audio CD; $129.95) packs a huge amount of source material from the subcontinent into three audio CDs. The focus throughout is on phrases, as opposed to single-note multisamples. Most are quite long, with some over a minute in length. The material is evenly divided between solo instruments, instrumental ensembles, and vocals, each of which is given its own CD.

Scintillating Sounds

On the "Instruments" disc, my favorites are the plucked strings, including the resonant, harmonically rich sitar; the more delicate sarod; and the banjo-like tumbi. There's only a single sample of the tamboura, a plucked drone instrument frequently used in ensembles; I would like to have seen more. I'm fond of the santur, an Indian version of the hammer dulcimer. Some of the santur samples use an interesting performance technique in which the hammer is allowed to bounce freely against the string as the note decays, like a ping-pong ball bouncing against a table.

Percussion is well represented, with tabla phrases ranging from relaxed to frenetic and an equal number of less-resonant dholak samples. There are only four phrases from the deep, ringing dafli—which sounds like a large frame drum—but I used one of them immediately as the basis of a dark, slow, ambient song. Also represented are flute, algozeh (two flutes played at once), the double-reed shinai, bowed strings (including violin, dillrabar, and serengi), and the baja (a harmonium).

The instrumental-ensemble disc includes excellent samples from many different indigenous Indian ensembles. There's the eerie, slightly menacing, gliding melody of

(continued on p. 200)

ADVERTISER INDEX

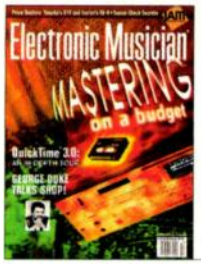
ADVERTISER	READER SERVICE #	PAGE
Aardvark	556	103
acoustic	558	108
Adaptec	520	45
Akai	517	38-39
AKG	518	41
Alesis (QS6.1)	508	17
Alesis (QCard)	565	117
Antares	567	119
Apogee Electronics	540	79
Applied Research & Technology (A.R.T.)	591	147
Audio DeutchKraft (ADK)	604	173
Audix	575	163
B & H Photo-Video	618	196-199
BASF	557	107
Bellari	533	68
beyerdynamic	551	94
Boston Acoustics	584	140
Cakewalk Music Software (Pro Audio 7)	515	33
Cakewalk Music Software (Metro 4)	559	109
Cakewalk Music Software (In Concert)	573	127
Caruso Music	579	133
Computers & Music	596	157
Conservatory of Recording Arts & Sciences	530	62
Creamware	561	111
The DAT Store	529	62
Digidesign	550	93
Digital Piano Buyer's Guide 1999	•	183
DigiTech (Studio)	509	20-21
DigiTech (Vocalist Series)	587	143
Disc Makers	574	128
Discovery Firm	541	80
Ebtech	548	89
Edirol	580	135
Emagic (Logic Audio)	524	53
Emagic (Unitor8)	600	167
emusician.com	•	185
E-mu Systems	519	43
Ensoniq (Fizmo)	504	9
Ensoniq (ZR-76)	568	121
Event Electronics	619	211
ExpoLatina '99	•	96
Fostex	•	129
Frontier Design Group	•	81
Full Compass	593	151
Furman Sound	577	132
Gadget Labs	588	145
Generalmusic	511	25
Guitar Center's Rhythm City	585	140
Guitar Center	563	114
Hafler	527	59
Hermes Music	586	141
HHB Communications	607	177
HHB Communications #2	599	165
Ilio Entertainment	539	78
Innovative Quality Software	595	155
JBL Professional	576	131
Jensen Pro Audio	583	139
Joemeek/PMI	566	118
Korg (D8)	503	4-5
Korg (N1/N5)	516	35
Korg (Trinity V3)	569	123
Korg (1212 I/O)	590	146
Kurzweil Music Systems	594	153
LDI 98	•	191
Leigh's Computers	608	178
Line 6	545	85
Lucid Technology	536	72
Mackie (HR824)	502	2-3
Mackie (CR1604-VLZ)	554	99
Mark of the Unicorn	501	212
Merrill's Music	617	193
Metalithic	553	73
Microworks	546	86
Midiman	572	125
Mix Books	602	169, 174, 189
Musician's Friend	538	77
Music Industries	543	83
Musitek	578	133
Opcode	532	67
Panasonic	•	26-27
PG Music	592	149
QCA	609	178
QSC Audio Products	514	30-31
Quantegy	528	61
Rich Music	549	89
Roland	523	50-51
Sam Ash Professional	•	63
Seer Systems	562	113
Sibelius Software	534	69
Sonic Foundry	522	47
Sonorus	581	137
Sony	•	55
Sound Chaser	582	138
Sound Quest	601	168
SoundTrek	571	124
Speir Music	570	124
Steinberg North America (Cubase VST/24)	506	13
Steinberg North America (ReBirth)	560	110
Studiomaster	597	159
Sweetwater Sound	505	10-11
Syntrillium Software	552	95
TASCAM	507	14-15
TC Electronic (Unity)	510	23
TC Electronic (Gold Channel)	564	115
Thoroughbred Music	616	193
Turtle Beach	535	71
Taxi	588	144
Voyetra	521	46
Waves	544	84
West L.A. Music	606	175
Whirlwind	547	87
World Replication Group	603, 615	171, 192
Yamaha (SW1000XG)	555	101
Yamaha (DSP Factory)	526	57
Zefiro Acoustics	610	179

RATE THE ARTICLES IN THIS ISSUE! October 1998

We want to know what you think of the articles in *Electronic Musician*! Now you can use your reader service card to give us feedback about EM's editorial coverage. We have assigned a rating number to each of the main articles in this issue. Please select a rating for each article and circle the appropriate number on your reader service card:

Please select ONE rating number per article	Very Helpful	Somewhat Helpful	Not Helpful	Didn't Read
A. Cover Story: "Mastering on a Budget," p. 48	701	702	703	704
B. "In the Studio with George Duke," p. 64	705	706	707	708
C. "DIY: Build the EM Pop Filter," p. 90	709	710	711	712
D. JAM "Sounds Like a Winner," p. 104	713	714	715	716
E. JAM "Vox: Words, Words, Words," p. 116	717	718	719	720
F. JAM "Tech: Strange Bedfellows," p. 126	721	722	723	724

WRH



CONTACT SHEET

A GUIDE TO THE COMPANIES AND ORGANIZATIONS MENTIONED IN THIS ISSUE OF ELECTRONIC MUSICIAN

Mastering on a Budget
pp. 48–63

AnTares Systems/Cameo International (distributor) tel. (888) 33-CAMEO or (408) 399-0008; fax (408) 399-0036; e-mail andy@ns.net; Web www.cameoworld.com

Waves, Ltd. tel. (423) 689-5395; fax (423) 688-4260; e-mail waves@waves.com; Web www.waves.com

QuickTime Closeup
pp. 74–89

Apple Computer tel. (408) 996-1010; fax (408) 974-6615; Web www.apple.com

QDesign tel. (604) 688-1525; fax (604) 688-1524; e-mail enquiries@qdesign.com; Web www.qdesign.com

Qualcomm tel. (619) 587-1121; fax (619) 658-2100; e-mail asic-products@qualcomm.com; Web www.qualcomm.com

Terran Interactive, Inc. tel. (800) 577-3443; fax (408) 356-9373; e-mail sales@terran.com; Web www.terran.com

Desktop Musician: Jammin' Over the Net
pp. 134–141

Res Rocket tel. (888) RES-ROCKET or (415) 551-0894; fax (415) 551-1585; e-mail support@resrocket.com; Web www.resrocket.com

Full Tilt Design, Inc. tel. (709) 683-2043; fax (709) 786-2880; e-mail andrew.mercer1@nf.sympatico.ca; Web www.fulltiltdesign.com

Reviews
pp. 152–200

AMG/Time+Space (distributor) tel. (800) 411-4655; fax (415) 392-8934; e-mail sales@timespaceusa.com; Web www.timespace.com

Cycling '74 tel. (415) 621-5743; fax (415) 621-6563; e-mail info@cycling74.com; Web www.cycling74.com

Discovery Firm tel. (888) 544-3476; fax (310) 781-1330; e-mail dis@discoveryfirm.com; Web www.discoveryfirm.com

Fostex Corporation of America tel. (562) 921-1112; fax (562) 802-1964; e-mail info@fostex.com; Web www.fostex.com

Gadget Labs, Inc. tel. (503) 827-7371; fax (404) 685-0922; e-mail info@gadgetlabs.com; Web www.gadgetlabs.com

HHB Communications, Ltd. tel. (310) 319-1111; fax (310) 319-1311; e-mail sales@hhb.co.uk; Web www.hhb.co.uk

Korg USA, Inc. tel. (516) 333-9100; fax (516) 333-9108; e-mail product_support@korgusa.com; Web www.korg.com

Opcode Systems, Inc. tel. (650) 856-3333; fax (650) 856-0777; e-mail info@opcode.com; Web www.opcode.com

Sonorus tel. (800) 949-7797 or (212) 253-7700; fax (212) 253-7701; e-mail info@sonorus.com; Web www.sonorus.com

Symbolic Sound tel. (800) 972-1749 or (217) 355-6273; fax (217) 355-6562; e-mail info-kyma@symbolicsound.com; Web www.symbolicsound.com/kyma.html

Telex Communications, Inc. tel. (800) 392-3497; fax (800) 323-0498; Web www.telex.com

Xavier Serra e-mail xserra@iua.upf.esw; Web www.iua.upf.es/~sms/docs/software.html

Yamaha Corporation of America tel. (714) 522-9011; fax (714) 739-2680; e-mail info@yamaha.com; Web www.yamaha.com

Zero G/Time+Space (distributor) tel. (800) 411-4655; fax (415) 392-8934; e-mail sales@timespaceusa.com; Web www.timespace.com

VIDEO and PRO AUDIO

DIGITAL MIXERS

MACKIE.

Digital 8 Bus Mixing Console — New

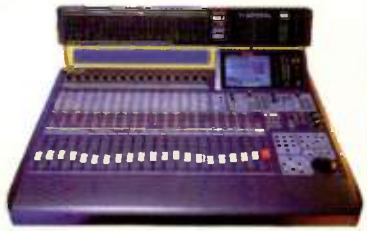
Well, it's finally here and just like the analog 8 bus a few years back, it's everything you've anticipated! Great sound quality, full recording and mixdown capabilities, motorized faders and an array of digital features geared to take you flying into the next century.

FEATURES-
- 48 channels of automated compression, gating, EQ and delay
- Built in 3-way meter display keeps you on top of your mix.
- Built-in meter bridge.
- Ultramix II automation for complete control, hook up an S-VGA monitor and you'll feel like you spent a lot more money.
- All functions can be automated, not just levels and mutes. Store EQ, reverb, compression, gating and even Aux send information.
- Fast SCENE automation allows you to change parameter snapshots on every beat.
- Reads Standard MIDI tempo maps, displaying clock info on the built-in position counter.
- Truly the cutting edge of mixing technology

Panasonic

WR-DA7 Digital Mixing Console — New

Stop dreaming about your digital future, it's here! The Panasonic WR-DA7 digital mixer features 32-bit internal processing combined with 24-bit A/D and D/A converters as well as moving faders, instant recall, surround sound capabilities, and much more. Best of all, it's from Panasonic.



FEATURES-
- 32 Inputs/8 AUX send/returns
- 24-bit converters
- Large backlit LCD screen displays EQ, bus and aux assignments, and dynamic/delay settings.
- 4-band parametric EQ
- Choice of Gate/Compressor/Limiter or Expander on each channel
- 5.1 channel surround sound in three modes on the bus outputs
- Output MMC
- Optional MIDI joystick

TASCAM

TMD1000 Digital Mixing Console — New

You want to see what all the digital mixing buzz is about? The NEW TMD100 from Tascam will have you smilin' & automatin in no time. It features fully automated EQ, levels, muting, panning and more in an attractive digital board with an analog 'feel'. Your digital future never looked, or sounded, so clear.

FEATURES-
- 4 XLR mic inputs, 8 1/4" balanced TRS inputs.
- 20-bit A/D D/A conversion, 64x oversampling on input, 128x on output.
- Store all settings, fully MIDI compatible.
- Optional **IF-TD1000** adds another 8 channels of TDIF and a 2-channel sample rate converter.
- Optional **FX-1000** Fx board adds another 4 dynamic processors and another pair of stereo effects.

MIC PREAMPS

Focusrite

Green 3 *"Voicebox MKII"* — New

The Voicebox MKII provides a signal path of exceptional clarity and smoothness for mic recording, combining an ultra-high quality mic amp, an all new Focusrite EQ section optimized for voice, and full Focusrite dynamics. The new MKII now includes a line input for recording and mixdown applications.

FEATURES-
- Same mic pre section as found on the Green Dual Mic Pre includes +48V phantom power, phase reverse, and a 75Hz high-pass filter. Mute control and a true-VU response LED bargraph are also provided
- EQ section includes a mid parametric band with frequency and gain control as well as a gentle bell shape to bring out the character of the voice.
- Dynamics section offers important voice processing functions of compression and de-essing combined with a noise reducing expander
- Single balanced Class A VCA delivers low distortion and a S/N ratio as low as -96dBu

EFFECTS PROCESSING

t.c. electronic
ULTIMATE SOUND MACHINES

Finalizer Plus — New

Improving on the multi-award winning Finalizer platform, The Finalizer Plus delivers an unprecedented level of clarity, warmth and punch to your mix. Inserted between the stereo output of your mixer or workstation and your master recording media, the Finalizer Plus dramatically rounds out your material, creating that "radio ready" sound.

FEATURES–
- Balanced Analog as well as Digital outputs including AES/EBU, S/PDIF, & TOS.
- 24-bit precision A/d & D/A Converters
- 5-band 24-bit stereo EQ
- Enhance - De-essing, stereo adjust or digital radiance
- Real-time gain maximizer
- Variable slope multi-band expander
- Multi-band compressor
- Word Clock Sync
- MIDI section useful for controlling sequencer fades or any of the Finalizer's parameters from a remote MIDI controller.

lexicon

PCM81 Multi-Effects Processor — New

The PCM-81 has everything that made the PCM80 the top choice among studio effects processors, and more. More effects, more algorithms, longer delay and full AES/EBU I/O.

FEATURES–
- 300 Presets include pitch, reverb, ambience, sophisticated modulators, 20 second stereo delays, and dynamic spatialization effects for 2-channel or surround sound applications
- 2 digital processors including Lexicon's Lexchip for the reverb and a second DSP engine for the other effects.
- 24-bit internal processing
- Dynamic patching matrix for maximum effects control.
- PCM card slot

EQUALIZERS

Focusrite

Green 2 *"Focus EQ"* — New

The Green 2 Focus EQ is suitable for a variety of applications combining a Focusrite equalizer section with a multi-source input section. Use it as a high-quality front end for recording applications or patch it into the send/return loop to upgrade a single channel of console eq, either way, it sounds great.

FEATURES-
- XLR & 1/4" inputs are similar to the Dual Mic Pre but have been adapted to cope with a wider range of levels.
- VU metering via a 10-LED bargraph
- EQ section derived from the Red and Blue range processors for superb audio quality.

COMPRESSORS

JOE MEEK

VC1 Studio Channel — got meek?

The Joe Meek Studio Channel offers three pieces of studio gear in one. It features an excellent transformer coupled mic preamp, a great compressor and an enhancer unit all in a 2U rackmount design. Find out why more and more studio owners can live without one.

FEATURES-
- 48V phantom power, Fully balanced operation
- Mic/Line input switch
- Mono photo-optical compressor
- High pass filter for large diaphragm mics
- Extra XLR input on front makes for easy patching
- Compression In/Out and VU/compression meter switches
- Twin balanced XLR outputs with one DI XLR output for stage use
- Enhancer In/Out switch and enhance indicator
- Internal power supply 115/230V AC

dbx

Blue Series 160S Stereo Compressor

The dbx 160S combines the best features of all the great dbx compressors in a well-built unit where the craftsmanship is as stunning as the engineering is innovative. This is truly a desirable compressor.

FEATURES-
- 127dB dynamic range • Program dependent "Auto", or fully variable attack and release
- Hard knee/OverEasy switchable.

VIDEO and PRO AUDIO

VISA · MasterCard · Discover · American Express Cards

TO INQUIRE ABOUT YOUR ORDER:
800 221-5743 • 212 239-7765
OR FAX 24 HOURS:
800 947-2215 • 212 239-7549

New Address:
420 Ninth Ave. (Bet. 33rd & 34th St.)
New York, N.Y. 10001

B&H
PHOTO - VIDEO - PRO AUDIO

MIDI HARDWARE

Mark of the Unicorn

MIDI Time Piece™ AV
8x8 Mac/PC MIDI Interface

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

FEATURES–
- Same unit works on both Mac & PC platforms
- 8x8 MIDI merge matrix, 128 MIDI channels
- Fully programmable from the front panel
- 128 scene, battery-backed memory
- Fast 1x mode for high-speed MIDI data transfer

Digital Time Piece™
Digital Interface

Think of it as the digital synchronization hub for your recording studio. The Digital Timepiece provides stable, centralized sync for most analog, digital audio, and video equipment. Lock together ADATs, DA-88's, ProTools, word clock, S/PDIF, video, SMPTE, and MMC computers and devices flawlessly. It ships with "Clockworks" software which gives you access to its many advanced features and remote control of some equipment settings such as record arm.

OPCODE

Studio 64XTC
Mac/PC MIDI Interface

The Studio 64XTC takes the assorted, individual pieces of your studio-your computer, MIDI devices, digital and analog multitracks and even pro video decks, and puts them all in sync.

FEATURES–
- 4 In / 4 Out, 64 channel MIDI/SMPTE interface/patchbay with powerful multitrack & video sync features
- ADAT sync with MIDI machine control
- Simultaneous wordclock and Superclock output, 44.1kHz or 48kHz for perfect sync with ADAT, DA-88 and ProTools
- Video and Blackburst in (NTSC and PAL)
- Cross-platform Mac and Windows compatibility

SAMPLING

AKAI
S-Series
Rack Mount Samplers

Starting with 64X oversampling, Akai's S-Series Samplers use 28-bit internal processing to preserve every nuance of your sound and the outputs are 18- and 20-bit to ensure reproduction of your sounds entire dynamic range. These three new samplers add powerful capabilities, ease-of-use, expandability and affordability to set the standard for professional samplers.

KEYBOARDS & SOUND MODULES

Roland

XP60 & XP80 Music Workstations

The XP-80 delivers everything you've ever wanted in a music workstation. An unprecedented collection of carefully integrated features provide instant response, maximum real-time control and incredible user expandability. The XP-80 features a pro-quality 76-note weighted action keyboard while the NEW XP-60 features the same sound engine in a 61-note keyboard.

XP80 FEATURES–
- 64-voice polyphony and 16-part multitimbral capability
- 16 Mbytes of internal waveform memory, 80Mbytes when fully expanded (16-bit linear format)
- 16-track MRC-pro sequencer with direct from disk playback. Sequencer holds approx. 60,000 notes
- New sequencer functions like "non-stop" loop recording and refined Groove Quantize template
- Enhanced realtime performance capability with advanced Arpeggiator including MIDI sync and guitar strum mode and Realtime Phrase Sequence (RPS) for on-the-fly triggering of patterns
- 40 insert effects in addition to reverb and chorus
- 2 pairs of independent stereo outputs; click output jack with volume knob
- Large backlit LCD display

SR-JV80 Series Expansion Boards

New

Roland's SR-JV80 Series wave expansion boards provide JV and XP instrument owners a great-sounding, cost-effective way to customize their instruments. Each board holds approx. 8Mb of entirely new wave-forms, ready to be played or programmed as you desire.

Boards Include–
Pop, Orchestral, Piano, Vintage Synths, World, Super Sound Set, Keys of the 60's & 70's, Session, Bass & Drums, Techno & Hip-Hop Collection.

KURZWEIL

K2500 Series Music Workstations

The K2500 series from Kurzweil utilizes the acclaimed V.A.S.T. technology for top-quality professional sound. Available in Rack mount, 76-key and 88 weighted key keyboard configurations, these keyboards combine ROM based samples, on-board effects, V.A.S.T. synthesis technology and full sampling capabilities on some units.

FEATURES–
- True 48-voice polyphony
- Fluorescent 64 x 240 backlit display
- Up to 128MB sample memory
- Full MIDI controller capabilities
- 32-track sequencer
- Sampling option available
- Dual SCSI ports
- DMTI Digital Multitrack interface option for data format and sample rate conversion (Interfaces with ADATs or DA-88s)

KORG

Trinity Series Music Workstations DRS

Korg's Trinity Series represents a breakthrough in sound synthesis and an incredible user interface. It's touch-screen display is like nothing else in the industry, allowing you to select and program patches with the touch of a finger. The 24MB of internal ROM are sampled using ACCESS which fully digitizes sound production from source to filter to effects. Korg's DSP based Multi Oscillator Synthesis System (MOSS) is capable of reproducing 5 different synthesis methods like Analog synthesis, Physical Modeling, and variable Phase Modulation (VPM).

FEATURES–
- 16 track, 80,00 note MIDI sequencer
- Flexible, assignable controllers
- **DRS (Digital Recording System)** features a hard disk recorder and various digital interfaces for networking a digital recording system configured with ADAT, DAT recorder and hard disk.
- 256 programs, 256 combinations
- Reads KORG sample DATA library and AKAI sample library using optional 8MB Flash ROM board

TRINITY *88 Weighted-key/Solo Synth*
TRINITY *76-key/Solo Synth*
TRINITY *61-key/Solo Synth*
TRINITY *61-key*

**(Digital IF, SCSI, Hard Disk Recorder, and sample Playback/Flash ROM functions are supplied by optional upgrade boards)*

MONITORS

Hafler

TRM-8

Winner of Pro Audio Review's PAR Excellence Award in 1997, Hafler's TRM8s provide sonic clarity previously found only in much more expensive speakers. They feature built-in power, an active crossover, and Hafler's patented Trans•nova power amp circuitry.
- 45Hz - 21kHz, ±2dB
- 75W HF, 150W LF
- Electronically & Acoustically matched

MACKIE.

HR824

These new close-field monitors from Mackie have made a big stir. They sound great, they're affordable, they're internally bi-amped. "What's the catch?" Let us know if you find one.

FEATURES-
- 150W Bass amp, 100W Treble amp
- Full space, half space and quarter space placement compensation
- Frequency Response 39Hz to 22kHz, ±1.5dB

TANNOY

New

Reveal

The latest playback monitor from Tannoy, the Reveal has an extremely detailed, dynamic sound with a wide, flat frequency response.

FEATURES-
- 1" soft dome high frequency unit
- Long throw 6.5" bass driver
- Magnetic shielding for close use to video monitors
- Hard-wired, low-loss crossover
- Wide, flat frequency response
- Gold plated 5-way binding post connectors

SOUND CARDS

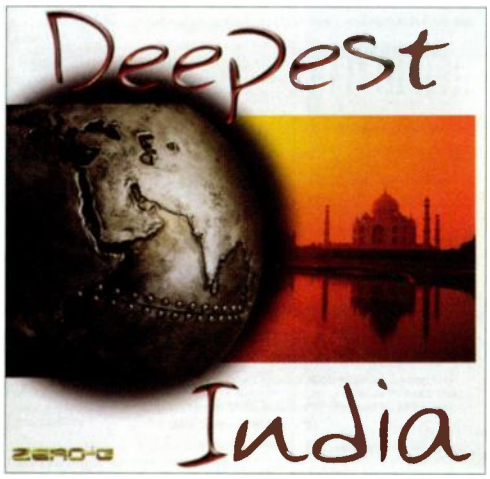
digidesign · AVID
A Division of Avid Technology, Inc.

Audiomedia III
Digital Audio Card

Working on both Mac and Windows OS systems, Audiomedia III will transform your computer into an powerful multitrack workstation. Compatible with a wide variety of software options from Digidesign and Digidesign development partners. Audiomedia III features 8 tracks of playback, up to 4 tracks of recording, 24-bit DSP processing, multiple sample rate support and easy integration with leading MIDI sequencer/DAW software programs.

QUICK PICKS (continued from p. 193)

"Satpack Ensemble 7"; the easy, hazy-summer-day phrasing of the "Jugal Sitar 'n' Flute Ensemble"; and the almost drum 'n' bass exuberance of the "Saharhar Mirdangam Ensemble." About a quarter of the material is from Indian film orchestras; authentic though they may be, I found these to be cloying and silly for the most part and easily the least compelling material in the collection.



Zero-G's *Deepest India* provides fine samples of Punjabi folk singing, rapid-fire tabla, and more.

The vocals disc covers a lot of ground, from plaintive to exultant, with both male and female singers. Most are solos, but there are some vocal ensembles, as well. My favorites are the more rhythmic phrases, such as the Punjabi folk song "Joginder Diwana," and the soulful drones of the vintage "Karnatic."

Passage to India

Audio quality is generally high, but some samples are obviously from older sources. The documentation is well done, with bpm noted for all phrases and key noted for all vocals and solo instruments (although, for whatever reason, key was omitted from the instrumental-ensemble disc's documentation). Also included is a good-sized glossary of Indian musical terminology, which is useful in making the most out of the track names, even though some of the spellings disagree. There are even partial translations for many of the lyrics on the vocals disc.

This is a very worthwhile collection, highly recommended for anyone looking to give their dance, pop, or film music a dose of true subcontinental style.

Overall EM Rating (1 through 5): 4

CIRCLE #447 ON READER SERVICE CARD

HHB CDR-800

Compact Disc Recorder

By Alex Artaud

Just a few years back, you needed pretty deep pockets to buy a CD recorder—at around $10,000 minimum, they weren't cheap. Today, with several inexpensive, computer-based systems on the market (see "The CD Software Cook-Off" in the March 1998 issue of **EM**) and blank CDs selling for as little as two dollars a piece, it seems silly *not* to be burning your own at home. But what if you don't want to be wedded to a computer every time you burn a CD? Enter HHB, a company with a solid track record in DAT recorders and other digital recording media. With its CDR-800 compact disc recorder ($2,195), HHB looks to provide a flexible, stand-alone solution for your studio.

Vitals

The sleek CDR-800 is a black, 3U rack-mount recorder with a pleasing, minimalist design. In fact, if you have ever used a DAT machine, you should have no problem finding your way around the CDR-800. The front panel includes the familiar play, record, pause, and stop buttons, in addition to forward and reverse search controls. Two knobs control analog record level and balance, and there is a front-panel headphone jack. Although the rack unit lacks a numeric keypad, one is available on the provided remote.

The main LCD panel is large and easy to read, and it displays an 8-step level meter with a clip indicator, in addition to values for track number, record status, and track time (selectable between time elapsed, total time, and time remaining). The display also shows sampling rate and the source of the material being recorded. Digital material at any sample rate between 32 kHz and 48 kHz will be read by an onboard sample-rate converter and automatically changed to the standard 44.1 kHz, which is a very cool feature.

Analog inputs are on balanced XLR or unbalanced RCA jacks, and digital inputs include AES/EBU, S/PDIF, and coaxial or Toslink optical. You can switch between -8 dBu, +4 dBu, and unbalanced -10 dBV line-level inputs, and DIP switches allow you to copy protect/permit each CD you burn. Two RCA jacks serve as unbalanced audio outputs, and an 8-pin DIN socket is used to connect the remote control.

Burn Baby, Burn!

The unit is extremely easy to operate. A blank CD is placed upside-down on a hefty platter—ideal for preventing unwanted vibrations during recording. Recordings can be made in one of four ways: track-by-track (for a digital source with IDs already in place), all-track (for bulk transfer of digital tracks along with their IDs), manually from an analog source, or manually from a digital source with no IDs. Recordings can be done continuously or interrupted and then resumed later.

When recording is initially completed, the CD is only playable on the CDR-800. To make it compatible with any ordinary CD player, the disc must be finalized, a process that writes a CD-standard table of contents. And, in case you mess up a track, a Skip ID function lets you "erase" the track by instructing the CDR-800 to ignore that track's ID information during the finalizing process—a bit like sweeping it under a digital rug.

We've Got a Winner

Whether I was doing CD-to-CD or DAT-to-CD transfers, the CDR-800 operated glitch-free. All ID numbers were recorded along with each track, and I encountered no anomalies in sound quality. My only qualms: I am less than thrilled with the RCA line outs, and there is no AES/EBU output. Other than that, it's a fantastic stand-alone CD recorder at a great price. Sign me up.

Overall EM Rating (1 through 5): 4.5

CIRCLE #448 ON READER SERVICE CARD

Sporting a user interface similar to that of a DAT recorder, the HHB CDR-800 compact disc recorder is a good solution for the personal studio not equipped with a computer.

CLASSIFIEDS

ELECTRONIC MUSICIAN CLASSIFIED ADS are the easiest and most economical means to reach a buyer for your product or service. The classified pages of **EM** supply our readers with a valuable shopping marketplace. We suggest you buy wisely; mail-order consumers have rights, and sellers must comply with the Federal Trade Commission as well as various state laws. **EM** shall not be liable for the contents of advertisements. For complete information on prices and deadlines, call **(800) 544-5530**.

ACOUSTIC PRODUCTS

SILENT
58 Nonotuck St., Northampton, MA 01062
INFO (413) 584-7944 • FAX (413) 584-2377
ORDER (800) 583-7174
info@silentsource.com • www.silentsource.com
Acousticore Fabric Panels • Sound Barrier
Isolation Hangers • A.S.C. Tube Traps
Silence Wallcovering • WhisperWedge
Melaflex • S.D.G. Systems • Tecnifoam
R.P.G. Diffusors • Sonex • Sound Quilt

Cloaking Device
acoustic conditioning systems
- Quick - Easy - Affordable -
modular systems start at 144.00
Start with a Good Sound
770-427-8761
fspace@mindspring.com
www.mindspring.com/~fspace
Folded Space Technologies

AcousticsFirst™
Toll Free: 888-765-2900
Full product line for sound control and noise elimination.
Web: http://www.acousticsfirst.com

★ACOUSTIC FOAM★
Diffusors • Bass Traps • Broadband Absorbers • Sound Barrier & More

Introducing the Eclipse™ Stand-Mounted Modular Acoustic Environment!

Famous artists, motion picture companies, studios & networks choose Auralex time & time again because we make the world's best sound control products regardless of price. We offer free, no-pressure advice & can solve any sound problem. Call us today!

USERS: James Taylor, Journey, Sammy Hagar, D'arcy of Smashing Pumpkins, Clint Black, Celine Dion, Doane Perry (Jethro Tull), Dennis DeYoung/James Young/Todd Sucherman (Styx), Spyros Poulos (Madonna, Al Dimeola, Kathy Troccoli, Taylor Dayne), George Terry (Eric Clapton), Andrew Gold, Christopher Cross, Mike Wanchic (John Mellencamp), Ross Vannelli, Slud Row, Mark Lindsay (Paul Revere & The Raiders), Norbert Stovall (D. Parton, Gatlin Bros., K. Rogers, E. Rabbit, etc.), Mark Farner (Grand Funk Railroad), Toshi Iseda, The Bellamy Bros., Wayman Tisdale, Nona Hendryx, John Baxter (Re-Flex), Disney, MUMFORD (A Lawrence Kasdan/Touchstone Film), Bose, Harpo Studios, LucasArts, Silicon Graphics (SGI), Todd-AO, JBL, Qualcomm, Time Warner Cable, Shure, Pelonis Acoustics (FutureDisc, K. Loggins, Skywalker Sound), Steven Klein, Fmr. Sr. Eng. @ Criteria Studios (E. Clapton, Bee Gees, A.W.B.) & Studio Designer (Don Was, Kenny G, Yab Yum Entertainment, Larrabee), Sear Sound (N. Merchant, S. Colvin), Castle Oaks Prod. (Titanic, Tremors, Wings, 21 Jump Street, S. Mendes, J. Feliciano), Sound Kitchen (P. Frampton, Petra), Digital Insight, AT&T, NASA, Sony, CBS Sports, NBC Sports, ABC TV & Radio, ESPN, MSNBC, Discovery Channel, Bill Fulton (I Am Weasel/Cartoon Network), Boeing, Edtel, Berklee College of Music, the Lincoln Center, Investor's Business Daily, ShowCo, Opryland, Music Bakery, Audix, Ensoniq, WhisperRoom, Hitachi, Toshiba, 20th Century Fox, Universal Studios, NPR, Warner Bros., Polygram, chef Wolfgang Puck, Fruit of the Loom Country Comfort Tour, Manley Audio Labs, Lucent Technologies, 3BTV, Electroplex, Azden, Macromedia, Adaptec, Martin-Logan, Crawford Post, Mormon Church TV, Pioneer, Cobra Golf, Carvin, MTX, Silver Dollar City, the voices of McDonald's, Miller Brewing & Sports on Fox and more!

Auralex acoustics
www.auralex.com ★ auralex@auralex.com
(317) 842-2600 ★ Fax (317) 842-2760
(800) 95-WEDGE

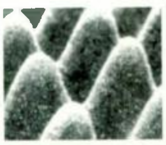
WhisperRoom INC.
SOUND ISOLATION ENCLOSURES
Vocal Booths
Practice Rooms
Broadcast Booths
etc...
PH: 423-585-5827
FAX: 423-585-5831
E-MAIL: whisper@lcs.net
WEB SITE: www.whisperroom.com
116 S. Sugar Hollow Road
Morristown, Tennessee 37813

IMPROVE YOUR ROOM SOUND!

3'x3'x8" Wood & Foam Absorber/Diffuser Boxes
• FREE-STANDING • PORTABLE
• LIGHTWEIGHT • STACKABLE
SOUND ACOUSTICS
(630) 832-3064
www.soundacoustics.com

SALE! PLUS FREE ADHESIVE!

GIANT 54" x 54" MARKERFOAM™ ACOUSTIC FOAM



Immediate Shipping
2" Reg. $29.95 Now $19.99
3" Reg. $39.95 Now $29.99

KILL NOISE QUICK! High performance, full-size sheets of super high density Markerfoam. EZ mount. Blue or gray. Super-effective sound absorption for studios. Markerfoam offers best value, looks professional & is proven in studios worldwide. Request Foam Buyers Guide/Catalog, specs & free samples today.

MARKERTEK JUMBO SOUND ABSORB BLANKETS

Heavy-duty 72" x 80" padded blankets absorb sound wherever they're hung or draped. Fabulous for stage, studio and field use. Top professional quality at a super saver price! Weight: 6 lbs. Black......$19.99

MARKERTEK BLADE TILES™

HIGH PERFORMANCE – LOW, LOW COST!!!
America's best acoustic tile value only from Markertek!
$3.49 per tile, 16"x16"x2", charcoal or blue $4.49 per tile, 16"x16"x3", charcoal or blue $5.49 per tile, 16"x16"x4", charcoal.

MARKERSTIK™ FOAM ADHESIVE
FREE with any foam purchase in this ad! Limited offer. A $4.00 per tube value.

SONEX
All the Colors, Styles and Sizes Plus Great Prices!

FREE! *America's most unique catalog featuring 328 pages of over 6,000 exclusive and hard-to-find supplies for Pro Audio, Broadcast Video, Audio Visual & Multimedia production.*

MARKERTEK® VIDEO SUPPLY
4 High St., Box 397, Saugerties, NY (USA) 12477
800-522-2025 • Fax: 914-246-1757
Web: www.markertek.com • E-Mail: sales@markertek.com

COMPUTER SYSTEMS

BONUS 5 CDR FREE — BONUS 5 CDR FREE — Panasonic 4x8 CD-R bundle... $395
TEAC 4x12 CD-R bundle...$455
BONUS 5 CDR FREE — Yamaha 4x2x6 CD-RW exter. bundle...$495
Pioneer DVD Recorder bundle........$16,499
AFFEX CD Color Printer bundle Prints 2 CD at a time........$1,399
LabelMaker with 100 FREE labels...$39

Replica K-30 30CD-R.............. $19,499
MediaFORM DUPLICATORS:
2701 Autoloader.. $4,999
5900 8CD-R.. $6,599
5300 3CDR...CALL
Easi-DAT/Easi-Audio option available

CD-R BLANKS as low as 99¢ also available TDK & Verbatim

Shimad
1-888-4-SHIMAD
toll free 888-474-4623 PH. 650-493-1234
http://www.shimad.com FAX: 650-493-1333

FOR CLASSIFIEDS RATES AND DEADLINES CALL (800) 544-5530

CLASSIFIEDS

EMPLOYMENT OFFERED

Sweetwater SOUND INC.

DO YOU WANT A GREAT CAREER?
POSITIONS AVAILABLE NOW!
Musical and Recording Equipment Sales, Desktop Publishing, Sales & Administrative Assistant, Tech Support & More! Contact Kristine!
(800) 222-4700 • (219) 432-8176 • FAX (219) 432-1758 • email: careers@sweetwater.com

BANDS! MUSICIANS! FIND BOOKING AGENCIES ACROSS THE COUNTRY!
Over 400 listings including names and addresses. List updated through 1998. Send $9 for diskette or printout to: Lifetime Publishing, 305 N. Rutledge, Pauline IA, 51046-0707. **(800) 446-4548.**

Every major brand of everything. Millions of dollars of musical gear in stock. **ALTO MUSIC**. Guitars, recording, keyboards, amplifiers, drums, pro sound, new & used. One of the largest selections in the country. We ship everywhere! **(914) 692-6922** • 680 Rt. 211 East Middletown, NY 10940
Ask for Uncle Freddy—He loves ya!

Great Career Opportunity
$50k-plus potential. If you live in the Northeast and enjoy an energetic, goal-oriented approach, come join one of America's oldest and most respected music stores. **Caruso Music** is seeking music-industry professionals for sales and store management positions. Health benefits, paid vacations, and a professional work environment. Send resume or letter to: Richard Caruso, **Caruso Music**, Inc., 94 State St., New London, CT 06320. Fax: (860) 442-0463. All replies treated confidentially.

EQUIPMENT FOR SALE

Sound Deals, Inc.
Specialists in ***Samplers, Synths, Pro Audio, Analog & Digital Recording, Effects, Drum Machines, Computer Software/Hardware & more!***
(800) 822-6434/(205) 823-4888
Sound Deals, Inc.
230 Old Towne Rd.
Birmingham, AL 35216

RACKCRAFT
The Desktop Studio Rack
6-sp. for MDM,efx-
2-sp. for pwr. amp-
12-sp. for rack mixer-
padded handrest
$299.95 + S&H
For more info Call
913-262-3949 email: Rackcraft@aol.com
6819 W. 73rd • Overland Park, KS 66204
"It's the perfect Mackie/Adat rack!"

PARTS EXPRESS ELECTRONICS & MORE
FREE CATALOG
ASK ABOUT OUR WHOLESALE PRICING PROGRAM!
- MICROPHONES
- MIC STANDS
- CABLES
- HEADPHONES
- RAW SPEAKERS
- POWERED MIXERS
- PA SYSTEMS
- CABINET & RACK ACCESSORIES
- STAGE LIGHTING
- MIXERS
- POWERED AMPS
- SHOCKMOUNT RACK CASES
- HORN DRIVERS

Visit our Web Site: www.parts-express.com
CALL TOLL FREE 1-800-338-0531
725 Pleasant Valley Dr., Springboro, OH 45066-1158
Phone: 513/743-3000 ◆ FAX: 513/743-1677
E-mail: sales@parts-express.com
Source Code: EMM

XENOVATOR www.xenoweb.com THINK XENO!
SUPPLYING EARTH WITH INNOVATIVE MUSIC PRODUCTS CALL US FOR YOUR NEAREST DEALER!
CANADA • Tel: (519) 421-2570 Fax: (519) 421-2960 P.O. Box 24028, Woodstock, ON N4S 8Y4
USA • Tel: (801) 553-7030 Fax: (801) 572-6880 13281 South 1300 East, Draper, Utah 84020
- **SHERMAN PRODUCTIONS** • *Sherman Filterbank Dual Analogue VCF with MIDI*
- **SPECTRAL AUDIO** • *Neptune Dual Osc Analogue & Syntrack Hybrid MIDI Synths*
- **LOGIQ ELECTRONICS** • *Micro Sync 24 Converter - No Power Supply Required!*
- **STUDIO ELECTRONICS** • *ATC-1/Selector & SE-1 Analogue MIDI Synthesizers*

APOGEE QUALITY... ASTONISHING VALUE!

THERE'S NEVER BEEN A BETTER TIME TO INVEST IN APOGEE DIGITAL QUALITY!
Limited supply of ex-demo stereo 20-bit converters available at rock-bottom prices!
- **AD-1000 A/D** ..... *$ 2495*
- **DA-1000E-20 D/A** ..... *$ 1995*
- **PS-1000E PSU** (runs 2 units) .. *$ 295*
- **TT1200** (powers D/A only) .... *$ 90*

Contact us for full details.

APOGEE ELECTRONICS
tel: +1 310/915-1000 fax: +1 310/391-6262
info@apogeedigital.com
http://www.apogeedigital.com/

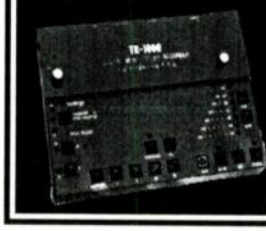
Don't Get Beat
When you need equipment call
8TH STREET MUSIC
(800) 878-8882
Philadelphia's Largest Musical Instrument Dealer!!!
8th Street Music, 1023 Arch St. Philadelphia, PA 19107

MIDI-KIT CATALOG: 30 kits, including Programmable Controllers, Relay Driver, Custom Instrument, CV-MIDI, Programmable Transmitter, Data Monitor, MIDI project book, and newsletter for Artistic Technologists. PAVO, Inc. **(800) 546-5461**; www.pavo.com

NEW, USED, DEMO EQUIPMENT
BEST SELECTION OF DIGITAL/ANALOG RECORDERS, CONSOLES, DAWS, OUTBOARD GEAR
Otari C1 4032, Yamaha 02R, API 1200 rack system, Dynaudio Monitors, Alesis ADAT, TASCAM DA-88, Sony PCM-800, Otari Radar 24TK, Pro Tools III, All Digidesign Plug-Ins, Mackie 8•Bus, Apogee AD-1000, Lexicon PCM-80/90, TC Electronic M5000, CD Recorders, API, GML, ADL, Summit, Focusrite, Demeter, Lucas, TL Audio, Neumann, AKG, Microtech, Røde, B&K, Genelec, Dynaudio.
Studio and System Design, Financing, Factory Service/Installation, Experienced and Knowledgeable Sales Staff.
EAR PROFESSIONAL AUDIO
(602) 267-0600
http://www.ear.net


CL6/1800 Midi Lighting Dimmer
- 6 Independent Channels of Dimming
- Responds to Midi Notes and Controllers
- Only $449.00 US List Price !

Ask about our other Midi products of control Valves, Relays, Servo's, Lighting, Analog Keyboards & more!!
MEDIA Motion *Show Control & Multi Media Systems*
2461 West 205th St. B100 Torrance, CA 90501
Phone: (310) 320-0696 Fax: (310) 320-0699
Visa, MC, Discover & AmEx. "Dealer Inquires Welcome"

TR-1000: DIGITAL MUSIC STUDY RECORDER
Record 3 minutes 10 seconds from CD or tape player. Play back at one of 28 playback speeds without changing the pitch or octave. Make loops. Transpose +/- 12 semitones, adjust pitch +/- 100 cents.
Exceptionally clear!

★ Price: Only $219.95 ★
1-800-FRET-PRO or 512-847-8605
E-mail: em501@fretpro.com
Web site: www.fretpro.com
VISA, MASTER, AMEX, DISCOVER
RIDGE RUNNER, DEPT. EM-501
84 YORK CREEK DRIVE
DRIFTWOOD, TEXAS 78619

CLASSIFIEDS

One Listen...
You'll Never Go Back

For unlocking the passion in your performance, J.J.Electronic tubes are the way to go. These European tubes are responsive to every touch, with voluptuous harmonic detail, velvety highs, seductive midrange and sensational bottom. They're reliable and dependable night after night, *specially tested and warranted through VAC for one year.*

12AX7	$ 7.75 each
EL34 MP	$ 28.00 pair
E34L MP	$ 30.00 pair
EL84 MP	$ 18.50 pair
KT88 MP	$ 90.00 pair
6L6GC MP	$ 40.00 pair

Other types also available

VAC

Call VAC 919-596-1107
http://www.vac-amps.com
Dealer inquiries welcome

Cakewalk * Sek'd * Opcode * Roland * Yamaha * Steinberg * Emagic
Digital Pro Audio
Shop The Most Comprehensive Secure Site On the Web
http://www.digitalproaudio.com
1-800-240-4079 sales@digitalproaudio.com
Tascam * Sony * AKG * Neumann * Manley * dbx * Fostex * Lexicon

Sound thinking
Digital Audio: It's What We Do!
digidesign ALESIS
...and more
541-386-2682
New! website
www.soundthinking.com

Bayview Pro Audio
Tumwater, WA, USA
Toll -Free (888) 718-0300
Int'l: (360) 753-3862

Software	
SoundForge 4.5	$299
Sound Forge CD Architect	$249
Steinberg WaveLab 2.0	$319
Waves Native Power Pack	$295
Sek'd 24/96	CALL
Sound Cards	
Digidesign ToolBox	CALL
Zefiro Acoustics ZA2	$419
Sonorus STUDI/O w/cables	$639
AdBMulti WAV24 Digital & Analog	$389
Event GINA	$425
Event Layla	CALL
Monitors, Mics & Processors	
Røde NT2 Omni & Cardioid	$525
Røde Classic 'Tube'	CALL
Røde NT1 cardioid	$289
TC Electronic Finalizer Plus	CALL
Event 20/20 bas Pwr. Biamped	$799
AKG C 3000	$279
AKG SolidTube	CALL

www.olywa.net/duper
We Accept Major Credit Cards

OMNIRAX
STUDIO FURNITURE
MixStation /OER

Custom Design and Modifications Available
800.332.3393
FAX 415.332.2807
Outside U.S. 415.332.3382
WWW.OMNIRAX.COM
Available for All Mackie 8-Bus mixers, & Eurodesk
P.O.Box 1792 Sausalito, CA 94966

EQUIPMENT WANTED

(800) 264-6614
We want your used keyboard, recording, and audio equipment. We'll **airmail** you **$$$** or take your stuff in trade toward over **350 brands** of new and used products. **Come in or do it all through the mail.** 69 years in business. **Worldwide delivery.** Visit our new **22,500 sq. ft.** location. Call, fax, or e-mail us today. **carusomusi@ aol.com OR sales@caruso.net.** Visit us at www.caruso.net. Start saving money today. Call **Caruso Music,** 94 State St., New London, CT 06320 U.S.A. Outside of the U.S. call **(860) 442-9600.**

SPECIALIZED FURNISHINGS
FOR YOUR **MACKIE 8•BUS**

IN STOCK, READY TO SHIP
Call for a FREE catalog 800-427-5698
OUTSIDE U.S. 573-346-8549, FAX 573-348-2789
ACI - 5687 Precision Ct. - Osage Beach, MO 65065
www.argosyconsole.com info@argosyconsole.com
ARGOSY

Analog Modular Systems, Inc.
We buy, sell, and trade all analog synths—especially **Moog, ARP, Buchla, Serge, Roland, Mellotron,** etc. Best price paid!!! Tel. USA: (323) 850-5216; fax USA: (323) 850-1059. Visit our virtual store, http://www.analogsynths.com

SINGERS! REMOVE VOCALS
Unlimited Backgrounds™
From Standard Tapes, Records, & CDs with the **Thompson Vocal Eliminator™**
Visit our Internet Site at http://www.ltsound.com
LT Sound, Dept EM/1
7988 LT Parkway
Lithonia, GA 30058
24 Hour Demo/Info Line (770)482-2485 - Ext 16
Best Vocal Eliminator™, Key Changer, Voice Enhancer!

THE CASE SPECIALISTS
FREE CATALOGUE

(800) 346-4638
(516) 563-8326, NY
(516) 563-1390, Fax
Custom or stock sizes.
Our prices can't be beat!
Discount Distributors

Make your ad more visible with color
(800) 544-5530

Looking for Music & Recording Equipment?
CALL SWEETWATER — YOUR MUSIC TECHNOLOGY AUTHORITY!

Want the Best Selection?
Massive stock of recording, MIDI, Sound Reinforcement Guitars, Basses, Amps and Accessories.

Want the Greatest Convenience?
Shop by phone—no running around! We deliver to your door! Top-notch assistance—no high pressure!

Want the Best Value — Guaranteed?
The right gear at a fair price! Outstanding tech support & service. Genuine respect. A great experience!

Music Technology Direct — and the Best Value, Guaranteed!

Sweetwater SOUND INC.
(800) 222-4700
(219) 432-8176
Fax: (219) 432-1758
www.sweetwater.com • sales@sweetwater.com

Studio Cat Software
Toll Free (888) 873-8855

Samplitude Studio 4.5	$379
Red Roaster 5.0 24-Bit	$279
Samplitude 2496 (upgrade)	$500
PRODIF 24, 32, 96, and Gold	Call
Arc88 (8 analog I/O, S/PDIF)	$569
DMan 2044 (4 analog I/O)	Call
Sonorus STUDI/O (dual lightpipe I/O)	$650
Aark/20 (8 analog I/O, S/PDIF)	$632

http://www.studiocat.com

How BIG is Yours?
HARD DRIVES
CD RECORDERS
MEMORY CHIPS
SOUND CARDS
MIDI SOFTWARE
Digital Audio Specialists!
BIG DISC
(954) 749-0555
http://www.bigdisc.com

USED ADATS WANTED
Easy exchange toward a newer or different format. Everything available. Save **THOUSANDS** when you deal with our 69-year-old company. **UPGRADE TODAY.** Call, fax, or e-mail for details. Worldwide delivery. **CARUSO MUSIC,** New London, CT; sales@caruso.net
(800) 264-6614
outside of the U.S. (860) 442-9600;
http://www.caruso.net

we've got your n'hummer.™
it's simple. it's inexpensive. it removes hum from audio lines without transformers, noise gates or comb filters. guaranteed. numb the hum today! $249.95 for a 2-channel unit.
more info: www.stro-lion-technologies.com 800.567.0881

COMPACT DISC
ALL SERVICES AVAILABLE
• Highest Quality • Low Prices
• Superior Service • Est. 1986
• Member Better Business Bureau
1-800-900-7995
1-802-453-3334
Fax 1-802-453-3343
CD AUDIO • CD ROM
AUDIO & VIDEO CASSETTE
PRINTING / PACKAGING
MASTERING • GRAPHIC DESIGN
PROTOSOUND INC.
MASTERCARD • VISA • AMERICAN EXPRESS

GROOVE HOUSE RECORDS
1000 CD'S only $1180
Includes 3 color CD face, jewel box & shrink wrap. Major label quality. Fast!
1-888-GROOVE-8

• Full Packages or Bulk
• Pre-Mastering & Mastering
• Tapes, CD's or Audio Visual
• Knowledgeable, Friendly Staff
• Engineering
KLARITY MULTIMEDIA, INC.
Call for a catalog & prices:
1-888-387-TAPE
www.klarity.com

Lonely Records
1CD for $13
10 CDs for $85
100 CDs for $300
1 800 409-8513
http://members.aol.com/lonelyrec/homepage.html

Complete CD packages!
WAVE

	CD's	Cassettes
300	$975	$396
500	$1075	$506
1,000	$1637	$752

1-800-928-3310
World Audio Video Enterprises
Retail ready including full color inserts. Bar codes. CD-Rom. CD-R. Mastering. Design and Film services available.

CLASSIFIEDS

INSTRUCTION

MAINTENANCE SERVICES

RECORDING SERVICES & REPAIRS

CLASSIFIEDS

RECORDS, TAPES & CDS

CLASSIFIEDS

One Listen...
You'll Never Go Back

For unlocking the passion in your performance, J.J.Electronic tubes are the way to go. These European tubes are responsive to every touch, with voluptuous harmonic detail, velvety highs, seductive midrange and sensational bottom. They're reliable and dependable night after night, *specially tested and warranted through VAC for one year.*

12AX7	$ 7.75 each
EL34 MP	$ 28.00 pair
E34L MP	$ 30.00 pair
EL84 MP	$ 18.50 pair
KT88 MP	$ 90.00 pair
6L6GC MP	$ 40.00 pair

Other types also available

VAC

Call VAC 919-596-1107
http://www.vac-amps.com
Dealer inquiries welcome

Cakewalk * Sek'd * Opcode * Roland * Yamaha * Steinberg * Emagic
Digital Pro Audio
Shop The Most Comprehensive Secure Site On the Web
http://www.digitalproaudio.com
1-800-240-4079 sales@digitalproaudio.com
Tascam * Sony * AKG * Neumann * Manley * dbx * Fostex * Lexicon

---

Bayview Pro Audio
Tumwater, WA, USA
Toll -Free (888) 718-0300
Int'l: (360) 753-3862

Software	
SoundForge 4.5	$299
Sound Forge CD Architect	$249
Steinberg WaveLab 2.0	$319
Waves Native Power Pack	$295
Sek'd 24/96	CALL
Sound Cards	
Digidesign ToolBox	CALL
Zefiro Acoustics ZA2	$419
Sonorus STUDI/O w/cables	$639
AdBMulti WAV24 Digital & Analog	$389
Event GINA	$425
Event Layla	CALL
Monitors, Mics & Processors	
Røde NT2 Omni & Cardioid	$525
Røde Classic "Tube"	CALL
Røde NT1 cardioid	$289
TC Electronic Finalizer Plus	CALL
Event 20/20 bas Pwr. Biamped	$799
AKG C 3000	$279
AKG SolidTube	CALL

www.olywa.net/duper
We Accept Major Credit Cards

OMNIRAX
STUDIO FURNITURE
MixStation /O2R

Custom Design and Modifications Available
800.332.3393
FAX 415.332.2807
Outside U.S. 415.332.3382
WWW.OMNIRAX.COM P.O.Box 1792 Sausalito, CA 94966
Available for All Mackie 8-Bus mixers, & Eurodesk

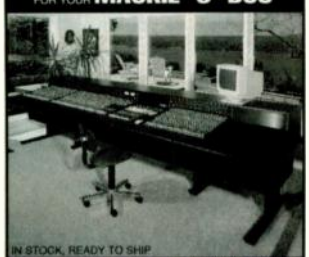
Sound thinking

Digital Audio: It's What We Do!
digidesign ALESIS
...and more
New! website
541-386-2682
www.soundthinking.com

EQUIPMENT WANTED

(800) 264-6614
We want your used keyboard, recording, and audio equipment. We'll **airmail** you **$$$** or take your stuff in trade toward over **350 brands** of new and used products. **Come in or do it all through the mail.** 69 years in business. **Worldwide delivery.** Visit our new **22,500 sq. ft.** location. Call, fax, or e-mail us today. **carusomusi@ aol.com OR sales@caruso.net.** Visit us at www.caruso.net. Start saving money today. Call **Caruso Music**, 94 State St., New London, CT 06320 U.S.A. Outside of the U.S. call **(860) 442-9600.**

SPECIALIZED FURNISHINGS
FOR YOUR **MACKIE® 8•BUS**

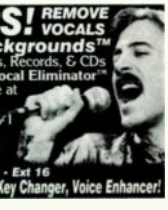


IN STOCK, READY TO SHIP
Call for a FREE catalog 800-427-5698
OUTSIDE U.S. 573-346-8549, FAX 573-348-2769
ACI - 5687 Precision Ct. - Osage Beach, MO 65065
www.argosyconsole.com info@argosyconsole.com ARGOSY

Analog Modular Systems, Inc.
We buy, sell, and trade all analog synths—especially **Moog, ARP, Buchla, Serge, Roland, Mellotron,** etc. Best price paid!!! Tel. USA: (323) 850-5216; fax USA: (323) 850-1059. Visit our virtual store, http://www.analogsynths.com

---

SINGERS! REMOVE VOCALS
Unlimited Backgrounds™
From Standard Tapes, Records, & CDs with the **Thompson Vocal Eliminator™**
Visit our Internet Site at http://www.ltsound.com
LT Sound, Dept EM-I
7988 LT Parkway
Lithonia, GA 30058
24 Hour Demo/Info Line (770)482-2485 - Ext 16
Best Vocal Eliminator™, Key Changer, Voice Enhancer!



THE CASE SPECIALISTS
FREE CATALOGUE

(800) 346-4638
(516) 563-8326, NY
(516) 563-1390, Fax
Custom or stock sizes.
Our prices can't be beat!
Discount Distributors

Make your ad more visible with Color
(800) 544-5530

Looking for Music & Recording Equipment?
CALL SWEETWATER — YOUR MUSIC TECHNOLOGY AUTHORITY!

Want the Best Selection?
Massive stock of recording, MIDI, Sound Reinforcement Guitars, Basses, Amps and Accessories.

Want the Greatest Convenience?
Shop by phone—no running around! We deliver to your door! Top-notch assistance—no high pressure!

Want the Best Value — Guaranteed?
The right gear at a fair price! Outstanding tech support & service. Genuine respect. A great experience!

Music Technology Direct — and the Best Value, Guaranteed!

Sweetwater SOUND INC.
(800) 222-4700
(219) 432-8176
Fax: (219) 432-1758
www.sweetwater.com • sales@sweetwater.com

Studio Cat Software
Toll Free (888) 873-8855

Samplitude Studio 4.5	$379
Red Roaster 5.0 24-Bit	$279
Samplitude 2496 (upgrade)	$500
PRODIF 24, 32, 96, and Gold	Call
Arc88 (8 analog I/O, S/PDIF)	$569
DMan 2044 (4 analog I/O)	Call
Sonorus STUDI/O (dual lightpipe I/O)	$650
Aark/20 (8 analog I/O, S/PDIF)	$632

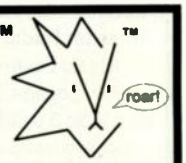
http://www.studiocat.com

How BIG is Yours?
HARD DRIVES
CD RECORDERS
MEMORY CHIPS
SOUND CARDS
MIDI SOFTWARE
Digital Audio Specialists!
BIG DISC
(954) 749-0555
http://www.bigdisc.com

USED ADATS WANTED
Easy exchange toward a newer or different format. Everything available. Save **THOUSANDS** when you deal with our 69-year-old company. **UPGRADE TODAY.** Call, fax, or e-mail for details. Worldwide delivery. **CARUSO MUSIC**, New London, CT;
sales@caruso.net
(800) 264-6614
outside of the U.S. (860) 442-9600;
http://www.caruso.net

---

we've got your n'hummer.™
it's simple. it's inexpensive. it removes hum from audio lines without transformers, noise gates or comb filters. guaranteed. numb the hum today! $249.95 for a 2-channel unit.



more info: www.stro-lion-technologies.com 800.567.0881

CLASSIFIEDS

INSTRUCTION

MAINTENANCE SERVICES

PARTS & ACCESSORIES

INTERNET SERVICES

RECORDING SERVICES & REPAIRS

CLASSIFIEDS

MANUFACTURERS OF CDs and CASSETTES

CD REPLICATION -
CASSETTE DUPLICATION -
DIGITAL MASTERING -
GRAPHIC DESIGN -
PRINTING - PACKAGES -
ONE OFF CDS

Ask about our FREE WEB PAGE offer

HTTP://WWW.PB.NET/~CCMUSIC

800-289-9155
OUTSIDE U.S. 516-244-0800

C&C MUSIC

Best Price... Best Service... Period.

CD REPLICATION

- CDs in Retail-Ready Packages
- CDs in Bulk (minimum order only 100 CDs!)
- Vinyl Records, 7 & 12" - colors available!
- Cassette Duplication

Work directly with our factory and save! Call for Free Catalog or Quote: **(800) 455-8555**

http://www.europadisk.com

Major Credit Cards Accepted

EUROPADISK,LTD.

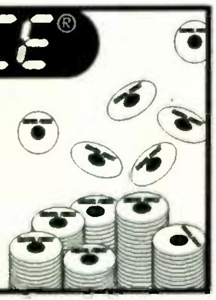
DIGITAL FORCE®

149 MADISON AVENUE NY, NY 10016

212-252-9300
www.digitalforce.com

Expanded State of the Art Mastering Facility

TOTAL CD, CD-ROM, DVD & CASSETTE PRODUCTION



COMPACT DISC

ALL SERVICES AVAILABLE

- Highest Quality • Low Prices
- Superior Service • Est. 1986
- Member Better Business Bureau

1-800-900-7995
1-802-453-3334
fax 1-802-453-3343

CD AUDIO • CD ROM
AUDIO & VIDEO CASSETTE
PRINTING / PACKAGING
MASTERING • GRAPHIC DESIGN

PROTOSOUND INC

MASTERCARD • VISA • AMERICAN EXPRESS

GROOVE HOUSE RECORDS

1000 CD'S only $1180

Includes 3 color CD face, jewel box & shrink wrap. Major label quality. Fast!

1-888-GROOVE-8

Lonely Records

1CD for $13
10 CDs for $85
100 CDs for $300

1 800 409 8513
http://members.aol.com/lonelyrec/homepage.html

RECORDS, TAPES & CDS

Castle Technology, Inc.
Cassette Duplication
C-10...$.74 C-20...$.84 C-30...$.94
Printing—Packaging—Labeling
Single CDs Starting at $6.95
(800) 636-4432 or Fax (615) 399-8855
http://members.aol.com/Castletch/castle

---

10 CDs • $65
20 CDs • $120
50 CDs • $250
1000 CDs • $1280

Random Access Media
1-800-684-8071

---

100 CD's $349

Eastco Pro A/V Corp.
Free Color Catalog
13 Years Serving The World
(800) 365-8273

1000 CD's $699

1-800-TAPE WORLD or 1-800-245-6000
We'll beat any price! 6.95 SHIPPING • FREE CAT.

SONY		MAXELL		TDK		FUJI	
DAT-120	5.69	XL II-90	1.39	CDR-74 NL	1.49	SVHS-T120	5.99
DAT-124PRO	8.99	XL IIS-90	1.99	CDRXG-74	5.99	HI8 120	5.99
T-120V	1.69	ST-120	6.99	SA-90	1.49	DR-I-90	.69
L-750BT	3.49	DAT-124PRO	6.99	SAX-100	2.09	JVC ST120	5.49
MDW-74	4.99	T120HGX	2.39	T120 EHS	2.49	JVC T-120	1.59
UR120	1.29	UR-90	.79	UD35-90	8.99	CDR-74	1.79

TAPE WORLD

KLARITY QUALITY ... KLEARLY DIFFERENT ... KLEARLY BETTER

- Experience, Since 1987
- Personal Service
- Full Packages or Bulk
- Pre-Mastering & Mastering
- Tapes, CD's or Audio Visual
- Complete Graphics Arts Service
- Knowledgeable, Friendly Staff
- Engineering

KLARITY MULTIMEDIA, INC.

Call for a catalog & prices:
1-888-387-TAPE
www.klarity.com

---

www.yourmusiconcd.com
10 cds - $70
50 cds - $200
770-931-0375
SNS
Includes CD, Label & Jewel Case

1000 CDs: $1150
4 panel 4/1 insert, 4/0 tray card, 2 color CD, bar code, jewel case, assembly and wrap.
From your film and CD-R. Add $245 for film
1000 Bulk CDs: $690

500 CDs: $935
4 panel 4/1 insert, 4/0 tray card, 2 color CD, bar code, jewel case, assembly and wrap.
Includes film! From your CD-R and art on disk
500 Bulk CDs: $500

CD-Rs:
100: $300; 50: $200; 30: $150
With b/w label, insert, tray card and jewel case.
Full color packaging also available. Call for prices
single CD-R from DAT: $15

100 Cassettes: $184
C-45 with b/w j-card, labels and norelco cases.
Real-time duplication on BASF Chrome Plus tapes
Full color packaging also available. Call for prices
50 tapes as low as: $39

Call us at (888) MONKEY 5
THE MONKEYHOUSE
www.themonkeyhouse.com

WE'LL BEAT ANY PRICE ON CD'S

- CD
- CASSETTES
- HIGHEST QUALITY
- QUICK TURNAROUND
- PERSONALIZED SERVICE
- TOTAL COMPLETE PACKAGES
- LOWEST PRICES, CALL US LAST!

(813) 446 8273

Total Tape Services
639 Cleveland St / Clearwater, FL 34615

Complete CD packages!

	CD's	Cassettes
300	$975	$396
500	$1075	$506
1,000	$1637	$752

Retail ready including full color inserts
Bar codes, CD Rom
CD R Mastering
Design and Film services available

WAVE
1-800-928-3310
World Audio Video Enterprises

CLASSIFIEDS

RECORDS, TAPES & CDS

CLASSIFIEDS

Serving You THE WAREHOUSE Since 1975
Studio Sales & Service$
Cassette, CD, CDR duplication
R-DAT · DATs · ADATs · HI8 · VHS · CDs
Blank Cassettes, any length
Warehouse prices
800-483-TAPE · fax: 904-398-9683
Visa · MasterCard · Discover
internet:warehouse@jaxnet.com
2071-20em Emerson St., Jacksonville, FL 32207 · 904-399-0424

Good Vibrations - RJR Digital
RJR DIGITAL MASTERING 1-800-828-6537
OUR CD PRICES INCLUDE ABSOLUTELY EVERYTHING
1000 CDs - $2175 (or less!) retail ready.
3 day promo CDs in quantities of 1 to 100.
Call for details, free samples, special quotes.
http://www.diabloweb.com/goodvibrations

100 CDs
for only
$410!
manufactured in as little as TWO DAYS
Includes
- FREE design
- FREE b/w insert & tray
- On-disc printing
- Jewel case

Other packages available.
Call for details and information packet.
(800) 249-1110 • (302) 999-1110
National Multimedia Services
Compact Discs • Real Time Cassettes
Digital Mastering

MEZZOMAN PRODUCTIONS
1000 REPLICATED CDs
We'll Print your full Color Booklets &Traycards and Assemble into Jewel Boxes w/ Shrinkwrap.
$1180.
your films and master supplied
ANNOUNCING OUR NEW FREE GRAPHICS PACKAGE
CALL FOR DETAILS!
1-888-231-9927
mezzoman productions inc. 100 grove street worcester, ma 01605

HEALEYdisc Manufacturing
Premier Quality CD/CD-ROM, VHS and Cassette manufacturing
CD PACKAGE INCLUDES:
Color 4 page /2 panel insert, 2 color on CD printing
pre-master, glass master, jewel box and shrink wrap.
BARCODE INCLUDED.
500 CD's $1099
1000 CD's $1599
Professional mastering at affordable rates.
Special STUDIO and INDIE label rates.
Call now 1-800-835-1362
for your free catalogue ► www.healeydisc.com
taag DESIGN
design for the music industry
Make your CD Interactive!
CD Enhanced/ Interactive Press Kit
$500.00
1-800-410-4855

CD-ROM
CD-Audio
CD-I
Mixed Mode CD-ROM
Audio & Video Cassettes
Graphic Design
Printing
Interactive Media
Slides
Floppy Disk
Bulk CD's as low as
60¢
Toll Free 1-888-CD SONIC (237-6642)
CD Sonic
Tel: (617) 424-0670
Fax: (617) 424-0657

FAST CD-R DUPES!
Lowest prices & Highest-quality work.
Sonic Solutions Digital Mastering
Major credit cards accepted.
Call or e-mail us for a free catalog.
DBS DIGITAL, HOBOKEN, NJ
(888) 222-2090
e-mail dbsdigital@aol.com

MASTERING • MANUFACTURING • PRINTING
DIGI-ROM
CD-AUDIO • CD-ROM
REAL TIME & HIGH SPEED AUDIO CASSETTES
COMPLETE PACKAGES • CD-ROM STRIKE-OFFS • GRAPHIC DESIGN STUDIO
CD-ROM PRODUCTION & ARCHIVING • 1 TO 200 DISCS DUPLICATED OVERNIGHT
(800) 815 3444
(212) 730-2111
www.digirom.com
130 West 42nd Street • New York, NY 10036

Full-length "one off" CDs. $11 each including postage. Send DAT @ 44.1 kHz or cassette with payment to ERS, P.O. Box 1824, Huntsville, AL 35807. Web site:http://members.aol.com/erscd/erscd1.htm E-mail: erscd@aol.com

CD and Cassette Manufacturing
State-of-the-art Audio Mastering
Complete Graphic Design Services
Enhanced CD Creation
americanmedia MANUFACTURING
To discuss your project, call today toll free:
1 888 442 8994

Fleetwood MultiMedia
1000 CDs from $799
500 Chrome Tapes $715
Includes Everything
7-10 Day Turnaround
800-353-1830 (617) 289-6800

RECORDING LAIR MASTERING
STUDIO DESIGNED BY RUSS BARBER GROUP
FREE INFORMATION GUIDE ON MASTERING
(888) 881-LAIR

DON'T WAIT!
PERFECT PROMO PACKAGES NOW!!!
50 CD SINGLES $179
150 CD SINGLES $419
INCLUDES GRAPHICS ON DISC AND VINYL SLEEVE
FAST TURNOVER! CALL
B.R.R. 1-888-554-9334

Subscription Questions?
(800) 845-4086

"OUR 30TH YEAR OF FAST GUARANTEED SERVICE"
FREE CATALOG
CD-RS, HI-B, MINI DISKS, S-VHS MASTERING TAPE
A-DAT, R-DAT, BULK VHS
PLASTIC REELS, BOXES
NORELCO, SOFT POLY BOXES
VIDEO BOXES & SLEEVES
SINGLE & DOUBLE CD BOX
DCC, MOD, DDS2 AND MORE
ANDOL AUDIO PRODUCTS INC.
4212 14TH AVENUE • BROOKLYN, NY 11219
CUSTOM LENGTHS FROM 1-126 MINUTES

LENGTH - TYPE	C-10	C-20	C-30	C-40	C-50	C-60	C-70	C-80	C-90
BASF CHROME PLUS	.27	.32	.37	.41	.46	.51	.57	.63	.68
TDK SA	.25	.30	.35	.39	.44	.49	.53	.58	.63
MAXELL XLII	.27	.32	.38	.44	.47	.52	.67	.70	.76
BASF CHROME SUPER	.30	.38	.47	.56	.65	.69	.80	.87	.89

100 PIECE MINIMUM
TELEX TDK BASF AMPEX maxell
IN HOUSE DIRECT ON CASSETTE PRINTING
• CUSTOM PRINTED LABELS & J-CARDS •
IN NYC 718-435-7322 • 800-221-6578 • 24 HOUR FAX 718-853-2589
www.andolaudio.com
andolaudio@aol.com
FREE LABELS WITH EVERY CASSETTE ORDER
ROUND EDGE OR STANDARD NORELCO BOXES $0.12 EACH

ESP
We Anticipate Your Every Need
CD REPLICATION
Cassette Duplication
Graphic Design & Printing
Digital Editing & Mastering
1-800-527-9225
(716) 691-7631 • Fax (716) 691-7732

SPINNER WORLD WIDE
Complete Full Color Package
500 CDs $999.00
We Do It All Package
500 CDs $1299.00
Call for our wholesale manufacturing guide
1-800-582-3472
www.spinnerworldwide.com

CLASSIFIEDS

RECORDS, TAPES & CDS

Universal Media
CD/DVD Manufacturing Services
25 CDs (Media, Print & Case) $175
1,000 Bulk CDs for $670
Ready in 7 Business Days
Tel.(408) 946-0948 or (408) 973-3514
http://www.syntac.com/um

CD, CASSETTE, CDR and CD-ROM
Complete Packages!
DDAI
DIGITAL DYNAMICS AUDIO INC.
1-800-444-DDAI
www.4ddai.com
- CD/CASS MASTERING
- CD/CASS REPLICATION
- CEDAR RESTORATION
- GRAPHIC DESIGN
- FILMS AND PRINTING
- CD-ROM AUTHORING

MUSICIANS
Put Your Music on CD
25 CDs (Full Color Pkg)
$8 each
No Charge for Mastering
and Color Set-Up
(800) 446-4548

MINIDISCS
best prices in the world!!
Minidisco
2124 Kittredge St. #56
Berkeley, CA 94704
sales@minidisco.com
www.minidisco.com
sales: 510-848-6703

STANDARD MIDIFILES
WHEN QUALITY COUNTS
ONLY **TRAN TRACKS** WILL DO
- World's leader in quality & service
- In business over 11 years
- Over 4000 popular songs
- Including Italian and Opera libraries
- Rhythm, Groove and Style Disks
- General MIDI compatible
- Email service

FREE demo & catalog
1-800-473-0797
www.trantracks.com
TRAN TRACKS
MIDI SEQUENCES
350 Fifth Ave. #3304
NYC NY 10118
voice 973-383-6691
fax 973-383-0797

It's not a dream...
25, 50, 100 retail-ready CDs
25 CD Package $249
50 CD Package $359
100 CD Package $549
4 Panel CD Folder 4/1, Tray Card 4/0, black print on CD, Jewel Case, insertion, and shrink wrap from your CD-R master and print-ready electronic files.
www.oldewest.com
info@oldewest.com
800-739-3000
olde west

ENSONIQ OWNERS: Convert Sequences to/from **Standard MIDI Files** on IBM/PCs. Each package TS-10/12, ASR-10, EPS/EPS-16, VFX-SD/SD-1, SQ-80, SQ-1/2, KS-32, or KT-76 costs $54.95. Convert SD-1 to TS-10 w/our SD1TS10 Conversion for $54.95. **Call for Alesis, Kawai, Korg, PianoDisc, Yamaha, Roland.** Visa/MC/Amex. **Giebler Enterprises**, 26 Crestview Drive, Phoenixville, PA 19460. **(610) 933-0332;** fax (610) 933-0395.

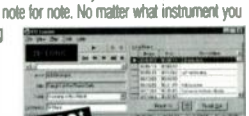
BAND-IN-A-BOX IMPROVEMENT PRODUCTS***You can put a Better-Band-In-Your-Box. Power-User Styles, Fake Disks & More! GenMIDI **SEQUENCE** & CD-ROMs, too! **FREE** info! Norton Music & Fun, Box 13149, Ft. Pierce, FL 34979. Voicemail/fax (561) 467-2420; http://members.aol.com/NortonMIDI/

SOFTWARE, SEQUENCES & SOUNDS

WORLD CLASS MIDI FILES
the WORKS Music Productions
For **Free Catalog & Demo Disk** call **(800) 531-5868** or visit our Web site: **www.worksmidi.com**
Popular styles, General MIDI compatible, e-mail delivery avail.
Box 22681, Milwaukie, OR 97269.

Our popular 2000-Series K2000/2500 CD-ROM is loaded with over 123 soundbanks specially prepared for the Kurzweil. Includes over 2,500 Programs! Only $200 (Foreign $210). VISA/MC. **PATCHMAN MUSIC,** 1600 Saint Charles Avenue, Lakewood, OH 44107. (216) 221-8282. E-mail:matteblack@aol.com Web site http://www.patchmanmusic.com

Learn to Play Your Favorite Songs!
CD Looper is the perfect music software for Windows that allows you to easily learn how to play any song directly from your computer's CD player. Because CD Looper can slow down any audio CD 2, 3 or 4 times without changing pitch, you can now learn your favorite songs note for note. No matter what instrument you play, CD Looper is the perfect tool for transcribing and learning your favorite music.
- Loops can be set anywhere within a track with 1/100th of a second resolution.
- Loops can be any length.
- Slowed loops can be sped up in 10 percent increments.
- Many other features.


$59.99*

CD Looper Pro Includes These NEW Plug-Ins!

NoteGrabber: Extends CD Looper's capabilities beyond CDs. Record and slow down music from any input source or existing wav files. Graphically loop any section of a wav file, down to a single note.
OverDubber: Record yourself playing over any loop in CD Looper. If your sound card supports full-duplex recording (most do), you can even record yourself playing over wav files with NoteGrabber. Record yourself playing over backing tracks. The perfect tool to help you analyze your playing.
PitchChanger: Change any loop's pitch up or down an octave in half-step increments.
CD Looper Pro is **$94.99*** or you can upgrade CD Looper for only **$39.99***.
CD Looper™
See Your Local Retailer
To order your copy of CD Looper call toll-free **888-3REPLAY** or in NY **516-385-1398.**
http://www.replayinc.com
*plus shipping and handling.

THE SAMPLE LIBRARY IS OPEN
Liquid Studios brings you Wide Open Synths Volume One. No short little bytes here. We give you the full sound, from attack thru decay. Patches given in 4 octaves for full sound. $29.90 for audio CD. Liquid Studios, 164 W. Eddleman Dr., Nineveh, IN 46164. (888) 711-6292 www.liquidwreckords.com

DANGEROUS SOUNDS!
The best patches and samples for **Ensoniq keyboards**, from the ASR and TS back to the Mirage. Free Catalog! Syntaur Productions, (800) 334-1288, (409) 234-2700. Web http://www.fatsnake.com/syntaur

CLASSIFIEDS

EM CLASSIFIEDS WORK FOR YOU

Text rate: $9.50 per line (approximately 25-32 character spaces per line); seven-line minimum. Add $0.50 per bold word. Each space and punctuation mark counts as a character. **$66.50 MINIMUM CHARGE for each ad placed.**

Enhancements: $10 black border, $25 for a color-screened background, $25 for a reverse. $25 for Post Office box service. Charges are based on a per-insertion basis.

Display rate: $117 per inch (1" minimum/half-page maximum). Frequency discount rates available; call for information.

Special Saver rate: $35 for up to four lines, including first word in bold. **Only available to individuals not engaged in commercial enterprises.** No additional copy allowable for this rate.

Closing: **First of the month**, two months preceding the cover date (for example, the April issue closing is February 1). Ads received after closing will be held for the next month unless otherwise stated. **Cancellations will not be accepted after the closing date**. Copy changes and cancellations must be submitted in writing.

Other requirements: Full street address (PO boxes aren't sufficient) and phone number must accompany all requests, whether included in ad or not. All words to be **bold** should be underlined. Copy must be typed or printed legibly in standard upper/lower case. Publishers are not responsible for errors due to poor copy. Arrangement of characters may be altered in typesetting process due to space. The publishers are not liable for the contents of advertisements.

The small print: Only ads dealing with music, computers, or electronics will be accepted. No stated or implied discounts allowed on new-equipment sales. Publishers reserve the right to refuse or discontinue any ad deemed inappropriate.

Art Instructions: Logos or display advertising must be sized to **EM** column widths and specs. For best printing results please provide exact size film (emulsion side down) preferably with a velox proof, or camera-ready linotronic paper output, or a stat. We accept laser prints or photocopies but do not assume responsibility for their reproduction quality. Line screen should be between 90 & 133 LPI.

Send coupon & payment to: **Electronic Musician Classifieds:** Attn: Robin Boyce-Truitt, 6400 Hollis St., #12, Emeryville, CA 94608, tel. **(800) 544-5530** or (510) 653-3307, fax (510) 653-8171, e-mail emclass@intertec.com

Payment: **Must be included with copy: check, Visa, MasterCard, or American Express accepted. Sorry, no billing or credit available.**

FINAL MIX

By Larry the O

Who's the Boss?

Early in my experience working with MIDI, I went through a period where I never got any music finished. It took quite a while before I realized what was going on: I was overwhelmed with options, paralyzed by possibilities. Typically, I would start working on a musical idea, then decide the sound of the instrument wasn't right and switch to programming a synthesizer. I would run out of time before the musical idea was fully developed.

Once I saw what was happening, I separated the two processes, settling for vaguely representational sounds while I composed, then going back and refining them after the composition was done. I started turning out complete works.

Since then, I've done a lot of thinking about this problem, reflecting on the way teachers often limit the number of elements a student can use at a given time, and noticing how some musicians play better when they're in someone else's band, rather than running their own. The fact is that constraint is very often a creative catalyst. Limitations of musical technique, technical resources, time, money, and so on, often serve to prod the muse to action as you work to overcome whatever obstacles you're facing and realize your inspiration.

My second realization was that when I was doing my own engineering, difficulty of use could stop me cold in my tracks or at least hold me at bay. Put simply, technical hassles stymie creative flow. My entire sound-engineering frame of reference turned at that point, and trumpets heralded the arrival of a new trinity in the studio: templates, presets, and scripts.

Templates get you right to jump street. On the Macintosh, virtually any document can easily be made into a template (stationery), including *Pro Tools* sessions, *Excel* spreadsheets, database designs, and so forth.

Set up a sequencing document with all the instruments you commonly use already laid out and initial Program Changes in place. Make that document a template, and save yourself a half hour of setup every time you start a tune. I have a *Pro Tools* template set up with eight tracks in place (including grouping) and five zoom levels stored. Just having those zoom levels preset is reason enough to create a template.

Presets are another way of quickly reaching a point of departure. A library of EQ plug-in settings that deal with various common problems will significantly reduce the amount of time you spend futzing around fixing things. Synthesizer presets, chorus settings for an effects processor, drum maps—all of these get you to an acceptable jumping-off point in short order.

Ah, but scripts! Once you get off the launch pad with your template or preset, scripts—and I include all variety of macros in this category—can be the wings that carry you on the winds of inspiration. Some scripts are simple 2- or 3-step macros that are created by performing a set of actions once while the application records your moves.

But it would be difficult for me to overstate the effect that CE Software's *QuicKeys* (the leading Mac macro program) has had on my productivity in *Pro Tools* sessions. For example, I have QuicKeys that select from the current insertion point to the beginning or end of the region it is in, then perform a linear or exponential fade-in or fade-out.

If you dare to get your hands a little dirtier, scripting languages such as AppleScript can perform an impressive integration of different applications and automation of file handling. After all, customizing a tool to your particular needs can easily be seen as a form of preset.

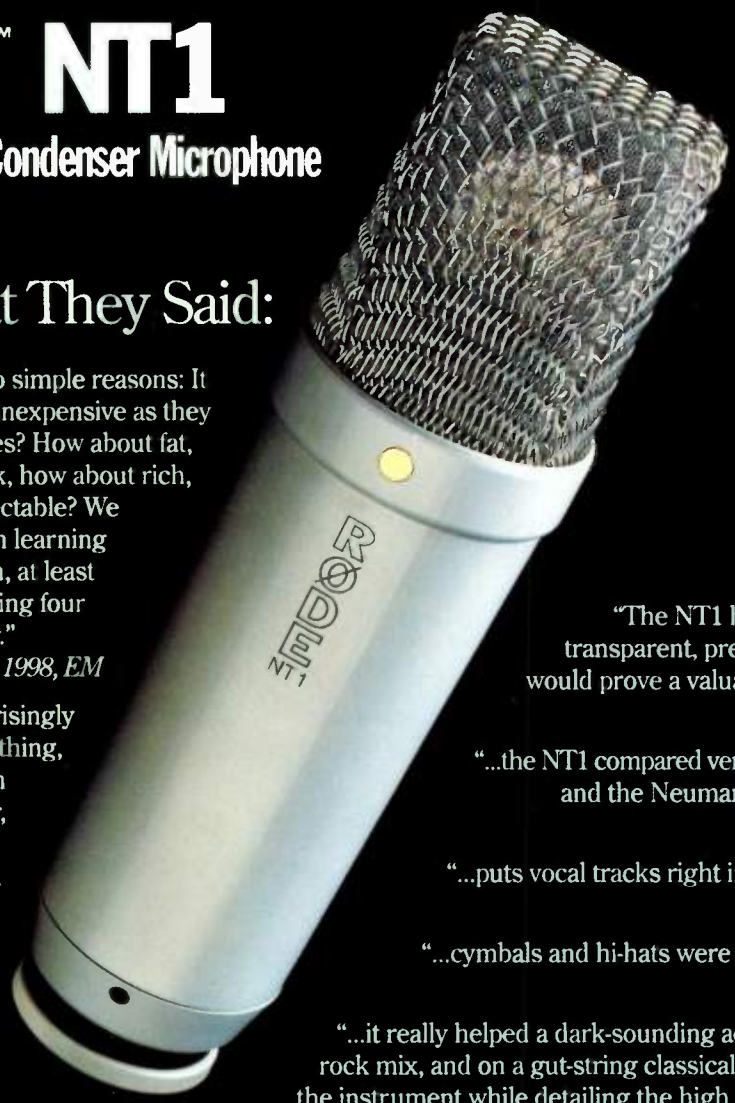
Tools exist to help you build things; they are a means to an end, not an end in themselves. Preconfiguring your studio universe is one of the most powerful ways of ensuring that you are the master of your domain.

ILLUSTRATION BY STEVE CURL

Electronic Musician's 1998 Choice for Best Microphone —*at any price.*

RØDE™ NT1

Large Diaphragm Condenser Microphone



Electronic Musician 1998 EDITORS CHOICE

TEC TECHNICAL EXCELLENCE & CREATIVITY 1998 NOMINEE

Here's What They Said:

"It gets our award for two simple reasons: It sounds great, and it's as inexpensive as they come. You need adjectives? How about fat, warm, and present? Heck, how about rich, sexy, and downright delectable? We won't hide our surprise in learning that the NT1 held its own, at least tonally, against mics costing four and five times the money."
—EM Editors, January 1998, EM

"The NT1 sounded surprisingly good on just about everything, but I especially liked it on vocals, on acoustic guitar, and as a drum overhead. This mic has a very open and detailed sound with lots of presence."
—Brian Knave, April 1998, EM

"The NT1 has a rich, stunning sound—very transparent, present, and brightly detailed—that would prove a valuable addition to any mic cabinet."
—Brian Knave, April 1998, EM

"...the NT1 compared very favorably to both the AKG C414 and the Neumann U 87—and that's saying a lot!"
—Brian Knave, April 1998, EM

"...puts vocal tracks right in your face with startling clarity."
—Brian Knave, April 1998, EM

"...cymbals and hi-hats were reproduced exceptionally well..."
—Brian Knave, April 1998, EM

"...it really helped a dark-sounding acoustic guitar cut through a busy rock mix, and on a gut-string classical guitar, it captured the warmth of the instrument while detailing the high end and minimizing boominess."
—Brian Knave, April 1998, EM

Don't Trust What You Read? Trust What You Hear.

Send for a free RØDE Microphone Audio Demo CD. Write to "Free CD," c/o Event at the address on this page, or visit our special Web address, http://www.event1.com/rodecd/

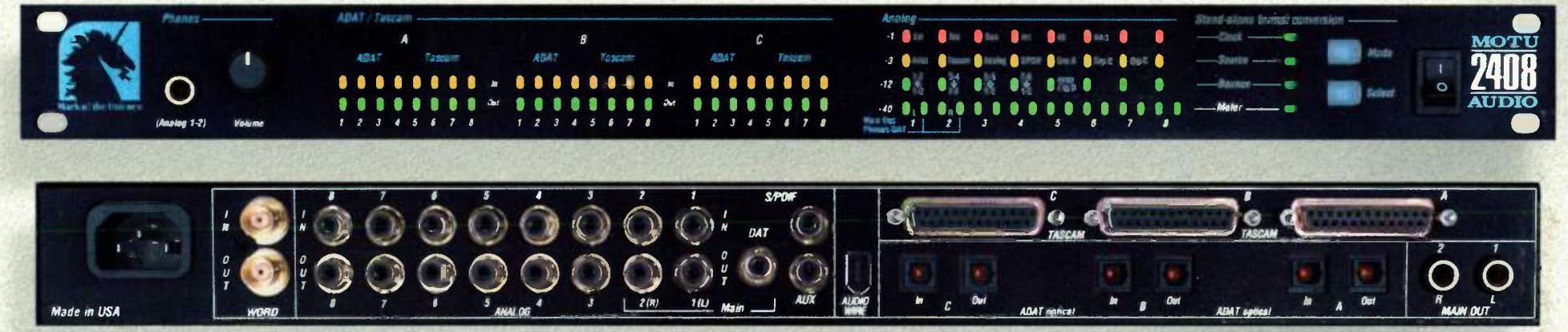
EVENT ELECTRONICS

P.O. Box 4189
Santa Barbara, CA 93140-4189
Voice: 805-566-7777
Fax: 805-566-7771
E-mail: info@event1.com
Web: www.event1.com

circle #619 on reader service card

NOW SHIPPING

Introducing the 2408.



The next breakthrough in hard disk recording.

The 2408 is a computer-based hard disk recording system that gives you 24 independent inputs and outputs • 8 analog inputs (with 20–bit 64x oversampling converters) • 8 analog outputs (with 20-bit 128x oversampling converters) • 24 channels of Alesis ADAT optical in and out • 24 channels of Tascam DA-88 in and out • 2 channels of S/PDIF in and out • 16-bit and 24-bit recording at 44.1 or 48 KHz • • digital dubbing between ADAT and DA-88 • digital dubbing between S/PDIF and ADAT or DA-88 • ADAT sync input • Word clock in and out • MOTU Control track input for sample-accurate Digital Timepiece synchronization • includes the cross-platform PCI-324 card to connect the 2408 to your Mac or Windows computer • the PCI-324 will let you add additional 2408's for up to 72 input/output connections and as many channels as your computer allows • includes full-featured sample-accurate workstation software for Macintosh with recording, editing, mixing, and real-time 32-bit effects processing • • Includes standard Windows audio (Wave) driver •

$995

Mark of the Unicorn, Inc. • 1280 Massachusetts Avenue • Cambridge MA 02138 • 617-576-2760 • 617-576-3609 fax • www.motu.com

circle #501 on reader service card