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August 1997

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When you page through this magazine, you're going to see a multitude of ads for compact mixers. Some of the mixers look a lot like our CR1604-VLZ™. Heck, even some of the ads for other 16-channel mixers look a lot like Mackie ads¹.



■ Pretty soon, you may start to wonder how much difference there really is between all the various mixer makes and models.

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■ Send for our thick, color tabloid brochure³ and we'll include a comprehensive list of distinguished CR1604-VLZ™ users. It includes familiar names like the Tonight Show, The Late Show and Saturday Night Live bands, The Presidents of the United States of America, Ronnie Montrose, Microsoft®,

¹ Dense, fine print type. Lots of lines and arrows pointing to features. Textured backgrounds.

² There ARE vast differences too numerous to mention without resorting to dense, fine print...with textured backgrounds.

A short Grant Reeves bio:
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CR1604-VLZs™ than through any other 16-channel mixer.

sound design wizard Frank Serafine, Jet Propulsion Labs and all four national TV networks³.

■ The list also includes a lot of folks you may not have heard of... a huge group of pros who make their living creating music for ads, documentaries, corporate videos and multimedia. Real live, bonafied electronic musicians like Grant Reeves, shown below with his CR1604-VLZ™, sequencer and air guitar.

■ Bottom line, part one: Everything you track and mix down goes through your mixer. It needs the low noise floor, maximum mix headroom,

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make the mixer a joy to work with.

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No way were we going to get this ad past Greg Mackie without at least SOME informative fine print. First, the CR1604-VLZ basics: 16 x 4 x 2 configuration

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Below: a few of the 400+ folks and one incontinent Chihuahua (not shown) who work at Mackie Designs in Woodville, WA, 20 miles northeast of Seattle.

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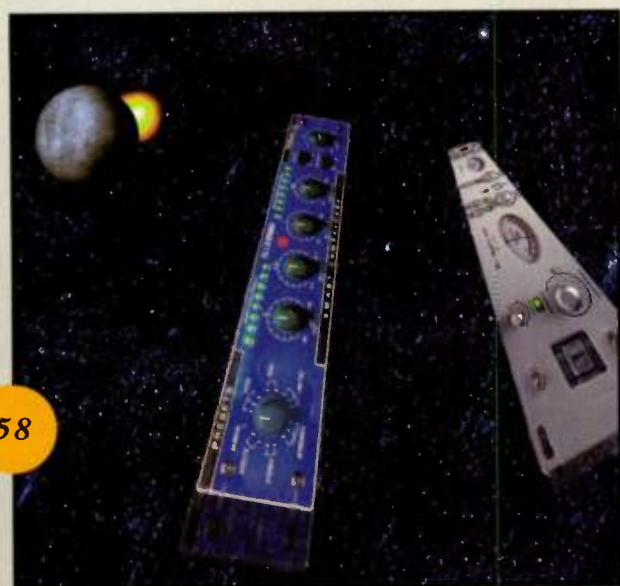
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and Westlight (picture frame).

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Happy Endings

Home film scoring is no pipe dream.

There are tons of things I'd like to accomplish before my mind and body decide that sitting in bed watching reruns of "Wheel of Fortune" is a good day's work. One of my more selfish goals was to compose a score for a film—and, happily, once I deliver the final music mixes for the documentary *Indian Land Forever*, I'll be able to cross that assignment off my list. The film unveils the complex history of the Indian occupation of Alcatraz (1969–71) and was directed by a dear friend, Jon Plutte.

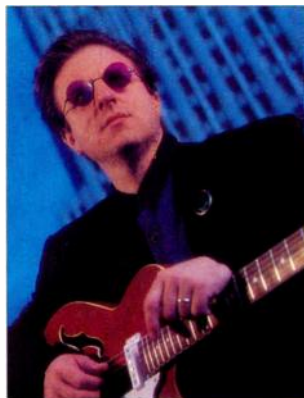
The hysterical thing about this great stroke of luck is that I was ill-prepared for the windfall. Although I co-own a professional studio, my audio-production niche is working with bands, so I typically don't run MIDI sequencers, digital audio sequencers, or time code. Obviously, the prospect of scoring to picture was somewhat daunting. But that old Cheap Trick lyric, "Everything works if you let it," rings truer with every passing year.

Jon decided that he wanted to cut the film without dealing with time code (hooray!), so he asked me only for musical snippets that he could weave in and out of the dialog. The rough, offline edits were assembled with Adobe *Premiere*, and the audio capabilities of that program allowed Jon to place the music wherever he wanted. I simply provided him with DAT mixes and thanked my lucky stars.

A more perplexing problem was that the film is 95 percent narration. The oral history, as it unfolds from the dramatic voices of the participants, is so engaging that music is almost superfluous. But the narration definitely needed *some* music to punch up the emotional context of each segment and prevent the film from degenerating into a series of talking heads. The native music—drum circles and chants performed by the group Wild Horse—was an easy fit for the sections on Indian history. However, the 1960s-flavored rock pieces that were to underscore the student demonstrations (and the ascension of young Indian leaders such as the late Richard Oakes) only served to distract the listener from the storytellers. What to do?

Through a few fortunate foul-ups—oops, didn't mean to play guitar over the drum circle!—I discovered that using tribal drums (rather than trap drums) as the rhythm section allowed the rock pieces to percolate without producing a tonal wash that interfered with the voices. As a bonus, the melodic and harmonic interplay of guitar, bass, and organ with the native drums exquisitely bridged the gap between Indian culture and the vibe of the times.

The point of all this jabbering is that I managed to score a movie without the benefit of SMPTE, something "big time" film composers might deem an essential tool. But one of the beautiful things about music is that a little luck and inspiration can often transcend technical difficulties. Of course, it's always best to *attempt* to do things "right," which is why this month's cover story, "Picture This!" on p. 30, is a marvelous resource for the home recordist who desires to be a film composer. Author Todd Souvignier provides bountiful information on how to compose and lock to picture with affordable tools that you may already own. Once again, *EM* proves that *nothing* should stop the savvy home recordist from doing high-level projects in a personal studio. So go to it, gang! I'll be scanning the video rental racks for your soundtrack triumphs.



ROBERT PERRY

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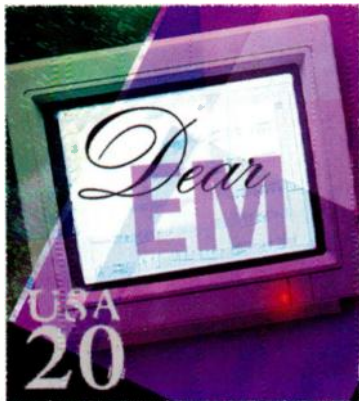
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JAILHOUSE RUCKUS

I have read (and used) **EM** regularly since 1984 and have always been extremely fond of your magazine. I'm not a conservative, and I have some sympathy for inmates' rights. Nonetheless, portraying Bobby BeauSoleil in your newest issue ("Jailhouse Rock," June 1997) as being in prison "for a murder committed during a drug deal gone bad" is disingenuous at best and dishonest at worst. Any reader of *Helter Skelter* remembers who BeauSoleil is, and those who don't should have been told about his relationship with Charles Manson somewhere in the article. Omitting it was wrong. Your readership is intelligent enough to be given the truth and make up their own minds.

Name withheld by request

Thanks for your letter. I apologize if you feel that we misled our readers regarding the severity of BeauSoleil's crime or his alleged association at the time with Charles Manson (which he denies). Our intention in publishing the article was to report on Oregon State Penitentiary's Audio/Video Program, not Bobby BeauSoleil's history. BeauSoleil was the interview subject because he started the program, but many others are involved in and affected by the A/V program, including other OSP inmates and the at-risk youth who benefit from the program's Los Hermanos project. The program piqued our interest because many manufacturers have supported it and because it is an unconventional and compelling example of how personal recording technology can enrich people's lives.—Mary C.

MIX IT UP

As an owner/operator of a project studio that creates and produces everything from commercial jingles to children's songs, I really appreciate some of the suggestions that Michael Molenda had to offer in his article, "Fix It in the Mix" (June 1997). I do have two questions. Do you "tweak" your vocal tracks once they are on tape, or do you add EQ and compression while you are actually recording them?

In addition, because about 75 percent of our music is sequenced, I'm constantly trying to find a better mix to diminish the harshness of sound that is common when trying to orchestrate with a sound module, such as E-mu's UltraProteus. Do you have any suggestions on how to achieve a high level of sonic quality when working with sound modules, drum machines, and samplers?

Matt Brennan
102554.1124@compuserve

Matt—The only EQ I use when recording vocals is a low cut (at 100 Hz or so) to diminish room rumble. I save any tonal tweaks for the mix to avoid the noise and other nasties that often occur when you EQ a source sound twice (during recording and mixing). I also like to document, as closely as possible, the natural timbre of the vocalist. (Even if you choose to amend that timbre later, it's still a good idea to use a relatively organic source signal as the foundation for your EQ tweaks.) During recording, I employ light compression—typically a 2:1 ratio at a threshold of -7 dB—to ensure that every word the vocalist sings is clearly audible, regardless of his or her performance dynamics. At mixdown, however, I'll use whatever level of compression is necessary to "seat" the vocal in the mix.

As far as your concern with the "harshness" exhibited by your sound modules, I can only recommend using EQ to tame the sizzle. I haven't noticed such sonic compromises in most rock or dance projects because the "snap" often helps the synth and sample tracks jump out of a dense mix. However, if you're producing orchestral work (or minimalist underscores) and the buzziness is

bugging you, try cutting 10 kHz on the modules that are the major offenders. You can also smooth out the sound by brutally cutting highs and then cutting the low mids to help replace any articulation lost to diminished treble frequencies.—Michael M.

CLASSICAL MIKING

I have enjoyed the many informative articles that have appeared in the pages of **EM** for quite some time. The May 1997 cover story, "Capturing the Classics," was one such article. I would, however, like to take exception with John Eargle's comments regarding orchestral, 2-mic pickups.

Mr. Eargle, for whom I have high regard, suggests it is not possible to make an acceptable commercial orchestral recording with only two microphones. Until I tried the 2-mic technique, I was very skeptical of its efficacy in both symphonic and chamber recordings. Since 1983, I've used the "Decca tree" configuration (consisting of three omnidirectional mics positioned above the front of the orchestra in an inverted T pattern) for most of my orchestral recordings. This includes recordings made with the finest American and European ensembles. Depending on the acoustical environment, spot mics might or might not be introduced into the sonic picture.

In 1990, I began experimenting with 2-mic techniques in sessions with Lorin Maazel and the Pittsburgh Symphony Orchestra at Heinz Hall. Our usual setup involved thirteen or more mics—spots and the omni "tree." These were fed to the Sony PCM 3348 DTR. Having many available unused tracks at our disposal, we were able to set up a variety of mics and positions and assess the quality of the various pickups when we returned home. The most successful "minimal" pickup for us consisted of placing two B&K 4003 omnis spaced approximately five feet apart and approximately seven feet behind the conductor's podium and at a height of fifteen feet.

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● LETTERS

other recordings made in Pittsburgh were released as 2-mic recordings. The recording of Strauss' *Ein Heldenleben*, with Zubin Mehta and the Berlin Philharmonic (also on Sony Classical) was made in the same manner. Some primary advantages of this recording technique are very accurate imaging; excellent depth of soundstage; accurate conveyance of the conductor and artists' intended balances; effective, "natural" integration of hall and ensemble; cleaner signal due to the use of fewer mics; and less of the off-axis coloration that can occur with multiple microphones.

This minimal approach can only work when circumstances allow for it. A good recording hall and a well-balanced ensemble are mandatory. Most producers would concur that this isn't always a given situation. Many orchestras prefer to record in their dedicated halls—a hit or miss proposition!

This is why, even in familiar surroundings, I still choose to set up supplementary mics and have them fed to a multitrack machine while multing the two main mics to a 20- or 24-bit 2-track

machine. The enormous cost of symphonic recording sessions require building a "safety net," just in case. For example, there have been times when, upon returning from a particular hall, the "perfect" sound heard in the control room was found to be overly reverberant. In that case, I would have no hesitation to introduce the "tree" or spot mics into the mix.

In conclusion, the 2-mic pickup is a viable alternative to multiple miking. However, one must tailor his or her setup to the given variables of hall, ensemble, etc. Great recordings can be, and have been, made with any number of microphones and techniques. As you have represented in your article, there are many valid approaches to the art of classical recording.

Steve Epstein
Senior Executive Producer
Sony Classical
stevepst@mindspring.com

TECH TIP

Thanks for the useful article, "House: Help the Sound Person Help

You" (*JAM*, May 1997). The article has good advice that I plan to share with almost every band I mix in clubs. (I've already made copies to hand out.) However, the article omitted one important detail: Write up a set list for the sound person. Indicate who's singing lead and backup for every tune, who's soloing, and any other helpful information. In addition, the lower you keep your stage volumes, the better your chances of actually hearing the monitor wedges!

Rich Lamb
pitchie@aol.com

WHAT BIG LCDs YOU HAVE

I just had to change the big LCD panel on my Yamaha TG-77 last month (about \$250) and another big LCD panel on my Roland D-70 last week (another \$250). Meanwhile, the large LCD panel of my Korg Wavestation A/D is becoming dim, and the tech at the service station said that E-mu's LCDs are also known to go bad. Looking at my home studio, I see big LCDs everywhere! So the lesson here

In the words of the reviewers:

"...All you really need to know is that it is a Lexicon, it sounds as good as the name implies and it is affordable. Now go buy one."

Roger Nichols, EQ Magazine

"I highly recommend that you get your hands on one of these units and check it out for yourself. Even if it doesn't change your musical life...I'm sure you'll agree that the MPX 1 is simply stunning. It offers outstanding effects and a brilliant user interface at a reasonable price."

Barry Cleveland, Mix Magazine



"It beams with intelligence and shimmers with outstanding sound...an excellent choice for live and studio applications."

Jon Chappell, Guitar Magazine

"...they'll have to pry it out of my cold, stiff fingers."

Jim Aikin, Keyboard Magazine

The MPX 1 — get your hands on one today.

is to be prepared for some future maintenance costs when you purchase machines with those huge, nice-looking LCDs!

Shinji
shinjiymt@aol.com

TAKE A STAND

I have been studiously reading both **EM** and *Mix* for the past three years, and my recordings definitely have improved as a result. However, as far as I can recall, from new product information in your pages to field tests to "how to use 'em" articles, you have never covered mic stands. It seems that all the project-studio suppliers offer are these wimpy midget stands that can be kicked over and bounced about at the touch of a feather—and with booms fully extended, they reach a "phenomenal" six feet into the sky. How about a feature on real, substantial mic stands? What should we be looking for? How do we minimize ground rumble picked up through the stand?

John E. van der Brook
brookjvd@magic.bunt.com

John—I can relate to your frustration; I've droppicked a few mic stands across the studio in my day! (Especially after a flimsy stand ruined a take because the boom slipped the mic into a bizarre, backward inside-out position or sent a Neumann U87 crashing to the floor.) Unfortunately, the only solution is not inexpensive: you have to visit a pro-audio supplier and spend big bucks to acquire a hefty, professional-quality mic stand (and boom). Look for heavy bases that accommodate severe boom extensions without risking a fatal "tip over" and hardware that really locks down stand adjustments.

Ground rumble, however, can occur even when using the best mic stands. I recommend activating your console's low-cut switch or using EQ to cut 100 Hz by 3 dB or so to reduce the rumble. As far as running a feature on mic stands—that's not a bad idea at all. We'll look into dealing with the subject in a future "Recording Musician" column.—Michael M.

EMPOWERED POWER USER

Well burst my bubble, **EM**. I had been confidently cruising along as a *Cakewalk* power user. There wasn't a

single feature unknown to me. Then you had to come along with the April 1997 article, "A Piece of Cake." Out came my red face and a yellow highlighter. I felt like a dork, but hey, those tips sure were nifty.

G. Dwayne Hancock
rohhan@teleport.com

ERROR LOG

June 1997, "What's New," p.16: *ReBirth* is available through reseller channels exclusively from Steinberg and via the Web by its developer, Propellerhead. Steinberg North America: tel. (818) 993-4091; fax (818) 701-7452; e-mail info@steinberg-na.com; Web www.steinberg.net. Propellerheads; e-mail rbinfo@propellerheads.se; Web www.propellerheads.se.

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...this device is a killer...
I laughed, I cried. Four stars;
a must hear..."

Peter Freeman,
Electronic Musician



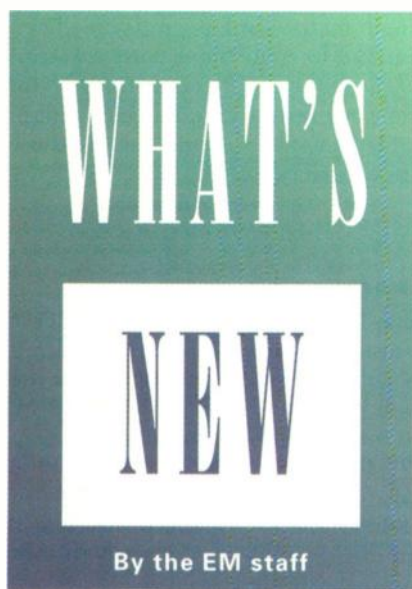
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▲ MIDIMAN MIXIM 10

Midiman's miXim 10 mixer (\$249) jams six mono channels and two stereo channels into a compact (7.3 x 7.6 x 1.3 inches) case. Channels 1 through 4 feature gain and pan pots, 3-band EQ, and one aux send. Channels 1 and 2 also have preamps, balanced XLR mic inputs, 1/4-inch line inputs, and individually switchable 42V phantom power. All the other channels have only unbalanced 1/4-inch inputs.

You get two stereo channels that feature gain, balance, and aux-send controls. The gain pots supply 20 dB of gain. There are two channels with no level control (unity gain), which are panned hard left and right. The aux return is stereo, and there are stereo RCA tape sends and returns and a headphone out.

Two 4-segment LED meters indicate signal levels on the main outs. Midiman rates the mixer's frequency response at an impressive 5 Hz to 50 kHz, channel crosstalk at -80 dB, and THD at 0.01%. Midiman; tel. (818) 445-2842; fax (818) 445-7564; e-mail info@midiman.net; Web www.midiman.net.

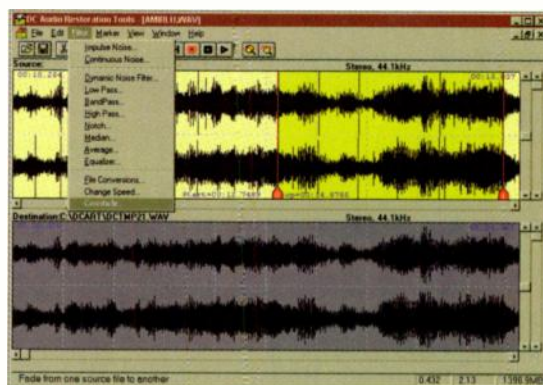
Circle #401 on Reader Service Card

▶ DIAMOND CUT DC ART

If "blast from the past" describes the noise on your old recordings, try cleaning them up with Diamond Cut Productions' *Diamond Cut Audio Restoration Tools* for Windows (\$59.95). This bargain-priced package consists of a waveform editor with extensive noise-reduction and audio-restoration functions for use with records, movie soundtracks, analog tape recordings, and broadcasts.

DC Art's Impulse Noise filter removes clicks and pops, and its Continuous Noise and Crackle filter attacks surface noise. A Dynamic filter function reduces hiss. Lowpass, bandpass, and highpass filters with first-, second-, and third-order slopes are included along with a 10-band graphic equalizer and sweepable notch filter.

Other functions include spectral analysis, pitch shifting, fades, and gain changes with linear or logarithmic envelopes, sine- and square-wave generators for level setting and testing, and file



conversions between mono, stereo, and reverse stereo. The waveform editor features cut/copy/paste editing, zoom in and out, and adjustable markers. Edits are nondestructive, and real-time preview is included for all filter functions. An online tutorial is included.

The program supports sample rates of 11.025, 22.05, and 44.1 kHz. It requires an 80486DX/66 or better PC with 8 MB RAM; Windows 3.1, 95, or NT; and a 16-bit sound card. Diamond Cut Productions, Inc.; tel. (973) 316-9111; fax (973) 316-5098; e-mail info@diamondcut.com; Web www.diamondcut.com.

Circle #402 on Reader Service Card

▼ SHURE BG MICROPHONES

Shure Brothers has expanded and upgraded its BG line of cardioid mics to six models, including four dynamics and two condensers. The upgrade includes the use of neodymium magnets for all dynamic models, which significantly boosts high-output capabilities. The latest addition to the line is the BG6.1 dynamic (\$140), a stubby unit well suited for toms and other percussion, guitar amps, brass, and woodwinds. The BG6.1 registers a frequency response from 80 Hz to 15 kHz.



Other dynamics include the BG1.1 (\$60), BG2.1 (\$84), and BG3.1 (\$110), with frequency responses rated at 80 Hz to 12 kHz, 70 Hz to 13 kHz, and 60 Hz to 14 kHz, respectively. The BG3.1 has an internal shockmount and is available in a wireless version.

The BG4.1 (\$220) is a small-diaphragm condenser microphone optimized for studio environments and can be powered with either 48V phantom power or an AA battery. Frequency response is rated at 40 Hz to 18 kHz. The BG5.1 (\$220) condenser, optimized for stage use, has a presence rise for vocals and can be powered via phantom power or AA battery. Its frequency response is 70 Hz to 16 kHz.

All mics in the BG line feature hardened, dent-resistant grilles, black-matte finish, and distinctive green trim. Standard accessories (these vary with each model) include cables, gig bags, and stand adapters. Shure Brothers, Inc.; tel. (847) 866-2200; fax (847) 866-2279; Web www.shure.com.

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Jon Anderson/YES

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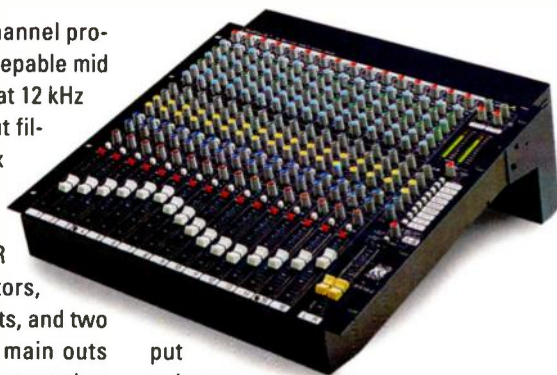
▶ **ALLEN & HEATH WZ16:2**

Now shipping is the first of Allen & Heath's new MixWizard series, the WZ16:2 (\$1,195), a 16-channel, 10U rack-mount, compact mixer designed for a wide range of applications, including stereo P.A., recording, keyboard mixing, submixing, and stage-monitor mixing. This is Allen & Heath's first mixer to feature the Quick Change Connector (QCC) system, which allows the board to go from rack-mount to desktop operation and back without unplugging cables or removing panels.

The WZ16:2 offers sixteen balanced mic/line inputs, each with XLR and TRS jack connectors, channel inserts, and

100 mm faders. Each input channel provides 4-band EQ with two sweepable mid bands, high and low shelving at 12 kHz and 60 Hz, and 100 Hz low-cut filters. The console has six aux sends and two stereo aux returns with balanced inputs. The master section has L/R main outputs on XLR connectors, individual faders, stereo inserts, and two 12-segment level LEDs. The main outs are augmented by an A/B output that can provide a second pre- or postfader L/R or mono mix, or it can be configured as a stereo monitor out.

Frequency response is rated at 20 Hz to 50 kHz (+0/-1 dB) and L/R residual out-



put noise at <-90 dBu. Allen & Heath/Harman Music Group; tel. (801) 568-7660; fax (801) 568-7662; e-mail customer@dbxpro.com; Web www.allen-heath.com.

Circle #404 on Reader Service Card

▼ **STRO LION N'HUMMER 1A**

Bummed by 60-cycle hum? The Stro Lion N'Hummer 1A (\$249.95; pronounced "nummer") is designed to eliminate AC line noise and its harmonics

canceling the hum. Because only the hum is sampled, the N'Hummer is said to deliver a clean output signal without adding dynamic or phase-distortion artifacts common to traditional noise gate/ex-

channel), which are phase-locked to the AC power line. The unit's front panel provides a level control and overload LED for each channel, a Rec/Play switch, and a Reset switch.



in audio lines. Stro Lion's unit works by digitally sampling AC line noise, looping the sound, and playing it back in sync but out of phase with the noise, thus phase

pander, comb-filter, and transformer-based solutions.

The 2-channel, 1U rack-mount N'Hummer contains two hum samplers (one per

The N'Hummer's rear panel has TRS 1/4-inch inputs and outputs. Power is provided by an 18 VAC adapter. Stro Lion Technologies, Inc.; tel. (800) 567-0881; fax (800) 567-0881; e-mail kingbeast@stro-lion-technologies.com; Web www.stro-lion-technologies.com.

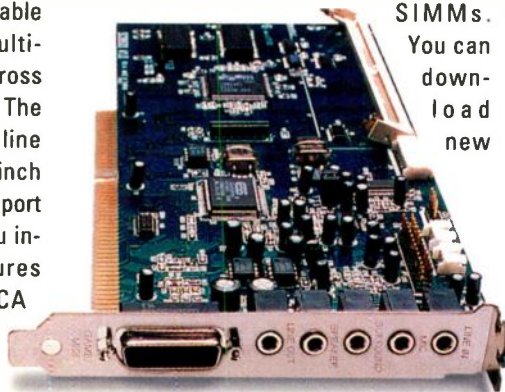
Circle #405 on Reader Service Card

▼ **GUILLEMOT HOME STUDIO PRO 64**

Guillemot International has introduced the Maxi Sound Home Studio Pro 64 ISA audio card (\$299), which features digital and analog I/O, a wavetable synth, and DSP for real-time multi-effects. The I/O options are split across the main card and a daughter card. The main card has mic and line ins, a line out, and two speaker outs (all on 1/4-inch minijacks) as well as a joystick/MIDI port (breakout cable to MIDI In/Out/Thru included). The daughter card features RCA stereo ins and outs and RCA S/PDIF connectors.

Home Studio Pro 64 uses 18-bit D/A converters and 16-bit A/D converters. For recording and playback, Guillemot rates its THD + Noise at -73 dB, its dynamic range at 76 dB, and its S/N ratio at 85 dB, A-weighted. Sampling rates from 4 to 44.1 kHz are supported.

The synthesizer delivers 64-voice polyphony; 355 sounds, including a GM bank; and 4 MB of sample RAM, expandable to 20 MB using standard SIMMs.



You can download new

Home Studio Pro sound banks from the Internet in Downloadable Sounds (DLS) format; Guillemot will make new banks available regularly on its Web site.

Using its onboard digital signal proces-

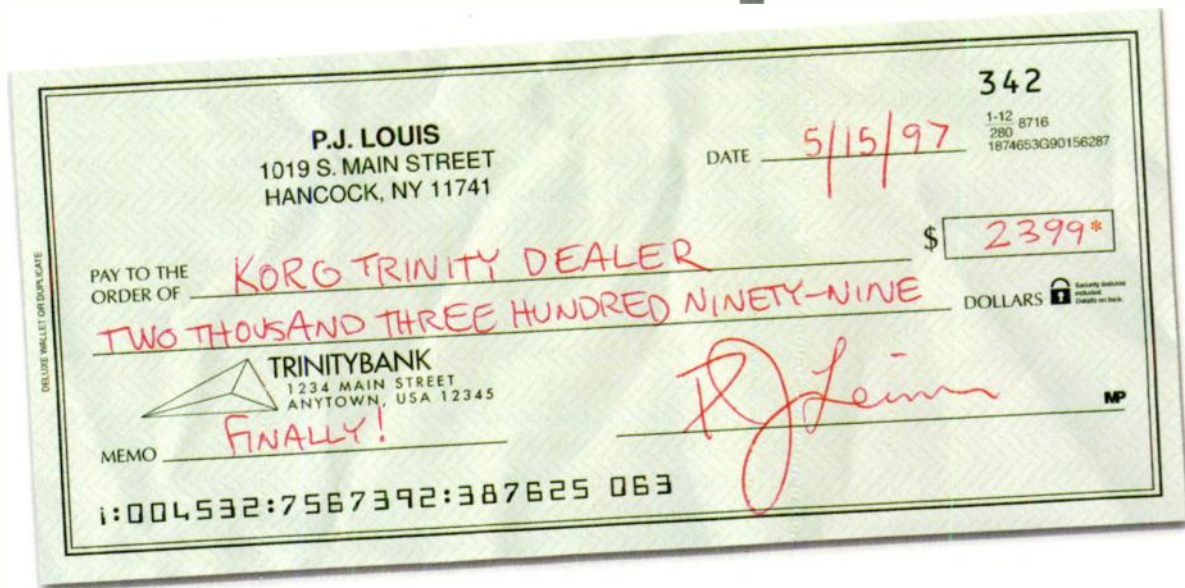
sor, the Home Studio Pro can manage eight audio tracks at once and apply reverb, echo, chorus, pitch shift, and equalization in real time. In addition, the card allows quadraphonic sound via two stereo speaker outputs and offers 3-D processing using Microsoft's DirectSound 3D API.

The Home Studio Pro is bundled with an extensive software package, including Canam Computers' Quartz Audio Master SE digital audio sequencer and Cakewalk Express. Proprietary effects-management and editor/librarian software is also included. An 80486DX/66 or better PC (Pentium recommended) with 8 MB RAM and Windows 3.1 or higher is required. Ubi Soft (distributor); tel. (415) 547-4000 or (800) UBISOFT; e-mail support@guillemot.com; Web www.guillemot.com.

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World Radio History

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SOUND ADVICE ▲▲▲▲

▼ DAN DEAN PRODUCTIONS

Vintage electric bass, acoustic bass guitar, and acoustic bass are featured on Dan Dean Productions' *Dan Dean Bass Collection*, vol. 2, CD-ROM for E-mu E11x and E1V (\$199). The



electric basses are recorded both direct and from Alembic, Stewart, Bag End, and Hartke amplifiers, played with either fingers or a pick. They include Fender Jazz and Precision, Hofner Violin, Guild Ashbory "Rubberband," Gibson Thunderbird, Rickenbacker 4001, and Alembic Spoiler 5-string. Washburn AB-20 and Hohner fretless acoustic bass guitars were also recorded direct

and through the amplifiers. The acoustic bass banks include stereo and mono recordings of an extremely old, German instrument done with a pair of Coles 4038 ribbon mics combined with a direct signal from the instrument's piezo-electric pickup.

Every note of each bass was sampled using Apogee A/D converters (UV-22 process); Manley and GML tube EQ; and Joe Meek, Crane Song, and BSS compression. Digidesign's *DINR* was used to remove noise. The disc contains 567.5 MB of samples. Bank sizes range from 10.8 MB to 23.7 MB, and each bank contains low-memory presets. For E4K users, there is full support for Thumbby button and MIDI sliders A, B, C, and D. Pacific Pro Audio (distributor); tel. (206) 284-9386; fax (206) 286-0140; e-mail pacpro@pacpro.com; Web www.halcyon.com/ddean.

Circle #407 on Reader Service Card

▶ PATCHMAN MUSIC

Patchman Music's new *05R/W*, vol. 1 (\$39.95), for the Korg 05R/W synth module contains 100 Programs and 100 Combinations designed to be used with a wind controller. Ensemble, layered, and solo instruments, acoustic

emulations, breathy wind instruments, synth leads, fat brasses, chorded leads, and even some guitars and basses are included.

Because the 05R/W is not capable of responding to breath controller data, these sounds are programmed to respond to Aftertouch. Breath and wind controllers will need to be remapped to send Aftertouch. *05R/W*, vol. 1, is available in Opcode, Mac Self Loader, Korg SoundEditor, and PC/Mac SMF formats.

Patchman also has released volume 97 of its 2000-Series library for Kurzweil K2000. *Stereo Pipe Organ* (\$36) features samples of Korg T3 synthesizer stereo pipe-organ patches. The collection includes eleven Programs and assorted layers of pipe organ with strings, choir, and brass. The collection is available on three floppy disks and requires 4 MB of RAM. In addition, the entire 97-volume 2000-Series library, featuring over 100 MB of samples and nearly 2,100 programs, is now available on CD-ROM for \$195 (also available on floppy disks for \$325 or Iomega Zip disks for \$235). Patchman Music; tel. (216) 221-8282; e-mail matteblack@aol.com; Web members.aol.com/patchman1.

Circle #408 on Reader Service Card

▶ REPLAY CD LOOPER

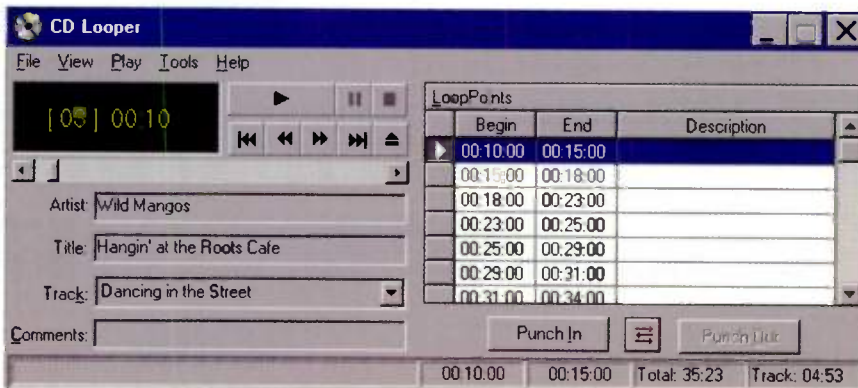
For many musicians, learning to play a song by ear often means endless fiddling with a CD player's Reverse button as they struggle through the piece phrase by phrase. RePlay Technologies' *CD Looper* (Win; \$59.99) can take a lot of the tediousness out of that process. The program lets you set a virtually unlimited number of loop points in each track and then play back loops at normal, half, third, or quarter speed without changing pitch. Loop points can be set to within 0.01 seconds. You can play loops continuously or a set number of times, and you can set them to pause between each iteration.

You can export a track's or CD's loop

points, and a text description can be saved for each loop. The program requires an 80386 or better PC with 8 MB RAM; Windows 3.1, 95, or NT; a CD-ROM drive; and a Sound Blaster-compatible

sound card. RePlay Technologies, Inc.; tel. (888) 3-REPLAY (outside New York only) or (516) 385-1398; e-mail info@replayinc.com; Web www.replayinc.com.

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To download a demo program, visit our website at <http://www.steinberg-na.com> or call Steinberg for a free CD-ROM demo.

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▶ XYTAR ADMS

Music in, CD out—does that sound like something you could use? Xytar's Audio Digital Mastering System (\$3,499 core system) is a recording and mastering DAW in a midsize tower computer case that lets you track, add effects, mix, and cut a CD-R submaster. (An optional rack-mount case costs \$430.)

The heart of the system is a 166 MHz Cyrix 6X86 processor with a high-speed 64-bit bus, 128 MB RAM, 2.5 GB internal hard drive, and Iomega Jaz drive. (A 200 MHz processor adds \$320 to the price.) You also get an 8x CD-ROM drive, 2x CD-R writer, 17-inch monitor, keyboard, and mouse.

The core system comes with two channels of line-level analog I/O on 1/8-inch minijacks, which use 18-bit Sigma-Delta A/D and D/A converters. RCA-to-minijack adapter cables are provided. The system does not include digital I/O. Optional 4-in/4-out (\$485) and



8-in/8-out (\$970) I/O interfaces (with RCA connectors) are available, which use 20-bit Sigma-Delta A/D and D/A converters. Xytar rates the system's frequency response at 5 Hz to 20 kHz (± 0.25 dB), its dynamic range at ≥ 90 dB, and channel separation at ≥ 87 dB.

ADMS' recording software supports 16-bit audio at sample rates from 11 to 48

kHz. It includes several types of EQ; echo, reverb, phasing, flanging, and distortion; fades, pan, and gain adjustment; and cut/copy/paste editing in a waveform display. Users can store custom presets for the processing functions. The included CD-recording software gives you 99-track Red Book mastering capability. It allows you to burn the disc in multiple sessions and play back finished sections before the disc is completed. Track time, disc time, and title subcoding is supported. You can also directly copy CDs.

The package includes a procedures manual that leads you through every aspect of using the system step by step. The company also offers a 16-input mic/line mixer and a complete studio package with microphones, monitors, and power amp; contact Xytar for complete details on these options. Xytar Digital Systems; tel. (415) 697-7493; fax (415) 697-4905; e-mail xytar@joanna.com.

Circle #410 on Reader Service Card

▼ PROSONIQ SONICWORX ARTIST

For sound-design work, you can never have too many ways to alter a sound. Prosoniq *SonicWORX Artist* (Mac; \$400) supplies more than 60 effects algorithms to add to your arsenal. The program comprises a waveform editor and effects plug-ins in a proprietary plug-in format. The effects range from such workhorses as pitch shift, time compress/expand, chorus, flanger, reverb, and distortion to more unusual tools, such as Wow&Flutter, Cellular Morphing, Telephone Line Simulator, and Drumloop Jungelizer. Other effects include Vocoder, Reverb Removal, Ring Modulation, and Formant Filter.

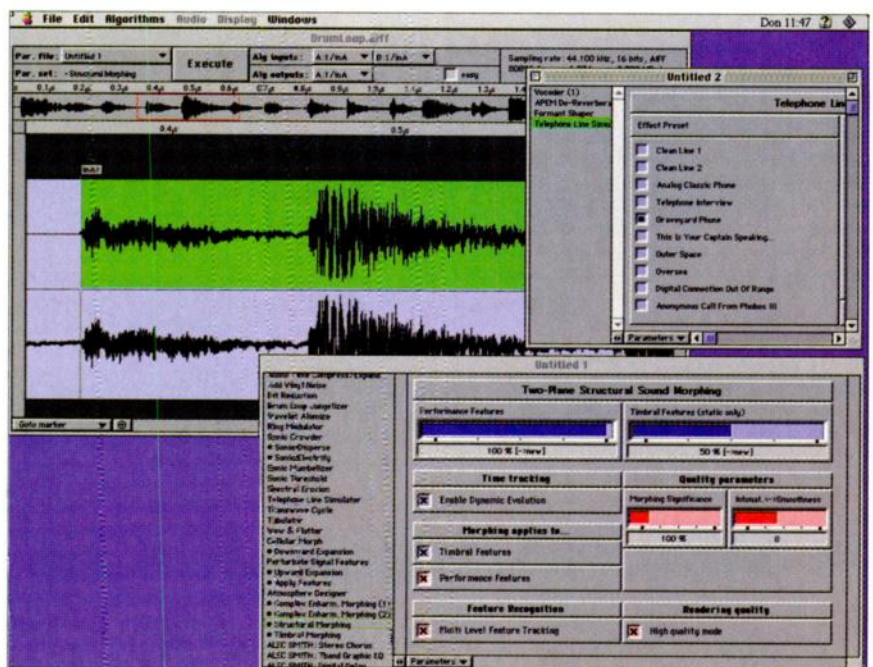
The plug-ins use neural network technology to accomplish fast and flexible sound manipulations. Prosoniq's algorithms have been licensed for use in some well-known professional products. Emagic's *Logic Audio 3.0*, for instance, uses Prosoniq algorithms for real-time EQ, reverb, and flanger effects as well as the timbre correction in that program's Time Machine II.

SonicWORX Artist supports audio with 8 to 50 kHz sampling rates and resolutions of 8, 16, or 24 bits in AIFF and SDII

file formats. All processing is done on the Mac CPU, and effects can be auditioned with the Pre-Listen feature. The wave editor allows analog and digital recording via Sound Manager and includes such tools as sample-rate conversion, Trim, Cut, Copy, Paste, Insert Silence, Insert/Delete Channel, Reverse,

Normalize, Invert, Remove DC Offset, and Fade. The program requires a Power Mac with 8 MB RAM, Mac OS 7.1 or later, and Sound Manager 3.0 or later. GSF Agency (distributor); tel. (310) 452-6216; fax (310) 452-3886; e-mail ggsa@netcom.com; Web www.prosoniq.com.

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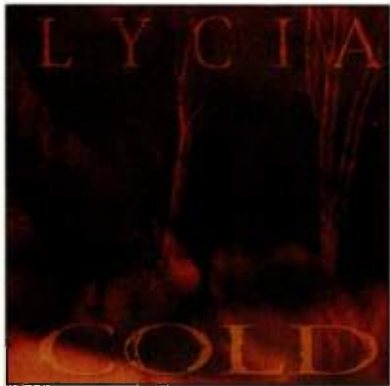
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FILE

Dark Spirits

Lycia uses signal processing to great effect.

By Bryan Reesman

Lycia's music doesn't just drift around your ears, it *envelops* you with the sound of isolation and introspection. On their latest album, *Cold*, the band's lush, brooding atmospheres are created with evocative signal processing—and the imagination and talents of multi-instrumentalist Mike Van Portfleet, soprano Tara Van Flower, and bassist David Galas.

One of the foundations of Lycia's signature sound is a guitar processor: DigiTech's GSP-5. Van Portfleet uses the device to bend and twist layered guitars and synths to blur the tonal lines between the instruments and, in the process, construct a "really massive sound."

"My main keyboards are the Kawai K-11 and PH-50, and a lot of times I'll run them through one of the GSP-5's really dense reverbs or through the same distortion/chorus/delay effect chain that I use on my guitar," explains Van Portfleet. "The effects—especially the distortion patches—give the synths a really meaty sound."

Rather than employ guitars and synths as separate tonal entities with

specific musical "chores," Van Portfleet uses each instrument as a building block for more unique sounds. "I layer parts until they become one tone," he says. "For example, if you listen to the songs 'Baltica' and 'Snowdrop' on the new album, the pads are not solely programmed keyboard sounds. I would double a synth part with a guitar line and mess with the tones further by recording the synth through my guitar effects. In addition, I'd play some of the guitar lines using a Heet Sound E-Bow to emulate the fluidity of the keyboard parts."

Delay is also a vital component of Lycia's undulating soundscapes. Although many bands use cavernous reverb programs to create a sense of expansiveness, Van Portfleet prefers the sonic chaos that long delays can produce.

"I tweak the GSP-5's delay to the point where it repeats almost non-stop," he says. "The wet/dry mix is typically from 70 to 90 percent delay and only 10 to 30 percent of the source sound. You can still hear the original source sound, but it's washed in this

massive delay that just goes and goes and goes. The more notes you play, the more the delays rebound against each other, which creates a rich, chaotic background of cascading harmonics. This effect really adds depth and fullness to the overall sound."

The songs on *Cold* were sequenced using MOTU's *Performer*, with acoustic tracks recorded to a TASCAM 488 cassette 8-track and Macromedia's *Deck 2.2*. All of Van Portfleet's guitar tracks and Galas' bass tracks were recorded direct to tape.

"I don't like playing through amps," states Van Portfleet. "I like to plug right into the effects processor and send the sound straight to tape. That way, I can make everything sound really electronic."

At mixdown, the band manipulated the barrage of source sounds and effects into an aural stew. "We prefer blending everything together, rather than having certain sounds stand out," says Van Portfleet. "We don't even want the *vocals* up front!"

For more information, contact Projekt Records, PO Box 166155, Chicago, IL 60616; tel. (312) 913-9160; e-mail info@projekt.com.

If you have a CD you recorded in your home studio, we'd love to consider it for "Pro/File." Send your CD and background information to Pro/File Editor, *Electronic Musician*, 6400 Hollis St., #12, Emeryville, CA 94608.



Mike Van Portfleet and Tara Van Flower

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World Radio History

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Master mixer Ken Kessie
breaks down the mix for
En Vogue's "Let It Flow."



Photo By Reisig & Taylor

Diva Mix

By Maureen Droney



With a résumé that includes En Vogue, Tony Toni Toné, Bell Biv DeVoe, and All-4-One, engineer Ken Kessie is one of the hottest R&B mixers around. He recently sat behind the board for "Let It Flow," the new track by that sassy, vocal-heavy R&B group, En Vogue. (The song is featured on their latest East West/Elektra Records release, *EV3*.) Kessie was the sole mixer on both of the previous En Vogue albums—produced by the team of Denzil Foster and Thomas McElroy—which included the hits "Free Your Mind," "(My Lovin') You're Never Gonna Get It," and "Hold On."

The mix session was at Foster and McElroy's FM Studios—a Chips Davis-designed facility that is, says Kessie, "The best room I've ever worked in. The detail, the depth, and the low-end articulation of the room and speakers allow me to hear deep into the music, making it easier for me to locate and fix any problems. It's the kind of room where you can turn a pan pot a sixteenth of an inch and hear the difference." For slammin' sounds, FM Studios uses both analog and digital multitracks, relying on trusty Otari MTR-100 2-inch, 24-track decks and Alesis ADAT XTs.

GETTING THINGS FLOWING

When starting a mix, Kessie's first move is to configure the console. The Euphonix CS 2000 is software driven, so he is able to easily recall the basic setup that he uses for every mix. The console is configured with two rows of faders—48 lower and 48 upper—and, as the En Vogue project was recorded on 48-track analog, Kessie uses the lower faders for multitrack returns. The tape tracks are typically brought straight off the machine (track 1 to channel 1, track 2 to channel 2, and so on). Some engineers like to return the audio tracks to the board in a different configuration than they use for tracking. For example, the drums may have been recorded on tracks 9 through 13 as snare, hat, kick, left overhead, and right overhead. By repatching, however, the engineer can lay those tracks out on the console as tracks 1 through 5 and configure them more "naturally" as kick, snare, hat, overhead left, and overhead right.



"I don't cross-patch because the producers are used to the tracks coming up on the console exactly as they are on the track sheets, and besides, it saves patch cords," says Kessie. "Also, if you have to overdub something during the mix, you can accidentally record over the wrong track if the console 'tracks' are not the same as the tape tracks. And the worst sin an engineer can commit is to wipe something valuable!"

The CS 2000's upper faders are typically used for effects returns. Each fader on the console can be configured as stereo or monaural, so Kessie assigned the stereo effects returns to one fader to save space. (To see Kessie's complete signal processing array, see "Jewels for the Divas" on p. 28.) Kessie also set up a "Background FX group" on Aux 4 that was an effects chain of the following toys: an API 560 graphic EQ, an AMS DMX 1580 delay, a Roland DEP-5, and a Yamaha SPX90. This effects group was used to add some high-end shimmer and clarity to the background vocal sound. The settings and/or programs used were: EQ boosts at 8 kHz and 16 kHz on the 560; delay times of 43 and 45 ms (with no feedback or pitch

change) on the DMX 1580; Program 12 (chorus) on the DEP-5; and the Stereo Phase program on the SPX90.

The next steps were to make sure that the effects were actually working, that they were not producing audible hiss or other noises, and that the left and right sides were balanced. To do this, Kessie routed a snare-drum sound through each effect and soloed the appropriate effect return. He did a visual check on the meters to confirm the left-right balance and also auditioned the effect in stereo *and* mono to ensure that the center image didn't move.

ROUGHING IT

Now he was ready to mix. "First I put up a quick rough mix and listen for problem areas," says Kessie. "These 'problems' can include less-than-solid drums, tonal clashes between midrange instruments, timing and pitch problems, a weak structure, and so on. Obviously, a good mixer has to act as another producer. At the same time that I'm looking for problems, I identify what's working well, and I try not to mess that stuff up!"

"In this case," he continues, "the rough mix on 'Let It Flow' revealed few problems. The ten percussion tracks, including two different kick drums, were solid. There wasn't a problem with the two bass tracks—a fat synth and a live 'fill' part—either. We had only one keyboard part, so that was easy. But the

four guitar parts—now we start having some separation problems! However, I've been using the Desper Spatializer lately, and I'm sure that this tool will help clarify the tonal ranges and spread out the guitar sounds. So now that's not a problem. As for background vocals, I'm in heaven. En Vogue does just about the best backing vocals in the business. Thanks to great singing, great production, and great engineering, I can just about push up two faders and be done with it. Lead-wise, however, I earn my pay. All the members of En Vogue are great singers, but everybody sings lead on this track, so—because they all have such different voices—I need to work up a different lead vocal sound for each singer."

GROOVE MIXING

Once the rough mix was up and all the track's sonic pros and cons were identified, Kessie started working on the final drum sounds. His first move was to gate all the percussion tracks with the CS 2000's onboard dynamics processors.

"I only want to remove tape hiss," he says, "so I listen carefully to be sure the noise gates do not alter the natural attacks and decays of the source sounds." Even with such subtle gating, producer Denny Foster asked that Kessie remove the gates from the bell and triangle because he didn't like what happened to the groove when the gates were in.

EN VOGUE'S TRACK SHEET FOR "LET IT FLOW"

1 kick 1	2 kick 2	3 clap	4 intro bike horn	5 hi-hat 1	6 hi-hat 2	7 hi-hat 3	8 vibra-slap
9 bass	10 quiros	11 triangle	12 bell	13 electric piano left	14 electric piano right	15 electric guitar (main lines)	16 electric guitar (wah chords)
17 electric guitar (high lines)	18 electric guitar (chords-ride out)	19 live bass fills	20 rap (ad libs)	21 rap	22	23 time code	24 time code
25 kicks (work track)	26 clap (work track)	27 hats (work track)	28 vibra-slap & quiros (work track)	29 bass (work track)	30 triangle (work track)	31 bell (work track)	32 "The En Vogue Hit"
33 guitar (work track)	34 guitar (work track)	35 guitar (work track)	36 guitar (work track)	37 background vocal (left)	38 background vocal (right)	39 doo-wop vocals (left)	40 doo-wop vocals (right)
41 Terry vocal	42 Cindy vocal	43 Max vocal	44 Dawn vocal	45	46	47 time code	48 time code

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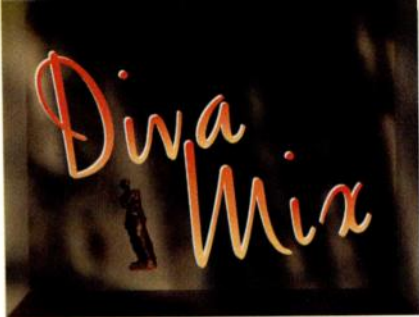
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ALESIS



After deciding that the bass drum needed help, Kessie sent the kick to a Drawmer noise gate and allowed only the snap to break through. Then the signal was routed to a dbx 165 compressor and crushed to death. The now extremely punchy sound was assigned to an open input channel and blended in with the original kick drum. "Now, you're poppin'!" exclaims Kessie. However, the bottom needed a little more beef, so he employed an Aphex Model 109 Tubessence Parametric EQ to boost the subharmonic lows.

"I really like the 'rubbery' tone I get from the 109," says Kessie. "It's tight but warm. I boost the low frequencies at 80 Hz, with a narrow bandwidth, and sometimes I will overload the unit for a little attitude."

The snare drum didn't require any heavy processing ("Snare sounds are really no big deal these days—until someone decides it's time for the return of the 1980s snare," laughs Kessie.)

The sequenced bass also required minimal tweaks. Kessie boosted the low end with a Neve 1073 EQ and tightened up the sound with an Aphex Expressor.

"This setup roared on the last rock project I did," he says. "Of course, the

producer walked in and told me to take it off. He liked the bass better flat. But I managed to sneak in a little subharmonic EQ from the Aphex 109 and a pinch of flanging from a Boss stomp box."

Bassist James Earley's live fills were sharpened up with an EQ boost at 1.8 kHz and a cut at 200 Hz.

ON TO THE VOCALS

"En Vogue background vocal tracks are a dream," Kessie says once again. "To really make them shine, I use the CS 2000's dynamics processing to add a slight amount of compression and gating for dynamic control and hiss suppression. Then, I send the tracks to my background vocal effects group. Because of all the treble boost on the API EQ, I leave a lot of headroom in all the digital signal processors to avoid sibilance distortion. I pan the DEP-5 left and the SPX90 right and add just enough of the overall effects to make the vocals sound shimmery.

"On 'Let It Flow,' I felt the background vocals needed a little more warmth," he continues, "so I also boosted 100 Hz and 400 Hz by a few dB with a Klark-Teknik equalizer. This particular tweak added some density but still kept the overall stereo effect clear and bright. I really want the listener to be able to hear all the words."

The lead vocals required more individual attention, however, because each of En Vogue's singers has her own unique vocal sound. "Terry and Cindy sound good from tape, so they just get a little board compression," says Kessie. "For Dawn, I use my pet UREI 1176 compressor, which sounds really smooth. And for Max, I use an Aphex Expressor, and I add a bit of top end with the unit's HFX control."

Finishing touches were accomplished by employing the Desper Spatializer to add some dimension, and an API 560 EQ to add slight mid and top boosts that made everything sound very present. For depth, a pinch of reverb was mixed in using a combination of



NINA BOMBARDIER

Smooth operator: R&B mix maestro Ken Kessie at FM's big bad Euphonix console.

the Lexicon 480 and PCM 70 and the Eventide H3000.

"In general, I use very little reverb, so that the personality of the singers' voices isn't obscured," says Kessie.

FINAL TWEAKS

Once the sounds were happening and the mix was almost ready to print, Kessie practiced riding the vocal levels and even considered changing the level of the entire mix in spots.

"I'll do almost anything to increase the dynamics of a song," he comments, "including raising or lowering the master-fader level. Lead vocal rides take the most time to get right, however, because they need to be musical and emotional yet show no evidence of the mixer's touch."

For final tweaks, some processors were patched into the stereo bus: a Focusrite Red 3 compressor (a slight threshold hit at a ratio of 1.5:1) and a pair of Tube Tech EQs (a 2 dB boost at 60 Hz and a 4 dB boost at 12 kHz). Kessie ran about fifteen passes of the song to two Panasonic SV-3700 DAT decks. The different versions consisted mainly of varying vocal levels and instrumental mixes.

"That's it; I'm done," he says. "Another day in the life of a mixer. Not bad for a day job."

[Editor's note: After the album was completed, Dawn Robinson left En Vogue.]

Maureen Droney is Mix magazine's Los Angeles editor.

JEWELS FOR THE DIVAS

Here are the main effects that Kessie used for "Let It Flow."

Send	Box	Patch
Cue 1	Lexicon 480L #1	Plate
Cue 2	Lexicon 480L #2	Large Hall
Cue 3	AMS RMX 16	Reverse Reverb
Cue 4	Yamaha SPX990	Left-Center-Right Delay
Cue 5	Not used	
Cue 6	ADA Stereo Tap Delay	Phaser
Cue 7	Eventide H3000	Micro Pitch Shift
Cue 8	Not used	
Cue 9	Desper Spatializer #1	Wide
Cue 10	Desper Spatializer #2	Wide
Cue 11	dbx 160A (left)	Compression (3:1 ratio)
Cue 12	dbx 160A (right)	Compression (3:1 ratio)
Aux 1	Roland 330 #1	Single Delay
Aux 2	Boss BF-2	Flange
Aux 3	Not used	
Aux 4	Various (see text)	Background Effects Group
Aux 5	Roland 330 #2	Stereo Delay
Aux 6	Klark-Teknik DN410	Low-mid EQ boost
Aux 7	Lexicon PCM 70	Vox Plate

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Picture



*M*uch as alternative and electronic music revitalized a moribund rock scene, the focus of excitement in the movie industry has recently shifted to independent filmmaking. Production activity in this area continues to expand as new cable channels, video rentals, and film festivals create more screening opportunities. Faced with huge production costs, even on "low budget" pictures, filmmakers are looking for ways to reduce their expenditures and simplify their work. Inexpensive desktop audio production offers some solutions.

In this article, we'll explore audio production and post-production film work that uses relatively inexpensive, computer-based, digital audio workstations. We'll look at some examples of film-related audio tasks (such as music editing, sound design, and dialog editing) that can be effectively tackled in a personal studio. We'll also look at a few different setups for locking sound to picture.

The examples in this article are all drawn from the low-budget world of independent and student films, the types of productions that you're most likely to encounter—at least,

when you're starting out. Keep in mind that production methods in the big-budget film industry may vary sharply from some of the low-end solutions discussed here.

THE QUICKTIME WORK PRINT

Think you need a video deck to work with film sound? Maybe not. A number of audio programs have implemented QuickTime playback and offer a frame-accurate way of putting sound to picture, all within the confines of your computer.

ILLUSTRATION BY DMITRY PANICH

PICTURE FRAME PROVIDED BY WESTLIGHT

Thomas Dimuzio is a torture-tester at Macromedia, but in his "real" life, he's an internationally known multi-instrumentalist and composer whose forté is dark ambient brooding and long, evolving, noise-heavy improvisations. On a whim, he responded to an ad from a first-time director seeking film music; Dimuzio sent him his new release, *Sonicism* (on RRRRecords). It was a perfect match for *Inside*, a claustrophobic, 14-minute, *Eraserhead*-like, black-and-white, 16 mm film.

by

→ TODD SOUVIGNIER

Audio professionals reveal the secrets of constructing low-budget movie soundtracks.



Picture *This*

Filmmaker Lon Mitchell Teller had essentially shot a silent film. Because there was no dialog or production sound available, the music alone had to embellish the action. Teller used Data Translation's Media 100 video-editing system to edit a rough music track from the Dimuzio CD. Then he exported the picture and audio as a QuickTime movie with a mono soundtrack. Dimuzio was charged with rebuilding the soundtrack, based on the guide track, and enhancing it wherever he could.

Dimuzio insisted that the QuickTime movie frame rate match the 29.97 fps nondrop frame rate that Teller had used on the Media 100. (For an explanation of time-code rates and types, see "That Synching Feeling" in the October 1996 *EM*.) But his computer—a stock Quadra 840AV with no extra video hardware—wasn't optimized for video production, and the QuickTime movie that he received had been captured at too high a resolution. Dimuzio was only

able to play back one or two frames per second. "So I Cinepacked [compressed] it using Apple's *MovieShop*," he explained. "That took 45 hours; luckily the power didn't go out." The compressed movie played back more smoothly at around fifteen frames per second and was good enough for a rough reference. He opened the movie in Macromedia's *Deck II* and used *Deck's* Chase Positioning feature to view all thirty frames outside of real time. That allowed him to position audio edits with frame accuracy.

Dimuzio listened to the mono scratch track while viewing *Deck's* QuickTime display. This enabled him to assemble two sets of stereo music beds in addition to stereo and mono sound-effects tracks. He first rebuilt Teller's initial edits of the *Sonicism* tracks and then did additional editing and processing to the material. One of Dimuzio's techniques is to use a visual geometric approach to track editing, such as reversing selected regions in a checkerboard pattern across multiple tracks. As you'd expect, it can create some jarring results.

Dimuzio added, "I did some sound design, too. In the scratch track, there were sounds from commercially released CDs that we couldn't use. For a part that had a lot of voices, we were able to simulate some voices with a musician doing vocal stuff through an oca-

rina. We slowed that down, fattened it up, processed it a little, and played around with it."

Dimuzio had initially intended to deliver the finished soundtrack on an ADAT tape, but instead he made four 2-track DAT recordings and used sync tones to align the recordings with the movie. The sync tones were simply beeps that occurred in the film during the countdown and at the end. Teller then laid the recordings back to his Media 100 nonlinear system, did the final mono mix, and made the print master, which was ultimately joined to the optical audio track on the film. *Inside* debuted at the Santa Barbara International Film Festival during early March and will play additional festivals.

TIME CODE FOR THE POOR

As Dimuzio and I concluded our interview, LucasArts Entertainment sound designer (and frequent *EM* contributor) Larry the O walked into the studio. Larry is well known to readers of *EM*, but he is usually too modest to mention that his credits include music editing for the second-generation *Gumby* television show, sound design for ABC's *Bump in the Night* television show, and dialog editing for the film *The Thin Blue Line*.

After assessing the situation, Larry mentioned that he also did sound effects for short, super-low-budget, stop-motion animation films. He used *Deck II* locked to SMPTE time code that was coming from an audio track on a VHS tape. "Here's the killer," he said "you can't do it with Hi-Fi tracks, because Hi-Fi tracks are FM, and it messes up the time code. I found it to be very unreliable. You have to use the linear audio tracks." Larry added that if you plan to stripe the tape yourself or lay it back to the VHS tape, you won't be able to use most consumer VCRs. "You need a VHS deck that can punch in on an audio track."

Pressed to make the most of a basic set of tools, Larry the O used Digi-design's 4-channel Pro Tools 442 in an 8-track configuration. But that still wasn't enough. "Animation can be very effects-heavy; you burn through many tracks," he explained. "I do a lot of mixing to disk to make stereo submixes. Once you've done four stereo submixes and combined them in an 8-track session, however, it's hard to tweak individual effects later on. You have to



Multi-instrumentalist and composer Thomas Dimuzio and assistant engineer Buzz (left) conspire to create dark ambient music, including long, evolving improvisations. Filmmaker Lon Mitchell Teller decided Dimuzio's style was perfect for his claustrophobic, black-and-white film, *Inside*.

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Picture *This*

peel back a couple of layers, go in and tweak the effect, and mix it to disk again. It can consume a lot of time and disk space."

THE PROBLEM WITH MUSIC ENGINEERS

Peter Steinbach spent several years working on sound effects for commercials under the direction of Andy Newell at San Francisco's Earwax studio. After being involved with over 300 national ads, including 40 Sega television spots, Steinbach segued into sound design and dialog editing for independent films. Although he puts no energy into marketing his services, he has established a steady business working out of his home studio on low-budget features.

"My studio is meant for editing, and this is a nice niche. You no longer need a big, expensive studio to make these types of decisions. If you have good

monitors, such as my Genelec 1031s, you can do much of the work at home. There's very little discrepancy between what I hear at home and what I hear at a larger studio. You don't need to spend \$100 per hour to make many microlevel adjustments. Filmmakers can save money by being as prepared as possible and by using the mixing studio as more of a mastering studio. You still need professional post-production facilities for outboard effects and for the large screen, which for some reason changes the way the movie sounds."

Dialog editing is not the most creative endeavor. It's a relatively mechanical process in which you locate and assemble the original pieces of dialog from the production audio tapes. Depending on how well the dialog was recorded and documented, this can be a smooth or a rocky process. The production audio can arrive in MDM, DAT, Nagra, or other formats. It may be time coded, but on independent films, it probably isn't.

Steinbach is currently doing dialog editing and sound design on Heidi Arnesen's *Some Prefer Cake for Up All Night Productions*. The San Francisco-filmed, independent feature is a contemporary relationship story. Steinbach was given DATs with the dialog and stage sound. It had been tracked wild

(without time code) by two different engineers using lavalier and shotgun microphones.

One sound recordist was evidently a novice; his recording levels were really hot. "I could tell this guy was a music engineer," Steinbach said. "He always recorded as close to zero as possible, which is what you would do in music. In film you can't do that because you can't risk ever going over zero. It's much better to record low; you just don't know when someone is going to clap their hands or whatever. A peak is just unacceptable. There are a lot of peaks on these tapes. They're horribly distorted, and there's nothing I can do about it. If it's recorded low, it's not the end of the world. It's not ideal, but I can always give it more gain."

To some degree, dialog editors live or die by the work of others. They rely on sound recordists to slate each take and to record words such as "scene 2, take 6" just before each cue. "Slate at the beginning of the take; delayed or omitted slates waste time," Steinbach advises. "Roll as little as possible. Don't track crew chatter. And keep thorough logs. Good sound reports match what is on the tape." Making note of the DAT ID numbers, camera roll, scene, take, and in/out time cues and adding short comments or descriptions of the usability of each take can save days in dialog editing. Also, remember to jot down your sample rate and time-code format if applicable.

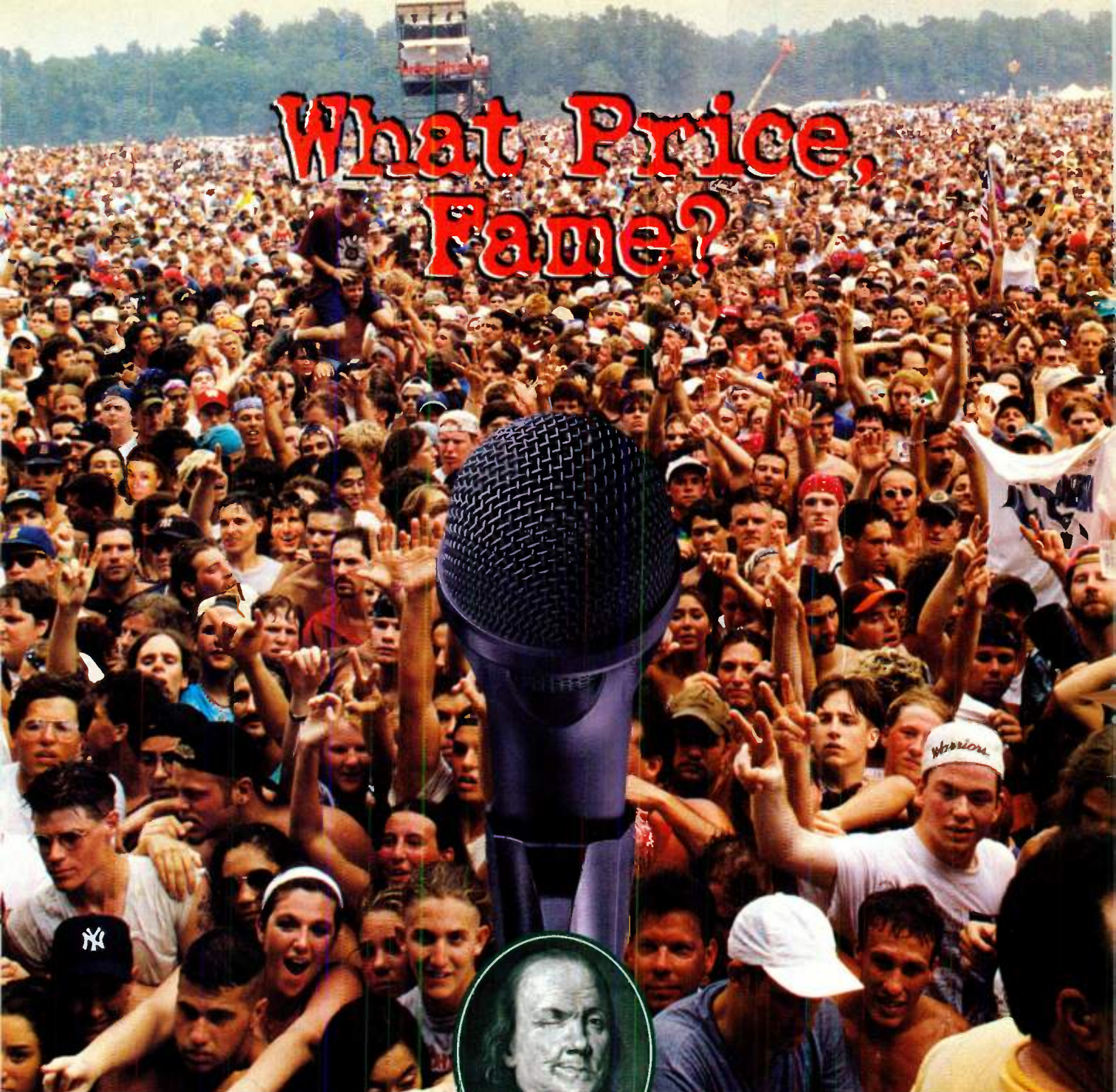
Another document that is helpful in the dialog editing process is the Edit Decision List (EDL), a list of each of the shots in the film and their location on the edited video. Nonlinear editing systems such as the Avid or Media 100 generate EDLs automatically, but if the editor is cutting actual film, the EDL will have to be written by hand. "If there's a discrepancy between the video transfer and the EDL," Steinbach points out, "I always defer to what's on the video. If there's a sync problem, I take it upon myself to move things around. There have been times when the wrong take was indicated on the EDL, so always be listening to your guide track at the same time as your rebuilt track. It'll let you know if you have the right take."

"When there are holes in the dialog," he continues, "you can't have perfect silence, or it will be obvious that there's a break in the dialog, a discontinuity. So



Producer Lon Mitchell Teller gave composer Thomas Dimuzio a QuickTime movie of Teller's film *In-side* with a mono soundtrack containing excerpts from Dimuzio's *Sonicism* CD. Based on this guide track, Dimuzio created music beds and sound effects. The film had no dialog or production sound.

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recording room tone is very important. Have everyone on the set be perfectly quiet. Using the same microphone and the same settings that you were recording dialog with, just record 30 seconds of silence. If anyone moves or shifts or if there's a sound outside, it will be picked up and heard later. Be careful not to breathe too loudly.

"On the current film [*Some Prefer Cake*], there's a laundromat scene, and the sound recordist thoughtfully recorded all of the actions that I'll need, such as opening the loader and putting in coins, recorded from different perspectives: close up and far away. Now I don't have to go to the laundromat to tape those sounds. Also, getting crowd *walla* is very important. [Walla is the indistinct background murmuring in a crowd scene, typically created by the extras on the set.] A lot of *Cake* takes place in a cafe; try finding a cafe that doesn't play music! So it's best to get as much crowd *walla* and room tone as feasible when on location, along with whatever effects you know will be needed."

MORE UGLY TRUTHS ABOUT TIME CODE

As Steinbach locates each dialog cue, he digitizes it using Digidesign's *Sound Designer II* and records everything into one big file. He then creates regions, names them, and breaks them up into discrete sound files.

"I then use Waves' *WaveConvert* to convert the sample rate. I'm biased toward the 44.1 kHz sample rate because that's the rate all my sound effects are sampled at. Most of the music that comes in is also at that rate. After converting the sample rate, I use Waves' *CI* plug-in to compress it. I usually don't use EQ; I leave that to the mixer. But I feel that compression is the key to really good sound, whether it's music, film sound, or effects. And *CI* doesn't appear to have a 'sound' to it at all; [transparency] is what you want. For 16 mm film, I'll hit it somewhat hard. If

you begin to hear the room, that's probably too much."

Steinbach recently finished work on *Fame Whore*, director Jon Moritsugu's punk triptych, which recently won two awards at the New York Underground Film Festival. "It's one of the least P.C. movies I've ever seen," attests Steinbach. Moritsugu assembled the film and the rough dialog track using a traditional flatbed editor. The production sound was copied from DATs to mag, which is like magnetic tape on a piece of celluloid film that is read by a stationary head on the editor. Jon found the clapper sound for each shot on the mag and synched that to where the sticks came together on the picture. "Although you can hear dialog and see lips moving at the same time," Steinbach says, "the dialog in *Fame Whore* was recorded without time code; there was no sync."

When the film edit was complete, Moritsugu had the final picture cut and the mono dialog scratch track transferred to video and delivered to Steinbach. Next, Steinbach recorded the rough dialog track from the 1/4-inch videotape into Pro Tools. "I imported

all the dialog cues from the location DATs and lined them up visually, just matching the waveforms. Doing dialog without time code is essentially cheating. You wouldn't want to do a big movie with a big budget that way because everyone would freak out. But it does work. You can tell the sync is perfect if you play the two tracks together and they just sort of phase. If they're flanging, it means the difference is changing." And it means you have a sync problem.

One of the more esoteric aspects of using DAWs, MDMs, or DATs for film involves the use of *pull-up* and *pull-down*. To vastly oversimplify the issue, each 24 frames of film is transferred to 30 video frames by duplicating every fourth frame, thus adding six extra frames per second. VCRs play 29.97 fps, so the film transfer is actually playing back slower. In order to compensate for the time difference, DAW manufacturers allow you to slow down playback when you're working with transfers and then speed it up slightly when laying it back to the master.

Steinbach elaborates, "If you're suffering a discrepancy in a pull-up or



Peter Steinbach created sound effects for commercials before moving into sound design and dialog editing for independent films. By focusing on this niche, he is able to do his job without needing a large, high-priced commercial facility.

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pull-down, after 30 seconds you'll have drifted by one frame. A third of one frame is the farthest I'll let it go. Every ten seconds I'll snip out ten milliseconds."

He explains that in the Pro Tools time-code menu there's a Film Transfer/Pull-down checkbox. Under normal conditions, he would have checked that box, but in this case he couldn't because he also had sound effects and

music in the same session. He had to do a sample-rate conversion somewhere, so he did it to the dialog. "If I have a 44.1 session," he says, "I convert it up to 44.144 kHz so that it plays back slower. You can't hear the difference, although you'd notice the sync drift after 30 seconds."

Steinbach's studio is built around a Power Mac 8500 with lots of RAM and hard-disk space. His VCR is a Sony VO-5800 U-matic 1/4-inch deck that is locked to a video signal sent by a Horita BSG50 blackburst generator. The blackburst generator provides a constant, sub-frame-accurate reference signal for locking all of the equipment together. It functions as the external clock source for a Mark of the Unicorn MIDI Time-piece AV that is set to the LTC video mode. The MTP AV, in turn, drives the Digidesign Pro Tools 888 I/O interface.

"The video sync issue must be underscored," Steinbach says. "Everything must be strictly in video sync; SMPTE alone doesn't cut it. Many products that use SMPTE are lock-and-release; they get things in sync and then let them go. Even though the clocks are very accurate, after fifteen minutes things drift a little bit, and even ten or fifteen milliseconds [out of sync] is unacceptable. You can get away without using a time-code DAT machine, but you can't get away from using house sync when you're putting this all together, especially when you're delivering to a professional facility."

EMOTIONAL CRUELTY FOR FUN AND PROFIT

Time-code issues aside, as long as things are well documented, dialog editing is relatively simple. It's essentially a graphic exercise. Sound design, on the other hand, offers some opportunity for playfulness.

"I love to record my own sound effects," Steinbach continues. "You don't often have the time and budget to go out and record the perfect cat screech, for example, so you end up using a sound-effects library along with everyone else. I've heard the same cat sound in dozens of commercials. And I've heard the same hospital page for Dr. Jay Hamilton in many productions. When you record your own effects, you get a lot closer to what you want, and you usually get a better recording. Also, it gets you out of the house, and it can be kind of fun. You need some jungle sounds? Better go to the jungle."

Steinbach's portable rig is a Neumann RSM 191-S with Rycote wind-screen and shock-mount blimp, a Schoeps preamp, and an Apogee A/D converter that is patched to a Sony DAT recorder. He recently collected water sounds for an Imax film titled *Whales*. "You really need to get within ten feet of a wave in order to get a good wave crash, which is a real trick when you're lugging \$15,000 worth of gear," says Steinbach. "My lesson from that project was 'don't record waves after drinking beer with your friends.'"

"Some films are realistic and straightforward in terms of sound effects," he continues. "You see a duck, you hear a duck. Jon Moritsugu is a director who likes to have fun with his movies. My favorite part in *Fame Whore* is a character who works in the Dog Placement



Fame Whore, directed by Jon Moritsugu, was recorded without time code. Peter Steinbach imported the dialog cues from the location DATs and lined them up visually by matching the waveforms.

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MAY 1997, KEYBOARD MAGAZINE.

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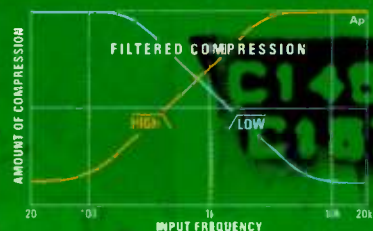
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Center, an animal shelter. The dogs are all off camera, you really never see the dogs, so I created the illusion that he works at a shelter by going to the Berkeley SPCA and recording a lot of dogs. For fun, just in case anyone ever noticed, I had the dogs react the way the character reacted. If he was angry, the dogs in the background got angry. If he was sad, the dogs were sad.

"At a climax in the movie, he receives a heartfelt letter from a girl who had adopted a new 'best friend,' and I have all the dogs whining and howling. I wanted a lot of different dog reactions, including happy barks and sad barks, so I actually had to torment the dogs to make them howl. These were dogs in cages, starved for affection. The way I made them howl was to almost pet them and then pull my hand away. They whimpered inconsolably. I'm going to hell for this."

The character of Jody, a tennis star, decides to commit suicide by taking a clock radio into the bathtub. "He turns on the radio and tunes it to a station," Steinbach explains. "It's a sound-design opportunity. You have to think about what song you would put on the radio as the character is contemplating suicide. My first reaction was some song that meant something. Then I thought, 'No, everyone's expecting that. Let's put on nothing. Not even give him the dignity of having some nice song at the end of his life.' So I gave him this half-tuned-in Vietnamese radio station with mostly static. It had no relevance at all.

"A good thing about sound design is knowing when to pull back. It's easy to get carried away and forget that movies are not usually about sound. If you distract from the movie, you're not doing your job. The visuals and the story are what drives the movie. Knowing when not to have sound is also important. In *Apocalypse Now*, when they napalm the forest, there's no explosion. It was very effective."

DELIVERING THE GOODS

Doing the final mix and print master is a larger job than Steinbach's edit suite can handle. For *Fame Whore*, he took a hard drive with the Pro Tools session that contained the edited dialog, music, and effects to San Francisco's Outpost studios, where the film was mixed by David Nelson.

Steinbach uses a Sony PCM-800, which he prefers to the TASCAM DA-88 because it has balanced ins and outs. "I'll run three PCM-800s in sync with Pro Tools and do a digital transfer: six tracks of dialog, six tracks of music, and eight tracks of sound effects for a total of twenty tracks. Everything has to be clearly labeled and clearly organized so that someone who isn't familiar with the session can understand what it's all about. Some people prefer to use an MDM as more of a shuttle than anything else. They bump everything back to analog 24-track or digital 24-track because the lock-up time is a drag on these MDMs. It's ten seconds or so, and if you're working repeatedly on a section, those seconds really add up.

"Digital is great for film sound," Steinbach notes, "because of the number of transfers that you have to make. I bring my portable rig out into the field and record a background onto DAT. I transfer it into my computer to edit and archive it onto a CD. I can then pull the recording back onto my hard drive for a film and transfer it to the PCM-800 for delivery to the mix studio. It goes through their mixing board to the print master. If we did this in the analog realm, [copying so many times] would be a problem."

Steinbach explains that you must "hold your sound's hand" through every step of the process. In the end, however, it winds up as a mono optical track on a piece of 16 mm film, typically displayed under adverse conditions. As he points out, "You cannot have nuance or subtlety in 16 mm film. If you can, there's a secret I don't know about. There's no dynamic range, and frequency bandwidth is minimal. It sounds like hell, and the trick is to minimize the sonic problems as much as you can."

Todd Souvignier is a San Francisco writer and musician with a background in the audio-software industry. Special thanks to the staff at Outpost.

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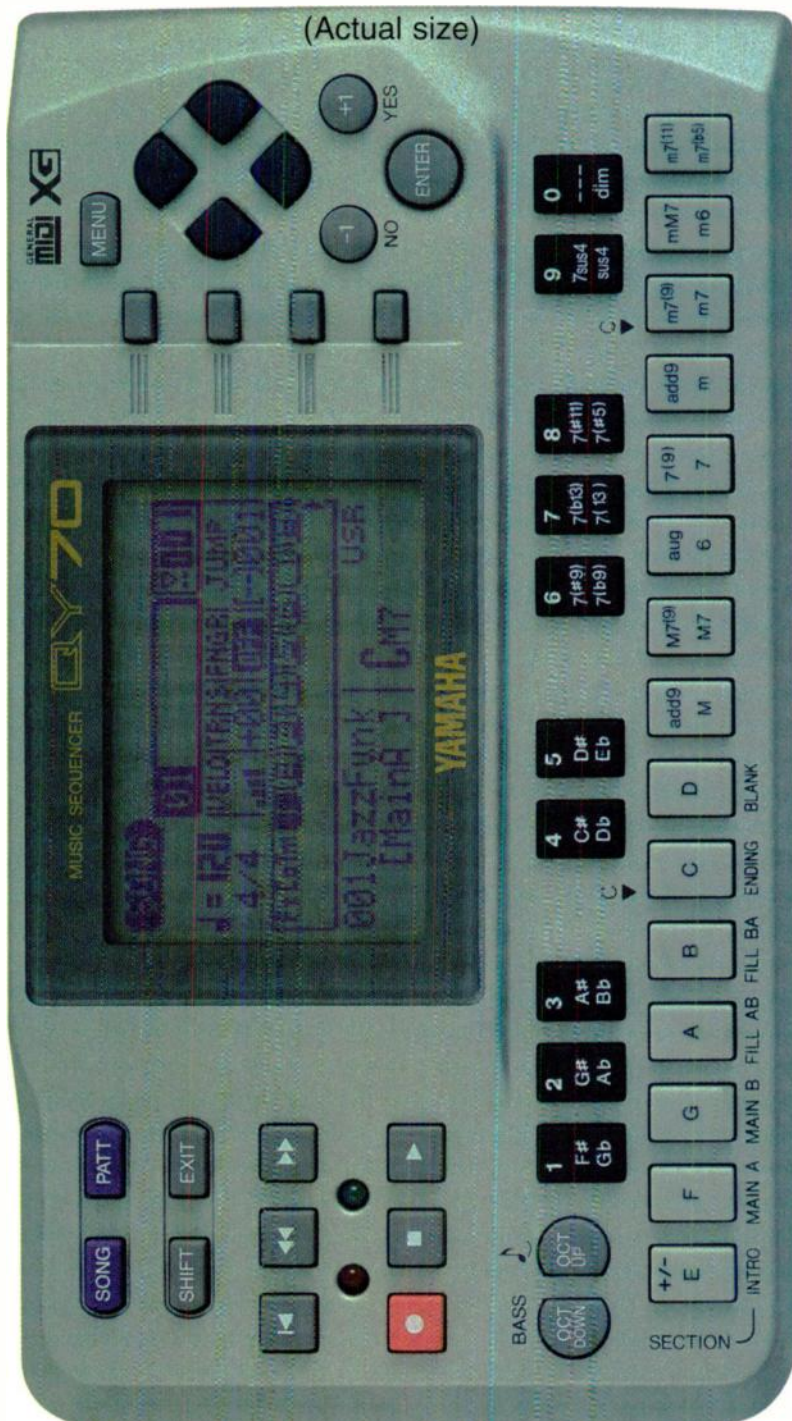
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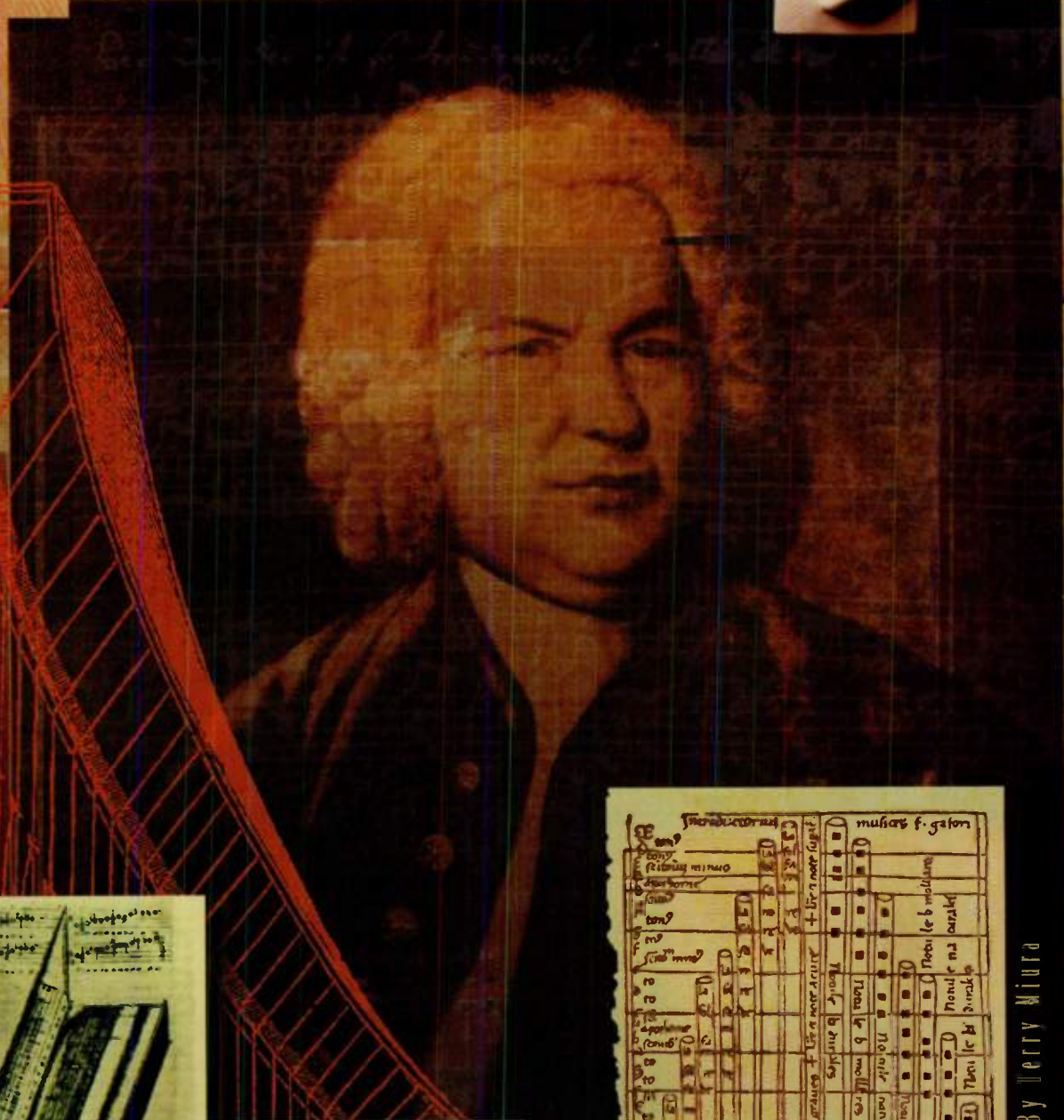
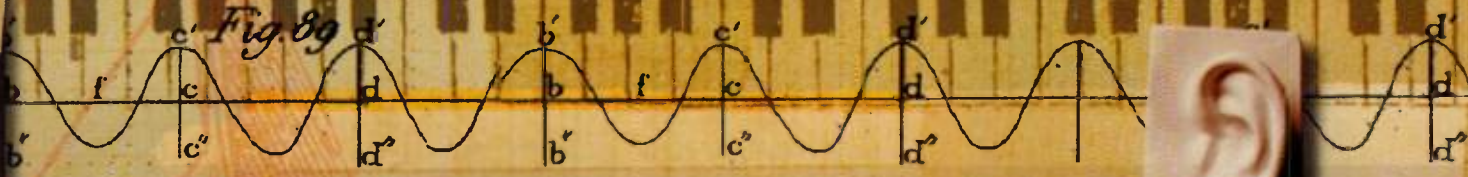
When you refer to keyboard instruments today, most musicians think of pianos or synthesizers. However, these are relative newcomers to the keyboard pantheon. The first attempts to create keyboard instruments date back hundreds of years before the invention of the modern grand piano and almost a thousand years before Bob Moog built his first synthesizer. Between the tenth and twelfth centuries, pipe organs were slowly evolving into something like the sophisticated instruments we know today. Stringed keyboard instruments began their evolution in the fifteenth century; the first of these instruments was most likely the clavichord.

The complete history of how these keyboards came to be—and how they work—is a fascinating story, but we're here to discuss the process of sampling them. (For more on the history and workings of all historical keyboard instruments, contact the Harpsichord Clearing House in Rehoboth, Massachusetts; tel. 800/252-4304; fax 508/252-4397; e-mail gng@harpsichord.com; Web www.harpsichord.com.)

For reasons we'll get into shortly, both types of keyboards—stringed (harpsichords and clavichords) and wind driven (pipe organs)—rank among the most difficult of all instruments to sample and loop, so roll up your sleeves and let's get to work. As with any sampling, you should always record to a DAT machine and transfer the recorded notes to your sampler in your home studio so you have plenty of time to pick the best notes.



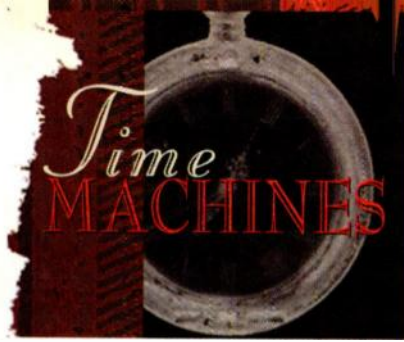
Fig. 89



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73	74	75	76
77	78	79	80
81	82	83	84
85	86	87	88
89	90	91	92
93	94	95	96
97	98	99	100



Illustration By Terry Miura



HARPSICHORDS

Many people think harpsichords are suitable only for playing baroque music, but it ain't necessarily so. Anyone who remembers the Yardbirds' "For Your Love," which was firmly based on a harpsichord-driven chord progression, will appreciate the fact that this instrument can rock, too.

The harpsichord (also known as a clavecin or cembalo) has a unique tone that is immediately recognizable. The sound is produced by a quill plectrum mounted on a pivoting tongue near the end of a wooden jack. When you depress a key on a harpsichord, the jack rises, and the plectrum (which sits only about a millimeter beneath the string) plucks the string above it. When the key is released, the jack falls back, and the plectrum pivots past the string

without sounding it a second time. A damper then comes to rest on the string to stop its vibration.

Part of the distinctive sound of the harpsichord comes from the jack falling back into place and the damper dropping onto the string as the note is released. Interestingly, harpsichords exhibit almost no dynamic range because the throw between the quill and the string is only one millimeter; lightly pressing a key produces roughly the same volume as striking it with a lot of force. As a result, harpsichords are fairly quiet instruments, which makes sampling them more difficult.

The most basic harpsichords use a single set of strings (which is called a *rank*), one string for each note. The typical pitch range of this rank is called the 8' register because it matches the pitch range of the 8' pipe-

organ register, which is so named because the lowest pipe in this register is eight feet in length. As the harpsichord evolved, additional strings were added—in some cases up to four per key—to make the instrument louder. An additional rank of 4' strings creates a brighter (and thus perceptibly louder) sound. The largest harpsichords, which can reach up to nine feet long, might have two ranks of strings at 8' plus two additional ranks at 4' and 16'. Such instruments normally have two manuals (keyboards) that can be linked to access all four ranks.

Harpsichords were developed in many countries, and subtle design differences produced instruments with distinct tonal characteristics. The various instrument designs are usually classified by the countries in which they were developed; for example,

harpsichords are identified as English, Flemish, Italian, French, or German, all of which have a different sound.

RECORDING THE HARPSICHORD

If you want to sample a harpsichord, your first task is obtaining access to a good instrument. Your best bet is finding one at a local university or in the possession of musicians who perform in baroque ensembles. You might even find one or more harpsichord enthusiasts in your area that have several different instruments available. Rarely, you might find a recording studio or even a church that has a harpsichord for special applications; however, these instruments are typically not well maintained and thus not suitable for sampling. Finding a good instrument often requires a lot of networking.

After you've located a good harpsichord, arrange a time to record it when things will be relatively quiet; these instruments don't put out a lot of volume, especially when playing single notes. At most universities, the best time is between semesters when there isn't a jazz ensemble practicing in the next room. In this case, though, the instrument might not have been tuned in a few weeks; like guitars, harpsichords require frequent tuning to sound their best.

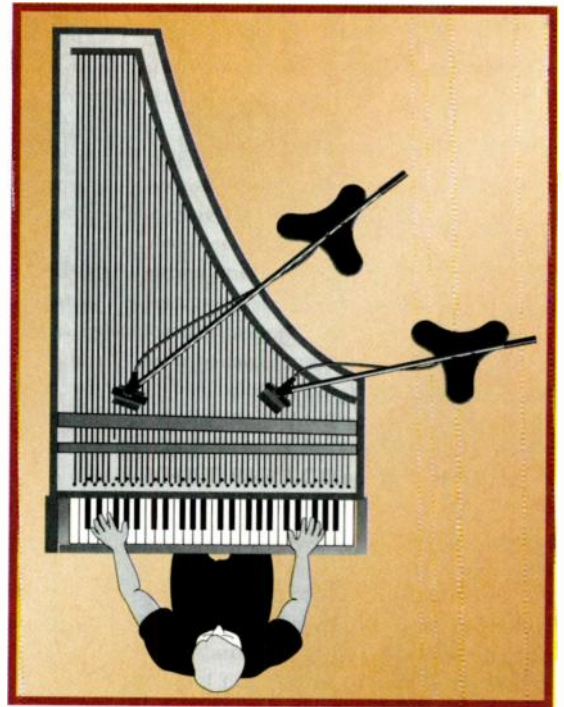


FIG. 1: When recording a harpsichord, position omni mics over the strings at a close distance.



This double-manual harpsichord includes three ranks of strings (two at 8' and one at 4'). The jacks are located under the strip of wood in the center of the photo. (Courtesy Harpsichord Clearing House)

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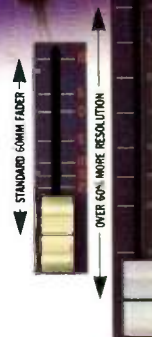


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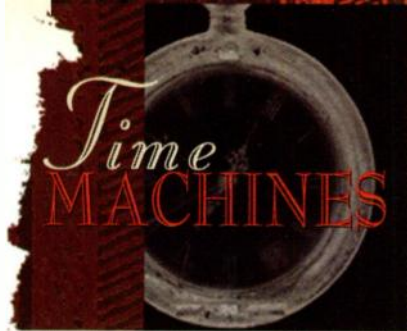
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A modest monetary contribution to the college or university usually helps to gain access, but it's often tough to find someone (usually a teaching assistant) willing to let you in during the evening or weekend. Be prepared to do a bit of negotiating and, if necessary, a little begging. If you find a private harpsichord owner, you might offer to do some recordings of the ensemble or individual in exchange for a few hours of the owner's time. Generally, people are happy to help out, as long as you don't make unreasonable requests.

Once your session is scheduled, it's time to decide which mics to use. Harpsichords produce a lot of upper harmonics, so you obviously want a condenser mic. In addition, an omnidirectional pattern works best in this application because the mics are placed very close to the strings (due to the low volume of the instrument). A cardioid pattern picks up too much energy from the strings immediately below the capsule and not enough from strings on either side, so the recording will be uneven in volume as you play farther up or down the keyboard from where the mic is placed. If you can get a harpsichord into a quiet studio, you can use cardioid mics placed farther away.

I've had the best success with a set of Earthworks TC-40K omni mics, which you can place very close to the strings without any boominess from the proximity effect. AKG C 414s set to the omni pattern also produce high-quality recordings, particularly when the low-frequency rolloff is set to the 150 Hz position. In addition, be sure to do your recordings in stereo, even if your ultimate goal is creating a set of mono samples.

Mic placement is the most critical part of the recording process. For starters, try the setup illustrated in Figure 1. Using two TC-40Ks to record an English harpsichord, I placed the mics about four inches from the strings. On a larger, somewhat louder German instrument located in a soundproof recital room, I placed two C 414 microphones about

eight to ten inches from the strings.

In addition to a DAT recorder and microphones, I always bring a small mixer and outboard mic preamp to location recording sessions. The mic preamps in most DAT recorders are not of the highest quality, and they don't provide phantom power for condenser mics. The mixer is handy for detecting any phase problems between the two mics. To check for phase cancellation (which you should do before any serious recording), pan both mics to center and make sure the lows or mids don't get lost. In addition, listen for a thin, nasal quality, which is another symptom of cancellation. (For more information on correcting phase problems, see "Recording Musician: Avoiding Phase Cancellation" in the July 1997 *EM*.)

Your best bet is to have someone play the harpsichord while you adjust the mics to the positions that sound best while monitoring through headphones. If you're on your own, record a section of music and then play it back to check the phase. You should also make sure the signals aren't clipping, which could happen even with such a quiet instrument if you have the record level set too high.

I suggest making several recordings of each note in the instrument's range (four and a half to five octaves) from

the point of attack until the sound fades to silence. Then release the key and keep the DAT going to record the sound of the jack dropping. The total duration of each note should be about five or six seconds in the low and middle octaves and three or four seconds in the upper two octaves.

Of course, we all want the very best and quietest samples possible, but you will probably record these instruments in a less-than-perfect environment, so a certain amount of ambient noise is almost sure to creep in. By their nature, harpsichords are delicate and usually very expensive instruments, so even musicians with deep pockets find it difficult to get one moved into an ultra-quiet studio for a perfect, noise-free recording. Fortunately, you'll never notice the noise as you play music with these samples.

SAMPLING THE HARPSICHORD

Once you have the DAT recording back in your studio, start by sampling the lowest note and working up the keyboard until you run out of memory. In most cases, I recommend sampling every minor third if possible. (Of course, you could sample every chromatic note, but this would take up an inordinate amount of RAM.) If memory is very limited, you can increase the sampling interval to every perfect

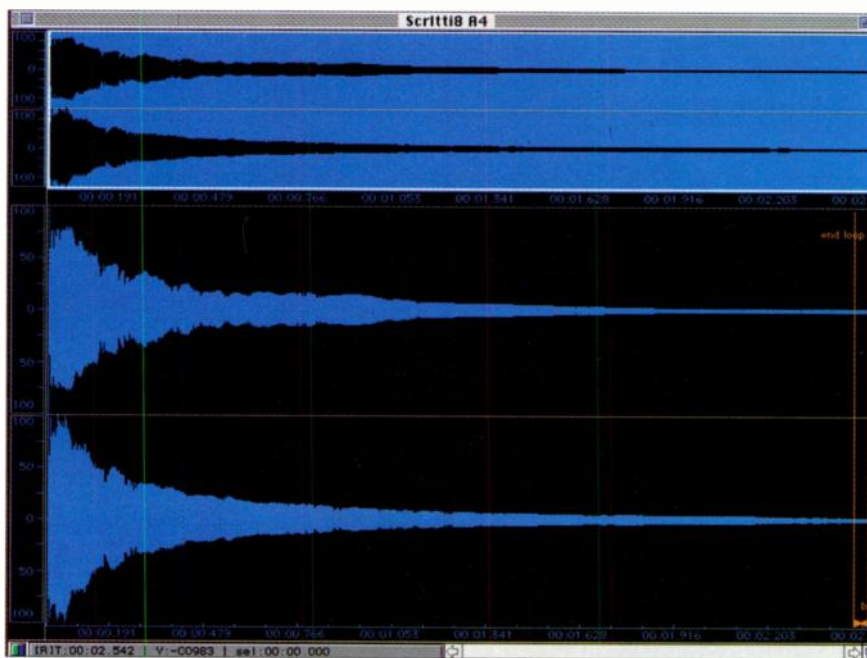


FIG. 2: This is a stereo recording of A4 played on a double-rank harpsichord. (The two sets of strings are both tuned to the 8' register.) Notice how smooth the waveform is at the loop points, some 2.5 seconds into the sample, which is due to the strings being in near-perfect tune.

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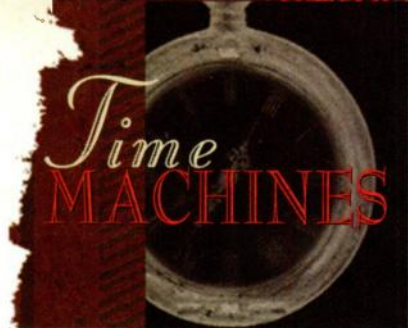


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fourth or fifth, or you can shorten the lengths of your samples. (Better still, get more RAM!)

For the low notes, four or five seconds is usually sufficient. In the upper octaves, two to three seconds per sample works well. For multirank harpsichords, use slightly longer samples. In any case, I suggest that you sample the full length of the note, including the release, so you can extract that sonic element and use it to create a separate set of release samples (more on this in a moment).

Single strings loop well with very short, linear crossfades, but samples of multiple strings are much tougher to deal with. I sometimes find it necessary (particularly with imperfectly tuned instruments) to create a longer loop of up to two seconds and then process it with an equal-power crossfade. I was very fortunate to get to use a double-rank instrument that had just been tuned before I recorded it, so looping was no problem (see Fig. 2).

For 3- and 4-rank harpsichord samples, you might find that no loop works well. In these cases, I recommend that you let the sample fade to silence naturally. Of course, this requires more RAM, but most modern samplers do a great job transposing harpsichord samples, and you can often get away with sampling every fourth or fifth, which helps conserve memory. Although such transpositions do not create a seamless set of samples, it's unlikely that you will notice this when performing.

For stereo, single-rank harpsichord samples, you'll probably end up with a multisample file between 8 and 12 MB in size. For a multirank instrument, 16 MB is typical. Of course, mono files are half these sizes. If you want to sample all chromatic notes, you need at least 36 to 42 MB of RAM dedicated to one harpsichord, which is rarely practical.

As mentioned earlier, for the most realistic samples, you should create a separate jack-drop keymap that triggers on release if your sampler allows this. Cut the jack-drop sound from each sample starting just a few milliseconds before

this sound actually begins (see Fig. 3), paste it into a separate file, and assign the new file to trigger on key releases.

Don't go crazy trying to create perfectly matched jack drops because they are not perfectly matched in an actual instrument anyway. It's not as important to tweak the jack drops to the same level of perfection as the primary set of samples. Typically, slightly adjusting the volume of the jack-drop samples can even out the response across the keyboard. We're looking for a subtle effect here.

CLAVICHORDS

It has been said that Bach preferred the sound and response of the clavichord to that of the harpsichord, mostly due to its characteristic touch and somewhat wider dynamic range. However, even the best clavichords have a dynamic range from fairly quiet to very, very quiet (mp to ppp). After all, these instruments were designed in the fifteenth century to be parlor instruments.

Anyone who has owned a Hohner Clavinet and listened to it without amplification understands these volume limitations; the Clavinet was designed on the same principles as the clavichord. As a result, clavichords were never used as accompaniment for other instruments or within ensembles.

The most remarkable aspect of the clavichord is its expressiveness. Using what is surely the oldest form of aftertouch, these instruments are capable of subtle pitch bending and even a vibrato effect known as *bebung*, which is German for "trembling."

Clavichords include one or two ranks of strings. When a key is depressed, an upright metal *tangent* (a type of brass blade), which is attached to the end of each key, contacts the string. Sometimes, the tangent acts like the nut on a guitar whereas other designs actually include frets that help define the pitch when the string is contacted by the tangent. This is similar to a guitarist performing a hammer-on, in which the left hand fingers a note on the fretboard without the right hand plucking the string.

SAMPLING THE CLAVICHORD

Almost everything I've discussed about harpsichords also applies to clavichords, particularly the caveat about close-miking due to the relatively low volume of this instrument; clavichords make harpsichords seem almost loud. In fact, it would be nearly miraculous to produce a completely noise-free set of samples.

Once you find a clavichord you can record, position your mics as close as possible to the string being played, and then reposition them every third or

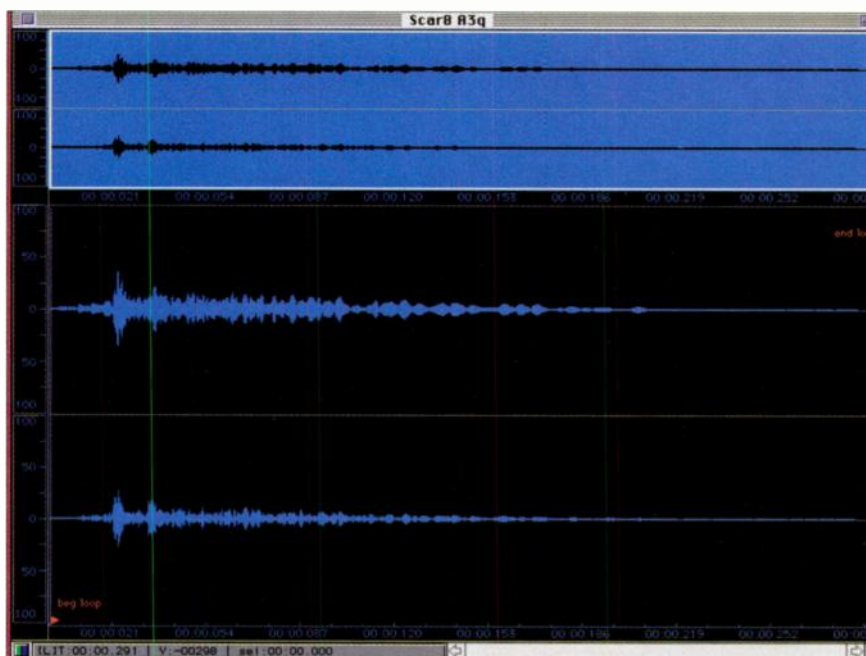
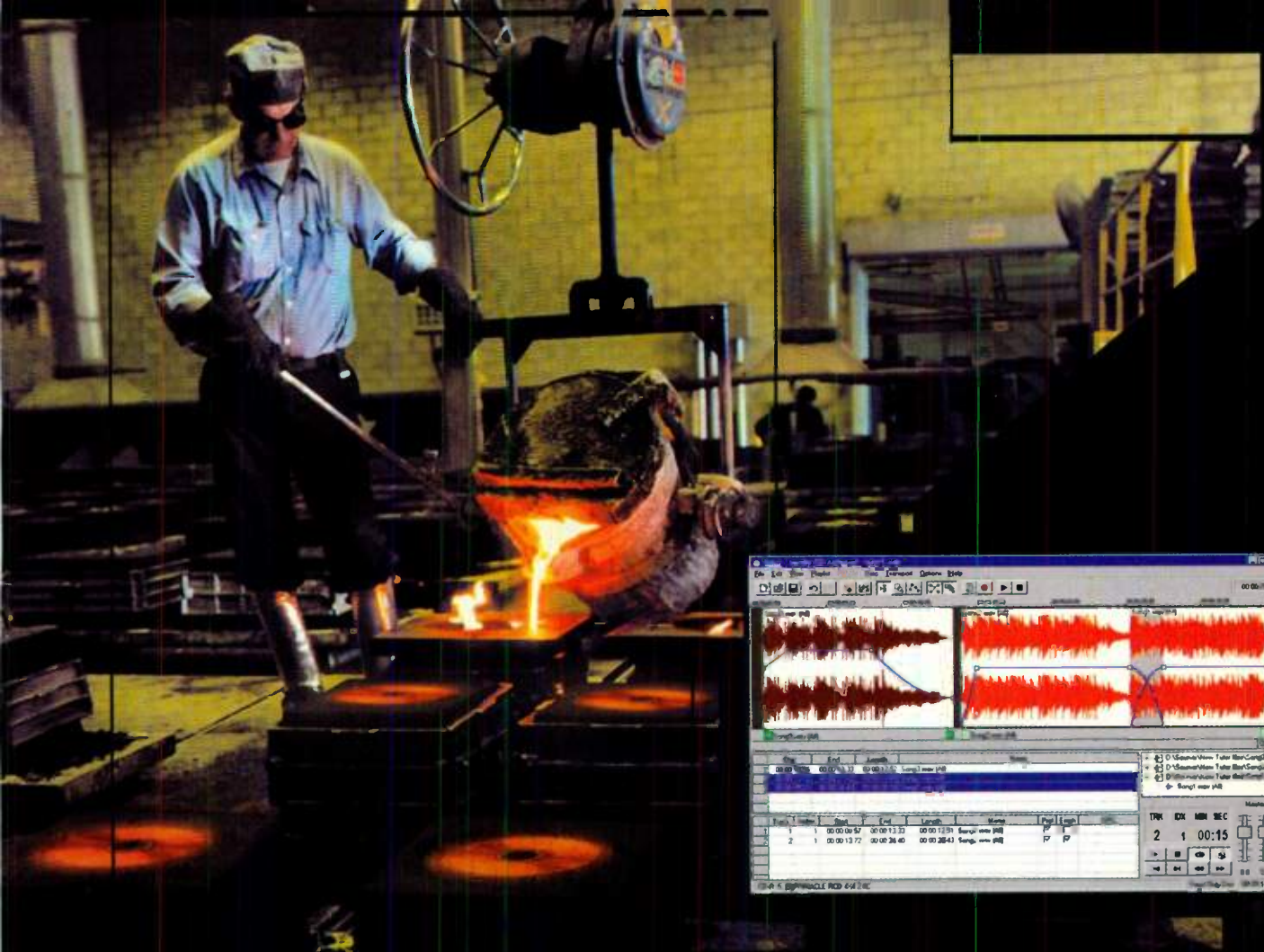


FIG. 3: The characteristic sound of the jack dropping after a harpsichord note is released is less than 0.3 seconds long. Only a small volume adjustment was performed; this effect should be subtle, so radical volume adjustment (such as normalization) is not required.



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fourth note as you move up the (typically) 4-octave keyboard. Stereo samples are great, but you might find that the limited working distance requires using a single mic and going for a mono set. In my own clavichord recordings, I've had success using an AKG C 414 (with the 150 Hz rolloff engaged) placed about two to three inches from the strings.

There is no jack drop in a clavichord as there is in a harpsichord. However, if you want the most realistic sound possible, consider sampling the wooden keys falling back into place and the damping of the strings by strips of soft cloth (known as *listing*) interwoven between the strings.

As with the harpsichord, you can generally get away with sampling every fourth or fifth note on the clavichord. A short, linear-crossfade loop generally works well, except when you encounter subtly out-of-tune string pairs that oscillate too noticeably to allow this. It is best to have the owner of the instrument correct the tuning before you record if possible, but a great many clavichords are just too old and delicate to maintain a perfect tuning for more than a minute or two.

Although it's interesting to play an acoustic keyboard that's capable of pitch bend, I don't recommend sampling this effect separately; it's subtle and adequately duplicated with Aftertouch applied to Pitch Bend. The *bebung* vibrato is also unique, but creating a sample set that duplicates this effect would require a lot of work because you'd need many samples to keep the pitch consistent across the keyboard. For those hardy souls who are determined to do so, I recommend sampling several cycles of the vibrato and then looping just one cycle. (See "Hot Licks" in the October 1995 *EM* for more on this technique.) You can then use aftertouch or the mod wheel to bring in the *bebung* with a crossfade.

PIPE ORGANS

There are many people who think pipe organs are strictly church instruments.

Of course, many pipe organs reside within churches around the world, but they also have a strong presence in modern concert halls. Still, the pipe organ has been associated with European culture and the Christian church, even though its inventor is widely acknowledged as a man named Ktesibios, an engineer from Alexandria, Egypt, in the third century BCE.

Regardless of its history, which could easily fill a book, the pipe organ is an instrument like no other in the world. The largest instruments can incorporate many thousands of pipes and seven manuals plus pedals. The pipes are divided into subsets called *ranks*, which produce different timbres. Most ranks are enabled and disabled by controls called *stops*, so called because they stop the flow of air to the corresponding rank. Compound stops, such as Mixture and Celeste, affect up to ten ranks with one control. Often, people use the word "stop" to refer to the corresponding rank of pipes.

The wind power required to drive such an instrument is enormous. The monstrous organ in Winchester Cathedral was built in the year 950, and it required two people to play it and no less than 70 strong men to work the 26 bellows that provided the wind needed to sound the notes. Of course, modern organs use electricity to power the blowers that produce the wind to sound notes in wood or metal pipes, which can be up to 64 feet in length.

The pipe organ is often described as the original synthesizer because it can create an almost infinite variety of timbres by combining various "root" sounds (the ranks) in different proportions. It has also given us some important terminology that carries over to modern synths, such as the Mini-Moog, which had oscillators tuned at 16', 8', 4', and 2'. As mentioned earlier, these numbers refer to the length of organ pipes.

As for the notion that the pipe organ can only play "church music," let me



The keys of a clavichord end with a metal tangent that excites a string to vibrate when played. (Courtesy Harpsichord Clearing House)

suggest that you check out Saint-Saens' Symphony no. 3, which is best known as the *Organ Symphony*. With a good sound system, the final movement will rattle your walls and clear out your sinuses while convincing you that this is no one-trick instrument. Even contemporary composers, such as James Horner and Alan Sylvestri, have used the pipe organ in their scores. And it's hard to imagine Richard Strauss' *Also Sprach Zarathustra* (perhaps better known as the theme from *2001: A Space Odyssey*) without the pipe organ's ominous, opening pedal tone and the massive finale that relies so heavily on this instrument.

RECORDING THE PIPE ORGAN

Finding a pipe organ to sample is usually not as difficult as locating a harpsichord or clavichord. Even small cities usually have one or more churches that house a well-maintained pipe organ. Some larger cities have many to choose from, including one or more in concert halls. A modest donation to a church is usually sufficient to gain access to its instrument, but access to

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concert halls might be a bigger problem due to certain union rules.

The biggest problem recording pipe organs is ambient noise. Put on a set of headphones in any large, live church or hall and you hear a startling level of extraneous noise from the air conditioning and heating system as well as outside sources (e.g., nearby traffic or

overhead planes). When you turn on the organ, you can hear a shocking amount of roar and hiss from the blowers, which the human brain (wonderful organ that it is) can filter out during live performances.

At one point, I had the brilliant idea of sampling each rank on a pipe organ to create a virtual pipe organ by mixing ranks when creating presets. It quickly became apparent that most individual ranks are simply too quiet to compete with the noise levels, even on large instruments. In addition, the pipes are located high overhead in most venues and are therefore not accessible for close-miking. Typically, they are also

spread out across a large stage or wall, requiring a wide polar pattern on the microphones.

Then there's the issue of polyphony. The most massive organ tones can include hundreds of ranks. For a stereo sample that uses only a dozen ranks, this would gobble up a ridiculous 24 voices of polyphony. Even on a 128-voice Emulator E4X, you would only be able to play five notes! On a 48-voice Kurzweil K2500, you could play only two.

I recommend that you begin by sampling a few of the louder solo voices, such as Trompette or Cornet IV, and then experiment with various stop combinations. Many larger pipe organs

A DIFFERENT APPROACH TO PIPE ORGANS

Bob Walker of Walker Technical Company creates high-end, sample-based pipe organs for churches and other venues around the country. For these instruments, he samples each and every pipe separately at 100 kHz, includes every chromatic note in the sample file, and builds his own sample-playback hardware (including speakers). For our purposes, however, he recommends a different approach to mic placement.

For one thing, Walker prefers close-miking whenever possible. He points out that the ranks of pipes are assembled into chests, which channel the air for up to a dozen ranks. The most common types of chests are called chromatic, A, and U.

Chromatic chests have the longest pipe at one end and the shortest pipe at the other end, with all the chromatic notes located sequentially between them.

An A chest has the longest pipe in the middle, and the pipe for each chromatic note above it is placed on alternate sides. As a result, the pipes in an A chest get shorter as they approach the ends, which resembles the letter A.

By contrast, a U chest is configured in the opposite manner: the shortest pipe is in the middle, and the pipe for each chromatic note below it is placed on alternate sides as you move toward the ends of the chest, which resembles the letter U.

For close-miking, a U chest is the best. These chests normally in-

clude a walkboard in the center, which provides access for a technician to tune and maintain the pipes. In some cases, the two sides of the chest are separated by the altar or other structure. Walker recommends placing two cardioid mics on the walkboard facing outward toward the long pipes at the ends of the chest. If the chests are separated, place one mic at the high-pitched end of each chest facing toward the longest pipes. Depending on the exact polar pattern of the mics, place the mics about one to two feet above the smallest pipes to achieve a uniform level for all pipes.

If the organ you want to record uses A chests, place the mics at the outer ends of the chest above the shortest pipes facing inward toward the longest pipes. Unfortunately, this will cause phasing problems if you convert these samples to mono. For chromatic chests, the best solution is a coincident-pair configuration, such as X-Y or ORTF, placed at the high-pitched end about one to two feet above the shortest pipes and facing toward the longest pipes.

Walker points out that close-miking eliminates much of the ambient-noise problem, which means you don't have to sample at a lower rate. He likes to hear high-frequency detail and even some of the noise, which imparts a more realistic feel to the sound. Close-miking also lets you apply artificial ambience instead of relying on the ambience of the hall. In fact, Walker recommends that you avoid record-

ing the room ambience because you lose some of the clarity of the sound. If you put the mics close to the pipes, you get a high-frequency transparency that helps make the final product sound real.

However, it's much more difficult to obtain permission to crawl around in the pipes, some of which can be easily damaged by an errant mic cable or slip of the foot. If you want to try this approach, you must be very careful and willing to pay for any damage you might cause. Clearly, the distant miking techniques discussed in the main article avoid this problem.

Walker also records the release of each note and treats it much like the release of a harpsichord. This is particularly critical for Reed stops, which sound obviously phony without the release. However, this is pretty tricky and takes a lot of time to do correctly.

To preserve polyphony in standard samplers, Walker recommends creating five basic patches from recordings of the corresponding groups of ranks. These include the 8', 4', and 2' Principal stops with Mixtures in one patch, two Flute patches (one of the 8' register only and one that combines the 8', 4', and 2' registers), and two Reed patches (the Trumpet stop at 8' and a combination of the 16', 8', and 4' registers). These patches can then be layered to produce many characteristic pipe-organ timbres.

—Scott Wilkinson

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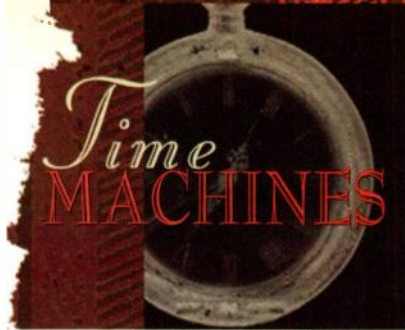
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actually have preset combinations, which are programmed by the builder or organ master; these presets are a great place to start.

Listing all the various ranks, stops, combinations, and voicings available on a quality pipe organ would be impossible, but some typical examples include Flute stops (such as Rohrflute, Spitzflute, Flute Harmonique, and Bourdon), Diapasons (including Montre, Principal, and Prestant), Reed stops (Oboe, Cromorne, Bombarde, and Clarion) and Mixtures/Mutations (Nazard, Tierce, Fourniture, and Plein Jeu).

In addition, most pipe organs have at least two or three manuals that are often identified by the stops they access, such as Great, Swell, Choir, and Antiphonal. Each organ also has a separate set of stops accessible from the pedal board (which you should record separately, of course). In some cases, stops can be "coupled" so they are available from more than one manual.

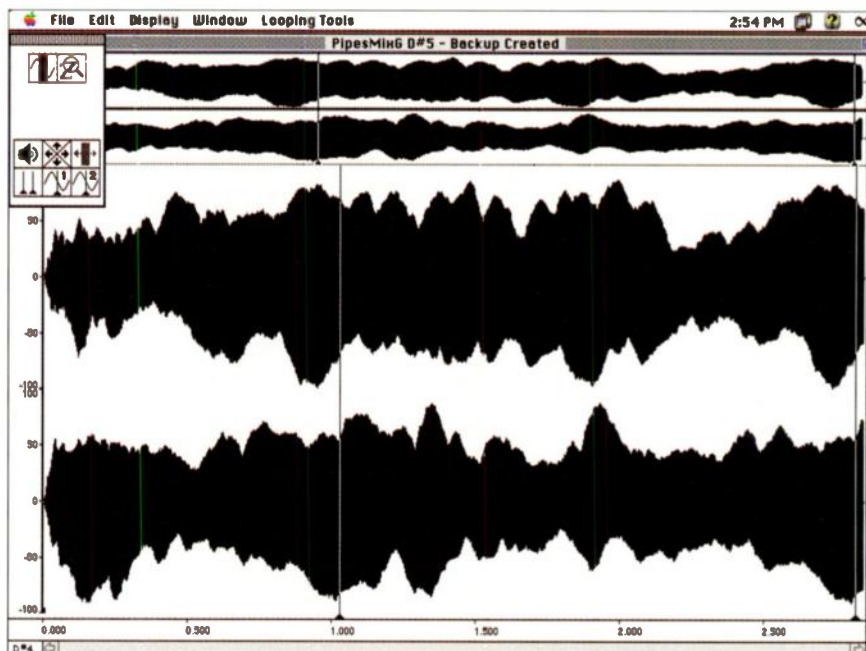


FIG. 4: You'll probably never see another waveform with less consistency than this one (unless it's another pipe organ). This screen shot demonstrates how tough it can be to loop pipe organs due to the complexity of five stops playing at once, none of which are completely in tune.

Another factor to consider when recording a pipe organ is *foldback*, which you'll have to deal with when creating your sample sets. Players of the Hammond B-3 should be familiar with this phenomenon, which occurs

because some stops do not cover the full 61-note, organ-keyboard range. At some point (or at more than one point), the notes "fold back" on themselves. For example, a 49-pipe Nazard stop might repeat the top octave, which can radically alter the tone as you move up the keyboard; suddenly, your highest harmonics drop down an octave.

Typically, most listeners won't notice this shift in tone, but it's something you should take into consideration as you record your way up the keyboard. Otherwise, it will come as a shock the first time it happens, and you'll probably think something is wrong with your EQ settings.

Take your time, and record as many different stop combinations on the various manuals as you can. Also note that pipe organs often include stops named after real acoustic instruments (e.g., Viola da Gamba), but these are just labels, and the corresponding stops aren't meant to sound exactly as the name implies. For the most part, these names describe a type of tonal characteristic that more or less matches a family of instruments.

As for mics, use any condensers you feel comfortable with, as long as they have an extended frequency response; pipe organs have the widest frequency range of any instrument on the planet (other than analog synths). My favorite



The pipes of a pipe organ are often located high above the floor, making them difficult to close-mic. This organ uses a U chest that is divided by the altar. (Courtesy Wicks Organ Co.)

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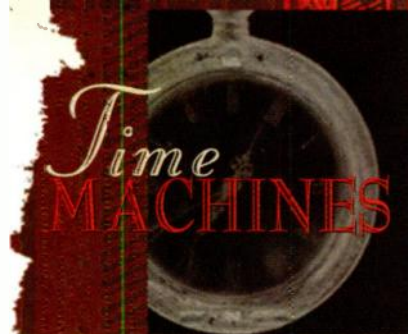
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mic in this application is the AKG C 414 set to a cardioid pattern, but I've also had great success with a Crown SASS-P stereo mic, which is omnidirectional at low frequencies and cardioid at high frequencies. Another nice mic for this application is the Audio-Technica AT4050/CM5, which is a large-diaphragm condenser with multiple patterns.

Omnidirectional condensers, such as the Earthworks TC-30 and TC-40K, sound fabulous and have superb imaging. But true omnis work best fairly close in, which wasn't possible with the organs I have sampled; they admitted just a bit too much extraneous noise at the distances I was required to use.

Pipe organs tend to fill the hall with sound, so mic placement isn't too critical. The best position for getting a good balance in a church is about twenty feet away from the pipes, usually in the first row of seats or pews. In a concert hall, the front edge of the stage is a good place to start. Trust your ears, and set up your mics where you hear the best sound. I prefer to set the mics on booms about two or three feet above my head.

As mentioned earlier, some of the individual stops can be quite subdued, making it difficult to record them cleanly. My best advice is to use mics with a cardioid pattern to cut down the overall ambient noise of the church or hall. Shock mounts can help to isolate the mics from the low-frequency rumble of the blowers, but some amount of that noise is going to creep into your recordings no matter how careful you are.

SAMPLING THE PIPE ORGAN

You should be prepared for some low-frequency rumble, due to the roar of the blowers, and some high-frequency hiss when working with the darker Flute and Diapason sounds. The latter problem can easily be offset by sampling at a lower rate, such as 31.25 kHz (or even lower in the case of some pedal tones). Fortunately, you'll never notice these artifacts when you play these samples polyphonically.

The toughest challenge in creating pipe-organ samples is looping, particularly with some of the multistop combinations and the chiffer flute and reed stops. The reason is simple: the pipes are almost never perfectly in tune, so they tend to beat or oscillate to some degree and exhibit some phasing, chorusing, or flanging effects (see Fig. 4).

Generally, these loops require long, equal-power crossfades. However, even with 4- to 6-second samples, you might not have one complete cycle of the entire shifting or beating effect. This isn't normally a problem because you're probably not going to listen to each note individually. Sometimes, you can create a better loop (and a better-sounding sample) by looping it twice: once to get rid of clicks or pops and the second time to smooth out the beating effect. However, you sometimes end up with a rolling, shifting sample no matter what you do.

When all else fails and even your best efforts are less than perfect—and believe me, this is inevitable with pipe organs—just live with it. You can go crazy trying for the perfect loop and never finding it! I know, I've tried. Fortunately, most pedal tones loop beautifully using samples as short as half a second (or less) with a linear crossfade.

LIVING IN THE PAST

Now, there is no law that limits the use of historic-keyboard samples to performances of "old" music. Be creative! For example, try substituting a sampled harpsichord or clavichord in place of a guitar accompaniment or piano part. Consider using a massive, mysterious pipe-organ sound instead of a big string pad; unlike a real organ, samples let you create a slower attack, allowing the sound to swell up. Either of these applications create interesting tonal colorations that listeners don't expect.

Of course, these are only two of many possibilities that are just waiting to be explored by intrepid musicians. In an age when new and unusual sounds are hard to come by, you just might find that these ancient and unique instruments are just the thing to get your audience to sit up and take notice.

Jim Miller is a frequent contributor to EM and a freelance sound designer whose samples have appeared in libraries and instruments from Alesis, Kurzweil, Roland, Peavey, and Sweetwater Sound.

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REACHING FOR THE

By Brian Knave

The personal-studio revolution put exquisite audio tools into the hands of the masses, but it did not manage to wipe out the inequity of the Haves and the Have-Nots. Large commercial studios can still afford the sexy, high-end gear that home recordists can only dream about. ("Same as it ever was," to borrow a line from David Byrne.) But *how much* improvement in audio quality are those rich acquisition budgets buying the pampered pros? For example, does the sound of a \$4,000 signal processor outstrip the sound of a \$400 unit by such a huge margin that the expensive model automatically elevates source signals to a pinnacle of undeniable brilliance?

Well, we just have to know how much audio magic lies within those costly toys. In the June 1997 EM ("Rich Man, Poor Man"), we pitted high-end microphone preamps against inexpensive models to see exactly what the pricey boxes delivered in relation to preamps we could all afford. Now, we're sliding six solid-state, stereo compressors under our value microscope for a similar price versus performance comparison.

For the inexpensive category, we looked at three models costing less than \$300 each: the Aphex 108, the dbx 266A, and the PreSonus Blue Max. The opulent units chosen were the Avalon AD2044 (\$4,200), the dbx 160S (\$2,495), and the Focusrite Red 3 (\$3,995). Is there even a prayer that the affordable boxes can sound decent compared to the tonal sophistication of such moneyed majesty? Should you simply toss your masters into the nearest trash bin until you can afford to spend four grand on a *real* compressor? Sit tight, gang; all will be revealed as we toss the diamonds in with the cubic zirconia, shake things up, and see which sparklers really shine.

*How do \$300 compressors
stack up against heavenly
units that cost thousands?*

STARS



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THE ARENA

To test the units, I focused on five instruments: electric fretless bass, acoustic guitar, vocals, kick drum, and snare drum. I recorded each instrument flat (without EQ) through a Mackie 8•Bus console to one track of an ADAT XT and cloned the performances to tracks three through eight. For vocals and acoustic guitar, I used a Neumann U 87; for kick drum, an AKG D 112; and for the snare drum, an Earthworks TC-40K for brush work and a Shure SM57 for sticks. I recorded the bass guitar direct via a Countryman DI box.

I set up the tests so I could patch each compressor into a separate channel insert and hear the units side by side, in real time, processing the same signal. Of course, I also made use of each compressor's bypass switch to compare processed and unprocessed signals. In addition, I listened to each compressor with some tracks—primarily fiddle, funky Stratocaster, and fretted bass—from a sample disc provided by PreSonus.

For these monaural instrument tests, I tried a number of settings with each unit, including mild, moderate, and extreme compression ratios; different attack and release times; and varying thresholds. Naturally, I had to spend a good bit of time fiddling around with

each compressor to find the best-sounding setting for each instrument. It was rarely a matter of simply applying the same setting to each unit.

It was also important to hear how each compressor performed in stereo-link mode while processing a complete mix. For this application, I dug up a few DATs that featured full-band mixes as well as a few simpler mixes consisting only of guitar and vocal. For this part of the tests, I kept the compression ratios low, between 1.5:1 and 2:1 (which is where they'd likely be in a typical mastering application) and sought to find the most transparent settings. Of

Model 108 "Easyrider" Automatic Compressor. With only three knobs per channel, this compressor is about as user friendly as they come. You get Drive, Speed, and Output (which is about the same as what Peter Fonda got in the movie of the same name).

Drive is basically input gain and provides a 40 dB range. The Easyrider has a fixed threshold (which actually varies depending on whether you operate the box at -10 dBV or +4 dBu levels). At either setting, though, the relationship of nominal level to threshold remains the same. Because the Drive control changes the relationship of input level



Aphex 108

course, I was also curious to see how well the limiting worked on the units that offered it.

MEET THE AFFORDABLES

You *know* these babies. You've met them in home studios and seen them on the shelves of your local music store. Perhaps you even own one. At under \$300, these units are attainable wonder boxes that can improve the sound of your tracks. But can they make a pro engineer proud, or are they marginal-sounding opiates for the personal-studio masses? Let's look now at these value-priced compressors from Aphex, dbx, and PreSonus and assess each unit's strengths and weaknesses.

APHEX 108 EASYRIDER

Aphex was clearly thinking in terms of ease of use when they designed their

to threshold, to increase the amount of gain reduction, you simply add more Drive. This "drives" more of the signal over threshold—effectively the same as lowering the threshold and increasing make-up gain. That's the cool thing about the design: the unit performs both operations with one knob, simplifying the procedure.

The Speed control adjusts the range of the Easyrider's automatic release times and is labeled, simply, Fast on the left side and Slow on the right. The Easyrider utilizes a proprietary "Wave Dependent" circuit that adjusts attack and release times automatically according to the texture of the waveform. Big changes in the signal, such as transients, call up a fast attack time whereas small changes evoke a slower attack time.

The unit also employs a soft-knee compression curve, dubbed "No-Knee,"

AFFORDABLE SPECS

Manufacturer/Model	Aphex 108	dbx 266A	PreSonus Blue'Max
Maximum Input	+29 dBu	+22 dBu	+22 dBu
Maximum Output	+22 dBu	+21 dBu	+24 dBu
Frequency Response	10 Hz–30 kHz	20 Hz–20 kHz	10 Hz–50 kHz
Dynamic Range	94 dB	114 dB	115 dB
Noise	-72 dBu (+4 dBu); -83 dBV (-10 dBV)	-92 dBu	-96 dBu (+4 dBu); -92 dBV (-10 dBV)
THD + Noise	0.03%	0.2%	0.03%
Stereo Crosstalk	-80 dB	-93 dBu	-82 dB
Price	\$299	\$249	\$249



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designed to deliver smooth gain reduction. The No-Knee ratio increases continuously from 1.1:1 at threshold to over 5:1 at 20 dB of compression. Together, the Wave Dependent circuit and No-Knee curve do most of the thinking for you, making this box practically a no-brainer.

The Easyrider is a lightweight, 1U rack-mount box with an aluminum front panel decorated with orchid pinstripes bordering a gray center strip. Along with the three rubber knobs, each channel features a process in/out switch with red indicator light and a recessed, 10-segment LED that monitors gain reduction. Two other LEDs, located next to the stereo-link switch, indicate power on and stereo-link mode. The unit's rear panel has balanced ¼-inch TRS inputs and outputs and separate operating-level switches per channel. There is no sidechain access. Power is provided by a wall-wart adapter.

Bang for the Buck. Considering that the Aphex 108 is primarily an automatic compressor, offering only a minimum of manual control, it does a decent job of covering many bases. Bass guitar, however, is one base it doesn't quite cover. Even at the lowest settings, it sometimes grabs a bit, evidently getting confused by the wealth of low-end information. For example, on a fast, sixteenth-note run, the Easyrider seemed to hold on to each bass note a shade too long, even at the fastest release setting. Naturally, this caused a loss of articulation in the phrase.

Likewise, the Easyrider has a difficult time with kick drum, accentuating the boom and making the drum sound slightly "boingy." Even using very modest settings (low Drive and Fast release), I couldn't achieve the dry, punchy sound I wanted. However, on the snare drum, the 108 sounded great. It nicely accentuated the low-mid "whap" of the stick, the paperlike snap of the snares, and the lush sweep of the brushes. Driving it hard and using a

10 REASONS TO SPEND BIG BUCKS ON A COMPRESSOR

1. Knob appeal.
2. Snob appeal.
3. Need to invest serious money for business write off.
4. Unit's sheer bulk and weight engender feeling of security.
5. Sophisticated user interface appeals to the control freak within.
6. Expensive gear dazzles clients and justifies higher studio rates.
7. Profusion of glistening LEDs suggests a crown of jewels.
8. You simply cannot produce music without huge VU meters.
9. The more money you spend, the more masterful you become.
10. Volkswagens are okay for some folks, but you require a Jaguar.

medium release, I got a well-defined, wet yet meaty backbeat. It also did a superb job on fiddle (warm and thick) and electric rhythm guitar (fat and visceral, with lots of body).

Another place where the Easyrider shines is on stereo material. Set with a low Drive (around nine o'clock), the unit performs very light, transparent compression with no uncomely coloration, low-end weirdness, or overt loss of highs. The only drag, function-wise, is that the stereo-link switch links only the VCAs, not the Drive and output controls—which means you have to match the channel controls manually. However, this is no big deal, and it actually offers the advantage of accommodating minute level differences between right and left channels of a stereo mix.

Acoustic guitar and vocal are two other instruments for which the Aphex 108 is perhaps less than ideally suited. My studio helper, singer-guitarist Nancy Hall, described her acoustic guitar tracks as sounding "brittle" and "slightly squished" when compressed through

dbx 266A

Part of the dbx Project I series, the 1U rack-mount 266A Compressor/Gate is a straightforward box with seven knobs per channel: five for the compressor and two for the expander/gate. Compressor controls include threshold, ratio, attack, release, and output gain; the expander/gate has threshold and ratio. Attack and release controls are scaled with AutoDynamic circuitry—a program-dependent algorithm that is coupled with the manual controls.

The unit's compressor threshold is variable from -40 to +20 dB, ratio from 1:1 to ∞:1, and output gain from -20 to +20 dB. There are also threshold and ratio controls for the expander/gate section (complete with threshold above/below LEDs), with threshold ranging from Off to +10 dBu and ratio from Minimum to 10:1. Attack and release times for the expander/gate are program dependent. Each channel provides an OverEasy switch (for soft-knee compression), a 3-segment threshold LED (indicating whether the signal is



dbx 266A

the Easyrider. To my ear, they also had a slightly unnatural, "boxed in" sound. Vocals fared a bit better, sounding warm and fairly smooth, but they, too, evidenced the slightest artificial quality. The Easyrider definitely takes the prize for ease of use, though. As compressors go, this is about as close as you'll likely get to finding a set-and-forget box.

below or above threshold or in the OverEasy range), a 10-segment gain-reduction LED, and a bypass switch with indicator light. A stereo-link switch with indicator LED links the two channels.

The 266A is a cleanly laid-out box with a black front panel, white silkscreened lettering, and royal blue accents. The unit's rear panel provides ¼-inch TRS



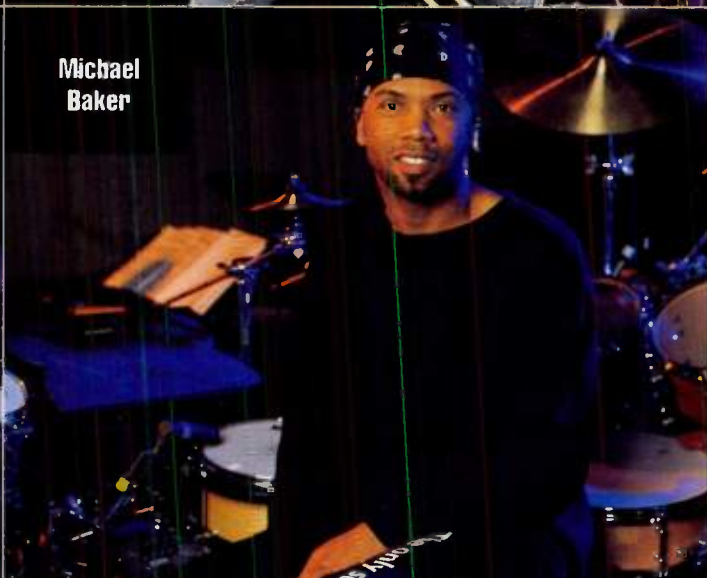
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inputs and outputs (accepting balanced or unbalanced signals), 1/4-inch sidechain access, and operating-level switches (+4 dBu or -10 dBV) for each channel. The unit has an internal power supply and detachable power cord.

Bang for the buck. Though not as crisp sounding as its rich cousin the 160S, the dbx 266A still falls on the bright side of the fence. Its controls, too, are similar to those on the 160S in that they offer a fairly broad, usable range. In fact, of the inexpensive units tested, the 266A is the one that fared best with extreme settings (maximum ratio, minimum threshold). However, I found the 266A to be slightly noisier than either the Aphex or PreSonus compressors.

On bass guitar, the 266A was smooth, but the sound was a bit thin. It also proved a tad thin and crispy sounding on the Stratocaster rhythm tracks. But I liked it a lot on snare drum, both with brushes and backbeats. Its brightness beautifully enhanced the brush sweeps, and on backbeats it sounded almost as good as the 160S, which is saying a lot. The gate, too, proved very useful on snare drum. Between it and the release time, I was able to precisely define the length of the note, with pristine silence between one hit and the next. Considering that it's an extra on such an inexpensive box, this is an excellent gate.

On kick drum, the compression was

usable but not my cup of tea. It enhanced the boom too much without clarifying the hit of the beater. The 266A was bright sounding on fiddle but, surprisingly, slightly darker sounding on acoustic guitar than the other two low-end units. Go figure. For vocals, it lent a very nice presence, compressing the signal smoothly and handling the peaks admirably. However, the sound was a bit "enclosed" and had the slightest hint of an artificial quality.

On a stereo program, the 266A did a nice job at about a 1.5:1 ratio with threshold around 0 dB and OverEasy engaged. The 266A maintained an

and stereo programs. Used with the presets, this unit is a no-brainer. There's also a manual setting, which activates the control knobs for input, ratio, attack, release, and output. The input knob ranges from -20 to +40 dB and the output from -20 to +20 dB. Ratio is variable from 1:1 to 20:1, attack from 0.01 to 100 ms, and release from 10 to 500 ms. Two 8-segment LEDs provide metering for gain reduction and input/output (switchable). A Process in/out switch provides bypass.

The Blue Max is an easy-to-grok unit with a bright blue faceplate and clearly marked controls. Considering its



PreSonus Blue Max

overall balanced sound with sufficient high end and even handled wayward drum hits pretty decently.

PRESONUS BLUE MAX

Unlike the other test units, all of which are dual-mono compressors with two sets of independent controls, the PreSonus Blue Max "Smart Compressor" provides only one set of controls for both channels. This keeps the unit small (less than one-half rackspace) but means that the two channels cannot be set independently.

A newcomer to the market, the Blue Max is unique in offering fifteen preset compressor settings: three each for vocals, keyboards, and fretted instruments and two each for percussion, effects,

small size, its feature set is fairly comprehensive, with the only obvious omission being a threshold control. For manual operation, the threshold is fixed at -10 dB (a good place for it) whereas threshold settings vary on the presets. The unit's rear panel has unbalanced 1/4-inch inputs and outputs, a single 1/4-inch sidechain connector, an operating-level switch (+4 dBu or -10 dBV), and an on/off switch. The power supply is internal and the power cord detachable.

Bang for the buck. This little box has a surprisingly big sound. Of the three low-end units, it was the one that handled bass guitar signals most gracefully, providing both smooth compression and a warm, reasonably fat sound. Accordingly, it proved excellent for kick drum, too, tightening the sound without adding boom, and accentuating just the right part of the thud. I also liked it on vocals, where it provided a good, very natural tonality with plenty of presence. The only complaint here is that, on sudden vocal peaks, it would clench up a bit and sound somewhat edgy. Possibly, though, were there a dedicated threshold control, I would have been able to dial up a setting that better accommodated those peaks.

The Blue Max was also the most natural sounding of the low-end compressors on acoustic guitar; in fact, in terms of naturalness, it gave even the

10 REASONS TO PINCH PENNIES ON A COMPRESSOR

1. The less expensive the gear, the gentler the learning curve.
2. The fewer knobs, the less chance of screwing up the signal.
3. No fears about taking inexpensive gear on the road.
4. You'll have money left over for other gear.
5. You'll have money left over for beer.
6. You prefer inexpensive stuff on principle.
7. Your partner would kill you for spending four grand on a compressor.
8. Your partner is already going to kill you for spending four grand on a mixer.
9. You're not exactly sure what a compressor does.
10. You'll never really produce any music anyway, so why spend the money?

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high-end units a run for their money. It also sounded very natural on the fiddle: not as warm and thick as the Aphex and not so bright as the dbx 266A. On electric rhythm guitar, where naturalness of tone isn't necessarily the point, the Blue Max provided a bit less body than the Aphex unit. Still, though, it sounded quite good.

Snare drum was the only instrument I tested that didn't seem a perfect complement for the Blue Max. To my ear, the Blue Max overly stressed the thud factor in the backbeats, accentuating the stick hit and de-emphasizing the "wetness" that I like so much in a snare sound. On the brush beats, the sound was slightly muffled.

I also tried many of the presets on the Blue Max and found that, in many instances, they offered compression characteristics I wasn't able to duplicate with the manual controls—probably due to the built-in variations in threshold, attack, and release settings. (The manual lists all the preset parameters, which is helpful.) At any rate, the Blue Max's presets are definitely "value added" and not mere marketing hype: for each instrument I tested, at least one preset was nicely suited to the application (which, of course, is the idea). However, most of the time, I still preferred the sounds I got from dialing up my own parameters.

The Blue Max also did a fine job in stereo applications. The sound was slightly darker than the other two units and possibly punchier in the low mids, but these are hairline distinctions.

MEET THE FAT CATS

Now, *these* strutting sophisticates are like the movie stars you'll never get close to at Spago. Sure, you can gawk at them as they cruise towards the VIP lounge, but don't bother entertaining the notion that they'll decide to sit at your table for a spell. They travel in different circles, kids. But do you ever wonder if the snooty megastars are really just high-priced poseurs? Well, let's meet these expensive compressors from

edge, oval cutouts for the analog VU meters—has a distinctive Gothic vibe. For each channel, sizable machined-aluminum threshold and ratio knobs sit on opposite sides of the VU meter (which can be switched to monitor output or gain reduction). Three smaller knobs handle attack, release, and output and are positioned beneath clear, orange-backlit in/out switches for sidechain, meter, and compressor. On each channel, a tiny, mercury-vapor



Avalon AD2044

Avalon, dbx, and Focusrite and critically assess the sound quality that thousands of dollars buys.

AVALON AD2044

There are plenty of compressors on the market costing upward of two thousand dollars—but how about one costing upward of four thousand? One such unit is the Avalon AD2044, a relative newcomer that, despite the high ticket price, has been selling steadily and garnering wide acclaim. The Avalon AD2044 is distinctive not only for being the most expensive compressor we tested but also for being the only one that uses optical-control elements rather than voltage-controlled amplifiers (VCAs). It also features 100 percent discrete, Class A circuitry throughout and a large, separate, 200W power supply that connects to the compressor via a beefy 4-pin cable.

Visually, the AD2044 is a study in austerity and attitude. The front panel—a thick slab of brushed aluminum with charcoal gray lettering and beveled-

blue LED beams luminously during operation, and an identical LED lights up when gain reduction is underway. A large, reddish orange stereo-link button glows brightly when engaged.

The ratio settings on the AD2044 are variable from 1:1 to 20:1 with a variable threshold ranging from -24 dB to +20 dB. Attack times are variable between 0.5 ms to 150 ms, and release times range from 80 ms to 5 seconds.

The AD2044's rear panel provides—next to a large heat sink—balanced XLR inputs and outputs, XLR sidechain access, and a connector for the power cable. The 2U rack-mount unit does not provide a power switch.

Bang for the buck. The Avalon AD2044's sound was unquestionably the warmest, fattest, and most full bodied of the bunch. It was also the quietest. The quality of the compression is supremely smooth, transparent, and musical, even at extreme settings. In fact, with this box it's difficult to make a signal sound bad.

At first listen, the AD2044 seems to produce transparent compression. However, critical listening reveals that the unit subtly *colors* the signal—but what delicious coloration! Specifically, the Avalon unit enhances the bass and low-mid content of the signal and slightly darkens the high end, removing any hint of harshness. Yet it doesn't sound cloudy or hazy, and the compression itself doesn't noticeably squeeze or diminish the signal.

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dbx 160S

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compressor for electric bass that I've ever heard. The sound is fat yet detailed, smooth yet aggressive. Indeed, if I didn't know better, I would think there must be a tube preamp stage somewhere inside the AD2044. Ditto for bassists Marty Holland and Edo Castro, both of whom fell in love with the unit. "It sounds like my old Acoustic 370 tube amp," remarked Holland.

Of course, the qualities that make the AD2044 so awesome sounding on bass may render it less than ideal for some other applications. For example, although I personally loved the warm, luscious way the AD2044 handled vocals, Nancy Hall preferred a brighter-sounding compressor on her vocal tracks. And for acoustic-guitar tracks—especially if I were trying to make the guitars sparkle and stand out in a busy mix—the Avalon wouldn't be my first choice. Likewise, on snare-drum backbeats, the sound was smooth, dry, and meaty, but there was not enough high end for my tastes. On kick drum, it was fat and round with lots of low-end oomph. The AD2044's warm quality also nicely fattened the fiddle and electric rhythm-guitar tracks.

I liked the AD2044 a lot as a stereo-program compressor. It very slightly darkened and thickened the mix, making the overall sound beautifully smooth. Tonally, it reminded me of what you might get using a high-end, tube-based mic preamp to warm up the sound.

dbx 160S

Successor to the dbx 160, the 160S is a classy, feature-laden, 2U rack-mount box that addresses practically every conceivable compressor/limiter application. It's a looker, too. The machined-aluminum faceplate, finished in a sumptuous blue, is richly arrayed with huge aluminum knobs, sturdy aluminum switches, and a profusion of jewel-like LEDs, each individually mounted in a shiny, stainless-steel housing. The dbx team evidently pulled out all the stops when designing this unit.

Threshold for the dbx 160S ranges from -40 to +30 dBu, ratio from 1:1 to ∞:1, output from -20 to +20 dB, attack from 400 dB/ms to 1 dB/ms, and release from 4000 dB/second to 10 dB/second. There is also a Stop Level limiter control (for setting a maximum peak-output level), adjustable from +4 dBu to +30 dBu. Each channel offers switches and corresponding LEDs for sidechain, Auto (program-dependent attack and release), PeakStopPlus (a special limiting algorithm), and bypass. There's also an OverEasy switch and corresponding LED in the threshold-LED cluster, as in the 266A.

The meter section, clearly delineated on each channel, features a VU meter and three switches (with LEDs) offering input, output, or gain-reduction metering. There is also a stereo-couple switch with LED and a power-indicator LED. The unit's rear panel is full featured, too, providing balanced XLR inputs, outputs, and sidechain I/O; switches for unbalanced operation (output only), ground (for chassis-grounding the output), and Pin 1 Lift for the input connectors (to break a ground loop); separate chassis-ground binding posts; and an on/off switch. An option panel can be removed to install a digital module with 24-bit

COMPRESSOR MANUFACTURERS

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AES/EBU and S/PDIF output connectors. The 160S is internally powered and has a detachable power cord.

Bang for the buck. The 160S is bright, crisp, and articulate, even at conservative settings. The emphasis is definitely on the high end, and there's never an unwelcome bass boost. Perhaps that's why, on bass guitar, the sound was just a bit too edgy for my tastes. Holland, too, wasn't sold: he found it "slightly artificial sounding on the top end." Of course, if you like to hear the click of the strings on the frets, this unit could be just what the doctor ordered.

The bright, detailed sound of the 160S made it my all-around favorite for acoustic guitar, snare drum, and stereo program. Hall also liked it best on acoustic guitar. She found it "more

EXTRAVAGANT SPECS

Manufacturer/Model	Avalon AD2044	dbx 160S	Focusrite Red 3
Maximum Input	+30 dBu	+30 dBu	+28 dBu
Maximum Output	+30 dBu	+30 dBm	+24 dBm
Frequency Response	1 Hz–450 kHz	2 Hz–200 kHz	5 Hz–200 kHz
Dynamic Range	124 dB	122 dB	106 dB
Noise	-94 dBu	-92 dBu	-80 dBu
THD + Noise	0.05%	0.008%	0.02%
Stereo Crosstalk	-102 dB	-100 dB	-98 dBu
Price	\$4,200	\$2,495	\$3,995

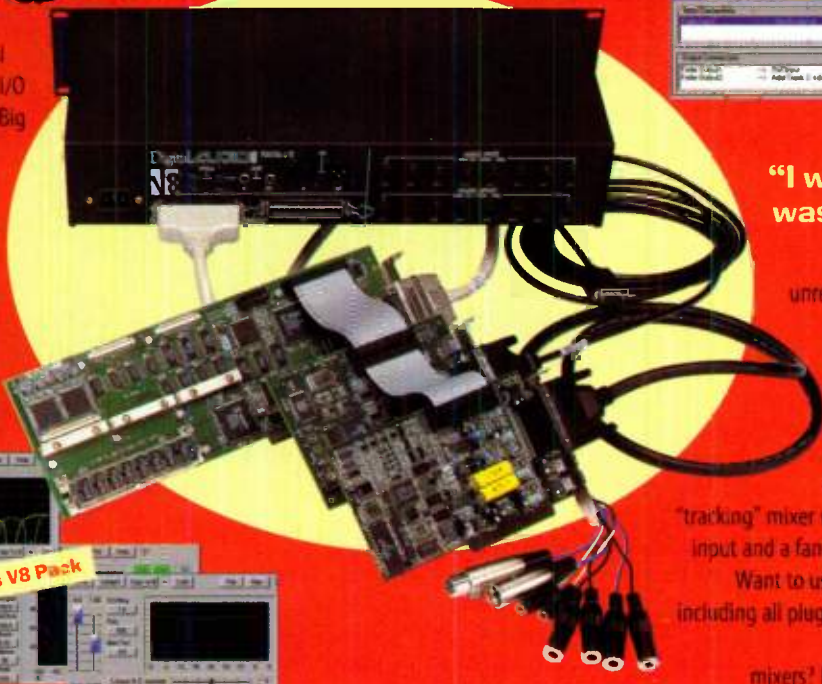


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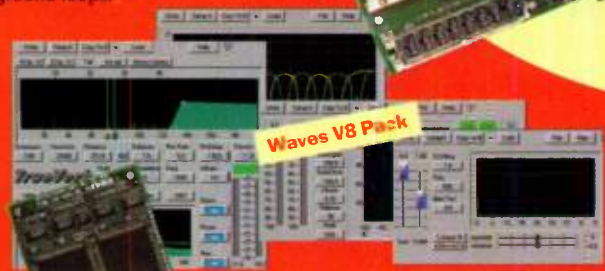
Audio Quality is Job 1

When it comes to sound quality, Digital Audio Labs cuts no corners and the V8 I/O peripherals are no exception. Take the Big Block for example: This 8 channel rack mount A/D/D/A sports S/N ratios in excess of 90dB and crosstalk better than 100dB! Add to that the ability to completely configure the Big Block from software, right down to the individual analog gain trims. We even isolated the ground, making the system virtually impervious to ground loops.



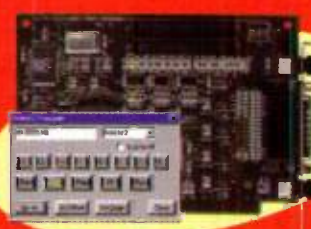
"I wish my mixer was this flexible"

With the V8's completely unrestricted, totally automated mixing and routing architecture, your only limitation is your imagination. If you can think of a mixer, you can build it. Want a specialized "tracking" mixer with a compressor on every input and a fancy cue matrix? No problem. Want to use that vocal input channel, including all plug-in effects settings and aux sends, on several different mixers? It's done. Create specialized consoles for each job or project and modify and build new channels and buses as needed.



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The Audio Gearhead Partners: The V8's Secret Weapon

Since the V8 runs entirely on third party software, you already know how to drive it! Why shackle yourself to a proprietary software interface when you can choose your own from among a growing list of Audio Gearhead Partners? And don't worry about compatibility between programs and plug-ins; if you see the Audio Gearhead Approved symbol, they're simpatico. But what if your favorite software's not yet Audio Gearhead Approved? No Sweat. The V8's .WAV emulation makes standard windows programs think they're talking to up to four CardPlus's. Now that's hip, Daddy!



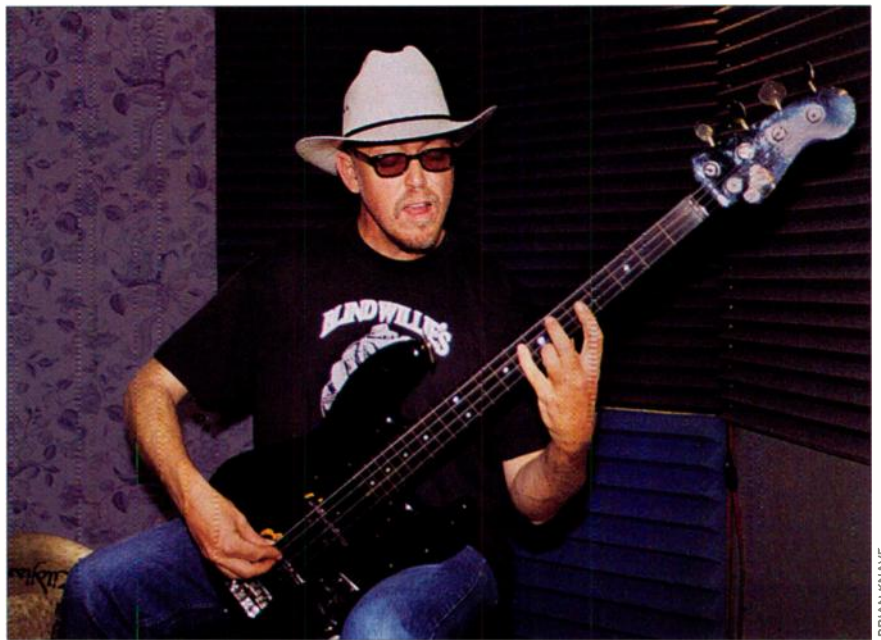
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expansive, less boxy” than the other units. On vocals, though, we agreed that it wasn’t as lush and silky as the Avalon or Focusrite. Compared to those units, the sound was a bit cold. Of course, that same quality might be ideal for helping a vocal cut through a dense mix.

I also loved the 160S on kick drum. One of the great things about this box is that it offers so much control: even the slightest turn of a knob can produce a huge difference in sound. Therefore, if you have the patience, ears, and know-how, you can dial in very precise, tailor-made settings for each different instrument. For example, on kick drum I found just the sound I wanted—tight and punchy, with well-defined beater impact and no boominess—while working through various settings in the manual mode. Also in the manual mode, I dialed up a wonderfully wet snare-drum sound that I couldn’t quite duplicate with any of the other compressors.

Of course, the down side to having so much control is that you can easily butcher a signal if you’re not careful. This is especially true with the attack and release controls, which are extremely sensitive. In fact, the fast side of the attack control is so darned fast that I couldn’t even find a use for it. Fortunately, the Auto switch handles most situations beautifully. Also, the Over-Easy function really smoothes out the sound for most signals, and the Peak Stop control, used wisely, does a good job of quelling troublesome peaks without flattening the sound. (PeakStop-Plus, on the other hand, proved too hard edged for my tastes and is probably best reserved for broadcast use, where one needs an absolute limiter.)



BRIAN KNAVE

Bass wizard Marty Holland of the San Francisco-based band Propeller plays his Fender Jazz (with a custom Chandler neck) for EM’s compressor listening tests.

FOCUSRITE RED 3

The feature set on the Red 3 Dual Compressor/Limiter is similar to that on the dbx 160S, minus the proprietary stuff such as OverEasy and PeakStop-Plus. The placement, feel, and attitude of the controls is quite different, however. (These folks *are* British, after all.) The dual channels are stacked rather than positioned side by side, and labeling around the knobs is fashionably understated—if not downright vague. The ratio knob, for example, designates only two settings: 1.5:1 and 10:1. For anything in between, your guess is as good as mine. (The subtext, it would seem, is that one’s ears—not eyes—should determine settings.)

The Red 3’s threshold ranges from -24 to +12 dB, attack from fast to slow, release from 0.1 seconds to 4 seconds, and limiter threshold from 0 to +18 dB. As for the output (make-up gain) knob, neither the front panel nor the manual offers a clue as to levels; all you get is a little icon indicating which direction you can turn the knob. Both channels

provide illuminated in/out switches for compressor, key (sidechain), Auto (program-dependent attack and release), and limiter threshold.

The top channel provides an illuminated button for switching the VUs from input-level to gain-reduction metering. A meter-sensitivity switch (labeled +14 dB), when engaged, makes input-signal peaks easier to read by adding 10 dB to the standard +4 dB. An illuminated stereo-link switch is located on the lower channel, which becomes the control channel during stereo operation. The front panel also provides a big, red, illuminated on/off switch.

Of course, the Red 3 is in no way compromised by the abbreviated front-panel markings or scanty documentation; on the contrary, once you figure out which end is up, it’s a breeze to operate. Aesthetically, too, it’s a winner. Not only the front panel but the back and sides, too, are machined aluminum finished in a gorgeous, deep red, and the top and bottom panels are polished stainless steel. If that’s not enough, a hint of the Taoist yin/yang symbol can be seen in the curving line separating the two VU meters, and there’s something about the elegant, polished aluminum knobs and port-window style VUs that suggests a nautical theme. Clearly, this machine is built both to last and to please. The



Focusrite Red 3

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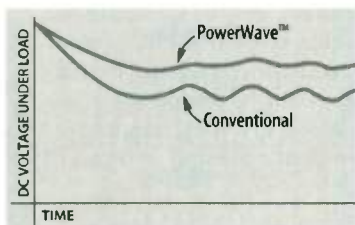


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QSC's PowerLight Project Team (clockwise from left): Darrell Austin, Technical Services Manager, Pat Quilter, Chief Technical Officer, Robert Becker, Design Engineer, Greg McLagan, Market Manager (Live Sound), Doug Teulie, Industrial Designer

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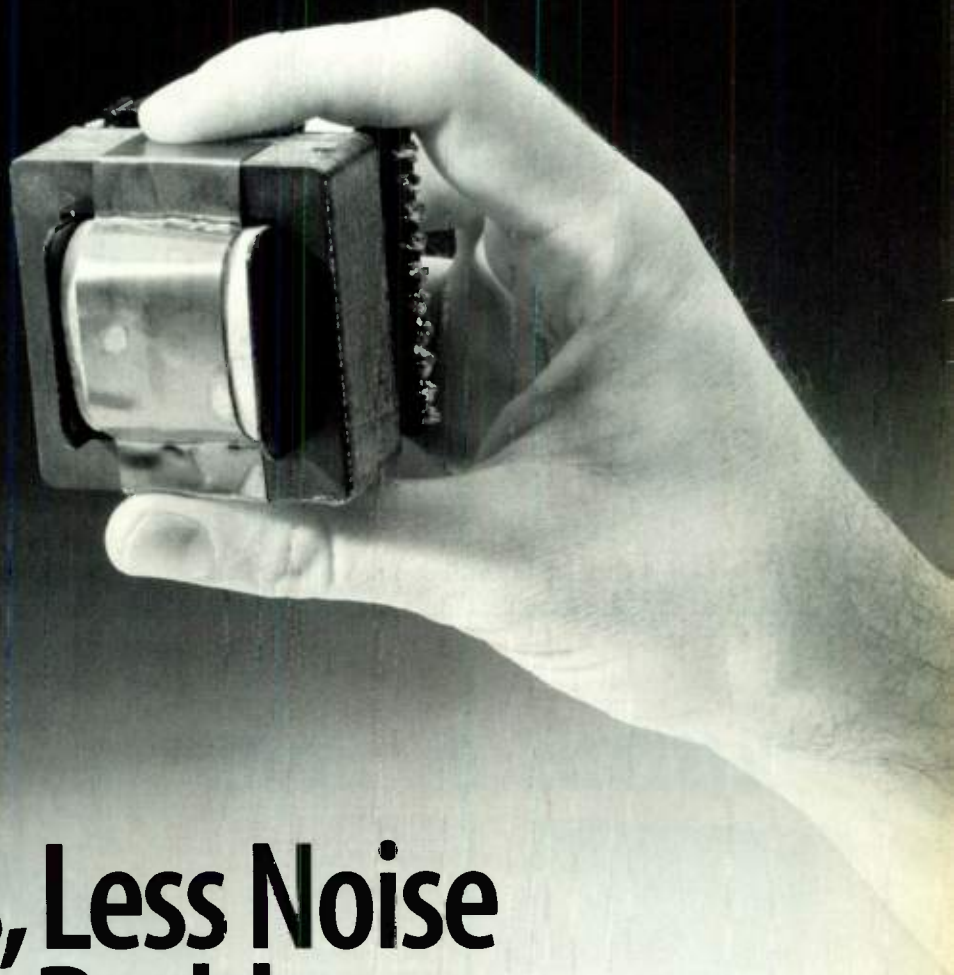
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reliability, durability, and user confidence. Sonically, the high-end units are almost always more transparent and pleasant sounding as well as cleaner and quieter. With the exception of the dbx 160S, they are more forgiving, as well. In addition, the high-end units were able to produce decent audio at extreme settings. This was not the case with the less-expensive boxes, which were more likely to crash and burn at the far fringes of processing.

The inexpensive compressors also charted less-than-audiophile results on vocals and bass. The distinctions were subtle, but to my ear, the low-end units imparted more of an electronic sound to the vocal tracks. As for bass guitar, evidently all that low-end energy is often simply too much for the cheaper boxes to handle well.

However, the expensive compressors were not clearly superior at handling all source sounds and applications. Certain instances arose where a low-end box performed about as well as a high-end one. For example, on stereo material, the Aphex 108 was almost as transparent sounding as the dbx 160S. The other two low-end units went head to head with the 160S, as well: the Blue Max on kick drum and the 266A on snare. These are "feel good" victories for the affordables.

So unlimited headroom on a Gold Card can certainly buy gorgeous audio for many applications—especially those timbre-critical tweaks for vocals. But you don't have to feel like subpar audio is a fact of life if you are restricted to budget boxes. Just use your imagination, your ears, and the technical knowledge you can gain in these very pages, and even those affordable compressors can produce delightful sounds. And if you *do* make a transcendent recording with inexpensive gear, the bragging rights go on for about 25 years.

Assistant Editor **Brian Knave** is giving his ears a rest. Special thanks to Edo Castro, Nancy Hall, Marty Holland, Earthworks, Neumann, and PreSonus.

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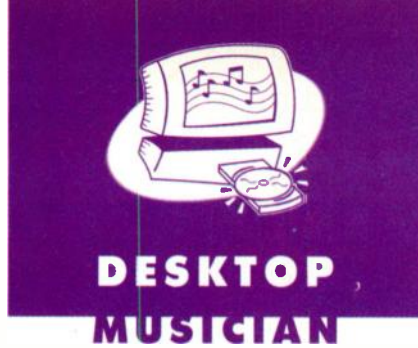
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From Desktop to Disc

Get your music out of the house and onto a CD!

By David M. Rubin

If you're producing a large-scale product, such as an album, and you want it to be taken seriously—and maybe even make some money—you have to release your work on compact disc. Most radio stations accept only CDs for airplay, and many record stores won't carry your music if it's not on disc. (For more information on CD marketing strategies, see "Working Musician: Timing Is Everything" in the June 1997 *EM*.)

Desktop musicians using MDMs, DAT decks, DAWs, and CD recorders can now mix digital masterpieces to pro-

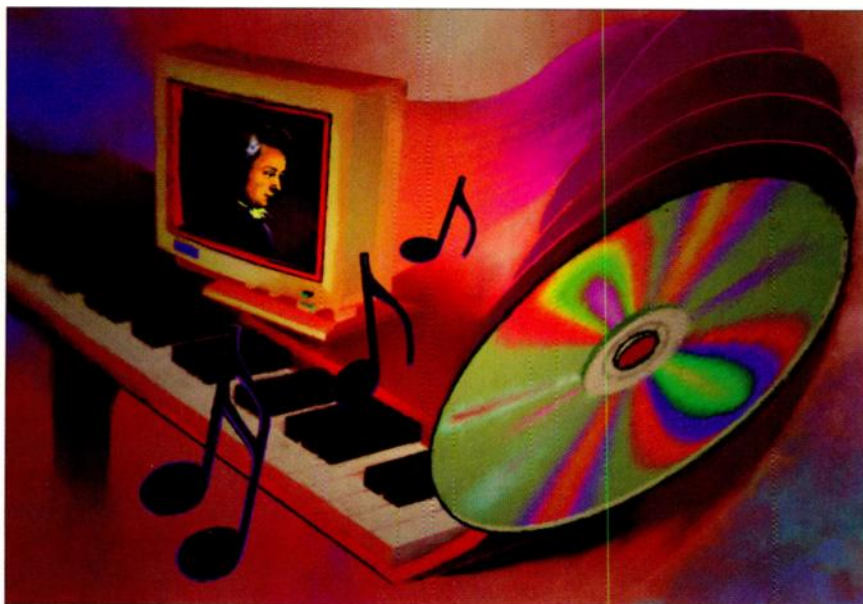
fessional-level audio standards. However, trying to distribute your music to the public by running "one off" copies from a CD recorder (at about \$6 to \$12 a pop) is a sure ticket to bankruptcy, and to pull it off properly you need to acquire the skills of a mastering engineer. Practical public distribution requires using a commercial mastering and replication service, which can cost-effectively provide an ample supply of quality discs.

In addition, there's more to producing a commercial CD than just recording a clean signal and doing a well-thought-out mix. Many projects that are prepared in home studios simply don't sound as good as commercial recordings because their creators are not expert in CD preparation. The resulting CDs often lack important characteristics found in commercial CDs. In this article, we'll explore how to prepare your recordings for CD replication, how to avoid common problems, and how to keep costs down and turnaround times low.

MASTERS OF THE UNIVERSE

Companies that prepare music for CD replication can accept your mixed recording in any of several formats, including analog tape, CD-R, and PCM-1630 U-matic tape. For desktop musicians, DAT is by far the most popular format, so we'll focus our attention there. Regardless of format, however,

JOHN BEUTLER



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what you label your recording soon becomes an issue. The term "master" is bandied about so loosely by musicians that it has begun to lose its meaning. This is a common source of confusion when communicating with CD manufacturers. In a CD pressing plant, the only "true" master is the *glass master*, a glass plate about ten inches in diameter coated with a light-sensitive material on which a laser etches microscopic pits. The glass master must be handled carefully, and it can't be played. It is only used to create the metal forms that hot-mold CDs by the thousands.

The recording from which the data is transferred to the glass master is best described as a *premaster*, but because it is the complete and "final" Red Book recording, it is often referred to simply as a *master*. When the premastered recording is stored on a recordable CD, it is typically called a *CD-R master*. Some companies use Sonic Solutions digital audio workstations that can also output the recording in a disc format called *PMCD* (premaster CD). This Sonic Solutions proprietary format is preferred by some pressing plants, notably Sony. The other common media for mastering—PCM-1630 1/2-inch tape and Exabyte DDP tape—are still in wide use, although the 1630 format is declining as disc-based media become more popular at many facilities.

The DAT recording that you submit for mastering should, likewise, not be called a "master." Bob Katz, president and chief engineer at Digital Domain, suggests that you label your tape "Submaster" or "Final Mix" or perhaps "Session Tape" or "Equalized Mix" to help keep the process clear and to avoid confusion.

GETTING IT RIGHT

The path from your DAT submaster to the finished CD-R master or PMCD can be a long or a short journey depending on how well prepared your tape is when it leaves home. Keep in mind that the amount of preparation that your tape requires after it's submitted to the pressing plant will ultimately affect the final cost. Here are some useful tips for preparing your tape.

Your tape should not have extraneous noise on it before or between selections. Starting and stopping the tape while recording may leave subtle clicks or pops that need to be cleaned up with an audio-editing program.

DISC MAKERS AUDIO MASTER LOG 41

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Release #: _____ Date: _____ DIGITAL: DAT 1630 CD One-off

Client: YOUR PRODUCTION COMPANY ANALOG: 44.1 kHz 44.056 kHz 48 kHz

Phone: Day (655) 000-0000 eve. (655) 000-0000 Speed: 7 1/2 ips 15 ips 30 ips

Artist: JANE AND JOE DOE BAND Noise Reduction: YES NO Type _____

Title: JANE AND JOE DOE BAND'S GREATEST HITS

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START ID# (DAT only)	TRACK #	SONG (TRACK) TITLE / DURATION <small>(please indicate tones in this space also)</small>	TIME				
			Hours	Minutes	Seconds		
		TEST TONES: NONE / N/A	START TIME:	N/A	:	:	:
			END TIME:	:	:	:	:
		PREROLL/DIGITAL BLACK/BLANK (RECORDED)/:15	START TIME:	:	0	:	00
			END TIME:	:	0	:	15
1		FIRST SONG TITLE / 2:23	START TIME:	:	0	:	15
			END TIME:	:	2	:	38
2		SECOND SONG TITLE / 4:15	START TIME:	:	2	:	42
			END TIME:	:	7	:	17
3			START TIME:	:	:	:	:
			END TIME:	:	:	:	:
4		[SONG TITLES AND	START TIME:	:	:	:	:
			END TIME:	:	:	:	:
5		TIMES FOR	START TIME:	:	:	:	:
			END TIME:	:	:	:	:
6		SONGS 3-8]	START TIME:	:	:	:	:
			END TIME:	:	:	:	:
7			START TIME:	:	:	:	:
			END TIME:	:	:	:	:
8			START TIME:	:	:	:	:
			END TIME:	:	:	:	:
9		LAST SONG TITLE / 2:03	START TIME:	:	2	:	32
			END TIME:	:	2	:	35
		POSTROLL/DIGITAL BLACK/BLANK (RECORDED)/:15	START TIME:	:	2	:	53
			END TIME:	:	2	:	10
			START TIME:	:	:	:	:
			END TIME:	:	:	:	:
			START TIME:	:	:	:	:
			END TIME:	:	:	:	:

NOTES TO THE ENGINEER: _____

START ID#	TRACK #	SONG (TRACK) TITLE / DURATION	START TIME	END TIME
0	0	Silence	:15	0:00-0:15
1	0	1 Like You	:15	0:00-0:15
2	1	Amazing The Beautiful	3:18	0:15-0:33
3	2	What A Wonderful World	2:30	0:33-0:45

FIG. 1: Always include a complete time log with your DAT submaster. Many companies will provide printed forms on request. This example is from Disc Makers.

The tunes should appear in the proper sequence, with sequentially numbered start IDs at the beginning of each piece, one ID per tune. The tape should also include a preroll and a postroll of one to two minutes in length. These should be completely silent (digital black), recorded with the inputs set to zero.

The tunes should be properly spaced with silence (digital black or room tone, depending on the content). The gap length depends on the nature of the material and what sounds appropriate to you. Most popular styles have spaces of one to four seconds in length. Classical styles may have spaces lasting three to six seconds. Regardless of the style, however, you should take the musical context into account. After a piece with a long fadeout, for example, it may help the album's continuity if you

shorten the following space.

It's best to limit the total length of your recording to 74 minutes (the maximum length of a CD-R) or less. Commercial CDs can actually accommodate a few minutes more, but the added length requires extra handling and usually incurs additional cost. Moreover, extralong recordings place the mastering process close to critical tolerances and may adversely affect playback on some CD players.

Your DAT submaster should be recorded at 44.1 kHz. Most CD manufacturers will accept 48 kHz DATs, but they have to convert them to 44.1 kHz before going to disc. That involves using software to downsample the recording or transferring the submaster through the DAT recorder's analog outputs and rerecording at 44.1 kHz. In either case, there may be undesirable

alterations to the sound. (Many high-end facilities now use 24-bit sample-rate converters that can downsample from 48 to 44.1 kHz with virtually no degradation, but the extra processing may still affect the final cost.)

There must not be clipping anywhere on the original recording. In fact, to be on the safe side, the highest peaks should occur around -1 or -2 dB. That provides a little leeway to accommodate variations in DAT decks without noticeably affecting the sound quality. You can always increase the gain later if needed. Clipping, on the other hand, is a major problem that can't be fixed.

Including a calibration tone at the beginning of a DAT submaster is usually optional. Some companies, such as Europadisk, ask that you not include a tone. Disc Makers will accept tapes with or without a reference. If they're simply making a straight digital transfer, a reference tone serves little purpose.

On the other hand, some companies prefer that you do include a tone if the tape will need additional preparation and enhancement in the studio. The mastering engineer may use the tone to evaluate the quality of your equipment (left/right channel balance, console distortion, etc.). If you are adding a reference tone, do *not* record it at 0 level (maximum peak level on a DAT machine). Different companies have different preferences, but in general, record a 1 kHz tone between -15 and -1 dB on the DAT meters. Never exceed the -1 dB level.

Do not include a start ID number for the reference tone. Your ID numbers should begin with the first tune, and that should be ID 1. If possible, you should record your submaster in a single pass and let the DAT's Auto ID function handle the numbering. Be sure to turn off Auto ID until after the calibration tone. If a tune has a break in the middle or the recording has other nonstandard characteristics, you may have to add the IDs manually.

If you can't record the submaster in one pass, use the Pause button to stop recording. Using the Stop button may introduce pops between the selections. And remember not to stop the recording until you're sure that the music has faded all the way to zero and you're not truncating any reverb tails.

Each time you hit the Record button (or leave Pause mode), wait five to ten seconds to let the DAT machine get up

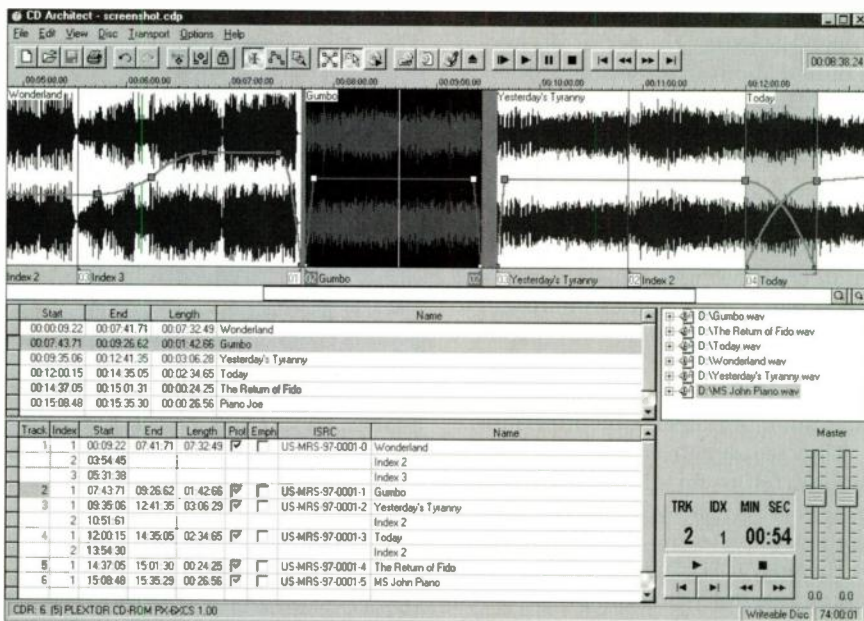


FIG. 2: Sonic Foundry's new *CD Architect* enables many CD recorders to produce Red Book-compliant discs.

to speed before starting the music. After recording, you'll need an audio-editing program to trim the gap lengths.

Never send you only copy of a tape. Always make an exact digital copy of the submaster before sending it out, and always ship by UPS, FedEx, or another reputable overnight courier service. The less time your tape spends in transit, the less likely it will be to suffer from exposure to harmful environments.

Finally, you must include a complete and accurate time log with your submaster (see Fig. 1). It should include all reference tones, ID numbers, song titles, start times, end times, and any other information (such as extralong fade-ins or unusual gaps between songs) that will help the CD engineers understand your intentions. Many companies will provide you with printed forms upon request.

If your submaster meets the criteria I've mentioned and sounds exactly the way you want it to sound, then the recording is already well on its way to becoming a PMCD or CD-R master.

MINDING YOUR Ps AND Qs

When the DAT tape is received by the CD manufacturer, it is typically transferred to a high-end DAW, such as a Sonic Solutions Workstation, or to some other hard-disk editing system. That begins the premastering process. A recording engineer listens to the

music and verifies that the songs are in the proper sequence and correctly identified with the right start and stop times. Levels are checked, and any problems or discrepancies are noted. If a problem arises, the engineer will give you a call to discuss possible remedies.

When everything is digitally copacetic, the engineer will add the PQ coding. All commercial CDs include specific subcode channels that carry additional data. The Red Book standard actually defines eight subcode channels, labeled P through W. Channels R through W are intended for graphics and other data, but they're seldom used. Most CD players simply ignore the R through W channels.

The P and Q channels, however, are very important. When you insert a disc into a compact disc player, the display shows the total playing time, the number of tracks, the running time from the beginning of the disc, and the running time from the start of the current selection. This information (and other useful data that the CD player needs) is provided by the P and Q subcodes. The addition of PQ coding completes the process of premastering. The final step involves transferring the data from the PMCD or CD-R master to the glass master.

BEAST MASTER

In the best of all possible worlds, you would, of course, only submit a cleanly

mixed submaster of the highest professional caliber, well organized and ready to compete in the commercial marketplace. But in the real world, things don't always work out the way we would like them to. If, for example, your desktop studio doesn't allow you to digitally transfer tracks to and from your hard disk for editing, you may have to mix directly from an MDM to a stereo DAT.

Furthermore, not everyone with a good editing program can afford the sophisticated DSP plug-ins required to properly shape their music. Many desktop musicians also lack the necessary training to capture the sonic quality that commercial CDs exhibit. Regardless of your circumstances, if you feel that your stereo DAT is not quite ready for prime time, fear not! Most CD-manufacturing facilities offer CD-mastering services, as well.

CD mastering, sometimes referred to as *post-production*, involves more extensive alterations to your submaster—beyond premastering—before it becomes a finished CD-R master. But the line between premastering and mastering is not clear, and as might be expected, the terminology is equally murky.

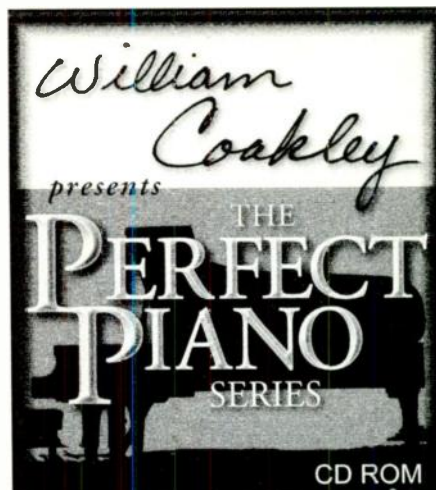
Because premastering is often part of the basic package price when you have CDs pressed, it pays to find out exactly what is covered when you call different companies to get quotes. For example, some companies include minor edits, equalization, and normalization under the category of premastering. But most companies consider any editing or processing to be additional mastering that adds to the price.

On the other hand, there are outside studios that specialize in CD mastering, and they can produce a CD-R master and sometimes a PMCD as a final product. If you plan to use an independent studio, ask the pressing plant whether you're entitled to a price break for providing your own master disc. Make sure they will accept the disc format that the outside studio delivers.

If your desktop studio provides only a modest set of tools, it's probably worth having your DAT mastered by professional engineers in a high-end facility. They'll listen to your music with experienced ears in a good studio environment with excellent monitors. Then they'll enhance the recording with expensive toys to bring it as close as possible to commercial standards. As David Torrey of DRT Mastering describes it, "Mastering creates a seamless whole out of a collection of individual tracks."

CD mastering may include any or all of the following: adjusting levels, equalizing, compressing, limiting, normalizing, improving fades, adjusting and cleaning up gaps, crossfading between tunes, removing clicks and other noises, improving the stereo image, cleaning up phase problems, and rearranging the selections. Many of these editing tasks can be accomplished quite well in a small studio, even with a modest desktop system. In the long run, the cleaner the recording, the less it will cost to prepare. Most engineers, however, prefer that you do not heavily process your recording if you plan to bring it to them for mastering.

The price for CD mastering can range anywhere from a few hundred



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CD REPLICATION AND MASTERING FACILITIES

Before investing your hard-earned money in a roomful of shrink-wrapped CDs, it pays to call several manufacturers and CD-mastering studios. Most companies are more than happy to discuss their setups, package options, and mastering techniques. You'll find the **EM** classified ads to be an excellent resource. Here is the contact information for the companies mentioned in this article:

Digital Domain tel. (800) 344-4361 or (407) 831-0233; fax (407) 834-1339;
e-mail bobkatz@digido.com; Web www.digido.com

Disc Makers tel. (800) 468-9353 or (609) 663-9030; fax (609) 661-3458;
e-mail discman@discmakers.com; Web www.discmakers.com

DRT Mastering tel. (800) 884-2576 or (603) 924-2277; fax (603) 924-4384;
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dollars for some simple tweaking and fixing to over a thousand dollars for serious enhancement and preparation. The results might make the difference between a first-rate, commercially viable CD and one that sounds like a small MIDI-based studio production. As Katz puts it, "Good mastering can bring out the acoustic quality in your samples, increasing your chance of success in a crowded music field."

BACK TO REALITY

If you're working on a very tight budget and you can't afford a professional mastering session, there are a few common pitfalls to watch out for as you prepare your tape.

For starters, be sure that the levels are appropriate throughout the tape. Just because the waveform peaks in your editor are maxing out at zero for each tune doesn't mean that the tunes will sound the same in volume. We perceive loudness based on average levels, not peak levels, therefore some songs will jump out at you while others will seem too soft.

You can't simply compile a string of tunes all at the same gain setting and expect them to form a smooth listening experience. Normalizing the waveforms won't help. Instead, listen critically to the entire tape and focus on the volume levels for consistency. Ask your friends for their impressions. Remember, it's not what it looks like onscreen but how it's perceived by the listener that counts.

SEPARATE BUT EQUALIZED

Equalization is another source of inconsistency. Most songs are recorded and mixed over a period of days, weeks, or even months. During that time, your perception about aural brightness or darkness may change. Furthermore, each piece might sound fine by itself, but in the context of an album, it might not blend well with the other selections. Again, listen critically to the entire tape. Play it on different systems, in different rooms, and at different times of the day. See if any pieces jump out as being overly harsh, bright, or dark.

Even after a song is mixed, some instruments can be brought out with a little EQ. You'll get better results, though, if you don't paint yourself into a corner. Paul Elliot of Disc Makers' SoundLab reports, "A lot of the masters I get have the bass drum mixed

too high and the bass guitar mixed too low or vice versa. Because they're in the same frequency range, EQ can't always help bring out the bass guitar without making the bass drum unbearable." He suggests that you think of the bass guitar and bass drum as one instrument during the mixing process.

COMPRESSION IMPRESSIONS

Compression is another possible problem area. Apply compression to the individual tracks as needed, but be careful not to overcompress the final mix. As Katz points out, "Improper compression can remove the life from program material instead of helping it to sound lively." He adds that if you apply overall compression to your music and you later feel that you've



**The cleaner the
recording, the less
it will cost to
master.**

made a mistake, you'll have a difficult, if not impossible, time trying to undo the damage. It's better to be conservative. A good mastering studio can always make your mix more punchy by adding a little compression later on. But a recording that's been overly compressed is usually beyond resuscitation.

Torrey has another suggestion. He states, "On many tapes I receive, kick and snare drums contribute most of the peak levels. If this is the case as you mix, try using a little limiting on either or both instruments. You may be able to bring overall levels up, get a better balance between instruments, and maintain a great drum feel." He also suggests that you scrutinize your mixes with the best headphones you can get because headphones eliminate room-related bass problems while monitoring. And they are especially good diagnostic tools for resolving problems with spectral balance, noise, and distortion.

DISC TO DISC

An increasing number of desktop musicians have added recordable CD units

to their setups. Although not as popular as DATs, CD-Rs make excellent submasters. In fact, with the proper software, you can burn your own CD-R master and have a glass master cut directly from it. However, as David Conrad of Sound Concepts mentions, "not all CD-R devices can produce a fully Red Book-compliant disc." To do that, you'll need a digital audio workstation or an audio editor that can output the necessary PQ subcoding (see Fig. 2).

Furthermore, your setup must be able to record onto a CD-R in Disc-at-Once mode (which records the disc in a single pass) rather than Track-at-Once mode (which shuts off the laser between tracks). A recording made in Track-at-Once mode can still make a fine submaster, but it must be premastered like a DAT recording before the glass-mastering process.

Torrey adds one caveat: some CD recorders can burn start IDs directly from the start IDs on a DAT. Because DAT Auto ID mode works by detecting the attack of a recorded segment, it typically places the IDs a few milliseconds late. That's not a problem if your CD-R is a submaster; the CD house will realign the IDs during premastering. If you're making a direct transfer to a glass master, though, the IDs on your finished CDs will be slightly late. Tracks cued up by ID number will then have the attacks truncated, which is especially annoying to broadcasters.

In addition, if you submit your own CD-R master, remember that everything on the CD-R will be transferred unaltered to the glass master. Any clicks, background noise, abnormal gaps, phasing problems, or other anomalies will be perfectly preserved and reproduced on the final discs. CD manufacturers will gladly run your homegrown CD-R master through the replication process, and that's certainly the cheapest and fastest way to go. However, they all strongly recommend that you have a mastering engineer evaluate the recording before making a commitment. In most cases, there's room for improvement.

Associate Editor David M. Rubin owns a computer-music studio in the Los Angeles area where he composes for film, video, and multimedia. He wants to thank Bob Katz at Digital Domain and David Torrey at DRT Mastering for their help in preparing this article.

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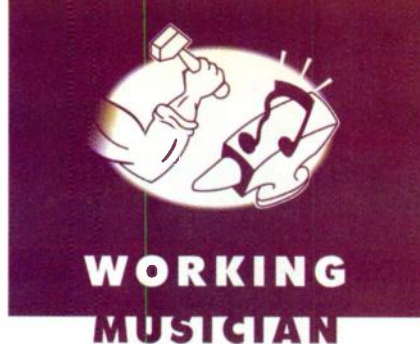
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Publishers' Roundtable

Five music publishers talk about what they can do for you.

By Michael A. Aczon

From George Gershwin and Tin Pan Alley to Tupac Shakur and the streets of Oakland, songwriters and their songs have always been the foundation of the music business. The billions of dollars made from songs each year in the music industry is generated by music publishers, who understand how to convert songs into dollars. To demystify the role of the publisher, I assembled a number of music-publishing executives to talk about how they help songs get heard.

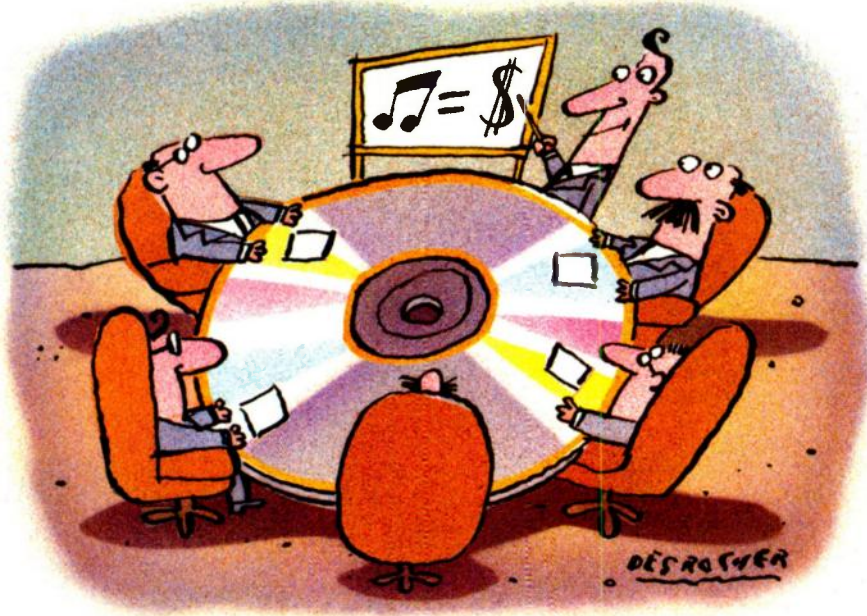
The participants in this discussion are Greg Hill, manager of Creative Services

at EMI Music Publishing in Nashville; Adriene Rodriguez of EMI Music Publishing's Film and Television Division in Hollywood; Ian Crombie, executive director of the Northern California Songwriters Association (NCSA); Michael Eames, a partner in the PEN Music Group, an independent publishing company based in Los Angeles; and Jim O'Loughlin, owner of O'Lyric Music, another independent music-publishing company in Los Angeles.

How did you get into music publishing?

GREG HILL: I got a master's degree in Music and Media Industry from the University of Miami (Florida). After an internship at Hothouse Music, an independent publishing company in Nashville, I was hired as the creative director of Magnatone, another indie in Nashville. I moved up to general manager, and eventually EMI hired me for the position I have today.

ADRIENE RODRIGUEZ: I was practicing law in San Francisco for a large law firm, and let's just say that it wasn't the right fit. I relocated to Los Angeles. I got a gig at a film studio doing project development for movies. One of the executives there introduced me to Jody Gersen, senior vice president at EMI Music Publishing, who was looking for an assistant. I think it's important to realize that to make a career change,



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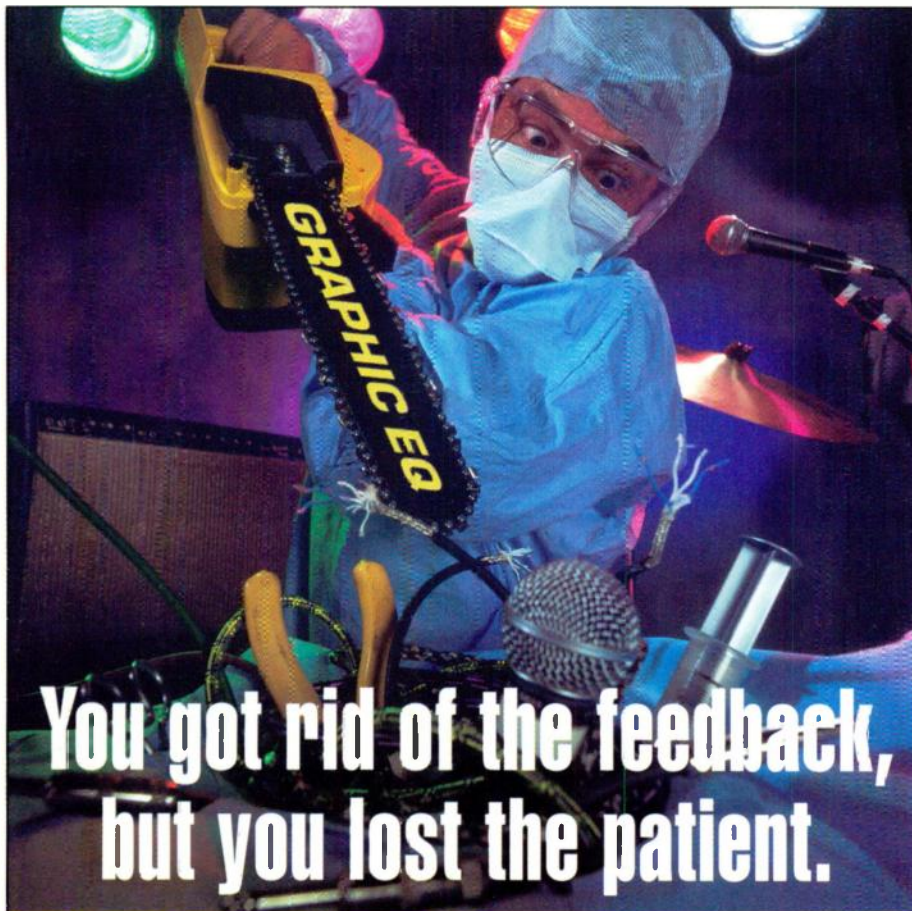
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it is sometimes necessary to start at the bottom again. Though ego shattering at first, my apprenticeship ended up being the best thing for me. Jody was smart, knew everything about music publishing, and was a great teacher. Eventually, Jody recommended me for a promotion into my current job.

IAN CROMBIE: I fell into this quite by accident. I'm from England, where I was a musician and songwriter. I came to the states touring with a rock band in 1980 and moved here permanently in 1982, getting involved as a volunteer with NCSA shortly after that. A couple of years later, my predecessor asked me to sit in for him for a month while he was a consultant to the National Association of Songwriters in Los Angeles. He ended up burning out on the business and never returned to NCSA. I've been doing this ever since.

MICHAEL EAMES: When I graduated from college, I decided that I wanted to pursue film scoring, so I tracked down the one person I knew in L.A. and, after a number of temp jobs, got a gig at the recording studio and office of Brian Wilson. The office handled all of Brian's publishing matters, so I developed an intimate knowledge of that end of the business. After that, I worked for a film and television music supervisor and then moved on to the Don Williams Music Group, the publishing company that administers Jimi Hendrix's catalog. In 1994, I got together with Pat Hoyman to start up the PEN Music Group.

JIM O'LOUGHLIN: I got into the business as a writer, but I discovered that my writing talents were limited. I came to the conclusion that I'd rather be a publisher representing good writers than be a writer who wasn't putting out good work. My first break was with an attorney representing David Bowie's early works, and then I moved on to get experience with a large company by working for the legendary E. B. Marks Company, which had a deal with Inter-song/Chappell. I also found my way through Polygram, MCA affiliate Heath-Levy, and finally CBS. I went independent in 1980 and have been ever since.

What is the role of the music publisher?

HILL: My primary obligation is to generate income for EMI with the writers

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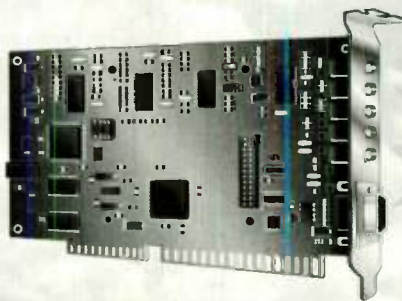
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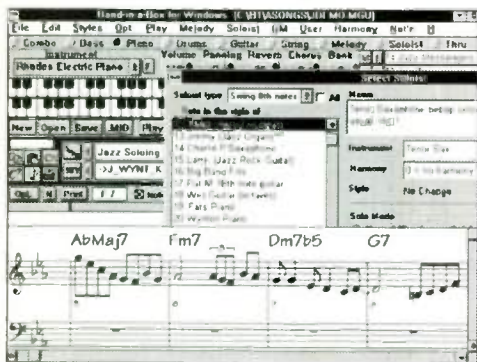
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(* NOTE: ATARI Band in a Box available only in Ver 5)

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Band-in-a-Box 7.0 is here! This major upgrade includes over 60 new features. We've added a 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 great musicians! And there's lots more in 7.0 - improved notation, step time/notation edit of StyleMaker patterns, scroll ahead option for notation, improved synth support, over 60 new features in all!

OUR CUSTOMERS LOVE VERSION 7.0! "Wow! The soloing sounds amazing... how can it do that?" "I love the notation improvements." "Another winner - thanks!" "You guys have added everything I wanted."

NEW! Add-ons for Band-in-a-Box Version 7.0! Jazz, Rock & Bluegrass Soloist Disk Sets

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- Soloist Disk Set #3: Specialty Jazz Soloing \$29
- Soloist Disk Set #4: Rock Soloing \$29
- Soloist Disk Set #5: Bluegrass Soloing \$29
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An exciting aspect of the Soloist feature in Band-in-a-Box Ver. 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 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 BB with your favorite types of music.

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MIDI guitar by Bluegrass virtuoso
Marty Cutler

NOTE: Soloist Disk Set #1 is
included with Band-in-a-Box 7.0
and upgrade, so is not offered as
an add-on.

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Band-In-A-Box Pro (first time purchase)	\$88
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The UltraPAK includes Pro version 7, Styles Disks 1-8, Harmonies Disk 1 + Soloists Disk 1 (* ATARI available only in Version 5)	

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Soloist Disk Set #5 - Bluegrass Soloing	\$29
Soloist Pak - All 4 Soloist Disk Sets + Bluegrass MIDI-FakeBook	\$99

NOTE: Soloist Pak available on disks or CD-ROM. Soloist Disk Set #1 included with Version 7 upgrade

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MEMORY REQUIREMENTS: DOS (640K), Windows (8 mb), Macintosh (8 mb), Atari (1040)
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The Jazz Pianist™ \$49

This program makes it "too easy" to learn to be a great jazz PIANO player!

Top jazz/studio pianists play 60 jazz standards in a wide variety of styles.

Hear the music with CD-quality through your sound card or MIDI system. Most pieces have bass/drums as well as piano so you get a full sounding jazz trio for the tunes! Jazz Trivia game & Guess the Song game, program notes, biographies & music dictionary (all on disk).

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Over 90 ragtime & early jazz piano standards, played on MIDI keyboard by top Ragtime Pianists... and featuring world-renowned Ragtime performer JOHN ARPIN!

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The New Orleans Pianist™ \$49

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 & David Torkanowsky playing a wide variety of New Orleans, R & B, Blues & Ragtime piano music.

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In versions prior to 3.5, we added major features like music notation, wave files, lyrics, chord symbols & printout. Now we've added many new features. We've added a big "Karaoke" Style Window to display lyrics. The notation is enhanced with support for finer resolutions like 32nd notes. You can align a rubato piece to a click track. We've enhanced the intelligent piano hand splitting routines. The enharmonics are intelligently chosen based on the chord symbols & more! PowerTracks for DOS includes FREE (NOTE: DOS version doesn't support music notation or other graphical features).



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Hear the music with CD quality through your sound card or MIDI system. Most pieces have bass/drums as well as guitar so you get a full sounding jazz trio for the tunes!

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development. Although publishers would like to do that, they need to find developed talent so they can get right to work finding placement for songs.

EAMES: I get them two ways, the more important of which is through referrals from publishers, writers, or other industry professionals. Secondly, I "cherry pick," meaning that I find writers whose music I love and respect and send them a pitch to let them know who I am and what I do and see whether I could be of some assistance

to them. The Gypsy Souls, a group we represent, is a good example of this. An attorney friend of mine ran into me at a conference and turned me on to the band. I got to hear them and liked them.

O'LOUGHLIN: I make myself available at conferences and song screenings like the NCSA or the Los Angeles Songwriters Showcase. Because I've been in the business for such a long time, word of mouth always keeps me supplied with plenty of material. Just last week, I went through two post-office containers

of material submitted to me through contacts, and I listened to all of it!

What is the difference between a large music publisher and a small one?

HILL: There are definitely differences, and the preference depends on the individual writers. For a developing writer, a smaller company will spend more time artistically and emotionally helping the growth process. For me, starting out at a small company was good; I learned publishing by having to claw my way through the doors. For the writer, a larger company usually means increased access because the larger volume of songs represented by the publisher gets them to the people who need the songs more regularly. This is also the down side: the publisher has more songs to choose from.

RODRIGUEZ: When I started my job, I had few contacts in the industry. Because I was from EMI, film and television people answered the phone when I called. From what I understand about the smaller companies, it is harder to get in the door. The larger companies have bigger staffs, including A&R, support staff, and song pluggers. The disadvantage of the large company is that it is easier to get lost. However, it is also possible to get lost in a small company. The important thing is to have a relationship with the person who signs you; that person is your pipeline to the company, whatever its size.

CROMBIE: The smaller companies can cater more to the songwriter and often will make a more favorable deal with the songwriter for the publishing. The smaller company has less of a catalog to work with, so the writer's songs are probably easier to remember when sorting through and looking for a tune for a particular purpose. On the down side, the smaller publisher has less money to pay for demos and advances. The larger companies have more of an "in" to potential users of the music. From the organization's perspective, we sometimes experience difficulty keeping up with staff changes and turnover with the larger companies.

EAMES: That question is similar to asking whether a writer should go with BMI or ASCAP. If you were to bring in a big catalog of songs with a preexisting track

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● WORKING MUSICIAN

record of use, the large company is probably an advantage. Not only will you usually get a lot of money up front, but because there is so much money at stake, you will be a priority. Because of this, I don't think that the large companies do the individual writers and smaller catalogs justice. As a writer, you have to meet everyone you can and then sign with the company with whom you are most comfortable. You simply need that one person at the company who will take your call and take care of you and your songs.

O'LOUGHLIN: The large company was tough for me. I prefer to keep it small. Large companies can get you accessibility, but over the years everyone develops a list of "go to" people that they can present good material to. Whenever I hear someone from one of the majors say, "We just signed this catalog," I find it hard to believe that they can get excited about all of the songs. Smaller companies like mine know all of their writers and all of their songs.

What is the future of music publishing?

HILL: I think it is strong, especially seeing how country music became so big, with a 400 percent growth over a four- to five-year period that was based almost solely on great songs. Look at the success of song-driven artists like Sheryl Crow, and you can see how important music publishing will continue to be. It still comes down to the song and getting it heard.

RODRIGUEZ: From the business side, it looks like the acquisition of companies and catalogs—like the recent gobbling up of Cherry Lane Music by Dreamworks—will continue. This goes in cycles where smaller publishers and boutique labels develop new sounds, and the larger companies come along to buy the smaller companies. We're probably going to see fewer of the small companies for a while. Publishing will not go away, though. It remains the most profitable, but least known or understood, component of the music industry.

CROMBIE: I think most publishers are nervous about the market. For example, in country we're seeing more self-contained acts, which means less use of outside songs. We have a lot of

singer-songwriters in our organization, and one of my hopes is that we'll see a swing back to the 1960s coffeehouse singers. I think that there is more pressure put on pop, R&B, and even country artists for "a sound." I see this resulting in the public wanting to see the performer doing his or her own songs.

EAMES: Certainly the digital revolution will affect all of us. I'm alarmed by the copyright violation that could go on if the music industry doesn't take the necessary steps to prevent it. It's also excit-

ing because, from CD-ROMs to interactive games, they all need music.

O'LOUGHLIN: Music publishing is healthy. New geographic territories are opening up, and as they open, the international market becomes available to all who can supply music.

Michael A. Aczon is a Bay Area entertainment lawyer and personal manager. He also teaches music-business courses for San Francisco State University and Diablo Valley College in Pleasant Hill, California.

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RECORDING MUSICIAN

Creative Drum EQ

Produce slammin' grooves with these tonal tweaks for head bangers.

By Brian Knave

Everyone's heard the classic drummer joke that begins, "What do you call someone who hangs around with musicians?" Okay, so I may be a drummer myself, but in the role of recording engineer, I can laugh knowingly at that one. After all, in my opinion, a musician is not just someone who makes music on an instrument but someone who can *tune* that instrument, as well.

Of course, we all occasionally encounter the drummer who can't—or

won't—tune his drums. One solution is to tune the drums yourself, or at least offer a few tuning suggestions. (For a primer on drum tuning, check out "Recording Musician: Sonic CPR for Drums" in the January 1996 **EM**.) But be forewarned before taking this approach: some drummers don't take kindly to suggestions about how to improve their sound.

Fortunately, with EQ you can improve the drum sound without ever going near the drummer. On drums in particular, equalization can go a long way toward salvaging crummy-sounding tracks without resulting in an unnatural sound. Even if you're blessed with a drummer whose kit sounds splendid, a few tonal tweaks may still be in order to make what's recorded on tape better suit the style and mood of the song. Of course, there are also those times when you just feel like reshaping the sound for creative reasons.

This month we'll look at equalizer settings for kick and snare, the two drums that are the driving force behind many styles of music. Armed only with console EQ that offers one or two sweepable midrange bands as well as high and low shelving, you can subtly enhance or drastically alter the sound of these two all-important instruments.

KICK TRICKS

Before delving into problem-solving applications, I'll map out some critical



Sorry, folks: EQ alone can't infuse humdrum drum tracks with the thunderous tones John Bonham laid down. It can, however, make lackluster tracks hit harder. (Courtesy Atlantic Records)

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(J.H., Ithaca, NY)

■ **"I really like the EQ points you've chosen and the EQ curves."**

(B.M., Lanseshore, MA)

■ **"Plastic mixers can break easily. The MS1402 is made of metal!"**

(M.S., Shorewood, IL)

■ **"I will be using the MS1402 to track all keyboards on MANDBWDWTTWEL* for Atlantic Records."**

(R.H., New York, NY)

*Major act, name deleted because we don't want to tangle with entertainment lawyers.

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when running a big bass and arch-top guitar live."

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■ **"The quality of the EQ is amazing! I was blown away by the tone and clarity."**

(J.D., Pomeret, CA)

■ **"The MS1402-VLZ is great — excellent specs (I teach audio engineering) and really clever routing options."**

(J.P., Los Angeles, CA)

■ **"What I heard when I hooked up my MS1402-VLZ was exactly what I wanted to hear. Nothing. Cleanest mixer I have ever worked with."**

(R.S., Fergus Falls, MN)

■ **"The 1402 RULES! People all the time come and tell me how wonderful the sound is."**

(P.F., Cincinnati, OH)

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(H., Houston, TX)

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(S.E., NY, NY)

■ **"Great product!"**

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Below: A few of the 400+ folks who work at Mackie Designs in Woodinville, WA, 20 miles north of Seattle.



centered at 1 kHz, that tends to emphasize the tonality of the drum shell (wood, stainless steel, brass, etc.). *Meat* might also be called *body* or *guts* and is located anywhere from 240 Hz down to 100 Hz. Because these frequencies make the speaker move a lot of air, it can be very visceral and bone shaking, especially in the lower realm.

To get a quick tour of the possibilities, try some basic combinations: for a military snare sound, combine meat and snap; for a funk-in' backbeat, combine meat and crackle; and for ball-

busting rock, combine meat and pop. To get more precise, check out the following tailor-made applications.

HUNK O' FUNK

For a really fat but shredding backbeat, first boost 300 to 350 Hz by 6 or more dB to lay in some "thunk." For the shred, boost 5 kHz by 3 to 6 dB and maybe add a touch of 12 kHz. Finally, depending on the sound that works best in the mix, either cut or boost the low-shelving frequency by 2 or 3 dB. Try both. I tend to like it with a cut at 80 Hz.

PAPER TRAIL

For a distinctive, postmodern tone, make the snare drum sound like paper tearing. Start with a radical, 12 dB cut at 80 Hz. Then make another deep cut, say 9 dB or so, at 250 Hz. Now, using a 2-octave Q, boost 6 kHz by 3 or 4 dB. If desired, add a dB or two of high shelving. Now run the whole thing through a flanger and you're ready for the European trip-hop scene.

DEEPER DOWN

Sometimes the norm just doesn't cut it. To make a standard, 5-inch snare sound like a deep-shell, parade drum—a once-again popular sound for certain flavors of pop—first add some meat by boosting 220 Hz 6 dB or so. Now, cut 1 kHz by 6 to 9 dB and 80 Hz by 3 dB. Finish off with a 3 dB boost at 12 kHz, and set the troops to marching.

PSEUDO PICCOLO

That guy who hangs out with musicians doesn't have a piccolo snare either? No problem—with a few easy tweaks, you can simulate one. First, boost 1 kHz by 3 to 6 dB to attain the characteristic piccolo pop. Next, shave off 9 to 12 dB at 230 Hz and another 9 dB at 80 Hz. To go the extra mile, use a pitch shifter and bring the sound up a fifth or so.

FINAL HIT

Whether or not you like the sound of my EQ templates for kick and snare, the valuable thing about giving them a whirl is that you may come across some sounds you *do* like. Also, as you experiment with the different EQ combinations, you'll find there are more ways than one to achieve a particular result. That can be a useful thing to know, for example, if a certain EQ setting adds too much noise to the mix. Generally, it's best to favor the combination with more cuts than boosts.

Remember, the point of equalizing kick and snare is to define and clarify them so they can do a better job of driving the song. It's fun to dial up "out there" settings, and on some songs, a radical drum tone can work wonders. But remember that context is king. While EQing, bring in the rest of the instruments frequently, or you may end up with a killer sound in solo mode that doesn't work for beans in the mix.

Special thanks to Karen Stackpole for help with this article.

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Digidesign Pro Tools 4.0 (Mac)

By Paul D. Lehrman

The latest version adds power, speed, and complexity.

When Digidesign's Pro Tools system first appeared, it set the standard for digital audio production on the Macintosh platform. Since then, the software and hardware have undergone several major revisions, each one adding many new features and refining old ones. The latest version of the *Pro Tools* software is 4.0, and its myriad new features, enhancements, and general fixes are successful and welcome for the most part. Always known as a brilliant editing platform, *Pro Tools* now brings the quality of

its mixing, automation, signal routing, and processing functions up to the same exalted level.

The new features would fill a book; in fact, they fill several books. The main software manual weighs in at over 400 pages, and there are an addendum, an 80-page *Installation Guide*, and a 182 KB Read Me file. For the purposes of this review (which is still pretty long), I'll hit some of the highlights and point out some of the things that aren't quite what they could be.

CARD GAMES

Pro Tools III is Digidesign's flagship product, but the system is now available at a wide range of price points. The cheapest way in is to use it without any additional hardware in Power-Mix mode. This requires a Power Mac with at least 32 MB of RAM, and it takes advantage of the computer's internal, 16-bit, 44.1 kHz sound engine (see the sidebar "Hardware Options"). Going up the economic scale, you can run the program with an Audiomedia III card or a Pro Tools Project system.

To take advantage of all the features, you need a full-fledged Pro Tools III system. The minimum configuration includes a Disk I/O card, a DSP Farm card, and an audio interface. You also need an external disk drive that is dedicated to audio and connected to the Disk I/O card. Digidesign says you must have Apple's System 7.5.3 or later to run the version 4.0 software, but I had no trouble at all running it with System 7.5 on a 100 MHz, NuBus-equipped, PPC 601-based clone.

The new software will not run on older Pro Tools 442 systems, so if you have this hardware and want to upgrade your software, you should contact Digidesign about their Exchange program (see the sidebar "Upgrades").

Installing the software is a snap because it now comes on a CD-ROM. (Floppy disks are available on request.) However, the process takes a little longer than you might expect; in fact, it seems to stall at one point. As it turns

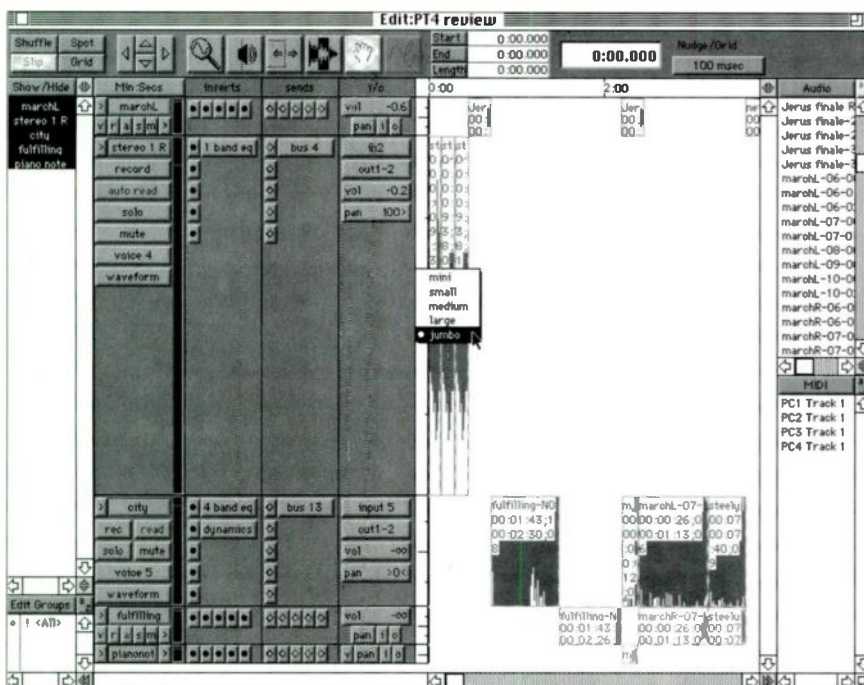


FIG 1: In the Edit window, you can now view inserts and sends. Each track can have its own height, and track layouts can be saved in memory locations.

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● PRO TOOLS

out, the software is doing some rather brutal housekeeping on your hard disk. In order to guarantee that the installation is successful, the procedure "idiot proofs" your system disk by removing all traces of older versions of *Pro Tools*. In addition, all Digidesign INITs and sound drivers, as well as Opcode's OMS MIDI management system and Apple's QuickTime (both of which are now required), are replaced with new versions.

The old files are not simply placed in a Disabled Extensions folder, they are *erased*. Fortunately, a warning dialog asks if you want to save any of them, which you will if you use other software, such as *BIAS Peak*, that doesn't work with the old versions. In this case, you must move them not to a separate folder but to another disk entirely.

ON DISPLAY

The first thing you notice after launching the software is that the Edit window, where you view tracks linearly, has become quite a bit more complicated (see Fig. 1). You can now resize tracks individually, which lets you shrink the ones you're not working on and enlarge the important ones. Sends and inserts can be included in the edit screen, which means it's quite possible to do a session without ever opening the Mix window.

The increased screen complexity doesn't hurt performance. On the contrary, the program feels a lot faster and more fluid than previous versions, at

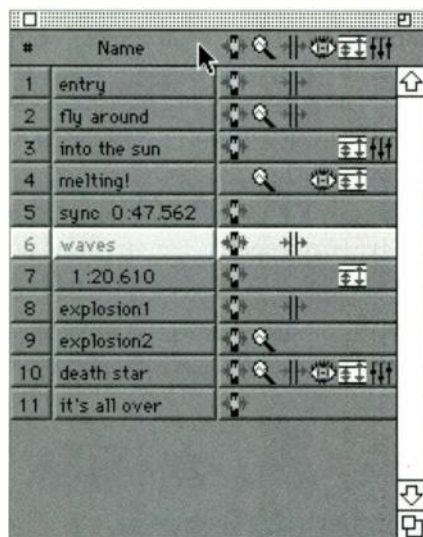


FIG 2: Up to 200 memory locations can store zoom settings, screen layouts, groups, and pre- and postroll times.

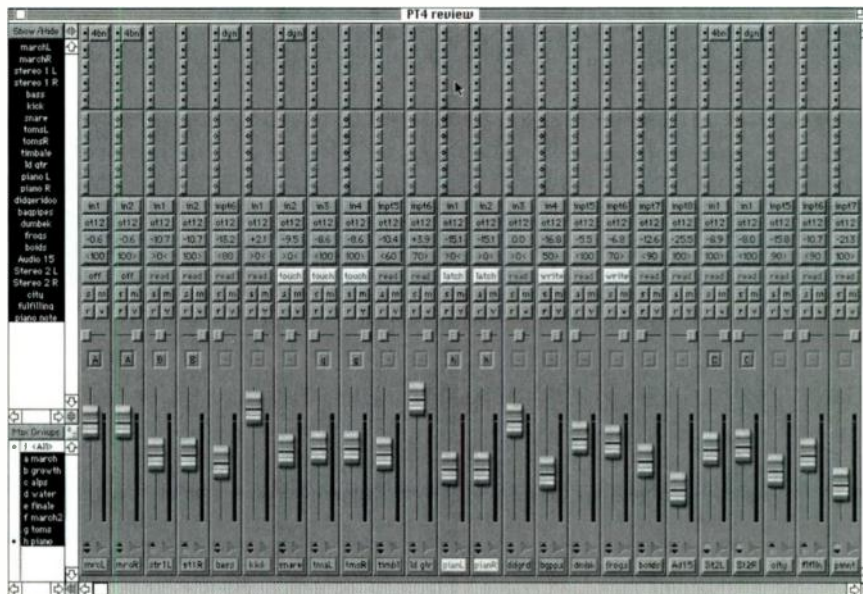


FIG 3: Mixer channels can be displayed at half width, allowing twice as many to fit on the screen.

least on a Power Mac. Most of the code is now PowerPC-native, which provides a tremendous boost to such things as mouse response and screen redraws. (The level meters and location counter, which is now available in a "big number" version, have lost their annoying lurching quality.) I didn't get to test the software on a 680x0 Mac, but I would imagine these benefits are not nearly as obvious on these machines.

On the other hand, the screen complexity does add greatly to the confusion factor, at least when you're first learning the program. There are so many preferences (five pages of them!) and various other toggles that a new user could spend a lot of time quite befuddled over why the program behaves the way it does. Once you set up your Edit window, you can store its configuration—zoom settings, pre- and postroll times, track heights, show/hide toggles, groupings—in any of 200 memory locations, along with current time and region start and stop times (see Fig. 2).

The Region List has become much more flexible. Regions can be sorted by name, start time, stop time, length, date, or disk location. Most of the housekeeping chores dealing with regions have been moved to a submenu within the window, which makes a lot of sense.

Unfortunately, one thing that hasn't changed is that you can see the parameters of only one plug-in at a time. For example, you can't compare EQ settings on two channels. On the other

hand, if you want to make sure two modules are identical, you can copy (or save) the settings from one and paste (or load) them into the other. You can also create an auxiliary channel, assign a plug-in to one of its inserts, and bus any audio track to this channel for identical processing.

In the Mix screen, where the tracks are displayed as channels on a console, you now have the option to cut the width of all channels in half (see Fig. 3). The names on the channels are abbreviated when you do this, but it lets you see twice as many channels—27 on a 17-inch screen—without scrolling, which is a very welcome improvement.

THE RECORD BUSINESS

There are a number of new recording options in version 4.0. Loop Record, a familiar feature in MIDI sequencers, loops part of a track and lets you record a new sound file each time. When you're done, you can retrieve the takes you want from the Regions List and assemble a "comp" track from bits and pieces of each one. A new pop-up menu displays only the regions in a track that have the same time stamp as the one you're working on, which helps you find the right takes without having to use the Region Bin. You can also audition takes during playback.

Record Safe prevents a track from going into Record mode. Half-Speed Record does just what you'd think: if you've ever overdubbed a track at 15 ips on a 30 ips multitrack tape, you know

how this works. Finally, Destructive Record erases everything in a track that's "beneath" a new take so that you don't keep piling up new files and regions as you do retakes, and you don't increase the file size.

Shuttle is a new playback feature that allows any of nine forward or backward playback speeds. Shuttleing can be controlled from the mouse, computer keyboard, or external transport controller. Frankly, I found this to be a little clumsy when using the numeric keys, but if you don't have an external controller, it could come in handy once you're used to it. One of the more annoying features of the old *Pro Tools* software was that playback stopped whenever you changed anything in the Edit window. Fortunately, that's now history. Not only can you scroll and change views on the fly, but *Pro Tools 4.0* lets you edit audio while it's playing, just like a MIDI sequencer. You can also change fader levels and automation parameters, drop in new regions, switch edit playlists, nudge regions, and even change the tempo map while the audio is playing. (If you have a MIDI metronome playing and you change the tempo map, the metronome doesn't reflect the new map until you stop and start playback again.)

If the Active in Background toggle is on, you can even switch into another application entirely, such as a Sample-Cell editor, MIDI sequencer, or word processor. However, you must turn Active in Background off to use any program that accesses the audio hardware, such as *Sound Designer II* or a digital audio sequencer.

There are a few restrictions on what you can do while audio is playing. For example, you can't change the type of plug-in on any channel or open any new plug-ins, and when you disable a track's automation, you can't turn it back on again without stopping playback. In addition, when you are moving around the screen during playback, the cursor doesn't always change when it should, and you might find yourself trying to move a window with an I-beam text cursor instead of an arrow.

MIDI and audio recordings are often partners in the modern desktop studio, but *Pro Tools'* treatment of MIDI sequences has always been one of its weakest features. Fortunately, this has finally changed. With OMS fully integrated into the software, a MIDI track can be routed to any instrument in your OMS Studio Setup. You can specify a MIDI channel or let the track play on the originally recorded channel.

THE MIRACLE OF AUTOMATION

Some of the most significant changes in the software involve mix automation. Instead of automating just volume and pan, *Pro Tools 4.0* provides total snapshot and dynamic control over all mix parameters, including EQ, solos, mutes, and send levels, as well as all plug-in parameters (see Fig. 4).

When you are in Auto Record mode and you change a parameter that has been designated as automatable, that change becomes part of a graphic, breakpoint-based automation playlist. The breakpoint curve is superimposed on the associated audio, which lets you make automation edits relative to the

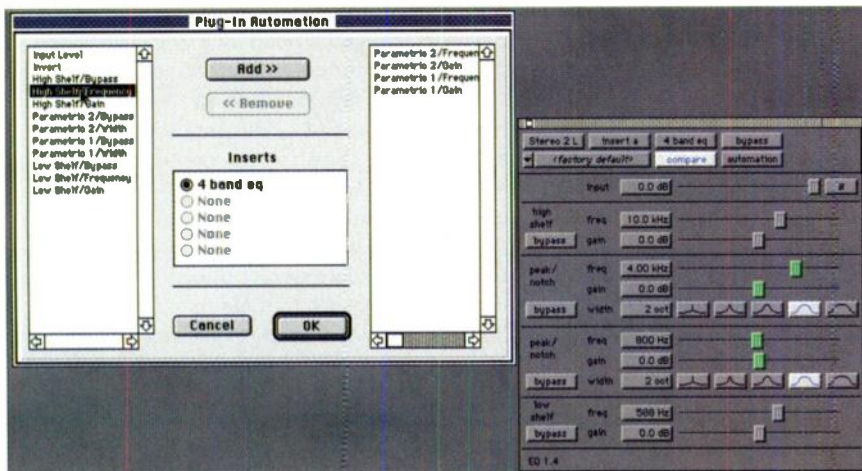



FIG 4: Any or all plug-in parameters can be automated, and they are color coded in the plug-in window.

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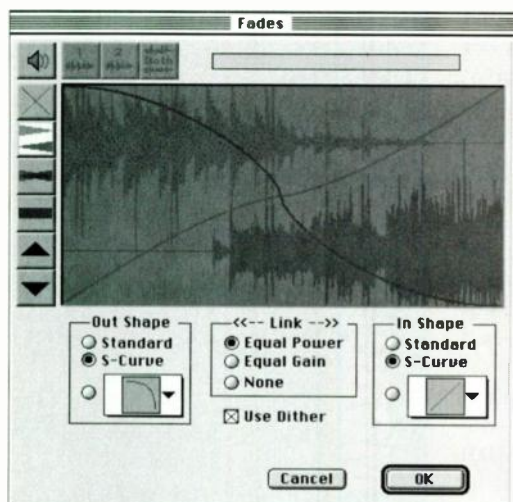


FIG 5: The Fades window now allows independent curves for fade ins and outs and displays the waveforms affected by the fades separately or superimposed.

waveform. For example, if you want to draw a long, slow change in a delay's mix level or apply a wah-wah effect to a track by wobbling the center frequency of a bandpass filter, you can do it graphically and in real time.

Trim controls can be used to raise

or lower a group of automation moves while maintaining their relative positions. In addition, you can copy the automation data from any track and paste it to the same parameter in any other track. Using a special Paste function, you can even clone automation moves and apply them to a *different* parameter, including a different plug-in. The only restriction is that you can't paste a continuous parameter's moves, such as volume, into a binary parameter, such as mute.

Unfortunately, you can only view the automation for one parameter at a time—volume, pan, sends, toggles, or processing—on any particular track. For example, even though you

can see how an EQ's center frequency moves or how its gain changes, you can't see both simultaneously. There is one way around this: if you are automating a linked stereo pair of tracks, you can display one parameter on one track and a different one on the other.

But this requires temporarily unlinking them so you can set up the different views.

Automation moves can result in a lot of data; in fact, the manual warns that in particularly dense situations, the automation data might clog up and not play at the right time, although I never encountered this. A System Load meter warns you when this might happen, and a 4-level Thin Automation function, which is similar to the Thin Controllers feature in many MIDI sequencers, helps address the problem. Thin Automation can operate automatically during recording or can be manually applied after recording. The slopes between automation points are continuous in *Pro Tools* (unlike a MIDI sequencer, which can only record discrete values), so the smoothness of the automation within a thinned track should never be an issue.

The automation playlist is separate from the track playlist (which determines the order in which the sound files in a track are played), and it can be edited separately. When you cut and paste a track playlist, the automation goes with it.

HARDWARE OPTIONS

Pro Tools 4.0 is available in four flavors. The PowerMix version (\$795) uses no additional hardware; it relies on the Power Mac's internal sound hardware. You can record two tracks and play sixteen tracks using the Mac's stereo analog input and output, although the number of playback tracks will be lower if your CPU speed is less than 120 MHz. You get no TDM capabilities or effects sends with this version, and the QuickPunch and scrub/shuttle functions don't work. However, you do get 2-band EQ on each channel, and you can use AudioSuite and its plug-ins.

If you add an Audiomedia III PCI card for another \$795, you get the advantage of lower-noise hardware and RCA jacks on the analog connectors (as opposed to those hideous stereo mini-jacks Apple uses), plus a stereo pair of S/PDIF digital inputs and outputs. You can also scrub and shuttle.

Then there's the Project version, formerly called Session 8. This is essentially a *Pro Tools III* system

without the TDM hardware. It uses Digidesign's Disk I/O card and therefore requires a dedicated, external hard disk. Project hardware is available for PCI or NuBus Macs and costs \$2,495 plus the price of an audio interface. There are two such interfaces to choose from: the 882 (\$995) provides eight balanced, 1/4-inch, analog I/Os and a pair of S/PDIF digital I/Os; the 888 (\$2,995) provides eight balanced, XLR I/Os and four pairs of AES/EBU digital I/Os. Project lets you record up to eight tracks simultaneously and perform QuickPunches. It gives you two postfader effects sends and up to eight returns, but the send levels are not automatable.

Finally, there's the full-blown *Pro Tools III* system. The NuBus version costs \$6,995, and the PCI version costs \$7,995 (again, plus the audio interface). This is the only version that supports all the features of the new software, including TDM plug-ins. You can combine Disk I/Os and audio interfaces (up to seven on PCI systems and

eight on NuBus systems) for a total of 56 or 64 analog and digital I/O connections. However, you can simultaneously record on a maximum of only 48 tracks. (This bothers you, I know.)

At \$5,000 (NuBus) or \$6,000 (PCI) per additional sixteen channels, we're starting to talk serious money here. In addition, if you weren't smart enough to buy a 6-slot Mac in the first place, you'll need an expansion chassis if you crave all that connectivity. Digidesign has one for NuBus Macs that costs \$2,190, including a card that's required to make the thing Power Mac-compatible. It has twelve slots, but some of them might not be usable with your particular computer. Digidesign also supports PCI expansion chassis from Magma (tel. 800/285-8990 or 619/457-0750; fax 619/457-0798; e-mail sales@magma.com; Web www.magma.com) and Bit 3 (tel. 612/881-6955; fax 612/881-9674; e-mail info@bit3.com; Web www.bit3.com). Second Wave expansion chassis are not officially supported.

One of *Pro Tools 4.0's* best features is an unlimited number of edit playlists for any track, which lets you assemble alternate takes into a comp track. However, you are allowed only one automation playlist per track, so those alternate takes had better not need different levels, sends, or EQ settings. You can always create new tracks and mute the ones you don't want to hear, but if you're using plug-ins, this can quickly max out your DSPs, as we will shortly see. Perhaps a future version will allow multiple automation playlists, which can be attached to specific edit playlists or even mixed and matched.

Solos and mutes now work intelligently. For example, soloing a reverb doesn't mute the reverb when tracks that feed it are soloed. If the Mute Frees Voice preference is turned on, there's a 1- to 2-second delay between the time you unmute a track and the time the track actually sounds, whether you do it manually or automate it. If this preference is turned off, the change is immediate. Once during my evaluation, the software refused to unmute a track; I had to close and reopen the session to hear the track. On the positive side, this is the *only* serious bug I found in several weeks of testing.

You can even port a session from a full-fledged *Pro Tools III* system to a *PowerMix* system. For example, you could do your editing and mixing on a *PowerBook* at the beach with a pair of headphones and bring it back into the studio for final tweaking.

TOUCH AND GO

The automation provides two special modes, which are similar to those found in megabuck moving-fader consoles. One is an overdub mode called Touch. In this mode, automation is recorded only if the fader is actually touched by the cursor. When you take the mouse away, the fader glides back to where it's supposed to be at that moment in the automation sequence, and the glide time is programmable.

The other mode, called Latch, starts recording automation as soon as you move a fader. The mode stops when you stop playback, at which time a new automation event is written to bring the fader back, at a programmable speed, to where it's supposed to be. One nice touch is the presence of on-screen null indicators that show you the current position of a fader being recorded relative to the previously recorded position.

Faders can now be grouped, and groups can be nested within each other or overlapped. Up to 26 fader groups can be created, and they can be individually or globally enabled or disabled without changing their configuration. Moving any fader in a group moves all of them, and they all move proportionately to each other. In addition to automation groups, you can define editing groups; slicing and dicing one track in the group affects all the other tracks in the same group. Any group can be designated as an edit group, mix group, or both.

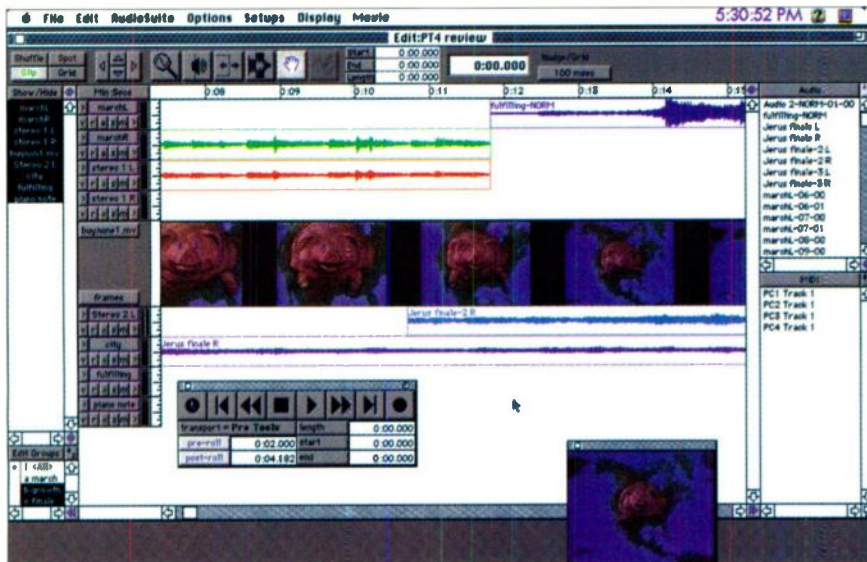


FIG 6: When you import a QuickTime movie, it can be shown in its own window and displayed as a series of "picons" in its own track.

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ALESIS

EXTERNAL CONTROL

Using a mouse to manipulate a bunch of onscreen sliders and buttons is a pretty clumsy way to mix, so Digidesign has long supported external hardware controllers that can operate the software via MIDI. In *Pro Tools*' earliest versions, you could assign any MIDI Control Change message to any onscreen control. This meant you could use the sliders, buttons, wheels, and footpedals on a MIDI keyboard or a dedicated controller (such as JLCoooper's FaderMaster) to manipulate the software's controls. In version 4.0, however, onscreen controls are hard-wired to specific incoming MIDI messages.

The software includes command sets called Personalities to accommodate three popular families of hardware controllers: Peavey's PC 1600, Penny & Giles' MM16 and DC16 endless-belt controllers, and JLCoooper's CS-10 and CS-10². These devices have eight or sixteen faders and several buttons, which *Pro Tools* uses for soloing, muting, track arming, and transport control. You tell the software which devices (up to four) you are using in a special Setups window, and you can mix and match models.

Each device can control up to 32 *Pro Tools* tracks by addressing different banks of sliders. For example, the eight sliders on a CS-10 can address *Pro Tools* channels 1 through 8, 9 through 16, 17 through 24, or 25 through 32. In this case, the software automatically high-

lights the current channels and scrolls them into view. In addition, the MIDI connection is bidirectional; some of these controllers have indicator lights showing transport status, fader position, etc., and the software sends the proper MIDI commands to control these indicators.

You can also use any MIDI controller (including the old FaderMaster), as long as it conforms to one of the Personalities. The manual includes the complete MIDI command setup for the CS-10, which you can then try to emulate with another device. Digidesign is also working on its own hardware controller, called ProControl, and the company will release a Personality for Mackie Designs' Human User Interface when that product becomes available.

SLICING AND DICING

The new software provides increased control over crossfades. Fade-out and fade-in curves are independent of each other and can be drawn manually (see Fig. 5). The crossfade can occur before, after, or surrounding the splice point, and you can view what happens to the waveforms as a result of the fades before you execute them. You can also audition a fade through the Mac or Digidesign audio hardware.

The Strip Silence feature, which identifies silences in a track and accordingly separates the track into regions, has also been improved. This feature now offers separate on and off thresh-

old settings, minimum silence time, pre- and postroll to make sure attacks and decays aren't cut off, and automatic sequential naming of the separated regions. You can select what you consider to be a silent region (e.g., a pause in a voice-over consisting only of room tone) and use the Identify Silence command to tell the program to recognize it as such.

A significant change in *Pro Tools* 4.0 is that file-based editing is now available inside the program. To do a destructive gain change, reverse, or pitch change in previous versions, you had to export the file to a separate program, such as *Sound Designer II*, mess with it there, and then import the altered audio back into *Pro Tools*.

Pro Tools 4.0 includes many file-based capabilities from *Sound Designer* in the form of plug-ins that conform to Digidesign's new AudioSuite architecture. These plug-ins let you make edits even while a file is playing, although the alterations don't occur in real time. (You hear them next time you play the file.) The new file can overwrite the old one on disk, or you can save it under a new name. In either case, you can always undo mistakes. In addition, the processed audio can be automatically dropped into the same position as the original audio. Multiple tracks and regions can also be selected and processed by AudioSuite in Batch mode, which is a terrific convenience.

AudioSuite functions don't depend on DSP hardware, so they run on any version of *Pro Tools*, including PowerMix. This also means you can perform as many AudioSuite operations as you wish on a session without maxing out your DSPs, though it might take awhile.

The AudioSuite functions that come standard with *Pro Tools* 4.0 are normalize, pitch shift, time compression/expansion, DC offset removal, reverse, phase reverse, gain change, and duplicate. Many third-party companies that have developed plug-ins for *Sound Designer* (which will not work with *Pro Tools* 4.0) are porting their products over to AudioSuite, and some TDM plug-in manufacturers are doing the same thing.

Lest you worry about the fate of *Sound Designer*, Digidesign has no plans to discontinue it, despite the integration of many of its functions into *Pro Tools*, not to mention its age (eleven years). After all, many professional users still swear by it.

DISK DRIVES

Pro Tools III lets you daisy chain up to five hard drives on the Disk I/O card's SCSI-2 port, which means you can have a humongous amount of storage, backups, redundant arrays, or whatever.

Apple's System software, however, won't recognize a volume larger than 4 GB. If you have a larger drive (and you can now get a 9 GB drive for what I paid for a 20 MB drive only ten years ago), you must partition it. A neat *Pro Tools* feature called Disk Allocation lets you specify which tracks go to which drives, and you can choose to automatically assign each new track to a different drive or partition "round robin" style.

Iomega's removable, 1 GB

Jaz drives are a natural for *Pro Tools* because you can use a separate cartridge for each project. In previous versions of the software, these drives were not supported. The software that controlled the Disk I/O card refused to recognize Iomega's formatting, so if you wanted to use one for audio duties, you had to pretend it was a different kind of drive by reformatting each cartridge using software other than Iomega's.

Thankfully, Jaz drives are now supported without so much as a whimper. However, they have a tendency to go to sleep if you don't use them, so you must make sure they're awake if you've been letting the system lie idle for a while.

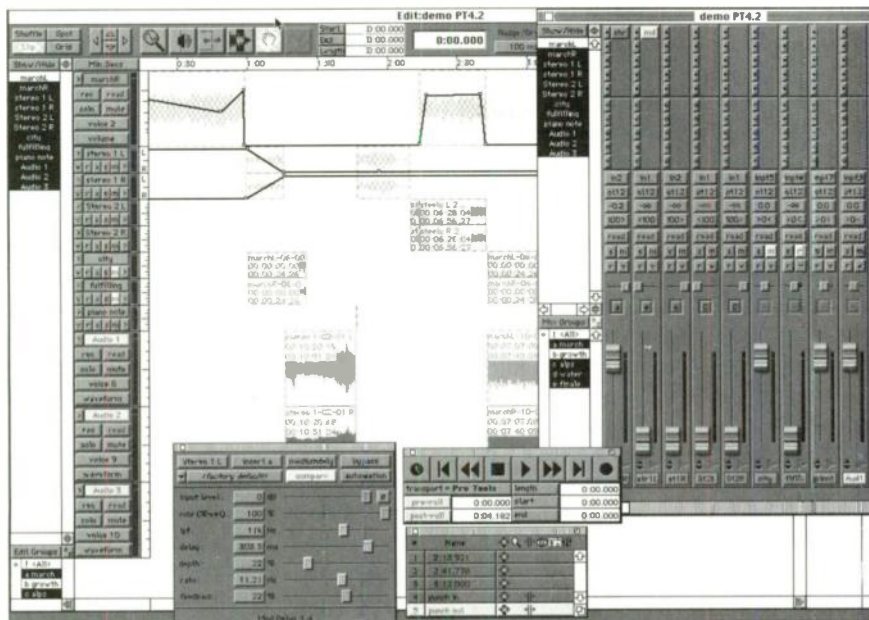


FIG 7: You can easily clutter up the screen with lots of windows, which makes a large monitor (or even two monitors) almost imperative.

PLUG IN, TURN ON

TDM plug-ins have been an integral part of *Pro Tools* for the last several versions. This format has inspired engineers to design software processing tools that provide everything from brilliant and insane new ways to manipulate audio to emulations of old hardware that allow this advanced digital platform to sound like a 1950s tube studio.

Up to five TDM plug-in inserts can be used on any track in any combination that your DSP hardware allows, which is actually a problem, as we'll see. (In addition, each track has five sends, which can be bused to an auxiliary input track that has up to five inserts.) Plug-ins now have internal Copy, Save, and Load pop-up menus for dealing with settings, and saved settings have their own folder inside the session folder. However, these settings can be applied to any *Pro Tools* 4.0 session.

The program ships with several TDM plug-ins: 1-band and 4-band parametric EQs; a dynamics module (compressor, limiter, expander, gate); a delay with adjustable feedback and modulation; a longer delay called Procrastinator; a dither generator; and a Time Adjuster, which delays the track up to 1,024 samples in single-sample increments to compensate for processing delays caused by other plug-ins. The Time Adjuster also provides up to 24 dB of gain and offers phase inversion. All of these modules can be automated.

Most TDM plug-ins from previous versions of *Pro Tools* work fine with 4.0, although they will not be automatable, and you can't save and load settings. Most third-party developers are working on new versions of their plug-ins that will have automatable parameters. What these upgrades will cost is, naturally, up to the individual manufacturers.

I LOVE MOVIES

If you've been jealous of digital audio sequencers that can play QuickTime movies along with the music or you've lusted after Digidesign's old *PostView* software (which let you scrub picture right along with the audio), you'll be pleased that *Pro Tools* 4.0 lets you import a QuickTime movie and play it on the screen while locked to the audio, either in real time or scrubbed. You can't adjust the window size, but you can set the SMPTE offset of the movie.

An extremely cool feature is that an imported movie shows up in its own track as a series of "picons" (picture icons), which makes lining up audio events to video frames a joy (see Fig. 6). If the movie already has an audio track, you can import it with the video or by itself. However, the software does not recognize a movie's MIDI track.

Borrowing one of the best features from Digidesign's lower-end *Session* software, *Pro Tools* 4.0 lets you export everything you've done—stereo audio and video—to a QuickTime movie.

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In addition to QuickTime, many other file formats are now supported, including WAV and SND, and you can work with files in a wide range of sampling rates and word lengths. Format conversion is automatic when you import a file. When exporting, you can downsample the session to eight bits using a proprietary Squeezer algorithm that sounds pretty good. You can also change the sample rate, and you get a choice of five quality levels from Low to Tweak Head. I experimented with all the different settings, and oddly, I found the Low setting provided the best-sounding results; the others had lots of low-frequency grunge in spots that were supposed to be silent.

ARE WE HAVING FUN YET?

If I told you that learning *Pro Tools* 4.0 is a breeze and anybody can be up and running in no time, I'd be lying. This is a complex, sometimes daunting program that will cause a lot of beginners to lose a lot of hair. There are programs that are much simpler to use—*AudioVision* from Digidesign's parent company, Avid, for example—but they don't do nearly as much as *Pro Tools*

4.0 does. If you want this much power, you must learn how to use it. With patience, the software can be mastered, and once seasoned users get over the initial shock, they will make sense out of it in a reasonable amount of time.

A whole raft of new Mac key combinations help get you around quickly. The Option, Shift, Command, and Control keys are used liberally, singly and in combinations. For instance, if you're in Select mode, the Control key turns the cursor into a scrubber whereas the Control and Option keys together put you into Shuttle mode. Moving a fader while holding the Command key increases the resolution of the fader so you can adjust it in 0.1 dB increments. Moving a fader that's in a group while holding the Control key temporarily releases it from the group, so you can trim an individual channel without disabling the group entirely.

Once you play with the key combinations for a while, you'll develop an intuitive understanding of the logic behind them. After that, you'll be able to stop constantly referring to the Quick Reference Card.

As with most complex software, the

screen tends to get cluttered (see Fig. 7). Although I welcome the ability to set different track heights, it's not hard to go cross-eyed trying to figure out what the heck you're looking at when you mix up tracks this way. I do not recommend using the software on a screen measuring less than nineteen inches, and if you can get a second monitor on line, even a small one just to deal with the mixer window, you will be even better off.

Unfortunately, it is ridiculously easy to run out of DSP power in a system with a single DSP Farm. Of course, software processing tools are cheaper than the corresponding hardware boxes, but there's a serious tradeoff: when you have a rack full of separate boxes, you can use as many of them as you want simultaneously. In a PCI *Pro Tools* system, only three of the four DSP chips on the first DSP Farm card are actually available for plug-ins. (In NuBus systems, only two are available on the first DSP Farm. In both cases, all four DSPs are available on subsequent cards.) Once you've set up a couple of compressors, a couple of EQs, and a single reverb, you've maxed out your DSPs.

UPGRADES

If you already own *Pro Tools* with the current *Pro Tools* III hardware, a simple software upgrade to version 4.0 is \$395, although many owners (e.g., anyone who purchased *Pro Tools* III Project new after June 1, 1996) will be eligible for a free upgrade.

Conspicuous by its absence in the new software's promotional materials or documentation, however, is any mention of the *Pro Tools* 442 hardware because it is no longer supported by the software. If you have one of these old systems (which Digidesign now calls "classic"), you'll have to dump it and get new hardware if you want to use the new software. If you don't upgrade the hardware, you are stuck with version 3.2 software.

On the plus side, Digidesign has an extensive upgrade program, called Exchange, for replacing old hardware with new. It's a very complex program, but the company throws in software to sweeten the pot a little. Here are a few examples, but don't

take them too literally; these prices were scheduled to go up this summer, but because the 4.0 software was so late, the old prices might be extended. Also keep in mind that these exchanges are handled directly by Digidesign, and the reference prices are full list. You might be able to get much better prices through a dealer; in fact, the street price may be so much better that conceivably trading in might not be worth it.

- You have a *Pro Tools* 442 system and want to trade up to *Pro Tools* Project NuBus with an 882 interface. This costs \$3,084, as opposed to \$3,490 list, plus the company will upgrade your software to 4.0 and give you either *Sound Designer II* or *MasterList* CD software, each of which lists at \$495.

- You have a 442 system, and you want to trade up to a full-fledged *Pro Tools* III system. This system costs \$6,884 and includes PT III and an 882 interface (total list \$7,990), plus a software upgrade and a copy

of either *D-Verb* or *DPP-1*, which list for \$495 each.

- You have an Audiomedia II and want to trade up to *Pro Tools* Project. This costs \$1,695 (instead of \$2,495 list), but you still have to buy an 882 or 888 interface. In this case, you might be better off buying an Audiomedia III for \$795 and a new PCI computer to go with it!

If you invested in multiple 442 cards for an 8- or 12-track system in the early days of *Pro Tools*, you'll have to sit down with someone at Digidesign to discuss what to do.

If you have more recent hardware, you'll find the Exchange terms are quite a bit more advantageous. Going from a *Pro Tools* Project NuBus system to *Pro Tools* III NuBus is \$4,495. Compared with \$6,995 list for a new PT III system, you save \$2,500, which is exactly what you would pay for a new *Pro Tools* Project, so at least you've protected your original investment.

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The best solution is to buy extra DSP Farms, but they aren't cheap at \$2,495 each. In addition, you must have available computer slots to put them in. Unless you have unlimited funds and expansion slots, you must learn Digidesign's complex formulas for what can be used together. The included *Allocator* software helps you keep track of what's going on, but it doesn't negate the fact that you're in for a constant juggling act if you want to do a lot of processing. This includes setting up auxiliary buses, bouncing processed tracks, and doing offline processing with AudioSuite.

I suppose I shouldn't complain—it

Product Summary

PRODUCT:

Pro Tools 4.0 multitrack audio editor

PRICE:

Upgrade from version 3.2: \$395

PowerMix version (no hardware): \$795

With *Pro Tools Project* hardware: \$2,495 (audio interface extra)

With *Pro Tools III* hardware: \$6,995 (NuBus); \$7,995 (PCI) (audio interface extra)

SYSTEM REQUIREMENTS:

Macintosh with 68040 or later CPU (PowerPC required for PowerMix version); 32 MB RAM; System 7.5.3 or later; OMS 2.3.1 (included); QuickTime 2.5 (included); 14-inch or larger monitor; external hard drive required for Project and *Pro Tools III* systems.

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still beats dealing with huge amounts of outboard gear—but it's important to realize that if you want to take advantage of all of the cool features *Pro Tools* offers (especially those mouth-watering plug-ins), you're going to have to assemble a pretty large system.

MANUAL LABOR

Unfortunately, the documentation does not help things along as much as it could. I am very sympathetic to the folks who wrote it: they had a gargantuan task on their hands, and they produced an exhaustive and well-organized book. Nevertheless, it is extremely tough going for the initiates and even a little intimidating to experienced users. There is a "What's New in 4.0" chapter for old users and an excellent "Essential Concepts" chapter, which is really essential reading for all users, regardless of experience.

Beyond that, however, the software cries out for a series of tutorials that at least touch on all the numerous parts of the program, but there are none. Like too many manuals, the emphasis is squarely on "What does this do?" when what's really needed is "How do I do this?" For instance, the concept of a comp track, which seasoned *Pro Tools* users talk about all the time, is never mentioned in the manual. If you have the patience to read and understand all the various manuals and Read Me files, you'll probably have no trouble, but if you're the type who likes to dive in and explore a new program (and who isn't?), you're going to be doing a lot of floundering.

Fortunately, the *Pro Tools 4.0* upgrade includes Digidesign's *User Tools* CD-ROM, which includes QuickTime Movie demonstrations and tutorials of the major new features and changes in version 4.0. The next version of this CD-ROM, which will be included with all systems, is expected to include a complete tutorial.

If ever a program cried out for a spiral-bound manual that can be left open on a flat surface, this is it. Digidesign used to use looseleaf notebooks, but they switched over to conventional bindings that require a hand to keep them open. Alternatively, you must smooch them down hard enough to break the binding and eventually cause the pages to fall out. (According to Digidesign, the next revision of the manual will be in a loose-leaf binder.)

AT THE END OF THE DAY

Minor complaints aside, *Pro Tools 4.0* is great stuff. It does more than ever, better than ever, and faster than ever. Digidesign's engineers have thought a lot about how to make the new features accessible and logical. Although you might find yourself scratching your head from time to time asking "Why did they do that?" a little reflection and practice reveals that their decisions were good ones in most cases. With this release, Digidesign once again pulls ahead of the pack and confirms its position as the most versatile, most bang-for-the-buck, best-supported digital audio workstation on the Macintosh or any other platform.

In addition, it's very clean; as mentioned earlier, I found only one minor bug in the program, and it literally never crashed. One can only assume that a major part of the 5-month period between *Pro Tools 4.0*'s first announced shipping date and its actual release was spent bulletproofing.

Of course, this much power comes at a price. It takes a while to get used to all the new tricks, take advantage of all the features, and fully assimilate what's under the hood, especially with all those Preferences to set. It's unfortunate that the documentation doesn't offer much in the way of hand holding, but at least (almost) all the information is there to be found.

There's another price to be paid, which I suppose could be called "DSP lust." With all the amazing third-party plug-ins available, and with more being announced almost daily, the prospect of putting together a super-duper system that does everything you could want is highly tempting. But if you go for all the plug-ins without also making a hefty investment in extra DSP Farms, you'll feel like a carpenter with a box full of fancy tools but only one hand.

Even at the lowly PowerMix level, however, *Pro Tools 4.0* is one heck of an audio-production program, and the more you add to it, the better it gets. If you can afford to indulge, it can become a complete studio on your desktop with powers far beyond what anyone could have imagined from a whole roomful of gear just a few years ago.

Paul D. Lehrman is a composer, author, consultant, and part-time college professor based in Massachusetts. He thinks his life is due for an upgrade real soon now.

EM METERS	RATING PRODUCTS FROM 1 TO 5				
FEATURES	●	●	●	●	●
EASE OF USE	●	●	●	●	●
DOCUMENTATION	●	●	●	●	●
VALUE	●	●	●	●	●

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World Radio History

KORG

Roland JP-8000 Synthesizer

By Jeff Burger

**An analog-synth pioneer
uses modeling to
turn back the clock.**

There is an adage that says history repeats itself. Nowhere is this more true than in the realm of synthesizers. Just look at the trend toward analog-style synths; if this isn't a retro tendency, I don't know what is. Of course, modern instruments use digital electronics to *simulate* analog synthesis, but the goal is the same: a big, fat sound.

Roland's JP-8000 is a perfect case in point. It uses "analog modeling" to recreate the sound of an analog synthesizer, and it even provides a bunch of dedicated knobs and sliders on the front panel to vary the sound in real time. This harkens back to the JP-8000's progenitors, such as the venerable Jupiter-8. (You can even see the family resemblance in the names of these instruments!)

FIRST GLANCE

Among the similarities between the JP-8000 and Jupiter-8 are 8-note polyphony and 2-part multitimbral capability, which is used to split and layer two

sounds across the keyboard. This might seem skimpy by today's standards, but these standards are based on sample-playback technology. Modeling technology is still young and relatively expensive; after all, it was only a few years ago that the first commercial modeling synth, the Yamaha VL1, was introduced with a maximum polyphony of two notes. This is strangely appropriate considering that true analog synths evolved from monophonic to an average polyphony of eight notes as they lumbered out of the techno swamps back in the Synthocene epoch.

The JP-8000's 49-note keyboard is sensitive to Velocity but not Aftertouch, which is pretty surprising in a professional instrument. (The internal sound module can respond to Channel Aftertouch messages from an external source.) To the left of the keyboard is Roland's pitch-bend/mod lever and a ribbon controller in addition to controls for LFO 2, the keyboard, pitch-bend range, and parameter-control assignments for the ribbon and Velocity.

Above the keyboard are clearly defined blocks of controls for the two oscillators, multimode filter (highpass, lowpass, bandpass), amplifier, arpeggiator, and effects. A small, 2-line x 16-character LCD is found in a block that also includes patch-selection buttons and several multi-function buttons that call up parameter pages in the display. This is much better than the 2-digit display on the competing Clavia Nord Lead.

The relatively simple rear panel in-

cludes a power switch, IEC power-cord receptacle, and MIDI In and Out ports. (Interestingly, there is no MIDI Thru.) The rest of the jacks are 1/4-inch and include a headphone jack, two main outputs, hold-pedal jack, and foot-controller jack.

PATCHES SANS CABLES

The basic sonic unit of the JP-8000 is a Patch, which includes two oscillators processed by a filter and amplifier (see Fig. 1). (If a Patch uses only one oscillator, you still get only eight notes of polyphony.) Two LFOs can be applied to the oscillators, filter, and/or amplifier; LFO 1 can also fade in after a programmed delay. The oscillator, filter, and amplifier blocks also include dedicated envelope generators. The output from the amplifier is sent through a simple, shelving, bass/treble EQ; delay; and chorus/flange/phase processor.

There are 128 preset Patches in ROM and 128 user Patch locations in RAM. As in most Roland synths, the preset and user Patches are organized in two groups of 64 (A and B), each of which is further divided into eight banks of eight, numbered 11 to 88. Unfortunately, you can't directly select a Patch; you must scroll through all banks in the preset and user A and B groups with the Up/Down buttons and then press one of the numbered buttons (1 through 8) below the display to select a Patch.

A Performance has an Upper and Lower Part, each of which is assigned a Patch. Although the JP-8000 is always in



With 8-note polyphony and 2-part splits and layers, Roland's JP-8000 is the digital heir to the Jupiter-8's analog synthesis legacy. Providing dedicated knobs and sliders on the front panel, it uses digital modeling to emulate analog synthesis.

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sounds, and X-mod is more in the "angry beehive" category.

This scheme provides a reasonable amount of flexibility, especially in the category of classic outer-space effects. However, shifting ring-mod sounds must be created with an envelope because changing Oscillator 2's pitch by hand produces audible glitches. In addition, setting the envelope depth to a nonzero value with the attack and decay times set to zero can generate a click that is useful for such things as adding some light percussion to an organ patch.

Using different filter modes in the two Patches in a Performance can produce rich, complex, and spacey textures. The filter slope can be toggled between 12 and 24 dB/octave, which approximates some of the classic filters from Oberheim, Sequential, and ARP. To my ears, the sound of the filter occupies the brighter Roland end of the spectrum rather than the fat Moog end. In addition to sliders for the cutoff frequency, resonance, and standard ADSR parameters, knobs offer positive and negative amounts of envelope depth, LFO 1 depth, and keyboard tracking.

The amplifier section offers another set of sliders for its dedicated ADSR envelope parameters. The associated gain knob is nice because it lets you program an independent volume for each Patch. Unfortunately, there is no Mix knob associated with Performances, so you must go into one or both Patches to make balance adjustments when using the Dual or Split keyboard modes.

The function of the remaining knob in the amplifier section depends on the setting of the adjacent button. It can control the depth of LFO 1's effect on the level or pan position, or it can be used to manually pan the sound to the right or left. Like all other LFO 1 depth controls, this one offers both positive and negative amounts, although the difference is negligible with all but the characteristic directional ramp of the sawtooth modulation source.

TAKING A REAL RIBBON

The spring-loaded pitch-bend/modulation lever increases the depth of LFO 2 when pressed forward, and the bend range can be set anywhere from a half-step to a maximum of two octaves. Pitch bend applies to both Parts in Dual keyboard mode and only to the

selected one in Single or Split mode. For example, you can bend riffs on upper leads over droning lower arpeggios in Split mode.

LFO 2 offers only a triangle wave that can simultaneously be routed to modulate pitch, filter cutoff, and amplitude. Each routing uses the same rate but with independent depth settings. Unfortunately, there's no provision for programming a fixed amount of LFO 2 modulation; it is always brought in with the modulation lever. Combined with the lack of additional waveforms, this translates to a partial waste of a perfectly good LFO.

The ribbon controller can be used to alter one or more parameters simultaneously, which is a nice performance feature. For example, you could map it to control the feedback amount of Oscillator 1's feedback waveform to drive a guitar-esque solo into screaming overtones or create hammer-on effects by routing the ribbon to pitch.

Although you can map Pitch Bend

to the ribbon, the range can't be set independently from the pitch-bend lever, which prevents such effects as a subtle bend with the lever complemented by a plunging whammy bar with the ribbon. Moreover, setting the ribbon to a wide pitch range reveals that its resolution is grainier than the lever's: wide pitch shifts with the ribbon are not completely smooth and exhibit a slight stairstep or zipper effect.

After setting the various synthesis parameters to create the sound you want with no ribbon modulation, you press the Ribbon Assign button, modify any parameters to the values you want when the ribbon is touched on the right end, and press the Ribbon Assign button again. You can do this with as many parameters as you like. However, some controls with plus/minus ranges cannot be modulated bidirectionally through the center zero point. On the plus side, you can assign different parameters to the right and left sides of the ribbon.

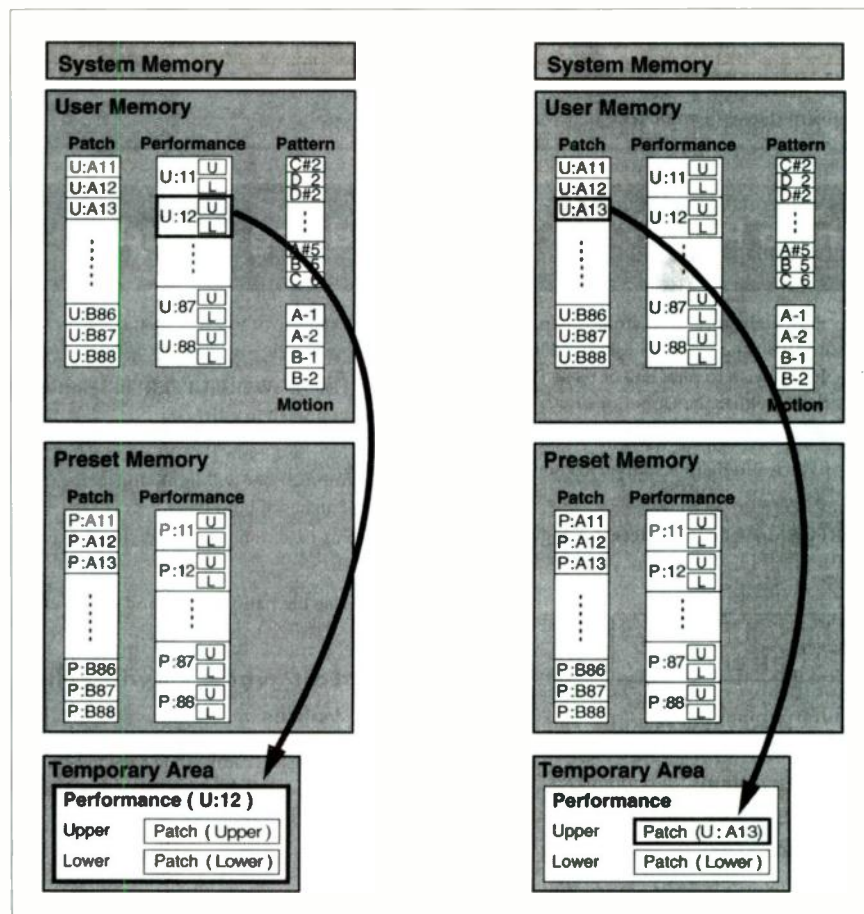


FIG. 2: When you select a Performance or Patch, it is copied into a Temporary Area. The Patches assigned to Performances are independent of their counterparts in Patch memory, which lets you alter them without affecting other occurrences of the same Patch. (Courtesy Roland Corp. U.S.)



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● JP-8000

Normally, the center of the ribbon (which is marked by a small bump on the case) corresponds to no modulation, and any altered parameter values spring back to their nominal values when the ribbon is released. Relative mode locates the nominal or unmodulated position wherever you first place your finger on the ribbon so that you don't have to worry about finding the exact center. The range from normal to maximum effect is automatically scaled to traverse the remaining distance to the ribbon end points.

Hold mode maintains the modulation at whatever point you release your finger instead of snapping back to nominal. For example, this lets you cruise along in tranced arpeggiation, gradually open the filter with the ribbon, and leave the filter open on release.

You can engage both Relative and Hold modes simultaneously, but they don't complement each other as you might expect. It would be great if the held amount maintained its value the next time you pressed anywhere on the ribbon instead of popping back to zero.

Velocity can be applied to any slider/knob parameters except master volume and tempo. These assignments are similar to ribbon assignments: you set the controls to the values desired for average playing Velocity, press the Velocity Assign switch, alter any parameters to the values you want to associate with maximum Velocity, and then press Velocity Assign again. For example, this lets you simulate the pitch instability of a trumpet by assigning a small amount of pitch envelope to soft Velocity and a greater amount for harder/faster Velocities.

The left-hand control section also includes a pair of Octave +/- keys that

shift the currently selected Part over a range of four octaves. Indeed, this is the only way to control the octave of Oscillator 1, and Oscillator 2's pitch is always relative to Oscillator 1. This implementation is elegant and welcome when it comes to creating Performances. Holding Shift while pressing the Octave buttons changes their function to overall keyboard octave control, shifting both Parts as well as the range of the note data sent to MIDI Out.

In addition to 4- or 8-note polyphony (depending on the keyboard mode), a Patch can be placed in one of two monophonic modes. Mono mode re-triggers the envelopes for each played note whether or not the previous note is still being held, whereas Legato mode does not retrigger the envelopes if a note is still being held. Both these monophonic modes offer only last-note priority, ignoring the potential value of high- or low-note priority, which would be handy when lead or bass lines, respectively, are desired over chords in Dual or Split mode.

In addition, these monophonic modes affect the behavior of portamento, which can be applied to monophonic or polyphonic sounds. Portamento is always in effect in Mono mode, but in Legato mode, it is applied only when you play in a legato style; if you play detached notes in Legato mode, portamento is not applied.

An optional expression pedal can be used to control LFO 2 modulation depth, pan, expression, or any single front-panel knob or slider. You can also assign the pedal to duplicate the effect of moving the ribbon up or down from the center point, which allows you to change multiple parameters from one pedal. However, you can't program the

JP-8000 Specifications

Keyboard	49-key, unweighted, Velocity-sensitive
Synthesis Type	analog modeling
Polyphony	8 notes
Multitimbral Parts	2
Patches (RAM/ROM)	128/128
Performances (RAM/ROM)	64/64
Stereo Effects Processors	2
Effects Types	4 (delay, chorus, flange, phase)
Audio Outputs	2 (1/4" TS)
Dimensions	36 7/8" (W) x 13 3/4" (D) x 4 1/2" (H)
Weight	17 lbs. 11 oz.

exact range of the pedal's influence as you can with ribbon and Velocity assignments.

The effects of the pitch-bend/mod lever, ribbon, Velocity, and pedal are programmed into Patches and apply to both Parts of a Performance in Dual mode. In Single and Split mode, these settings are derived from and control only the selected Part. The Relative and Hold functions are global to the entire unit.

The monophonic modes and portamento apply only to the selected Part, even in Dual mode, which means you must program them separately. For example, if you want a mono Performance in Dual mode for a monster lead, you must program both Patches for mono separately. Although this implementation provides the greatest flexibility, it is not always the most elegant in performance situations.

DELAY THE INEVITABLE

None of the onboard effects—bass/treble EQ, delay, chorus/flange—are tremendously flexible by themselves. However, their independence from each other and the ability to program them separately for each Patch or Performance Part can definitely beef up the sound.

The only front-panel control for the chorus determines the amount. Diving into the display menus, you can select from twelve types of chorus, flanging, and phasing with preset modulation speeds, amounts, and delays, most of which seem quite useful. The delay's front-panel controls include time, feedback, and level. The delay time knob produces audible glitches when

turned, which precludes any of the those speed-up-the-Echoplex tricks. Roland says this is an artifact of the modeling technology.

The available delays include three types of panning delays (625 ms maximum) and two monaural delays (1.25 seconds maximum). (These hard-panned delays are different from the smooth auto-panning available in the amplifier section.) The delay operates independently of polyphony, so you can create complex delay loops without sacrificing notes. All delay types

gradually roll off the highs with each successive echo, making things either more playable or more muddy, depending upon what you're trying to accomplish.

INDEFATIGABLE ARPEGGIATOR

The JP-8000's arpeggiator is certainly appropriate for such styles as trance, rave, space, and new age. As with most such functions, you hold a chord on the keyboard, and the arpeggiator plays the notes in sequence. You can specify whether the notes are repeatedly

Product Summary

PRODUCT:

JP-8000 synthesizer

PRICE:

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● JP-8000

played upward (from the lowest note to the highest), downward (from the highest note to the lowest), up and down, or in a random fashion. The range over which the notes are played can be set from one to four octaves. When the Hold button is engaged, the arpeggiator continues its incessant mission after you release the keys until you play one or more keys again.

You can assign the arpeggiator to the Upper, Lower, or both Parts in Dual mode. In Single mode, the selected Part is arpeggiated, and in Split mode, only the Lower Part is arpeggiated. One useful configuration is a Dual Performance in which six notes are assigned to a static pad Part and two notes are assigned to a more staccato, arpeggiated Part. (Of course, you're still restricted to the polyphony of the instrument, but the arpeggiator reads as many notes as you can hold down and plays them one at a time.)

Arpeggiator tempo can be controlled manually or slaved to incoming MIDI Clock messages. (Changing the tempo manually produces the same glitches I found in the delay-time control.) You can also sync the clocks of LFO 1, chorus, and/or delay to the arpeggiator-tempo control or MIDI Clock. The LFO 1 and chorus cycle can be specified as a rhythmic value from sixteenth notes to eight measures of 4/4, and the delay time can be specified from sixteenth notes to half notes. This function makes the JP-8000 very good at accommodating metronomically oriented grooves.

You can also arpeggiate in one of 90 beat patterns from absolute note values to preset patterns, such as walking bass, strumming, and harp. For example, the combination of beat patterns and MIDI Clock synchronization makes it possible to slave to a sequencer while driving the arpeggiator at up to four times the speed of the sequencer's metronome. This is a very welcome provision.

TO COIN A PHRASE

In addition to the up, down, up/down, and random modes, a fifth arpeggiator mode, called Realtime Phrase Sequence (RPS), is a potential boon to those doing live modern dance styles. RPS lets you create 48 minisequences up to four bars in length that are assigned to different keys on the JP-8000. To play one of the RPS sequences, simply hold the corresponding key.

All RPS patterns follow the arpeggiator's tempo setting. The Pattern Trigger Quantize setting determines whether playing a key triggers the sequence immediately, at the next beat, or at the next measure. This makes it a cinch to move between grooves seamlessly. The lowest note on the keyboard is used to stop RPS playback. You can also assign RPS to apply only to the Lower Part, which lets you play along using the Upper Part.

To set up an RPS pattern for recording, hold the Record button and press the key to which you want to assign the pattern. Any existing pattern begins playing back along with a metronome. In this mode, the Patch/Performance



**The JP-8000 includes
tons of great presets
to satisfy analog
hounds.**

Select buttons access parameters such as Loop Length, Quantization, Metronome, and Pattern Clear. The patterns are all in 4/4 time, so you can't do anything fancy. Gate time can be set to real time, staccato for short notes, or specific percentages of the input quantization value, which is useful in creating robotically uniform passages.

Unfortunately, you must listen to the metronome and any pattern already assigned to the key while you're trying to think about your settings. Although it's nice to verify the pattern you're about to erase or modify, I found listening to it during the basic setup process to be distracting. Of course, you can clear the pattern as your first step in the setup process to alleviate this problem, but the metronome remains active.

When everything is set up, pressing the Record button again kicks RPS into Record mode. The process is similar to recording drum-machine patterns; the pattern keeps looping as you add more stuff to it during each pass. Unwanted notes can be erased by holding the Erase button and the offending note during the corresponding section of the loop. Holding two notes with the Erase button erases all of the notes

between them. There are also provisions for copying entire patterns to different keys.

MOTION CONTROL

The JP-8000 offers even more automation with a feature called Motion Control, which records the motions of all knobs and sliders except master volume and tempo. These changes can then be played back like a sequence. (They can also be recorded and played back with an external sequencer.) These recorded motions allow complex filter sweeps, automated changes to envelope settings, and similar effects that can be very useful for adding character to both manual performances and repetitive patterns.

Motions can be set to repeat cyclically or restart when a new note is played after all previous notes have been released. If you loop a Motion, the parameters jump back to their starting values at the beginning of each cycle unless you carefully take the parameters back to their starting values at the end of the Motion. This can be a useful effect or a problem, depending on the situation.

The Motion recording/overdub process is similar to recording Realtime Phrase Sequencer patterns. Strangely, the Motions metronome is prone to going in and out of sync with any RPS pattern that might be playing, which is enough to give any self-respecting musician the shivers!

The JP-8000 can store two sets of two Motions each, and each Motion can be up to eight bars in length. These Motions are global and are not saved with Patches or Performances. Accessing Motion 1 and 2 in the currently selected set is simple thanks to dedicated buttons, but the switch you use to toggle the other set of Motions is buried in the display menus. (Boos from the crowd...)

Speaking of automation and related processes, the JP-8000 offers an Individual Trigger mode that triggers the filter and/or amplifier envelopes of the Upper Part from notes in the Lower Part or an external MIDI device. For example, this lets you apply a snappy rhythm from a sequencer track or play a right-hand chord from a single left-hand note, which is handy for fast, crisp dance passages in which even the slightest delay between the notes of a chord is undesirable.

THAT 5-PIN DIN THING

Independent MIDI transmit and receive channels can be assigned to each Part, and a separate receive channel can be assigned to Performances. In addition, yet another channel can be used to receive Performance Program Changes, which is a very flexible setup. Bank Select messages are also supported.

The JP-8000 offers two MIDI modes. Mode 1 sends Control Change (CC) or SysEx messages, depending on which control you manipulate. By default, Mode 2 sends only CC messages. Be-

cause there are so many controls that can trigger messages, however, this mode uses some CC messages in ways that fall outside the MIDI specification. Mode 2 also lets you remap the controls to SysEx or different CC messages.

Two separate toggles let you enable or disable the transmission and reception of SysEx and other MIDI messages to reduce the required bandwidth, and bulk dumps of all the different types of data can be performed. The JP-8000 lacks local storage, such as a floppy disk drive, so it's bulk dump or nothing.

RAVE ON!



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• JP-8000

IN THE END

In a sea of instruments using digital samples, the JP-8000 is one of a handful of new instruments that gives analog warriors something to salivate over. The front-panel controls make the experience feel real-time, but the lack of immediate data display gave me the unshakable feeling of working blind. The synth engine offers a few surprises, such as the Super Saw and feedback waveforms, but I wish it also provided matrix modulation, as in the Oberheim Xpander and Matrix series.

The ribbon really shines when it's set to control two or more parameters simultaneously, letting you apply performance nuances that would be impossible otherwise. However, it doesn't completely make up for the lack of Aftertouch.

The dedicated real-time controls give the initial impression that the JP-8000 is great for live work. However, a couple of things lead me to temper my enthusiasm in this regard.

As mentioned earlier, the lack of program chaining and direct Patch/Performance selection is a problem. In addition, the keyboard has no Aftertouch, and it's rather short; I often found myself running out of room while playing split Performances. Nevertheless, this instrument would work well for live lead and/or bass parts and in live raves or trances in which the entire experience is a fluid orchestration of parameters. In this situation, the arpeggiator/RPS features are great, especially when used in conjunction with a master drum machine. If techno grooves are your thing, the sync capabilities of this instrument might be reason enough to buy it.

Eight-note polyphony with only two Parts takes some getting used to in today's multitimbral world, but the JP-8000 should not be directly compared to modern, sample-based workstations. It is intended for retro technophiles who want fat sounds, arpeggiator grooves, and lots of knobs and sliders for real-time control. In this respect, the JP-8000 delivers. If you're looking for a techno/rave/trance orgasmatron or a modern Jupiter-8, the JP-8000 is definitely worth checking out.

Jeff Burger is a songwriter and multimedia producer who actually owns a modular synthesizer that requires (gasp!) patch cords to make sound.



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World Radio History

Nightpro EQ3-D

By Brian Knave

**A mastering-quality,
broad-band equalizer for
the personal studio.**

Engineers with limited experience outside of the personal-studio environment might not recognize the names Night Technologies International (NTI) or Nightpro, but those who have worked in major studios or mastering houses may well be familiar with the company's flagship offering, the EQ3 equalizer. Known for its AirBand high-end enhancement, silky-smooth sound, and lack of phase distortion, the EQ3 is a unique and remarkable analog equalizer that has been used on more than 60 gold and platinum albums. But with a price tag of \$3,000, the EQ3 remains beyond the reach of many home recordists.

Nightpro's latest offering, the EQ3-D Dimensional Equalizer (\$995), solves that problem. Featuring essentially the same circuitry as the EQ3, the EQ3-D is simpler to use and, thanks to its variable-frequency AirBand, more versatile. (The EQ3's AirBand is fixed at 10 kHz.) Nightpro reduced production costs by replacing the EQ3's two linear power supplies with a single, switching power supply and by using continuous pots rather than detented, dual-concentric rotary switches.

I tested the EQ3-D pretty thoroughly, and the results were very impressive. Although I wasn't able to compare it to its exalted predecessor, the word on the street is that the EQ3-D sounds every bit as good.

SIX DIMENSIONS

The EQ3-D is a 6-band, dual-channel, broad-band equalizer with individual

controls for each of the six bands. Each of the first five frequency bands is 2.5 octaves wide, allowing for considerable overlap between adjacent bands. The first four bands (centered at 10, 40, 160, and 650 Hz) provide 15 dB of boost or cut with a peak/dip-style curve. The fifth band is a shelving filter that also provides 15 dB of boost/cut and shelves at 2.5 kHz. The sixth band, controlled by two knobs (labeled Air and Vari), is a boost-only shelving filter offering 20 dB boost (Air) and selectable shelving frequencies (Vari) of 2.5, 5, 10, 20, and 40 kHz.

Because the filters overlap, boosting or cutting adjacent bands results in a greater, summed boost or cut with a broader, smoother curve. For example, a 14 dB boost on both the 10 and 40 Hz bands results in an 18 or 19 dB boost at 20 Hz (see Fig. 1). On the other hand, boosting one band and cutting an adjacent one results in a steeper slope between the two bands' center frequencies (see Fig. 2). Of course, it is not necessary for you to know the theory to operate the box, but the interaction of the overlapping filters provides increased flexibility as well as smooth, musical-sounding tonal alterations.

IN-YOUR-FACE INTERFACE

The EQ3-D is about as easy to use as pro audio gear gets. You could easily skip the 16-page user's manual and dial up enhanced tones in no time. The 1U rack-mount unit features an on/off switch, color-coded frequency-control knobs, channel-bypass switches, and status LEDs for power, peak overload, and EQ in/out. The brushed-aluminum front panel is finished in an attractive, metallic blue with silver,

silkscreened labels that clearly delineate each control. Knobs for the first five bands are labeled from zero to five in either direction, with each number representing roughly 3 dB of boost or cut and the centered, zero position indicating no boost or cut. The AirBand is labeled from zero to ten, with each number representing approximately 2 dB boost.

Although not having detents for the boost/cut numbers precludes precisely repeatable settings, I didn't find this to be much of a problem. However, it would be nice if at least the zero

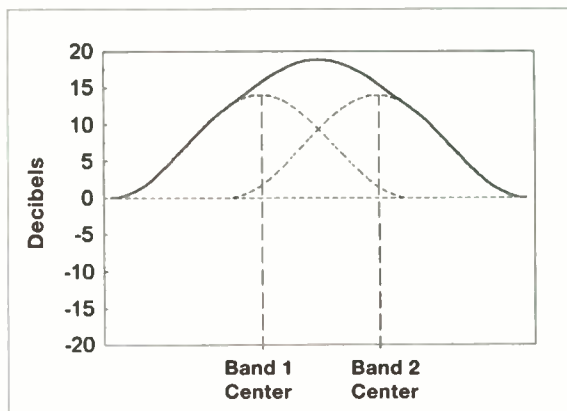


FIG. 1: Because the EQ3-D's wide, 2.5-octave frequency bands overlap, boosting two adjacent bands results in a broader curve with a greater, summed boost. (Courtesy Nightpro)

setting were detented so as to ensure a flat starting point.

The knobs feel sufficiently sturdy, and in general the EQ3-D seems built to last. I did notice, however, that one of the pots on my test unit was a bit dirty sounding. Also, the channel in/out switches made a slight "click" sound whenever they were switched in or out. But considering the dramatic price reduction from the EQ3, I can live without detented controls and premium pots.

The unit's rear panel has XLR channel inputs and outputs. The inputs support either balanced or unbalanced connections. The output connectors



The Nightpro EQ3-D is a smooth and natural-sounding equalizer that is well suited to mastering finished mixes. Free of the phase distortion that often plagues EQs, it features five broad, interactive frequency bands and a variable, high-frequency AirBand that opens up the high end of a mix.

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are preset for unbalanced operation but can be set to balanced by changing four jumpers internally. The internal power supply automatically adapts to 110 or 220 VAC power sources, and the power cord is detachable.

To the extent that the EQ3-D is aimed at home and project studios, 1/4-inch I/O would be a nice addition, especially for those who want to use the unit in channel-insert applications. (I had to have special insert cables made that terminated in XLR connectors.)

ROUNDS WITH SOUNDS

I used the EQ3-D for several months in a variety of studio situations. Although broad-band equalizers are commonly connected between the console output bus and mixdown deck for mastering applications, I found the EQ3-D helpful at other recording stages, as well. For example, I inserted it after a mic preamp to enhance instrument sounds going direct to tape, and I also patched it into individual channel inserts on my console for equalizing already-recorded tracks.

In the latter application, the EQ3-D performed markedly better than the EQ on my console (a popular 8-bus model). The results were consistently more natural sounding, with more open-ended highs and richer, less boxy-sounding lows. For example, by boosting the Sub (10 Hz) and 160 Hz bands and slightly cutting at 40 and 650 Hz, I was able to improve the sound of a 2-headed kick drum, imparting wonderful low end without adding unwanted boominess. A 3 dB boost at 2.5 kHz and 12 dB boost on the 40 kHz Air band further enhanced the sound, adding increased punch and beater-impact definition.

UP FOR AIR

The AirBand is one of Nightpro's claims to fame and rightly so. Engineers who tend to shy away from spectral enhancers—particularly the kind that use phase alterations to impart "sheen" to highs—will likely love the clear and natural-sounding high-end enhancement provided by the EQ3-D's AirBand. I especially like the 40 kHz band, which lets you dial up a considerable amount of "airiness" with practically no hiss. It and the 20 kHz band sounded great on every vocal track I processed. They also added some welcome sparkle to acoustic guitar and drum-overhead tracks, helping them stand out in the mix. Set at around half-throttle, the 20 and 40 kHz Air bands impart a lovely, transparent, open-sounding high end with no hint of the brittle edginess or phase distortion that despoils some EQs.

The lower-frequency Air bands sound great, too, but typically require a more conservative hand on the level controls. After a boost of more than 6 or 8 dB on the 2.5 or 5 kHz bands, for example, some hiss may start to become audible. Of course, it depends on the song. On a dense rock mix, I got away with 12 dB of 10 kHz on a snare drum. (I also dialed in boosts at 10 Hz and 2.5 kHz and a slight cut at 160 Hz.) However, on a mix consisting only of acoustic guitar and vocal, such an extreme boost (at 10 kHz) would probably be excessively noisy.

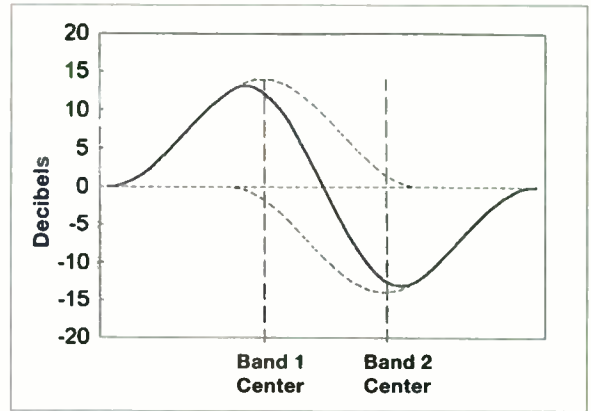


FIG. 2: When one band is boosted and an adjacent one cut, the resulting EQ slope becomes very steep. (Courtesy Nightpro)

It seems a bit redundant for the EQ3-D to offer both an AirBand 2.5 kHz setting and a dedicated 2.5 kHz band; both are shelving filters with the same cutoff frequency. But due to different circuitry, the two do not sound the same. The dedicated 2.5 kHz band is distinctly warmer and richer sounding than the comparable Air band. (It also offers cut as well as boost.) The boost-only, 2.5 kHz Air band has a steeper slope and therefore doesn't reach down as low as the dedicated 2.5 kHz band, making the sound thinner and a bit more edgy.

MASTER'S TOUCH

Connected between my console outputs and 2-track DAT recorder, the EQ3-D proved a welcome last-stage addition to my studio's signal path. In fact, it soon ended up in that dreaded category known as "indispensable"—meaning that, no matter how content I was with a completed mix, it seemed I was always able to improve it with the EQ3-D. (This does not bode well for my budget!)

Of course, the improvements I'm talking about are, for the most part, subtle. Often, the equalization I dialed in on finished mixes amounted to no more than a 2 or 3 dB boost or cut here or there, along with a dose of high-frequency Air. Yet without fail, a quick comparison of the processed and unprocessed mixes confirmed my "fears": yes, the mix *did* sound better after equalization with the EQ3-D. To put it simply, this box is able to reshape and enhance mixes in ways that most console EQs—especially those typically found in home and project studios—cannot.

EQ3-D Specs	
Frequency Response	10 Hz–125 kHz ±0.5 dB 5 kHz–330 kHz -3 dB
Maximum Output	+25 dBm
Signal-to-Noise Ratio	90 dB (bypass); 89.9 dB (flat)
Crosstalk (30 kHz lowpass)	0 (bypass); 0 (flat)
THD (30 kHz lowpass)	0.005% (bypass); 0.005% (flat)
Phase Shift (normal operating range)	10°
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Dimensions	1 rackspace x 7.5" (D)
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EQ3-D

I found the same thing when I connected the EQ3-D between two DAT decks to remaster a completed 9-song band demo. The band leader was already quite pleased with the final mixes, but I told her I was trying out some new gear and would like to attempt further improvements—at no extra charge. She consented. After hearing the enhancements I made with the EQ3-D, she was glad to have made time for the extra session. The EQ3-D is so simple to use that the whole 9-song remastering session took only two and a half hours.

My only admonition is that, in general, one should not get too carried away with boosting. Always make sure to do A/B comparisons not only with the mix but also without signal so you can hear any sound that might be added by the EQ settings. As with any active EQ, the noise added by boosting multiple bands is cumulative; depending on the program material, a modest, 2 or 3 dB boost on each band, for example, might result in an unacceptable amount of hiss.

SAVE THE DAY

The EQ3-D also came in handy when I was hired to transfer an old stereo recording of *The King and I* to DAT. Not only were the two reels of 1/2-inch tape, circa 1961, brittle and cracking at the edges, but whoever made them had evidently recorded at very low levels, leaving a high noise floor and loads of hiss. A digital workstation with sophisticated archival-restoration software was in order; unfortunately, I had no such system. Nor did I have a dedicated hiss-reduction circuit. All I could hope to do was save the tracks from further decay and perhaps improve the sound a bit with some EQ and compression.

To reduce hiss, I employed the high parametric band on my console EQ, cutting mercilessly with a 3-octave Q and center frequency around 15 kHz. This, in conjunction with a stereo compressor set at a mild 2:1 ratio, helped considerably in cleaning up the sound and making the quiet sections more audible. But dialing out so much high end dulled the sound considerably. In addition, there was a huge drum on stage that overwhelmed the voices every time it was struck.

The EQ3-D saved the day. I cut 6 dB at 10 Hz, 3 dB at 40 Hz, and 2 dB at

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160 Hz, creating a smooth curve that tamed the drum without killing it entirely. Next, a 3 dB boost at both 650 Hz and 2.5 kHz helped bring out the orchestra and voices in the mix. Finally, by boosting 9 dB on the 10 kHz Air band, I salvaged some of the presence lost to the drastic high-end cuts. Considering what I had to work with, the results were pretty impressive. Indeed, the client went away thinking me some kind of miracle worker.

DIDN'T PHASE ME

The AirBand isn't the only feature that sets Nightpro equalizers apart from the pack; they're also distinguished for having minimal phase shift. According to the specs, in normal operating range the EQ3-D introduces only about 10 degrees of phase shift. Even the maximum amount, 30 degrees, is still pretty low.

Just for fun, I tried some radical settings to see if I could cause the unit to exhibit audible phase anomalies. For example, on one channel (using stereo material) I set steep, "roller coaster" slopes by alternately boosting and cutting 15 dB on successive bands from

top to bottom. I then set opposite slopes on the other channel. Again, these were extreme settings, beyond what anyone would conceivably use in a real-world situation. Even so, as I A/B'd the stereo and mono mixes, I could hear only the slightest change in frequency content. Nightpro's claims are

not exaggerated: this unit truly is all but free of phase distortion.

DIALED IN

The EQ3-D is clean, smooth, warm, and natural sounding. Its unique AirBand will "open up" the high end of your mixes, adding clarity and sparkle, and its interactive, broad-band response lets you smoothly contour bass, mids, and high-mid elements. The result is fuller, more intelligible, and richer-sounding mixes. The EQ3-D is also useful for filtering individual instruments, both while tracking and during mixdown. And because it is virtually free of phase shift, it can be used at multiple recording stages without the risk of cumulative phase distortion.

It is not an all-purpose equalizer, however. Its 2.5-octave filters are simply too wide to allow precise, narrow-band boosts or "smart bomb"-style notching. For those types of applications, reach for a parametric or graphic EQ. But if you're looking for an easy-to-use analog equalizer that can add hard-to-come-by finishing touches to a mix, I highly recommend the EQ3-D. ●

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World Radio History

Tracer DART Pro (Win)

By Bryan Wright

Guerrilla tactics for the war on clicks, pops, and hiss.

The advent of the compact disc didn't rid the world of recorded noise; there are still plenty of old tape and vinyl recordings around that are permeated with scratches, buzzes, hisses, hums, and other distracting sounds. It's too bad that so many otherwise great performances have been marred by old technology, the ravages of time, and poor handling.

Fortunately, many of these archived recordings can now be salvaged thanks to products such as *DART Pro* from Tracer Technologies. *DART Pro* is an expanded and enhanced version of the original *DART* (Digital Audio Restoration Technology; reviewed in the January 1996 *EM*), which removed click and scratch sounds from digital recordings of old analog tapes and vinyl records. The new *Pro* version also handles hisses, hums, whines, and other sonic aberrations and provides some useful tools to enhance the cleanup process.

THE INNARDS

DART Pro consists of three basic noise-analysis and processing algorithms that can be used independently or in combination with each other. Each algorithm starts by examining a sound file in a particular way to determine the noise characteristics within the selected program material.

The DeClick algorithm determines the duration and amplitude of clicks and pops in the source file and attempts to differentiate them from actual musical transients. It works by scanning a few samples ahead in the recording and searching for noise pulses using the program's Outlier Detector. The software then makes predictions concerning the amplitude and frequency content of the program material and flags noise pulses that lie outside its predictions. By looking at peaks that don't conform to its predicted range of parameters and watching how quickly those sounds return to the predicted range, the DeClick processor makes decisions about what to keep and what to discard.

Pops and clicks usually have extremely short durations (typically not more than 1,500 samples), and they have no real decay time when compared to musical peaks such as cymbal crashes. Because a cymbal crash decays more slowly back into the predicted range, it is recognized as program ma-

terial and left untouched. When a click or pop is removed, *DART Pro* replaces the excised click with audio material of the same duration from near the edit point. To make the repair as seamless as possible, the program examines the material immediately before and after the repair and selects the most appropriate match to replace the missing click. In that way, *DART Pro* effectively rids a recording of "impulsive" noises without significantly degrading the quality of the recording.

The DeHiss algorithm uses a wide-band filter to snuff out background noise such as tape hiss and surface noise from vinyl records. Unlike conventional noise-reduction systems, which cause noticeable high-frequency loss and volume pumping, DeHiss acts as a "smart" lowpass filtering system to effectively knock out hiss without muffling the recording.

Unlike DeClick, which scans ahead a few samples, DeHiss looks ahead in blocks and takes a snapshot of the activity in the high-frequency range of the recording. The snapshot is stored in memory, and the filter then moves on to take another snapshot a little farther ahead. This process is repeated many times during each real-time second of digital audio, and it helps the filter determine whether there are any abrupt changes in the high frequencies.

What *DART Pro* considers high frequencies is primarily dependent on the sample rate of the recording. If, for example, the recording was sampled at 44.1 kHz, *DART Pro* considers everything from about 11 kHz up to be the high frequencies of that recording. (Although this seems to be a fairly wide frequency band for a hiss filter, there are many cases in which hiss is not limited to the extreme high end of the audio spectrum.)

When *DART Pro* sees a fairly static pattern of sound in the high frequencies, it assumes the information is hiss, and it begins filtering aggressively. If, during the course of processing, the filter detects sudden activity in the high frequencies (such as cymbal crashes), it throttles back until the event has passed, after which it begins filtering aggressively again. Because high-frequency audio activity usually masks most of the hiss anyway, the resulting cleanup is quite impressive. And the processed recording retains the integrity of the original audio very well.



FIG 1: Clicks and pops are clearly visible as narrow amplitude peaks in the top waveform. After I ran the DeClick filter, they were completely eliminated, as shown in the bottom waveform.

The DeNoise filter uses yet another algorithm that looks for broad-band noises from such sources as air conditioners, record surfaces, running motors, or wind. Again, using the snapshot method, DeNoise performs a mathematical operation to remove that noise without destroying musically relevant sounds.

DeNoise works in conjunction with NoisePrint, one the coolest features I've seen in a long time. With NoisePrint, you first select a short fragment of "silence" (from just before or during the recording), which includes only the background noise that you're trying to eliminate. NoisePrint's special noise-identification function creates a reference model (NoisePrint) that DeNoise then uses to search for and destroy the offending sounds. This technique works especially well with old LP recordings where groove noise is always a problem.

WORKING WITH DART PRO

In spite of its impressive processing power, *DART Pro* is relatively easy (although time consuming) to use once

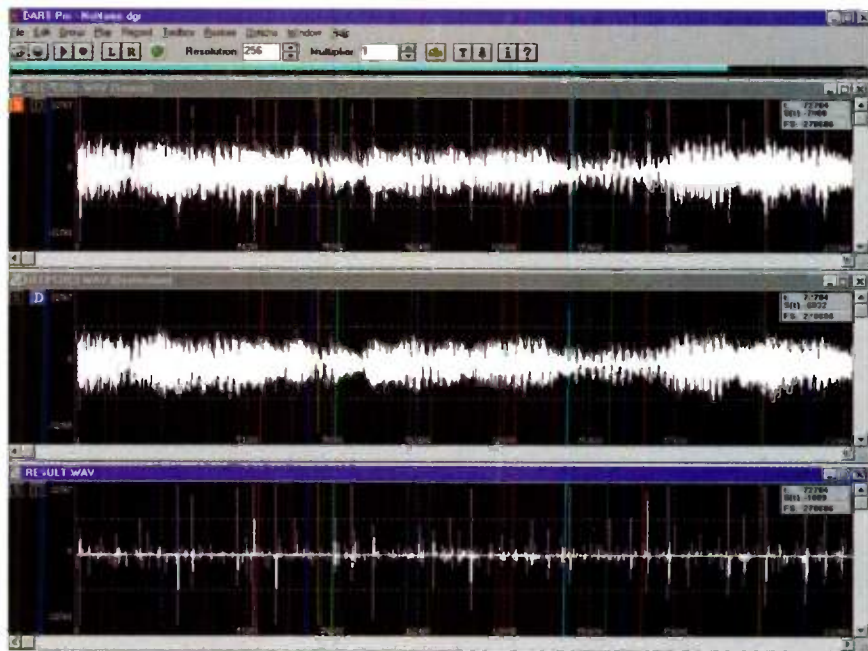


FIG 2: The Result file (at the bottom of the screen) shows and plays back what *DART Pro* removed from the original file—in this case, the LP clicks and pops.

you understand a few simple concepts. Using the DeClick filter was especially easy, and most of the time it worked

fine without my changing the default parameters. I was able to simply point and shoot for nice, clean recordings.

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● DART PRO

The tall, narrow peaks in the upper display of **Figure 1** are clicks and pops from an LP recording. The level of the program material is far below the level of the clicks, creating a very unpleasant listening experience. I ran the DeClick filter on this file using only the default settings; the results are displayed in the bottom waveform. As you can see, the clicks and pops were completely eliminated, and there was no evidence of processing. In fact, you couldn't even tell that there were any clicks or pops in the first place!

That's pretty cool by itself, but I was really blown away when I discovered that *DART Pro* would let me listen to the garbage

that it had removed from the audio file. The program creates a separate Result file (in WAV format) that includes only what you've processed *out* of the original recording (see **Fig. 2**). In this case, I was amazed that all I heard in the Result file was noise; no musically relevant material was removed. It sounded like an old record with nothing on it: just a bunch of clicks and pops exactly where they had been in the original recording! If *DART Pro* does make a mistake, however, you can individually override its decisions with the program's versatile ReTouch feature.

The DeHiss filter is also easy to use, and most of the time it works great without adjusting parameters. When I began experimenting with the controls, I found that adjusting the DeHiss filter was a bit trickier than adjusting the DeClick filter, and some of my early results were dreadful.

Fortunately, the guys at Tracer came to my rescue. They helped me to better understand the capabilities of the DeHiss filter by sending me a horrible, hiss-ridden WAV file along with a clean version that Tracer's cleanup gurus had fixed. By opening both the original and the clean versions, I was able to compare the two recordings and experiment with the original until I achieved results that matched those in Tracer's clean version.



FIG 3: The Soundtree window makes tracking your file's audio progression a snap. You can insert one, two, or three smiley faces next to files to show how satisfied you are with each version.

Of course, you must keep in mind that *DART Pro* isn't magic. There are limitations to the improvements that you can make to a truly bad recording. Furthermore, the quality of the original recording dictates the noise-removal approach for each piece. And because waveform data is being removed from the recording, there are cases in which sound degradation is impossible to avoid. Nonetheless, *DART Pro* has produced stunning results with most of the recordings on which I've used it.

KEEPING IT ALL TOGETHER

When you process files in *DART Pro*, there are two ways the new data can be recorded: it can be written into a new file, or it can overwrite an existing version of the file. Either way, file management is critical to the success of any cleanup operation, and *DART Pro*'s Soundtree feature makes it easy to track an audio file's progress through the noise-removal process.

In the Soundtree window (see **Fig. 3**), it's easy to tell which files are generated directly from the root file and which files are derived from previously processed files. The Soundtree provides a graphic representation of the root file "genealogy" and makes it easy to audition and sort files by allowing you to view waveforms, play files, or tag file names with smiley faces to indicate satisfactory results.

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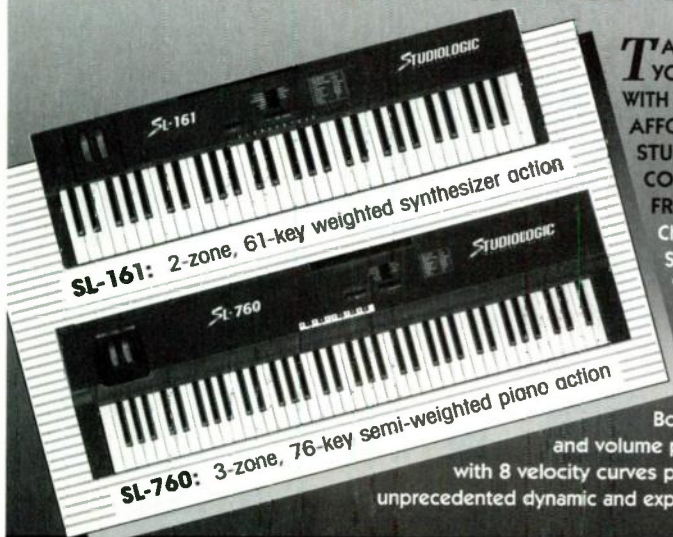
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• DART PRO

The Soundtree also provides detailed information about all the files in the tree. I worked for a while without using the Soundtree feature to see how difficult file management really was in *DART Pro*, and believe me, the Soundtree is a great idea.

MORE GOODIES

To help kill noise more effectively, *DART Pro* includes several additional processing tools. For example, in some cases, reversing the waveform helps the software to better identify and destroy certain types of noise. *DART Pro* allows you to simply reverse the waveform using the Reverse command, process the file as usual, and then reverse it back again.

You can also split stereo files into discrete mono (left and right) files for separate processing and then rejoin them later. This method can help isolate noise in one channel of a stereo recording without unnecessarily degrading the other channel.

When the noise-removal process is complete, you can further improve the quality of your recordings by delving into *DART Pro's* Toolbox. The Toolbox menu offers several signal-processing functions, including amplitude scaling, maximizing (normalizing), muting, mixing, fading in/out, and crossfading. In addition, the program provides

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EM METERS	RATING PRODUCTS FROM 1 TO 5				
FEATURES	●	●	●	●	●
EASE OF USE	●	●	●	●	◐
DOCUMENTATION	●	●	●	●	◐
VALUE	●	●	●	●	◐

a graphic equalizer and a collection of filters: lowpass, highpass, bandpass, band-reject, and notch.

DART Pro also includes a feature called WaveManager that allows you to combine several sound files into a playlist. You can use these playlists to produce and store lists of recordings that are scattered over different disk directories, to rearrange the lists in any order, and to play back the corresponding sound files. And I was able to note the path names for every one of them. That was a big time saver.

LOW-LEVEL HISSES

Tracer's *DART Pro* has a lot to offer audio professionals at all levels. Although it took me a while to become familiar with everything that this powerful program could do, I began to get positive results once I understood the process better. As with any piece of software, however, *DART Pro* has a few shortcomings.

For instance, to my annoyance, I discovered that I couldn't perform any mouse-click operations without stopping playback. This meant that during playback I was unable to zoom in or out on the waveforms or scroll along with the cursor. It also meant that I couldn't look at menu items during playback to help me plan what to do next. That became less of a problem as I grew more familiar with the program, but it still made some operations more time consuming than was necessary.

DART Pro's documentation is thorough in terms of getting the program up and running but a little lean when it comes to explaining how changing the different parameters will affect results. I'd like to see more application-specific descriptions of the more complex processing controls.

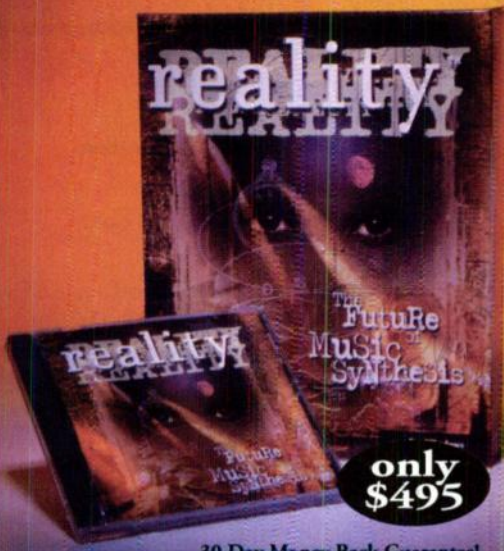
THE BOTTOM LINE

DART Pro is an incredible software package that lives up to Tracer Technologies' claims. What the program may lack in user friendliness it easily makes up for in laser-like precision. And all it requires to work its miracles is an ordinary Windows PC with some modest audio hardware. Add to that the fact that *DART Pro* lists for only \$399, and it comes up a real winner in my book.

Bryan Wright is a tall, scary person.

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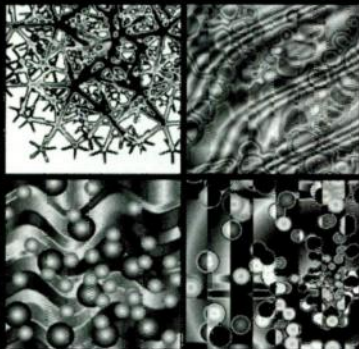
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Spectrasonics Distorted Reality

By Dan Phillips

**A sample collection
that stands
realism on its ear.**

Sometimes it's hard to predict what will be a hit. The initial soundware releases from Spectrasonics, including *Heart of Asia*, *Heart of Africa*, and *Bass Legends*, concentrated on pristine samples of a variety of instruments—and very successfully so. *Distorted Reality* is a venture along very different lines, so different that, aside from the fact that the volume maintains Spectrasonics' extremely high standards for both quality and quantity, it's hard to believe this title comes from the same company.

Distorted Reality is the fruit of a collaboration between Eric Persing, creative director of Spectrasonics and longtime chief sound designer for Roland, and Ryeland Allison. The two tossed sounds back and forth for years, processing and reprocessing, sampling and resampling, until some had passed through more than twenty generations of alteration and redefinition.

The initial plan had been to release the results as a lower-priced offering, perhaps with less than a full CD-ROM's worth of material. When they were done, they ended up instead with a disc absolutely full of spectacular sounds. According to Spectrasonics, it has outsold every other sample CD-ROM in history.

It's nice to know that, at least sometimes, the unexpected comes out on top.

WHAT IS REALITY, ANYWAY?

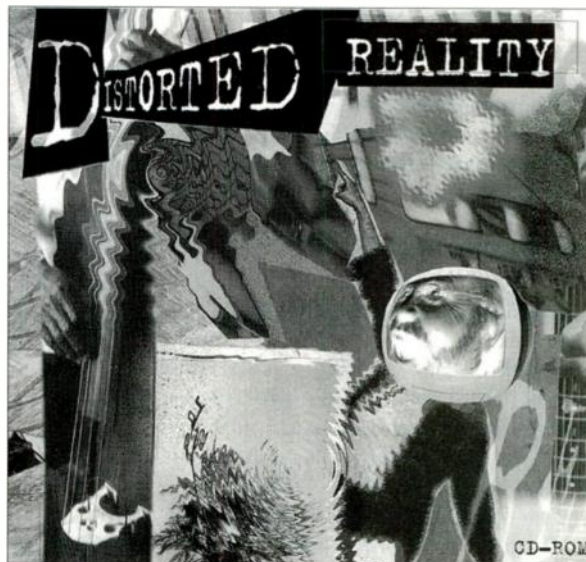
I auditioned *Distorted Reality* using a Roland S-760 sampler, the platform on which it was created. It's also available for Akai S1000 (verified for compati-

bility with E-mu E-IIIx and later models as well as with Ensoniq's ASR series), Digidesign SampleCell, and Kurzweil K2000 formats. There is also a condensed audio-CD version.

The patches span a broad range of categories, including ambient noise beds (pitched and unpitched), low drones, pads, synth basses, science-fiction effects, techno hits, mutated drum loops, altered guitars, twisted vocal effects, Gothic choirs, bells and mallets, cavernous drums, mangled orchestras, and more. Many of these sounds came into being without any "source" at all: the sound designers set up several effects processors in a feedback loop, let them resonate together for several hours, and recorded the results. There are about 500 patches in all, not counting about 70 memory-size variations of multisampled sounds.

Most of the disc's sounds consist of a single stereo sample stretched across the entire keyboard. This makes for a somewhat limited range on the Roland S-760. The root keys of many of these samples are around the middle of the keyboard, and the S-760 transposes up by a maximum of 24 steps, so the upper two octaves of my 88-note keyboard were often playing back the same pitch. According to the manufacturer, however, this problem doesn't occur with the other formats.

Many of the samples are between ten and twenty seconds long, and some are even longer, allowing for a healthy amount of timbral evolution. Short



Spectrasonics' *Distorted Reality* sample library features a menagerie of peculiar and outlandish sounds.

loops are simply *not* an issue. Most of the ambient sounds use different loop lengths for the left and right samples so that the two sides continue to shift against each other with each loop repetition, providing continuous sonic movement. (Apparently, this is only available in the Roland version.)

BAZAAR OF THE BIZARRE

I have so many favorite sounds from this collection that the most I can do is to point out a few especially choice items. The ambiences and drones are almost universally spectacular. By turns they're lush, spooky, calming, and ominous. "Mist" layers two other patches to create a complex colored noise for an instant *Blade Runner* atmosphere. "Star Shower" blends water ripples, low-pitched resonant noise, and sparse ambient insect calls in a curious combination of science fiction and nature. "Dark Buzzord" is quite wonderful: a hummy and hollow drone like distant winds across Martian canals.

The pads are also excellent. "Ethereality" begins on a mellow timbre, after which several different elements gradually fade in, one after another, ending in a breathy vocal. Very sweet. "Shakey Jake," on the other hand, throbs like underwater engine noise, as if the oscillator were threatening to implode.

"MegaPad 1," one of the few multi-sampled patches, is a dark, gorgeous pad, voiced for low-range playing. It makes effective use of a resonant band-pass filter, swept with Mod Wheel or Aftertouch, so that pressing down increases upper frequencies while diminishing low frequencies. It's based on a 16 MB set of synth multisamples named "MegaMan," which shows up in various incarnations as synth, pad, and bass sounds.

In the "Bowed Metals" volume, "Rusty Spoke" is a standout. A metallic pad, its tone is mellow at first and then grows into a bright, buzzy, almost grating texture. I lowered the cutoff frequency of the lowpass filter to mold it into a mellow, eerie pad.

"Phuzz Drumz" offers over six octaves of severely distorted, crunchy, squashed, or otherwise uniquely garbled percussive material. "Super 909" offers ultra-fuzzed, compressed versions of the classic beat box. This is great stuff, with the processing taking over so that many of the sources are unrecognizable.

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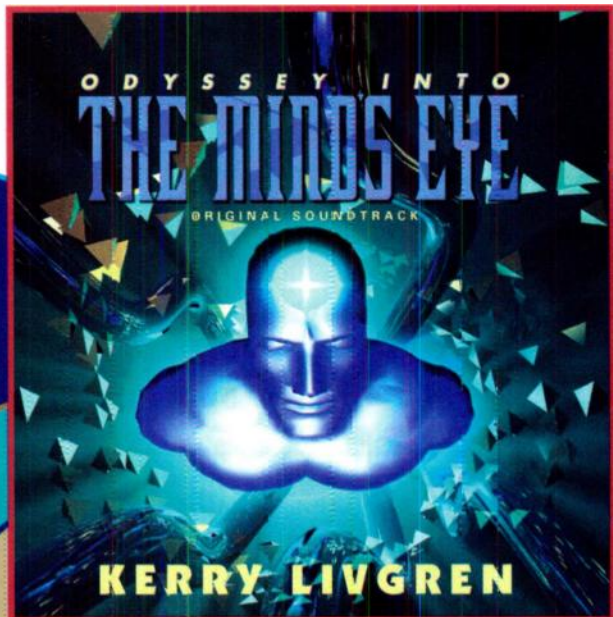
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● **DISTORTED REALITY**

The drum loops are great to listen to for production ideas alone. There are acoustic loops processed through incredible, fiery distortion; drums filtered through vocoders and wah pedals; didgeridoo; spacey, phase-shifted panning grooves; pounding industrial beats; and so on. There's a lot of cool stuff in here, but it isn't designed as a full-fledged loop library, so don't expect a lot of variations on the same rhythm, soloed parts, or other such amenities.

The "Bizzare Gtr" volume includes a collection of wonderfully rich, ambient guitar washes. "Spin Cycle" and "Rinsing" combine backward and forward elements to create smooth, harmonically complex chords with subtle timbral motion. They worked really well to round out the chorus of a synth pop arrangement.

There are tons of hits, ranging all the way from huge ambient blasts to low-fi jazz orchestras to techno blips and blats. "Pit Hit 1," for example, is a smallish, woody-sounding hit followed by *tons* of rolling reverb, which creates a lush ambient bed following the initial impact. The techno hits are very strong: "Monopoly Bip," for instance, is a brassy slapback synth with lots of punch, and the percussive "Rave Stopper" is built on the plummeting pitch of a tape wind-down.

MY OWN REALITY

My only small complaint is that more consistent attention could have been

paid to the modulation routings on the Roland version. Some patches offer modulation paths that have clearly been specifically tailored for that particular sound, but many others offer only the default routing of Aftertouch and Mod Wheel to pitch depth, with identical settings for every sound in an entire volume. In some cases, the filters were turned off entirely; turning them on and doing a simple routing of Mod Wheel to cutoff would have provided a useful axis of timbral control.

The specific modulation routings will, of course, vary depending on the sampler format used; the SampleCell and Kurzweil versions, I'm told, offer more extensive modulation routings. Spectrasonics is working on a follow-up to *Distorted Reality* that will be released toward the end of this year, and the sound designers say that they will make modulation routings more of a priority in the Roland version of that product.

The documentation supplied with the disc is adequate. The booklet is well laid out, with cool graphics, biographical notes on the sound designers, a list of gear used, a list of volume-name abbreviations, setup info, etc. For the Roland, SampleCell, and Kurzweil versions of the disc, however, there is no list of the sounds. If you want one, you can request it from distributor Ilio Entertainments or get it from Ilio's Web site; the list varies depending on the disc format. I thought that I would miss having a list to refer to, but I didn't, largely because the organization of the disc is exceptionally clear. Each sound category has its own heading (using a name on a dummy file so that it shows up in the S-760's disc window), file names are easy to read, and patch variations are labeled using the standard conventions.

The more I listen to this CD-ROM, the more impressed and inspired I become. It's already proven to be a workhorse sound source for my current work in progress, an electronic/alternative album. If you're involved in any genre of electronic music, from techno to film composition, you owe it to yourself to give *Distorted Reality* a listen.

Product Summary

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PROGRAMMING	●	●	●	●	
DOCUMENTATION	●	●	●		
VALUE	●	●	●	●	●

Dan Phillips is currently revising his own conception of reality. For an update, you can visit his Web site at www.vinylware.com/DanPhillips/DanPhillips.shtml.



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Ambiance Acoustics California Cubes

By Rob Shrock

A new speaker manufacturer attempts to play with the big kids.

The 1990s have been years of radical change when it comes to the design of audio products. From MDMs to digital audio software to compact digital mixers, our tools have been redefined. Even the relatively staid reference monitor has changed, thanks to such advances as affordable active monitor systems and shielded drivers for computer-based production.

Ambiance Acoustics' Robert Salvi believes that traditional, passive monitor systems also can be improved upon, and he is offering his California Cube speaker system to prove it. This industry newcomer is attempting to break new ground in reference monitor designs, and I was eager to find out whether he had fixed something I hadn't even realized was broken.

A VOTE FOR EQUALITY

The midsized California Cubes do not employ the typical driver and tweeter array divided by a crossover. Instead, each cube-shaped cabinet contains four

equally spaced, 4.5-inch drivers. The cabinets are meant to operate in conjunction with the company's EQC-1 equalizer, which you insert between a line-level source (e.g., a mixer) and your power amp. A bass port is centered in the back of each monitor.

The documentation claims that the speakers can handle 120 watts apiece but also suggests using 10 to 250 watts per channel (see the table, "California Cubes Specifications"), so there appears to be plenty of room for amplifier variety. I tested the speakers with Carver TFM-15CB (100W/side) and Ramsa WP-9055 (50W/side) power amps.

Ambiance Acoustics used high-quality components all the way. The 5-way binding posts for connecting the Cubes to the speaker cables are gold-plated, and the internal wiring is copper. (Silver wiring is offered as an option.) The hand-built speaker enclosures can be ordered with a choice of designer finishes. The manufacturer also claims to use audiophile-grade circuitry in the EQC-1, including gold-plated IC sockets and RCA jacks; 1 percent tolerance, metal-film resistors; and 2 percent tolerance, polypropylene caps and non-polarized electrolytic capacitors. That's pretty impressive.

FUTZ-FREE FILTER

To deliver the proper frequency response, the California Cubes require Ambiance Acoustics' EQC-1 2-channel active equalizer (included). Since my first experience with the California



Breaking with tradition, Ambiance Acoustics uses equally spaced, identical drivers with an active EQ—but no crossover—in its California Cubes.

Cubes several months ago, the EQ has been redesigned several times, and the enclosures have also been modified. (The bass ports used to be in the front.) These alterations slightly improved the overall frequency response of the monitor system.

The EQC-1 supplies L/R source inputs, outputs to your power amplifier, and a separate set of Tape Monitor I/O jacks. The latter are especially handy if your mixer doesn't have a dedicated input for a CD player, DAT, or cassette deck. (The Tape Monitor input is pre-EQ, and the output is post-EQ.) All EQ connections are via rear-panel



**Moving my head
eight or ten inches
drastically affected
what I heard.**

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The EQC-1 front panel presents only three buttons: an EQ bypass, a Tape Monitor/Source switch, and a switch that engages the 53 Hz, 18 dB/octave bass-rolloff filter. Given that the California Cubes have no tweeters or crossovers, I recommend you not engage the EQ Bypass unless you want your audio to sound like it's being run through a guitar cabinet. (Then again, there may be some creative possibilities there.)

AN INTERESTING AMBIANCE

Theoretically, there are advantages to eliminating a crossover. For example, each driver has identical impedance and produces the same sound-pressure level, which eases the load on the amplifier. In addition, according to Salvi, equally spaced, identical drivers maintain a time-coherent signal and largely eliminate the on-axis phase shift found in many crossover designs.

When auditioned from the "sweet spot," the Cubes deliver a full sound that is very flattering to stereo program material. The "air" in a recorded performance is apparent, and transients are well preserved. You get a wide soundstage, and it is easy to pick out localized instruments.



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● CALIFORNIA CUBES

The bass response is very good. The sound is round, even, and smooth all the way down to the 50 Hz range. Although there is a subsonic filter on the EQC-1, I found no need for it; the California Cubes sound better with the full bottom end grooving away. The extended low-end response could really help you lock down the bass frequencies of a mix if you don't have a subwoofer or large monitoring system available.

As noted earlier, however, the Cubes require extensive equalization, and the EQC-1 equalizer and drivers used in the Cubes do not produce a full-range frequency response. This was readily obvious; the high-end cutoff at 15 kHz was unsatisfactory to my ears. In an audio world where we are striving to increase the resolution of digital audio and microphones to be more accurate at 20 kHz and above, we have made pointless progress if we can't hear the added resolution, even if it is subtle.

NARROW FOCUS

During the course of a vocal-tracking session, I was bothered by the extremely tight focus of the speakers' dispersion. In other words, the sweet spot is very narrow. This became apparent because the session singer did not like anything he had sung when I played his parts back over the California Cubes. Everything sounded fine in the headphones while tracking, and it even sounded okay on my little mono reference speaker. But every time we listened on the California Cubes, he

thought his performance was lackluster. It sounded fine to me.

As it turned out, he was confused because he was sitting off-axis to the monitors. Finally, we traded seats, and his reaction was "wow!" (So was mine.) Neither of us could believe the difference. As I moved out of the center listening position, it sounded like someone was downwardly sweeping a lowpass filter on the signal. I soon realized that moving my head even eight or ten inches in any direction drastically affected what I heard. In my opinion, this is not good.

The manufacturer suggests positioning the monitors four to seven feet apart and angling them to be on axis and at ear level with the listener. This makes speaker location and listening position extremely critical. Not only do you have to be greatly concerned with the speaker angles, but also there is very little tolerance for speaker height. Basically, the manufacturer designed these speakers to offer only *one* accurate monitoring position.

The tight dispersion made it difficult to work; I was tempted to string a golf ball from the ceiling and keep my nose touching it to remember where to keep my head. Otherwise, I couldn't trust what I was hearing. The California Cubes do not possess that "other room" quality that lets you step into the next room to see whether it still sounds good from *over there*.

PROTECTING YOUR IMAGE

After I'd spent time mixing with the Cubes, some other weaknesses became

California Cubes Specifications

Drivers	(4) 4.5", full range with treated paper cones and rubber surrounds
Inputs	gold-plated, 5-way binding posts
Enclosure Type	4th-order vented
Enclosure Material	medium-density fiberboard
Frequency Response (free field)	42 Hz-15.5 kHz (±3dB)
Total Harmonic Distortion (EQC-1)	<0.005%
Sensitivity	91 dB (1W/1m)
Power Handling	120W
Nominal Impedance	8Ω
EQC-1 Weight	3 lbs.
Enclosure Dimensions	13 3/4" (H) x 13 3/4" (W) x 13 3/4" (D)
Enclosure Weight	28 lbs.

evident. In particular, the imaging is unstable. This is one of my pet peeves. Moving my head slightly forward or backward (or up and down) greatly affected the perceived frequency response, and moving slightly left or right created a huge shift in the soundfield positioning. Basically, the center image seems to be directly in front of wherever your head is, and only sounds that are panned a lot to one side maintain any sense of stability.

This could account for some of the difficulties I had in mixing the mid-range; the soundscape does not feel solid when you're even slightly out of the optimum listening position. The combing effect of frequencies that occurs when you move in and out of the ideal listening position adds to the problem, and it took a long time to get used to the character of these monitors.

I never felt comfortable enough with the California Cubes to do final mixes or make critical tracking decisions with them, but they were helpful as a second pair of monitors. When I *knew* I was in the right monitoring position, I was able to make some decisions that enhanced my work; however, it would be extremely difficult for me to work if these were my only monitors.

IT'S A FEEL THING

Because they employ identical, small drivers, the California Cubes do not suffer from many of the problems that plague many conventional monitor designs. As long as you stay in the optimum listening position, the speakers deliver good low-end response and an overall tight sound that I find very pleasing. It seems to me that the California Cubes' tight sound is due to

Product Summary

PRODUCT:

California Cubes close-field reference monitors

PRICE:

\$1,995

MANUFACTURER:

Ambiance Acoustics
tel. and fax (619) 485-7514
e-mail rjsalvi@calcube.com
Web www.calcube.com

CIRCLE #441 ON READER SERVICE CARD

their phase coherency, which is a result of using matched drivers that deliver the same information. Drum kits, in particular, benefit from this: there seems to be a connection of frequencies from the lows of the kick all the way up to the hi-hats and cymbals. Obviously, there are advantages to not cutting up a signal into frequency bands and pasting it back together at the monitoring stage.

However, I am less pleased with the system's 15 kHz high-end ceiling and cannot accept its uncomfortably tight dispersion, which results in unstable



The high-end cutoff

at 15 kHz is

unsatisfactory.

high-frequency response and imaging. These limitations make the California Cubes unreliable for critical decision making in the studio. These problems are reduced somewhat when you are listening at low volume, but they are still apparent.

To some extent, I might be less critical if the California Cubes sold for \$500. But they retail for \$1,995, which is more expensive than many fine, conventional monitor systems from a host of companies. Considering that separate amplification for the California Cubes is also necessary, this puts the price tag way up there, and I don't feel they deliver on that level.

I applaud Ambiance Acoustics' desire to innovate in an attempt to address real problems of conventional monitoring. I also appreciate the company's use of quality components, and I have no problem buying and using gear that doesn't have strong name recognition. But to win my loyalty, the product has to deliver superior all-around performance, and its price has to be reasonably competitive. Although I feel that the California Cubes fall well short of the mark, I will be interested to hear what Ambiance Acoustics comes up with in the future.

Composer-producer Rob Shrock is the keyboardist-arranger for Dionne Warwick and Burt Bacharach. He can be reached through Avatar Productions at avatarprod@aol.com.



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HARD DISK RECORDING



ProTools Project™ Digital Audio Workstation for Macintosh

With Pro Tools Project you get 8 tracks of digital audio &, on some Power Mac systems, up to 16 tracks of playback & 64 virtual tracks! The Pro Tools Project system includes an audio card as well as award winning Pro Tools software. You choose either an 888 or an 882 I/O to complete the package. Project also features MIDI recording and playback as well as Quickpunch™ punch-on-the-fly & when your ready to upgrade, its ready too.

REQUIRES-

- Qualified NuBus or PCI Macintosh CPU
- 24MB RAM minimum
- Hard Drive, system software 7.1 or greater
- 14" monitor (17" recommended)



MAC

ProTools 4.0 Software Digital Audio Software for Macintosh

Pro Tools version 4.0 software provides the next step in the evolution of Digidesign's award-winning digital audio production software for the Mac. Fully Power Mac native, 4.0 features noticeable improvements in every major area. ProControl™ support, improved automation features, real-time fader groupings & group nesting, plug-in MIDI personality files, multiple edit play lists, Sound Designer II™ functionality, Finder-style searching & sorting, and I'm out of breath.



WINDOWS

Session 8™ Digital Audio Workstation for Windows

Session 8 is a professional quality digital audio recording, editing, & mixing system created specifically for personal and project recording studios. Designed to operate with Windows 95 or Windows 3.1, Session 8 offers professional recording features, powerful random access editing, automated digital mixing, & unparalleled integration with most popular MIDI sequencers.

FEATURES-

- 8-channel direct to disk digital recording
- Random access, non-destructive editing
- Automated, intuitive digital mixing environment
- Built-in volume & pan automation
- Complete SMPTE frame rate support
- Frame accurate sync with built-in AVI video playback window
- Digital parametric EQ
- Support for multiple hard drive partitions
- Auto sample rate convert to 44.1 or 48 kHz mono
- .WAV file format
- Choice of audio interface options

SOUNDSCAPE DIGITAL TECHNOLOGY LTD.

SSHDR-1 Hard Disk Recorder/Editor

A professional Multitrack Digital Audio Workstation, the SSHDR1 combines the highest quality processing hardware with easy-to-use Windows-based software. The most complete and affordable solution for high quality digital audio on the PC, the SSHDR1 has over 50 powerful editing tools and is expandable from 8 to 128 tracks, with up to 32 inputs and 64 outputs. Ideal for a wide range of applications ranging from project studios, to multi-unit 32, 48 and 64 track systems for major TV and film studios needing audio post production linked to video.

SSAC-1 Accelerator Card

The new SSAC-1 is a DSP card that can be added to any existing SSHDR-1 system for faster processing as well as an additional 8 channels of I/O in the form of a TOIF port. This card is needed by anyone who wants to upgrade an existing system to V2.0.

SS810-1 8 Channel I/O

This rack mount unit connects to the SSAC-1 card via the expansion port to give you 8 XLR ins & outs with superb A/D-D/A conversion. It also features an ADAT Optical interface. The SS810-D comes without the analog converters for connecting an ADAT without additional channels.

Version
2.0



CD & CASSETTE DUPLICATION

marantz CDR615 / CDR620 Compact Disc Recorder



CDR620 Additional Features-

- SCSI-II Port • XLR (AES/EBU) Digital In/Out and Digital cascading
- 2x speed recording • Index Recording and playing™
- Defeatable copy prohibit and emphasis • 34 key, 2-way wired remote (RC620)
- Available on CDR615 w/optional Wired Remote (RC620)

Balance write-once CD recorders, the CDR615 & 620 offer built-in sample rate conversion, CD/DAT/MD/DCC sub-code conversion and adjustable dB level sensing. Additional features include adjustable fade in/fade out, record mute time, & analog level automatic track incrementing. A 9-pin parallel (GPI) port and headphone output with level control are also included.

Telex ACC2000/ACC4000 Cassette Duplicators

Designed for high performance & high production, Telex duplicators offer easy maintenance and operation. The ACC2000 is a 2-channel mono duplicator while the ACC4000 is stereo. Each produces 3 copies from a cassette master at 16x normal speed & by linking additional copy modules, you can duplicate up to 27 copies of a 60 minute original in under two minutes.



ACC2000XL/ ACC4000XL

The XL Series feature "Extended Life" cassette heads for increased performance and wear characteristics. They also offer improvements in wow and flutter, frequency response, S/N ratio & bias.

STUDIO DAT RECORDERS

SONY PCM-R500



Incorporating Sony's legendary high-reliability 4th D Mechanism, the PCM-R500 sets a new standard for professional DAT recorders. The Jog/Shuttle wheel offers outstanding operational ease while extensive interface options and multiple menu modes meet a wide range of application needs.

FEATURES-

- Set-up menu for preference selection. Use this menu for setting ID6, level sync threshold, date & more. Also selects error indicator.
- Includes 8-pin parallel & wireless remote controls
- S/M recording for improved S/N (Sounds like 20bit)
- Independent L/R recording levels
- Equipped with auto head cleaning for improved sound quality.

TASCAM DA-20/DA-30mkII



- Multiple sampling rates (48, 44.1, and 32kHz).
- Extended (4-hour) play at 32kHz.
- S/PDIF Digital I/O, RCA Unbalanced In/Out.
- SCMS-free recording, Full function wireless remote.

DA-30mkII Additional Features-

- Variable speed shuttle wheel.
- Digital I/O featuring both AES/EBU and S/PDIF.
- XLR balanced and RCA unbalanced connections.
- SCMS-free recording with selectable ID.
- Parallel port for control I/O from external equipment.

Panasonic SV-3800/SV-4100



The SV-3800 & SV-4100 feature highly accurate and reliable transport mechanisms with search speeds of up to 400X normal. Both use 20-bit D/A converters to satisfy even the highest professional expectations. The SV-4100 adds features such as instant start, program & cue assignment, enhanced system diagnostics, multiple digital interfaces and more.

Fostex D-15



The new Fostex D-15 is the least expensive timecode DAT on the market. It has a host of new features aimed at audio post production and recording studio environments.

FEATURES-

- Chase mode functions built in
- Hold the seek reading on the digital bargraphs with a choice of 5 different settings
- Set cue levels and cue times
- Supports all frame rates including 30df
- Newly designed transport is faster and more efficient utilizing a 4-motor design. 120 minute tape shuttles in about 60 seconds.
- Parallel interface
- Front panel trim pots in addition to the level inputs



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MICROPHONES



C414B/ULS

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- Dual 1" Gold-sputtered diaphragms.
- Flat on-axis response. • 126dB dynamic range.
- Switchable 10dB and 20dB pad. • 20Hz-20kHz.



E-300

Studio Condenser Microphone

A multi-patterned side address mic that combines vintage capsule design with advanced head-amp electronics, the E-300 has an unusually wide frequency response of 10Hz to 20kHz & an exceptional dynamic range of 137 dB. It also features extremely low self noise of 11dB. Ideal for even the most critical studio applications.

Shown with optional ZM-1 Shockmount

Unique powering of all Equitek Series microphones is accomplished with a pair of rechargeable nicad 9-volt batteries in combination with 48V phantom power. This overcomes inherent current limiting associated with most phantom power supplies & can supply 10x the current.



audio-technica.

AT4050/CM5

Cardioid Capacitor Microphone

The AT4050 multi-pattern condenser expands upon the AT4033 to set the standard for studio performance mics.

- 2 capacitor elements.
- Cardioid, Omnidirectional, & Figure 8 polar pattern settings.
- Vapor-deposited pure gold on specially-contoured large diaphragms are aged through 5 steps to ensure optimum characteristics over years of use.
- Transformerless circuitry results in exceptional transient response and clean output even under extremely high SPL conditions.



UHF Performance Series

Breaking new ground, Azden's new UHF receiver and microphone transmitters offer superb performance and features at prices far below anything you've ever seen.



441 UHF Receiver

- Crystal-controlled, PLL synthesized UHF receiver with 63 user-selectable channels in the 794-806 MHz band. Up to 9 systems may be used simultaneously. Features both 1/4-inch and XLR output jacks, volume adjustment and can be rack mounted.

- **41HT Handheld Microphone Transmitter**
- Newly-designed handheld with supercardioid uni-directional mic element and 63 user-selectable channels. Uses 2 AA alkaline batteries or Azden Ni-cads with the AMC-2A Charging Station.

41BT Backpack Transmitter

- 63 user-selectable channels, input level control, standby switch, locking mini-plug connector and metal clip. Ideal for use with lavalier and headset microphones or as an instrument transmitter.

- **AMC Ni-cad Battery Charging Station**
- Turns the 41HT into the only rechargeable UHF microphone available. (Uses Azden AA-1A nicad batteries only). Fully charged, the 41HT will run for 4 hours. Charging time is approximately 12 hours.



ME66/K6P

Short Shotgun Microphone

This road ready mic system is perfect for camera mount and other short gun applications. It's professional sound quality and affordable price combined with the flexibility of a modular setup make it a hard choice to beat.

MIXING BOARDS

MACKIE.

SR24x4 • SR32x4

Sound Reinforcement Consoles

These consoles do for live sound what the acclaimed 8-bus series has done for studio recording. Both professional grade mixing consoles, the SR32-4 and SR24-4 were built to deliver the same kind of useful features found on "bigger boards" while standing up to 24-hr-a-day use.

- Fast, accurate, easy level setting via "solo".
- 4 submix buses.
- 3 band EQ w/ sweepable mids.
- 6 Aux sends
- Globally switchable AFL/PFL.
- Mackies "VLZ" technology for low noise.
- Tape return to main mix, mono out w/level control.



The new MS-1202, 1402, 1604 & SR Series all include VLZ (Very Low Impedance) circuitry at critical signal path points. Developed for Mackie's acclaimed 8-bus console series, VLZ effectively reduces thermal noise and minimizes crosstalk by raising current and decreasing resistance.

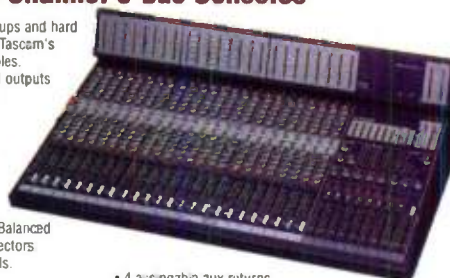
TASCAM M-1600

16 & 24 Channel 8-bus Consoles

Great for modular Digital Multitrack setups and hard disk recording, the M-1600 is part of Tascam's next generation series of recording consoles.

It features multiple options for inputs and outputs and uses the same, easy to install D-sub connectors as Tascam's more expensive consoles, all in "a compact design."

- XLR Mic inputs w/phantom power on 8 channels.
- Signal present/overload indicators on each channel.
- Balanced & Unbalanced tape returns & Balanced Group/Direct outputs using D-sub connectors.
- TRS Balanced Line Inputs on all channels.
- 3-band EQ with sweepable mids.
- 5 Aux sends: (1 stereo)



- 4 assignable aux returns.
- Perfect for use with DA-88 and ADAT setups.

MINIDISC MULTITRACKS

TASCAM

564 Digital Portastudio

The Tascam 564 Digital Portastudio combines the flexibility and superior sound quality of digital recording with the simplicity and versatility of a portable multitrack. Using MiniDisc technology, the 564 has many powerful recording and editing features never before found in a portable 4-track machine.

FEATURES-

- Self contained digital recorder/mixer.
- Uses low-cost, removable MiniDiscs.
- 2 AUX sends / 2 Stereo returns.
- 4 XLR mic inputs.
- Channel inserts on inputs 1 & 2.
- 5 takes per track, 20 patterns, 20 indexes per song.
- Random access and instant locate.

- Non-destructive editing features: with undo capability include: bounce forward, cut, copy, move.
- Full-range EQ with mid-range sweep.
- S/PBIF digital output for archiving.
- MIDI clock and MTC.

SONY

MDM-X4 MD Multi-Track Recorder

MD recorders are here! Offering up to 37 minutes of high-quality 4-track digital recording, the MDM-X4 is truly the next generation of personal multi-tracks. With a built-in mixer, exclusive Track Edit system, and a Jog/Shuttle wheel for sophisticated editing with ease, the MDM-X4 will encourage you to flex your creativity.

FEATURES-

- Records on high quality, removable MD data discs
- 3.5-gen. ATRAC LSI for wide dynamic range.
- 10 Input / 4Bus mixer.
- 2 AUX sends, 3-band EQ • 11-point locator.
- Random access memory for quick playback and record from anywhere on the disk.
- Editing features include: Undo, Redo, & Section/Song editing for flying material between different tracks



STUDIO MONITORS

ALESIS

Point Seven

DESIGNED FOR MULTI-MEDIA!

- Shielded reference monitor.
- Front ported venting system for great bass response.
- 50 watts RMS-100 watts peak @ 4Ω.
- 85Hz-27kHz, ±3dB.
- 2kHz crossover for accurate phase and a wide "sweet spot" for mixing.
- Accurate flat sound reproduction.
- Great for studio and multi-media applications.



TANNOY

PBM 6.5II

Studio Reference Monitors

The PBM 6.5 II is the industry standard for studio reference monitors. They provide true dynamic capability and real world accuracy.

- 6.5" lowfrequency driver and 3/4" tweeter
- Fully radiused and ported cabinet design reduces resonance and diffraction while providing deep linear extended bass.



SONY

SMS-1P

Powered Studio Reference Monitors

The new SMS-1P monitors are perfect for post production environments. They feature 2 types of inputs with independent volume adjustment, 15 watts of power, bass/treble control and shielding for use near computer monitors.



JBL

4206 & 4208

Studio Reference Monitors

The 4206 & 4208 studio reference monitors are 6" and 8" respectively. Both offer exceptional sonic performance, setting the standard for today's multi-purpose studio environments.

- Multi-Radial baffle ABS baffle virtually eliminates baffle distortion.
- Superb imaging & reduced phase distortion.
- Pure titanium diaphragm high frequency transducer provides smooth, extended response.
- Magnetically shielded for use near video monitors.



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PRO CASSETTE DECKS

TASCAM 202 mkIII / 302



These decks provide high-fidelity sound reproduction and a wide frequency response, as well as a host of feeding & play back features.

- Dual Auto Reverse. Normal and high-speed dubbing.
- Dolby HX Pro™ extends high frequency performance and minimizes distortion.
- Auto sensing for Normal, Metal & CrO2 tape.
- Intro Check. Computerized Program Search, Blank Scan and One Program quickly find the beginning of tracks.

302 Advanced Features—

The 302 is 2 independent decks, each with their own set of RCA connectors, transport control keys, auto-reverse, and noise reducing functions. Cascade and Control I/O let you link up to 10 additional machines for multiple dubbing or long rec & playback.

112mkII/112RmkII



A classic "no frills" production workhorse, the 112mkII is a 2-head, cost effective deck for musicians and production studios. It features a parallel port for external control and an optional balanced connector kit for integration into any production studio. The 112RmkII features a 3-head transport with separate high performance record and playback heads as well as precision FG servo direct drive capstan motors.

SIGNAL PROCESSING

BEHRINGER

MDX 2100 Composer



- Integrated Auto/Manual Compressor, Expander & Peak Limiter.
- Interactive Gain Control (IGC) combines a clipper and peak limiter for distortion-free limitation on signal peaks.
- Servo-balanced inputs & outputs are switchable between +4dB & -10dB. **NEW LOW PRICE!**

APHEX 107 Tubessence 2 Channel Mic Preamp



The 107 delivers outstanding sonic performance, as well as a great degree of presence, detail, & image.

- Up to 54dB of gain available
- 20dB pad with red LED indicator, 2 LED input meter
- Full +8V phantom power with red LED indicator
- Low-cut filter at 80Hz, 12dB/octave
- Polarity inversion switch with LED indicator
- Switchable +4dB/-10dB output, 1/4" Balanced

109 Tubessence Parametric EQ



The Aphex 109 is an extremely versatile, high performance parametric vacuum tube EQ with professional flexibility and sound quality.

Great for "warming up" digital signals.

EFFECTS PROCESSING



Lexicon

PCM-80 & PCM-90 Digital Signal Processors



A great combination for any studio owner with an ear for the best. The PCM-80 delivers high quality multi-effects based on the legendary PCM 70, maintaining Lexicon's high standards for sonic clarity and extraordinary processing power. The PCM 90 is a digital reverb with its roots stemming from the studio standard 480L and 300L effects systems. Reverbs from telephone booths to the grand canyon, the PCM 90 is incredibly realistic. Together, they make an excellent addition to any rack mount arsenal.

Buy a PCM-80 and receive a **FREE Pitch FX Card** offer valid thru 7-31-97

Lexicon MPX-1 Multi-Effects Processor



Lexicon's latest addition to their Digital effects family, the MPX-1 features top-quality effects in an easy to use, 1 rack space unit. With 56 Pitch, Chorus, EQ, Modulation, Delay, and world-class reverb effects accessible from the front panel, as well as TRS and XLR balanced I/O and complete MIDI implementation, the MPX-1 creates a new standard for cost and quality in a multi-effects device.

t.c.electronics

Wizard M2000 Studio Effects Processor



The M2000 features a "Dual Engine" architecture that permits multiple effects and 6 different routing modes making it a great choice for high-end studio effects processing.

FEATURES—

- 250 factory programs including reverb, pitch delay, chorus, flange, phaser, EQ, de-essing, compression, limiting, expansion, gating and stereo enhancement
- 20-bit A/D conversion, AES/EBU and S/PDIF digital I/O
- "Wizard" help menus, 16-bit dithering tools,
- Tap and MIDI tempo modes
- Single page parameter editing, 1 rack space.

SONY

DPS-V77 2 Ch. Master Effects Processor



Sony's latest effects processor, the DPS-V77 yields excellent sonic quality combined with realtime control, a digital I/O and many more features that will put a smile on the face of any discerning studio engineer.

FEATURES—

- 198 preset & 198 user-definable programs.
- Control up to 6 parameters in realtime via MIDI information and an optional foot pedal
- Use the AES/EBU & SPDIF digital I/O to link multiple V-77s together & when working with digital mixers
- 10-key pad input
- Shuttle-ring equipped rotary encoder allows for quick patch changing.
- A noise gate circuit is provided ahead of the input for guitar players and other instrumentalists who want top quality effects without sacrificing tone.

ALESIS

QuadraVerb 2 2 Ch. Master Effects Processor



Alesis' most powerful signal processor, the Q2 offers amazing audio fidelity in a versatile multi-effects unit. Great for professional & project studio owners, its large backlit display making parameter editing intuitive and quick.

FEATURES—

- 100 preset & 200 user-editable programs.
- Octal Processing allows: use of up to 8 effects simultaneously in any order.
- Choose between over 50 different effects types for each block, including reverb, delay, chorus, flange, rotary speaker, pitch shift, graphic and parametric EQ, overdriver and more.
- 5 seconds sampling, triggered pan, and surround sound encoding are built in
- Selectable -10 dB and +4dB levels, servo-balanced TRS inputs and outputs
- ADAT Digital Interface allows you to work entirely in the digital between the Q2 and an ADAT XT.

PRO HEADPHONES



K240M

The first headphone of choice in the recording industry. A highly accurate dynamic transducer and an acoustically tuned venting structure produce a naturally open sound.

- Integrated semi-open air design.
- Circumaural pads for long sessions.
- Steel cable, self-adjusting headband.
- 5Hz-20kHz, 600Ω



SONY MDR 7506

The Sony 7506's have been proven in the most trying studio situations. Their rugged, closed-ear design makes them great for keyboard players and home studio owners.

- Folding construction
- Frequency Response 10Hz to 20K Hz
- 1/4" & 1/8" Gold connectors
- Soft carrying case
- Plug directly into keyboards



beyerdynamic

DT 770 Pro

These comfortable closed headphones are designed for professionals who require full bass response to compliment accurate high and mid-range reproduction.

- Wide frequency response
- Durable lightweight construction
- Equalized to meet diffused field requirements
- Padded headband ensures long term comfort



SENNHEISER

HD 265/HD580

The HD-265 is a closed dynamic stereo HiFi/professional headphone offering high level background noise attenuation for domestic listening and professional monitoring applications. The HD 580 is a top class open dynamic stereo HiFi/professional headphone that can be connected directly to DAT, DCC, CD and other pro players. The advanced design of the diaphragm avoids resonant frequencies making it an ideal choice for the professional recording engineer.





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PORTABLE DAT RECORDERS

TASCAM DA-P1



- Rotary 2 head design, 2 direct drive motors.
- XLR mic/line inputs (w/phantom power)
- Analog and S/PDIF (RCA) digital I/O.
- 32/44 1/48kHz sample rates & SCMS-free recording.
- Built in MIC limiter and 20dB pad.
- TRS jack w/ level control for monitoring.
- Includes shoulder belt, AC adapter, & battery.



PDR1000/PDR1000TC



- 4 head Direct Drive transport
- XLR mic & line analog ins. 2 RCA line outs. Digital I/O includes S/PDIF (RCA) and AES/EBU (XLR)
- L/R channel mic input attenuation selector (0dB/-30dB)
- 48V phantom power, limiter & internal speaker
- Illuminated LCD display shows clock and counter, peak level metering, margin display, battery status, ID number, tape source status and machine status.
- Nickel Metal Hydride battery powers the PDR1000 for 2 hours, AC Adapter/charger included.
- PDR1000TC Additional Features-**
- All standard SMPTE/EBU time codes are supported, including 24, 25, 29.97, 29.97DF, & 30 fps.
- External sync to video, field sync and word sync.

PDR1000 Master Sync module ensures drift will be no more than 1 frame in 10 hrs.

JUST IN

192-080 Headphone Cable provides a rotary switch for selection of Stereo, Mono Left, Mono Sum, & M/S mic-side/Stereo modes.

SONY TCD-D8



This is the least expensive portable DAT machine available. It features 48kHz, 16-bit sampling, automatic and manual recording level, a long play mode for 4 hours of recording on a 120 minute tape, & an anti-shock mechanism. It includes a carrying case, a DT-10CLA cleaning cassette and an AC-E60HG AC adaptor.

KEYBOARDS & SOUND MODULES



A-90EX Master Keyboard Controller



The A-90EX is an 88-note, weighted master controller with one of the best keyboard actions currently on the market. It offers incredibly realistic piano sounds, powerful controller capabilities and "virtual" programmable buttons which can be configured to operate your software and other devices. The A-90EX combines the majestic sound of a concert grand, the expressive action of a fine acoustic keyboard and the comprehensive MIDI functions of a master controller—all in a portable stage unit.



JV-2080 64-Voice Synthesizer Module



- FEATURES**
- 64-Voice polyphony / 16-part multitimbral capability.
 - 8 slots for SR-JV80 series expansion boards.
 - 3 independent effects sets plus independent reverb/delay and chorus.
 - 6 outputs, Main Stereo and 4 assignable.
 - **NEW** patch limiter and Phrase Preview functions for easy access to the huge selection of patches.
 - Large backlit graphic display
 - Compatible with the JV-1180, XP-50, and XP-80.



JP-8000 Analog Modeling Synthesizer

Analog is back- FOR REAL! This synth delivers a killer array of real-time control. Roland's revolutionary new analog modeling technology, and FAT, FAT SOUNDS! The assignable ribbon controller, 4 active keyboard, built in arpeggiator w/ external sync capability, and RPS function will make this little gem a must have for DJs and re-mixers as well as that funk musician looking for some new inspiration.



- FEATURES-**
- 8 note polyphonic, 49-key velocity sensitive keyboard.
 - Newly developed DSP oscillator
 - "Motion Control" recalls parameter changes in real time
 - Single, Dual, & Split mode, assignable "on-the-fly".
 - 128 user/ 128 preset patches, 64 user/64 preset performances.
 - Tone control, 12 chorus & 5 delay effects. *Fly of Steel.*

MIDI

OPCODE

Studio 5 LX Macintosh MIDI Interface



The Studio 5 LX is arguably the most advanced MIDI interface on the market today. It incorporates a MIDI patchbay, MIDI processor, and SMPTE synchronizer with it's interface functions, all in a 2 rack space unit.

- 15 Independent MIDI ins and outs.
- SMPTE reads and writes all formats— 24, 25/29 97/29.97DF and 30.
- Network multiple units, 240 MIDI channels each.
- 128 patches, unlimited virtual instrument controls.
- 2 assignable footswitch inputs, 1 controller input.
- 8X speed when used with OMS.
- Internal power supply.

Studio 3 & 4 MIDI interfaces, and Vision 3.5 sequencing software also available.

JUST IN



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, and word clock sync, even Dig design superclock!

- 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.

Pocket Express Mac/PC MIDI Interface



With the pocket express you get a 2 in, 4 out, 32-channel interface that supports both Mac and PC. It also features a computer bypass button that allows you to use it **EVEN WHEN THE COMPUTER IS TURNED OFF.**

Digital Performer Macintosh MIDI Sequencer w/ Integrated Digital Audio



Digital Performer contains all of the sequencing capabilities of Performer V.5 and adds Digital Audio to the picture. Apply effects such as Groove Quantize, shift, velocity scaling and more- **ALL IN REALTIME.**

- MIDI Machine Control, Quicktime Video playback.
- Sample rate conversion.
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- Real-time editing and effects processing.
- Complete Notation

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Roland VS-880 V2

This new version of the popular VS880 incorporates powerful additional software functions that allow you to get the most out of this baby's incredible creative potential.

- FEATURES-**
- Auto Mixing Function: records and plays back your mix in realtime
 - Easy recording with an inserted effect in "INPUT-TRACK mode."
 - Processes the master output with a specific inserted effect such as total compression.
 - Scene change by MIDI program change message.
 - Simultaneous playback of 6 tracks in MASTER MODE recording
 - Digital output with copy protection.
 - 10 additional effect algorithms (30 total) including Voice Transformer, Mic Simulator, 19-band Vocodes, Hum Canceller, Lo-Fi Sound Processor, Space Chorus, Reverb 2, 4-band Parametric EQ, 10-band Graphic EQ, and Vocal Canceller.
 - 100 additional preset effects patches.
 - Use MIDI program & control change messages to edit and change effects.
 - In total, over 20 powerful and convenient features in editing/sync sections have been added. Some require the optional effects expansion board



Fostex DMT-8 VL

The latest in the Fostex HD recording family, the DMT-8 VL truly brings the familiarity of the personal multi-track to the digital domain.

- FEATURES-**
- 18 bit A/D, 20 bit D/A conversion.
 - Built in 8 channel mixer, Ch 1&2 feature mic & line level.
 - 2 band EQ and 2 AUX sends per channel
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 - Built-in MIDI Sync., 6 memory locations.
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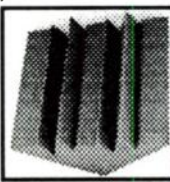


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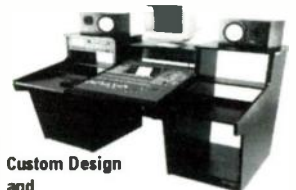
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One of the causes I feel passionately about is hearing preservation; after all, hearing is of the utmost importance to musicians and music lovers alike. Unfortunately, listening to music at very high volume levels is all too common, which contributes to the onset of permanent hearing loss.

A company called Clark Synthesis (tel. 800/898-1945 or 813/323-4929; fax 813/327-0717; e-mail info@clarksyn.com; Web www.clarksyn.com) offers a fascinating solution to this problem. After considering why people like loud music, the engineers at Clark determined that the physical sensations produced by high sound-pressure levels (SPLs) were one of the most attractive elements of the experience. This realization led them to develop the Tactile Sound Transducer (TST), which re-creates these physical sensations without high SPLs.

The TST consists of two domes: the voice coil is mounted in one dome, and the other dome includes an extremely powerful, permanent, neodymium magnet. The entire assembly is attached to a surface, such as a floor, and connected to a normal power amplifier. In essence, the TST and the surface to which it is attached become a "tactile speaker," transmitting vibrational energy to anyone in contact with the surface.

The frequency response of the TST on a piece of plywood is 20 Hz to 20

Good Vibes

A new transducer technology shakes things up.

By Scott Wilkinson

kHz, but the human body can't sense vibrations above about 3 kHz, and most people are sensitive to vibrations only up to about 800 Hz. However, most people can detect frequency shifts of as little as 2 Hz within their perceptive range.

One of the primary goals of the TST system is to reproduce the physical sensation experienced by musicians as they play their instruments. The vibrational signatures of guitars, violins, pianos, and other instruments are felt in the fingers and anywhere else the instrument touches the player. These signatures can be effectively reproduced by the TST system, adding a new dimension to the way we perceive audio. In live concerts, this allows the standard sound system to operate at much lower SPLs, protecting the hearing of the performers and audience while providing what they want from loud music.

This concept was recently tested at the first annual Vibe-O-Thon concert sponsored by Hearing Education and Awareness for Rockers (H.E.A.R.; tel. 415/431-EARS; fax 415/552-4296; e-mail hear@hearnet.com; Web www.hearnet.com). A 30 x 30-foot modular dance floor was equipped with 26 TSTs connected to four stereo power amps. The amps were fed from an aux send on the mixer, allowing the sound crew to adjust the levels of the normal sound system and the TSTs separately.

As a result, the overall SPL in the room was reduced by 15 to 20 dB without sacrificing

the sensation of high volume. According to Kathy Peck, Executive Director of H.E.A.R., "It feels loud, but it isn't!" Most of the concertgoers wound up lying on the floor to experience the unique sensations produced by the TST system (see Fig 1.).

Other applications include home-theater installations in which a TST is attached to a chair or sofa to replace the subwoofer. The power of the magnet can overcome any damping due to padding; in the company's demo/research room, they use an overstuffed leather couch, but the TST can still create enough vibration to blur your vision.

For those who are hearing-impaired, TST technology can help them experience sound and music more fully. In fact, Clark Synthesis is considering a line of wearable TSTs, which could include a microphone to pick up sound in the surrounding environment. Clearly, the potential applications for this technology are many and varied. I'm especially excited about the ability to reproduce gut-wrenching vibrations without ear-damaging SPLs. ☺

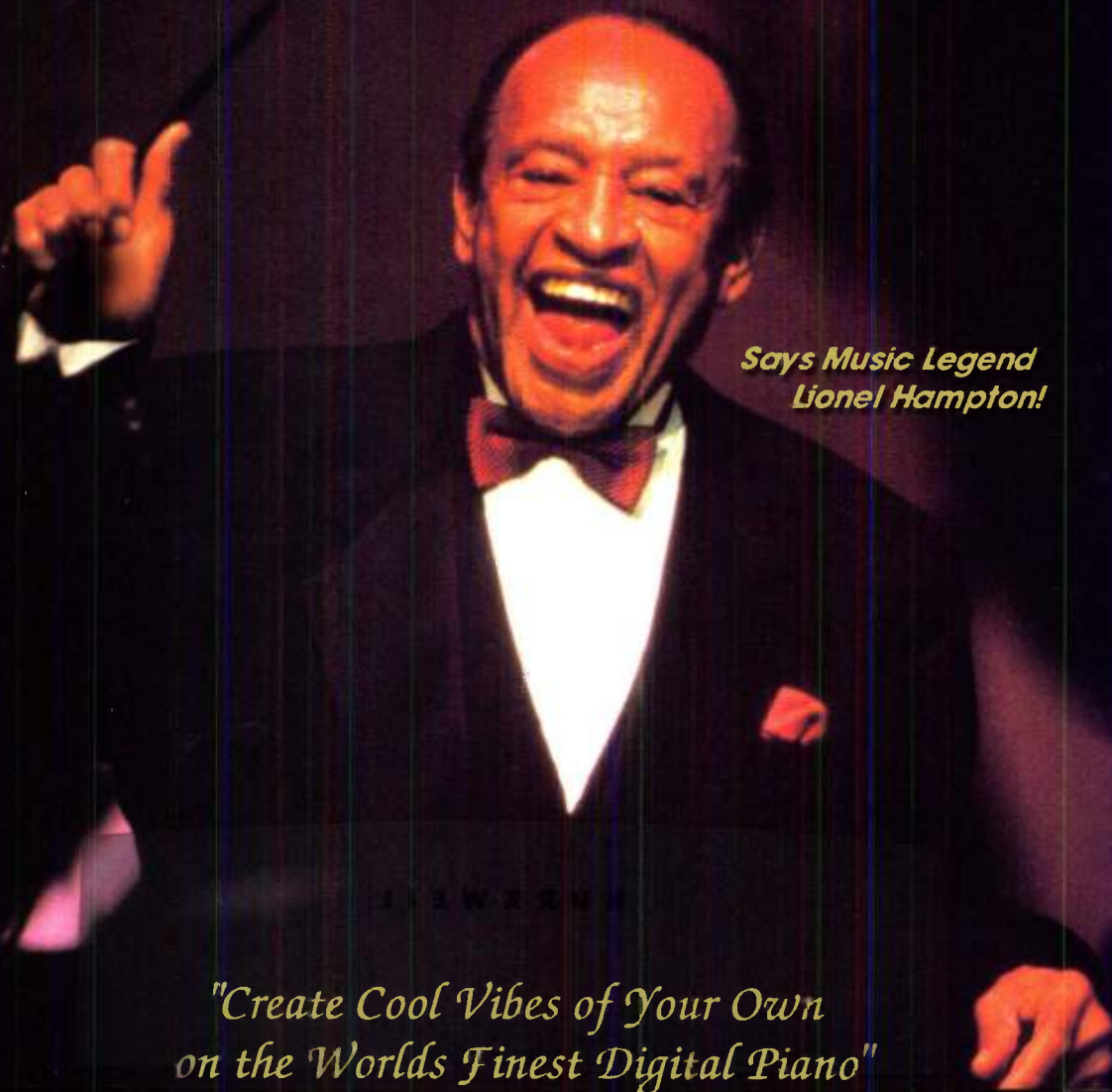


FIG. 1: Vibe-O-Thon attendees sprawled on the Wenger dance floor to feel the full effect of the TSTs.

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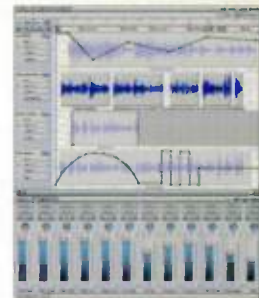
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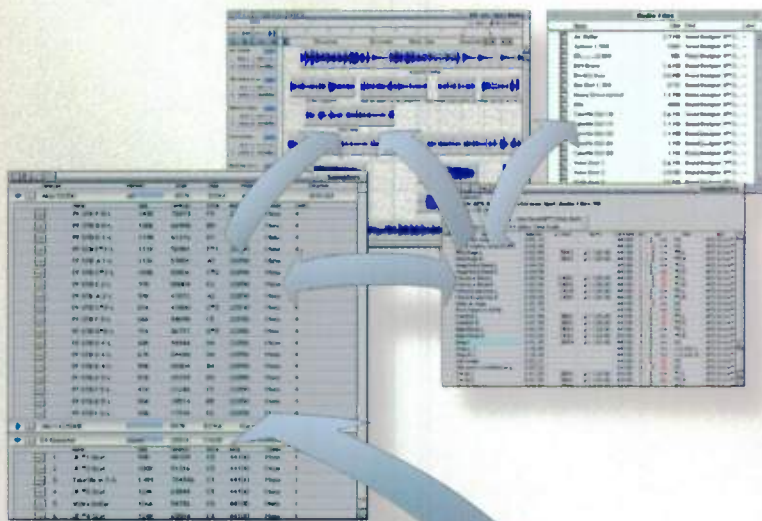
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