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PROFESSIONAL RECORDING · SOUND AND MUSIC PRODUCTION

Wiring Your Project Studio

The Stones In the Studio Two Views



TOUR PROFILE

Ani DiFranco



DVD-Audio Format in Search Of an Identity

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WEDGE™
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If you're on the net, check out the special Wedge page with audio files at www.alesis.com/wedge. For more information on the Wedge Desktop Master Reverb, see your Authorized Alesis Dealer or call 800-5-ALESIS. © Wedge and Impulse Audition are trademarks of Alesis Corporation.

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PROFESSIONAL RECORDING • SOUND AND MUSIC PRODUCTION

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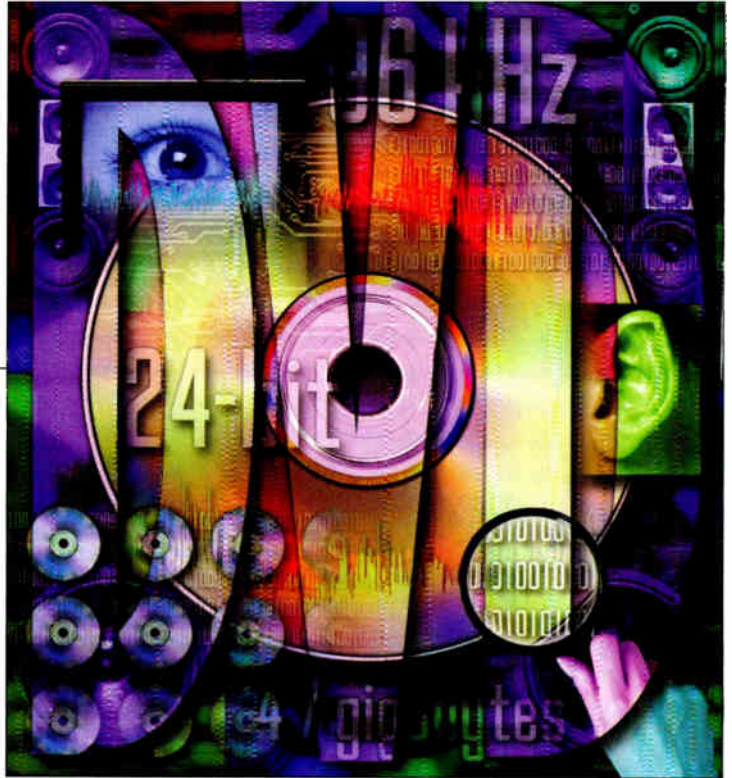
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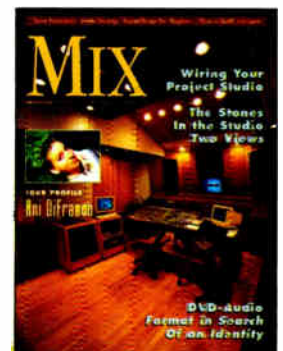


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Cover: Sony Music Studios opened a new room devoted to DVD-Audio Production, centered around an AMS Neve Capricorn digital console and Boxer T5 monitoring system. For more on Sony Music Studios, see page 66. **Photo:** A. Michael Hoiland Photography.



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World Radio History

FROM THE EDITOR

THERE'S A (PRICE) WAR OUT THERE!

When the Apple II debuted in 1977, it was \$1,300—sans floppy drive, but with a then-whopping 4 K of RAM! Today, with the advent of the G3 line, Apple is blowing out its 200MHz models at street prices around \$999. Meanwhile, hard drive pricing has also plummeted, and the old "one-dollar-per-megabyte" rule of thumb from three years ago seems almost laughable compared to the fraction of that price you'd pay today. The story on RAM is no different—the current \$3 to \$4 per megabyte is one-tenth of the \$40 per MB in 1995.

There are few constants in the world, but in most hardware-driven industries, it's a sure bet that prices will rise over time. Thirty years ago, you could buy a decent new car for \$3,000 (even less if you bought a Volkswagen) or buy a nice suburban home for \$25,000 or so. Nobody expects those days to return, but at least with regard to technology, especially software-driven technology, audio pros have reason to celebrate.

Computer-based audio peripherals, rapidly replacing racks as the staple of the project studio, are a perfect case in point. When New England Digital was in its prime, an 8-track Synclavier Direct to Disk recording system set you back more than \$200,000. Today, you could have that same disk recording power using an Event Gina or E-magic Audiowerk8 card for less than a half percent of that amount! Add a disk-based audio processing program (such as Symbolic Sound's Kyma, Seer System's Reality or BIAS Peak), and that Synclavier approach to processing could be yours—for pennies on the dollar.

If finances are a problem, the Internet offers a world of freeware and shareware for the taking, at no—or very low—cost. And some of it is very good: As an example, download Syntrillium's Cool Edit PC recorder/editor/mixer software from www.syntrillium.com and see for yourself.

Not everybody is into computer-based recording, and the new Alesis ADAT XT20 (unveiled at this month's NAMM show) offers 20-bit recording on low-cost S-VHS tapes, for \$500 less than the 16-bit ADAT XT! Digital consoles keep becoming more affordable with the Mackie Digital Mixer, Panasonic DA-7 and Tascam TM-D8000 all slated to arrive soon, while Yamaha has just unveiled The DSP Factory, which puts the power of an 02R mixer and 16-track disk recording on a \$999 PCI card. And tube microphones are no longer limited to recording's rich and famous, with new models from Groove Tubes and AKG offering superb cost/performance ratios.

So where will it all end? I recently got a flyer from computer super-retailer CompUSA that listed a five-pack of CD-R blanks for \$9.99. The price was pretty good, but the ad included a coupon for a \$10 mail-in rebate, making the net cost of the disks an amazing -1 cent (not including sales tax or the stamp for claiming the refund). I'm not sure that Sony will start doling out \$100,000 rebate checks on PCM-3348HR 48-track purchases, or that we'll see a "Buy two Massenburg mic pre's, get one free" campaign, but maybe with all the money we save on RAM and CPUs, we can splurge on all the *audio* toys we really want.

Put me down for a couple EMT plates.



George Petersen
Editor



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Founded in 1977 by David Schwartz and Penny Riker Jacob

DEAR QUANTEGY,
LATELY, WHEN I SMASH
MY GUITAR ON STAGE,
I NOTICE A SHARP
PAIN IN MY WRIST.
COULD THIS BE CARPAL
TUNNEL SYNDROME?

NILES T.
LONDON

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500 UNIVERSITY DR
P.O. BOX 100
30289 USA

Dear Niles,

Sounds like it. From now on, try smashing your guitar with
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a lot less wrist action.

(Hint: Practice this technique when busting up hotel
rooms.)

Regards,



major music legends place their careers in our capable hands. In fact, of the over 10,000 albums
last year, 90% of those that went gold were recorded on Quantegy tape (formerly known as Ampex).
Even for the big names, we now make it in small formats like DAT. Answers to your every music question.



Questions? Fax: 800.345.5919 or visit www.quantegy.com.

FEEDBACK

MONEY TALKS

I think that Stephen St.Croix missed my point regarding Sony's poor theater sound ("The Fast Lane," Sept. '97 *Mix*). He is right, in many Sony theaters the sound is not worth paying your \$8.50, and it is Sony's responsibility to set and maintain higher standards, just like it does in its other endeavors. My point is that *most* theater sound is awful, and even if Sony fixes their theaters (and let's hope that they do), there will still be all of the other theater chains to conquer. I just want you to broaden your vision and attack all of the theater operators that don't give a damn about the total theater experience.

In the meantime, I will continue to vote with my dollars and go right past my local cinemas (Sony and others) and drive more than an hour into Manhattan to Sony's Lincoln Square theater complex, where Sony does know how to put on a great show.

Mickey Toneband

DVD ASAP

I've been following the development of the DVD-Audio specification with great interest, and *Mix* has consistently provided excellent reporting on topics such as these. I'd like to offer some observations in the hopes that some of these ideas might resonate with industry insiders.

Everything I've read on the subject seems to confirm that the new DVD players will be capable of reading standard CDs and CD-Rs, as well as the DVD-Video (and audio) formats. Given these capabilities, it occurs to me that the DVD formats, most notably MPEG and Dolby Digital AC-3, could be read from standard CDs. The spec could be nearly identical to the DVD spec except for disk capacity. Alternatively, sound files and table of contents images could be stored in an existing CD-ROM format, simplifying desktop authoring for the financially struggling. Even for professional DVD production, being able to record part of a project (including video) onto CD-R and preview it on a standard player would certainly be handy.

According to Dolby Laboratories, its AC-3 encoding format requires from 32

to 640 kb/s, while MPEG encoding provides reasonable stereo reproduction at 192 kb/s and above. Multichannel 5.1 surround bit rates are typically 384 kb/s. Compare these figures with Red Book CDs 1.4 Mb/s requirement, and it becomes apparent that our familiar 74-minute CD could easily become a 272-minute 5.1 surround CD, or even a 544-minute stereo CD. It's easy to see that a \$3 CD-R could provide higher audio quality than the standard high-bias compact cassette at considerably lower per-minute media cost. Since streams from both physical formats could be readable by the new players at nearly the same bit rates, doesn't it make sense to extend the usefulness of standard CDs in this way?

If the consumer electronics companies don't want the players to be able to do this (a number of reasons readily come to mind), it's good to realize that consumers are not at their mercy to provide this capability. A sleek, black off-the-shelf PC enclosure could house an off-the-shelf DVD (and/or CD-RW) drive running an off-the-shelf OS, with a PCI TV tuner card, modem, etc., and no one will be stuck with a closed box. CD recorders and the blank CD-Rs are *finally* affordable, so now we're trying to obsolete them?

There's something to be learned from the HDTV vs. DTV debates: High resolution is great, but variable resolution is better. Sure it's great to have 4.7 GB, and we must come up with a DVD standard more suitable to the existing infrastructure of the audio community (e.g., 44.1 kHz!). I do hope that intellectual-property paranoia and greed (remember SCMS?) don't keep the masses in the cassette age for another ten years. Home taping of sub-CD-quality audio cannot be prevented in any way. Rather than pretend that it can, DVD players should support lower resolution audio played from CD-Rs without encryption. This will lure people into buying the DVD players. Once they have the players, they'll eventually start buying DVD titles.

*Sam Frantz
Convivial Systems
Mohnton, Pa.*

WORTH REPEATING

A note of thanks to Judith Sherman ("Producer's Desk," Nov. '97) for reminding us that if people don't maintain healthy hearing, all of our engineering efforts and technical advances will literally fall on deafened ears. As an audiologist and recording engineer, I find it critical that this issue be gently kept at the forefront of our collective minds.

I recently screened the hearing sensitivity of a number of recording engineers from around the world. The majority displayed some degree of hearing loss, particularly in the 3 to 8kHz range—frequencies critical to clarity of speech and music.

Be sensible, folks. If your ears "ring" after exposure to intense sound pressure levels, that sound was too loud! Carry with you a cheap pair of foam ear plugs, and use them. Custom ear protection with flat attenuation is available as well. Have your hearing checked at least annually by a reputable audiologist. Contact the American Academy of Audiology or the American Speech-Language-Hearing Association for the audiologist nearest you. Your career depends on keeping your "instrument" in tune!

*Daniel Ostergren, M.S., FAAA
www.Scandia-Audio.com*

MAGIC NUMBER

In Rick Clark's article "Recording Piano," (Nov. '97) John Hampton is quoted: "There is a French method of miking...called ORTF...You take a couple of mics...and put them in an X-Y setup with the capsules seven centimeters apart. That's the magic number."

That's not really the magic number. The magic number is 17 cm apart, and the capsules should be at a 110-degree angle from one another.

*Richard Humphries
Henninger Digital Audio*

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Capricorn.

"The most fun I've had with my clothes on!"

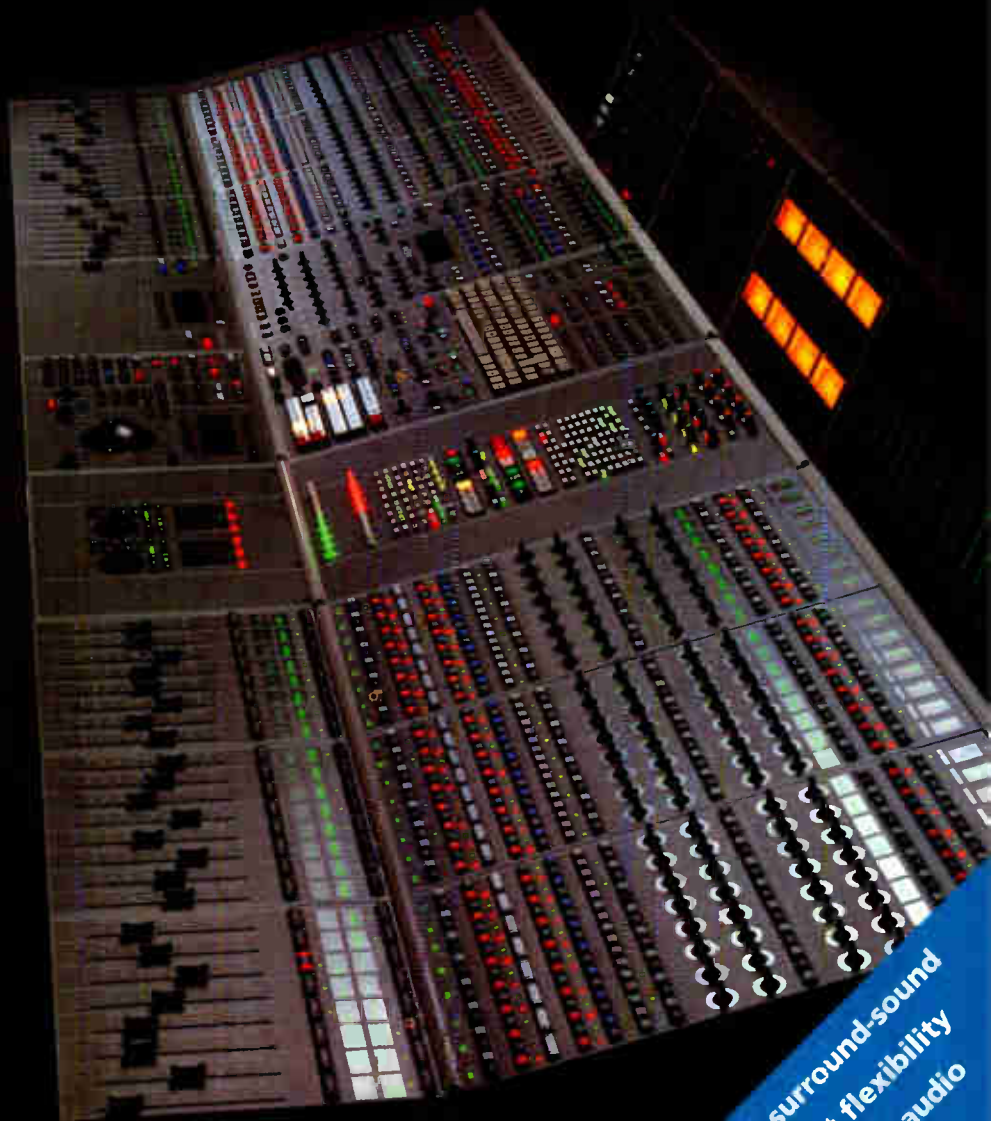
Roger Nichols, producer/engineer

"My first sessions on Capricorn at Chung King Studios, New York City, were the most fun I've had with my clothes on.

"Do you like the EQ before the dynamics, after the insert, before the fader, or EQ on the dynamics sidechain? No sweat.

"I could easily toggle between mixes to compare them. At one point I also kept everything from my current mix but recalled the drums from the final mix of another tune. The recalls were exact, sample by sample.

"The Capricorn mixes sounded so much better than what we'd mixed already, I wanted to remix the tracks done on other consoles."



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CURRENT

TEC AWARDS SCHOLARSHIP APPLICATIONS

Applications are now available for the 1998 TEC Awards Scholarship Grant. Administered by the Mix Foundation for Excellence in Audio, the Scholarship Grant was created in 1995 to award funds to deserving individuals pursuing careers in audio and currently enrolled in an audio program. Last year's winners were Joshua Allen, a student in the recording arts program at Full Sail Real World Education; Travis Gregg, a sophomore studying audio recording at Indiana University; and Claudius Mittendorfer, a third-year student in music production and engineering at Berklee College of Music.

For a TEC Awards Scholarship application form, please send your request to TEC Awards, 1547 Palos Verdes Mall #294, Walnut Creek, CA 94596, or e-mail KarenTEC@aol.com. No phone calls, please.

MIX L.A. OPEN DATE ANNOUNCED

The Third Annual Mix L.A. Open is slated for Monday, June 15, at the Brookside Golf Course in Pasadena, Calif. Proceeds will be distributed to Hearing Is Priceless (HIP) for its outreach programs in hearing conservation and to other programs of the Mix Foundation. For the second year in a row, engineer/producer Ed Cherney will serve as honorary chairman.

The Mix L.A. Open will be a "best ball" tournament with a shotgun start. Individuals or companies have been offered the opportunity to sponsor each of the 18 holes or one of three special awards: Longest Putt, Longest Drive and Closest-to-the-Pin. For information about sponsorship or entry fees, contact Terry Lowe, tournament director, at 310/207-8222.

FOUR MEDIA ACQUIRES POP

Four Media Company (Burbank, Calif.) recently signed an agreement to acquire Visualize Inc., d.b.a. POP Studios, a Santa Monica-based provider of creative services for the commercial, television, feature film and interactive markets. The acquisition expands Four Media's capability to provide integrated technical and

creative services to entertainment content owners and creators.

The agreement called for POP, formerly known as Pacific Ocean Post, to become a wholly owned subsidiary of Four Media Company, retain its present management and continue to operate under the POP name. Financial terms of the transaction were not disclosed.

Four Media Company chairman and chief executive officer Robert T. Watson said, "The acquisition of POP further strengthens our ability to serve the television advertising creative community, generates significant positive momentum in our film division and adds many new and innovative services."

VISION AND AUDIO '97

The British Association of Professional Recording Services, APRS, reported a strong success for its November '97 show, entitled Vision and Audio '97. Nearly 9,000 visitors attended the three-day show; exhibitors represented broadcast, film, post-production and music sectors of the industry. More than 27 workshops were held on a wide range of business and technology issues. One of the highlights was the APRS 50th anniversary dinner gala, which took place on the first night of

the show and was attended by more than 350 guests. At the dinner, which was sponsored by AMS Neve, special guest Sir George Martin received an honorary award from the APRS.

UPCOMING SHOWS AND SEMINARS

The Production Services Association (PSA) and the Live! Show will again hold their conferences together, February 5-6 at the Roundhouse, Chalk Farm, UK. For details and registration information, visit www.psa.org.uk, or call 44/1322/660070.

Canadian Music Week is happening next month, from March 5-8, at the Westin Harbour Castle in Toronto. Now in its 15th year, CMW is one of the largest music festival/conference events in North America. For information, visit www.cmw.net or call 416/695-9236.

NAB '98, "The Convergence Marketplace," will take place from April 4-9, at the Las Vegas Convention Center and the Sands hotel in Las Vegas. More than 1,300 companies will exhibit, and 150 educational sessions at 11 concurrent conferences are planned. For details, visit the NAB Web site at www.nab.org/conventions, call 800/342-2460 or

—CONTINUED ON PAGE 16

MIX SLATES STUDIO CONFERENCE FOR JUNE IN NEW YORK CITY

Mix will present StudioPro '98 at the Marriott Marquis in New York City on June 25-26, 1998. The two-day conference will include a dozen workshops and panel discussions on topics of interest to studio owners, producers, engineers and other audio professionals. The sessions will focus on both technical and business subjects, including studio business diversification, the commercial and project studio interface, acoustical design solutions, making the transition to all-digital, an MDM workshop with *Mix* editor George Petersen and producer/engineer sessions hosted by the newly formed Music Producers Guild of the Americas.

"We've had this event on the drawing board for quite a while," says *Mix* publisher Jeffrey Turner. "Our intent is to create a forum where engineers, producers, facility owners, manufacturers and other professionals can talk to each other about the state of the recording industry and where it's headed. So much of our time is spent in isolation. By bringing people together in New York, this conference will provide an education that will help attendees make smart business decisions today and in the future."

Serving as conference director is *Mix* director of special projects Hillel Resner. Writer/consultant Mel Lambert is program director. For a conference brochure, call Daniela Barone at 510/653-3307 or fax 510/653-5142. ■

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Regardless of your recording gear, the single best way to improve your sound is with Neumann microphones. Utilizing a large-diaphragm capsule derived from our world-standard U 87, our new TLM 103 gives you the full, rich, warm sound that Neumann is famous for. It has the lowest self-noise of any condenser mic in the world – important in today's low-noise digital recording environment. And with our new TLM 103, owning a Neumann has never been easier...for less than \$1000 US, you can have the most important piece of equipment you'll ever own.

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Canada: Tel: 514-426-3013 • FAX: 514-426-3953 • Mexico: Tel: 52-5-639-0956 • Fax: 52-5-639-9482
World Wide Web: <http://www.neumannusa.com>

CIRCLE #007 ON PRODUCT INFO CARD

World Radio History

HR824 ACTIVE MONITOR

“Overall frequency was almost hard



Logarithmic wave guide helps accurately propagate high frequencies over a wider area. Result: better dispersion, more precise imaging and a far wider sweet spot.

Edge-damped 25mm high-frequency transducer is directly coupled to its own 100-watt FR Series™ Low Negative Feedback internal power amp.

Alloy dome is free from “break-up” that plagues fabric domes, causing high frequency distortion.

Signal present and overload LEDs.

Instead of a noisy port, a passive honeycomb aluminum transducer on the rear of the HR824 almost doubles the low frequency radiating surface.

“This allows the HR824 to move a large volume of air with minimal low frequency distortion & power compression.” EM Magazine*

Specially-designed 224mm low frequency transducer has a magnet structure so massive that it wouldn't even work properly in a conventional passive loudspeaker. But servo-loop-coupled to a 150-watt FR Series™ amp, it's capable of incredibly fast transient response and extremely low frequency output.

Inside the HR824 cabinet is 100% filled with adiabatic foam. Result: Unwanted midrange reflections from the low frequency transducer are absorbed inside the enclosure instead of being reflected back out through the cone into your listening space.

* Electronic Musician, October 1997, All quotes are unedited.

MACKIE!

HR824

Actually this paragraph doesn't have anything to do with the HR824. Mackie is further expanding its R&D/Engineering department and is looking for more analog and digital engineers with experience in pro audio. Log onto our web page for particulars.

“The enclosures — dressed in conventional yet classy black motif — are shielded.” EM Magazine*

Inside. Two separate FR Series power amplifiers with a total of 250 watts rated power — the most of any active monitor in the HR824's class.

On the back. HF Boost/Cut, Acoustic Space, Roll-Off and sensitivity controls, balanced 1/4" and XLR inputs. *“The Mackie HR824 is the only system [in the comparative review] that doesn't require the user to fumble around with tiny tools in order to make adjustments.”* EM Magazine*

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CIRCLE #008 ON PRODUCT INFO CARD
World Radio History

response was so flat that it to believe." Electronic Musician Magazine*

Ready to confront reality? The HR824 Active Monitor is now in stock at Mackie Dealers.

Owning a set of HR824 near field studio monitors has the potential of seriously altering your perception of sound.

For the first time, you'll be able to hear precisely what's going on all the way through your signal chain — from microphones right through to your mix-down deck. You'll suddenly discern fine nuances of timbre, harmonics, equalization and stereo perspective that were sonically invisible before.

Some tracks you've recorded will amaze you; others may send you back for an immediate remix.

But either way, for the first time, you'll be hearing exactly what was recorded — not what a conventional loudspeaker may or may not have been capable of reproducing.

Admittedly, these are pretty brazen claims (which is why we're backing them up with comments from a credible, third-party source).

But all you have to do to become a believer is to visit

your nearest Mackie dealer. When you compare HR824s to the competition,

you're going to hear some dramatic differences.

First you'll notice far more openness and detail. Critical listeners tell us that it's as if a curtain has been lifted between

themselves and the sound source.

Next, you'll notice low frequency output so accurate that you might look around for the hidden subwoofer (some of the world's most experienced recording engineers have

the traditional, narrow "sweet spot" directly between the monitors, you'll discover that the HR824s really DO live up to our claim of wide, dispersion.

Their sweet zone is so broad that several people can sit next to each other —

if you work solo, you can move from side to side in front of large consoles — and still hear a coherent, detailed stereo panorama.

Finally, let the salesperson go wait on somebody else and enjoy an extended session with one of your favorite CDs. When you're through, you'll discover that when distortion and peaky frequency response are minimized, so is ear

fatigue: You can listen to HR824s for hours on end.

One final point... your monitors are the only part of all your studio equipment that you actually hear.

Along with good microphones, HR824s are the best investment you can

make, no matter what your studio budget. And, like premium mics, HR824

monitors cost more than less accurate transducers.

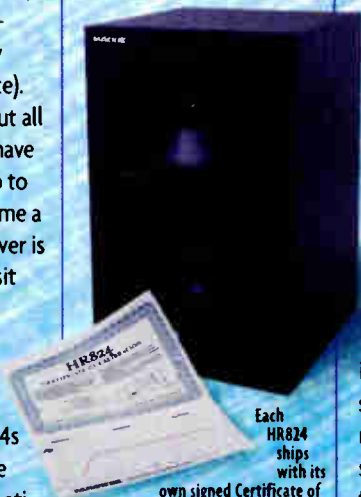
But if you're committed to hearing exactly

how your creative product sounds, we know you'll find owning HR824s well worth it.

"In fact, all the sonic details that I can discern on a \$45,000 reference system were very well reproduced, although not identically, on the HR824s. That was very impressive."

"The precise resolution is a major boon for finicky sound sculptors."

"The imaging and high frequency dispersion is brilliant. I was amazed at how far off-axis I could scoot my chair and still clearly hear what was going on in both channels."



Each HR824 ships with its own signed Certificate of Calibration attesting to its $\pm 1.5\text{dB}$ 39Hz-22kHz frequency response.

done this, so don't be embarrassed). The HR824 really IS capable of flat response to 39Hz. Moreover, it's capable of accurate, articulated response that low. Rather than a loudspeaker's "interpretation" of bass, you can finally hear through to the actual instrument's bass quality, texture and nuances.

Next, if you can "unlock" yourself from

"The low end was robust and present; the electric bass and kick drum thumped into my chest the way those huge DFE monitors did back in the old days."

"Overall, the response was so smooth that I wasn't even aware of a crossover point."

"Stereo imaging and depth were fabulous."

MACKIE

In the U.S., phone 800/898-3211 • Outside the U.S. 415/467-4333
Web: www.mackie.com • E-mail sales@mackie.com • NASDAQ: MKIE

World Radio History



INDUSTRY NOTES

Ensoniq (Malvern, PA) entered into an agreement to be acquired by Singapore-based **Creative Technology Ltd.**, a provider of multimedia technology for the personal computer. The acquisition enables Ensoniq and Creative to jointly focus upon the PCI audio segment of the PC OEM and PC motherboard markets. All Ensoniq executives and staff will continue to operate from the Malvern facility...**Alesis Corp.** moved to 1633 26th St., Santa Monica, CA 90404. Phone 310/255-3400 or 800-5-ALESIS; fax 310/255-3401...On December 19th, **Akai Musical Instrument Corp.** moved to new corporate offices and warehouse facilities at 4710 Mercantile Dr., Fort Worth, TX 76137. The toll-free number is still 800/433-5627. The new phone number is 817/831-9203; fax 817/222-1490. The new PO Box address is 961077, Fort Worth, TX, 76161-0077...New staff at **Dolby Laboratories** (San Francisco): **Bob Pinkston** joined the company as vice president, exhibitor relations, and **Patrick Artiaga** was hired as director of distributor relations...**Hohner Midia** (U.S. offices in Santa Rosa, CA) merged with Dresden, Germany-based SEK'D. In the States, the company will do business under the name SEK'D America; in Germany as SEK'D Vertrieb, Soft and Hardware GmbH. All employees, addresses, phone numbers remain the same...**Doug Nestler** joined the staff of **Sonic Foundry** (Madison, WI) as director of music industry development. The company also recently hired **Jhim Van Bommel** to oversee the opening of its first European office in Delwunen, Netherlands. (Phone 314/185/52-104). Also, **Sonic Foundry** tapped **SCV London** as exclusive UK distributor for its line of audio software...**David Van Hoy** and **Leo's Professional Audio Inc.** announced the formation of **Advanced Systems Group LLC**. Located in Oakland, CA, the company will market, sell and support audio, video and

related computer goods and services to the pro audio and video production community. Call 510/654-8300 for more info...**Lexicon** (Bedford, MA) hired **Scott Loiseau** for product support, desktop products division...**Costa Mesa, CA-based QSC Audio Products** named **Plus Four Marketing** as its Northern California sales representative firm, and appointed **Fred Thomke** to the position of QSCControl product specialist...**Group One Ltd.** (Farmingdale, NY) is the new U.S. distributor for UK-based **Garwood Communications**, manufacturers of in-ear monitoring systems...**Scotts Valley, CA-based Emu Systems** and **Newfire Inc.** announced that they are collaborating to provide advanced digital sound and graphics for game developers. E-mu also announced new partnerships with the following software companies that provide support for E-mu sampler products: E-magic, BIAS, Sonic Foundry, Steinberg, Interval Music Systems, Gallery Software and MOTU...**Leitch Inc.** is now offering free advice for broadcast and production professionals making the switch to digital. The company developed a DTV seminar, titled **Destination Digital**, and established a DTV hotline (800/231-9673) on which experts are available to answer any DTV question...**Greg Byrne** was promoted to operations manager of **Music Annex's** audio post production facility in San Francisco...**beyerdynamic** (Farmingdale, NY) announced the appointment of two new independent representative firms. The **Peter E. Schmitt Co. Inc.** will represent Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont; **Innovative Marketing Concepts** will cover upstate New York...**Gary Osteen** joined **Comprehensive Technical Group** (Atlanta, GA) as an audio sales specialist...**Norwood MA-based Analog Devices Inc.** announced the purchase of **MediaLight Inc.** ■

—FROM PAGE 12, CURRENT

dial fax-on-demand: 732/544-2888.

This year's NSCA Systems Integration Conference and Expo, "Uniting Electronic Technologies for the New Millennium," will be held at the Las Vegas Convention Center from April 24-29. The convention features 480 exhibitors of commercial audio/video contracting and sound reinforcement technology; in addition, more than 40 hours of educational programs will be presented. Call 800/446-6722 for registration information.

Syn-Aud-Con announced upcoming arena and stage-rigging seminars, taught by Harry Donovan and Jay Glerum. The dates are February 15-17, New Orleans; March 15-18, Long Beach; May 3-6, Denver; and June 7-9, Boston. For details, call 812/278-3123 or visit www.riggingseminars.com.

The 104th convention of the Audio Engineering Society will be held at the RAI Conference and Exhibition Centre in Amsterdam, May 16-19. For exhibitor and registration information, visit the AES Web site at www.aes.org.

NEW WEB SITES

The Binaural Source, a mail-order service offering recordings for headphone experiences, introduces a site at www.binaural.com. There, download free MPEG-format binaural sound demos.

Join weekly Web chats at Fenderworld, at www.fender.com. Also find company and product info and Q&As.

Neutrik USA announces a new Web page at www.neutrikusa.com. The site includes company and product information, as well as links to professional organizations and trade publications.

SoperSound Music Library has a new Web site that offers monthly specials, online demo requests and information on new releases. Visit www.sopersound.com.

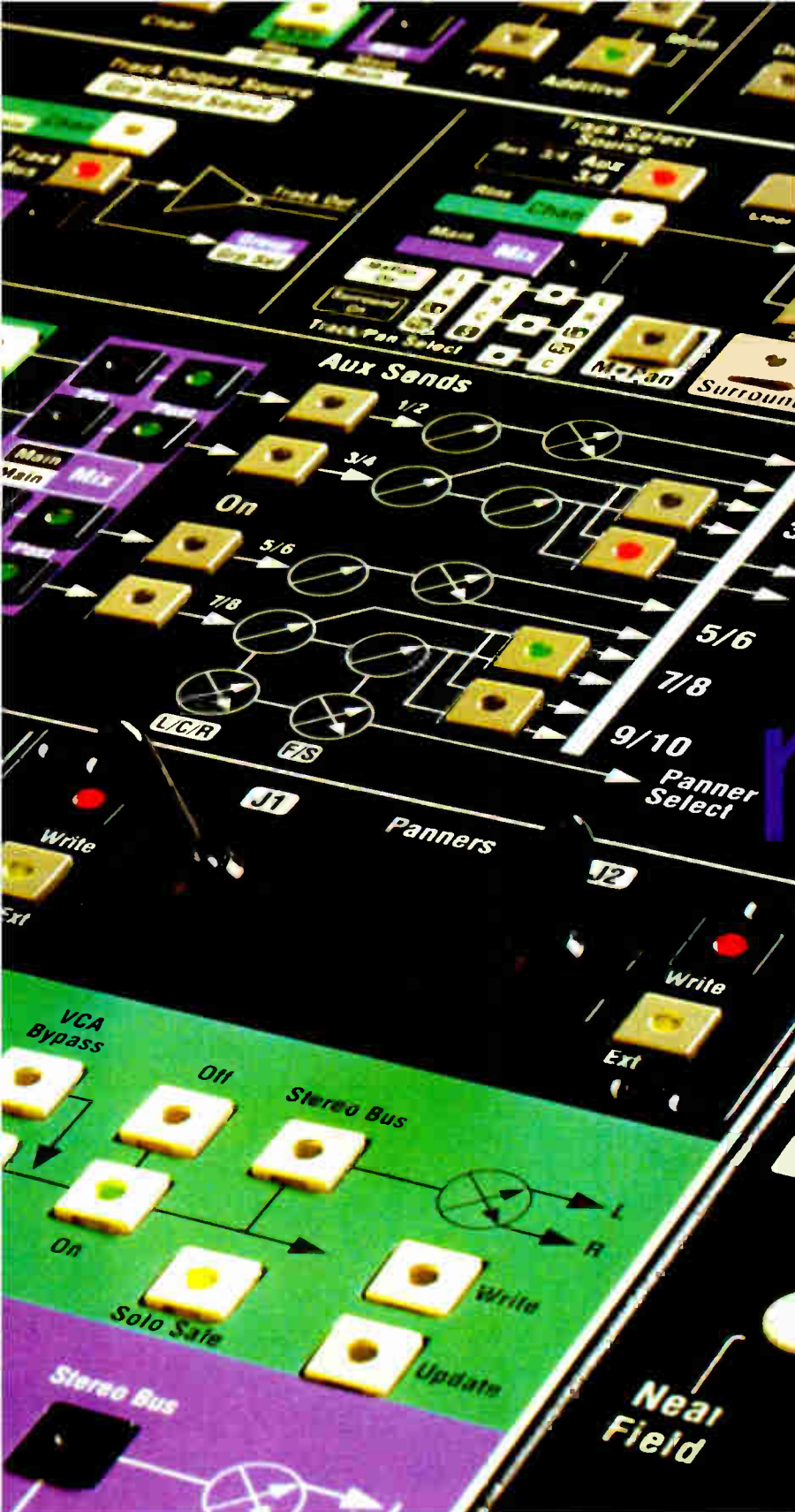
World Wired Productions debuted **The Crew Room**, an online database of music professionals, including engineers and lighting and production technicians: www.wipro.com/crewroom.htm.

CORRECTION

The November "Current" incorrectly stated that Pat Brown is TEF instructor for Goldline. For a list of instructors, contact Greg Miller at Goldline, 203/938-2588. ■

CHECK OUT THIS MONTH'S
MIX ONLINE!

<http://www.mixmag.com>



post touch mix feel

ELITE... the latest in Post Production tools from OTARI.

ELITE is Digital Control Technology that remembers what mixing is all about. Snapshot and Image Recall provide resettability of all console parameters. Multi-format Panning (up to 5 way) is available on each input with Automated Joystick controls. ELITE is PicMix™ ready with integrated machine control and Multi-stem monitoring.

Audition the ELITE from OTARI.



OTARI's exclusive Active Block Diagram display shows signal flow at a glance. Fader & Mute Automation provided by the new Otari Eagle™ Automation System.



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CIRCLE #009 ON PRODUCT INFO CARD
World Radio History

The Panasonic DA7 Mixer. Taking Digital Further.

1-Step Functionality
24 Bit A/D and D/A
Moving Faders
Surround Sound
Automation & Memory

Inspiration can strike you in the strangest places. But, when you've been dreaming of the ideal digital mix mixer for as long as we have, you jot it down on the nearest piece of paper. Well, the end results of that inspiration have come to pass...Panasonic introduces the RAMSA WR-DA7 digital mixer, and sets an entirely new standard in quality, flexibility, affordability, ease-of-use and value.

TAKE COMMAND... NOW

32 inputs and 6 auxiliary send/returns (for a total of 38 inputs), 8 bus, 24 bit converters, moving faders, instantaneous recall of all settings, surround sound... you'd think nothing this fully featured could be this easy to use or this affordable... but it is!

GREAT SOUND

32-bit internal processing combined with 24 bit A to D and D to A converters, yield an incredible 110 dB dynamic range, putting the DA7's sonic quality in a class by itself.

MAXIMUM FLEXIBILITY

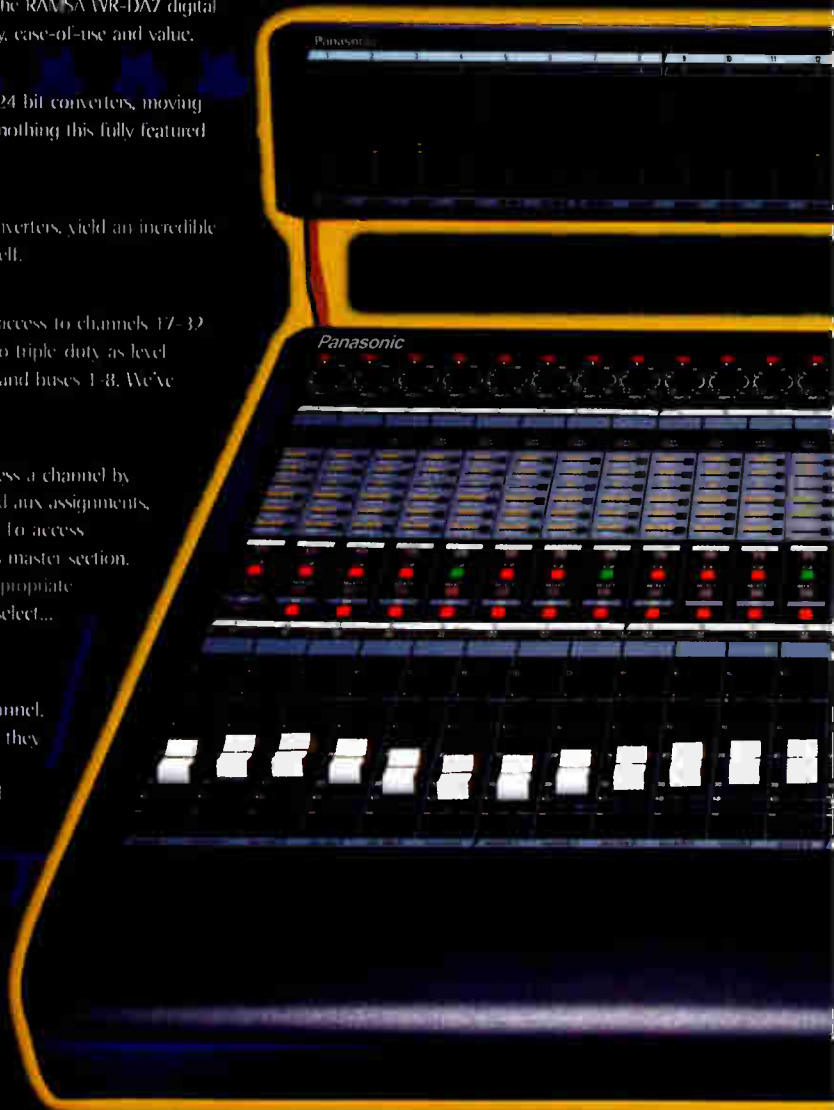
Packed into the DA7 are sixteen analog mic/line inputs and individual access to channels 17-32 through channel flip buttons located above each fader. Twenty faders do triple duty as level controls for channels 1-16, 17-32, or Aux sends 1-6, Aux returns 1-6, and buses 1-8. We've even added an additional fourth layer, which includes MIDI faders.

EASY-TO-USE

The DA7 features automated, logical layout and intelligent design. Access a channel by pushing its select button, and all parameters for the channel; EQ, bus and aux assignments, and dynamic delay settings come up on the large backlit LCD screen. To access individual parameters, just touch the appropriate knob in the console's master section. This calls up the sub-menu on the LCD screen and zooms in on the appropriate function. No digging through menus or getting lost in functions; just select... and you're there.

THE POWER TO CONTROL

The EQ section offers four true parametric bands active on every channel, with the top and bottom bands selectable from peaking or shelving, or they can be high and low pass filters, respectively. The frequency bands are overlapping, with the top two bands ranging from 50Hz to 20kHz, and the bottom two bands ranging from 20Hz to 20kHz. Boost or cut for these bands are adjustable in 1/2 dB steps to + or - 15 dB. The bandwidth is adjustable from 0.1 octave to 10 octaves. The DA7 is so full featured, even the Aux returns feature a 2 band parametric equalizer. The dynamics section offers you a choice of a Gate/Compressor/Limiter or an Expander on every channel with variable attack and release times and levels for threshold and ratio. A Delay of up to 300ms is available on every channel. In addition, 50 EQ and 50 Dynamics memories can store your favorite settings for instant recall.



RAMSA

SURROUND SOUND AT YOUR FINGERTIPS

The DA7 is equipped to mix 5.1 channel surround through its buses, so you don't have to tie up auxes, controllable by three modes for any channel or combination of channels. All modes provide full dynamic control of panning, and can be copied, stored, and transferred to any other channel. An optional MIDI joystick gives yet a fourth method.

MORE FEATURES THAN WE HAVE ROOM TO TELL YOU ABOUT

The DA7 features four up/down/left/right cursor keys that are switchable to output MIDI Machine Control commands to MDMs, sequencers, or workstations. Data entry is done through the parameter dial or alphanumeric keypad. There's an undo/redo button, solo-mode-set, and built-in talkback mic. Honestly, the DA7 is so feature rich, (but still easy to use) that we don't have room to describe it all here. You'll have to test drive it in person!

TAKE ON THE WORLD!

The rear panel has 16 analog mic/line inputs (8 XLR with individual software-switched phantom power, and 8 with TRS); 16 channel inserts (preA/D); and 6 auxiliary send/return jacks (3.2 use S/PDIF; the rest, +4dB 1/4inch connectors). Analog outputs include +4dB balanced master outs with XLRs; +4dB balanced record outs on TRS 1/4inch jacks and two -4dB monitor outs on TRS balanced jacks. Digital I/O, via XLR connectors is switchable between AES/EBU and S/PDIF. The rear panel also offers MIDI In and Out, word clock I/Os, plus both a 9-pin RS-422/RS-485 serial port and PC port for Mac/Windows with software support for both, a 1.4 inch footswitch jack for controlling talkback on/off or automatic punch in/out for automation, and a D-15 subconnector for the optional meter bridge.

TAKE IT EVEN FURTHER

3 expansion-card slots allow connection of recorders with ADAT Lightpipe, TASCAM I/DIE, and AES/EBU (switchable to S/PDIF) interfaces, with any of the audio cards fitting into any slot. A fourth card provides 8 more analog inputs/outputs via a D-25 subconnector. The third expansion-card slot can be used 3 ways:

- Connect 2 DA7's together with true bi-directionality
- Replace analog inputs 9-16 with digital inputs
- Digital inserts across the 8 buses, six Auxes, and L/R stereo out. An option card provides SMPTE and Video Sync input.

WHEW!

Panasonic worked overtime to provide so much creative power and flexibility, in such an affordable package. We can't possibly show all you can do with the DA7 on paper, so experience it yourself at your Panasonic RAMSA dealer.

Panasonic

Broadcast & Digital Systems Company

FOR MORE INFORMATION CALL:

1-800-777-1146

IT'S ABOUT TIME...

IF I COULD KEEP TIME WITH A THROTTLE

How long is an hour when you are behind on a project with only three hours left to do 20 hours of work? But how long is an hour when you are sitting in an airport waiting for a flight that's late? And how long is a minute when are talking long distance to the one you really miss? How long is that same minute when you are sitting at a red light on your way to that airport to catch that plane, and you think you're running far too late because you don't yet know the plane is even more delayed? And how long is a second when you are trying to avoid an imminent traffic accident? A thousand times shorter than the next second, when you have been hit and you are flying through the air forever, in high-resolution slow motion.

ROCK-SOLID SENSE OF TIME

I am one of those people that can pick a time in the morning to wake up, and without using an alarm of any kind, can almost always awaken spontaneously within a couple of minutes of the desired time. Unless I have a flight to catch.

I can hear an acoustic event and tell you what the time to the first echo is within 2 milliseconds or so, in the range of zero to about 300 milliseconds, and to an accuracy of about 7 milliseconds above that. But I lost 1968 and '69, and as I remember it, 1967 took about 45 minutes.

I am always surprised when a law enforcement officer insists that his technology tells him that I have just covered a linear distance of

2,333 miles in one minute, when my technology said an even 120. Which one of us has the bogus speedo?

DON'T GET IT YET?

This should do it for any musician who has played live. How long does it take to get through a three-minute song onstage when the audience loves it? Now how long does it take when you bomb, when you fall dead flat, when you blow the opening chord and get lost in the solo? Just how many hours does that little ditty of death take to sweat and suffer through? And there you have it.

Being organic, analog beings, we can be amazingly subjective at times, about time. How long are the three hours before FedEx final-

BY STEPHEN ST. CROIX

—CONTINUED ON PAGE 200



ILLUSTRATION: ELIZABETH LADA

Romance

[but calculated]

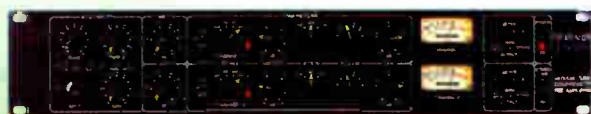


A technical statement laced with passion. The Drawmer 1960s.

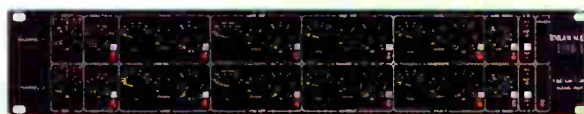


24-bit digital **1962** tube preamp

- Full 24 bit A/D conversion with 48K/44.1K sample rate.
- Two ultra high-quality pre-amp stages providing 'clean gain' from -25dB to +60dB.
- Dynamic range in excess of 133dB.
- Comprehensive digital output formats include AES/EBU, SPDIF, Tascam™ TDIF-1 and Alesis ADAT™.
- Creative processing including Fire Tune EQ, Dynamic Spectral Enhancement, Variable Tube Drive, Hi/Lo Pass filters and transparent Limiting can be inserted in the signal path.
- Word Sync in/out.



vacuum tube **1960** compressor



vacuum tube **1961** equaliser

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CIRCLE #018 ON PRODUCT INFO CARD

DRAWMER
master of the gentle art

The compressor that forgives,

50 factory presets, 50 user programmable presets

OverEasy® with VariKnee™ or hard knee thresholds

Dual mono or true stereo linked operation

Wide-ranging gain control allows for +4/-10 operation

8-step analog input and output metering

Digital input and output meters measure internal digital processing levels

Hybrid display technology. Combines the best of graphics, character and icon based displays



Ultra wide dynamic range 24-Bit A/D and D/A converters with TSE™ Tape Saturation Emulation on board

TYPE IV™ output available when equipped with digital output option

Digital meters show both peak and average levels

High resolution gain reduction metering

Optional AES/EBU or S/PDIF output for assured compatibility and flexibility. 48 / 44.1 kHz output

Build your own presets using your favorite building blocks

Change programs, parameters, and bypass via midi controllers



Gate



Start with the gate. Set parameters for threshold, ratio, attack, hold, release, and output gain. See the effect of your settings on the graphical display, as well as on the gain reduction and audio level meters, they all interact in real time with your manipulation of the parameters. Start with a threshold setting of about -60dB to clean off the noise in between the vocal takes. You can save your final gate settings as a "gate preset" building block and recall it into any other setup you do.

Compressor



Then move to the compressor. The effects of the gate settings are still visible on the graphic display, so let that help you determine where to set your compressor threshold. The parameters you change here will also effect the curve on the graphical display in real time. Move through all the regular parameters, like threshold, ratio, attack, release, and output gain. For vocals use a threshold of about -25dB, a ratio of about 3:1 or 4:1, and a slow attack and fast release for the most natural sounding effect. Your compressor settings can also be saved off as a building block to be called up into any other preset.

Limiter



On to the limiter. Changes you make to the limiter settings are also seen on the graphical display. Adjust the level up or down to suit your needs. The flat top line of the display moves up and down as you adjust the level. You can also set the speed at which the limiter lets go of the signal as it goes below the threshold. This is truly smooth limiting, with patented dbx PeakPlus™ algorithms, so rest assured that where ever you set your threshold level, your tape will not distort, and your signal will not get butchered as it goes across the threshold. And like the other parts of the processor, your limiter settings can be named and saved for later recall.



but never forgets...

All the classic dbx trademark sounds in gating, compression, limiting, de-essing, and sidechain EQ.

Compression controls: threshold, ratio, gain, OverEasy®, auto, attack, hold, and release

Variable Transient Capture Mode™.



dbx digital

IT FORGIVES

- New dbx technology, the TYPE IV™ Conversion System with TSE (tm) (Tape Saturation Emulation) gives you the pleasant overload characteristics of analog tape without the harsh distortion of most digital input systems. No more dancing around with the input levels to protect the integrity of your audio.

- Ultra-wide dynamic range 24 bit A to D converters with TYPE IV™ make your signal sound better than you ever thought possible. Capturing the full dynamic range of your analog signal and coupling it with the powerful dynamic range of this patent-pending dbx process, TYPE IV™ will make your digital signal sound like it came from the quietest high-quality analog source you could imagine.

- With the extensive metering of the DDP, you can see EXACTLY what is going on with ALL parts of your signal: input, internal processing, and output, with peak and VU, as well as gain reduction for both sides of the stereo image.

- And speaking of stereo, you can work in stereo with dbx's True RMS Power Summing™ for phase-coherent tracking, or in dual mono mode, without the two channels interacting at all, making the DDP a great processing value.

IT NEVER FORGETS

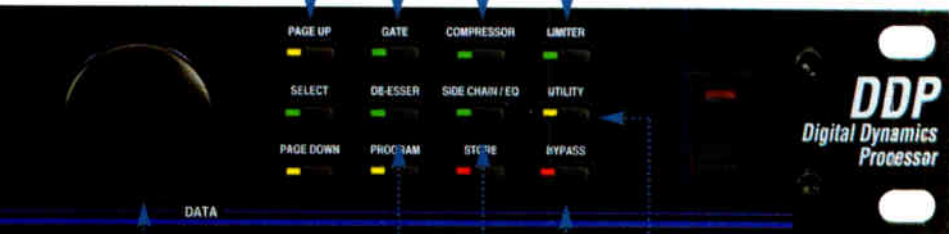
- The DDP works right out of the box. It comes with 50 factory setups that are guaranteed to knock your socks off. There are presets for every application you can think of, and then some. dbx engineers are musicians and recording engineers. We know what a compressor is supposed to sound like, and we know it better than anyone else. We invented compression. We eat, sleep and breath compression.

- Want to duplicate that perfect compressor set-up? Each processor in the chain has all the parameters you would expect. After you set the parameters the way you want them, save it as a processor preset, available to be recalled any time. These building blocks allow you to save entire setups just for the way you like to work. It doesn't matter that you are doing a live gig one night, then mixing the tracks in the studio the next night, the DDP will be there, just the way you left it.

- When you save a preset, you also save the information that makes it work behind the scenes, too. Digital output (optional), sample rate performance, MIDI setup, as well as any of the other utilities, like sidechain setup and monitor, EQ settings, and SysEx functions.

- When you make changes to any parameter, you can see where your adjustments are affecting the signal, simply by looking at the Hi-Res graphical display, which shows the processing curve in real time as you make your adjustments.

Check out the DDP at your local pro audio outfitter, and experience DIGITAL performance you'll never forget.



Precision control over every parameter

De-ess from 800Hz to 8kHz, vary the amount.

Utils: sample rate, A/D input and output, Midi functions, Sysex functions.

XLR and 1/4" balanced ins and outs.

Sidechain functions for advanced filtering applications. Sidechain monitor included

EQ offers 20Hz to 20kHz, Q, ±12dB, and SCM-monitor.

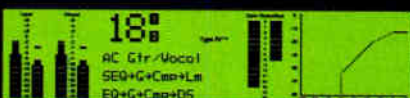
Midi bypassable via midi program changes.



De-esser



and More



De-essing works the same way: see the effects of your settings displayed on the graph. Parameters here are the common ones: threshold in frequency, 800Hz to 8kHz, and amount in percent. Other available processing includes EQ - both in-path and sidechain, for special-effect types of processing. When you are editing any of the building blocks, its icon is visible on the display, and the parameters are shown on the graph, so it's always easy to know where you are. Parameters are easy to see in this page driven operating system. When it's as complex as this, it's nice to know somebody was thinking when it was put together.

You can also work in stereo, or set up a completely different and independent processing chain for the other channel. Also, notice that the audio meters are capable of showing both peak and average levels for input and output. Optional digital output with the TYPE IV™ Conversion System with TSE™ (Tape Saturation Emulation) provides up to 24-bit output in either AES/EBU or S/PDIF formats with the trademark digital processing of TYPE IV™. The DDP also has full MIDI/Automation capability, with separate midi in and thru jacks. Entire processing setups may also be saved into one of 50 user-defined presets, or use one of the 50 factory setups.

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CIRCLE #011 ON PRODUCT INFO CARD



MARS NEEDS WINDSCREENS!

FORMATS IN SPACE

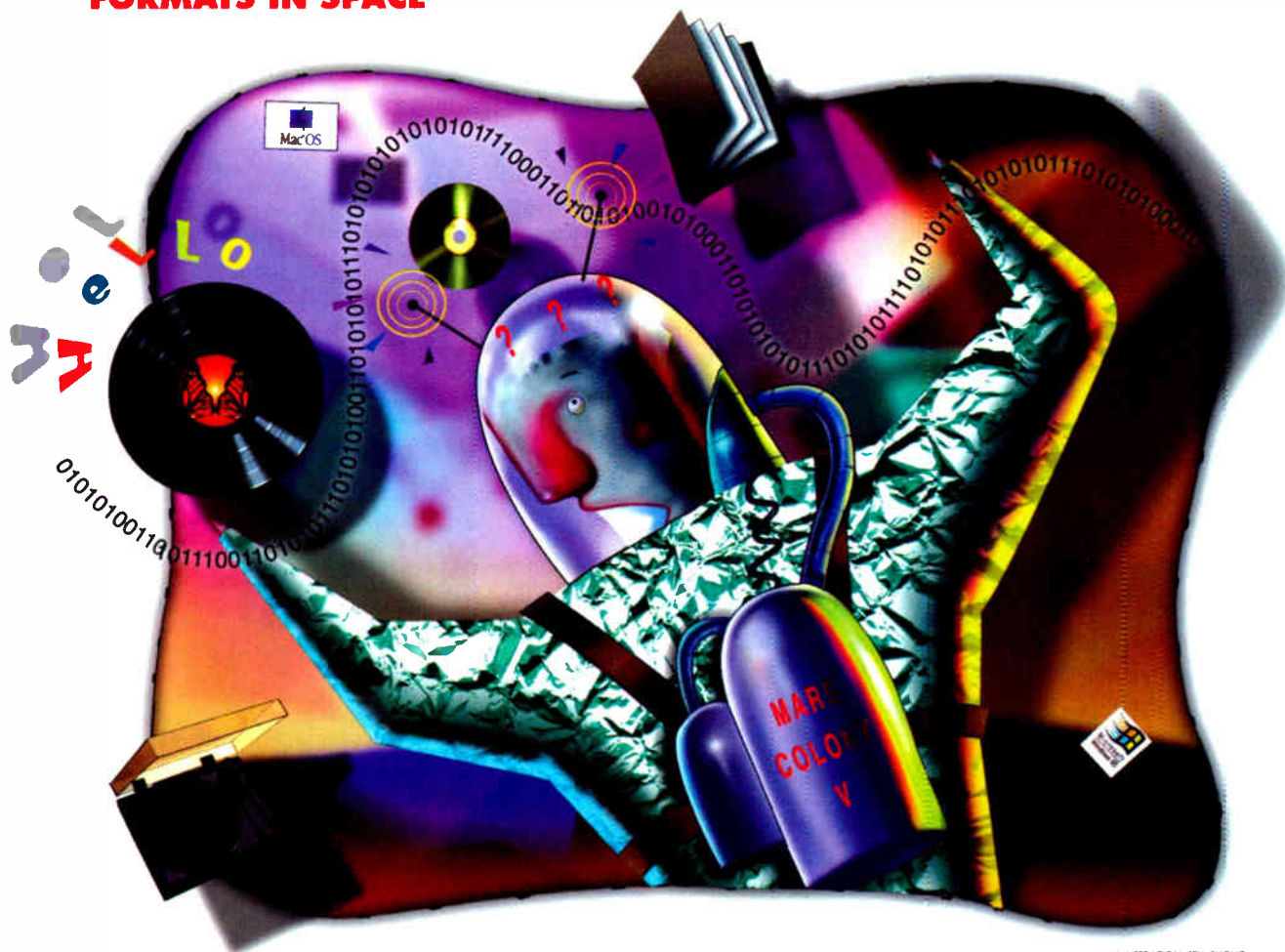


ILLUSTRATION: STU SUCHIT

I've been working for the past few weeks on the score for a cable documentary dealing with the issue of life on Mars. It's a pretty exciting topic and a pretty exciting time to be dealing with it, what with all the recent and upcoming probes and landers. And I'm having a lot of fun writing a score that's equal parts Enya, Gustav Holst, Pink Floyd and Mussorgsky.

One of the segments of the film describes a "time capsule," created by The Planetary Society and Time Warner, which accompanied a Russian Mars probe launched in 1996. Like most time capsules, it was designed to be "opened" some decades or centuries from now, hopefully by humans who have colonized Mars. It contains artifacts of our current civilization, including

essays and science-fiction stories about Mars, several generations of artists' conceptions of the red planet and...audio clips.

Unlike most time capsules, however, these were not left on the Martian surface in the form of discrete objects, like newspapers, books or films. Certainly, no one was going to pay to bury them in the Martian soil, and, left on the surface, even in Mars' noncorrosive atmosphere, they would deteriorate quickly. Besides, the weight would add considerably to the expense of an already costly project.

No, all of these items were coded onto a CD-ROM, which was attached to the leg of the probe. Presumably, 20 or 50 years from

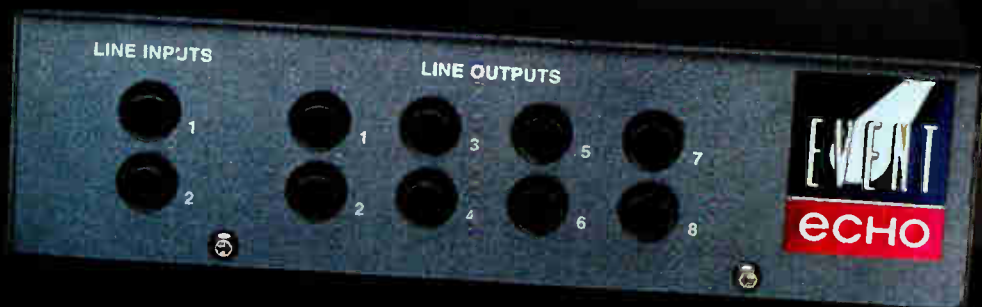
now, the new Martians, our descendants, would find the CD-ROM called "Visions of Mars" and view its contents, to their edification and delight.

If this rings a bell, you may be recalling the Voyager interstellar probes of the late '70s, the first man-made objects to leave the solar system. Inside the probes was a phonograph record called *Sounds of Earth*. Except for the fact that it was made out of solid gold, was recorded at 16 $\frac{2}{3}$ rpm (to cram as much as possible on there), and included about 100 black-and-white and color photos encoded into analog, it was an ordinary LP. Any civilization that discovered it a thousand, or a billion, years hence would presumably be able to look at the grooves with a

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microscope and deduce that these were sound waves, and then be able to build a device that would allow them to listen to it. (It would still be a lot smaller a creative leap than when Jodie Foster, in the movie *Contact*, realized that the blueprints being beamed down from the cosmos looked so weird because they were actually three-dimensional.)

Of course, the finders of Voyager may not know exactly how fast to spin the record, but as composer Laurie Spiegel says, "We don't know how fast they're listening." No doubt they will play it at whatever speed they find comfortable to listen to, wherever their hearing (or whatever equivalent sense they have) falls, in the range from DC to X rays. Some of the recordings are mono and some are stereo, and it's fun to speculate on how extraterrestrial listeners might interpret this fact—perhaps, as the late Carl Sagan, executive producer of the project, hypothesized, they will conclude that some of the Earth species who contributed to the project have only one ear. (No, there's no Beach

Boys on it, and shame on you for thinking that!)

Spiegel is responsible for the first musical piece on the record, a realization of Johannes Kepler's treatise on the movement of the planets, "Harmonia Mundi," using a custom FORTRAN program that fed Kepler's data to Bell Labs' experimental GROOVE synthesis system. Besides being gorgeous, the piece could allow a clever civilization to figure out where the craft came from by examining the data and comparing it to all of the solar systems in the galaxy. Other sounds on the record include the music of Bach, Mozart, Chuck Berry and Louis Armstrong, folk music from a dozen different countries, nature recordings such as birds and volcanoes, whale songs, and spoken greetings in 55 languages. The audio clips are all from professional sources like the famed Elektra Sound Effects Library, and the brilliant field recordings of folklorist Alan Lomax.

Warner New Media (now Time Warner Interactive) released the record on a hybrid CD-ROM in 1992, so you can listen to what they'll be hearing a million years from now on Rigel 4. It's quite a wonderful document, and it

makes you feel pretty good about our planet and our species.

Okay, back to Mars. The Mars CD was not meant to be found by other civilizations; it was meant to be found by humans. And our technology has advanced quite a bit in the ensuing two decades, so one assumes we could find more clever ways to present information and cram more of it into one place. "Visions of Mars" is a presentation, done with Director or Premiere or something similar, with onboard player software for use in either Mac or Windows computers.

It's not the most effective use of the medium I've ever seen. There's no video (although apparently some videotapes were made for the project), the pictures are pretty grainy for the most part and look lousy if your monitor has more than 256 colors, and it's slow. Some of the text is in a badly kerned, hard to read, Avant Garde typeface, while other texts run off the screen. The data on the disk takes up only about 160 megabytes, one-fourth of what could be on there.

But beyond the merits, or lack of same, of this particular disk is a more troubling question: Isn't it a bit of a

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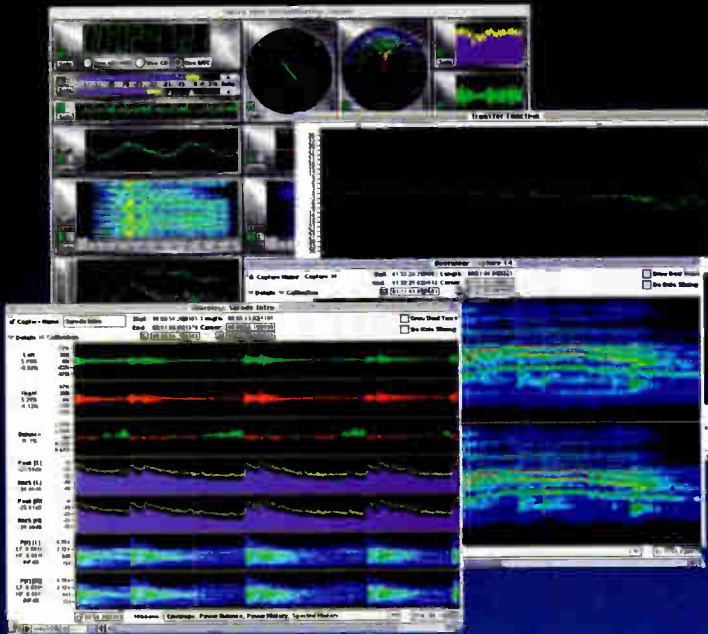
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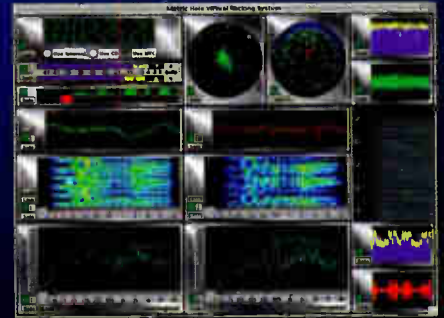
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stretch to think that CD-ROM will be a viable medium 20, 30 or 100 years from now? If you think about it, the only medium that we have today that we can *guarantee* will be readable in future generations is the printed page. The more technology you need to interpret a document, the less likely it is that a person at some random point in time and space will be able to read it. Looking at a phonograph record under a high-power lens could reveal to an intelligent being the nature of the information it contains, but could the same be said for the almost random pit patterns of a CD?

And how is someone in 2098 going to deal with the fact that they need to have something called a "Mac" or a "Windows PC," and it needs to have on it something called an "operating system," which must be of early '90s vintage? (How much you want to bet this won't run under Windows 2001?) I have Apple II software that's ten years old, and I'm hard-pressed to find a machine that can even read the disks, to say nothing of run the programs on them. To anyone in our industry who cares

about either the past or the future, this issue is of paramount importance: how to preserve what we've done in our 100-year history and make it accessible to audiences 100 years from now.

Unfortunately, there's another issue, even more dismaying, with this CD. The producer of the documentary I've been doing is including in the film some audio extracts (and still pictures) from the CD of famous people saying hello to the future Martians. When I heard his first temp audio mix, I was surprised at how awful the clips sounded. I asked how he got them, and he replied that he played the CD on his Power Mac, plugging the audio output of the computer right into his editing system. "Pshaw!" I countered. "I have many sophisticated tools for extracting and converting audio from CD-ROMs, and if you send me the CD, I will create a 44.1kHz, 16-bit file of the clips, which will sound perfect, that you can load right into your Avid."

He sent me the CD, and I hacked at it for the better part of a day before I gave up. The files were in some weird format that I couldn't get to play in any of the dozen or more audio programs I threw at them. The closest I came was

with Tom Erbe's amazing SoundHack, which can make sounds out of any file format, from MPEG to a Photoshop document. It got the files open and started to play them, but after a few seconds they dissolved into a harsh buzz. So I was reduced to using, like my producer, the audio output from my Mac. I figured I could still do him one better by routing the analog signal through the A/D converters on my high-end DAT machine, but when I tried that, my dismay gave way to horror: No matter how I got to them or what I did to them, the audio files were just plain garbage.

To get Arthur Clarke on tape, they must have sent him the cheapest portable cassette recorder they could find, and they forgot to tell him that he shouldn't record himself sitting in his garden during a typhoon. Carl Sagan's voice is distorted and full of cracks and pops, and children's book author Judith Merrill sounds as if she's at the bottom of a well. The recordings made me recall the time I captured my three-year-old sister doing her Shirley Temple imitation on my father's dictation machine. I was six. My tape sounded better.



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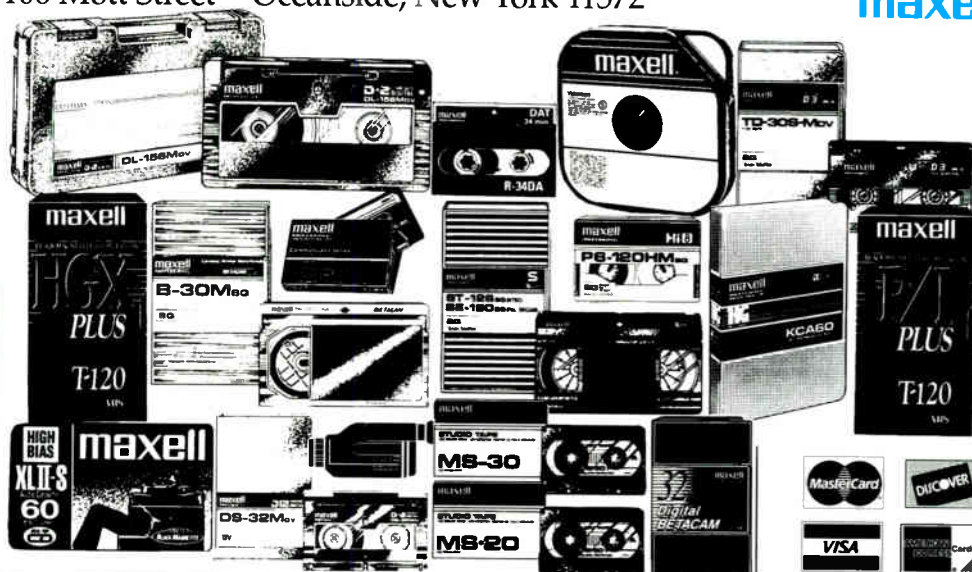
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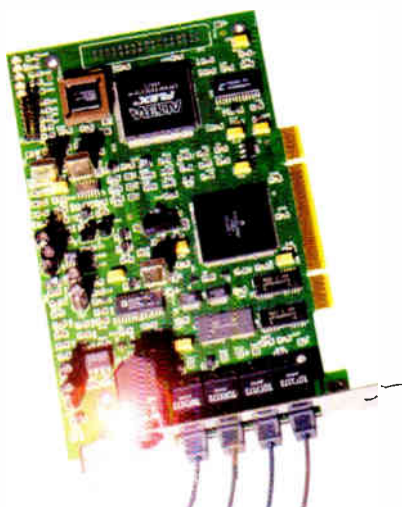
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CIRCLE #017 ON PRODUCT INFO CARD

INSIDER AUDIO

I sent the CD back to the producer and told him that I failed, and he had already done the best that could be done. During the final mix process, some of the scratches and crunches on Carl could be painstakingly excised, and some radical EQ might make Judith a little more intelligible. The wind noise on Arthur was impossible to deal with, however, and so the producer would simply salvage what he could between gusts. We shook our heads and laughed over how such an ambitious project, with such a lofty goal, could be done so badly.

It's okay for the best minds in our industry to be squabbling about whether analog mastering sounds better than digital. It's okay for us to argue over the merits of oxygen-free cable, tube preamps, oversampling or active crossovers, or to debate how many channels of audio should be dancing on the head of a DVD, at how many bits per word and how many words per second. But *Visions of Mars*, like too many products of its ilk, forcibly reminds us that we need to band together to combat a very real enemy: the people who make the multimedia today and who are building the delivery systems of tomorrow—and I'm not talking about space probes—who know nothing, and care less, about *how things sound*.

That an independently produced 20-year-old record, re-released on CD, should be far more successful—technically, aesthetically, educationally, and in terms of the amount and value of the information it presents—than a modern, state-of-the-art interactive presentation produced by the world's largest media company, should give us all pause.

Fortunately, "Visions of Mars" never made it to Mars. The Russian Mars probe, like all other Russian Mars probes, never got there. It's probably drifting around somewhere in the Asteroid Belt by now. Future Martians, if there are any, will probably only encounter it in the cutout bins at Egghead. Then they'll have to go over to Fry's Antiques to find something to play it on. And when they've gone to all that trouble, they'll marvel at how we could have been so stupid as to want to leave this as a legacy for the future.

...

Update department: A couple of months ago I wrote that I had aban-

doned the MIDI sequencing program I had been teaching with for ten years, in favor of a newer, slicker program. It turns out it was a mistake. As much as I liked the new program (and no, don't ask me what it was... I would like to stay on speaking terms with the manufacturer), it suffered from the very malady that I described in that column, a malady that all technology-oriented educational programs are in danger of falling into: the inability to look far enough into the past to learn *why* we do the things we do.

In this case, the program ignored a decade or more of user-interface development and locked users into its own, rather peculiar way of doing things. Worse, a lot of features that appealed to me upon first encounter turned out to be unfinished, and unusable, while the simple operations one needs in a teaching program were made unnecessarily complex. I struggled with the program for six weeks, watching my students suffer far more than they should (though I *do* believe in suffering for your art, there's a limit), and before the semester got too far under way and I found myself marooned in software hell, I pulled the plug and went back to my old sequencer.

Most of the students were grateful, and discovered that despite missing a few of the new program's cooler features, they could work a heck of a lot faster once things began doing what they were supposed to. The old program is buggy (one real whopper is that if you are running a SMPTE source into the program while you launch it, it crashes immediately), but I know where the bodies are buried, and so I am able to give the students plenty of tips about how to work around the bugs. The lesson to be learned is that the devil you know is preferable to the one you don't know—which, of course, is a primary reason why incumbency is the most valuable asset a politician has. But it also illustrates that those of us in the development biz must be forced to come up with much more concrete ways of convincing people to change their work habits and use our wonderful new toys than the usual smoke and mirrors...but that's another column. ■

Paul D. Lehrman has both feet planted on Earth, although other parts of him are in cyberspace. You can meet them at the Signal2Noise Web site, <http://www.s2n.org>.

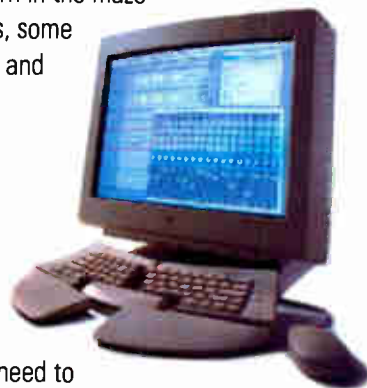
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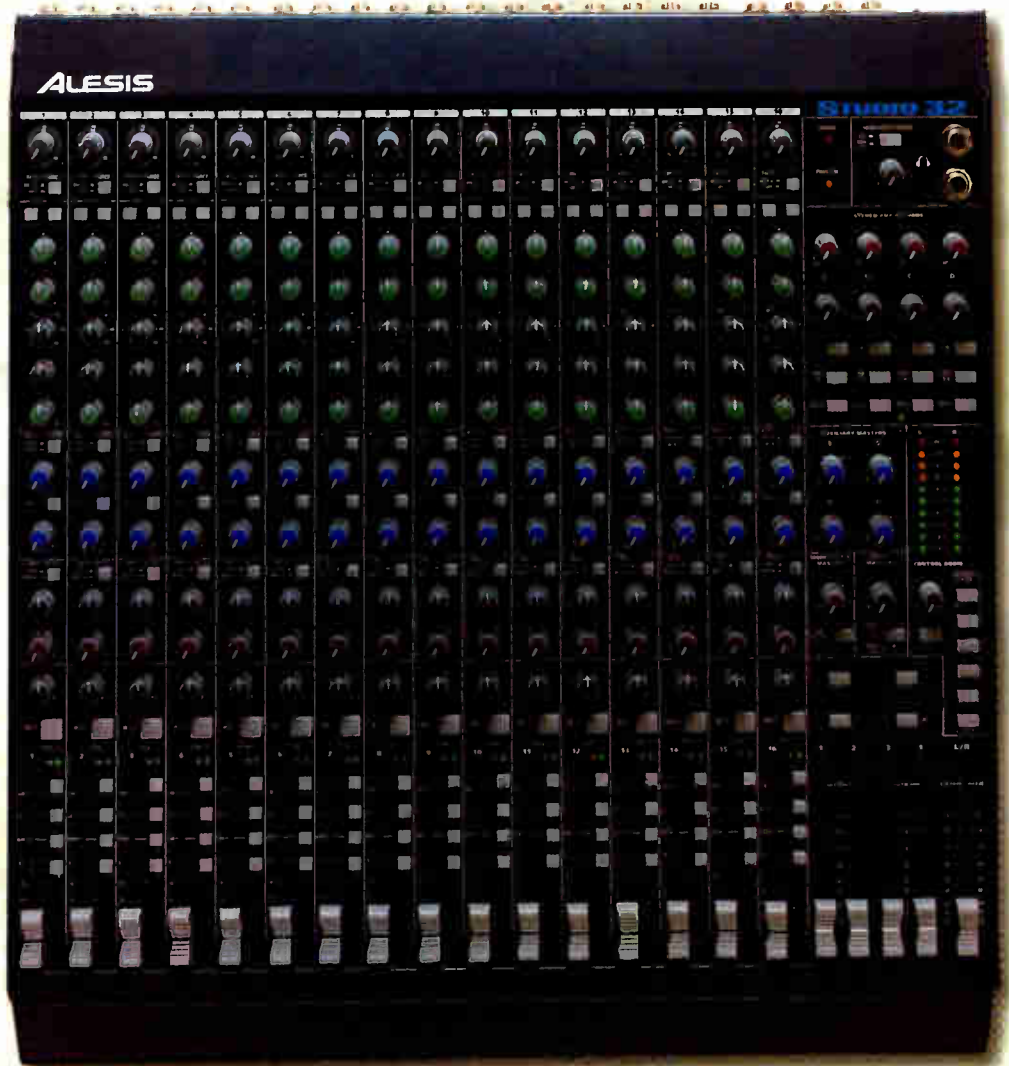
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Thomas Dolby Robertson has always been a big fan of music technology. Born Thomas Robertson, he earned the nickname "Dolby" as a teen in London for his obsession with gadgets and his creative talents. In the late '70s, he left school to pursue a career in music, and went from working as sound engineer for local bands to performing in Paris Metro stations, all the while working on finding new ways to manipulate technology toward his musical direction.

In 1982 he released the first of five albums, *The Golden Age of Wireless*, which included the Top Five hit "She Blinded Me With Science." He successfully rode the wave of MTV with award-winning music videos and helped define the British Invasion of the '80s.

In the early '90s, Dolby returned his surname to Robertson, thus ending long confusion with another audio pioneer, with whom he has no relation. He began venturing into film and commercial scoring, and in 1993 he and his manager, Mary Collier, founded Headspace Inc. as a music-for-multimedia production company. Some early Headspace projects included the "Virtual String Quartet," a musical virtual reality installation at the Guggenheim Museum that earned a Computer World Smithsonian nomination, and the underwater soundtrack for Steven Spielberg's Dive! submarine-themed restaurant chain. Soon, however, as his interest in the Web deepened, the focus shifted to the development of tools for the creation and delivery



PHOTO: STEVE JENNINGS

of audio over the Internet. With offices in Hollywood and in Silicon Valley, Headspace offers a suite of products to help bring music to the forefront of the interactive experience on the Web.

You're seen as a pioneer in pushing the envelope of technology as a tool for creating music. What inspired you to explore the technical side?

It began in 1977, back when I left school. Punk was happening in London in a big way, and I knew all of these diminished 9th chords, so I couldn't really get into a punk band—I was overqualified. They were more interested in somebody who could trash a Hammond organ onstage. So I ended up in this little bedsitter one-room apartment in

South London, with a 2-track tape recorder and a kit synthesizer called a Transcendent 2000. And I used to make music by just sort of programming one part at a time and recording it, ping-ponging back and forth between the two tracks of my TEAC recorder. So I would program a bass drum with a synth, and I'd sit there for hours, and I'd add the snare drum, and I built stuff up that way.

This, of course, was before the days of the PC, and so very often off-the-shelf technology would only get you so far in terms of making music. I saw ways to adapt technologies to do what I needed. As an example, when the first electronic drums came out, everybody was playing octagonal pads. I happened to see a disco lighting machine,

made by PPG for Tangerine Dream, which had a way of sequencing positive and negative voltages and putting them on 16 different channels. And I thought that with a little bit of soldering work, I could actually get this lighting computer to play the Simmons drums. So the drums on "She Blinded Me With Science" are actually being played by a disco lighting console. That was really before Linn Drums, before PCs, Macs and Ataris. So it was a real hack.

I think during the '80s, a lot of technology sort of trickled down from an elite few, who were either insane enough to use soldering irons the way I did, or rich enough to afford the first batch of Fairlights that came into the UK. I was lucky enough to be part of that group, as well, but during the course of the '80s, a lot of the technologies trick-

BY SARAH JONES

led down to a much wider market. But to my mind, it kind of leveled off going into the '90s. I don't think there have been any sort of watershed advances in technology.

So it's not so much about advancements in technology as it is about the availability of that technology.

It's more about availability. But there's been nothing that's really got my blood running the way [it did] when I first saw a Fairlight, when I first saw a Simmons drum, when I first saw a polyphonic synthesizer. Those kinds of things were some major breakthroughs, very influential to me. And there hasn't been much in the last few years that's really got me that excited. Until the Internet came along.

How did that initial excitement evolve into the Headspace vision?

Mary Collier and I formed Headspace because I was getting asked to do music for a variety of different experiences, such as virtual reality and CD-ROMs, and it made sense to have a production company with several composers and sound designers. But very quickly the real excitement went from the stand-alone game/CD-ROM world to the Web. During the time I was making sound for these experiences, there was no off-the-shelf software or hardware to help me. While there are some great dedicated programs on PCs and Macs to do music, the basic level of support for sound in computers is very poor. This, it seemed to me, was not really a technical limitation—it was just the fact that it's never been that important to the high-tech industry overall.

It seemed to me that it was a wasted opportunity: this huge audience with machines that are capable of doing very good sound, but for us content creators and experienced designers, we can't make use of the power of those computers and the breadth of that audience because they don't have the software necessary to make their computers [play back] good sound. So the idea started to form in my head that if we were willing to give all those people a free piece of software that had the ability, the sequencing, the sampling, the playback abilities of what was previously dedicated hardware, then you would get a sort of ubiquitous platform to write for. And now, suddenly, I can write an interactive music piece and tens of millions of people can enjoy it, overnight. And that became the vision behind Headspace.

Now that the company is established,

what is your role? What kind of direction do you provide?

It's really a mixture. I guess I'm the artistic director, but I'm also the assimilator. We're operating in a market that barely exists yet; we're one of a few groups who are trying to create the market. And what that involves day to day is finding little chinks of light where we can make an impact. So when I say assimilate, there's a lot of business development involved in how we fit into this mold.

Explain the Headspace family of products in terms of the opportunities they provide for audio engineers and producers.

We have a suite of products that are designed to provide a one-stop shop for audio on the Net. First, the Beatnik player—a completely free software synthesizer that works with Netscape, Microsoft IE, WebTV, Oracle's NCI set-top box and Java 1.2. Anyone can download it from our Web site [<http://www.headspace.com>]. Then there's the Beat-

IMPLEMENTING A BEATNIK SOUNDTRACK AT THE UNIVERSAL STUDIOS WEB SITE

by Thes Hansen

[Thes Hansen is the producer of Universal's Online Horror Channel, Universal Studios Online Inc. He offers this description of his hands-on experience with Headspace's Beatnik software.—Eds.]

Since 1994, Universal Studios Online has promoted various entertainment releases from the studio. During this time, we've started many new online programs targeted at the Web-connected entertainment consumer. One of these was Universal's Online Horror Channel, a monthly Web 'zine dedicated to classic horror properties, such as Frankenstein, Dracula, the Wolf Man, the Mummy and the Phantom of the Opera, which have been a big part of the studio's legacy.

Projecting Halloween as the peak interest season for the site, we looked for additional ways to enhance the experience for our users. We met with Headspace on their Beatnik technology and were impressed by what it offered to our development team: a combination of small instrument instruction files and .WAV audio, mixed together seamlessly and delivered via cross-platform Web browsers. The only drawback we considered was the requirement of an additional plug-in for users to download to experience the content. We decided to experiment with Beatnik audio to customize an interactive soundtrack for the special Halloween edition of the Horror Channel, mak-



ing it an option at the home page for those who wanted to download the plug-in and experience the "sonified" version.

To assist with this process, the Headspace engineers composed three unique tracks that would seamlessly loop together in various areas of the site. Meanwhile, we culled through the video archives for relevant "horror" sound bites to be mixed into the soundtrack for added effect. We also thought it would be fun if these clips could act as feedback to mouse rollovers on our navigation strip. Within about ten days, we finished the composition process with the engineers and received several library files with the audio themes and rollover "sprite" clips. We were ready to implement them into the Web site!

To accomplish this, we were pointed to the Headspace site, where we found a comprehensive developer guide, with sample code, tips and tricks, and an overview of the entire process. Our lead programmer dove in, editing the HTML code and modi-

—CONTINUED ON PAGE 39

nik Editor, a standalone application for Mac and soon PC, which enables audio professionals—and to a lesser extent, motivated Web page designers—to create RMF (Rich Music Format) files, which are optimized for the Web. Next, the Headspace RMF Music Collections, production libraries of music and sound effects for Web sites who don't have music of their own, or who can't deal with the hassles associated with licensing music via conventional publishers and copyright societies. Lastly, a set of add-ons for NetObjects Fusion, Macromedia Dreamweaver and Random Noise Coda. These make it very easy to add interactive RMF files to Web pages using a Beatnik module for the most popular high-level Web authoring tools—most audio pros can probably get their heads around these tools without needing to learn to program HTML, JavaScript and so on.

These products are all based on our core technology, the Headspace Audio Engine. Companies license this code library from us and adapt it to suit their needs. It provides extremely high-quality with tiny file sizes and a very small

memory footprint, and it requires only a D-A-C audio output, no special hardware.

How would you compare your products to other Internet audio software?

I think it's really important early on to understand what distinguishes us from other technologies out there. First off, some statistics: There is sound on less than 2 percent of Web pages. And of that, over half are pirated music files, where somebody has made, let's say, an MPEG version of their favorite CD and put it on the Web site. The biggest piece of what's left is existing audio content that's been repurposed onto the Net—a radio station has a live RealAudio feed, a Webcast of a live concert or record labels that work with Liquid Audio and put out clips of new recordings.

Doubtless, those uses of audio will expand, and maybe a couple of years from now music will be on up to 10 percent of all Web pages. But it seems to me that the growth of linear sound on the Web is really limited. It's limited by a couple of factors: One, not many people actually own audio masters that they can leverage onto the Net. There are a few companies that own their

own audio, and it's a great opportunity for them to get it out to a wide audience. But the average Web page developer—a person on AOL who has a home page up with their dog on it—these people don't have the rights to own any audio.

The other thing about linear audio, there's a whole metaphor that's not really appropriate to the Internet. What's really cool about the Web is in terms of text and graphics and links, the ability to do a search, the ability to format a Web page—all this sort of multilayered, description-based use of Hypertext, HTML, to layer a Web page. If the Net were just a slide show of scans, pages, it would be ten times as slow as it is already, God forbid, and it would be totally inflexible, because you wouldn't be able to link, to resize, reformat the page; you could just open a file, read it and close it again.

So now when you look at what we're doing with linear sound, streaming sound on the Web, it's pretty much like scanning a page of text. You take an existing master DAT, compress it using one of various codecs, and stick it up there on the Net. And there's really not very much you can do with it ex-

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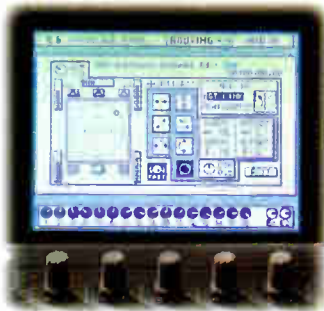
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World Radio History

cept play and stop it. We're using the wrong metaphor.

But the area that interests me a lot more is not the linear area. As a composer who uses sequencers and samplers, I know that when I make a 5-minute song, it's not usually a bunch of musicians in the studio playing a five-minute performance; it's usually a two-bar drum loop repeated 64 times and then a vocal lick that I took from the second chorus that I pulled into the first chorus. I know there is a structure to the music. And it seems ludicrous to me that the way to put that onto the Web is to take a recording of it, crunch it down and stream it. So when you know the internal structure of a piece of music, wouldn't it be nice if instead of shipping it as a whole, you keep it in its component parts, ship them and then restructure it on the client end? That seems like a natural, lossless compression technique which has the potential of giving people the exact same quality on their machines as I have on my machine when I'm sequencing. Without consuming an enormous amount of bandwidth.

The second thing that it does is that because all of the music is in chunks, it allows for interactivity in a way that linear audio doesn't. If I'm sequencing on my MIDI sequencer, I can highlight a group of notes and transpose them up an octave. You can't listen to a 2-track master and make that decision—but if everything is still in real time, and it's built up of components, you can do that. You can use a multitrack mixer, mix, add effects, pan, all of that is possible in software, so long as the music that they're getting is still broken down into its components. That would be one application.

Another would be—forget about mixers and pro music metaphors—the user is playing *Myst* on the Web and moving around in space. This is not about music as far as they're concerned; it's about exploration. But decisions that they make in that space could affect the music in real time. So the composer can allow for a variety of atmospheres in the experience, by providing different



Dolby in the early '80s

layers through mixes, different instrumentation, tempos and keys, segues between pieces and so on.

Another important issue facing audio

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CIRCLE #022 ON PRODUCT INFO CARD

professionals using the Internet for music delivery is piracy. How is Headspace addressing copyright protection?

In a lot of ways, I think the Web has been a step back in terms of copyright protection for music. Radio stations, TV channels and so on are not always terribly educated about copyright, but we've been able to keep tabs on them. Suddenly, with the Web, you've got hundreds of thousands of broadcasters; many of them are not very educated about copyrights as a whole, and there's really far too many of them and they're hard to keep tabs on, so suddenly the task of educating these

—FROM PAGE 35, *BEATNIK SOUNDTRACK*
fying the JavaScript templates to fit our environment and filenames. As we began to test, it became evident that we needed to use HTML frames to load the audio in a persistent (invisible) frame, so that playback could occur while the user navigated between pages in the active frame.

To transition between tracks when the users entered the Halloween section, we were able to update the invisible Beatnik frame with the new track names. In areas that offered QuickTime or RealAudio media, we discovered that Windows 95 sound devices could only handle playback of one stream at a time. To work around this problem, we issued a "stop sound"-type of routine in JavaScript that would "turn off" Beatnik in those sections, and then turn it back on as users moved to other areas.

We overcame these integration issues to fit Beatnik into our content and launched the site last October. The plug-in did an amazing job of mixing the transitions between canvas tracks and the rollover events. The audio was rich, original and scary—all the things we wanted in our Horror genre soundtrack. We received a lot of positive feedback from visitors and decided to keep the spooky soundtrack up as a regular feature of the site for the coming months. To check out what we did with Beatnik, point your browser to www.universalstudios.com and click on Frankenstein. ■



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broadcasters is way beyond the scope of an ASCAP or a Harry Fox. On top of which, the Web is by nature about copying and redistributing files all over the planet. So you've got a major security risk, in a way you don't have when it's music on TV or in a movie theater or in a restaurant. So the music copyright community is absolutely terrified. But at the same time it's immensely enticing, because it's one of the first brand new ways that's come along in decades for publishers to exploit their catalogs. And they would love to be able to turn the Internet into a profit center that doesn't compromise the protection of their works. So the stakes are very, very high, and this is a community that doesn't have to sit up and think often.

Headspace is one of a number of groups that is trying to collaboratively make some progress in this area. With our file format—RMF, Rich Music Format—we allow composers to fill in a fair amount of copyright information and encrypt it into a file, and that can't be tampered with very easily. An RMF file is a perishable thing. At the time of creating it, if copyright information is filled in—which may include not only the publisher's information but to whom this file is being licensed, what the term is, what the restrictive uses are—all that information is burned into the file, and when the file is played, it can be viewed by any user. This is not possible with a MIDI file or a .WAV file, whatever. Those are all formats that we support directly when you play them, but you can also convert those formats into RMF. It's a stake in the ground.

The good news for composers and performers is that they now have an opportunity to bypass the record labels to promote their music. How have the labels reacted to that prospect?

Up until the beginning of this year, many of them had their heads in the sand about it. There was a high factor of, "Oh yeah, well, we have a Web page as well," and you got a look at it and it's actually a tour brochure scanned into a Web page. They were ads for the record company. I think their opinions are changing fast. I think they're realizing, for example, that the public doesn't put a lot of stock into branding a Sony or a Warner's or whatever. They care about the Cranberries or U2 or Beck or whoever it is; that's the brand that they care about.

What's interesting about the Net is

—CONTINUED ON PAGE 202

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DVD-Audio

Format In Search Of an Identity

When the Compact Disc was introduced to consumers some 15 years ago, it came with benefits that were obvious to nearly everyone: sonic clarity, random access, long playing time and durability. Even with these attributes, the format was not an easy sell at first; it's easy to forget that it was actually the cassette that knocked out the LP, while the CD did not achieve dominance until late in the 1980s.

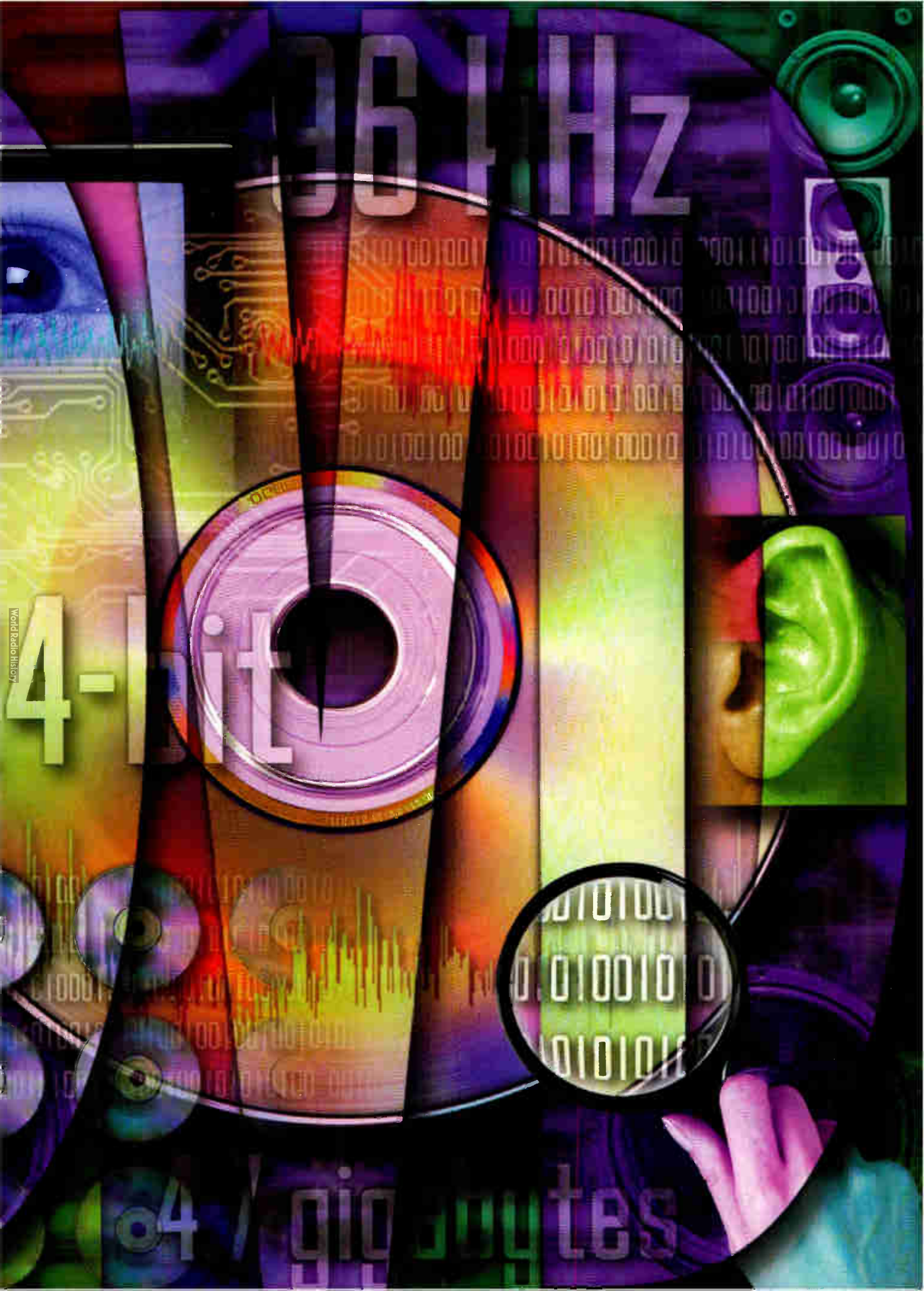
With the CD now firmly established, the record and consumer electronics industries are mulling over a new music carrier, DVD-Audio.

by **Philip De Lancie**

The new format—sibling to the recently introduced DVD-Video and DVD-ROM—may offer consumers a level of audio fidelity that has only recently become available to high-end recording and mastering facilities. But will consumers care? At present, there is little evidence to suggest any dissatisfaction with the CD as a music format, and little reason to believe that a new audio format can be pitched successfully to a mass market.

ILLUSTRATION: JEFF BERLIN





World Radio History

4.1 Hz

4.1 Hz



4 gigabytes



DVD-Audio

The record industry finds itself in an awkward position regarding DVD-Audio. On the one hand, labels can see as well as anyone the challenge they would face in marketing the format, and the prospect of yet another failure (remember MiniDisc and DCC?) is a grim one. But within their own ranks, they face agitation by those pushing for a higher-fidelity carrier, and there is the risk that a de facto standard—out of the control of trade groups such as the Recording Industry Association of America (RIAA) and the International Federation of the Phonographic Industry (IFPI)—could develop around DVD-Video's ability to carry 24-bit digital sound at a 96kHz sample rate. At the same time, the trade groups see DVD-

We are the people whose place in the industry is to make sure that the consumer has the best-sounding final product that is possible. Our voices should be raised loud and clear, so that the new players can be built to accommodate what we think sounds better.

—Bob Ludwig

Audio as an opportunity to incorporate copyright protection technology that is lacking in the CD system.

Led by their International Steering Committee (ISC), the leading record industry groups have been working with the DVD Alliance (which represents consumer hardware manufacturers) to



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try to find a way forward for DVD-Audio. The ISC announced at the end of May that it intended to develop a specification for DVD-Audio by December 1997, with product rollout expected to follow in two years (December 1999) but results are still pending.

The record industry gave three primary goals for the new product, the first of which is complete interchangeability with CD. That means that not only would DVD-Audio players play CDs, but DVD-Audio discs would play on CD players. According to Bob Ludwig of Gateway Mastering in Portland, Maine, this compatibility would probably be achieved by use of "a dual-layer DVD, where the first layer would look like a Red Book CD to any normal CD player,

I've been hoping that there would be some basic subset of features in common between DVD-Video players and DVD-Audio players. Ideally, the DVD-Audio spec could be flexible enough to allow the producers of the media to have control over the resolution.

—Scott Hull

and the second layer would be high-quality DVD-Audio. Of course, you would have to have special DVD-Audio-ready DVD players that know to look for that second layer, because none of the DVD-Video players out there right now would know to play that layer instead of the CD layer."

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WorldRadioHistory



DVD-Audio

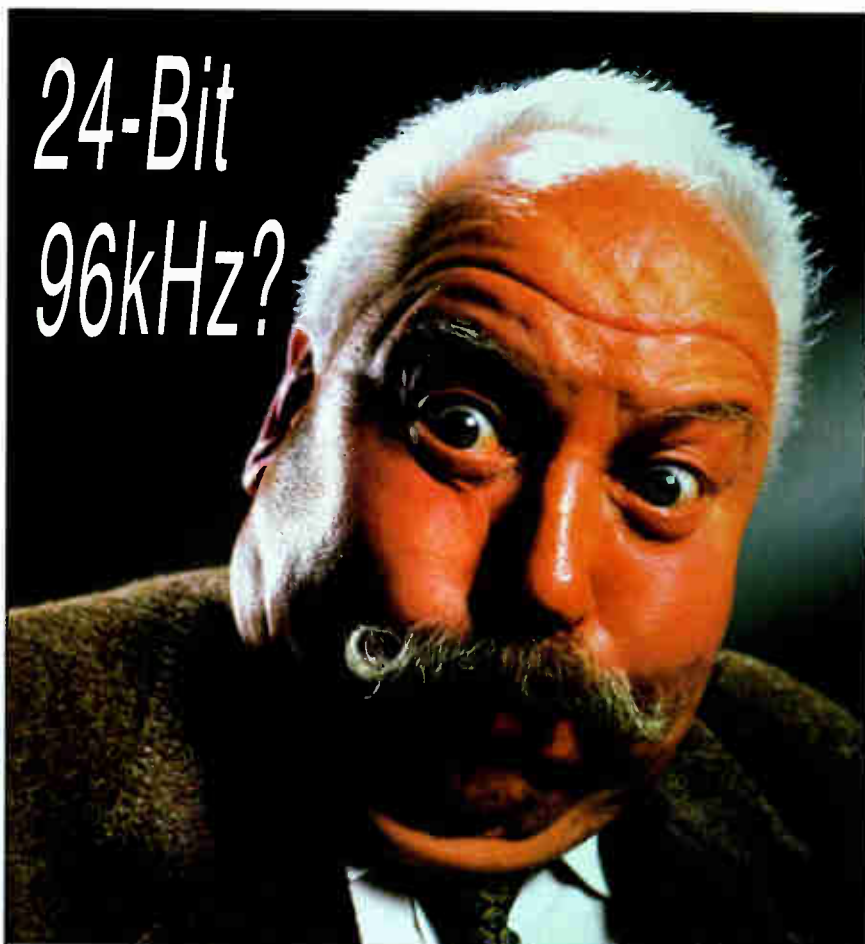
discs would allow single inventory in record stores, which would please music retailers and reduce consumer confusion. But they would also presumably

cost more to manufacture than regular CDs. A raise in prices might not be a wise move at a time when RIAA figures show that consumers are already cutting back on their CD purchases.

The ISC's other goals are "high-quality, multichannel surround sound that is vastly superior to current CDs" and "a new active copyright management system and other copyright identification and anti-piracy measures incorporated in all machines..." Those who recall the RIAA's efforts in the '80s to protect copyrights by tampering with audio program may be forgiven for reacting to the latter goal with some trepidation. And given



Good enough is not good enough for me, and I think that people who listen for a living have to keep their standards high no matter what the consumer begins to accept.
—Denny Purcell



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CIRCLE #029 ON PRODUCT INFO CARD

the group's claim in a Q&A accompanying the announcement that CDs already have "studio master-quality sound," it is hard to see how the new format can deliver on the promise of sound quality that the average consumer will perceive as "vastly superior."

To develop ideas for the new format, the ISC announced it would sponsor comparative listening tests using "golden ears" (respected engineers) at select locations in major recording markets, including L.A., New York, Nashville, London, Berlin and Tokyo. The plan was to use an A/B/X switching arrangement to compare ten different combinations of sample rates and bit resolutions: 44.1 kHz at 16-bit and 48; 88.2 and 96 kHz at 16-, 20- and 24-bit. Each combination was to be used to digitize four selections of different types of music from each of the six major labels, for a total of 240 lis-

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proach raised by Denny Purcell of Georgetown Masters in Nashville. Among other concerns, Purcell was unhappy with the fact that the original analog masters from which the digitized samples would be made would not be available for comparison during the tests, and he also felt that the sheer number of samples available for listening would prove overwhelming.

At the time of this writing, the testing plan was on hold while the ISC formulated improvements. With the possibility of shaping a new audio format still open, we decided it would be a good time to pick the brains of a few leading

mastering engineers—each of whom would have been a participant in the original ISC listening tests if they had gone forward—to examine where DVD-Audio may be headed. In addition to Ludwig and Purcell, we spoke with Scott Hull, chief engineer of Masterdisk in New York City.

What do you think is the appropriate role of the recording engineering community and the record industry as a whole in defining a standard that will actually apply to the consumer electronics industry?

Ludwig: I think we definitely should have a role. We are the people that deal with sound and whose place in the industry is to make sure that the consumer has the best-sounding final product that is possible.

Just to give you one example, the DVD-Video spec uses Dolby Digital (AC-3) as the format for surround sound, with the maximum bit rate limited to 448 kbps. That limitation has its place for DVD movies, where audio throughput has to be conserved in order to maintain video quality. But the DTS surround system uses 1.4 MBps, and in the listening tests that I have done, I have never seen an engineer who has not wildly preferred the DTS system. And if the Dolby system had that much bandwidth to work with, it could well be competitive with DTS. So this is a case where our voices should be raised loud and clear, so that the new players can be built to accommodate what we think sounds better.

Purcell: I think that those who listen for a living need to help the industry see what is available to pick from. We need to lay out the possibilities and make sure that any tests that are done, are done straight up. Listening comparisons are a very complex thing, but because we do them every day, they are like breathing to us.

Hull: I think what the engineering community needs to do is help provide a wish list about this newly proposed DVD-Audio. We aren't in a position to actually define a standard, but we can give the record industry and manufacturers our ideas about what could be done with a new music carrier. We've all been through discussions regarding sample rate, data compression and copyright protection schemes before with other formats. It would be foolish to define a new audio format without talking to the trusted ears in the music industry.

What value do you think DVD-Audio

tening samples.

The original testing plan was never carried out, at least in part because of objections to the validity of the ap-

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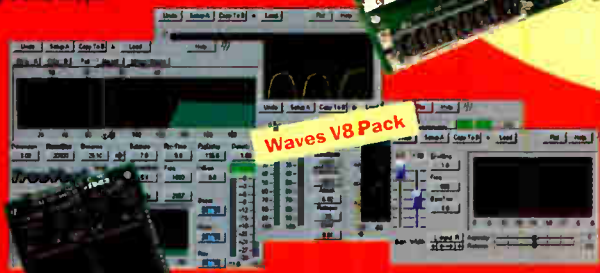
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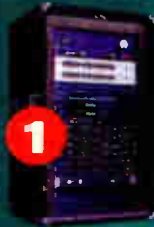
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can offer to the record-buying public that they are not already getting from CD?

Ludwig: One answer to that is that DVD-Audio could offer surround sound with the DTS system built into the player. Another is that the higher sampling rate and wider dynamic range offer much superior sound. I don't want to negate the value of 24-bit, 96- or 88.2kHz audio as a really good standard. But to the average person playing a DVD-Audio on a cheap system, the difference between 96 kHz and a well-done 44.1 recording is not going to be as obvious as surround sound would be.

Purcell: It can offer extended frequency range and greater depth and width, and add greater appreciation of a bigger piece of the music. These days music is getting smaller and smaller because of digital audio and people thinking that quality doesn't matter that much. Otherwise, you wouldn't have people delivering music over the Net and all that. Good enough is not good enough for me, and I think that people who listen for a living have to keep their standards high no matter what the consumer begins to accept.

Hull: Certainly the promise of a high-resolution recording format is important, but I don't think that it alone can drive a new consumer format. What I think will really excite the consumer is the ability of the DVD format to include many other attractions in one package. Video clips, cover art, graphics, live recordings in realistic surround sound, links to Web sites and computer interactivity are the things that will get the Game Boy generation to look and listen.

What are the factors that you think should be taken into consideration in deciding on the DVD-Audio format? What factors should not be taken into consideration?

Ludwig: The record companies' needs should definitely be taken into consideration 100 percent. For instance, instead of 96 kHz, they want 88.2 kHz.

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That is so the audio-ready players could have a chip in them that would easily decimate 88.2 to a very acceptable 44.1 for boom boxes and other low-end systems, whereas 96 kHz to 44.1 is a pretty nasty conversion, and you really need very expensive gear to do it right. And the spec should be flexible, with perhaps a way for people to upgrade the players as the specifications evolve in the future. What should not be taken into consideration is manufacturers who want to be sure that their patents are the ones that are getting paid royalties by the system.

Purcell: What should not be taken into account—in an ideal world—is politics. What should be is this: What is available now that can give you the most accurate recording of music? The purpose of any 2-track recorder is to faithfully reproduce what you give to it. I think each of the formats under consideration should have to prove that.

Hull: From my perspective, it's really important to establish a format that the artists can be happy creating material in. If they can create good material, the consumers will buy it. This is often left out of the discussion. The current Red Book CD is such a strict format that many times the artist's expression is limited. Like Web site design, each DVD could have similar features but a unique look and feel. The only factor that shouldn't be considered is the initial cost of the discs and players. If the format is cool, the cost to manufacture them will come down as more units are sold.

If it were up to you, what kinds of listening tests would you design to help decide on the best format for DVD-Audio, and who would the participants be?

Ludwig: I don't think the listening tests are something that we really need to do. I think there is already a consensus among knowledgeable engineers that we need high sample rates, because there are no real-time implementations of a perfect anti-aliasing filter. So the

—CONTINUED ON PAGE 210

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World Radio History

The Mean Streets of

PRO AUDIO

HOW TO PROTECT YOURSELF WHEN CRIME TARGETS STUDIOS

People who make records are often news, but the studios where they record usually aren't. However, here's how one Atlanta studio appeared in the *Atlanta Journal-Constitution* on Saturday, October 25, 1997: "An attempted robbery at a Midtown recording studio led to a 90-minute stand-off Friday between members of the Atlanta police SWAT team and four would-be robbers, who held two employees and a customer hostage. The stand-off ended after Atlanta police tear-gassed the Purple Dragon Recording Studio on Dutch Valley Road about 5 p.m., climbed into the ceiling and arrested three suspects. Police had arrested another suspect soon after the SWAT team arrived, and the three hostages were released. Two employees...were taken to the hospital to be treated for injuries. One was hit on the head with a gun, and another had an injured lip..."

It's not a pleasant possibility to consider, but because of the value of vintage as well as digital equipment, and the fact that facilities are for hire, recording studios are being targeted by certain criminals

who know what they're looking for and are willing to use violence to get it.

In the New York area, a string of robberies and attempts erupted over the past summer. Several Long Island recording studios were the targets of a group of thieves who robbed at least three Nassau County facilities of expensive microphones. One estimate pegged the area's losses between \$40,000 and \$60,000 just over the summer. In these cases, the M.O.s appeared to be similar—a studio receives an inquiry about the facility and schedules a visit, during which a studio owner or manager will, naturally, show off the studio's wares, including its microphone collection. A second visit is then arranged, and two or three people come in. Then, in several cases, while the studio manager was in some way distracted by one of the prospective "clients," another grabbed valuable microphones, the type of equipment that can most easily be snatched, hidden and spirited out under a coat or bag.

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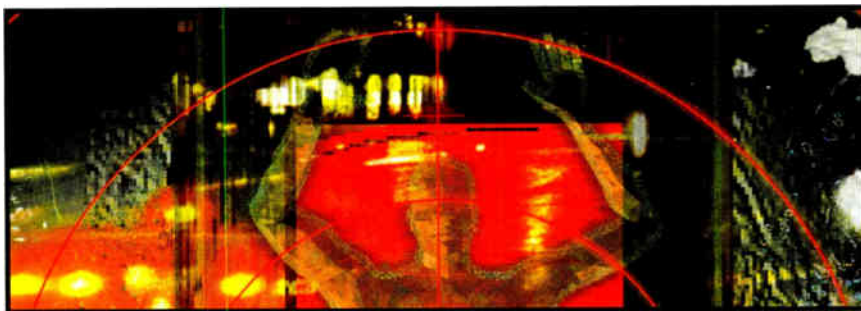
CIRCLE #038 ON PRODUCT INFO CARD

STUDIO CRIMES

Creative Sound in Massapequa, N.Y., was one of the first studios hit. Owner Fred Loshen says new "clients" showed up in March to see the studio and said they would return with a deposit. When they said they forgot their cash, Loshen directed them to a nearby ATM and went into his office to write a receipt. "I was waiting and waiting and thinking to myself, it can't take anyone this long to get cash from a machine," he recalls. "I walked through the studio, and that's when I noticed that some mics that were set up on stands were missing." In

tions cold calls, asked how the caller had heard about Pie. "He said he saw our ad in the Yellow Pages," Devere says. "We don't advertise in the Yellow Pages, so I was a little suspicious from the start." The suspects—Devere says they and their car matched descriptions that had been given to police by other studios—did show up unannounced three hours later but left without incident. The Glen Cove Police Department has assigned a detective to these cases, as has the Seaford police.

This same M.O. has been reported periodically by Manhattan studios over the years, and indeed there have been reports of New York City and Connecticut studios being cased similarly, al-



Creative Sound's case, an AKG C-414 TL-2, a Sennheiser MD-421 and an EV RE20 were missing. At Cove City Sound (Glen Cove, N.Y.), owner Richie Canata says that he lost two Neumann U87s to thieves in the same manner. The fact that mostly expensive microphones have been stolen suggests that the thieves are at least somewhat knowledgeable about pro audio equipment. As Loshen sarcastically put it, "They have more than they need for a band at this point."

In other cases, studio owners have received calls asking if the studio was open at a certain time of night and have noticed cars idling in their parking lots. That was the case at Tiki Recording (which was not robbed), where manager Inge Jannen noticed a strange car in the studio's lot. The car pulled away shortly thereafter without its occupants ever getting out. Since the crime wave started, Jannen says, the staff at Tiki now lock the front door, and visitors must be buzzed in, something the studio never felt the need for before.

Pie Studios, also in Glen Cove, had a visit from someone who may have been one of the perps. According to studio manager Ruth Devere, Pie was called by a new "client" who asked about hours of operation and scheduling a visit. Devere, who says she ques-

though no connection with the spate of Long Island crimes has yet been made.

In the Atlanta incident—by far the most violent reported to date—the four suspects arrived at the studio in a car pulling a U-Haul trailer. They entered the studio and, according to Purple Dragon owner Stanley Gaines, who wasn't there at the time, said they were lost and needed to use the phone or the phone book. Once inside, they began pistol-whipping two employees and a tape delivery person. The client, working in the control room, heard the commotion and ran out a back door after hearing a gun go off in the reception area. Police were notified, and the SWAT team arrived. The beatings resulted in stitches and a concussion to the employees. According to news stories on the incident, the perpetrators were wearing protective vests and carried handguns, and after herding the hostages into a bathroom, were in the process of dismantling the studio's equipment when police arrived.

"I've always told my guys, 'Never open the door unless you know who it is,'" Gaines says. Apparently, Purple Dragon was not the only Atlanta-area facility to experience robberies in recent months; the *Journal-Constitution* reported that a "robbing crew" had been hitting area studios, although no other

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CIRCLE #039 ON PRODUCT INFO CARD

STUDIO CRIMES

reports have surfaced. The incident has led Gaines to reconsider being in the studio business. "It's really gotten scary," he says. "Elton John comes in here with an armed bodyguard."

Things have been just as bad on the West Coast, as well as a bit more strange. An astonishing story, worthy of a screenplay, has been confirmed by several L.A. studio owners: Earlier this year, it seems, the Burbank and L.A. police departments broke up an organized gang that had reportedly been robbing studios at gunpoint at the behest of another studio owner, whose business was floundering, and who would then sell the equipment and cut the gang in on the action. After one member of the gang was caught, he turned in the errant studio owner, who tried to run from a police car, fell over an embankment and broke his back. After being recaptured, the studio owner apparently gave police the names of the other members of the gang, which promptly put a hit order out on him, so the story goes. Mike Kerns, co-owner of Para-

mount Recording Studios, which had 15 of its clients robbed at gunpoint late one night earlier this year, observes, "Broken back, paralyzed, in jail and with a hit on him. Talk about karma."

WHAT YOU CAN DO

Welcome to the 1990s. A new generation has passed through the portals of recording studios in the past decade, and some of them are a violent bunch. Studio owners and managers are loath to cast aspersions, but in many of the cases reported in New York, L.A. and Atlanta, the perpetrators have been alleged gang members.

Studios can take concrete steps to protect themselves, though—the same that apply to any business that makes itself available to the general public.

- **Staff Awareness and Training.** Security is simply going to have to be regarded as one more standard staff responsibility, just like session setups and keeping the coffee fresh. And the sooner it's made part of the regular routine, the better. Small signs around the facility reading "Security Is Everyone's Job" seem trite but do help raise awareness levels. There should be set guidelines established on showing studio

rooms and equipment closets to strangers; for instance, no one should do so alone, and using equipment lists to convey the information necessary without showing the exact location of microphones and other gear is recommended. Clients, musicians, engineers and other facility users should be offered escorts into unprotected parking lots at night. Employees should leave the building in pairs or groups.

- **Screen Clients and Vendors.** Recording studios are public places, and balancing the need to display the facility and still maintain security is difficult. "Studios have to have an open-door attitude," says Tiki Recording's Jannen. "That's how we get new business. Naturally, studio owners want to show off all of their best equipment. We don't want to conduct our business of recording in a state of fear and mistrust. But we do want to conduct our work safely—and hold onto our Neumanns."

It's suggested that all new client calls be screened for references, including studios previously worked at, engineers and producers who can vouch for someone, and home and office phone numbers and addresses. Another suggestion is to create a list of approved vendors who

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CIRCLE #041 ON PRODUCT INFO CARD

World Radio History

STUDIO CRIMES

cater to the studio—limit the studio's collection of takeout menus to restaurants that will call you before the delivery person arrives, possibly using a code word. And inform clients—in writing, preferably—that any visitors or deliveries they expect have to be cleared with the studio first. Some studios have begun limiting the number of nonessential personnel allowed at sessions, and one New York studio actually levies a fee per person for entourages.

Exposure to direct violence can make security consciousness more intense for some. Richard Evans, owner of L.A. post house CineSound, was cold-cocked and robbed of more than \$200,000 worth of audio and video gear in 1997 by men posing as messengers, which were a common sight at the studio at all hours of the day and night. Evans subsequently instituted a policy of not opening the doors to the studio after 5:30 p.m. to anyone except clients. (The incident also contributed to Evans' decision to get out of the business. "I'd rather live," he says.)

- **Inventory Records and Marking Equipment.** Keep a list of every piece of equipment in the studio. A computer is invaluable for this, and there are several off-the-shelf database software programs that can make this job much easier. Lists should contain the gear's make and model, serial numbers, where and when purchased, and price. Keep the lists updated as inventory changes. Mark every piece with some sort of indelible identifier, such as with an engraving tool, and mark it both inside and out. Take advantage of other technological help. For instance, Tascam's DA-88 allows you to insert your name into the system memory, and that is exactly how a major L.A. rental company got its DA-88s back after they were stolen. Develop routines for making sure each piece used on a session is still there when the session ends; too often, thefts are not noticed until several days later, making recovery (and insurance claims) harder.

- **Security Systems and Agencies.** Large facilities should invest in alarms and agency service contracts, which vary in cost depending upon location. A larger facility usually has more possible points of entry. Cameras are as essential for monitoring those choke points as they are for parking lots and other areas where intruders can lie in

wait. Smaller facilities can also benefit from cameras at strategic points but at the very least should have a buzzer entry system. Facilities that rent should consider trying to beef up security jointly with their landlords or other tenants. All types of facilities can benefit from a security consultation, which can be obtained from a local security company for a fee, or by retired police officers or the local police department for considerably less, or for free.

- **Know What to Do if Confronted.** If confronted by an armed robber, comply quickly and politely with every demand made. There is no equipment that can't be replaced; the same can't be said for human life. Armed robbery is a terrifying experience, but the two keys are: Don't panic and be observant. Calmness on your part will help keep the situation less tense, and any details you can recall for police—height, appearance, voice characteristics, clothing, vehicle detail, etc.—will help them pursue the case.

- **Communication With Other Studios.** In each region reporting, more than one studio has been hit, and studio robberies are becoming less of a crime of opportunity and more of a premeditated act. If your studio is robbed, make sure that people at other studios in your community know about it. Where crime picks up, competition leaves off. Keep fax numbers and e-mail addresses of local studios on hand and notify them immediately—studio robberies have been reported occurring within 24 hours of each other. Even in large cities, the studio communities tend to have pretty good grapevines, and bad news travels fast. In this case, help it along, including details on the stolen equipment and the perpetrators, if possible. If there is a strong professional organization in your city, such as SPARS or a regional association of studios, notify them of any crimes and try to get them involved in raising awareness and implementing preventative measures.

With robberies this year at more than a dozen facilities in the New York and Los Angeles areas alone, it's not unreasonable to regard studio crime as rampant at this point. It's always been a tough business; now it's an increasingly dangerous one, too. But awareness, a proactive attitude toward security and a sense of community can help establish a strong defense against the rising tide of crime.

Dan Daley is Mix's East Coast editor.

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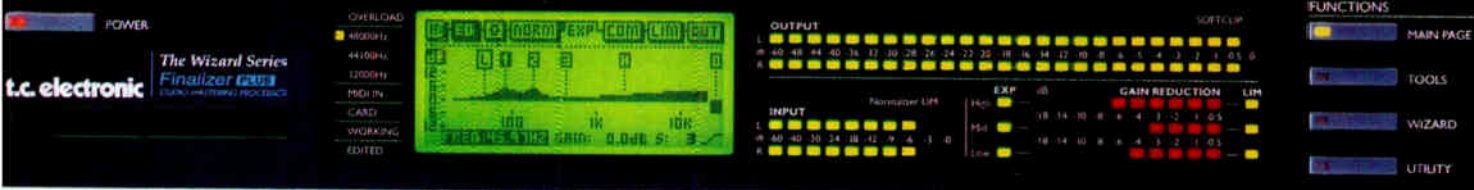
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CIRCLE #043 ON PRODUCT INFO CARD
World Radio History

ON THE COVER

Sony Music Studios

Now in its fifth year at 460 West 54th Street in Manhattan, Sony Music Studios has become a production megahouse, offering every service from shooting to recording to mastering—and now DVD production. “Our objective from day one has been to create an environment that offers the artistic community the ultimate in technology and creative choices under one roof, and I think we’ve done that,” says Andy Kadison, senior vice president of studio operations and programming for Sony Music.

In addition to its main 75x95-foot shooting stage, which hosts the popular *Hard Rock Live* and *Sessions at West 54th* series, Sony Music Studios houses more than 45 world-class production studios divided into three main departments: audio, video and stages. There is a variety of consoles (SSL 9000J, 4096 G Series, 6064; Neve VSP, Neve 8078; Capricorn; Euphonix DSC; OmniMix; and a 20-bit Harmonia Mundi), and the studio is currently designing and building custom mastering consoles incorporating GML components. In addition, there are satellite and EDNet/ISDN capabilities and countless ancillary services. The video department comprises multiple edit/effects bays, three D2 online suites, a D1 edit suite, Avid bays and visual effects design suites.

Sony Music Studios is modeled along the lines of a classic Hollywood film studio, and in the audio world, it gives new meaning to the phrase “one stop shop.” “An artist can come to Sony Music Studios to conceive, write, rehearse, record and track their record, rehearse for a tour, shoot the video, do photography, and prepare their release for DVD,” says Ian Huckabee, director of audio operations and marketing. “Most artists come in initially to record, but once they’re exposed to the range of services that we offer, many of them continue to work with us on other as-

pects of their projects.”

Huckabee and associate director of audio operations Brian McKenna oversee the audio department, which is operationally organized into five boutique components: tracking/mixing, mastering, production/duplication, classical (including remote recording), and audio post. Each area has its own manager and assistant, which makes



PHOTO: A. MICHAEL HOLLAND

operations more fluid, but perhaps more importantly, each is able to match technology to its own area of expertise.

Nowhere has that philosophy been more apparent than in the new digital surround room (pictured on the cover), which opened to rave reviews at last September’s AES show and has since been booked nonstop. The room, which supports all forms of 16-, 20-, and 24-bit multichannel formats, is centered around an AMS Neve Capricorn console and custom ATC monitoring system. “The room supports existing surround formats like Dolby Stereo and future formats such as 5.1 and 7.1 for music and television, which require differing acoustical environments. Panning dynamically and carefully positioning sound sources are direct attributes of the Capricorn’s op-

erating software and hardware,” says director of audio engineering David Smith. Projects can stay in the high-bit-rate domain by coming off the Sony 3348HR multitrack via the MAIDI interface, and are then printed to PCM-9000, Nagra Digital, DASH, MO or any other high-resolution format. A Sonic Solutions system is available for quick fixes, and the room is tied to the main shooting stage via a 100-channel, bidirectional fiber-optic cable.

The DVD room, its informal moniker, will be used for production, post-production, high-end classical mixing and 5.1-channel music mixing. It falls under the umbrella of Sony Music Studios’ classical department, which seems odd at first glance. But, McKenna says, “We are very big on training and cross-training here. All departments now incorporate all of the 24-bit technology. If you want to do so with both personnel and equipment.”

First-call film scoring engineer Shawn Murphy was in recently completing a 24-bit mix for BMG Classics, and Sony Classical is scheduled to mix Herbert von Karajan’s *Legacy*, a 5.1 remix for European release. Already, Sony Music Studios has worked on five DVD releases, and plans include a move into authoring; the company is experimenting currently on specific episodes of *Sessions at West 54th*.

It would seem that Sony Music Studios has it all right now—complete production/post-production services in the world’s media capital. On a recent *Mix* tour of New York post facilities, even the competition spoke highly of Sony being booked and bringing work back to Manhattan. The growth of the recording/mixing and mastering departments has exceeded expectations, the DVD room is pulling in new business, and the studio is building on its successes in bringing in more film scoring work. ■

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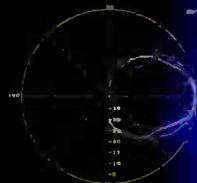
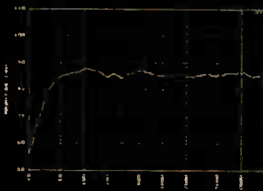
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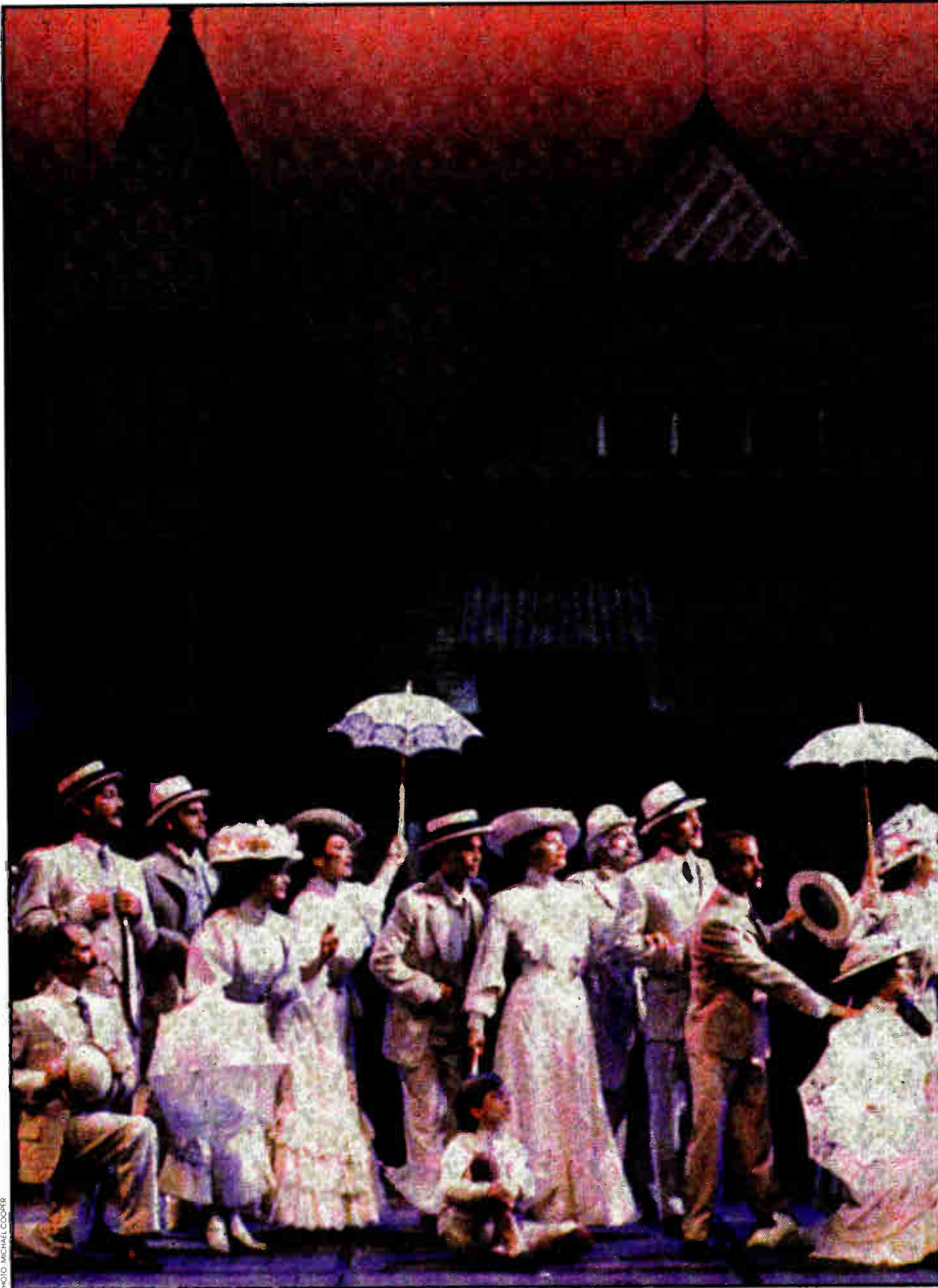


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RAGTIME

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Hits Broadway

BY MARK FRINK

Based on E. L. Doctorow's best-selling novel, the musical *Ragtime* tells the story of turn-of-the-century New York through the lives of three families from different backgrounds and social strata. With an original score by Stephen Flaherty and Lynn Ahrens, the musical *Ragtime* juxtaposes American-dream hopefulness with the prejudice and hardship that non-white and immigrant citizens endured. *Ragtime* has been playing since June at the Schubert Theatre in L.A. This January, the popular show opened on Broadway, at Livent's new Ford Center for

the Performing Arts on 42nd Street.

For a behind-the-scenes tour of this elaborate and innovative production, I met with sound designer Jonathan Deans, associate designer/production engineer Ron Sinko and advance production technician Garth Helm at the Schubert.

"What is interesting about this show is our ability to use different ideas in its design," Deans comments as he walks me through a design meticulously documented by associate designer Chris Jordan. "Not many producers will pay for you to go to these creative lengths to ad-



Garth Helm, Chris Jordan, Carin Ford, Ron Sinko and Jonathan Deans

vance the state-of-the-art." Producer Garth Drabinsky (*Kiss of the Spiderwoman*, *Showboat*), who is also Livent's CEO and chairman, has ensured the show's success by assembling a stellar creative team, including Doctorow himself (who was somewhat displeased with the 1981 film adaptation of his novel), playwright Terrence McNally (*Master Class*), orchestrator William Brohn, as well as Deans' team of audio pros.

Ron Sinko, the mix operator for *Ragtime*, comes to Los Angeles from Toronto, where he mixed *Ragtime's* first run at the Ford Centre for the Performing Arts. He operates a 79-input Cadac J-type console, controlling four dozen Sennheiser wireless mics, plus foot mics and backup orchestra mics. Twenty outputs from the Cadac, along with ten reverb returns plus sound effects, are fed to an 88-input Level Control Systems (LCS) mixer. A line-level device, the LCS also accepts 50 orchestra mic inputs (from 25 Aphex Tubessence Model 107 2-channel mic preamps) and distributes various mixes among 48 line-level feeds to the various speaker zones, complete with EQ and delay as necessary.

The main 88-input LCS is configured with 32 sub-groups, 8 auxes and 80 matrix outs. It is made up of 11 LD-88 two-rackspace 8x8 modules and is controlled by means of the 80-fader RIF control surface. In addition, an eight-fader RIF Jr. control surface has been installed into the Cadac.

The mic list for the 25-member orchestra includes a dozen Neumann U87s: seven on the brass section, two for celli, one for string bass and two for overheads in the center of the pit. The

violins and violas are double-miked: eight Sony ECM-77 lavs handle close miking in combination with AKG C-747s, which are also used on flutes, banjo and percussion, plus the kit snare and overheads. A Beyer M88 is used on the beater side of the kick drum. Sennheiser MKH-40 condensers capture the toms, woodwinds and harp. AKG C-414s are used on timpani and as overhead area mics.

TAMING THE PIT

Deans starts our tour in the orchestra pit. "The dynamics that happen in a pit are pretty violent, from a mouse fart to an elephant roar," says Deans. "Even the best solid-state mic pre is less forgiving than the [Aphex] tube preamp. The difference in tonality is night and day—it's much more musical. When I first took two 414s and ran one through the Tubessence, my initial reaction was 'Did I just drop one of these mics? What happened?' The difference was startling. The LCS mixer has everything except the mic pre's in terms of control and transparency. After you get mic position working down in the pit, there's not much else you have to do. The full picture of the music comes through.

"You have to keep the brilliance. When you have an orchestra in a pit you already have those nasty low-mids with no intonation because they're down in a hole," Deans continues. "In the design we have what we call a 'pit-cover' system to restore the tonal balance of the unamplified orchestra. We have a static mix which goes to the front-fills and to the lower proscenium speakers that has in it the highs in the orchestra that you

miss even in the first few rows, to add the brilliance back in and compensate for the pit's 'hole effect.' This then becomes the foundation upon which the live music for the entire room is built with an active mix. This way, the active mix doesn't jump out of the pit at the front of the orchestra level—it's more transparent and natural."

"The goal of sound in a theatrical show is to go unnoticed," Deans remarks. "If you get a mention in the press, they're going to hurt you. If you get no mention at all you were fabulous, which can be a bit tough to handle, especially as the theatrical industry itself doesn't acknowledge the existence of the sound design team for Tony awards. If you look at a program there's often no mention of the sound designer, even though all the other designers are specifically highlighted."

We pause to discuss the building of the system. "Westsun has done a great job of packaging the *Ragtime* system," notes Deans. Jason Sound of Vancouver, Canada, now a division of Westsun, was responsible for the audio portion of the production. Project coordinator Garth Helm, working with Jason's director of theatrical audio Don Barber, built the system in a 70,000-square-foot manufacturing/fabrication facility at Westsun's Winnipeg, Manitoba, headquarters. (Other Westsun divisions are located in Toronto, Seattle and New York, where the company now has three shows on Broadway.) The *Ragtime* show now running on Broadway is actually the Toronto production, which closed on September 1 and was shipped to New York after being refurbished in Winnipeg for two months. A *Ragtime* road show is scheduled to come to a theater near you next year.

MANAGING CONTEMPORARY SOUND DESIGN

"On any show you have to watch your cost," Deans continues. "There are trade-offs, whether you have active or passive loudspeakers, for example. For this show we have about 50 LCS matrix outputs that feed discrete speaker zones. If you're talking about bi-amped, processed speakers, costs can add up quickly. If you have an EQ and a delay on each output of your system, then the LCS mixer is almost free." Each LCS output has up to six parametric EQ filters and up to 465 ms of delay. "Let's say that we can agree it costs a thousand dollars for each channel of a quality product. Then eight of each would be \$16,000, which is about the list price of

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World Radio's History

one LCS LD-88 eight-by-eight matrix building block. Many sound designers know that the product is a black box that can adjust levels in scenes. [But] beyond that, LCS's capabilities include adjusting delays and EQ on the inputs as well, allowing precise placement of the actors' mics depending on where on the stage they are, including many refinements that aren't available with a traditional console, like gradually rolling off the highs as they move upstage."

Deans brought in a Meyer SIM II system to measure and adjust the EQ and delay for the four dozen speaker zone. "Using the LCS we are able to reduce the time it takes to align and EQ the system. We had budgeted three days and two nights to SIM the system and ended up only needing two sessions over two days, taking about a third of the time allowed. Todd Meier was able to adjust the system with me in six hours."

The main speakers are all powered by Cyberlogic 8-channel modular amplifiers: The larger speakers are driven with six NC-812 amps; the front-fills, balcony sidefills and foldback speakers are powered by four NC-807 amps. "The Cybers are built like tanks," Deans notes. The front-fills are Renkus-Heinz

81/12 two-way speakers used in A-B pairs, in six locations across the front of the stage. "I think one of the most important parts of a sound design today is the front (fill) speakers," Deans explains. "I went to a theater last week that didn't have front-fills, and it reminded me that 20 years ago, when sound was first coming in, front-fills weren't used. If you sat in the first three rows, it was expected that sound would just come directly into your ears and that was it. Front-fills used to be Bose 101s or Galaxy Hot Spots. They slowly crept up to be JBL Control Ones, and people started trying to put better-sounding speakers down there. You need to generate more and more energy coming off the front of the stage because you're not going to hear it come off the stage naturally anymore. Today you often have two actors facing each other six feet away who will say to the sound designer: 'I can't hear my cues from the other guy.' Now, you know they're not going to be carrying an entire theater with those levels. What you have today is production and actors who want to be more 'filmic,' and audiences who demand that. Acting, especially in musicals, has changed to reflect

that. You need to put a little microphone in everyone's hair and then treat it electronically to make it sound natural. Trying to do this with a speaker that's in the wrong place is very difficult. The front-fills become more important because, as actors move across the stage, we need to track them and position them correctly. Often there is only one speaker in the correct place for an actor's position onstage. It will have to work hard because it becomes the primary support for that voice, and it must sit on top of the static mix for the orchestra pit I mentioned earlier.

"Front-fills are very important for imaging," Deans continues. "Presently, it's common to have a zone system where we have a half-dozen positions across the front with different times, and then maybe three other time zones as you go offstage. The front-fills have to be fed individually so you can vary the delay. Then you have the upper proscenium speakers and the cluster. I've found that as you go back into the house, the image of the stage turns into a postage stamp and the left-to-right delay reference is not so obvious. You don't need it from farther back because you can see everything easily—you

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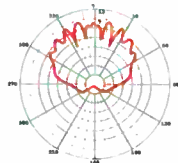
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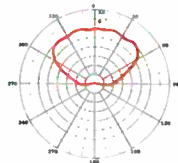
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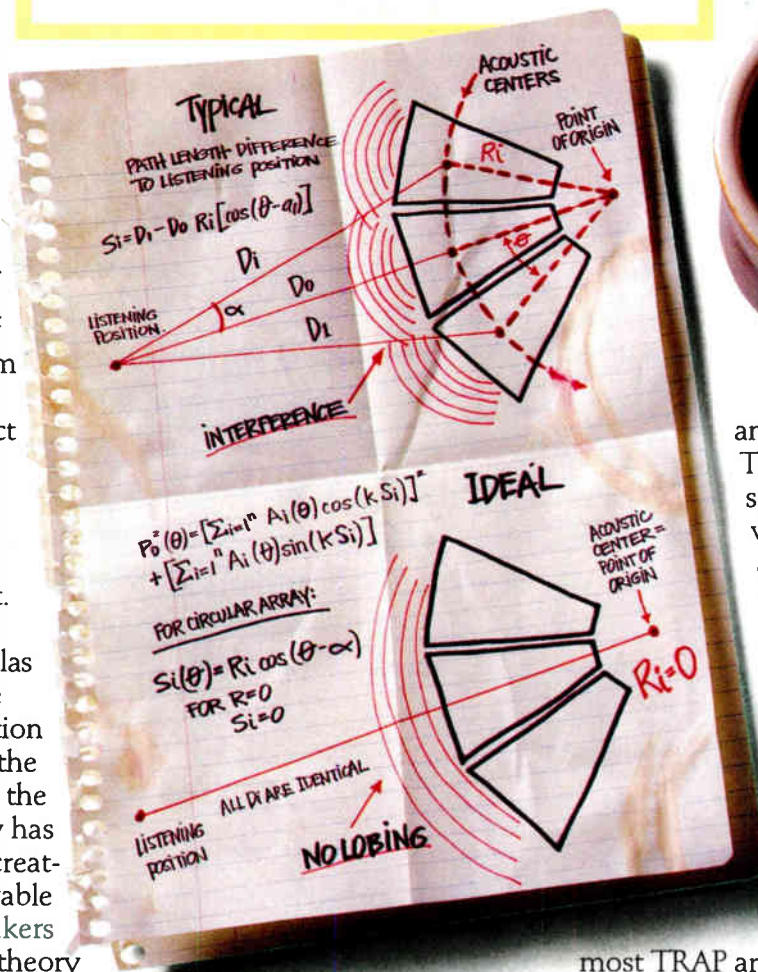
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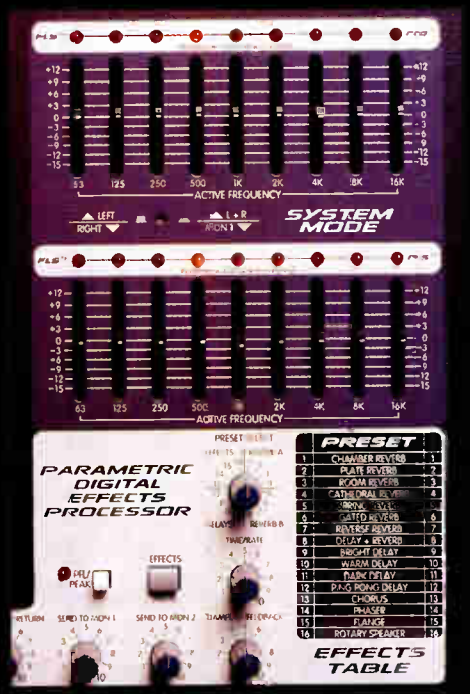
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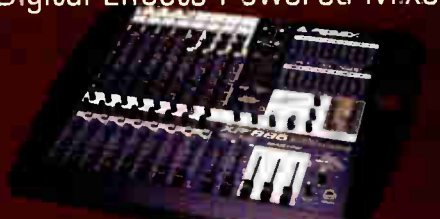
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Other speakers in the design include three RH BPS double-15 subs on each side of the proscenium. At the back of the stage there is a single three-way CE-3T, nicknamed the "Terminator," that is used for a special explosion sound effect. In addition to the two dozen A-B pairs of Mousetrap delay speakers, 22 RH Microtrap speakers are placed throughout the theater for surround effects. Audio "gags" in the show include a Lectrosonics wireless feed to a battery-powered speaker system in a Model T

car that is driven across the stage and a similar speaker placed in a piano.

SOUND EFFECTS AND REVERB IN MUSICAL THEATER

Ragtime's sound design calls for an additional sound operator to run effects. Carin Ford, who started in Toronto and is now in New York, runs an Akai S2000 sampler and a DR8 disk-based 8-track, each redundantly backed up with a switcher and mixed through two more LCS LD-88s; their 16 outputs feed

SOUND EFFECTS HELP WEAVE A THEATRICAL "TAPESTRY"

Ragtime's success as a production rests largely

BY BARBARA SCHULTZ

there's a dead drop, the crowd [noise] stops

on its ability to seamlessly carry the audience from one character's world to another, from one New York City borough to the next. Sound designer Jonathan Deans says that this works largely because director Frank Galati views the production as a "tapestry," into which all of the creations of the design team are woven; transitions and changing moods are effected with unusual, almost impressionistic combinations of the creative elements. Here are two examples of the way sound effects are combined with the music and visuals to draw the audience into the world of *Ragtime*.

The baseball game: "The baseball game scene comes at a very tense part of the show," Deans explains. "Mother, Father, Younger Brother and Little Boy—these are the characters' names—are having incredible tension, and the Father just blows it off by saying, 'I'll take you to a game of baseball.' And so, going into that scene, there is a very funny song, and we create stadium sound, which starts with someone shouting 'Play ball,' and the crowd comes up into the surround sound of our theater. At that moment there are maybe six seconds of sound effects, and then it goes into the song. But in the middle of the song, the Little Boy catches a ball, and it goes into a dreamlike section for another five seconds, where the crowd comes up again. We recorded a bat hitting a ball, and the sound comes from behind the audience. Then the ball is traveling through the air, and that's done with harp glisses. It's a dreamlike thing, and you see all of the performers onstage moving in kind of slow motion. Then

as he catches the ball—we recorded leather on leather—and then they carry on singing."

The destruction of the Model T: What could better symbolize the paradoxes inherent in *Ragtime's* turn-of-the-century world than the destruction of a character's automobile? "That scene is done in silhouette," Deans says. "It's an incredibly aggressive action that happens, and it's a pivotal point of the show. There are these racist firemen in New Rochelle, and they just don't like the fact that Coalhouse owns a Model T. They make it difficult for him to pass them. Then they destroy the car. They cut the roof, smash up the windscreen, they scrape the sides... With all the creative departments, we were able to stylize a complete destruction of the car without the car being destroyed. What you see in silhouette is very aggressive. The actors don't complete the action onstage, but the sound gives you what would be happening if they did complete the action. It extends the action."

Deans created all original effects for *Ragtime*. This difficult scene includes his recordings of metal and glass being smashed with baseball bats, canvas being torn and metal being scraped. Deans manipulated the tracks in his own portable, Pro Tools-equipped studio. He combined some sounds with library effects (the glass smashing sounds, for example, are combined with a stock recording of a wine glass being smashed). He says he never uses straight stock effects; rather he uses them as a "point of origin, a point to start and then go a little deeper." ■

the main consoles, the subs, the surrounds and the Model T. "In a musical, there usually aren't many sound effects because they will look at an orchestration and the composition of the music to tell the story and give the effects," Deans explains. "The background of director Frank Galati (*The Grapes of Wrath*) is more plays than musicals, where you achieve color through sound effects. He came in and said, 'I want to create a soundscape. I want to do things with sound that support each scene.' And our producer's background includes film. I brought in my sound effects system during the production period, which is ten flight cases with thousands of effects on hard drives, and looked at what the action is to tailor each effect. For it to be effective, though, you need every effect to happen right on the time for every show because the actors start responding to the effects, and the sound effects become one of the players."

The equipment list also includes four Lexicon PCM 90s and three Lexicon 300s. "If you're going to use reverb, you should get the best you can, because we're looking for transparency," says Deans. "It's not an effect, it's to add a dimension and will take over the scene if it's not transparent. In this design we have different reverbs on different sections of the orchestra. We also have separate reverb for the chorus, a reverb for the principals and then a dedicated effects reverb. The idea is that when a chorus sings together there is a different thing frequency-wise that happens when a large number of mics are fed into it compared to one used for individual voices. And you have a sound effects reverb that has different requirements. When there is a lot going on very quickly you simply don't have time to switch one machine back and forth to meet all those requirements."

Later that evening I'm treated to an orchestra-level seat for the show and, yes, there is a lot going on. The acting and singing, the lights, the set, costumes, story, music—all are beautifully done, but I didn't really notice the sound, other than having this strange feeling that I was at a movie. Not watching one, but actually in one. If you go to only one musical this season, this is the one to see. Oh, and hurry before the Tonys are handed out and it becomes impossible to get a good seat. ■

Mark Frink is Mix's sound reinforcement editor. He can be reached at mfrink@teleport.com.

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EDWYN COLLINS' WEST HEATH STUDIOS

DISTINCTIVE SOUND

“Much has been made in some press articles about the huge amounts of money that I made from the single ‘A Girl Like You’ and the album *Gorgeous George*,” says performer/recordingist Edwyn Collins. “I’ve been a bit stung by reports which describe me as splashing out on new houses and a new studio. My only important new equipment acquisition since *Gorgeous George* is my Studer A800 Mark II 24-track. Apart from that, the music on *Gorgeous George* and on my new album, *I’m Not Following You*, was recorded on exactly the same equipment.”

It shows. Anyone familiar with *Gorgeous George* (Setanta, 1996) and *I’m Not Following You* (Setanta, 1997) will recognize the same production qualities permeating both self-produced and partly self-engineered albums. Collins’ recordings are typified by a curious mix of ‘90s rhythm loops and ‘70s sonic sensibility.

These characteristic sounds are, according to Collins, exactly the point of his studio, West Heath Studios. It’s located in Northwest London in premises that once housed Alan Parsons’ studio, and includes a lounge, kitchen, office space, two live rooms, a control room, a machine room and storage space. “One of my main objectives in putting this studio together is to have a distinctive West Heath Studios sound,” Collins says. “I want you to be able to recognize that an album is recorded here, even before my idiosyncratic vocals come in. Over and above in the songwriting and the arrangements, the distinctiveness of my sound comes through the technology that we use.”

The equipment in West Heath Studios is nothing if not eclectic and distinctive. There’s a modified 1969 pre-80 Series Neve desk that was once used to mix film soundtracks, including *Brazil* and *Time Bandits*. Underneath the Neve desk there is a drawer full of the most outlandish and obscure guitar pedals, many of



PHOTO: PAUL TINGEN



them from the ‘60s and ‘70s, which Collins uses in all manner of unorthodox applications: “The guitar sound on ‘A Girl Like You’ is in part the result of a Colortone fuzz pedal,” Collins says. “I put the guitar through the Colortone, then DI that into my Vortexion mixer—the type that was used by Joe Meek to record ‘Telstar.’ It adds a benign valve distortion. Then the signal goes through one of the Neve 1064 EQs on the desk. I boost around 3k and a little around 10k and apply a highpass filter around 45 Hz. Finally, the sound is compressed in the EAR 660. It gives a very aggressive effect, which is why we call it the hooligan tone!”

The Neve is assisted by a Mackie 14x4x2 for off-tape monitoring and a small DDA desk for line outputs and headphone mixes. There’s also Collins’ Studer A800 MkII, plus two EMT plates (140 and 240), and there’s a multitude of vintage, valve and/or rare gear. The most eye-catching of these is the Binson Echorec 2 magnetic drum reverb, which has “a very distinctive, instant slapback sound that’s very ‘50s. I used it on my vocals on ‘A Girl Like You.’”

Other gear includes compressors/limiters such as UREI 1176, EAR 660, AE1D, Audio Design F600, early-‘60s Pyc and Langevin Electro-optical; EQs such as Pultec MEQ5, Pultec HFL-3C, Martin Audio SP EQ500, Orban EQ, API 5502 and

GLVC (Great Little Valve Company). There are also portable “lunch-box” EQs, such as an obscure 1965 BBC EQ, B1C graphic EQ, and API 554 and 550, plus the many Neve EQs and noise gates that have been added to the desk (1062, 1064, 2074 and 2257). The recording areas house some unique microphones, such as the Telefunken U47, Neumann U48, U87 and KM85, AKG C60 and C-12a, STC Octava, GEC, Reslo and so on.

All this eccentric equipment suggests that Collins subscribes to the current retro movement, but that’s not it exactly. “I have an almost romantic attachment to all this stuff, that’s true,” Collins says, “but it’s not a kind of Luddite thing. I don’t want to be associated with people who don’t use any equipment made after a certain date, or who won’t use any digital or integrated circuit technology. The fun for me is in mixing up digital and older technology. I do all my sequencing on a Linn 9000, use Akai S3000 and S2800 samplers, and one of my favorite reverbs is the Alesis XTC budget reverb. I don’t want to discriminate against any kind of technology, and enter debates about whether analog is better than digital or vice versa. Both media have advantages and their own distinctive sound.” ■

Paul Tingen is a UK-based freelance writer.

BY PAUL TINGEN

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Most people know about Robert Scovill from his gigs as a live sound engineer. His work with artists such as Tom Petty & The Heartbreakers, Foreigner, Rush and Def Leppard has earned him much acclaim, numerous awards (including five TEC Awards) and a list of endorsements any engineer would envy. When he's not touring, Scovill writes for various industry publications and lectures at recording schools. And not surprisingly, he has been involved in professional as well as project studio work throughout his career. In 1994, he decided to leave Los Angeles for Phoenix. "I moved to Phoenix about three years ago; from doing shows here I always felt there was a burgeoning music scene here and I wanted to get in on the ground floor of that," Scovill says. He formed the Eldon's Boy record label (Eldon is Scovill's father) and built a personal studio, MusiCanvas, in his house. "The studio is not necessarily a commercial facility; it's primarily done on a per-project basis," explains Scovill. Although much of the talent passing through MusiCanvas is Arizona-based, Scovill says one of his main attractions to touring is that it allows him to scout acts across the nation on days off.

The facility consists of a tracking room and control room, both designed and built entirely by Scovill, with surface treatments by Acoustic Sciences. The console is a 48-input, fully automated Soundtracs Quartz. Scovill's large-scale monitors are JBL 4430s modified to active two-way. Near-field monitors include Yamaha NS-10s, Hafler, Genelec, Alesis and Radio Shack, all powered by Hafler Transnova Series amplifiers. Recording formats available are 48 tracks of Otari MX-80 2-inch or 48 tracks of MDM. Effects include digital processors by TC Electronic, Eventide, Lexicon, Yamaha, Alesis, AKG and ADA.

"My favorite pieces of gear, though, are dynamics processors; I'm a bit of a compressor and preamp hound," says Scovill, naming compressors and equalizers by SSL, Neve, Tube-Tech, Lang, Gates, Compex, dbx, Drawmer and UREI as the bulk of his outboard selection. "I am also a really big fan of the new Pro Tools systems. We will be jumping into Pro Tools full-force very shortly."



Robert Scovill (left) with Eric Kuglin

Scovill spends much of his time on the road, so for a while, the studio was left empty for long stretches. "The studio stood the chance of just sitting collecting dust," says Scovill. "I also do some lecturing at the Conservatory of Recording Arts and Sciences in Tempe [Ariz]. One day I was chatting with Kirt Hamm and Michael Jones [directors of education at CORAS] and I mentioned, 'Why don't you send me a student or two to help me out at MusiCanvas?' Done deal. Last February, Scovill took on a recent CORAS graduate, Eric Kuglin, as an intern; since then, Kuglin's duties have expanded. "Eric basically runs the studio while I'm on the road, and he actually has done some road work as well, so we're constantly rotating in and out of there. I don't really consider him an intern any more; he's a full-fledged part of the program."

Kuglin adds, "It's an incredible opportunity for me, really; I get to come in and do my own projects here when time allows as well as assisting Robert on his projects and draw on his formidable insight."

Scovill is currently balancing a demanding tour schedule with a busy workload in the studio. "I just finished a CD for a band called Pleasure Crush," says Scovill, who adds that he presently has two major projects running concurrently. "During the day I'm sorting live Rush material; on the last tour we recorded 72-track digital, and 32-track digital on the previous tour, so I spend most days doing that. At night, we're doing a CD on EBR for a local band called Looking for Aldous Huxley; we're very excited about that project."

Scovill says he thinks he will always have some form of working studio in his home. "You cannot beat being able to just walk in on a moment's notice day or night and go to work." His ultimate goal is to keep the operation running as a functional studio as well as record label. "And then at some point break it off from the house and move it to another larger facility," he says, adding that the impetus for that growth will stem from "the growth of the local music community and our [Eldon's Boy records'] ability to put out quality product that can be picked up and distributed by larger labels," says Scovill. "There's a sense here in town that the studio scene is going to build the music scene. My feeling is that mentality is completely backwards. The music scene is going to have to happen first; in turn, a big recording scene may happen as a result. There's a lot of really talented acts in this local scene; hopefully we can cultivate some of them and they in turn can increase our profile as label and recording entity and the city of Phoenix as a music mecca." ■

BY SARAH JONES

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PHYSICS, PSYCHOLOGY AND MUSIC

Many of the musicians who form the backbone of the project studio community have eclectic backgrounds, and often those past lives prove useful. In the case of Ethan Cascio and Allison Aaron, degrees in physics and psychology, respectively, proved instrumental in the process of building their own project studio in the Boston suburb of Cambridge.

Both New York natives, Cascio and Aaron met as teens and dated until they married in 1985. While working toward his physics degree, Cascio also pursued his passion for music, playing wind instruments in school bands and increasingly adding electronics. He bought into project studio technology in 1981, with a Tascam 4-track deck while still in college. He then began singing and composing with Aaron, eventually forming a band, and they recorded at home.

The studio bug had bitten, and Cascio prepared to give up his job at Harvard's Cyclotron Laboratory, where he worked on the world's oldest operating particle accelerator. They decided to build a project studio, Hourglass Bird, in the basement of their Victorian-era house near Central Square in Cambridge. Cascio delved into the project in way befitting a physicist; as he puts it, "I gleaned the literature, starting with 'Helmholz on Sound,' and went on from there."

First, since the area designated for the control room was not evenly laid out, Cascio rotated the orientation of the control room by 45 degrees relative to the "natural" orientation of the room to improve right/left symmetry and reduce first-order reflections at the mix position. "I cut off part of the corner and placed the speakers at acute angles," he explains. "It acts like a splayed wall, redirecting reflections away from the mixer."

Other inspired construction approaches included using surface-



mount electrical boxes and lighting fixtures to avoid cutting holes in the walls, which could compromise sound isolation. Also, Cascio designed a central AC/vent system with flexible couplings at each wall penetration, with custom-built triangular duct work to fit desired ceiling lines and isolation vent louvers between the 13.5x14.5-foot control and 13.5x15.5-foot recording room. He also installed a fully framed ceiling suspended from neoprene vibration isolators, with a continuous layer of 3/4-inch plywood for cross-bracing, extra mass and a secure foundation for hanging ductwork and treatments underneath the sheet rock. The design also entailed putting a layer of Wonder Board sheet concrete underneath the sheet rock but over the metal studs in the walls behind the monitors in the control room.

"I wanted very rigid walls and didn't want them to soak up a lot of bass like typical sheet rock walls can," Cascio says. "I was getting these ideas from a combination of reading the magazines and from just thinking about alternative ways to deal with the physics of sound."

One of the few problems encountered in the \$50,000 project happened last spring, when Cambridge experienced severe flooding. Cascio and Aaron returned from an evening out and found water covering the studio space. "Fortunately, it happened before we had put the wood floors down," Cascio says, "and the equipment wasn't in yet, so we thought we had gotten off easy at first, but then we realized that water had gotten behind the walls and was being held in between the two-by-fours. The insulation was soaked. It set us back a couple of months."

The finished Hourglass Bird Studios is a cozy, intimate facility that seems perfectly suited to Boston's eclectic and acoustically oriented music base, as well as the assortment of voice-over work, comedy, sound effects, scores and audio post work that passes through. Equipment includes a Tascam 85-16B 1-inch 16-track with Fostex 4030/4035 auto locator/synchronizer that locks to a Digidesign system with Pro Tools 442 I/O (with Sound Designer II), Studio Vision and Master List CD software, 3/4-inch U-matic or S-VHS video decks and a Tascam 38 8-track. The console is an Allen&Heath CMC-24 with full meter bridge, augmented by a small Mackie mixer.

Cascio and Aaron have quit their day jobs and committed to running a studio, although Cascio stays involved in a few projects at the particle accelerator. So, if the studio owners ever want to impress prospective clients, they can truthfully state, "Facility maintained by a Harvard physicist." ■

BY DAN DALEY

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STEPHEN KAY

KEYBOARD WIZARD

New York Giants football fans know Westfield, N.J., to be the home of benched quarterback Dave Brown. Westfield, which boasts street after street of turn-of-the-century masterpiece single-family homes, perennially pops up on lists of America's most desirable communities. That's where designer/singer/engineer/software developer Stephen Kay makes his home, and his living.

Back in the late '80s, before the synth/sampler/jingle equation came to mean squashed budgets and little room for inventiveness, sound design had not yet split off from the art of composing a solid hook. Music houses were on the prowl for technical wizards who could also compose, but few engineers had the commanding keyboard technique and composing skills to balance out their button-twirling abilities. Kay does it all, as I found when I called on him at his home studio, which is built in a refurbished church.

Kay became part of the project studio phenomenon early. In 1986, he bet the whole roll on a Fairlight Series III sampling system. The next year found him in Minneapolis turning out a library of mainly orchestral sounds for the Sound Genesis library. This experience recording and editing a high-quality set of samples became the foundation for his burgeoning career. Also during this period, Kay turned out compositions under his own company, Technisound. Among his hits were the main themes to NBC's 1989 coverage of Wimbledon and the French Open.

In 1990, Kay began working with Korg Inc., as a consultant. He provided programming, sampling and wave editing for inclusion in the 01/W, X5DR, I Series and Trinity synths. He also composed demos for all of these units, many of which were praised in product reviews.

When *Mix* stopped in on Kay,



he was working on a software program he calls KARMA (Kay Algorithmic Real-time Music Architecture). "When I was asked to create demo sequences for Korg products, part of my job was simply to blow people away with the sounds they themselves and what could be done with them," Kay says. "One of the problems I'd come across revolved around the limitations of trying to execute a convincing guitar strum, for example. That's difficult to reproduce from a keyboard. Because I'm fascinated with these challenges, and because Korg was asking for something different, I'd spend hours and hours figuring out how to get the most realistic-sounding guitar strumming effect or harp glisses."

During our interview, Kay demo'd a beta version of KARMA. He called up a harp sound and played a chord on the keyboard. Out came a cascade of harmonically correct notes. Sounds like an arpeggiator, right? Well, to a point, but KARMA is actually far more advanced than its early ancestor.

KARMA gives the user control over a maximum of six generation modules, all of which contribute to the overall effect. The harp gliss offers an insight into what users will ultimately be tapping. "Most arpeggiated harp glisses end up sound-

ing lame because they don't take into consideration the fact that a harpist will begin the right hand gliss before the left hand completes its stroke. KARMA allows you to control exactly when the second hand comes in, the direction of the strumming, and with a controller set to modulate tempo, say, you can speed up or slow down the gliss in real time."

While working on Korg's I Series—he received two patents for his work—Kay started programming in Opcode's MAX language. "Five years ago, I hadn't written a line of code. MAX, which lets non-programmers write MIDI programs, eased me into things. I now use C for all of my work on KARMA, but MAX was indispensable to me."

The only regret this multitreat musician has is that the demands of turning out product for manufacturers like Korg, combined with his work bringing KARMA to market (he targets early '98 for both the software version and a stand-alone unit aimed at non-professionals who want to jam with MIDI files) leave little time for composing and recording his own material. But you can check in with Kay and his work on KARMA by e-mailing him at k@compuserve.com. ■

Gary Eskow is a freelance musician, producer and writer based in New Jersey.

BY GARY ESKOW

It took this man a decade to find his next reference monitor.



How long will it take you?

After over a decade of commercially successful and critically acclaimed work, changing an important part of your formula wouldn't seem rational. Unless you had very good reason. And Elliot's reasoning may be familiar to you. "Although I trusted the monitors I had been using on every project, including six Grammy nominated albums, I didn't particularly like their sound. I was always looking for something I could trust but smoother- easier to listen to and especially louder."

Then he listened to his work on a pair of Exposé E8s. Now he's using them exclusively on his current projects, the next releases from Steely Dan, Fleetwood Mac, John Fogerty and Toto. "The moment I heard the first sounds come out I knew these were right." What he means is the exceptional accuracy and ultra-low distortion Exposé offers to track and mix with confidence. With the smoothness and musicality that would otherwise make long sessions difficult.

"I've been after this type of clarity for over ten years."
—Elliot Scheiner
(producer, engineer extraordinaire)

With the advances in digital recording, power and punch are no longer an option, they're a requirement. And Exposé goes louder and lower than your alternatives. As Elliot puts it, "Some of the other high-end, powered monitors sound 'pretty' but I can't use them because they won't play loud enough and they lack the low-end for most of the material I work on."

He was also impressed by the expanse and depth of the stereo image they create. Elliot says, "I don't know how they do it, only that they seem to do it better than anyone else. Very, very clear. Everything is distinctly audible and natural. It's pretty amazing how they open up a mix."

So should you go out and buy a pair of Exposés today just because Elliot Scheiner uses them exclusively? No, but you owe it to your next project to run down to the nearest KRK dealer and get a demo for many of the same reasons.

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MARVIN CAESAR

FOUNDER OF APHEX SYSTEMS

Success in the business end of the pro audio industry comes in a variety of forms, including technologists demonstrating a business aptitude and investors with an ability to assemble a high-tech team. And then there's Aphex Systems founder Marvin Caesar, an ex-accountant with no technical or musical training.

In the mid-'70s Caesar met Curt Knoppel, who described an invention that enhanced recorded music in such a way that it sounded as if the listener were actually sitting in on a live session. Caesar agreed to invest in the fledgling Aural Exciter, but the young company was seriously undercapitalized. The solution was to lease the first batch of hand-built units for a per-minute fee for processing a mix.

Word spread. Paul McCartney took an Aural Exciter on the road for his 1976 *Wings Over America* tour. Producer Peter Asher was in the audience for one date and became intrigued by how much larger and clearer the piano sounded. At that time, Asher was producing Linda Ronstadt's *Hasten Down the Wind* LP. Half the record had already been mastered, but the remaining half was mixed through an Aural Exciter. The difference between the two sides in terms of clarity, presence and detail was so dramatic that the first side was remastered with the unit.

Since those auspicious beginnings, thousands of albums have been mastered through the Aural Exciter, a mysterious, patented black box that, until 1981, Aphex wouldn't allow anyone to purchase. (An example of Aural Exciter buzz during the '70s: The liner notes to The Eagles' *Long Run*



album says, "Mixed *without* the Aphex Aural Exciter.")

Through the years, Aphex Systems has continued to improve the Aural Exciter and set its sights on other innovations, including the Compellor compressor/leveler, Dominator stereo peak limiter, Easyrider auto compressor, Tubessence mic preamp, Digi-coder broadcast stereo generator, 2020 FM Pro 4-band broadcast compressor/peak limiter, plus the 9000 Series of processing and dynamics-control modules, and now a TDM Aural Exciter plug-in.

You have an unusual background for the president of a high-tech company...

Yes. I was trained as an accountant, but early on realized it wasn't what I wanted to do in my life; however, [accounting] has given me some excellent tools to run my business. I left my first job in accounting after ten months and in-

vested in a real-estate venture. I was trying to build an alternate energy community about 100 miles north of New York City.

How did you get Aphex off the ground?

I had 180 acres I was trying to develop into that alternate energy community. After the oil crisis of 1973, gasoline went up to \$1 a gallon, and people told me that I was crazy—which is something I have gotten used to hearing—to think that anyone would drive up to such a community. I held onto it for as long as I could, hoping things would change.

At the end of 1974, I met Curt Knoppel, the studio manager for Shaggy Dog Studios. Essentially, he told me that with \$5,000 we could make \$1 million. It's a testament to my naiveté that I believed him! Sounded like fun. It's not that I had very much money, but I handed him what I had. That came and went instantly, and then he needed more and more money. So I sold my interest in the land and put all of that in. There was nothing to sell at the time, but my job was to get money to keep the organization floating.

We hired some people to design a prototype [of the Aural Exciter] but nothing that was really road-worthy. Eventually, we got it together, through a line of serendipitous events—it was very, very difficult, primarily since we were broke. We had to come up with a way to finance it. We developed the licensing concept, because we didn't have enough money to go into production. The initial rate was \$10 per minute. When we handed the bill to Peter Asher—\$390 for Linda Ronstadt's *Hasten Down the Wind*—he laughed and said we

BY MEL LAMBERT

How did Chris Andromidas make it to The Galapagos?

His scores have graced over 350 movies and tv shows, adding texture and romance to places as remote as The Galapagos and as bizarre as The Catacombs. Yet Chris Andromidas rarely leaves his home to record. And the microphone he depends on most often is the CAD E-200. "On my latest Discovery series, "Invisible Places", I recorded everything from french accordion to Armstrongesque muted trumpet to renaissance lute, I found the E-200 to be remarkably accurate."

So no matter where your music takes you, take along an E-200 from CAD. You'll get the sound you want, naturally.

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INSIGHTS

should charge three times as much. So we did!

The other thing that we had to deal with, because we were so broke, was getting attention. The name Aural Exciter became *very*-attention-getting. Getting publicity because of the name, its function, who was using it, and the fact that we got credit on thousands of albums was part of the deal. We got all of that attention and a tremendous amount of free press.

Was capitalizing on the publicity sparked by the first Aural Exciters a survival instinct?

Yes, because I had no money. Traditionally people who have more money than imagination and energy just buy advertising. Obviously, to have an effective marketing campaign, you do both. I'm essentially a lazy person; I don't have the energy or the guile to sell something inferior, or just equal to another product. That's why everything we make has to be special. It sells itself!

The other thing I did to stay in business was to set up sub-licensees all around the world. I set up Aphex-UK, Aphex-Switzerland, and so on. Aphex-



Paul McCartney listens with Curt Knoppel and Showco's Rusty Brutsche (at console).

UK, for example, was the Pink Floyd organization [Britannia Row, now owned by its directors]. They paid for the unit in terms of deposits, and we split the license fee. We went from a zero income in 1976 to almost \$1 million in '78. We had five units, then we built 30 more, then 100 and everything was fine.

It was fortuitous that we introduced Aural Exciter at a time when recording

budgets were almost unlimited. When, in 1980-81, the recording industry took a major dive, all of a sudden the [labels] were looking at budgets. Here was a line item that could be left out: approximately \$1,000 an album that they could do without. So we sold all of the rental stock for \$3,000 a unit.

One of my business principles is never to rely on one thing to happen. The Aural Exciter was what we did, so

Folks say it's like a "best of" album with a few new songs....



It looks awesome, but what is it?

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that's what we focused on. Yet I learned the hard way not to depend on one thing. I saw that we needed to do different things. We joined with David Baskind and his associates, who had developed an ultra-precision VCA circuit. As a result, we were able to do certain things in dynamic control that couldn't be done before.

Because of its design characteristics, the VCA is one of the weakest components in an audio chain; we tried to achieve greater transparency. We sent a VCA to Aphex-Hawaii, and [it reached] a radio engineer named Donn Werrbach. He was taking care of six radio stations in Hawaii and was always dissatisfied with the processing that he could buy off the shelf. He hadn't been able to [perfect] his gain control designs until he found our [Model 1537] VCA. In 1984, we listened to this device Donn had built as a prototype. Everybody was confounded because here was an automatic gain control device that you could *not* hear. That device became The Compellor.

I knew that what Donn was doing was very valuable; he came onboard,

and his next product was The Dominator, a 3-band peak limiter. Donn is always looking for new ways to attack old problems. This has led to a succession of ingenious ideas that resulted in many patents and successful products.

Since I do not have an engineering background, I was vulnerable. I was forced to learn as much as possible, especially if I am asked to put money into a project. Donn, though sometimes impatient, has taught me a lot.

Aphex doesn't have a service department. Do you repair the small number of faulty products you receive on the production line, or do you just replace them?

The units in for repair are so few that we usually just put them into the final test lab. This high reliability comes from the design, as well as manufacturing consistency.

How does the new Model 2020 FM Pro Broadcast Processor differ from the Dominator?

The Dominator is a multiband peak limiter. The 2020 is a wideband leveler, 4-band compressor, split-band limiter, high-frequency limiter and stereo gen-



PHOTO: ALAN PERLMAN

Caesar accepted a TEC Award for Aphex's Model 107 Tubessence mic preamp in 1995.

erator. Just about everybody wants their audio loud—almost at any sonic cost. Listen to most commercial FM stations, TV commercials or the latest movie trailers. One of the reasons they are so annoying may be that they are clipped—and not in a good way! I've taken the 2020 to post houses, and they could not believe how loud they could get and still have some semblance of quality.

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Problems arise when people want to use The Dominator as a compressor. A top sound designer said to me The Compellor was the best limiter that he had ever heard! I thanked him and said that it *isn't* a limiter. There's so much confusion as to what a compressor is, what a limiter is, and what they are used for. People first must define their application, and then choose the appropriate tool.

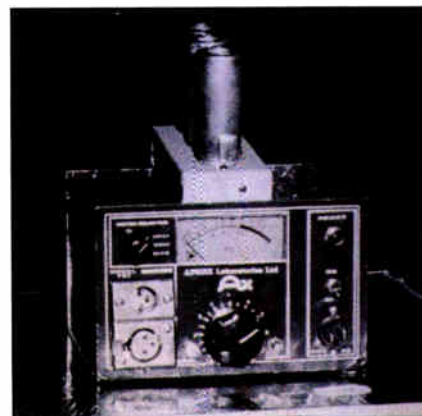
Who came up with the names Compellor and Dominator?

The Compellor was Donn's—a combi-

nation of compressor and leveler. The Dominator was mine. When you've established a mode of doing business by naming your first product the Aural Exciter, it's almost expected of us to have interesting names. The Big Bottom... There aren't many companies that would put "Overhang" and "Girth" on the front panel. Part of it is a desire to have fun; some of it has backfired on us because controls are difficult enough to understand let alone [those] with Overhang and Girth slapped on them!

Was the Easyrider another name for a peak limiter?

Fast attack is important for peak con-



Prototype of the first Aural Exciter, used at Shaggy Dog Studios

trol; slow attack sounds better, but then you have big overshoots through the compressor. How you choose between the safety of fast attack and the sonic enhance of slow attack is beyond most people's ability. Also, the texture of the music changes. The Easyrider [compressor circuit found in several Aphex products] is what Donn calls a "convolutional filter." What it does is stack attack times so that it sounds as if it's a slow-attack compressor, but it can kick into fast attack for peak protection.

I was just over at Warner Hollywood [Goldwyn Sound Facility], and Tom [O'Connell], who mixes ADR [in Studio E], was telling me about *Devil's Advocate*. In the last section of the movie, Al Pacino is screaming. Tom had the [Model 661] Expressor in the Easyrider mode, and Al Pacino's [dialog track, even when at maximum output] is totally transparent. The Expressor was doing 10 to 15 dB of gain reduction, yet it didn't sound like it was pulling back.

The Dominator II's automatic limit threshold is pretty sophisticated. In a conventional multiband processor, you can limit bands individually and then add the components together. But you face unpredictable peaks. There are three ways around that: One is a wide-band limiter after the summing, which has its own drawbacks; the second is to use a clipper on the summed output, which can cause distortion; and the third is your patented method—Automatic Limit Threshold (ALT)—to produce a predictable peak output while maintaining maximum loudness without audible distortion.

Yes, outputs of the three bands are summed and sent to the ALT detector circuit. If their sum exceeds a reference value, the circuit reduces the thresholds of each individual limiter. When the summed output falls below the refer-

—CONTINUED ON PAGE 212




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C-1 Dual Tube Compressor / Mic Pre
Stereo tube compressor; balanced & unbalanced mic & line inputs; +48v phantom power 2 AUX inputs; variable "soft knee" compression; sidechain insert points; continuously variable attack, release, ratio & gain make-up; stereo link mode; 20 Hz to 40 kHz frequency response.

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EQ-1 Dual Tube EQ / Mic Pre
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EQ-2 Stereo Tube Parametric EQ / Mic Pre
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5051 Mono Tube Voice Processor
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The master section includes an output gain control, VU meter (which can be switched to read input, output or gain reduction), and a stereo link switch. The mic input is on balanced XLR, and the line input/outputs are duplicated on balanced XLR/unbalanced jacks. A side chain insert point is also provided.

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VOICE PROCESSORS

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It is not entirely clear as to who first integrated a mic preamp with equalization and dynamics control. Valley Audio's 400 was arguably the first "voice processor," as it was introduced at the same AES show as Symetrix's 528, but narrowly beat the latter to market. But whoever thought of it first, the idea has been well received; whether for convenience, as a means to avoid the console or as an analog front-end for a workstation, voice processors have become a popular studio tool. Despite the name, such devices may be used to record almost any instrument, and voice processors offering line-level inputs can also serve as additional dynamics and EQ processors during the mix. The voice processor concept also appeals to the one-track-at-a-time recording methods of the solo artist in the project studio.

BY CHRIS MICHIE



Manley VOXBOX



Symmetric 528E



TL Audio 5051



Tube-Tech MED 1A



Calrec RQP 3200



Inward Vac-Rac



Drawmer 1962

This article lists most of the currently available devices that feature a mic preamp, compressor or limiter and an EQ section (for the purposes of this article, a "sonic enhancer" is considered to be equalization). Many of the models listed also offer line and instrument inputs, de-essing and gating functions, and even A/D conversion and MIDI control features. Some well-known items—the "Lunch Box" from **API** (Audio Products Inc.) and the Pro⁶

tres cool device that falls slightly outside the parameters of this article is **DigiTech's** Studio Vocalist, which combines a mic preamp with an intelligent vocal harmonization processor.

ATI's (Audio Technologies Inc.) EM1000 "Emph" a Sizer" Mic Processor includes a mic pre, gate, 4-band parametric EQ and a compressor/limiter. A free-standing desktop unit, the EM1000 can also be rack-mounted. The rear panel has mic/line input switching and a 150Hz mic filter switch. The input gate has adjustable threshold, ratio and gain reduction controls. The 4-band parametric EQ has internal adjustments for frequency, bandwidth and ± 20 dB of gain. EQ may be pre- or post-compressor or inserted in the sidechain for frequency-sensitive compression. The compressor features a 10dB range, low-noise VCA and normally operates in a relatively slow-acting, minimum distortion mode, though the unit automatically reacts to

fast rising or decaying signals and switches to a more appropriate dynamic characteristic. Output level is adjustable, and LED bar graphs display output and gain reduction levels and may be internally switched to peak, fast or VU ballistics. Price is \$1,459.

The VT-737 Vacuum Tube Direct Signal Path from **Avalon Design**, a two-rackspace unit with tube-based circuitry, offers three input choices: transformer-balanced mic input (with switchable phantom); balanced line input; and instrument DI via a front panel jack input. Additional features include a sweepable highpass filter and switches for polarity reverse, high-gain option and bypass. The opto-compressor section has separate threshold, ratio, attack and release controls; gain reduction is indicated on an ovoid VU meter. The 4-band EQ (the two midbands offer switched center frequencies and variable Q) can be inserted pre/post compression. High and low EQ bands are shelving, switchable over four frequencies. The mid-EQ sections can also be switched into the compressor sidechain for de-essing while the high and low EQs remain in the main signal path. Additional features include



ATI EM1000

Audio Processor from **ATI** (Audio Toys Inc.), in particular—have been excluded, as they are far from new, although they are both currently available. One

features a 10dB range, low-noise VCA and normally operates in a relatively slow-acting, minimum distortion mode, though the unit automatically reacts to

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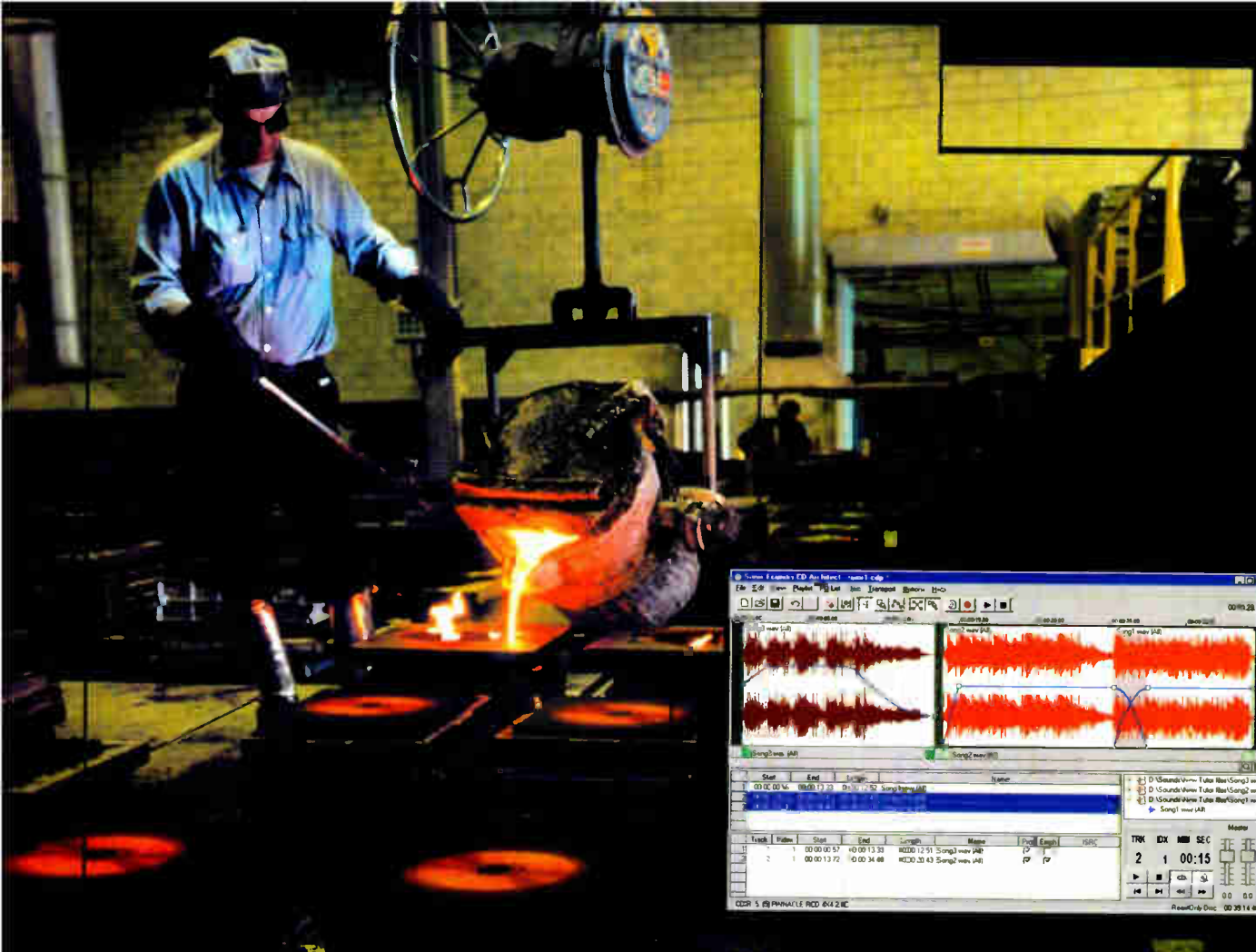
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Barbetta Manufacturing introduces the Channel One. The input section includes phantom power and polarity reverse switching. Gain for the mic/line preamp is continuously adjustable from +6 to +40 dB. A separate TRS line input accepts balanced or unbalanced line signals, and the unit also offers an ultra-high impedance instrument input (gain continuously variable from unity to +30 dB). Barbetta's Adaptive Impedance™ circuitry is designed to handle high or low impedance lines. The EQ section (with hard-wire bypass) offers a 3-band parametric control with overlapping ranges and ±20 dB gain. A low filter is sweepable from 32 to 320 Hz; the high filter sweeps from 3.2 to 32 kHz. The dynamics include a noise gate (with frequency-shaped sensitivity) followed by a compressor with Level, Ratio, Threshold, Attack and Release controls; a ten-step level indicator shows gain reduction. A fast-response peak meter is switchable to indicate internal system or line output levels. Price: \$799.

The RP533 Studio Tube Multiprocessor from **Bellari** features tube circuitry and combines a mic preamp, a compressor/limiter section with sidechain access, and a Sonic Exciter. Balanced XLR and 1/4-inch unbalanced I/O are provided, along with polarity reverse and 20dB pad switches and sidechain access jacks for the compressor. Front panel controls include rotary knobs for mic preamp gain, and compressor threshold, ratio (2:1 to ∞:1), attack, release and output level parameters. Switches engage compressor and exciter sections. The exciter section offers two controls, for Bottom and Definition. A VU meter indicates input, output or gain reduction levels. Price: \$700.

The RQP 3200 Channel Strip from **Calrec** is currently distributed by Independent Audio, Redwood Marketing and Studio Consultants. A single-rack-space package, the RQP 3200 combines a solid-state mic preamp, line input, 4-band EQ, expander/gate and compressor. The EQ section has adjustable high/lowpass filters. The 4-band EQ is sweepable: Low and high filters have bell/shelf (switchable) characteristics; mids have Normal (Q=1.0) and High (Q=3.5) settings. Filters and EQ sections

may be separately switched into the compressor sidechain. The expander/gate has two attack times, variable recovery time, two expander ratios and a bar graph gain reduction display. The compressor offers two attack times, variable compression ratio, variable recovery time or an Auto recovery option and a gain reduction bar graph indicator. Other features include a switch to insert the dynamics section ahead of the EQ sections, a Link facility and a key sidechain input. Price: \$3,332.

The **dbx** 1086 mic preamp and dynamics processor is a mono, single-rack-space device combining a mic pre with EQ, noise gate, compressor, de-esser and limiter functions. The 1086 mic pre has phantom power, 20dB pad and polarity reverse, a variable high-pass filter and fixed-frequency low and high Detail EQ controls. Level is indicated on a backlit VU meter. Normaled to the input of the 1086 dynamics section, the mic pre output is also available on rear XLR and 1/4-inch outputs. Based on dbx's new V2™ VCA, the 1086's dynamic section offers an expander/gate with variable threshold and ratio controls; a two-element meter indicates expander status. The com-

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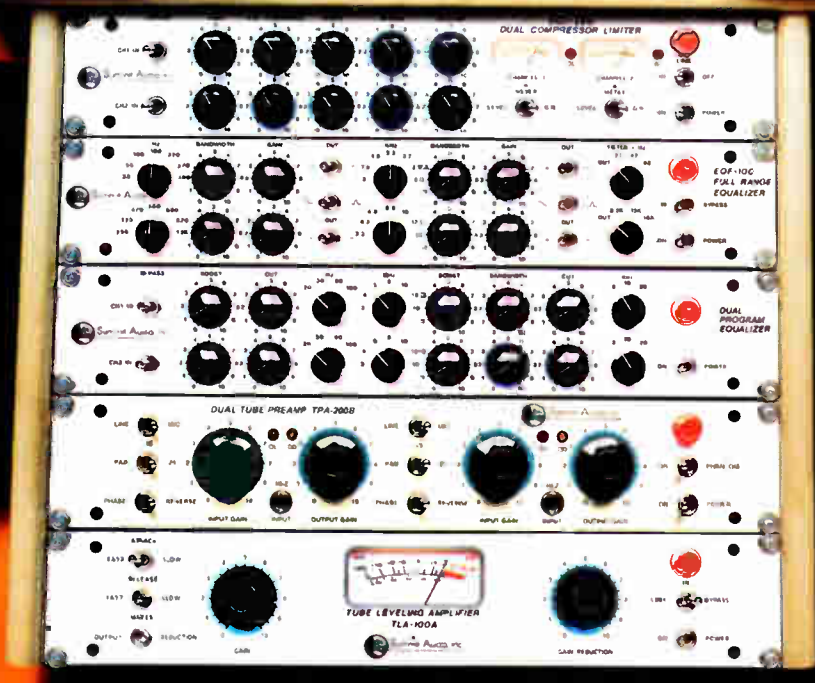
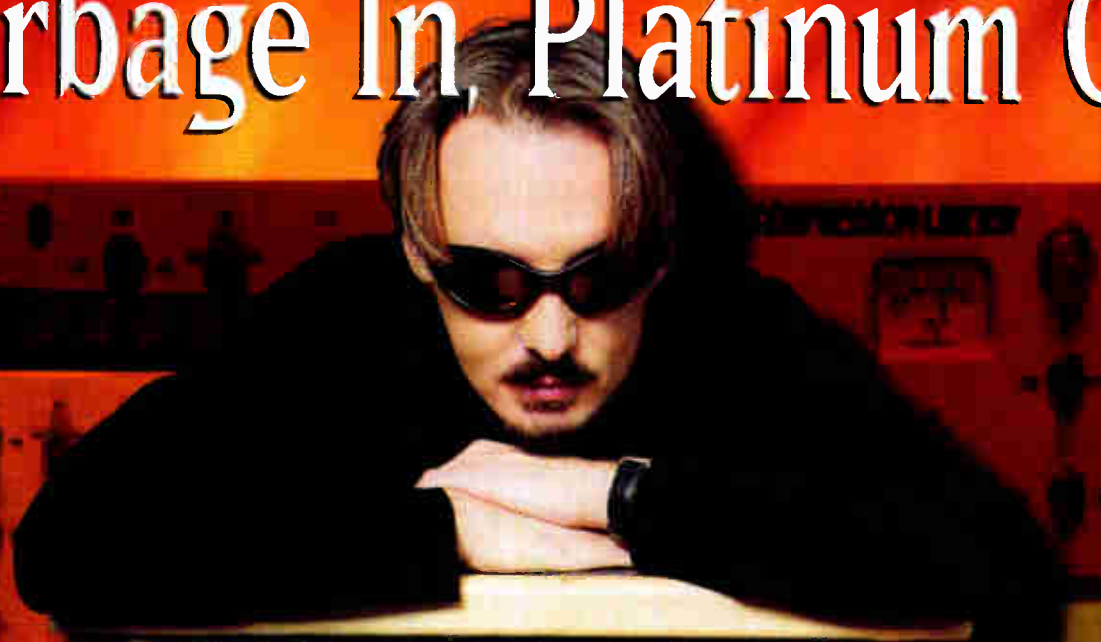


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pressor section also offers variable threshold and ratio controls with selectable hard-knee or Over-Easy® characteristics. The de-esser section has variable threshold and frequency controls, and the signal finally passes through a PeakStopPlus limiter. dbx's Type IV™ digital output is optional, and dither and shape switches can tailor the output. Eight-section lightpipe meters indicate gain reduction, de-essing and I/O levels. Price: \$750.

The **dbx Project-1 286A** microphone processor includes a preamp, compressor, de-esser, spectral enhancer and expander/gate. Mic (XLR) and line (TRS) inputs are standard. The 286A mic pre section includes 48V phantom power and selectable highpass filter; and a master bypass eliminates all onboard processing. Input metering is via a 4-segment LED display. The OverEasy compressor is engaged via a Drive control and a Density control, both rotary pots. Gain reduction is indicated on an 8-segment LED display. Its de-esser has center frequency and threshold controls, and a spectral enhancer section provides high- and low-frequency Detail controls. An expander/gate section



DOD VoFX

tortion functions. Output is line level. The VoFX comes stock with 30 factory presets and 30 user presets; up to seven effects may be used simultaneously. Price: \$300.

The 1962 Digital Vacuum Tube Pre-Amp from **Drawmer** is a 2-channel unit with a matched pair of preamps and line- and instrument-level inputs. EQ options include variable high- and lowpass filters, and a 3-band EQ section. A Spectral Enhancer feature adds small amounts of LF and HF harmonics, and a variable Tube Drive offers additional sound shaping facilities. Its output section incorporates a facility to mix an additional three stereo pairs (six inputs); additional input connectors are on the rear panel. Both analog and digital outputs are available, and the mixed stereo



dbx 286A

offers threshold and ratio control, and gate action is indicated on LEDs. A Gain makeup control feeds an unbalanced 1/4-inch line output. An insert jack allows additional processing between preamp and compressor. Price: \$349.

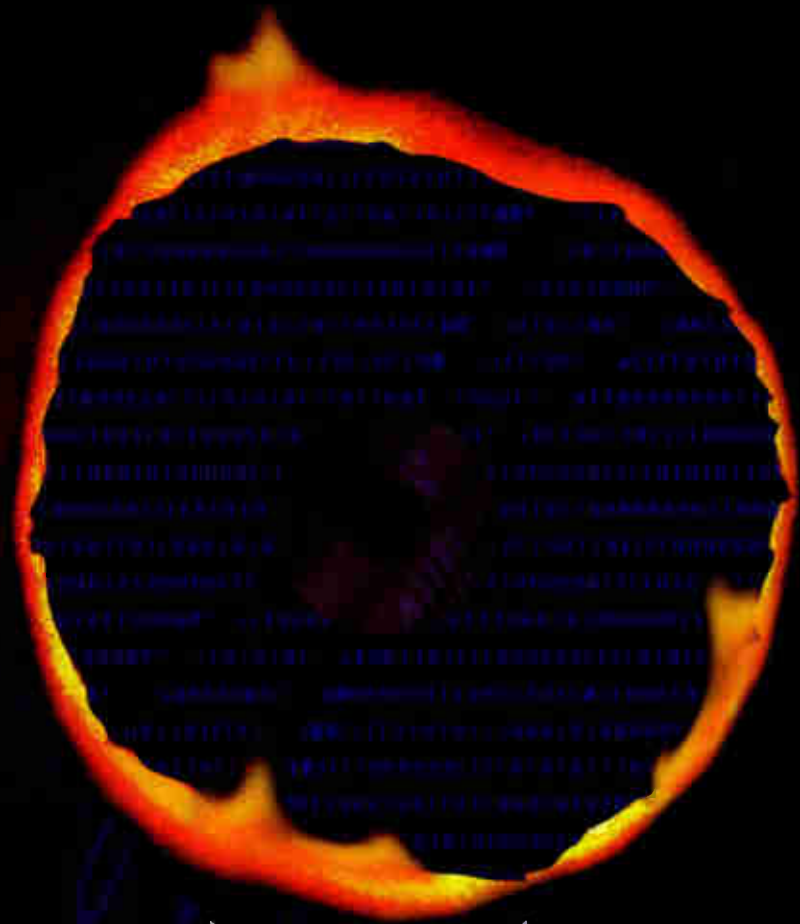
dbx also recently announced the dbx 586 Dual Tube Mic Pre. Features include a digital I/O option, 3-band EQ with mid-band sweep, a pre-tube drive control for optimizing that "tube driven" sound, post-tube section line trim control, and limiter. Price: \$995.

The VoFX from **DOD** is designed primarily for onstage use as a vocalist's effects pedal board; nevertheless, it offers all of the features necessary to qualify it as a viable voice processor. Input is XLR, and available effects include delay, reverb, compression, EQ, noise gate and a modulation section that includes chorus, flanger, phase shifter, pitch shifting and tremolo. Other features include DOD's Pixellator, and ring modulator and vocal dis-

signal finally passes through a zero-over-shoot limiter before analog-to-digital conversion (24-bit). Additional features include phantom power, polarity reverse, rear panel channel insert points, AES/EBU, S/PDIF and TDIF outputs, 24-, 20-, 18- and 16-bit output resolution, 12 dither options and digital sampling rates of 48 kHz and 44.1 kHz, as well as externally defined rates. Price: \$5,000. An analog-only version is \$2,600.

Fairman offers the Tube Recording Channel, an imposing (6U!) black-faced, rackmount device with a distinctly retro attitude. A low-noise mic/line input stage includes a front panel instrument input and 60dB gain adjust knob. The EQ section is based on Pultec filters and features high- and low-pass shelving filters, a 6-frequency low boost, a 10-frequency variable Q mid-cut and a ten-frequency variable Q high boost. The compressor (based on the Fairchild VCA) offers variable gain, threshold, attack, release and output

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Fairman Tube Recording Channel

controls and may be switched before or after the EQ. VU meter and input stage sources are also selected on front panel rotary switches. Price: \$7,100.

Focusrite offers two voice processors in its Green range of single-rack-space units. The Green 3 Voicebox has a low-noise mic preamp with polarity reverse, phantom power and a 75Hz highpass filter—individually selectable via front panel switches. Input levels are via a ten-segment, VU-response LED bar graph (switchable to show compressor gain reduction). The compressor offers variable threshold and compression ratio controls, and fixed or auto release characteristics. The de-esser has controls for threshold and bandwidth (one to four octaves). A 3-band EQ section offers ad-

justable high and low shelving filters and a parametric mid-band with switchable Q. Additional features include a noise reduction expander and a mute switch, both located next to the mic pre controls. EQ and dynamics sections may be individually switched out of circuit. Price: \$1,349.

The **Focusrite Green 5 Channel Strip** is a combination mic pre, six-section EQ and keyable compressor/gate/expander. The unit accepts mic, line and a TRS line input that also doubles as an instrument DI. The mic pre has 50 dB of gain and features phantom power and polarity reverse switches. The EQ section's sweepable high- and lowpass filters can be separately selected to the compressor sidechain. A 4-band EQ has two sweepable mids with switchable Q, and high and low shelving sections with sweepable frequency select. EQ gain is ± 18 dB. EQ and filters may be switched in and out separately. The compressor section has variable threshold and ratio (1.5:1 to 10:1) controls, and switchable attack and release

times. The EQ can be switched into the compressor sidechain for de-essing. The expander/gate section features variable threshold and release time controls. The gate/expander may also be triggered from an external source, and the Key Input Select button also puts the EQ filters in the gate sidechain. A ten-element LED VU monitors input level and compressor/gate gain reduction. Price: \$1,599.

The Vac-Rac™ 4000 Modular Vacuum Tube System from **Inward Connections** is based on a three-rackspace chassis with space for four individual modules plus a common power supply. As the three available Vac-Rac modules are a mic pre, a limiter and an EQ, the system may be easily configured as a voice processor (for a total cost of \$4,027). The TMP-1 Tube Mic Preamp (\$780) offers a VU input meter and front panel toggle switches for 48V phantom power, -20dB pad, polarity reverse and line/mic input select. A ¼-inch front panel jack accepts instrument level inputs. The TEQ-1 Tube Step Equalizer (\$1,078) offers 15 center frequency points in three overlapping ranges, plus switchable high/lowpass filters. The high and low EQ bands are switchable

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to peaking or shelving characteristics. I/Os are both XLR and TRS. The TLM-1 Tube Limiter (\$879) has switches for bypass, stereo link and VU meter select to read output or gain reduction. Limiter ratio is fixed, and the two rotary knobs are marked Gain and Reduction. The VRC-1A mainframe with power supply unit is priced at \$1,290.

Joemeek offers four different flavors of voice processors. The VC2 Tube Channel is a two-rackspace unit combining a direct-coupled, transformer-balanced mic preamp with dual line amplifiers, a photo-optical compressor and a Joemeek Sonic En-

hancer, followed by a tube drive section. The mic pre offers a 20dB pad, 48V phantom power, polarity reverse and LF roll-off filter. There is also a line/mic switch, and rear panel XLR inputs for line and mix sources that allow an additional line input to be added to the compressor input. A switch selects between 200- and 50-ohm mic impedances. The compressor has variable attack and release controls, two compression ratios (approx. 5:1 and 3:1), and an insert path is accessible. A VU meter is switchable to display input or gain reduction. The En-



Joemeek VC6 MeekBox

hancer section adds second-order harmonics via Q "filter" and Enhance pots. Tube drive is controlled by an additional tube amplifier and gain output pot. Price: \$1,999.99.

The **Joemeek** VC1 Studio Channel is similar to the Tube Channel (though it uses a different input transformer) and lacks only the latter's tube drive section. The VC1 features a front XLR mic input and a 1/4-inch instrument input in addition to rear panel mic and line XLR inputs, and has phantom power, 20dB pad and highpass filter switches. The compressor offers variable compression ratio, attack and release controls. The unit is stereo-linkable and features a balanced XLR DI out for stage applications. Price: \$1,099.99.

The **Joemeek** VC3 Pro Channel combines a mic pre, compressor and enhancer in a half-rack format. The unit accepts both line and mic inputs and has two line-level outputs. Additional features include 48V phantom power, insert point and five-segment LED meter. Price: \$399.99.

Introduced at Winter NAMM, the **Joemeek** VC6 MeekBox is a single-rackspace device with an electronically balanced mic pre, a compressor, an enhancer and a gain makeup section. Similar in most respects to the VC3 Pro Channel, the VC6 also offers variable compression ratio, 1/4-inch instrument input and internal power supply. Like the VC3, the MeekBox provides insert and mix inputs and dual line outputs. Price: \$599.99.

The Classic Channel from **LA Audio** is a solid-state, single-channel device in a two-rackspace box. Its preamp is the same as that used in the company's Classic Equaliser; inputs are XLR (mic) and 1/4-inch TRS (line). The mic preamp includes 48VDC phantom power, a variable highpass filter and 12kHz low-pass filter. An LED clip indicator alerts the user to input overload conditions. The EQ section is 4-band, with HF/LF shelving filters with two switchable frequencies. The two mid EQ bands are sweepable. The compressor has variable threshold, attack and release controls and a de-ess function (a high-frequency filter is inserted in the sidechain). Ratio is switch-selectable. Two VU meters provide simultaneous metering of output level and gain reduction. Two units can be linked for stereo. Inputs and outputs are XLR

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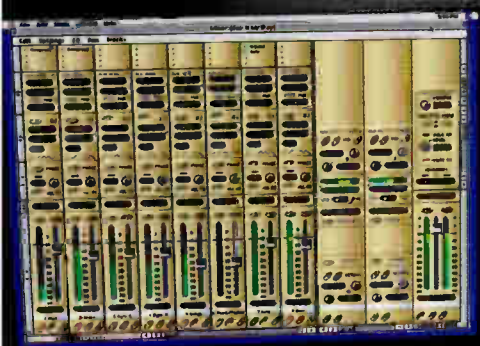
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transformer-balanced for the main signal path and -10/+4dB output levels are selectable. Insert and compressor sidechain send and return connectors are 1/4-inch TRS. Price: \$1,399; an optional 20-bit A/D module is \$639.

LA Audio's MPX1 Multi Processor is a single-rackspace unit with a mic pre/line/instrument input, de-esser, expander, compressor/limiter and 4-band EQ. The mic preamp has phantom power, polarity reverse, 20dB pad and a DI. All compressor parameters are adjustable, and soft- and hard-knee characteristics are selectable. The EQ provides high/lowpass filters, fixed high and low EQ and parametric low/high-mid sections. LED metering indicates gain reduction and output levels. An optional 20-bit A/D module offers AES/EBU or S/PDIF outputs, dithering and external word clock input. Price: \$449.

The VOXBOX from **Manley Laboratories** is a combination tube mic preamp, compressor, 33-frequency Pultec-style EQ, de-esser and limiter, all contained in a 3-rackspace chassis. The mic pre has 48V phantom power, polarity reverse, 80/120Hz highpass filter and 50 dB of gain. Line inputs (XLR and 1/4-inch) and a front panel instrument DI pass through an input attenuator. The compressor, placed before the mic pre in order to avoid overload and simplify the circuitry, is an opto-compressor design offering variable threshold, a single ratio (3:1) and five switchable attack and release times. The EQ section emulates the Pultec and offers three overlapping bands, each provided with 11 center frequencies. A de-esser/limiter section provides four de-essing frequencies and shares a common threshold control with the 10:1 limiter. Metering is via a single VU meter that's switchable among five different points in the signal chain. Additional features include all Class A circuitry and stereo link capability. Price: \$4,000.

Rane Corporation's VP12 voice processor, a single-rackspace unit, has mic (with phantom power) and line inputs, variable low/highpass filters, de-esser, noise gate, compressor and 2-band parametric EQ. The input section allows both mic (XLR) and line (TRS and screw terminal) inputs to be combined for simultaneous processing. The de-esser provides variable frequency and threshold controls and three ratio settings. The gate/expander provides variable threshold, and three expansion ratios. The compressor of-

—CONTINUED ON PAGE 203

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World Radio History

Wiring, A Guide Patching and For the Interconnecting Project Studio



W

hen wiring your project studio, the first thing to consider is the same thing we think about when wiring large facilities: AC power and grounding. I won't go into detail on ensuring adequate power and ground systems, as there are numerous good articles on this subject.

This time, let's focus on a narrow aspect of studio wiring, the nuts and bolts of choosing a patching and wiring approach. I am assuming that the reader has a grasp of AC

power requirements, grounding, shielding and balanced vs. unbalanced wiring. Because if you don't, you need to start there.

This article applies to audio production facilities of all kinds: music rooms, post rooms, edit suites, etc. However, broadcast and A/V systems have some different criteria that are not addressed here.

By David Carroll

PATCHBAY BASICS

If you have a workstation, an MDM or two, a small console, and you keep the setup consistent from day to day, you may have no need for patching. However, if you're constantly going behind the console and dealing with a rat's nest of disorganized cables and you have lots of versatile equipment, then you probably need to install a patchbay. Think of the patchbay as an organization system for your signals. The idea is to wire every input and output on your equipment to the bay and create normal paths so that the system is set for normal operation without plugging in a

PHOTO ILLUSTRATION: TIM GLEASON



patch cord. Every signal is available in one place for re-routing or troubleshooting. If you want to change modes, you start patching—to return to normal, simply pull out the cords. And think: You will never again have to search for an adapter cable; that's all been handled on the rear side of the bay!

You can choose from three types of bays: miniature telephone type (TT, bantam or mini), 1/4-inch full size military style ("long frame") or 1/4-inch musical instrument style. The patchbay you select is a trade-off of the following criteria:

- Cost: MI-styles (1/4-inch or RCA) are inexpensive, while long frame and TT are more expensive.
- Reliability: Long frame and TT are more reliable.
- Density: TT offers more patch points per rack unit.
- Compatibility: You may want to stay with the type you already have, but these are only rules of thumb. Other factors, such as quality, availability, labeling

QUICKTIP

THE QUALITY CONNECTION

Whether onstage or in the studio, solid connections are an essential part of what makes for clean, dependable audio flow. There's little point in spending thousands on your audio rig if you are going to save a few bucks by using cheap, low-quality

connectors or cabling. Often the difference between a low-cost cable or connector is simply that a quality interconnect is something you buy once and later forget about, while the budget alternative will fail sooner, and usually at some inopportune moment. Go smart and go with decent-quality interconnects. You'll sleep easier at night.

—George Petersen

options, normalizing options and termination will affect your final decision.

Once you've determined your patchbay style, we get into the nitty gritty. This is a pet peeve of mine, but most operators and studio owners couldn't care less what the back of the rack looks like. But if the key to success in real estate is "location, location, location," the key to patching nirvana is "flexibility, flexibility, flexibility." You

may think "just hook it up—we're never going to change it," but keep Murphy's Law in mind: Change is the rule—not the exception—in every studio I've ever worked in. Plan for change now, before you dig yourself in deep.

Why do you need flexibility in the wiring? Because as soon as you change even one piece of equipment, chances are that the changes will ripple across the bay and down to the next one, forc-

PATCHBAYS AT A GLANCE

Manufacturer	Model #	Front Jacks	Jacks Rows	Rear Termination	Strain Relief	Chan. Quantization	Tooling Options	Normalizing	Size	Price	Phone
ADC	PPB3-14MKIHN	TT	48x2	QCP	B	1	punch	N, H	2U	\$1,250	612/938-8080
ADC	PPB3-14MKIENH	TT	48x2	Elco	C, BS	24	crimp	N, H	2U	\$1,300	612/938-8080
Audio Accessories	WQP-07	TT	48x2	QCP	B	1	punch	N, H	2U	\$1,065	603/446-3335
Audio Accessories	WP-HN-48	TT	48x2	Edac 90	C	24	crimp	N, H	1U	\$1,034	603/446-3335
AVP	R96-QS-HNJ	TT	48x2	AVP	B	1	punch	N, H	1U	\$1,172	800/481-2493
AVP	C96-E90-1NJ	TT	48x2	Edac 90	C, BS	24	crimp	N, H	1U	\$1,099	800/481-2493
Bitree	APP96S	TT	48x2	Elco 90	C, BS	24	crimp	N, H, F	1U	n/a	818/500-8142
Bitree	APP96T	TT	48x2	Elco 3	none	1	crimp	N, H, F	1U	n/a	818/500-8142
DBX	PB40T	1/4" Bal	20x2	1/4" Bal	none	1	none	N, H	1U	\$180	801/568-7660
Furman	PB40P	1/4" Unbal	20x2	1/4" Unbal	none	1	none	N, H	1U	\$165	707/763-1010
Mosses & Mitchell	JAS 00101	TT	48x2	Edac 56	B	16	crimp	N, H, F	1U	\$1,093	310/452-4995***
Neutrik	NYS-SPP	1/4" Bal	24x2	1/4" Bal	none	1	none	N, H	1U	\$101	908/901-9488
Neutrik	NPP-TT	TT	48x2	spring terminal	B	1	none	N, H, F	1U	\$757	908/901-9488
ProCo	PM-148	1/4" Unbal	24x2	1/4" Unbal	none	1	none	N, H, F	1U	\$333	616/388-9675
Re-AN	RPM-48S	1/4" Bal	24x2	1/4" Bal	none	1	none	N, H	1U	\$179	201/828-7266
Re-AN	RPM-48M	1/4" Unbal	24x2	1/4" Unbal	none	1	none	N, H	1U	\$189	201/828-7266
Signal Transport	PP-96-1	TT	48x2	24-pin .10 hdr	tray	8, 4 or 2	crimp	N, H, W, M	1.5U	\$795	510/528-6039
Signal Transport	PP-96-2	TT	48x2	24-pin .10 hdr	tray	8, 4 or 2	crimp	N, H, F, D, R	1U	\$795	510/528-6039
Signal Transport	PP-48-1	1/4" Bal	24x2	24-pin .10 hdr	tray	8, 4 or 2	crimp	N, H, W, M	1U	\$275	510/528-6039
Switchcraft	TT96EDACNS	TT	48x2	Edac 90	C, BS	24	crimp	N, H	1U	\$2,084	773/792-2700
Switchcraft	TT96A	TT	48x2	IDC	B	1	punch	N, H	1U	\$2,027	773/792-2700
Tascam	PB-32B	1/4" Bal	16x2	1/4" Bal	none	1	none	N, H	1U	\$210	213/726-0303
Tascam	PB-32P	1/4" Unbal	16x2	1/4" Unbal	none	1	none	N, H	1U	\$185	213/726-0303

* The abbreviations in the "Strain Relief" column refer to the following: B = bar; C = connector; BS = back shell.

** Normalizing Options: N = no normalizing; H = half normalizing; F = full normalizing; W = wild; M = mult; D = double; R = reverse.

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Note: The above table is a representative sample of available patchbay products. Specs and prices may change, so contact manufacturer for more details.

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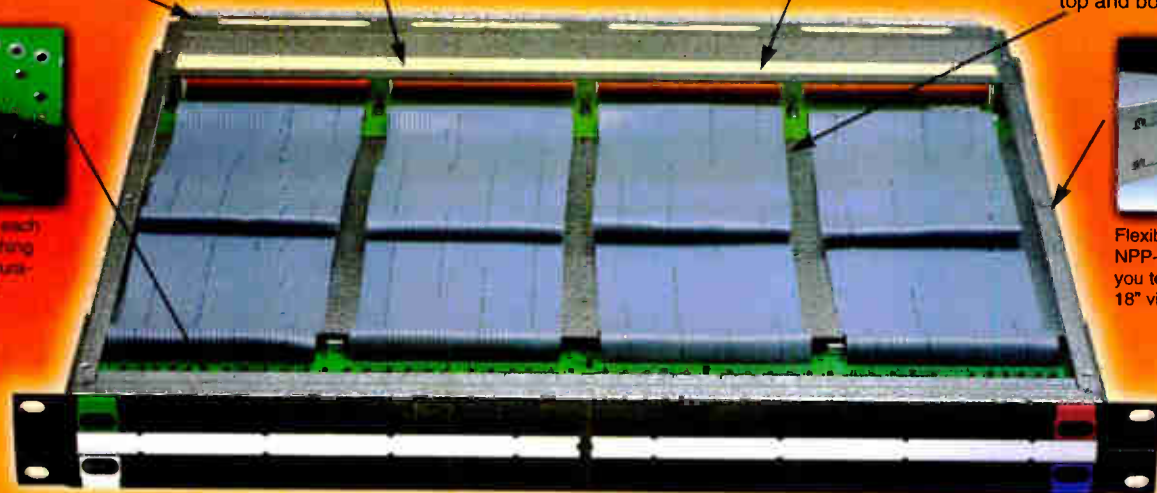


Heavy duty cable bar

Elco/Edac connections

Spring loaded terminal blocks

Metal shielding between ribbon cables top and bottom



Flexible rack depth: NPP-TT/TB-14 allows you to go from 14" to 18" via built-in slider.

The Easy Patch series of easy to use patchbays eliminates signal degradation and offers excellent crosstalk performance required in today's broadcast facilities, mobile trucks, recording studios and audio installations.

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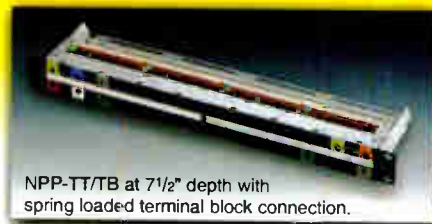
The Easy Patch gives you features and options no other patchbay provides:

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NPP-TT/TB at 7 1/2" depth with spring loaded terminal block connection.

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ing a reconfiguration of the wiring—especially if you want the new layout to continue to make sense.

PLANNING

You can't accomplish a neat job without planning. Do a complete patchbay layout that shows all of the normals. Make a wire-list from this and assign a unique wire number to each cable going from the patchbay to equipment. Think about the physical routing of the cables, and do a quick study of "cable loading" (how big are the bundles?) at each point of the room. Perhaps you are planning on running cables under

the floor or into a wall chase or conduit. Is that space adequate for the bundles? If not, now's the time to think about making chases in the furniture, enlarging the floor trough, etc.

NEATNESS

It's difficult to find anything in a jumble of wires. Keep your installation neat! If your cables are custom-made to exact length, then you can have it neat everywhere, nice combed out bundles, etc. If the cables are "stock" lengths, then find a place to stash the excess cable, preferably in a place away from any foot traffic. Think about creating "slop space"

for cabling excess. This can be in the kick space under a rack, in the floor or in a wall chase. Don't just let cables spill out on the floor!

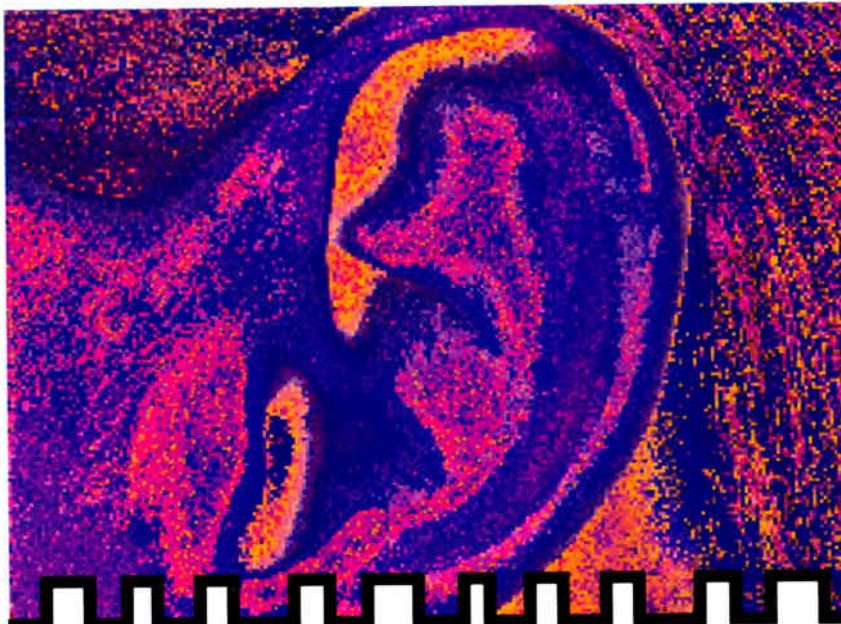
TERMINATION

"Connectorized" patchbays provide some type of termination at the rear of the bay for source and destination cables. If you're handy with a soldering iron, or if you have access to skilled wiring labor, you may choose to solder the cables directly onto a "raw bay" with no such termination. While this may seem inexpensive, it is the least flexible and therefore will cost you the most down the road when it's time to make changes. I have seen countless hard-wired bays pulled out of studios and replaced with connectorized bays at upgrade time. In contrast, many connectorized bays we installed years ago are still in service—some in their second and third installations. This article is devoted to connectorized bays exclusively.

Termination types range from solderless "punchdown" type contacts to individual plug-in style connectors (TRS, RCA, ¼-inch, etc) to multipin connectors such as Elco/Edacs. The best choice depends on another series of trade-offs:

In terms of interconnects, "channel quantization" doesn't refer to how to fix your sixteenth notes, it's how many channels go into each connector. A bay with ¼-inch phone plugs on the back has a quantization of one, and you are free to move a single channel at a time from position to position. A bay with Elco/Edac 90-pin connectors on the back has a quantization of 24 channels, meaning that you can only move an entire block of 24 at a time unless you go into the connector and start re-pinping. It may make sense to mix and match termination types depending on what application. For example, you could use an 8-channel quantized bay for your bus out, tape in, tape out, line in bay, but switch to a 1- or 2-channel quantized bay for 2-track, outboard processing, and other signals which diverge to the four corners of the room. Punchdown type bays inherently have a 1-channel quantization and therefore are extremely flexible. Multipin bays have larger quantizations and therefore are convenient for multichannel devices.

Most types of termination require specialized tooling. Punchdown blocks require punch tools. Multipin connectors require expensive crimp tools. (Don't gamble on the cheap "universal" crimp tools—the tolerances are extremely tight, and if you want your con-



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• Output THD+N < -90dB (at 1kHz -2dBFS)

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8 Balanced Analogue Outputs

TDIF Digital I/O



8 Balanced Analogue Inputs

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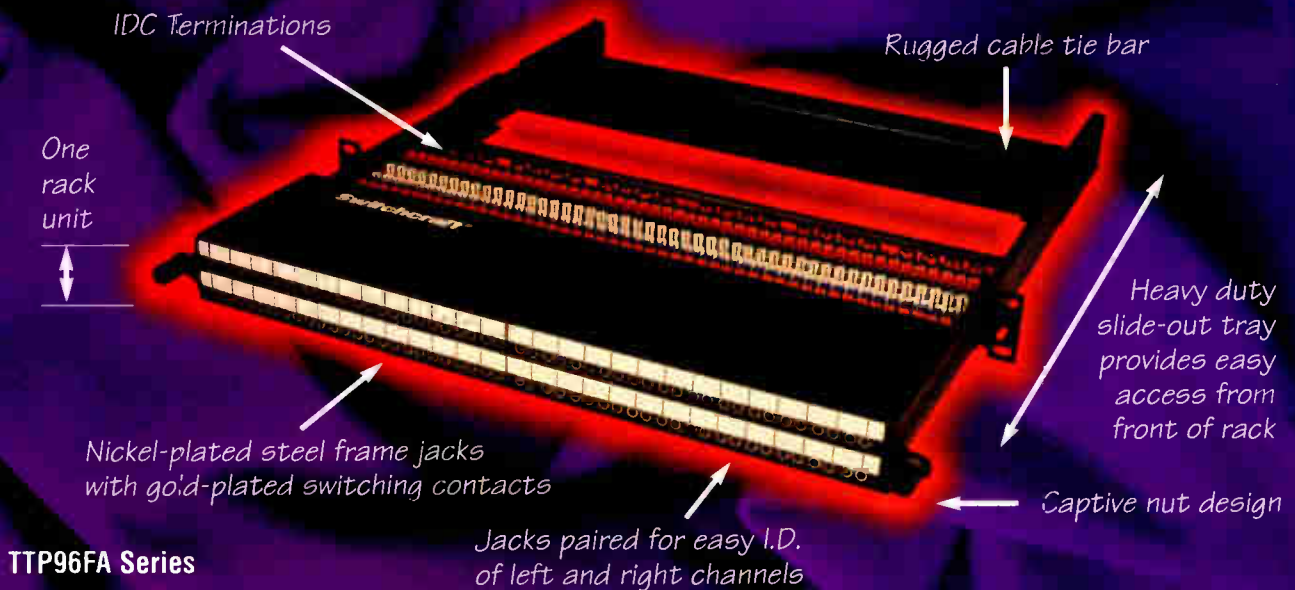
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Patch Kits

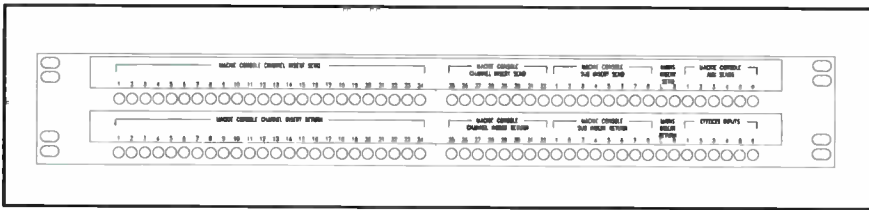
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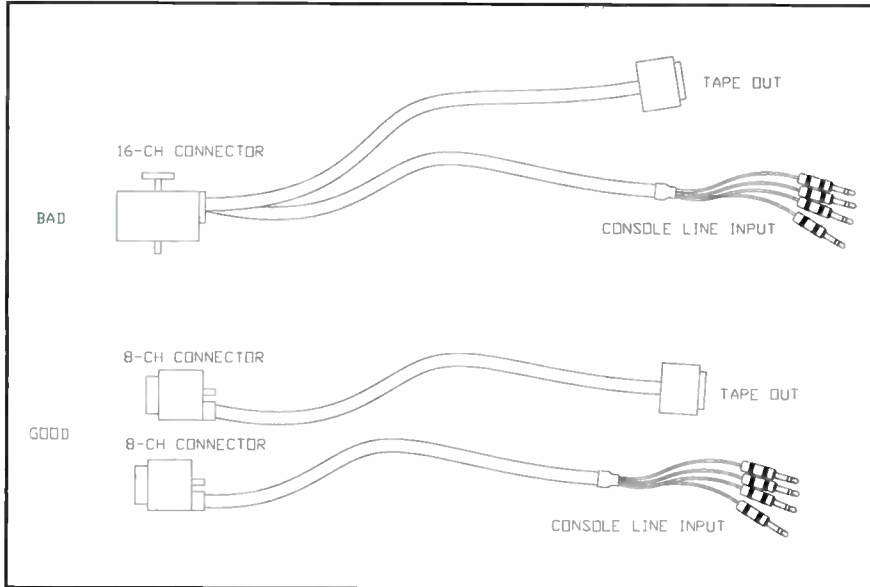
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Above: Sample patchbay layout—note that the console sends/returns are stacked, thus simplifying operations. Below: Two methods of breaking lines out of a multiconnector; combining different connectors from a single multipin reduces flexibility when changing setups later.



nection to last, it needs to be gas-tight. The only reliable way to do that is with the manufacturers' recommended tooling, which commonly costs about \$150. Consider how you are planning to build the room. Will your technicians have the skills and tooling required? Plug-in bays with prefab cables require no special skills. Punchdowns require modest skill level. Soldering requires the most. Crimping falls somewhere in the middle.

The termination type directly influences the amount of space required. Multipin connectors require the least space, punchdown panels the most. Some patchbays are available with punchdown panels on umbilical cords to allow mounting on the rear rails of the rack or even outside of the rack in furniture or on a wall. The front density (patchbay type) is limited to the rear density (termination type) unless the termination panel is removed. If punchdown panels fill up the rear of the rack, you won't be able to get at the rear of any equipment mounted in the front, above or below the patchbay. See the section on density below.

PREFABRICATION

Try to avoid making connections while

sitting cross-legged behind the rack. This occupation leads to eyestrain, backstrain, kneestrain, burned fingers, miswired racks, shorts and intermittents. Other than that, it's okay, but I've found it very helpful to plan out the installation and build all of the cables on the bench. That way you can see what you're doing, test it before you use it, and enjoy life more.

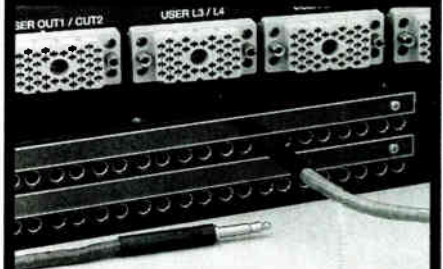
It's easiest and most flexible to make simple cables that go from one connector to another without "Y" connections. Take this into consideration when you choose the bay type and do the layout. Simple cables are reusable and can be more easily reconfigured.

CABLE MANAGEMENT

This is a fancy term for keeping your cables neat and organized. There are lots of useful products available to help you in that pursuit, like tie-wraps, tie-wrap blocks, metal rings, cable chase and gutter, conduit, tray, floor troughs, etc. The better you plan your installation for the requirements of cable management, the more flexible it will be because you will avoid overloading the available space with cables.

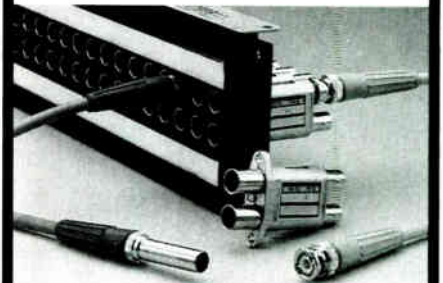
For example, consider the patchbay rack itself. As all of the cables for the

Patching Equipment



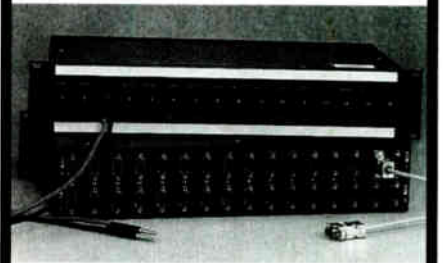
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World Radio History

Circle 48 on Reader Service Card

system go through this rack, it needs the most attention. Try to provide some kind of vertical cable chase, gutter or cable clamping in the rear of the rack. Also, if the number of patch points exceeds 300 or so (three TT bays), I recommend that the cables be run to the side of the rack with a feed into the rack for each bay. Otherwise the bundles get so big that you can't get past them.

Watch out: Neat dress can get the better of you. I have seen many gorgeous wiring jobs, where a huge bundle of single pair cable is neatly combed out parallel, with perfect exits

and entrances—a work of art! We've built bays like that ourselves. The problem is change: Murphy says you will have to move the cable that's in the exact center of the bundle! Save the beauty work for the "permanent" wiring: trunks to tie panels, multitrack, etc. Where you may encounter change, it's best to use loose dress cable management hardware that allows a cable to be pulled out or slipped in place without loosening a million tie-wraps and destroying a work of art.

EXPANSION SPACE

Don't forget to leave enough room for

additional patchbays and the cables that go with them in your rack layout.

DENSITY

There is such a thing as too much density. For punchdown panels, I feel that four rack units per 100 points is appropriate. Multipin termination can be done effectively in less space. You must consider the type of cable you will be using. The mix of single-pair and multi-pair cable affects the total bundle size, which should limit the practical density of the bays.

LABELING

All cables should be labeled at both ends. In a small one-room studio, it's sufficient to label it with the "functional name"—for example, "Mackie line in 1-8." In larger rooms and facilities, it's necessary to provide a unique wire number to cross-reference to a wire list and line drawing if available.

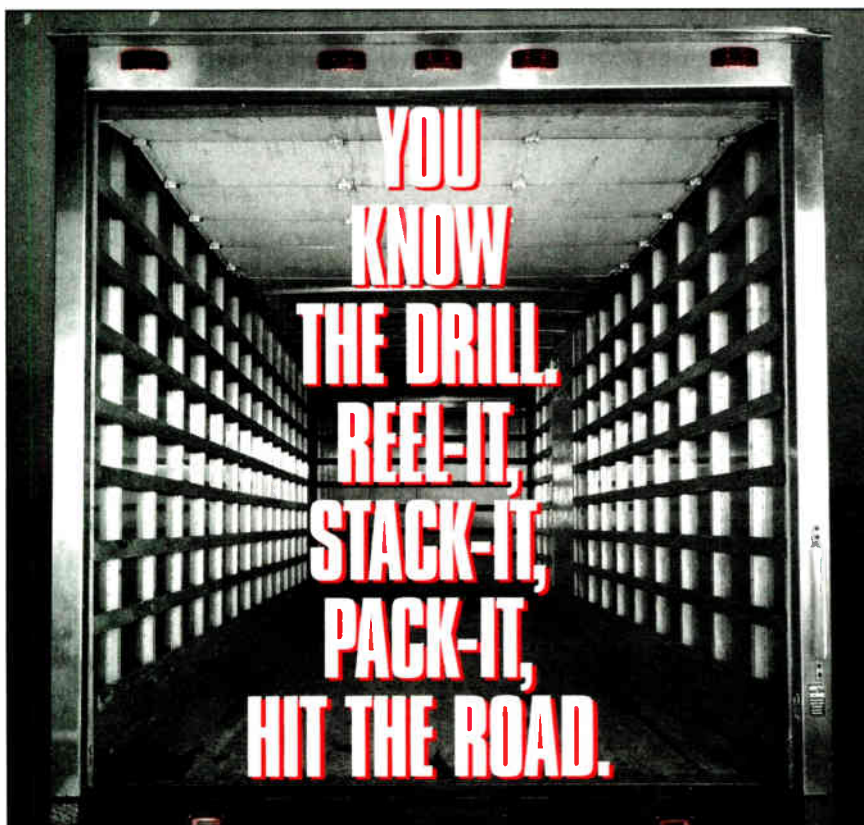
NEATNESS (AGAIN)

Did I say "neatness" before? It really contributes to flexibility because if things are neat, they are easy to find and change. But you have to set a standard and stick to it. I call it the organized mess. Start with it and keep it up, and you will never be cursed by anyone working in your room (not even yourself!).

WRAPPING IT UP

Although patchbays, cabling and interfacing are hardly the glamour aspects of any studio installation, effort (and a comparatively modest investment) spent in this area now will certainly pay off later, eliminating future problems and simplifying life in the production environment. And even little touches, such as documenting the wiring system and marking the cabling, may seem trivial now, but will save hours of time when it comes to troubleshooting and/or expanding the system down the road. ■

David Carroll founded DCE (David Carroll Electronics), a design/installation/fabrication firm in 1985; among the company's first projects was wiring the Skywalker Ranch. In 1995, Signal Transport was formed to bring some of the custom products (such as Project Patch, SynthDriver and Swing Rack) DCE developed to market. Recent DCE projects include post rooms and mix theaters for Fox and the animation groups at Disney and Warner Bros., as well as the all-digital sound system for the U.S. Senate.



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PREVIEW

ALESIS ADAT XT20

Debuting at last month's NAMM show was the ADAT XT20 from Alesis (Santa Monica, CA). The ADAT XT20 offers an improvement in audio quality over the ADAT XT by implementing ADAT Type II 20-bit recording capability previously offered only in the M20; both A/D and D/A converters are 20-bit. Designed for project and professional studios, the XT20 replaces the XT in the Alesis' recording product line and lists for \$2,999, \$500 less than the previous XT. It operates in either 20- or 16-bit mode and is compatible with the BRC remote control.

Circle 327 on Product Info Card

M&K POWERED THX SUBWOOFER

Miller & Kreisel (Culver City, CA) debuts the MX-5000THX™ Mark II powered subwoofer, which features dual magnetically shielded 12-inch woofers and an M&K Active Balanced push-pull dual driver amplifier capable of 400+ watts continuous RMS, exceeding THX specifications. The sys-



tem's response is reportedly flat (± 2 dB) to well below 20 Hz. Selectable low-pass filters offer 36dB/octave slope adjustable between 50 and 125 Hz and a 24dB/octave 80Hz filter for use with M&K satellite systems. A bypass switch allows for integration with THX and Dolby Digital™ processors. Dimensions are 23.25x15.5x26 inches. Weight is 115 lbs. Price is \$2,695.

Circle 328 on Product Info Card

FAIRMAN TUBE MASTER COMPRESSOR

Fairman (distributed by ATR Service Company, San Mateo, CA) debuts the Tube Master Compressor, a massive 6U rackmount unit that provides two channels of tube compression "for professionals who want analog warmth." Controls include rotary pots for Threshold, Attack/Release and Makeup Gain adjustment and Bypass and Stereo Link switches. VU meters indicate level or gain reduction. Price is \$9,500.

Circle 329 on Product Info Card



SPIRIT ABSOLUTE 4P NEAR-FIELDS

Spirit by Soundcraft (Auburn, CA) offers the Absolute 4P near-field speaker, a bi-amplified design featuring two integral 100-watt amplifiers and a constant-voltage time-aligned active crossover. Amps offer thermal and driver protection circuitry and stepped input level control for accurate setup. The woofer includes a 30mm edge-wound voice coil with Kapton former and vented pole piece. The soft-dome HF tweeter features a 25mm ferro-fluid-cooled coil. Designed for flat on- and off-axis response, the system includes a switchable 40Hz highpass filter. Price is \$1,195.95/pr.

Circle 330 on Product Info Card

EARTHWORKS Z30X CARDIOID

Earthworks (Wilton, NH) introduces the Z30X cardioid condenser microphone. Features include smooth frequency response to 30 kHz, reduced proximity effect, flat off-axis response and

superior 180° rejection. Price is \$750.

Circle 331 on Product Info Card

BARBETTA DIVA GENESIS MONITORS

The Diva Genesis 8 and Genesis 10 reference monitors from Barbetta Manufacturing (Moorpark, CA) are MOSFET powered bi-amplified systems containing 8- and 10-inch woofers respectively. Both systems feature a titanium dome tweeter mounted to a rigid metal plate to eliminate phase distortion and improve dispersion. Cabinets are high-density polyurethane and wood fiber matrix bonded to a heavy steel liner for magnetic shielding for use near video monitors. The individual power amps are matched to the speakers to optimize power transfer and minimize distortion, and are rated at .0002% distortion at full power; total RMS power is 180 watts, with peak rating of 360 watts. Connectors are XLR and ¼-inch. Genesis 8 is \$1,395/pair; Genesis 10 is \$1,595/pair.

Circle 332 on Product Info Card



dCS 96KHZ D/D CONVERTER

dCS Ltd. (distributed by Canorus, Nashville, TN) offers the 972 DDC digital-to-digital sample rate and format converter. The 972 DCC accepts digital audio information at up to 24-bit/96kHz resolution and outputs to the four principle digital interface formats: AES,

PREVIEW



dual AES, S/PDIF (on RCA, BNC and Toslink connectors) and SDIF-2. Features include selectable sample rates from 11.025-96 kHz, and first, third and ninth-order noise shaping options.

Circle 333 on Product Info Card

DIGITAL DESIGNS STUDIO MONITOR

The DD161d Series studio monitor from Digital Designs (Oklahoma City, OK) features a 6.5-inch woofer and an aluminum, alloy dome tweeter on a precision acoustic lens. Soft polymer suspension, tuned back cavity and ferrofluid cooling reduce tweeter resonances. The cabinet features three bass response characteristics, selected by removing a foam port plug. Frequency response is 45-22k Hz \pm 2dB. Features include midrange EQ switching, gold-plated five-way binding posts and solid-state, self resetting fuse. Price is \$699/pr. (cabinets are mirror-imaged).

Circle 334 on Product Info Card



FRONTIER DESIGN GROUP ZULU ADC

Frontier Design Group (Lebanon, NH) has introduced the Zulu™ multichannel ADC, a half-rackspace unit that provides four analog inputs, eight analog outputs and ADAT optical I/O. Sampling rate is variable between 39 and 51 kHz, and the unit operates at 20-bit resolution with 128x oversampling converters. Connectors are 1/4-inch unbalanced jacks, and the front panel offers bi-color level indicators. Price is \$598.

Circle 335 on Product Info Card

HOT OFF THE SHELF

The 48-point RPM-48CH patch panel from Re'an features a stainless steel finish and offers balanced 1/4-inch TRS jacks configured for normal, half-normal, or operation. Each modular channel card can be de-normalized in seconds by rotating it 180 degrees. Price is \$225. Call 415-492-9600 or e-mail reanace@aol.com... Real Hollywood Sound Effects Vol. 1—*Science Fiction and Fantasy*, a 54-track collection by sound designer Alan Howarth, has been released by GNP Crescendo Records. Call 800/654-7029... Auralex has introduced the Low End Node Reduction Device (LENRD™) affordable bass trap, an acoustic foam product that yields an NRC rating of 1.35. LENRDs measure 24 inches long, may be mount-

ed in corners, and are shipped eight to a box, allowing for 16 linear feet of bass trap. Call 317/842-2600... Neumann USA now makes selected microphone models available in matched stereo pairs. Neumann U87Ai, U89i, TLM170R and TLM193 models are now available in consecutively numbered pairs and, together with accessories, are shipped in a custom aluminum briefcase. Call 860/434-5220 or visit www.neumannusa.com...

DataTel's new swing gate racks allow racked equipment to be swung out from a wall-mount position for wiring, inspection and repair. Racks will hold up to 150 lbs of equipment. Models are available in 12- and 18-inch depths and heights of 24 and 36 inches. Prices begin at \$253.50. Call 201/839-1011... DK Audio's new MSD600C/MkII stereo display now offers color and a VGA monitor output. The MSD600C/MkII is a combined phase meter, audio vector oscilloscope and level meter and will operate in both analog and digital modes. Price is \$4,750.

Call 805/373-1828 or visit www.tcelectronic.com... *EDN Design Ideas on CD-ROM* from Newnes compiles three years of articles from the magazine in one easily searched reference work. The PC-compatible CD-ROM includes hundreds of circuit design ideas, illustrated by schematic diagrams, and features search, bookmark, notes and highlighting functions, plus direct access to sponsors' Web sites via an Internet connection. Call 800/366-2665 or e-mail to

orders@repp.com... The Hollywood Edge offers two new sound effects collections—the ten-disc Worldwide Sports Edition and the 15-disc Sounds of Speed. Call 800/292-3755 or visit www.hollywoodedge.com... Middle Atlantic PIRK Series rolling racks can house up to 500 lbs of equipment. Available in 14- and 21-space models, the racks measure 22 1/2 inches wide and 23 inches deep and are equipped with heavy-duty lockable casters. Rack rails are adjustable, and the units feature front and rear door key locks. Prices start at \$522.25. Call 201/839-1011... Promusic introduces the 75-disc Broadcast Plus collection of production music in full, commercial and tag-length edits. An annual license is available. Call 800/322-7879 or e-mail Promuse@aol.com... Troy Sound Wall Systems offers an acoustic wall system that achieves the highest transmission loss (TL) values ever recorded under laboratory conditions. When tested at Riverbank Acoustical Laboratory in Geneva, IL, the Troy product merited a Sound Transmission Class (STC) rating of 72, indicating that the system can attenuate sounds through a wall by 72 dB SPL, surpassing THX rating criteria. Call 800/987-3306... Acoustic Journey is the latest addition to JRT Music's Image Music Library of production music. Tracks cover Far East, Gypsy, Spanish, African Ritual, Modern European Dance, American folk and Mediterranean themes. Call 212/253-8908 or e-mail jrtmusic@earthlink.net. ■

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In addition to standard, off-the-shelf systems, and "semi-custom" systems made from pre-defined components, a large percentage of our business is full custom. This means that you can enjoy the benefits of a lower price for systems we've done so often they're standard, and the complete flexibility to get **exactly what you want** for systems that are truly one of a kind.

Our sales and engineering crew logs a lot of their "spare" time doing live and studio sound gigs. As a result, our cabling products are constantly evolving to better serve your needs. Good examples are our new Snakeskin® protective monofilament braid for protecting vulnerable fanouts, and the field pinnable MASS connectors we introduced last year.

Whirlwind wiring systems and electronic peripherals are standard equipment for Olympic broadcasts, major awards shows, theme parks, touring sound rigs, production facilities, entertainment complexes and project studios around the world. For not much more, these audio professionals are protecting the critical link between their work and their results.

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TC Native reverb is the first in a range of native processing plug-ins from TC Works, a division of TC Electronic (U.S. offices in Westlake Village, CA). TC Native is compatible with applications supporting DirectX or VST, and features ROM presets created by audio engineers in real-world situations, with an intuitive interface that provides a graphical overview of parameters. Suggested price: \$549.

Circle 336 on Product Info Card

PINNACLE PROJECT STUDIO

Turtle Beach Systems (Yonkers, NY) introduces the Pinnacle Project Studio, a low-cost desktop digital audio production system for Windows. PPS retails at \$599 and features CD-quality multitrack hard disk recording, dual Kurzweil synthesizers, MIDI interface, S/PDIF interface, and a full version of Voyetra Technologies' Digital Orchestrator Pro sequencing package.

Circle 337 on Product Info Card

ARBORETUM RAY GUN

Ray Gun is a new noise-reduction software package from Arboretum Systems (San Francisco). Ray Gun selectively removes hiss, hum, crackles, pops and other unwanted artifacts, while keeping the original signal intact. The software features spectral analysis and downward expansion algorithms derived from Arboretum's Ionizer package; list price is \$99.

Circle 338 on Product Info Card



DIGIGRAM PCX MULTICHANNEL CARDS

Digigram (Arlington, VA) recently debuted new high-performance multichannel PCXnp Series cards. The PCX800np, PCX801np and PCX440np cards use a new 32-bit driver (np), operate on the PCI bus and take advantage of the Motorola 56300 DSP. The new cards provide enhanced PCM performance, work with MPEG audio and are compatible with WAVE-compliant applications. Using multiple PCX cards, up to 32 physical channels can be supported simultaneously.

Circle 339 on Product Info Card

MAC THE SCOPE

Channel D. Corp. (New York, NY) introduces Mac the Scope, real-time spectrum analyzer and oscilloscope software for the Macintosh. Mac the Scope uses Macintosh built-in (or third-party) sound input and output hardware capabilities, and supports two 16-bit input channels at up to 44.1kHz sample rate on PowerPCs, with a simultane-

ous output of a user-selected stimulus source. Up to six traces—magnitude 1 and 2, phase 1 and 2, plus magnitude and phase transfer functions—can be displayed simultaneously in spectrum analyzer mode. The interface is designed like that of a regular oscilloscope, with color-coded "front panel" button controls. \$299.

Circle 340 on Product Info Card

UPGRADES AND UPDATES

Roland released the VS-CDR-S2, a new hardware/software bundle that lets VS-880 users burn CDs from the unit's SCSI ports...

Emagic announced that the latest version (3.0) of its TDM extension for Logic Audio MacOS fully supports Pro Tools 24-bit hardware. Download the upgrade at www.emagic.de. In other Emagic news, the Sound-scape extension for Logic Audio Windows 95 is now

shipping...New from Power Technologies: the DSP•FX Virtual product line, PC DAW-compatible versions of its effects algorithms. List: \$599...Merging Technologies introduces Pyramid Version 1.2; features include new recording options, library features, transport functions and information windows...Dig-o-Matic™ from Glyph Technologies is a low-cost (\$399), 2-channel PCI digital I/O card for Macintosh. A PC version is in the works...Antares debuts Auto-Tune, a multiplatform plug-in that corrects intonation problems either automatically in real time, or manually with a graphic editor...SEK'D America (formerly Hohner Midia) added CD-burning capability to Samplitude Studio. In other SEK'D news, PRODIF 24, Digital and Analog ARC 88s and Visualizer 2.5 are all shipping...Orban offers DSE users Audicity upgrade kits, available through any dealer...Sonus announces STUDI/O support for Steinberg software. The interface also supports Samplitude, SAW Plus, Sound Forge and other software packages via the supplied Windows audio drivers...Symbolic Sound Corp released a PCMCIA version of its Kyma workstation for laptops...HHB announced new file interchange capabilities between the Genex GX 8000 MO disk recorder and SADIE workstations...DiscJuggler CD duplication software from Padus can drive multiple recorders simultaneously, and supports robotic hardware such as auto-loaders and jukeboxes. ■

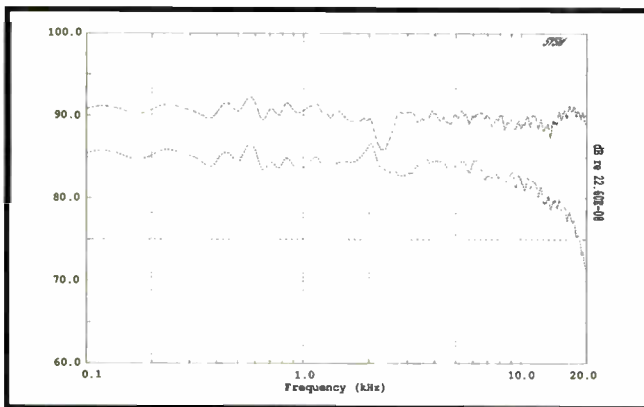
THE MIX SPEAKER TESTS

Quantifying the Characteristics of Studio Monitors

by Mike Klasco and Jack Hidley

Note: Starting this month, Mix is enhancing its loudspeaker "Field Tests" by adding a range of acoustic analysis results. The tests were performed by Menlo Scientific, an independent acoustical test facility in Berkeley, Calif. To help readers interpret the results of other monitors in the future, we examined characteristics of three near-field speakers that many readers would be familiar with: Genelec 1031s, Meyer HD-1s and the Yamaha NS-10Ms. The 1031s and HD-1s retail in the \$4,000/pair range. The NS-10Ms—priced about one-tenth that amount—were selected for their ability to translate to a "typical" home stereo bookshelf speaker, and because every studio seems to have a pair.—Ed.

Studio monitors are subjective tools, so why bother measuring speakers at all? Too often, manufacturers state speaker specifications that are questionable, either as a frequency response plot with a 90dB vertical axis, reproduced with a thick line that obscures a system's true performance, or response figures that are meaningless without a range specifier (such as ± 2 dB, ± 3 dB



On-axis (upper trace) and 30° off-axis (lower trace) frequency response of a Meyer HD-1. Note the smooth response and sharp roll-off above 15 kHz.

etc.). In such cases, an 8-inch ceiling speaker could spec out as 20 to 20k Hz (the ± 60 dB part of the spec is somehow omitted).

Is a perceived "midrange clarity" of some studio monitors merely a rise in the midrange frequency response, or because the speaker exhibits low distortion? Is "punchy bass" the result of a mid-bass bump in the frequency response, outstanding transient response with a fast settling time, low power compression or some other factor? For these, and dozens of similar loudspeaker personality characteristics, acoustic test instrumentation provides a quantitative analysis.

The acoustic analyzer used for the tests is called SYSid, short for SYSTEM IDentification. Developed by Bell Labs, SYSid is a PC-based system combining signal generation and acquisition and DSP, using an Ariel DSP-16 board. The measurement mic and preamp are Earthworks models M30 and Lab 1.

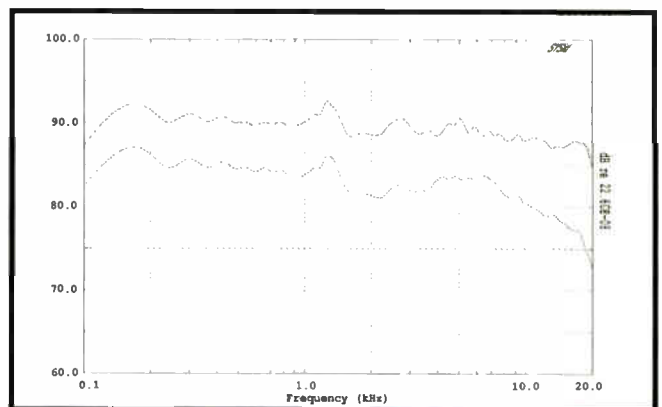
THE TESTS

The frequency response plot is taken from data collected both in the near field (1/4-inch) and at 1 meter. The close prox-

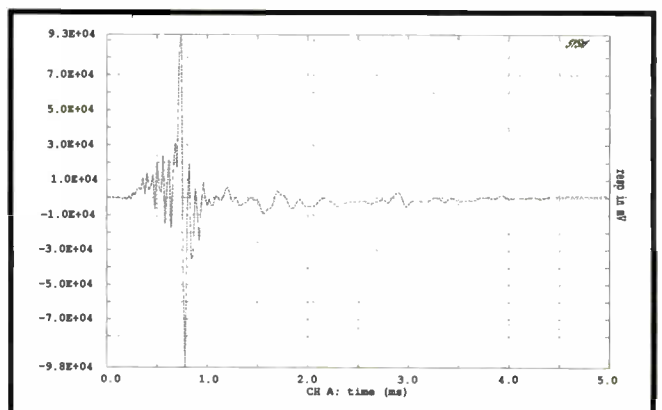
imity of the mic in the near-field measurements both loads the speaker diaphragm and creates reflections. By comparing the near-field and 1-meter data, room effects in the 1-meter data and mic reflections in the near-field test can be isolated and identified. We also measured each speaker 30° off-center (shown offset in the graphs by 5 dB for clarity), as off-axis response is important, particularly when reaching for controls or outboard devices located out of the "sweet spot." All frequency response measurements are made with a 40dB window, with each vertical division being 5 dB.

Transient response graphs reveal both a speaker's ability to reproduce the fast rise of an impulse and how quickly the speaker settles. If the speaker is still ringing from a previous waveform, it will mask the following waveform. The typical muddy sound of bandpass subwoofers, for example, is due to the long settling time of the enclosure design.

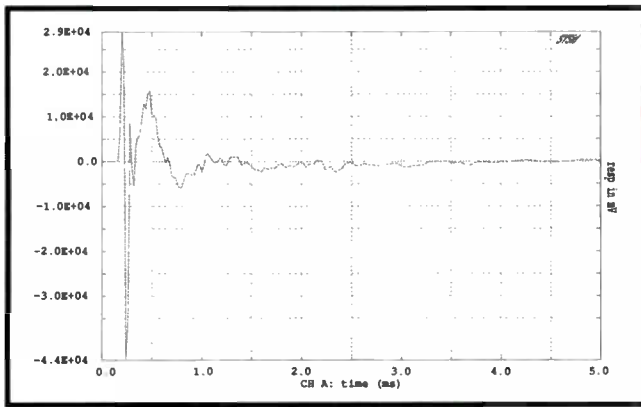
Harmonic distortion graphs show second- and third-harmonic distortion and total harmonic distortion, plus noise. There can be dramatic differences in distortion levels among speakers. Most "hi-fi" speakers typically exhibit about 1% distortion above bass frequencies. By contrast, some high-quality



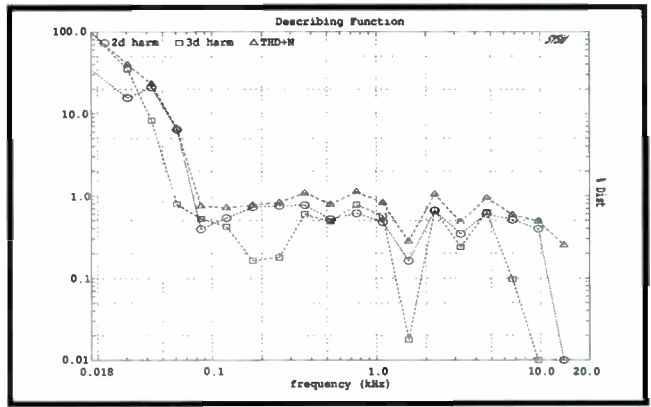
On-axis (upper trace) and 30° off-axis (lower trace) frequency response of a Yamaha NS-10M. Large peaks and dips in the crossover range like these are usually from crossover interactions.



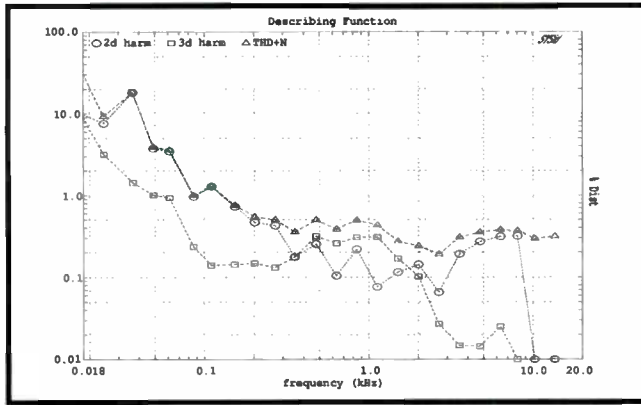
Impulse response measurement of Meyer HD-1, a powered monitor with internal signal processing that delays the tweeter's signal to align with phase of woofer output. Impulse response after initial pulse is quite good. The unusual preringing is the result of delay circuit in signal processor.



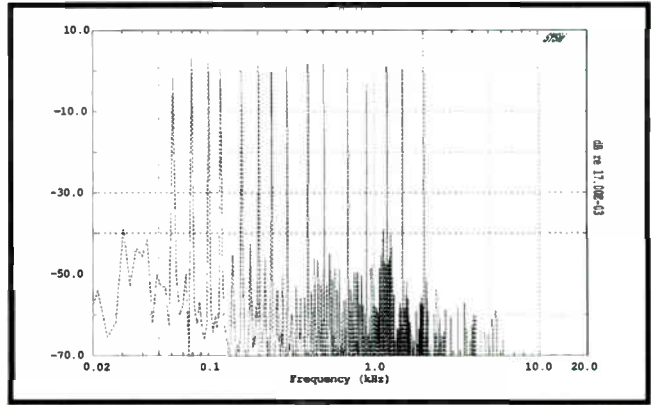
Impulse response of a Yamaha NS-10. Woofer output (wide spike) lags tweeter output (narrow spike). This type of impulse response is typical in many speakers.



THD measurement of Yamaha NS-10: High bass distortion and moderate levels of second and third harmonics will be audible.



THD measurement of Genelec 1031: The very low levels of third-harmonic distortion (indicated by line with squares) will result in clean sound reproduction.



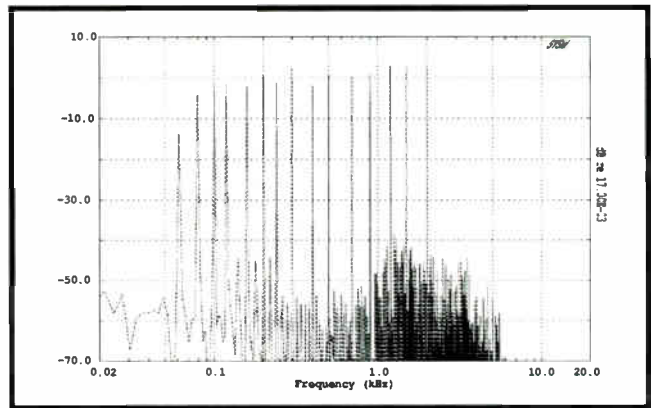
Spectral contamination measurement of Genelec 1031: Very low levels of harmonic and intermodulation distortion above 500 Hz.

audiophile and studio monitors deliver as little as 0.1%, and, at low excursion, distortion levels can drop to 0.01% over a narrow frequency band. Distortion rises dramatically at higher and lower frequencies; however, the ear is most sensitive in the midband.

Low distortion is hard to achieve. Refinements that can reduce distortion include features such as a copper cap on the pole piece, flat (as opposed to “cupped”) outside edge on the spider, improved tweeter dome and woofer cone materials, fancy passive crossover network components—or even better an active crossover/bi-amp configuration. But sometimes a speaker with less than exceptional data does excel; this can be due to smooth frequency and dispersion transitions between drivers at their crossover, the right octave-to-octave balance, and optimum radiation pattern control in the midrange (to minimize reflections off the console).

There are many ways to measure distortion, the most common being second, third and total harmonic distortion (THD). These specs are important, yet drivers can exhibit substantial second (or other even-order) distortion products and still sound acceptable. Higher harmonic distortions, particularly odd-order (fifth, seventh, ninth, etc.) are more objectionable.

All of the above measurements quantify distortion components that are in some way related to the original input signal. What about distortion products that have nothing to do with the input signal frequencies? This nonlinear distortion is reflected in intermodulation (IM) distortion levels. However, IM distortion tests usually use only two input frequencies, whereas music and speech contain far more than two tones. Multitone IM distortion tests will reveal nonlinearities that generate distortion products at frequencies where no signal is present.



Spectral contamination plot of Yamaha NS-10: large amounts of harmonic and intermodulation distortion between 300 and 3k Hz.

Such multitone test measurements produce a graphic analysis of the cross-modulation products (“self-noise”) generated by a speaker system that is excited by a multifrequency signal. The **spectral contamination** test (a term coined by Deane Jensen of Jensen Transformers) offers a unique approach to measuring and quantifying speaker clarity and definition in a subjectively meaningful way. A speaker with low spectral contamination may enable the recording engineer to discern more subtle aspects of a recording, such as phase cancellation effects between mics.

With this analysis, we hope to provide the reader with a comprehensive set of data that will correlate—but not replace—subjective evaluations. And perhaps over time, we will all learn to better see what we are hearing. ■

TANNOY AMS 8A

DUAL CONCENTRIC POWERED STUDIO MONITORS

Tannoy has been manufacturing loudspeakers since the late 1920s and has found great success with its trademark Dual Concentric driver designs in the studio marketplace worldwide. The term Dual Concentric is de-

fined by Tannoy as a coincident point source speaker, where the woofer cone acts as a seamless direct extension of the high-frequency horn, yielding a constant directivity pattern with linear amplitude and phase response in both horizontal and vertical axes.

Priced at \$3,995/pair, the AMS 8A is the latest product offering from Tannoy and part of the family known as AMS (Active Monitor Series, consisting of the 10A, 12A and 210A active sub in addition to the 8A being reviewed). The cornerstone of this AMS 8A is an 8-inch Dual Concentric low-frequency driver concentrically mounted to a 1-inch HF compression driver with a damped tulip-shaped waveguide. The drive unit is housed in a charcoal-black, slate side inlay, inert DMT (Differential Material Technology), front-ported cabinet. The twin laminated, space-frame design of the cabinet is heavily braced and decoupled to prevent signal coloration. All contoured



BY DON GEHMAN

LAB ANALYSIS: TANNOY AMS 8A

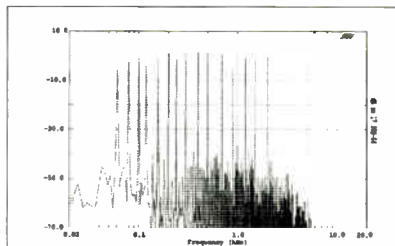
by Mike Klasco

PHYSICAL CHARACTERISTICS

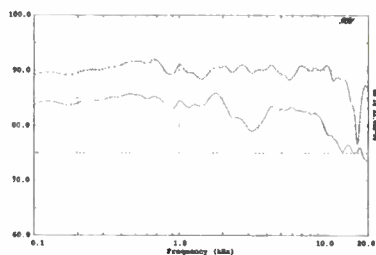
The wood stock (MDF) cabinet construction is unusually hefty, with a 1½-inch thick (!) front baffle with two flared "anti-chuffing" bass reflex ports; the other enclosure sides are ¾-inch MDF, with a brace behind the driver. The large (¾-inch) radius edges use L-channel wood strips with rubber antiskid inserts. One-inch-thick open cell foam lines the enclosure.

The woofer's curvilinear poly-propylene cone and rubber surround materials are more stable (less sensitive to humidity) and higher-performance materials than a paper cone/foam surround. The cast frame—thin (but strong), providing fewer acoustical reflections—is less resonant than a stamped steel frame and does not drain flux from the magnet structure. Its flat spider tends to be more linear than cupped spiders. The chamber behind the spider and magnetic structure is well-vented to lower air modulation

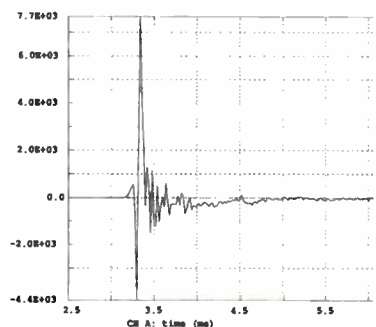
—CONTINUED ON PAGE 128



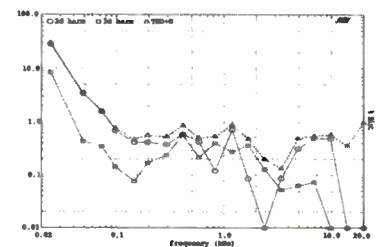
Spectral contamination test compares a series of input signals (long spikes) to speaker output. Clarity is good, with self-noise approx. 50 dB below input signals.



On-axis (upper trace) and 30° off-axis (lower trace) frequency response. The on-axis notch at 18 kHz disappeared when listening even a few degrees off-axis.



Impulse response test shows the tight phase correlation between the woofer and tweeter, with fast settling time.



Distortion (THD+N = Δ trace; 2nd Harmonic = ○ trace; 3rd Harmonic = □ trace) remains well under 1% from 100 Hz upwards.

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FIELD TEST

cabinet edges feature isolation pads for added durability. The quoted frequency response is 38 to 25k Hz ± 2.5 dB.

The bi-amped MOSFET power modules deliver 140 watts continuous to each of the HF and LF sections. The amp's construction techniques and components are reminiscent of high-end audiophile amps I have worked with. Heat is dissipated via the massive double anodized, aluminum finned back plate. A blue LED on each cabinet's front panel indicates power on.

The layout on the back of the amplifier plate is well-marked and easily followed, and the switches allow for easy adjustment access. Beneath the fuse holder is a subassembly that conveniently holds spare fuses. Operating voltage is switchable between 100-120V and 200-240V.

The active circuitry in the crossovers utilizes high-grade, 1% precision matched components yielding tolerances within 0.25 dB throughout each passband. The sophisticated active crossover shaping and design (a Tannoy secret) produces not only a tight amplitude response, but also linear

—FROM PAGE 126, LAB ANALYSIS: TANNOY AMS 8A

noise and reduce power compression (voice-coil heating) effects.

Coaxially mounted behind the woofer, the aluminum dome HF compression driver uses the woofer cone as the horn—a technique pioneered by Tannoy decades ago. The phase plug is a unique low-distortion/low-compression ratio design. Clay material on the back plate damps driver motion against the enclosure brace; the speaker is not magnetically shielded.

The amplifier/active crossover in this biamped system has no sub-enclosure, so components are exposed inside the cabinet. The heat sink fins resonate audibly when the enclosure is thumped; this might be audible in a quiet auditioning room under some listening conditions. The Class A/B amps have an op amp front end and MOSFET outputs. Power supply is analog with a toroidal (low hum field) transformer.

ACOUSTICAL CHARACTERISTICS

The sound coverage pattern is tight and should have few reflections off nearby surfaces (such as the console), resulting in a more consistent sound from one monitoring environment to the next. The system's impulse response was excellent, with a coherent pulse characteristic and fast settling time. (This is what coaxial speakers are supposed to be about.) Response extends past 15 kHz with a notch in the response (which appears only on-axis) centered around 18 kHz. Distortion, measured at 90 dB (@ 1 meter) and from 100 Hz upward, was well below 1%, and significantly lower over most of the compression driver's operating range. Spectral contamination (clarity) was very good, with speaker self-noise about -50 dB down from the input signal. ■

Mike Klasco operates Menlo Scientific, an independent acoustic analysis facility in Berkeley, Calif.

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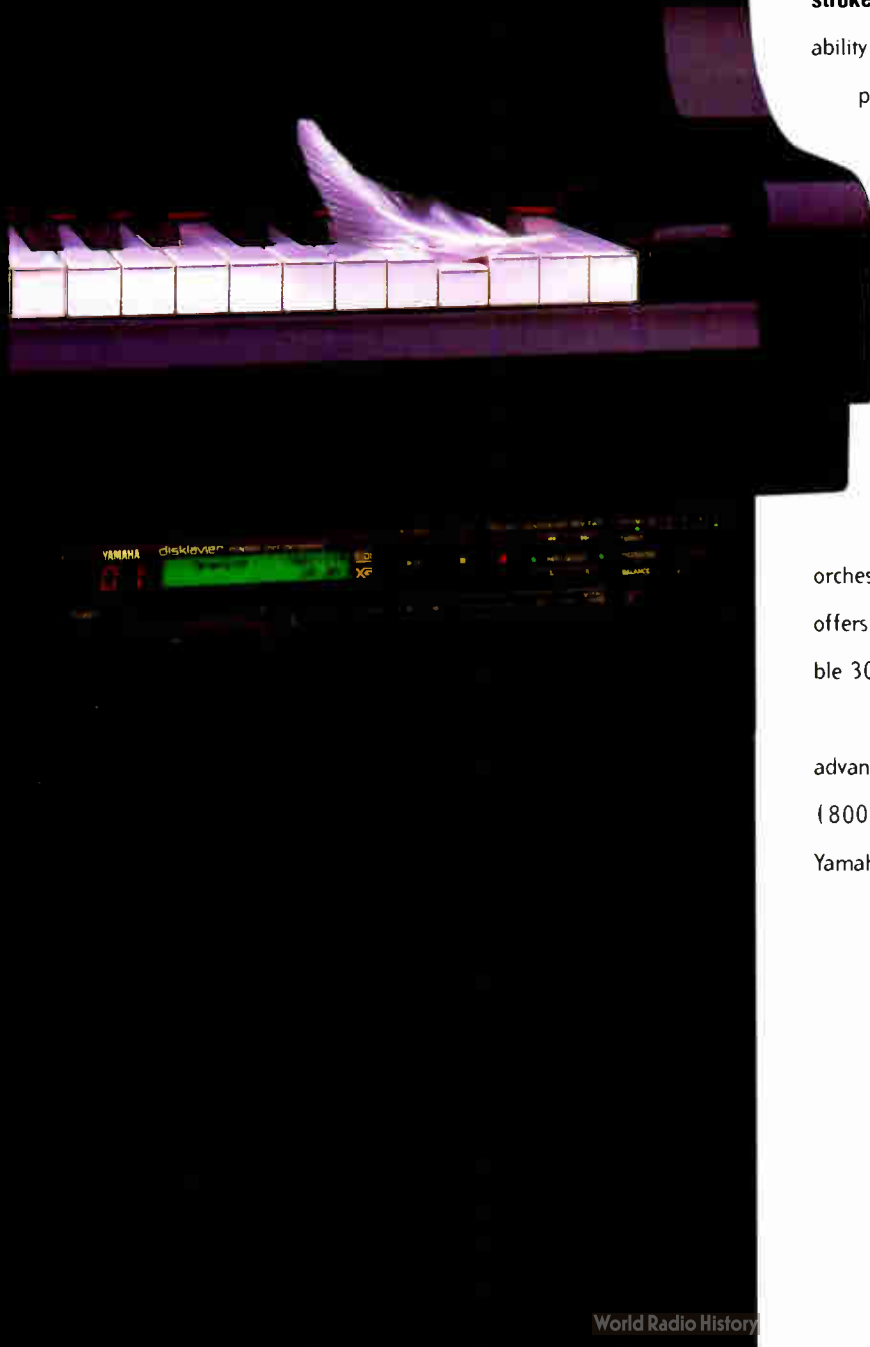
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FIELD TEST

phase response. Tannoy is confident in its accomplishments: The literature bluntly states that the AMS series monitors are the most phase-coherent, dynamic reference monitors in the world, period. Each AMS System is then tested, graphed and must acoustically fall within a 0.25dB window before being given the okay for shipping.

The AMS range of studio monitors do not use compression or limiting circuitry. Asked about this, a Tannoy representative simply stated that music by its very essence is dynamic, and squashing dynamics to protect a system may allow the system to play louder, but it's not musical. The only form of protection is noted as a Poly Temperature Coefficient (PTC) device that prevents what Tannoy defines as catastrophic bass driver failure, shutting down the LF only when the system is being driven to a point where physical failure of the drive unit is imminent.

There are two filter controls: LF Alignment allows a quick change-over between 4th- and 6th-order filters. The 4th-order is the natural -24dB-per-octave slope of the low frequency in a vented enclosure. The 6th-order tuning allows for gentle LF equalization to extend the -3dB downpoint to just above the system's vent resonance, where it actively rolls the bass out with a steep 36dB-per-octave slope. Tannoy suggests 4th-order for critical monitoring and the more aggressive 6th-order filters for playback.

The second filter set is HF Boost (Air), which raises the level of HF energy above 17 kHz to increase the openness of certain material. This feature is described as an effect filter and should be employed based on the user's subjective criteria. A Neutrik Combo connector accepts XLR or 1/4-inch TRS inputs, with gain trim to match -10dBm or +4dBm levels.

IN SESSION

As a producer, the studio monitors that I use are synonymous with a painter's blank canvas or a sculptor's hammer and chisel. They are tools for creativity and, as with any tool, they take a little getting used to.

When I unpacked the AMS 8As, it took me a fair bit of time to position them properly. Subtle changes in positioning were quite apparent, due to the time alignment being superior to anything I had used previously. The blue LEDs are brightest when you're

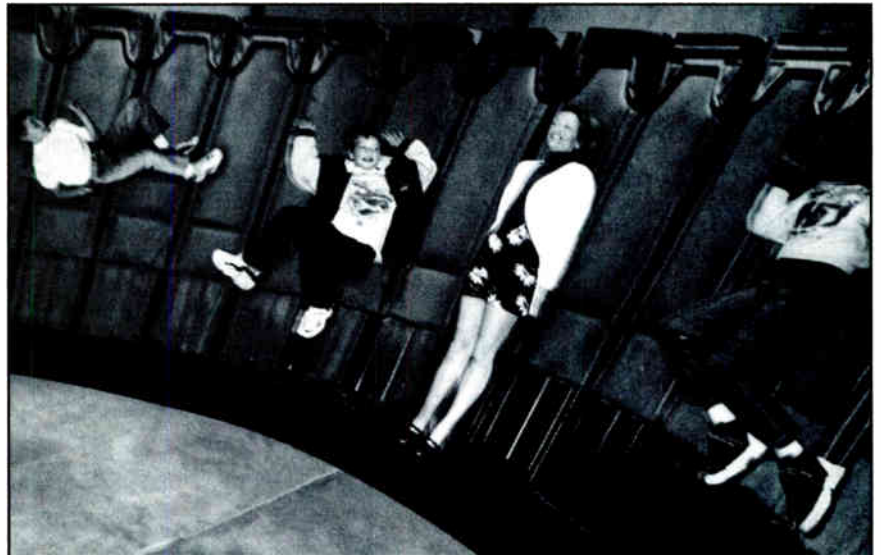
looking into the sweet spot of the monitors, which was helpful as a guide, but not always absolute in different room environments. Once positioned properly, the AMS 8As exhibit astonishing clarity and detail not only on-axis but off-axis as well. This characteristic allowed me to move around my console and outboard gear without experiencing dramatic changes in frequency response.

For me, mixing has always been a battle of making a mix sound good on five different studio monitors. If it sounds good on five monitors, the mix will sound good on all speakers. But

with further evaluation of that thought process, none of them would really be right, and all of them would have extensive coloration that I might have overcompensated for. You always walk out of a mix feeling like you missed.

Using the Tannoys to play back mixes I'd previously done, my immediate reaction was that some aspects could have been improved, such as tonal balance, imaging or things as subtle as choosing a different compressor or effect for certain passages. This results from the fact that the Tannoys do not exhibit the level of group delay

—CONTINUED ON PAGE 231



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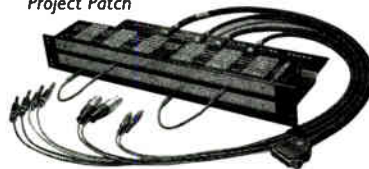
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SOUNDSCAPE SSHDR-1

WITH V.2.0 HARDWARE/SOFTWARE UPGRADE

The Version 2.0 software/hardware upgrade for the Soundscape SSHDR-1 workstation has transformed the capabilities of this feature-rich system. With its new 32-bit operating system, V.2.0 offers outstanding value for the money and—with the addition of full lock to video and EDL management—it's a viable choice for sound editorial and post work.

V.2.0 has an interface card for a Windows 95/NT-compatible plat-

Onboard DSP provides somewhat limited EQ, dynamics and related processing, but it is upgradable.

The PC provides a control/graphics interface and does not handle audio, so a modest-speed Pentium with 8 MB of RAM is recommended. The software screens can squeeze onto a 14-inch display, although dual 17- or 19-inch units make life easier. A base V.2.0 system, with interface card, a single Processor Unit and software pack-

128-character comment fields, time-code data, attribute flags (archive, read-only etc.), sample/frame rate and other extensions. The Take Directory (now renamed "SFile Manager") functions like Windows 95 Explorer, with files moved or copied easily between different units and media drives. Record/playback resolution is 16-bit, with 18-bit sigma delta 64-times oversampled A/D and D/A conversion. Software under development enables choosing between the current 12-track/16-bit capability, or 24-bit resolution across six to eight tracks.

A V.2.0 software utility updates V.1.18 files to the new file format; unfortunately, the process is not backward-compatible. In addition, V.2.0 will read DAT backups created by V.1.18 and earlier projects. Version 2.0 also supports full operation via a 10 Mbit/sec network utilizing TCP/IP protocols.

EXPANSION OPTIONS

A wide selection of analog/digital I/Os connect to the outside world. Additional sources can be accommodated by adding more Processing Units—a pair would provide direct inputs from four analog and 16 digital sources to the 24 available disk tracks, 16 digital outs and eight simultaneous analog (for monitoring, aux sends and master analog outs, etc.) outputs. Interconnecting up to eight units provides 96 playback tracks.

The \$375 SSPA-1 replaces the analog unbalanced I/O with balanced XLRs (2 ins, 4 outs), in addition to AES/EBU digital I/O. The SS8IO-1 Expander Unit (\$1,995) provides eight additional analog inputs/outputs (with 20-bit converters), word clock, SuperClock, and TIDIF and ADAT interfaces. This expands the I/O capacity for live multitracking to disk or for more aux sends and/or direct outs from V.2.0's virtual mixer. If you don't need direct analog I/O, the SS8IO-D Expander is \$1,099. Should your needs



Version 2.0 supports multiple units in one arrange window.

form that connects to a maximum of two two-rackspace Processor Units housing the system's A/D and D/A converters, DSP engine and companion I/O circuits. As before, the Processor accommodates a pair of analog and digital inputs and four analog/digital outputs; V.2.0 adds an accelerator card with an 8-channel interface for TIDIF (Tascam DA-88) digital I/O, frame-accurate LTC/VTC lock, video sync, EDL/auto-conform and video-capture capabilities. MIDI I/O is standard, for use with outboard sequencers or hardware mix controllers.

Internal DSP provides an unlimited number of virtual disk-based tracks, with 12 (increased from eight available on earlier software) being active and capable of mixing to the main stereo and aux outputs.

age, costs \$4,495; the user provides the PC, monitor and keyboard, plus IDE hard drives. A tasty 12-track system packed with useful functions would be around \$6,500.

Good news for the nearly 4,000 SSHDR-1 users running V.1.18: A factory-installed accelerator board upgrade (\$1,000-\$1,850) adds extra DSP, TIDIF interfacing and a multi-way Expansion Port. As a bonus, V.2.0 software can address any drive connected to the controlling PC as a virtual drive, allowing project and related system data to be stored on the same media as the sound files. A neat touch.

V.2.0 also offers increased storage, handling two 4.2GB drives, with 64-character Take File names,

BY MEL LAMBERT

change, the 8I/O D/A and D/A upgrades add eight analog inputs or outputs.

Such I/O flexibility and expandability are rare in a DAW costing so little. An all-digital V.2.0 could also handle 8-channel transfers between ADAT and DA-88 machines, for example, or interface directly to a Yamaha 03D/02R, Ramsa DA-7 or Mackie Digital 8-Bus. (And MIDI data from these and other digital mixers could control various SSHDR functions, or be routed into the mixer as automation data and/or program changes.)

V.2.0 options include a CD-R software module that functions as a Red Book CD recorder with a range of drives. The Soundscape/PointCD SCSI CD-R plug-in handles PQ editing, cross-fades, ISRC codes etc., and generates a merged file on the PC with a data file for PointCD. EDL management and Auto-Conform options allow automated inload and lay-up of sound elements to picture. A Remote Control Device Control (RDC) application commands popular ATRs and VTRs using RS-422 or MIDI Machine Control, and a pop-up window provides transport controls, jog/shuttle wheel and 8-position autolocator.

EDITING/MIXING ENVIRONMENT

Once you've set master sampling frequency (22.05/32/44.056/44.1/47.952/48 kHz) and SMPTE/EBU timecode rates, select the Edit screen to assemble sound files. This screen has a conventional Now Line with Sound Clips that can be named and set to display modulation envelopes. Transport icons and timecode displays correspond to the Now Line and Left and Right Locator handles. Sound cuts can be recorded directly to the Edit screen at the Now Line or transferred via drag-and-drop from a companion Sound File Manager Directory; a separate array of pre-stored Markers is available for timing references. V.2.0 allows the audition of cues directly from the List Manager window, and text fields show timecode frame rates and other parameters used when the file was recorded.

Sound cues can be moved freely within the Edit window and snapped to the Now Line or preset markers. Scrub editing is available across eight of the 12 replay tracks; used in conjunction with a familiar AVI Player, digital audio and picture can be scrubbed simultaneously. Using a suitable video capture card, you can record a work print directly onto one of the system's hard drives for full sound/picture integration.

V.2.0's editing environment is easier to use than previous incarnations and packs a lot of handy, user-friendly fea-

tures into a minimum amount of space. Comprehensive cut-and-paste functions, with selectable crossfades, are provided, together with the ability to create a tempo-based grid so events can be snapped to sub-bar intervals down to 32nd notes. A subsequent software release will offer punch-in/out recording—currently, you must define the range of a recording, and the system records new information between these limits.

MIXING AND PROCESSING

The Mixer Screen enables external sources to be blended with replayed disk tracks, panned between the master

left/right outputs and output from the system, or combined prior to recording to hard disk. Simplicity personified.

A revised Mixer window incorporates a user-definable routing/channel structure. A series of mono or stereo channel-strip icons can be laid out across the screen, and the user can develop as many mixing channels as necessary, with internal buses and effects processes, plus external aux sends/receives using the SSHDR's original 2-in, 4-out array, plus the SSAC-1's 8-channel TDIF I/O port (connected to the optional SS8IO-1, DA-88, Yamaha 02R, etc.).

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FIELD TEST

mono/stereo module from the menu, drag it into place, choose a source and destination, then drop into the icon any desired signal processing. Here, the V.2.0 software comes into its own. Each channel can have any number of real-time processes, including EQ, compression/limiting, gate, expander, chorus/flange and reverb; these functions are limited only by the available DSP. Other in-line functions include level metering, a trim pot and sample delay.

Sixteen internal buses per unit enable signals to be sent to real-time effects or to external sends/receives using any of the available analog/digital I/Os, and the mixer supports third-party real-time plug-ins that merge with the configuration. With access to multiple Soundscape units, all of the individual inputs/outputs/tracks and DSP processing are seamlessly integrated. The Mixer provides recall of all system parameters, including the settings of any real-time plug-ins. Onscreen faders can be linked for stereo operation or formed into VCA-style subgroups with any fader serving as master. Full timecode-based dynamic and snapshot mix automation is planned

for a future software release.

EQ AND DYNAMICS FUNCTIONS

The 2-band Parametric EQ and Dynamics sections are smooth and easy to use. There's ample overlap and adjustment range; real-time operation—even when dialing in large amounts of cut/boost—never once produced a pop or tick. Each EQ band extends from 20 Hz to half the sample rate, with a Q of 0.1 to 8.0, +14 dB of boost and -24 dB of cut. Sections can be linked, copied from channel to channel, and stored/recalled from a user library. The Dynamics Section enables large amounts of fast-attack/rapid-release compression to be applied—ducking, for example, during production of a commercial—without pumping or breathing. A powerful adjunct for any workstation.

Other available DSP functions include a real-time Reverb Module from Wave Mechanics (\$349), offering sophisticated control of ambience, delay and sound-absorption characteristics. Shipped as part of V.2.0, its functions are unlocked via a password provided once the user pays an activation fee. Other DSP functions will be made available in this way, including a TC Works Module (\$699).

Soundscape's optional Time Module provides time stretch/compress, pitch shift (a usable ± 5 -semitone range) and sample rate conversion.

THE FINAL WORD

Using such a reliable, bulletproof PC-based workstation was truly a revelation. It sounds good—particularly the 20-bit converters being used in the optional SS8IO unit—and is capable of enabling creative results. My complaints are minor. The feature-laden screens become cluttered on a single 14- or 17-inch monitor; dual monitors are a necessity with large configurations. The lack of punch-in recording is slightly annoying, although this should be addressed by the time this review appears. I also look forward to the ability to provide additional processing power, either via the SSAC-I's onboard DSP or utilizing the Expansion Bus.

Soundscape Digital Technology, 4478 Market Street, Ventura, CA 93003; 805/658-7375; fax 805/658-6395. Web site: www.soundscape-digital.com. ■

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SENNHEISER EVOLUTION SERIES

DYNAMIC VOCAL AND INSTRUMENT MICROPHONES

Founded more than a half-century ago, Sennheiser is no stranger to pro audio. In fact, there are few touring companies and studios throughout the world that don't have at least one—if not several—of the company's dynamic microphones in their mic collection. And over the years, models such as the MD-421, MD-431 and MD-441 have been regarded as classics in the category of proven vocal and instrument mics.

Now Sennheiser debuts the Evolution Series, a new line of handheld vocal and instrument mics, designed to provide the features of Sennheiser's established mics at a more affordable price. Due to some innovative manufacturing approaches and new tooling at the company's plant in Burgdorf, Germany, capsules and housings that previously required tedious hand assembly can be made by machine, so all models in the Evolution Series retail for less than \$350.

The Evolution Series incorporates four handheld and four instrument mics—all moving-coil (dynamic) designs with a rugged, steel-blue metal housing and removable microphone capsules for convenient field service.

The four handheld vocal models in the series include the cardioid E 825 (\$129) and supercardioid E 845 (\$229) with frequency response tailored for rock and pop vocals. Other models include the cardioid E 835 (\$159) and supercardioid E 855 (\$299) for all-around vocals. The E 825 has an on/off switch (a version without a switch will be available soon); switched-versions of the E 835 and E 845 are available.

Percussion/drum microphones in the series are the cardioid E 602 (\$319) for kick drum and the cardioid E 604 (\$249) for tom/snare miking. Both mics have an integral swivel mount for ease of placement into tight spaces.

The supercardioid E 608 (\$299) has a compact capsule and a short gooseneck for mounting directly onto woodwinds or horns. As no phantom power is required, the E 608 is suitable for either wired or wireless applications. The supercardioid E 609 (\$349) is designed for miking guitar/bass amps and rotary horn cabinets, and has a sound that's similar to Sennheiser's popular (but now discontinued) MD 409.



So far, advance comments from beta testers have been positive. "The E 855 on vocals is amazing—we sound bigger, clearer and louder than ever before," says Bret Whetstone, the FOH engineer currently on tour with the Honeyrods. "With some mics, even the really good ones, you have to EQ the bumps in their frequency response to get a natural sound, but this mic sounds great without any work at all."

This opinion was shared by Matt Diamond, the FOH engineer for Toad's Place, a nationally renowned venue in New Haven, Conn., who added that the E 855 was "great for monitors: high gain; no handling noise. Very crisp. A very impressive vocal mic."

Whetstone also tried the E 602 on kick drum and the E 609 on lead guitar. "I didn't need to use EQ on either of them. The E 602 was solid, without too much low end, and the E 609 made the guitar sound exactly like it was supposed to. If the rest of the line is anything like these, I'm going to want them all."

All Evolution Series mics include a velour storage pouch and one-year warranty. Deliveries are slated to begin in the first quarter of 1998.

Sennheiser Electronic Corp., 1 Enterprise Drive, Old Lyme, CT 06371; 860/434-9190; fax 860/434-1759. Web site: www.sennheiser-usa.com. ■

BY GEORGE PETERSEN

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ASC ATTACK WALL

MODULAR ACOUSTICAL TREATMENT SYSTEM

Acoustic Sciences Corporation, makers of the Tube Trap, have developed the Attack Wall, a Tube Trap array designed to help tame hostile acoustic spaces. The need for a product such as this is clear and widespread. Many bands move into large homes, warehouses or castles so that they can record without the pressure or restraints of a recording studio. Project studios with poor acoustics have sprung up at a frantic rate. Also, independent engineers travel from studio to studio experiencing a wide variety of acoustic environments. ASC says the Attack Wall can help solve the problems that go along with such un-acoustically designed

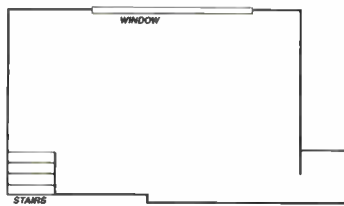
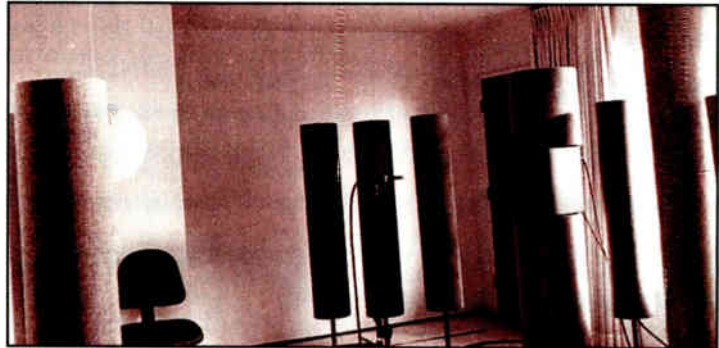


Figure 1: Test room floor plan

spaces, so I put it to the test in an empty room in my home.

The test room typifies the type of space one might run into when putting a studio into a home or small office space. It has drywall walls and ceiling, and curtains covering one large window. The layout is shown in Figure 1. As you can see, it is not an ideal symmetrical space, and the dimensions don't even conform to the "golden ratio." Because all the walls are parallel, the room has problems with flutter echo. The floor is carpeted. Speakers used for the measurements and listening were Meyer HD-1s, and measurements were done on my SIM System II.

The Wall comprises two styles of full round Tube Traps: Most of the traps in the system mount on stands (Studio Traps), allowing adjustment of the height, while the largest (Monitor Traps) sit directly on the



Above, author's test room. Figures 2-5, SIM readouts showing phase coherence (top trace) and frequency response (bottom trace).



Figure 2: Room before trapping, 8 to 200 Hz



Figure 3: Room with The Wall, 8 to 200 Hz



Figure 4: Room before trapping, 1 to 20 kHz

floor. The traps have one absorptive and one reflective side: As the entire trap is fabric-covered, the reflective side is indicated by a small brass tack, but you can also tell which side is which by speaking into it from a close proximity. The reflective side is perforated, so it scatters high frequencies, while al-

lowing some bass absorption. (ASC says that the reflective side has been recently remodeled for better high-frequency performance.) Because of the round shape, the reflective side acts fairly well as a diffuser. Traps are covered in an acoustically transparent Guilford fabric, and custom colors are available.

ASC supplied some 16-inch Monitor Traps for the speaker

BY BOB HODAS

WAVES RENAISSANCE COMPRESSOR

DSP PLUG-IN

One look at the Digidesign Development Partner Catalog and you may be overwhelmed by the surfeit of plug-ins on the market, ranging from straightforward “replacements” for their hardware equivalents to virtual bell-and-whistle boxes fulfilling the dreams of the most profligate audio geeks.

The first of Waves’ Renaissance® series of DSP tools, the Renaissance Compressor is a utilitarian plug-in for use with the Waves MultiRack program, Digidesign Pro Tools TDM (NuBus/PCI), and NuBus Sound Designer II systems. According to the manual, it is “a classic warm compressor and expander, with a simple, optimized interface.” As noted curmudgeons, we are hard-pressed to be dazzled by anything that asks us to “point and click” rather than “grab and turn.” Yet the Renaissance Compressor won us over.

The Renaissance has all of the controls of any good compressor and a few more, including “ARC” (Auto Release Control), a really cool release algorithm that has the effect of tailoring the release setting to the attack of each individual transient.

The user interface is marvelously uncluttered. It actually looks much more basic than it is, which is nice for a change. It strikes a good balance between the traditional compressor look and the advantages of software-driven technology, thus avoiding the limitations of putting a processor into a rackmount unit. The sliding controls for standard compressor parameters—threshold, ratio, attack, release and gain—are a pleasant variation to the rotary knobs on most hardware compressors.

Input, gain and output meters are vertical logarithmic displays that provide an instantaneous overview. The I/O meters have a 0 to -60 dBFS range, with 5dB

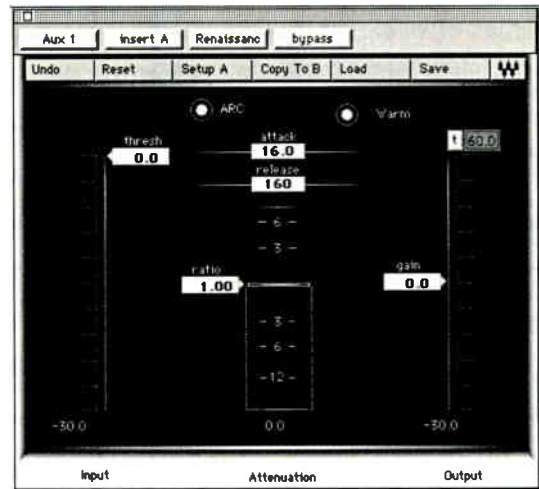
increment markings beside each meter. Peak Hold values—listed at the bottom of each meter—are reset by clicking on the values (or the meters themselves). A Mode button selects ARC in or out, and a Character button alternates between Smooth or Warm low-frequency characteristics.

Generic Setup Files (Master Program soft, Vocal, Voiceover, Elec Guitar, Drums, etc.) can be loaded, customized and saved with ease. Two setup banks allow toggling for A/B comparisons. (Once spoiled with this feature, we wanted more comparison banks—especially for dialog/voiceover work.)

Our first test for Renaissance was recording a vocal track for a friend. We won’t divulge his name, but we can tell you that as a singer, he’s a great guitar player. We *really* needed dynamics control for this recording. Renaissance worked beautifully and simply, and the controls worked as advertised. The manual says Renaissance is a soft-knee compressor, and compression and expansion start to ramp in 3 dB below the set threshold. The effect at those 3 dB was linear and smooth sounding.

The vocal track was recorded with a 4:1 compression ratio, and the threshold set at the top 50% of our friend’s dynamic range. The sound was awesome. We liked Renaissance’s ease of use, but the best part was the recording it produced: It evened out the vocal track without coloring it, and the vocal track now had nice, smooth

BY STEVE BORNE & PAUL P. SOUCEK



The Renaissance control interface offers fader controls for compressor parameters.

transients, something we thought our friend was incapable of.

We recently sound-designed and mixed 25 short films for a museum installation here in NYC. All of the films included interview dialog, music and sound effects, and all show in the same open space. We had to ensure the mixes wouldn’t interfere with each other, and that each individual mix would retain the subtleties we worked hard to achieve.

We tried Renaissance and a few hardware compressors on the mixes for peak limiting. After much comparison, we felt Renaissance left the material below the threshold alone, and the peaks were limited with a nice, quick, predictable response. We used Renaissance on most of the films. Why not ALL, you ask? In some cases we were unable to work around the soft-knee. Our wish list includes a hard-knee switch in a future revision so we could more accurately use Renaissance as a hard limiter. Or perhaps it could even contain a programmable knee. That’s the beauty of software: Updating to newer versions with new features is as easy as

popping in a floppy disk (instead of buying new hardware).

We used the Renaissance on a variety of post projects. Production dialog that was originally all over the place (peaky and problematic) was leveled without any noticeable pumping. Similarly, errant voiceover material was evened out without sounding held back. In a recording of group looping, one actor's voice continually "leapt" noticeably above the others. We used a variation of the Renaissance Compressor's Master Program "firm" preset to create an even walla track without audible artifacts of "electronic restraint."

The Renaissance also proved useful for shaping sound design elements. In successful pursuit of The Perfect Gunshot, the decay of a "crack" element was tightly compressed while the decay of a low-end sweetener was expanded. While there are many ways to achieve this kind of magic, the Renaissance Compressor was a convenient, flexible and fast option.

Finally, we tried Renaissance on the stereo master bus of a music-only session, just to give it a more polished sound. We used very little compression—1.8:1—and a low threshold. Once again, Renaissance worked well. The edges were softer sounding in a very musical way. Although we hate this word, we'd say it sounded "warmer" than the unprocessed track.

There's no shortage of competing hardware and software compressors on the market. Similarly, the endless argument of "analog vs. digital" isn't even going to be broached here. But the Renaissance Compressor is extremely easy to use and lives up to its promise in form and function. Waves has done an excellent job of making a plug-in processor that transcends the numbers. In the future, we'd like to see a version with frequency specific dynamics, allowing varying amounts of compression at different frequencies. But even as it stands now, at \$850 we'll take one, please.

Waves, 6716 Central Ave. Pike, Suite 8, Knoxville, TN 37912; 423/689-5395; fax 423/688-4260. Web site: www.waves.com. ■

Steve Borne is a freelance sound designer and a partner in Planet 10 Post in NYC. His credits include Gummo, Touch and The Brothers McMullen. Paul P. Soucek is a sound editor and partner in Planet 10. He's currently supervising Todd Haynes' Velvet Goldmine.



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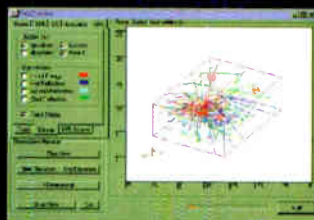


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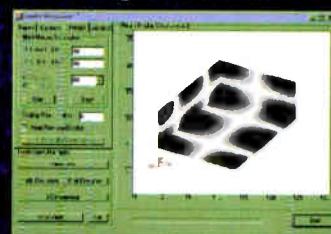
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PEAVEY CS 800S

1,200-WATT PROFESSIONAL STEREO POWER AMPLIFIER

The Peavey CS 800S is a 2-channel (or mono-bridgeable), two-rackspace amp featuring a switch-mode power supply to reduce weight. Retailing at \$899, the "S" version is louder and lighter than previous CS 800 models, which have been Peavey top sellers for two decades.

The 23-pound chassis is 17 inches deep and has two variable-speed fans for cooling metal-cased power transistors. Damping factor is stated at 1,000, and the amp boasts a slew rate of 40 V/ μ s. The CS 800S lived up to its claim of 400 watts per channel (both channels driving 4-ohm loads) or 240 W/ch into 8 ohms. As this amp is capable of driving 2-ohm loads with 600 watts, bridging the CS 800S as a single mono-block amp easily pushed two 600-watt, 8-ohm woofers to rock 'n' roll levels.

The rear panel has both binding posts and dual $\frac{1}{4}$ -inch jack outputs; Neutrik Speakon connectors are optional. The B-1 input module offers $\frac{1}{4}$ -inch/XLR combo connectors to accommodate a balanced or unbalanced input for each channel, plus $\frac{1}{4}$ -inch loop-through connections. Other input modules are available. Two Phillips screws release the module, allowing it to slide out, and a 20-pin multicable and a ground jumper connect it to the amp, taking less time to swap than describe.

Other inputs include two crossover modules, each having a single balanced combo connector input (switchable pin 2-3 hot). The two $\frac{1}{4}$ -inch crossover output jacks are normaled to input jacks for the amp channels, with the highs going to the B channel, offering a neat solution for bi-amp applications.

The X-1 crossover module (\$65) has two fixed frequencies, 150 and 1,200 Hz, jumper-selectable on the card, and can even be used for three-way systems, with another amp for the third channel—a third $\frac{1}{4}$ -inch jack allows its low-frequency

signal to be patched to another amp's input for tri-amp applications. The crossover slopes are unusual, with staggered, underlapped filters providing rising response (6 dB per octave) at all frequencies above the crossover on the high output. The low output exhibits rising response (3 dB per octave) toward lower frequencies, with a bump at 30 Hz. As a result, the X-1 has increasingly attenuated response approaching the crossover point.



The intended effect is to electronically condition the high and low outputs, contouring them to complement the acoustic response of a woofer and compression driver and providing an overall system response that requires less EQ than a traditional crossover design. I did not find this approach to be entirely successful, and the crossover frequency seemed much higher than 1,200 Hz. The idea is that this works well with particular Peavey speakers. I didn't find it the case with the Peavey two-way SP-2G trapezoids I was using. There may be some other Peavey speaker whose response combines with this crossover to provide a smooth response, and Peavey says there's been great feedback from SP-1G users, but I can't recommend the X-1 crossover module for general applications.

However, I liked the X-2 module (\$75), a conventional 3-pole Butterworth crossover, designed for two-way applications with an adjustable crossover point. Its crossover frequency is sweepable

from 80 to 800 Hz, and there's a multiply-by-ten jumper on the card, to meet a variety of specific needs. Another jumper reverses the polarity on the high output. Other adjustments include jumpers for a highpass (low-cut) on the low output and a CD horn EQ (high-boost) on the high output, which work well. The low-cut is -3 dB at 40 Hz and rolls off at 12 dB/octave. The horn shelf is +3 dB at 4 kHz,

with a standard 3dB/octave lift from there. The X-2's complementary 18dB/octave filters sum evenly through the crossover region. I later used the X-2 with two-way JBL-loaded floor monitors and was impressed with the results. Users needing an inexpensive modular solution to bi-amping speakers will have a hard time getting more value for their money in a compact, lightweight package.

The CS 800S is one of the best-sounding amps Peavey has ever made. How these will fare over the long run has yet to be seen, but I've had two running for almost a year without any problems. The CS 800S is not the most powerful amp in the world, but users in medium powering applications, such as smaller two-way house systems or monitors for pop and country, will find the Peavey CS 800S offers an extremely practical bi-amp solution that won't break the bank account.

Peavey Electronics Corp., 711 A Street, Meridian, MS 39301; 601/483-5365; fax 601/486-1278; Web site: www.peavey.com. ■

BY MARK FRINK

NEUMANN TLM 103

STUDIO CONDENSER MICROPHONE

Neumann's newest entry into the professional and project studio markets, the TLM 103 is part of the FET 100 series of condenser mics. The TLM 103's heritage is divided between two distinct and important Neumann technological eras: the venerable U87 microphone and the modern Transformerless Microphone (TLM) technology. As should be expected by the marriage of these two pedigrees, the 103 is indeed a quality microphone well worth the under-\$1,000 price.

The TLM 103's capsule is based on the K87 capsule used in the famed U87 and tube U67 mics. Whereas the 67 and 87 use a dual-diaphragm capsule (with two separate back electrodes) to create multiple polar patterns, the 103 uses the single, K103 large diaphragm capsule for cardioid-only operation. (This was acceptable to me, as there are few studio situations where I would use an omni mic and even fewer times I would use a mic on figure-8.)

The 48 VDC-powered, fourth-generation transformerless circuit within the TLM 103 has low self-noise (7 dBA) and a large dynamic range (131 dB SPL). The low noise figure makes the 103 ideal for Foley/sound effects and ambient recordings. Withstanding sound levels up to 138 dB (at 0.5% THD)—nearly the sound level of a modern fighter jet exhaust in full afterburner—the TLM 103 is ideal for close recording of drums and percussion without distortion. There's no attenuation switch, so you may want to verify that your microphone preamp will handle this mic's high 13dBu max output when recording close and loud vocals (or close loud anything else for that matter).

Frequency range is 20 to 20k Hz. The mic has a flat response up to 5k Hz where a wide, 4dB presence boost begins. This is similar to the U87, but the 103 remains sensi-



tive down to 5 Hz due to the TLM circuitry. An elastic-mounted internal structure reduces the influence of external shocks on the sound of the mic. This is crucial, as the 103 does not have a bass roll-off switch. This was apparent when I used the 103 around a group of backing vocal singers and could clearly hear the "thump" of foot tapping. The shockmount elastic suspension holder (EA 103) accessory is a recommended investment, especially when the mic is used onstage or around a drum kit. The mic includes the SG 103, a plastic swivel clip of minimal quality. After just a few mic stand changes, the plastic threading looked worn. It would be better if Neumann could have made this out of metal like the U87 mount.

BY BARRY RUDOLPH

The mic's small size works well around drum kits or as an unobtrusive mic for an acoustic guitar player. All the musicians I recorded with the 103 were intrigued by the new "cool little mic."

Subjective comparisons to the U87 are obvious, but I feel the microphone really has its own identity. As a reference point, I did a brief, A-B "comparison" with an AKG C-414 TLII (set on cardioid). I placed both mics in front of a player with a '60's vintage Martin D-28. In the case of this song and this particular guitar part, I liked the TLM 103 over the AKG. It has a definite, more "forward" sound, but not in the sense of a EQ'd sound. The guitar occupied a good "space" within the track without much extra equalization or compression. I also liked using the TLM 103 on electric guitar, making a midrange Vox AC-30 sound bright and fat.

Due to the mic's low self-noise and distortion, you could use a hyper-EQ shape and/or an extremely squashed and spanking compressor setting and not highlight any microphone shortcomings. I found applications where I preferred the TLM 103 over anything else in the mic cabinet. It was excellent on drums, harmonica and sax as well as certain singers who would also sound good on a U87.

The TLM 103 is \$995 (including SG 103 mount and a wooden storage box), yet I never felt I was using a "budget" microphone. The mic comes in either satin nickel or black matte finishes, and Neumann also plans to offer the mic in stereo pairs.

Neumann USA, 1 Enterprise Drive, Old Lyme, CT 06371; 860/434-9190, fax 860/434-1759. Web site: www.neumannUSA.com. ■

Barry Rudolph is an LA-based recording engineer. Visit his Web site at <http://home.att.net/~brudolph/>.

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World Radio History

MOVIE OF THE WEEK MIXING

TODD-AO'S DAVID FLUHR IN THE HOT SEAT

by Kim Wilson

Dubbing feature films is considered the pinnacle of a re-recording mixer's career. Many, like eight-time Emmy winner David Fluhr, cut their teeth on Movies of the Week, which is akin to getting your residency in ER medicine. Where feature film dubs take weeks, often months, to complete, MOWs are churned out in three to four days.

"If you want to successfully dub a MOW in the time allotted, you have to effectively budget your time yet still be fast and accurate," says Fluhr, a dialog re-recording mixer at Todd-AO in Hollywood. "To stay on budget, you have to lead the entire team confidently on your schedule."

Every phase of the audio

post-production process is reduced in the MOW schedule. Sound editors may be lucky to have a couple weeks to build sound effects, compared to the months of preparation allotted on features. Predubs of dialog, FX and Foley are snapped together in brief two-hour sessions instead of the six to ten days provided to film mixers. The final dub is generally a three-day project—and that includes playback and fixes.

A recent project where Fluhr functioned as lead mixer was the Hallmark Hall of Fame presentation *What the Deaf Man Heard*, starring Matthew Modine, Tom Sker-

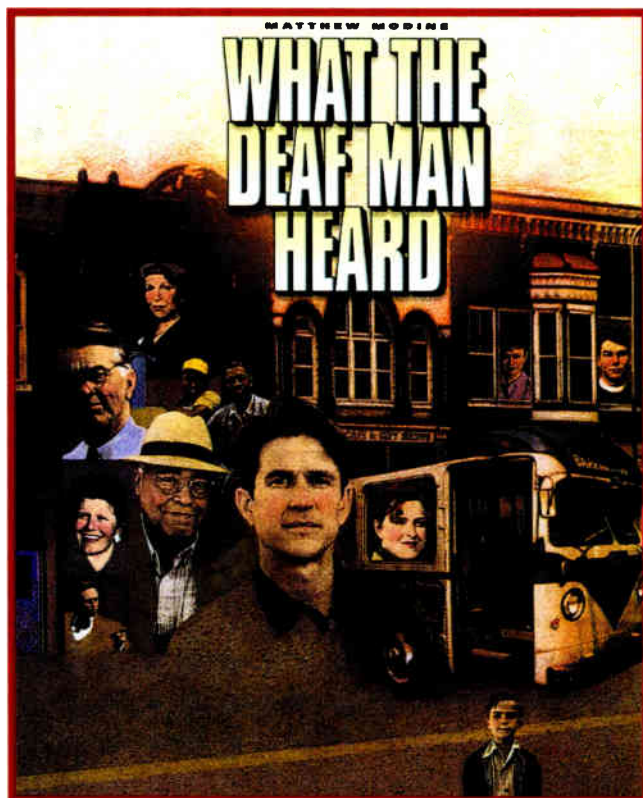
ritt, Judith Ivey, James Earl Jones and Bernadette Peters, directed by John Harrison.

"Hallmark MOWs are different," states Fluhr. "For one thing, they have higher budgets, which on this project meant five days instead of the usual three [for the mix]. It was a complex mix with source recordings from the field, fireworks and huge crowd scenes."

What the Deaf Man Heard was mixed on Dubbing Stage 2 at Todd-AO, where both MOWs and feature films are mixed. Stage 2 houses a 32-bus Martech console with 65 A/B inputs, utilizing Neve Flying Faders



David Fluhr



automation. Fairlight, Pro Tools or any other digital audio workstation can be set up immediately. The room is capable of recording 6-track digital mixes for features, but MOWs are mixed in either Dolby Surround or straight TV stereo.

A Mitsubishi 35-inch monitor and Audix 1A reference speakers are used to test real-world TV playback. The studio is also equipped with a Sony SuperBright video projector with line doubler. Film playback is possible via the two Century screening/changeover projectors and one Magnatech dubber.

"On this project, we were fortunate to have a film

—CONTINUED ON PAGE 150

Film sound columnist Larry Blake is on vacation this month.

POST NOTES

Projects: Damon Trotta of SoundHound (NYC) mixed the six-part series "Hitler's Henchmen" for the History Channel on Pro Tools 4.0... Gary Chester of The Edison, also in New York, recorded and mixed the score for *Kicked in the Head*, a new film produced by Martin Scorsese and scored by Stephen Endelman... Apres midi of Paramus, NJ, produced, directed and provided sound for the first birth control ad for television... Oasis Recording has picked up work on a seemingly burgeoning Atlanta film scene, including the post on feature films *The Nightingale and the Rose* (edit/mix by Chris Stafford) and *Clean Air Turbulence* (sound design by Bob Gillespie)... Sound designer Jay Green of Big Sci-



4MC, the hot L.A. post facility, recently completely rebuilt Stage A and put in the largest Otari Elite film console in the world—160 faders. In addition, 4MC recently acquired POP Studios in Santa Monica.

ence in Pittsburgh took over the audio reins for the award-winning public radio shorts "Everyday Science"... Syn Studios, the Japanese studio owned by Simon LeBon and Nick Wood, picked up its first American feature

score, the upcoming Mario Van Peebles film *Love Kills*... Crosstown Audio of Atlanta put together a 5.1-channel mix for a DVD trailer that ships with the new ThinkPad computers... 49er Steve Young was in San Francisco's

Music Annex Recording Studios doing radio spots for Sprint PCS and Pepsi... Down the Street, mixer Jay Shilliday of Crescendo! Studios posted spots for Safeway, Gallo, Chevron, Toyota and Isuzu, —CONTINUED ON PAGE 156



Left: Warner Bros. installed two AMS Neve Digital Film Consoles for use on the long-form TV re-recording stages in Burbank. Each is designed for two-mixer operation and provides 88 inputs, with 72 faders on the surface.

Below left: The redesign on Studio Eight at Howard Schwartz Recording is complete with the installation of a Harrison SeriesTwelve console. Pictured (L to R) are chief engineer Marty Newman, mix engineer Mark Van Bork and owner Howard Schwartz.

Below: The Nashville Network outfitted its first audio remote truck, equipped with a 48-channel AMS Neve Capricorn. The truck will be used to record live concerts and, when not on the road, will double as a remixing/production station.





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—FROM PAGE 148, MOVIES OF THE WEEK

print," recounts Fluhr. "The low resolution of the Avid ¼-inch cassette playback, even with the Sony projector and line doubler, makes the actors' mouths soft, and we can't always see how well sound is syncing to picture. So this was a real plus."

This particular MOW required lots of ADR and additional lines. Matthew Modine's character provides narration throughout, and a couple of the crowd scenes demanded a fair amount of looping. Fluhr's goal is always to preserve the production performance as much as possible. "If it's got noise on it,

I clean it up as best as I can and use as little ADR as possible," he says. "Sometimes, I will only add one word from a looped line. The key to ADR is trying to match it with EQ, reverb and room tone so it sounds like it belongs there."

After 150 MOWs, it's not surprising that Fluhr has developed a custom mixing formula to speed up the process. "It's a 16-channel Dolby SR mixing format on a 24-track tape," he explains. "Channels 1 through 6 are for dialog [L, R, C, C, C, C]. I keep ADR and production sound effects [PFX], even reverb, as separate as possible. I also record an X-track of my dialog and ADR on two

MOWS IN TORONTO

TRYING TO KEEP THE WHOLE PACKAGE

As Hollywood continues to head to Toronto for MOW location shoots, post-production facilities such as Medallion-PFA Film & Video, a division of Command Post TOYBOX, are vying to keep entire projects in Canada.

"Post budgets, particularly for MOWs, are relatively small," says Mike Baskerville, head re-recording mixer at Medallion. "We offer a package that includes Foley, ADR, editorial, sound effects creation and mixing, which is very attractive to both Hollywood and Canadian productions."

Besides the audio post-production services, the company also has onsite a 35mm film lab, transfer facilities and video editing capability. A recently completed Foley stage rounds out the one-stop shop. They can handle the post-production on a MOW, or a feature film, from the time the picture is locked to when it airs.

"A real advantage for us is when we transfer film dailies on projects that we'll be doing the audio post for in a few months, I can go listen to it and start plotting it out, even flag things before they are done shooting," says Baskerville.

With the time limitations on a typical MOW schedule, seeing the dailies gives Baskerville and his team a heads-up on what kind of ADR may be required. The goal is to get the ADR scripting and sound spotting done once the film is locked, which can be tremendously

beneficial if the principal actors haven't yet left town for their next project.

Everything on the Foley/ADR stage is recorded straight to Pro Tools. "We don't go to analog until the final mix on 24-track Dolby SR," says Baskerville. "Recording straight to Pro Tools saves time. When the editor receives the material, it is roughly in the right place—he just trims it a bit. We also use Pro Tools for dialog and sound effects editing, which is then digitally transferred to DA-88. We keep everything in the digital domain as much as possible."

The time constraints on MOWs often make it impossible to premix effects. By cutting and designing on digital workstations, fewer tracks are carried to the mix.

"The bonus for sound editors when they come here is we have such a great library to pull from," says Baskerville. "We build libraries from the various shows we've done. Some is off CD, and some is source. All our sound effects are backed up on optical drives."

Medallion-PFA has two mix theaters, one outfitted with a Neve 60-input console, the other a new LaFont Panoramix console with 68 channels. Both consoles are equipped with Neve Flying Faders automation. The rooms are capable of mixing mono, stereo, TV stereo, Dolby Surround and all 5.1-channel audio formats.

"The key to the MOW is you try to get a film soundtrack on a smaller budget," sums up Baskerville. "It may be a MOW, but it is still a movie, and you want to give it the best and fullest track you can."

—Kim Wilson

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ning the MOW to ensure he meets their audio requirements.

He also points out that a lot can happen to his handiwork after it leaves the dubbing stage. The final edited film goes to telecine, then commercials are inserted. "I really like these Hallmark Hall of Fame movies," remarks Fluhr. "They have total quality control because they buy the entire two-hour time slot from the network. They insert the commercials themselves. Levels match, so you don't have those annoying, blasting commercials."

With a smile he adds, "You're lucky to get what you get on the air, considering it is transmitted via satellite several times before it finally goes through your cable company's system. That's why you have to control dynamic range and EQ as much as possible. If you hit things too loud, even if the network doesn't reject the show, it's going to kick on the air. If you go to extremes one way or the other—too loud or too soft—your mix isn't going to work for TV."

DAY BY DAY

Fluhr, Jenkins and Digirolamo, along with recordist Aaron Levy, come in

early on day one of the dub and get a feel for the tracks. "The dialog and ADR were all on a DA-88, edited and recorded from Fairlight," says Fluhr. "Sound effects and Foley were Dolby SR on a 24-track playback. Generally, what we are looking at is a record multitrack, one or two 24-track playback machines and several DA-88s.

"We don't do a lot of rehearsal, and we dub scene to scene," he continues. "Since we have automation, we are constantly in record. We usually get fairly close the first time, then we back up and tweak. If we've been in a setting already from a prior scene, we know the levels. We just dub, back up, punch in and go. Most of the time we do a record pass just for music so we don't punch too many holes in the track."

Difficult and subjective scenes will sometimes require rehearsal. "That can take 20 valuable dubbing minutes out of your day on a short schedule," contends Fluhr. "You just have to ask the client if you have the time. Especially with these short schedules, you've got to create a comfortable environment. It can't be tense. It can't be 'everything's a problem.' Nothing is a problem, everything is a solution. Still, on MOWs, due to limited

budgets and time constraints, you can't always do creatively what you'd like."

One of the biggest compromises of the short schedules is the lack of time to audition alternatives. "Here is where the editors can make a huge difference," points out Fluhr. "If they give you tons of alternatives, like on a door slam, it's going to take longer to get through the mix. When the director can come in advance to hear ADR, effects and music, it saves precious time on the dubbing stage."

On day one of a typical three-day dub, Fluhr likes to have ten minutes of program in the can by lunch, with the first 30 minutes completed by the end of the day. To stay on schedule, half the picture needs to be dubbed by lunch on day two. When it all clicks, the movie is finished by lunchtime on day three. The afternoon is left for playback and fixes.

Quick, and final, decisions often need to be made along the way in the interests of saving time. Perhaps the most precarious decision is whether to play back a reel after it's been dubbed. "Everybody wants everything perfect in the beginning, and then you might have to make serious compromises down the line

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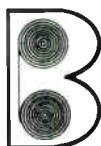


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when time is running out," maintains Fluhr. "Many times, it is a good idea to play back the first reel to get a sense of the sound, which fashions you for the rest of the dub. I would rather get minutes in the can, get the movie done, then go back and tweak it."

The fourth day on *What the Deaf Man Heard* was scheduled for dubbing the foreign music and effects mix. However, the M&E extended into day five after the producers came to see the final version on film on day four.

"A potential problem is when the decision-makers are not in the room during the dub and arrive just for playback," says Fluhr. "Fortunately, on this project we only had a few small issues to fix."

Typically, MOWs are dubbed a week or two before broadcast. *What the Deaf Man Heard* had an unusually long lead time as it was completed in September and aired on November 23 as a holiday special.

"I'm very proud of what we did on this movie," concludes Fluhr. "Obviously, with more time we might have made different choices along the way, but on the short schedule, you do the best you can with the time you have." ■

Kim Wilson is a freelance writer based in Los Angeles.

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—FROM PAGE 149, POST NOTES

among many others... Jim McKee of earwax productions, S.F., did the sound design for a Smithsonian National Air and Space Museum installation based on the *Star Wars* trilogy... One Union's (S.F.) Eric Eckstein and Andy Greenberg completed final mixes for 104 Borders Books TV spots, using Pro Tools and Yamaha 02Rs... Juniper Music and Video Post & Transfer, both of Dallas, teamed up on Oldsmobile Bravada and Texas Bank and Commerce spots, to name just a few... Up in Seattle, Clatter&Din worked on spots for the SuperSonics, McDonald's, TCI and many others... Also in Seattle, Bad Animals recorded the dialog with actor Lance Henriksen for the upcoming Disney animated feature *Tarzan*; and sound designers Dave Howe, Mike McAuliffe, Suzie Brutke and Gary Littell did the soundtrack for the ABC primetime special "Incredible Inventions and the Search for Flubber"... The Jungle, one of Seattle's newest facilities, brought in Peter Frampton to shoot and track an infomercial called "The Making of a Legend"; the facility includes a complete Genelec monitoring system, with 1031s

LCR and surround and a 1092 sub... Down in L.A., composers David Livingston and Bill Purse of DV8 created an original underscore for a Southwest Airlines spot...615 Music in Nashville scored the new network ID themes for the History Channel...Producer/engineer Kirk Yano was in Stepbridge Recording Studio in Santa Fe serving as music supervisor for the indie film *The Outfitters*...**People:** East Side Audio in New York made a move toward capturing long-form mixing with the addition of re-recording mixer Mark Holland... Right across town, National Sound hired engineer/mixer Anthony Erice...Primal Scream, a Santa Monica sound design/music house, has hired producer Sherry Virsen...**Studio Updates:** Buttons Sound in New York is fully digital with the addition of the PreSonus DCP-8 8-channel dynamics processor used in conjunction with the Spectral Audio Engine...**Four Media Company** in Los Angeles keeps growing, adding an Otari Concept Film Elite mixing console and a second Harrison SeriesTwelve... Olympic Sound Studio in L.A. also bought an Elite film console...Sonolab in Montreal has added a LaFont Panoramix 71 film console with Uptown 2000 moving fader automation...Triad Studios in Seattle has completed an artsy cosmetic redesign, then purchased a Sonic Solutions system and CD Burner...**Product News:** The BGW Millennium Series Models 1, 2 and 3 have been granted THX approval, and the Directors Guild Theater in Hollywood installed five Models 750G and 350As, with a self-powered subwoofer system, Model M1100...EAW CR72 Cinema Surround Loudspeaker also received THX approval...Fairlight opened a sales/support office in Germany, then promptly sold a third MFX3plus system to Sound Studio N, one of the country's leading music recording facilities; F.A.M.E. consoles, meanwhile, have gone to The Mix Place in New York, Synchronized Sound in Atlanta; National Video in Boston and Creative Domain in L.A.; and MFX3plus systems and DaD dubbers are being rented in a big way out of Audio Rents, Advanced Audio, Audio Effects and Design FX Audio in Los Angeles...HHB has demonstrated direct file interchange capabilities between its popular Genex GX8000 MO recorder and SADiE workstations. SADiE's Version 3 software provides a control interface for replay/edit on the Genex unit, and the Genex Version 4 software provides a linking language to the SADiE systems, including the 24-bit Octavia. ■

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Audio Products For Film/Video

ESAM FOR YAMAHA 03D

The 03D digital audio mixer from Yamaha (Buena Park, CA) is now compatible with video edit controllers through the ESAM II protocol. The 03DVEK software upgrade allows video editors to use Edit Suite Audio Mixer protocol to automate audio transitions in sync with ESAM-compatible video editors from Sony, CMX, Grass Valley and others. 03DVEK software features remote transition preview (for previewing audio edits), up/downloading 03D session data to/from the video editor; versatile crossfade capability, including individual channel and global fades; remote fader control; and preview source select. The upgrade is \$999.

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SIERRA'S ADVANCED AUDIO

Sierra Design Labs (Incline Village, NV) offers the Advanced Audio 4-track digital audio recording option for Sierra's Quickframe™ and Diskcovery™ videodisc recorders, enabling on-the-fly multitrack or single track control over record, playback and editing. Featuring four 24-bit, 48kHz AES/EBU



tracks, Advanced Audio allows independent control of each track, enabling each to be offset to other audio tracks or video. Control communication, additional output for channel cascade and external editor input are provided for via RS-422 connectors. RS-232 access allows for software updates. Additional features include LTC timecode support, audio silence generator and external reference and sync outputs. Audio I/Os are BNC.

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NEW DEVA DRIVE

Zaxcom's (Midland Park, NJ) new disk drive for the Deva 4-channel recorder/mixer will record up to 7 hours, 13 minutes in mono/3 hours, 50 minutes stereo track time. In addition, the recorder will record in 4 channels up to 1 hour, 55 minutes. Zaxcom is also shipping a SCSI drive port interface for Deva,

which will connect with CDR, Nikon Beluga and Iomega Jaz drives; the files will be written for .WAV and SD2 formats.

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SADIE PORTIA

Studio Audio Digital Equipment Inc. (Nashville) is now shipping Portia, a JPEG-based video playback card for SADiE and Octavia DAWs. Providing a random-access video component that matches the speed and efficiency of disk-based digital audio systems, Portia eliminates the search times and maintenance costs of conventional VTRs. The JPEG card system runs under Windows and is frame- and field-compatible with SADiE and Octavia systems. Disk space for video storage can be optimized by using various video resolutions, and all playlist functions may be automatically added to the

EDL. Audio and video can be scrubbed simultaneously. The Portia system ships with a 9GB hard drive, a rack-mount breakout box for video, timecode card and 9-pin RS-422 control.

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TRACER SHIPS SPOT

Tracer Technologies (York, PA) is shipping SPOT, playlist preparation software for IBM-compatible and Macintosh computers. Designed by Emmy Award-winning sound editor John Hegedes, SPOT allows users to catalog and manipulate SMPTE events and capture frame-accurate hit points and descriptions while locked to SMPTE timecode. Features include Event Mover, Project Editor, View Filter and Import/Export. The system also provides database management functions and prints out log sheets. Price is \$495. Tracer also is also now distributing the OnStage card from Applied Magic Inc., a digital audio adapter offering four analog XLR inputs, 20-bit digital I/O, real-time mixing and MIDI control. The card supports SMPTE, LTC and MIDI protocols. Price is \$1,595.

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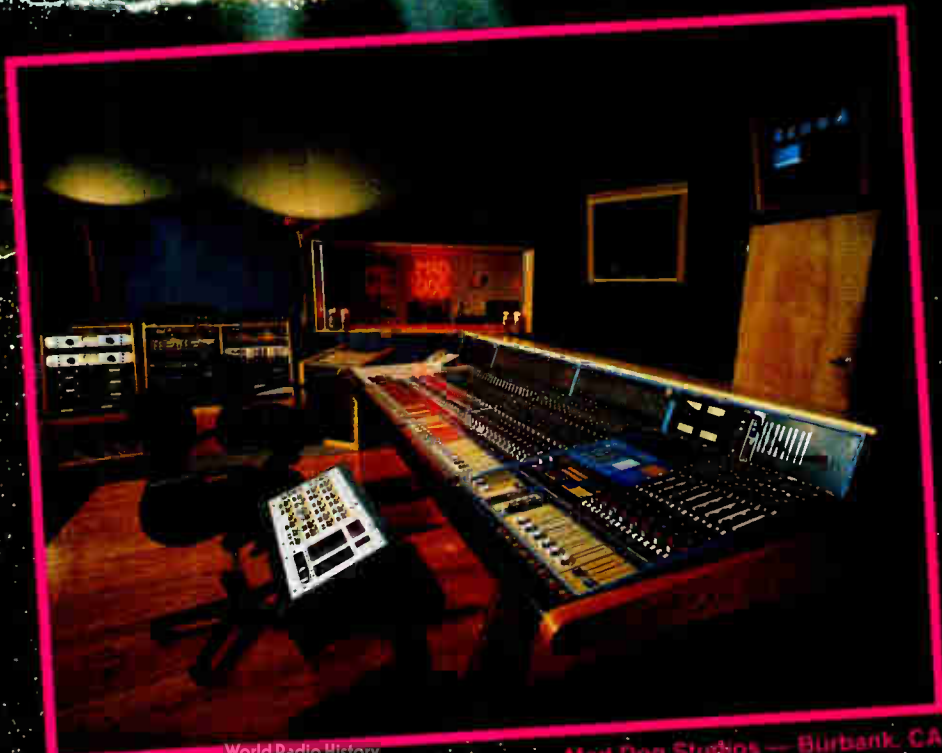


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TROUBLESHOOTING YOUR SYSTEM

LINE CHECK 101



ILLUSTRATION: PAUL MOOCH

Trouble will always turn up at the worst moment, in front of others who are waiting to see how you'll respond while the clock runs. The best insurance is knowing in advance how you'll handle the situation and what sequence of systematic moves will solve the problem quickly. Being prepared to put the right troubleshooting procedures into motion can solve problems fast and will help you keep the confidence of other members of the production.

Trouble starts when the engineer calls on the talkback, saying, "I don't have that input." Typically, the engineer who has been running the line check via a talkback mic is married to the mixing board, and cannot leave his or her post to solve problems. It's therefore up to the stage tech to find and fix the problem; on all but the largest live shows, this person is usually also the monitor mixer. And since the business end of the snake is where most problems occur and are solved, it makes sense to tackle these problems from the stage.

CHECK THAT CONNECTION

Seasoned audio techs often refer to the cables as "hoses," using the analogy of water for the flow of signals. Sorting through even the most complicated wiring scheme can be as simple as repeating to oneself the logical flow from the microphones—"goes outta here and goezinta here, goes outta here and goezinta here." Every "goes outta-goezinta" combination is a hose—er, cable—passing signal to the next connection. The old saying "a five-dollar cable will screw up a million-dollar sound system every time" contains a lot of truth. It also makes sense to suspect the connections rather than the gear because interconnects are subject to the most stress on a daily basis.

Even with most pro gear, which is built to high tolerances, any bench tech worth a coil of solder knows that connections within the XLR chassis are likely points of failure. Whether from "Daltrey-ing" the mic or from unplugging by

pulling on the wire instead of the connector, mechanical stress is the leading cause of failure. Check for broken hoses as a first step when things go south.

VISUALIZE THE SIGNAL PATH

Each mic cable is normally patched to the numbered rows of female XLRs on the snake/splitter system's main box. But between the snake and the individual mic cables there are often sub-snakes, which take a number of mic cables in one area, say the drums, and bundle them as a group. Sub-snakes are, of course, shorter, miniature snakes that neatly bring a dozen or so mic signals the brief distance from the middle of the stage over to the main box. The snake brings all these connections to the console, completing the multichannel XLR hose system that ends at the house mixing console. The circuit is microphone, mic cable, sub-snake, main snake and console. All this is obvious, but visualizing the system can help to

BY MARK FRINK

—CONTINUED ON PAGE 164

TOUR PROFILE

ANI DIFRANCO

The "Living in Clip" Tour

Ani DiFranco is finding that her unique brand of in-your-face, acoustic-based alternative folk music is attracting larger audiences every time she performs. Last fall, she toured on the strength of her double-live *Living in Clip*, her tenth independent release on Righteous Babe Records, which is now approaching the 200,000 sales mark. Sound equipment for the tour was again supplied by Klondike Sound of Greenfield, Mass., which has been Di-Franco's sound company of choice for the past three years. Many live engineers know owner John "Klondike" Koehler as the audio director for the New Orleans Jazz and Heritage Festival for the past 21 years. As a former Western Mass. resident, I've known Koehler for nearly that long and can affirm that he's a sound vendor who strives to give performers what they need. In fact, Koehler started out as a performer himself.

I first met DiFranco's front-of-house engineer Steve Schrems ten years ago, at the monitor desk for 10,000 Maniacs, before many had heard of them. The owner of the sound company I worked for then wasn't sure what category to put them in, but I was convinced they were the next big thing for college kids. That night, my chores in the U. Conn. field house included mixing the seven opening bands—all battle-of-the-bands winners. I didn't mind because I

ton, Mass., while we both worked there in the '80s. Since then, he's worked for Dee-Lite, Mel Tormé and Stephanie Mills. Imagine my surprise when, on another coast, a decade later I found Schrems again out with the hottest new sound, this time mixing front-of-house.

Schrems mixes DiFranco on a Yamaha PM4000. For effects, he relies on a Yamaha ProR-3 reverb, which he says is "clean and easy to use," an SPX-990 and a TC Elec-



PHOTO: MICHAEL MOORE/THE KEENE SENTINEL



PHOTO: MARK FRINK

From left: P.A. tech Larry Berger, Ani DiFranco, monitor engineer Andrew Gilchrist and FOH engineer/production manager Steve Schrems

knew great things were going to come from working with the headliner. When Schrems showed up that afternoon and informed me that the monitor console was set up on the wrong side of the stage, he was surprised when I took a deep breath and said, "Well, we'll just have to move it then." Schrems subsequently became my roommate in Northamp-

tronic 2290 "for excellent stereo delay effects." He uses no insert on DiFranco's vocal, to preserve dynamics and "because she has outstanding mic technique." Schrems does, however, use a Klark Teknik quad-gate on drum channels and four KT dual-compressors on the several guitar and bass inputs. An Alesis ADAT at FOH is fed a combination of direct outs and subgroups, and righteous sets are preserved for possible future release in 8-track ADAT format.

Drum mics on Andy Stochansky's kit include Audix D-4 mics on snare top, snare bottom and the floor tom, and a Beyer M88 is used on kick. An Audix D-2 is used on the rack tom, and Electro-Voice RE-200 condensers are used for hi-hat, ride and overheads. A Sennheiser MD-421 faces Jason Mercer's Ampeg Classic SVT 410 bass cab, which, along with an SVT 15E cab, is pow-

BY MARK FRINK

LIVE SOUND

ered by a Hafler P7000 Diablo using a Trace Elliot V-type tube preamp. Mercer's upright string bass goes through a Gaines active DI, while his Alembic goes through one of the industry's best kept recording studio secrets, the Evil Twin Class-A tube direct box from Northampton's Bruce Sigfried.

Guitar tech Reg Dickinson has his hands full, as DiFranco plays four Alvarez WY-1 acoustics and a tenor acoustic, plus a Hamer Artist Custom electric through an Ampeg SJ-12T Superjet, using Samson UR-5D wireless.

Three more input channels are taken up by a Morley "Bad Horsie" wah pedal and a Dunlop "Tremolo Stereo Pan" pedal (two inputs). Any or all guitars get effects treatment in the monitors via the aux sends on the monitor desk.

Vocal mics are Audix models, with both DiFranco and Mercer singing into the OM-5. "Audix mics were chosen for their tight pickup pattern and excellent frequency response," Schrems comments. "This is especially important in the vocal mics, where the off-axis response keeps the stage wash out of the mix and helps reject feedback." Drummer Stochansky's vocal mic is an OM-7,

which picks up less of his drum kit.

When not miking up the stage and assisting with the wedges, Klondike system engineer Larry "Pa Tech" Berger helps Schrems with the main speaker rig, which consists of a dozen Electro-Voice MTH-2/64 BTCF mid-high cabinets and six EV MTL-2 BTCF manifold subwoofers. The system travels with motors and flying hardware, plus scaffolding for use on stages with inadequate sound wings. The three-way rig is powered with Crest 8001, 7001 and 4801 amps. The new 18-space amp racks that Klondike built for this tour hold two of each amp model, and are configured for 4-ohm minimum loads. Each rack is served by a three-circuit 8/5 cable and a multipin signal cable for speedy setups. Electro-Voice S200 speakers are positioned at stage center to provide vocal reinforcement for the serious fans in front and center, aka the "Lizard People." Berger explains: "It's our commitment to provide clear vocal intelligibility for every seat in the house, since DiFranco's lyrics are such an important part of the music."

Schrems runs the system feeds through two BSS FCS-930 stereo graphics and a BSS Omnidrive, using a scheme involving asymmetrical boost and cut on the subs. "Summation of the subs at the center of the stage can be troublesome," Schrems explains. "Changing the phase at their crossover point and adding small amounts of delay, all easily done on the Omnidrive, helps steer this away."

Monitors are mixed by Andrew "Goatboy" Gilchrist, who has been with DiFranco since the folk venues, before she traveled with a band. Gilchrist also worked with the Family Folk Tour of Gorka, Larkin, Wheeler and Eberhardt, which is how I first met him at the Portland Zoo (don't disturb the elephants during soundcheck). Gilchrist mixes on a Yamaha PM2800 with KT DN 360 stereo graphics. Eight EV DeltaMax DML 1152 speakers are used as floor monitors, and they are also stacked on top of Electro-Voice 2181 subs, where they serve as the highs/mid section of three-way sidefills. The DeltaMaxes have been re-loaded with the EVX-155 found in the new EV Delta DMS-1152/64 cabinets "for more punch and better low-end response," explains Gilchrist. Power is supplied by 8001 and 4801 amps with EV DX-34A crossovers.

Fed from a separate mix, two 50-watt Aura Sound bass shakers mounted on a Klondike-customized drum throne supplement the low end for Stochansky's

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two DeltaMaxes. The shakers are mounted on a 0.15-inch aluminum diaphragm in the throne and powered with a Crest CA-6, eliminating the need for a double-18 sub behind the kit. In addition to the sidefills, DiFranco listens to three floor monitors—the center DeltaMax has a vocal-only feed, and two more wedges on either side are fed a dedicated acoustic guitars mix. Acoustics are also prominent in the full-range sidefill mix. DiFranco is a bit of a low-end freak—her playing style incorporates slamming the heel of her right hand on the guitar

bridge, and she really wants to feel those percussive thumps.

This month DiFranco's new studio album *Little Plastic Castle* is released on her Righteous Babe independent label. She plans to be back in theaters this spring to support it and then intends to tour sheds in the summer. It's been a quick trip from the coffeehouses, but careful attention from her crew and Klondike Sound have made it a smooth ride. Back on the wall of Klondike's lobby is an autographed DiFranco poster, with the inscription "If it ain't Klon, it ain't ON." Klondike sound can be found at www.klondikesound.com. ■

—FROM PAGE 160, TROUBLESHOOTING
find any wiring faults between the mic and the mixing board.

THREE-ITEM TROUBLESHOOTING KIT

A basic troubleshooting kit should include a spare mic cable, a spare dynamic mic and a device for checking phantom power. This kit should be stored where you can get to it in seconds; it can be incorporated into the setup routine by feeding the spare cable and dynamic mic to a generic spare input at the far end of the console. One inexpensive phantom-power tester, the Gold Line GL-1K, is housed in a Neutrik male XLR with a red LED indicator at the cable boot. Upon receiving phantom power, it generates a 1kHz tone at -49 dBm down the line. (Of course, with such a tone generator always on hand, the input may also be used to route tone to any of the console's outputs. And when it's time for a pre-soundcheck line check, these three items will already have been verified during the board operator's check to confirm outputs and effects routing.)

At least one spare line in the snake and a spare in every sub-snake is recommended. The former is not a luxury, as there is no other practical way to get a signal to the mixing board if a snake line is bad. The assignment of sub-snakes, however, is in your control when assigning how the mics will be routed to the main snake box, but if you end up without a spare line in a sub-snake, an extra 100-foot mic cable can substitute, though it can be awkward to implement quickly. In this case the benefit of "over-and-under" cable coiling will become obvious the first time you try to deploy a long cable by holding one end and releasing the other.

By means of the splitter system, the stage box typically also routes the input signals to the monitor console, usually over another, much shorter snake. If the first answer to the complaint that a mic line is dead is "We have it in the monitors," that means that the signal got all the way to the monitor desk, so any problem is downstream from the stage box, either in the main snake or the console. On the other hand, if the signal in question fails to appear at the monitor desk, the prescription is ACTION. We've established that there are actually three connections to the mixing board—the mic cable, the sub-snake and the main snake. Only four swaps are needed to replace every component to the desk's channel. Mak-

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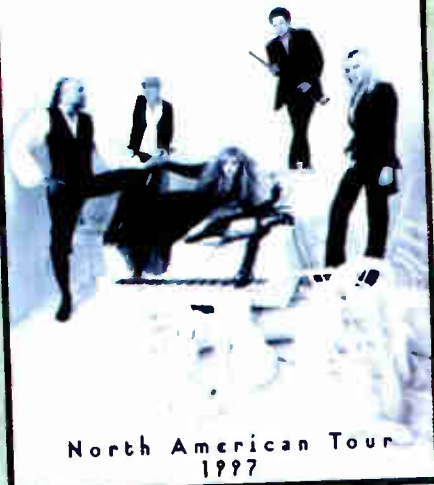
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World Radio History

Fleetwood Mac



North American Tour
1997

ALL ACCESS

Fleetwood Mac

TEXT AND PHOTOS BY STEVE JENSEN



Nicks and Christine McVie both used in-ear monitors—Future Sonics and Garwood Radio Stations—but only in one ear. Mick Fleetwood typically used one earbud to help him nail the song's tempo, but then removed it. Onstage wedges were Clair Bros. models; Fleetwood's drum monitor rig included two ML18 subs and Clair R-2s. All vocal mics were Audix OM7s.



At the FOH position, engineer Dave Kob used a pair of Yamaha PM4000s. Outboard gear included Yamaha NS4s as cue speakers, Lexicon reverbs, Aphex gates, Summit and dbx compressors and TC reverbs. All the bandmembers used backline cabinets positioned on both sides of the stage so they could hear each other as a band; monitor wedges complemented the instrumental mix. "It's a practical, simple way and I think the band plays more naturally that way, they hear each other," says Kob.

Before it was cut short in mid-December because Christine McVie was suffering from exhaustion, Fleetwood Mac's 1997 tour played to packed houses across the country and reunited the most popular lineup of the 30-year old group. Band-members included Mick Fleetwood (drums), Lindsey Buckingham (guitar/vocals), Stevie Nicks (vocals), Christine McVie (vocals/keyboard) and John McVie (bass).



Fleetwood's drum solo featured a MIDI trigger body vest with four pockets, each containing an FSR trigger, with a fifth trigger in the crotch of his pants. The triggers were velocity sensitive, allowing Fleetwood to trigger a variety of sounds ranging from drums to orgasmic moans. Because the triggers were extremely sensitive and not commercially available, "they were treated with kid gloves," says drum tech Bruce Jacoby.



Monitor engineer Chris Lantz operated two Yamaha PM4000s and a Mackie 16x4 (for effects) slaved together, totaling 90 inputs and 22 outputs.



Guitar tech./assistant Ray Linsey maintains Buckingham's 48-track home studio when not on the road. Though Buckingham played about half the show on his custom-made Turner electric, he used about seven guitars throughout the show, and Linsey kept a spare for each ready to go. "Lindsey is about clean, warm sound," says Linsey. "The emphasis is the playing coming from his fingers. The guitars are very consistent, there's not a lot of gadgets. What you're hearing him do is mostly the way he plays the neck of his instrument; he's not relying on knobs and things."

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ing these in the correct order will not only fix the problem, but verify its cause as well. Simply replacing everything doesn't answer the ultimate question of "what's broken?" Methodically changing one at a time from beginning to end allows the tech to find the broken component so it can be fixed. The only thing worse than finding a bad cable once is finding it again.

COMMUNICATION AND ACTION

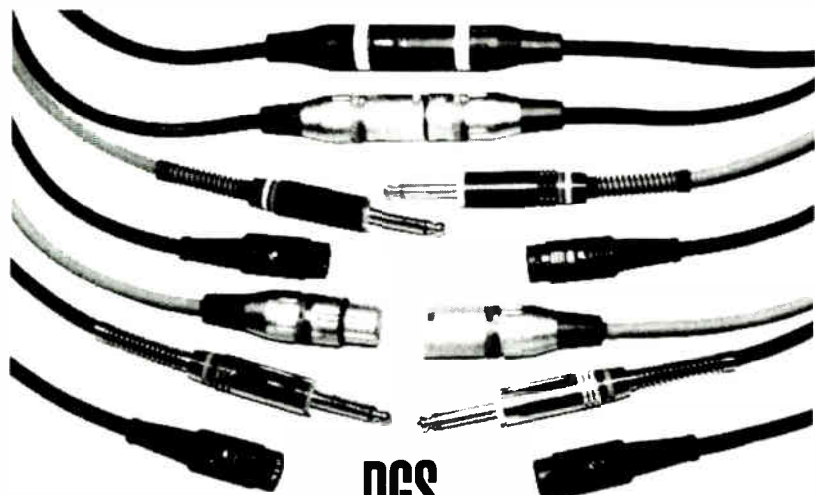
On a two-member audio team, there are three basic reasons for inputs not working correctly, and two of them are operator error, referred to as OE in audio shorthand. Here's a good place to leave the egos behind. They will only get in the way. Everything is suspect, but you must always remain a team. You're fighting the clock and possibly a bad component, not each other. Clear, concise communication is a key part of the process; placing blame wastes time and breaks the team.

Once you hear the words "I don't have that input," the clock is running: Take control of the situation. Check the signal path, in sequence, from mic to stage box. Make sure the engineer has muted the input so that each re-patch can be done safely without hurting any equipment or ears with loud pops. Carrying your spare cable and dynamic, wave your hands as you dash onto the stage to draw attention to your actions. Then use the international sign for "Mute!" —drawing your hand back and forth across your neck. You must clearly communicate with the engineer that the input should be muted before doing any re-patching.

1) **Swap the Mic.** Substitute your spare dynamic and use the simple mantra of "test, one, two, test, one, two" while gesturing to the engineer for a response. Start by using a dynamic mic because it does not require phantom power. Even if the mic in question requires phantom, getting a dynamic mic to work on the same cable immediately tells you that the problem was either that particular mic or the phantom power from the console. Usually the input still doesn't work, and this only tells you that it is, most likely, a cable problem and the problem is further down the line. Phantom is easily checked with your tester here and at the other connections, but using the dynamic first will turn up OE at the console.

2) **Swap the Cable.** Next go "downstream" one connection to the sub-

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snake and replace the cable. Wave your hands and make the "mute" sign again, as you will once more be re-patching something that may be turned on in the speakers. To keep the process pure, replace the mic cable in question by plugging your spare dynamic AND spare mic cable into the channel on the sub-snake. Often it's the mic cable that failed. However, if your engineer still doesn't receive signal, then the problem is farther downstream.

3) Check the Main Stage Box. Plug your spare mic and cable into the corresponding channel of the stage box, temporarily unplugging the sub-snake connector. If the signal suddenly appears, then either the channel in the sub-snake was bad or the main snake was simply mispatched. Sadly, the latter is often the case and is many times accompanied and worsened by several causes: The patch to the stage box was not documented, the XLR fan-out tails of the different sub-snakes coming into the stage box are not uniquely identified, and their numbers are hard to read. The next chance you get, take your multicolored collection of electrical tape and give each sub-snake a unique color stripe at both ends. Then, using the same color tape, label its XLRs with big, easy-to-read numbers. This takes only a few minutes and prevents hours of grief later on.

If the stage box was patched correctly but you now have signal to the console, the sub-snake is suspect. If you have a spare line in the sub-snake, substitute it at the stage box. Then re-patch the original mic cable to that spare line back at the sub-snake's box end. If you don't have a spare line, then that other, longer spare mic cable will be needed. However if after all this, the problem seems to be a line in the main snake, you must re-patch to a spare line in the main, and this must be done at the console input as well.

4) End of the Line! After verifying the culprit with a cable checker, an ohmmeter or your phantom power checker, make sure it doesn't happen again. Simply tying a knot in the cable can be mistaken by other techs as a funny way of wrapping it. Taping over both XLRs of a bad line in the sub-snake is helpful, but there's no guarantee that the tape won't be removed or that the problem will be fixed. Unless I am sure that a repair is imminent, I pull out a pair of dikes and clip the connector off at the bad end. Brutal, yes, but the next time I use that cable, the problem will have been addressed with a soldering iron on a bench. ■

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limiting. The unit provides two inputs and four outputs, individually switchable between analog and digital, and RS-232 and RS-486 ports for preset modification and storage (Windows-based control software is included). Front panel controls include output mutes and store/recall controls for up to 16 presets. Additional features include multiple security levels, rear rackmounting ears and the ability to link up to 30 units. Price: \$6,354.

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RECORDING NOTES

THE STONES IN THE STUDIO:



AN INTERVIEW WITH ED CHERNEY

by Harvey Kubernik
[Los Angeles record producer and man-about-town Harvey Kubernik attended a number of tracking and mixing sessions during the making of the Rolling Stones' latest album, Bridges to Babylon, at Ocean Way Studios. Later, he interviewed a number of the principals involved, including engineer Ed Cherney.—Eds.]

Do you have a general recording philosophy that you bring to a Rolling Stones session, or to any recording date?

Your first responsibility is to capture what it is they do. Their fans don't want to hear me in there, so the first thing is to be as true as you can to what the Rolling Stones are and what they do. And along the line, things come

up. You may enhance something somewhere, but Keith sounds like Keith and Charlie sounds like Charlie and Mick sounds like Mick, and I wouldn't mess with that.

Do the Stones have a different approach to recording than any of the other artists you engineer or produce?

When you have a little more money, it buys more time. So most other artists get in and out of the studio pretty quick. You cut tracks in a few weeks and you know what you're gonna do. With the Rolling Stones, it kind of morphs into what the songs are gonna be. So they can afford to stay in the studio a little longer and work out songs and performances.

Do the bandmembers make a lot of suggestions during the initial tracking sessions?

Not really, unless you are really screwing up. They're really most concerned with the music they are playing, and if you get it on tape, that's good enough. If you can get it on tape and have it sound pretty good, you're ahead of the game.

Do they take direction about microphone placement or

give some feedback about setup and location?

I was pretty lucky with them because I've had so much experience recording them. If I can be so presumptuous, they know what to expect from me, and I know what they expect in there. So there's very little of that conversation that goes on. The conversation is more about the music, the changes, the parts, who's playing what. We certainly listen to amplifiers before we start working on a song, and maybe come to a consensus about which amp sounds better or which

—CONTINUED ON PAGE 178



Ed Cherney

TWO INSIDERS' VIEWS

ROB FRABONI

BACK BEHIND THE BOARD

by Bruce Pilato

Producer/engineer Rob Fraboni's history with the Rolling Stones goes back 25 years, when he worked with them in the studio on one of their "middle period" albums. "I worked on *Goats Head Soup* in 1973, just for a couple of weeks," he says. "They did most of the record in Jamaica, but they came to L.A. for two weeks at the Village Recorder,

and I ended up working on it there. Keith and I became good friends, but that also meant that I really couldn't work with the Stones again, because we became such close friends and it was kind of viewed as me having a pro-Keith bias. But the



reason that I got involved on *Bridges to Babylon* is because there were a number of producers jumping on board, and so the Keith-bias thing was no longer an issue."

In the early '70s, when he was just out of his teens, Fraboni became an in-demand recording engineer, working on a number of records now regarded as classics, including the Beach Boys' *Holland* and their hit single, "Sail on Sailor"; Joe Cocker's "You Are So Beautiful"; and the two reunion albums by Bob Dylan & The Band,



Planet Waves and *Before the Flood*. In 1975, at only 24, he launched his pro-

—CONTINUED ON PAGE 185

"LIVE ON LETTERMAN"

FROM TV TO CD

by Barbara Schultz

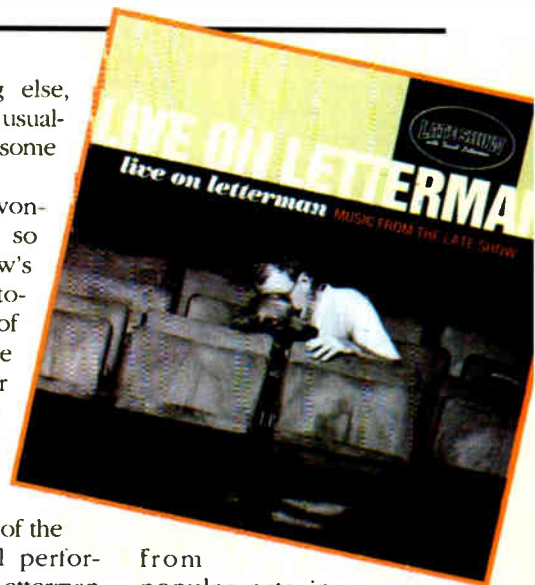
What are the Top 10 reasons people watch David Letterman's *Late Show*? Number 10: They don't have jobs or they're in the music industry, so they don't have to get up

early. Number 9: Most of us aren't clever enough to think up our own Top Ten lists. I know I'm not... But the music performances are usually the main reason I end up staying up late.

Music on the Letterman show goes beyond the garden-variety artist promoting a new release. There are often one-of-a-kind performances by unusual combinations of artists, or bands doing totally new arrangements of familiar

songs. If nothing else, Paul Shaffer's band usually gives the songs some new dimension.

It makes you wonder why it took so long for the show's producers to put together a selection of these memorable performances for CD release: *Live on Letterman, Music From the Late Show*. This collection features some of the most exceptional performances in recent Letterman history. Songs include one-off duets such as Jerry Garcia and David Grisman performing "Friend of the Devil," Elvis Costello and Burt Bacharach doing the first-ever live version of their collaboration "God Give Me Strength," and Jewel and Flea performing "You Were Meant for Me." There are also classic tracks from Lou Reed ("Sweet Jane") and Aretha Franklin ("Think"), and hits



from popular acts including the Dave Matthews Band and Sheryl Crow.

Tracks were selected by the *Late Show's* music segment producer, Sheila Rogers, who books all of the music acts for the show. "It's an idea that has crossed everyone's minds over the years," Rogers says. "I was working with Paul Shaffer on a retrospective of music for an anniversary show that we

—CONTINUED ON PAGE 182

R.E.M. performed "Crush with Eyeliner" on The Late Show



PHOTO: CHRIS BUEHNER

GEORGE BENSON'S "THIS MASQUERADE"

by Blair Jackson

Most pop music fans had never heard of George Benson when he unexpectedly landed his smooth, mellow version of the Leon Russell song "This Masquerade" on the upper reaches of the singles chart in 1976. With his

ever, this was another "overnight" success that was actually many years in the making.

Benson was born in Pittsburgh in 1943, and by the time he was 4, he was already showing a talent for music—he won a singing contest and began performing regularly on the radio as Little Georgie Benson. He took up the guitar when he was 8 but didn't play it publicly until he was 15; until then, he worked exclusively as a velvet-voiced singer in various Pittsburgh R&B groups. By his late teens, though, he had become known as one of the best guitarists in the city, and



matinee-idol good looks, mellifluous voice and pleasingly clean electric guitar sound, Benson managed to simultaneously court pop, jazz, easy listening and R&B audiences and laid the foundation for what has been a highly successful career as a singer and guitarist for the past two decades. As is so often the case with these stories, how-

that led to his landing a fair amount of session work outside of Pittsburgh. During the '50s, he fronted several groups, including the Altairs and George Benson & His All-Stars, both of whom recorded for Amy Records.

In the late '50s, Benson stopped singing to concentrate more on his guitar playing, which was heavily influ-

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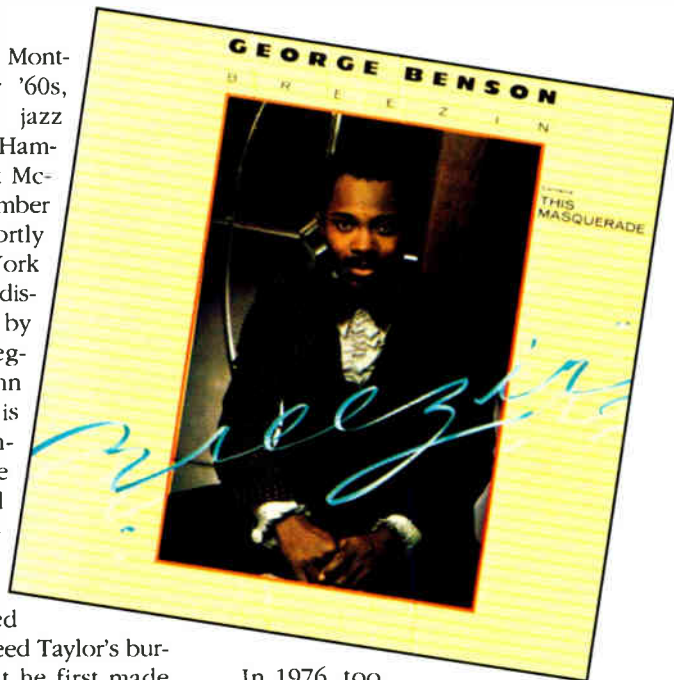
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enced by the great Wes Montgomery. In the early '60s, Benson played in a jazz combo with the noted Hammond B-3 master Jack McDuff, and they cut a number of sides together. Shortly after moving to New York in the mid-'60s, he was discovered and signed by Columbia Records' legendary talent scout John Hammond. Leading his own quartet, which included organist Lonnie Smith, Benson recorded a number of mainstream jazz records for the company, but it was when he switched to A&M and then to Creed Taylor's burgeoning CTI label that he first made minor commercial inroads by moving away from straight-ahead jazz into funk and instrumental extrapolations of pop tunes, a la Gabor Szabo. His frisky workouts on tunes such as the Jefferson Airplane's "White Rabbit" and the Mamas & The Papas' "California Dreamin'" even earned him some FM rock radio exposure.

Toward the end of 1975, he signed with Warner Bros. Records, and in January 1976 he was paired with producer Tommy LiPuma to cut an album. LiPuma was among those who convinced Benson to try singing again, and the result of this experiment speaks for itself: The first album they made together, *Breezin'*, became the first jazz album to sell more than a million copies, propelled by the success of the record's one vocal track, "This Masquerade," which made it to Number 10 in the spring of 1976. The single was an edited version of the eight-minute album track, which included an extended opening in which Benson scats along with his guitar, as well as a long piano break. The album hit Number One and stayed near the top for weeks.

Engineering the sessions for *Breezin'* was LiPuma's longtime studio mate Al Schmitt, winner of the 1997 TEC Hall of Fame award.

"We did that record in the old Studio A at Capitol—the big room," he recalls. "That was quite a room. That's where they did Sinatra, Dean Martin, Bobby Darin, Nat Cole. It had a real history. Musicians liked it, producers liked it, engineers liked it. It was just one of those places where it was easy to work and everything sounded pretty good."



In 1976, too, it was a throwback to an era of live-in-the-studio recording rooms at a time when the prevailing trend in studio design was to make rooms sound dead in an effort to gain more control. "I hated all that," the veteran engineer says. "That was the total opposite of anything I'd ever learned about making records—these dark rooms everybody was building with these big carpets on the floor and stuff on the walls to deaden down the sound. And they'd use all these dynamic microphones. It was bizarre to me. So whenever I could, I'd record in places that sounded a little more real to me—where you'd actually hear the music the way it was played in the room."

The studio was old-fashioned in another way, too: "Even though this was Studio A, this legendary studio, it had this tiny control room with an old custom board that had rotary faders. It took us forever to get them to put in vertical faders." At least the 24-track 3M machine was up-to-date, while the mics didn't need to be—Schmitt was a tube man, and there were plenty available to him.

Schmitt remembers that on "This Masquerade," "I had the drummer in the middle of the room, and then I had everybody around him, facing him. I had gobos and everything, but they were still pretty close to each other. Even though George was going to be singing, we had him sitting out in the open with everyone else, which of course is what he was used to from jazz sessions. Anyway, on that particular song, we were going to do a rough vocal, so I stuck up this cheap 666 microphone, and it turned out the first

take was it—that was the vocal that was used! Then the next time I went to do an album with him, which was *In Flight*, I had this great microphone up for his vocal but he didn't want to use it; he *had* to have that old 666. It took me two albums to talk him out of that microphone!"

In those days, Schmitt miked guitars at the amp exclusively, rather than using the now-popular combination of a miked amp and a DI signal. On "This Masquerade," he used a single Neumann U67 to capture Benson's guitar. The band on the album was Benson's regular group at that time: drummer Harvey Mason, keyboardists Jorge Dalto and Ronnie Foster, rhythm guitarist Phil Upchurch, bassist Stanley Banks and percussionist Ralph MacDonald, all superb players. Claus Ogerman was responsible for the low-key but occasionally intrusive string arrangements.

"Recording the strings turned out to be the hardest part of the record," Schmitt says. "For the whole album we recorded all the instruments at the same time. It was very easy; in fact, of the eight songs we recorded for those sessions, six of them were first take. When it came time to do the strings, we went to Germany because Tommy wanted to work with Claus and he was over there. He's an amazing arranger—believe it or not he did the arrangement on 'It's My Party' years and years ago, and he's done lots of other great records.

"So we took the tapes over there and they were recording a symphony in the studio. We were going to use the same players that night. It was a great setup—an incredible board, great microphones. I'm thinkin', 'Man, this is going to be the best!' But then I looked over and I saw that they had a Telefunken tape machine, which only goes 7½ and 15 [lips], and our tapes were at 30. Well, panic sets in because they can't get another machine, so we're stuck. The only other place around there was Giorgio Moroder's studio. So we called him and Claus actually threw him out of his own studio! 'Giorgio, we gotta use your room!' So we went in there and it was tiny, to the point where if the string players held up their bows, they could touch the ceiling. We had guys stuffed in the corners, *everywhere*. It was so crammed. We even had to move the piano out. But we finally got the session going and we worked until almost five in the morning. We got about half of it done, but

the guys were completely exhausted; they couldn't work anymore.

"At that point we made some calls and we managed to book CTS Studios in London. But we had three days before we had to go there, so Tommy and I went to Paris and we spent three days wining and dining and having a great time. Then we went to London and recorded the rest of the string parts there. I guess it ended up OK, though— we won a Grammy for it."

Though he was scorned by jazz purists for his turn toward pop, Benson settled comfortably into his role as a silky-voiced balladeer, and he made it

onto the charts with some regularity in the late '70s and early '80s. "On Broadway" made it to Number 7 in 1978, "Love Ballad" reached Number 18 in 1979, "Give Me the Night" rocketed all the way to Number 4 in 1980, and "Turn Your Love Around" hit Number 5 in 1981. A duet with Aretha Franklin, "Love All the Hurt Away," was another smash. Benson still plays a mean guitar, and he draws both jazz and pop fans to this day. He has also been around long enough and enjoyed enough success to have influenced many young guitarists the way Wes Montgomery influenced him a generation ago. ■

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—FROM PAGE 172, ED CHERNEY

guitar sounds better, to give us a place to start. But other than that, it's full speed ahead.

Why do you like recording a band live in the studio?

Well, you're there for the moment of creation. When you're playing live, everybody is working together and you're moving at the same pace, and hopefully you get to that pinnacle, that harmonic convergence where the performances are unbelievable and the song is unbelievable and the sound is unbelievable, and everybody is together, and you don't have a thought about yourself, just this thing that's going on.

Can we discuss playbacks? Sometimes I noticed Mick, Keith, Charlie and Woody said very little, and other times, Mick belmed the console and Keith became really animated. And, I totally dig it when Mick starts dancing around the room...

The Stones are really good about the people they hire. They figure they are hiring the best, hopefully, and they really let you do your job. In the context of mixing, what will happen is that they would give me enough time: "Call when you are ready and done with this thing." There's a lot going on, different schedules, everyone is doing different parts. Mick will come by and sit down with a piece of paper and make some notes for you, and hopefully he's got very few. Those notes will entail "turn this up" or "brighten that up" or "make a little more of that." Then Keith will take a listen, and it will be the same kind of thing. Then [producer] Don [Was] will take a listen, and it will be the same kind of thing. Charlie will have put his comments in and you try to accommodate everyone. We want to make the best Rolling Stones record we ever could.

Did you do any work with digital audio workstations—Pro Tools, things of that nature?

Absolutely. We used Pro Tools to put some things together. With the Dust Brothers [one of the producers, along with Was], the biggest part of their arsenal is their Pro Tools. We spent some time having Charlie play different things and put together different rhythms in the computer for the other guys to play to, and all through the album there's a combination of Charlie's computer-driven things that may have been cut-and-pasted together, along with live playing. *Charlie Watts is definitely the backbone of the band.*

Charlie Watts is an amazing musician. I sat for weeks and weeks with Charlie

and Keith playing together, working on songs and just listening to Charlie play, and he's a total master of his instrument. I think he's the best rock drummer I've heard on the face of the Earth. He just has this feel that nobody else has. Maybe he's a little on top on the 'ones' and maybe he lays the back-beat in a way, and the way he turns the music around. And he's fearless. He'll go in the studio and try everything, and he's not afraid to make a mistake. He knows his instrument intimately but still sits down behind it and makes a miracle. It's kind of like the Buddhists say: "the beginner's mind."

Charlie has a small kit. He has two tom-toms, snare, hat, three cymbals. When recording him, you have to have an open mind and you do anything that works. I believe the case with Charlie is that he really controls how his instrument sounds, so you do everything to capture what he's doing. And I found by recording him so much that what that means is not so much getting isolation on every drum, but getting an overall sound of the kit.

And Jim Keltner played on some sessions that really cooked.

Keltner is the kind of guy who can fall in the places, and he understands where the holes are and where the feel is. And all the music I recorded with them, Jim was usually playing 16th notes, the accents, that kind of thing, while Charlie was really holding down the pocket.

On Charlie, the microphones I use include A-T 25s on his tom-toms; on his hi-hat I have a B&K 4011, and I use a B&K 4011 on the snare drum. I use a Neumann U47 as a distant kick microphone, and I use one Sennheiser 421 for a close bass drum microphone, and I had a couple of M-50s for room and ambient mics. I also used some compression on the room mics, an old Fairchild compressor that Phil Spector used to use, and the Rolling Stones probably used when they made *Exile on Main Street*. Tubes, especially in this digital age, help to warm up and get a little more harmonics on the CD.

Why do you like Ocean Way Studio One? I love the history, knowing that the Mamas & The Papas and the Mothers of Invention and the Beach Boys and Quincy Jones all recorded there.

Phil Spector made some of his great albums there. The room knows what music sounds like. It was built at a time when people had a really good understanding of acoustics and reproducing stuff. So the room has a really great natural sound. It's got a high ceiling. We

go for the leakage and the interplay between the instruments and the frequencies, and just hearing the way the sound all tumbles together seems to make it more cohesive and exciting.

Don't you utilize a variety of microphones on Mick? Even a handheld, right?

Yes. You roll with the punches with Mick. He has the kind of voice that no matter what kind of microphone you use, he still sounds the same, so you get him a microphone that he's comfortable with. We would typically have a pop filter or a foam thing on there. You can hear him no matter what's

going on. I think he knows when it feels right. He has some preconceptions about what the music ought to be and what the song sounds like, without a doubt. He won't give up until he gets that. Always into the red zone. It's okay if his voice distorts the tape a little bit.

It just seems to work. It's rock 'n' roll. During recording and mixing, it's pretty straight-ahead. You might use a little bit of ambience around him, you may use a slapback or an 8th note delay, a la Buddy Holly, if the music is calling for that. But typically, it's fairly dry and fairly unaffected. Mick usually has an SM57 or 58.

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I noticed that Keith wanders around the studio when recording and playing guitar, but is a bit more stationary when he does a vocal.

You put a long cord on his guitar and try a lot of different guitars. I think the process for him in writing is looking for that signature riff, and we'll try different amp sounds, but mostly it's playing and working out the song. With Keith, the mandate is you get everything on tape. We get along really well. When he's in the room, I make sure tape machines are rolling and recording, so there's never any doubt.

Is there an advantage to working with a producer like Don Was, who can play along in the studio with the Stones?

In these situations, that's the way it ought to be. He's right there. You can communicate eye to eye. You can hear what's going on, if the headphones are right and everything is happening. And you're right in the middle of it. It's just easier to communicate, and, hopefully, if you have an engineer in the booth that you have worked with a lot and can trust, you know it's getting on the tape right, and your job is better off concerning yourself with what the musicians are playing and what the structure of the song is and what the vibe is.

When you first start working with someone, you don't know them that well, especially if you're working with icons like the Rolling Stones. The Stones really trust Don, and he doesn't bring his ego into it. He does what is best for the group. He always has a real clear, objective perspective on what's going on, and he has the ability to communicate with them.

Was it ever strange or uncomfortable with the established multiple-producer format that was chosen for this new album?

Everybody has their own style, and it wasn't a big deal. I engineered for Babyface when he came in and did some work. And I recorded a lot of stuff for the Dust Brothers, which they subsequently went and cut up. I recorded a lot of Keith's performances, and Charlie and vocals. We'd been working on things with Don, and at 8 p.m. that night, the Dust Brothers would get Keith. We made the adjustments. If the Dust Brothers needed something different, I was happy to oblige them. It wasn't a battle of egos. It was about being with the Rolling Stones. The interesting thing I realized is that it didn't matter who was coming in to produce what.

The overall sound of this record is a lit-



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the different than Voodoo Lounge and not like some of the L.A. and Hollywood albums they've done.

What happens—and it happens to most people, although I can't speak for Don, but I can speak for myself, certainly, and I've seen a lot of producers work with The Stones—everybody really wants to make *Exile on Main Street* again. [Laughs]. And on this new recording by the band, they wanted to get away from that; stretch out a bit and be as contemporary as they can.

But I did catch one of the engineers playing Exile to check out some levels...

Yeah. [Laughs]. If I need to know if I'm even in the ballpark; you certainly want to put on some of their catalog to see where you are in comparison.

What about mixing a record, and the engineer relationship to the band, or the principals hearing the first passes you've presented for review?

When it's time to mix, or overdubs are going on, as a professional you know where to pick your spots. The whole thing about art, and music especially, is being willing to be humiliated and be willing to look like a fool, and be willing to suck, basically, because that's the only way you can get to the point that you are great, is being willing to take a chance and screwing up.

What is the relationship between the engineers? Obviously, you know Dan Bosworth, who tracked the new recording.

I have it licked there, because Dan started out as my assistant, and that's how he met Don Was. He was our assistant on the second Bonnie Raitt album we tracked at Ocean Way. Subsequently, we probably did ten or 12 albums or more where Dan was our assistant at Ocean Way. And eventually, when we started putting together a studio at Don's house, Dan came along and started working for Don up there. Dan knows his client. He knows his boss, Don, and what his needs are, and that's what his job is: to deliver what that is. And he was the assistant engineer on *Voodoo Lounge*, so he knows the Rolling Stones and he can anticipate what's going to be happening next, which is a big part of the job. The biggest part of the job is to be able to anticipate and be ready so nobody is sitting around. When they are ready to play music, you are ready to record it.

Does Keith have any inherent philosophy about recording overdubs?

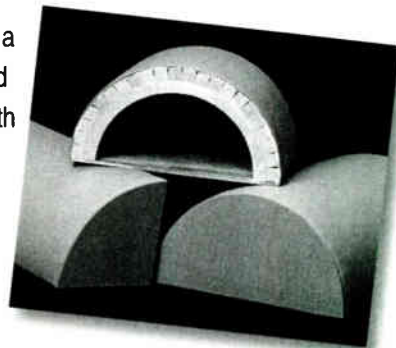
I think he'll do whatever it takes to make the song great. I don't think there's a lot of dogma going on there. If



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it feels right, it is right, and he recognizes when it is. And he recognizes when it's not, too.

What are we going to learn about the Rolling Stones from this new album? What will it show people about the band?

They're some playing motherf____s. These guys, aside from being rock stars, aside from being icons, play with the same exuberance as a bunch of 18-year-olds. They are in it for the love of the music and the love of the band. They try to please themselves. They are not insecure. I've always been treated with courtesy, respect and kindness by them. And on this new album, Charlie really reaches out and tries some new things. They're going for it, and they're willing to turn it inside out. ■

—FROM PAGE 173, LIVE ON LETTERMAN

had coming up. We were putting together a four-minute reel of performances, and it was such a tease, because you'd only get a few seconds of each song. That's when I thought we should definitely try to do something like this."

A few years later, Howie Klein of Reprise Records came up with the same idea. So when he phoned the Letterman show and suggested that Reprise release such a collection, it seemed like synchronicity. Warner Bros./Reprise publicist Bill Bentley, with whom Rogers had a longstanding working relationship, served as Rogers' co-producer on the project. Rogers and Bentley batted around a long list of songs from the Letterman show's CBS years (previous performances are the property of NBC) before coming up with the 14 tracks.

"The original list Sheila gave me was 12 or 13 single-spaced pages of everybody who has ever done a song on the show," Bentley recalls. "I came up with about 100 possibilities, and Sheila came up with about an equal number, not all of which overlapped, but Sheila was able to point out a lot of things because she was there for every taping."

The job of assembling the tracks fell to engineer Michael Delugg, who works for the show, recording and mixing the music segments for broadcast every night. Delugg has been part of the New York recording industry since the '70s, when he was on staff at Mediasound, recording such memorable tracks as "The Hustle," "Smokin' in the Boys' Room," and a number of Barry Manilow's early hits.

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Legendary Saxophonist Ernie Watts with West L.A. Music Pro Audio Manager John Burrولا



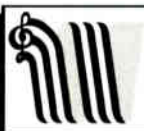
Studio drumming great Jim Kelmer with Drum Dept. Manager Glenn Noyes



Jermaine Jackson visits with West L.A. Music Sales Manager Mark Spiwak

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Delugg records the musical performances to a Sony digital 3324S half-inch machine and mixes on an SSL 4000G console. But unfortunately, before this project started, most of the multitrack tapes were being recycled; the show was actually recording over these one-of-a-kind tracks. "I absolutely hated doing that, but that's one of the many things companies do to save money and space," Delugg explains. "So up until a year ago, when they realized what these tapes meant, I was hoarding as many of the good ones as I possibly could. I would stick a few tapes in a machine room here, a couple of dozen tapes behind the edit room...like a squirrel storing nuts for winter. So when we finally got down to deciding which artists would be on the album and the artists agreed, Sheila and I had to go around with a couple of interns, find out how many songs we still had the multitracks on and how many we would just have to go back to the original performance, back to the D2, which is what the show is recorded on."

It turned out Delugg still had multitracks of about half of the selected performances. This, of course, meant that the possibilities of remixing would be



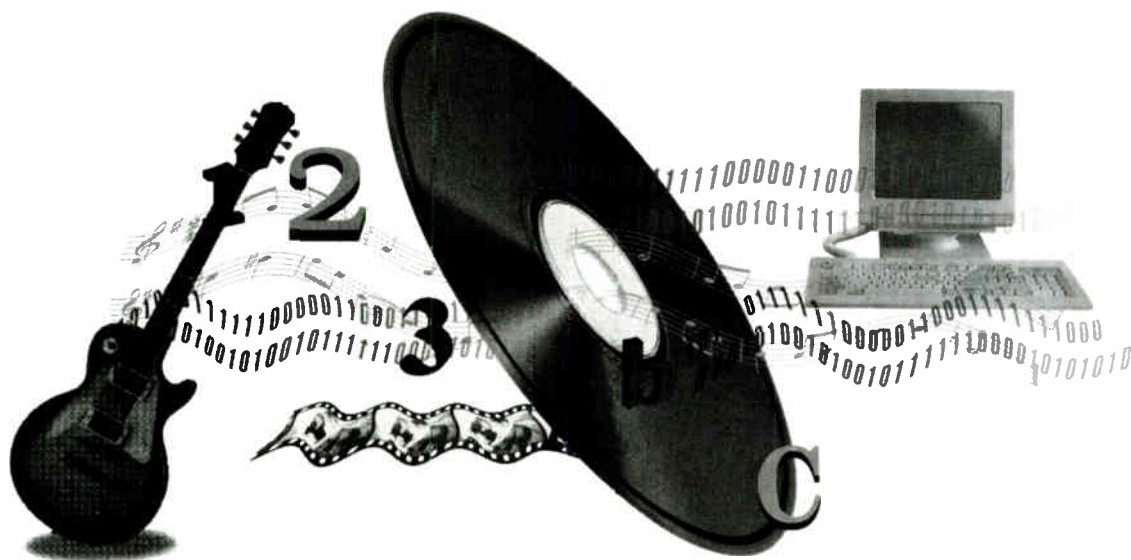
Lou Reed

PHOTO: USA BOHER/TOM WOLLEBERGER

quite limited. They certainly didn't want to remix the multitrack performances in such a way that they'd sound strangely different from the other tracks. These limits contributed to the approach that Rogers, Bentley and Delugg chose to take to the project as a whole: They

would keep the performances as live and intact as they could; the only adjustments they'd really make would be for the sake of smoothing out the sequence and editing out some of Dave's intros and outros. No sweetening and no overdubs.

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Paula Cole

Because Delugg already works 12- to 14-hour days on the Letterman show, he couldn't really be involved in all of the day-to-day engineering required for the album project, so he brought in his long-time colleague Harvey Goldberg. Goldberg and Delugg go back to Delugg's Mediasound days, when Goldberg was also on staff, recording rock and new wave acts including The Ramones, Bow Wow Wow, Peter Dinklage and Kool & The Gang. Goldberg has also subbed for Delugg on the Letterman show, so the two engineers have great trust in each other's work.

Delugg imparted the producers' philosophy of how the editing should work, and Goldberg went to work in Sound on Sound, where he remixed some of the tracks on an SSL G Plus console, listening on Yamaha NS10 monitors. "I mixed to DAT using Apogee filters, and I didn't get involved in a lot of outboard gear," Goldberg says, "because the idea, obviously, is to make it sound as good as you can, but I was aware that these would have to go with those D2 mixes from the original show. I didn't want these to stick out like a sore thumb.

"I also didn't want to compress to the point of television. I figured that would be better left for mastering, to Bob Ludwig, so when he listened to the entire record, he could do compression to match it. I just went with a healthy record sound, which is the way Michael does it. He goes for as much of a record mix as he can while on the show."

One of the tracks Goldberg spent a bit of time on was Aretha Franklin's "Think": "It's funny," he says, "because when I first started to mix that song, I

started to try to mix it like an R&B record, but after playing around with it for about 45 minutes, I realized that was the wrong approach. It should be treated more like a gospel church jam.

"On R&B records—certainly the style of the kind of records that Aretha made, or even contemporary R&B records—the arrangements have a very tight sound, a very tight balance. You can hear every instrument very clearly. The drums are certainly very much in the front of the mix. So that's what I started to try to do with that track, but because the arrangement was so busy—I believe it was some of her band and some of the house band—and also because it had such a live feel to it, I decided to go with more of an overall ambient sound. The picture in my mind was of a gospel revival.

"The other thing that's interesting about mixing live things like this," Goldberg continues, "and it's something I was never aware of until I started to fill in at the show from time to time, is that there's a great deal of sound of the instruments leaking through the vocal mic. If you're recording or mixing something that was recorded in a studio, there's a great deal of separation, and you can work with the sounds individually. When it's live like this, where they're using stage mics, using [wedge] monitors, and there's a P.A. system in the house that's blasting, there's a great deal of bleed that goes into everybody's mics. So, if you isolate the drum tracks, then suddenly pull up the vocal mic, you're going to find that the drum sound changes drastically. So a lot of times, I'm working on the drum sound while listening through the vocal mic. Everything affects everything so much that you need to hear everything together."

When the remixing process was complete, Goldberg took the tracks to Ground Zero, where staff engineer Joe Lambert did some editing on the facility's Sonic Solutions system. Delugg rejoined the day-to-day work on the project at Ground Zero during the sequencing, which wasn't completed until the tracks had been sent to Ludwig at Gateway, partway through the mastering process.

"After we were done and we had something that sounded nice and ran smoothly," Delugg explains, "they started changing the sequence. For instance, we originally had Jerry Garcia and Dave Grisman's performance at the very end of the CD, but Sheila and Bill decided it would be a better opener, and that changed things dramatically. I didn't

have the 24-track of that, and on the original broadcast, Garcia's first line in the song is kind of covered by audience and he's far from the mic, so there was no way to really get up the beginning of that line to get it out of the soup. At the very end of the record, it was easier to justify, because we were coming out of a tremendous amount of applause [after Patti Smith doing "Who Do You Love"], but as the first thing on the album, we had Dave introducing Jerry Garcia and Dave Grisman, and you hear something that's a little less than what I would want it to be, but it's still a beautiful performance. I'm just being picky because that's my job."

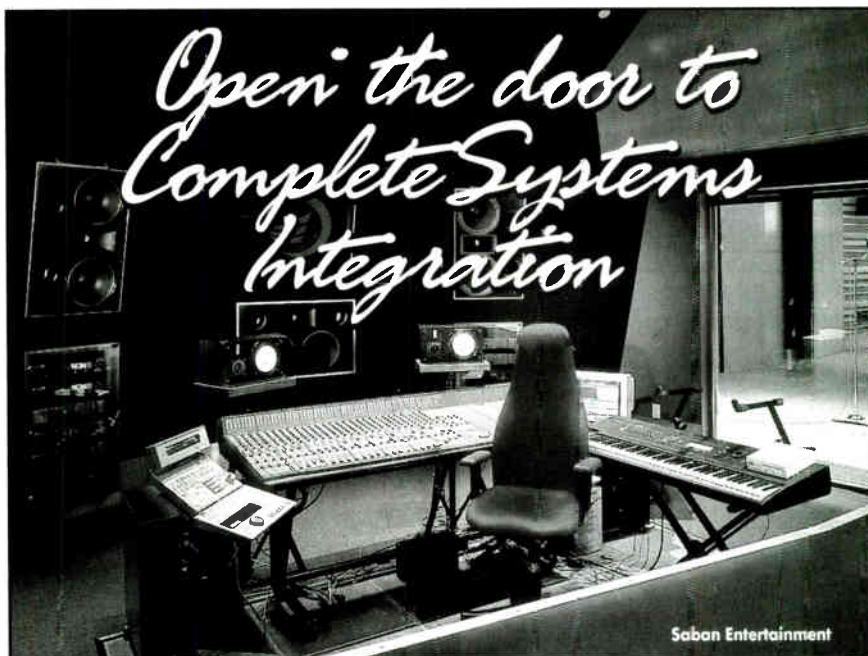
Rogers says that Delugg being "picky" is a big part of what makes the musical artists comfortable enough to deliver such great performances on the *Late Show*. "Artists come on, they rehearse a song, they do it for cameras, and then Michael invites them downstairs to listen to a playback and they discuss the mix," she says. "And more often than not, they walk out of there going, 'Boy, that was great.'"

"The other thing," Goldberg says, "is that there's an adrenaline energy when a performer is going onto a show to do just one song. When somebody's doing a concert, it can be paced. But when somebody walks out to do one song, there's like a ridiculous amount of energy that goes into that one song, and I think that energy is captured on the album." ■

—FROM PAGE 173, ROB FRABONI

ducing career with an album by Joe Cocker. In the ten years that followed, he engineered and produced memorable albums by Eric Clapton, Jennifer Warnes, Bonnie Raitt, Wayne Shorter and others. By the mid-'80s, however, he'd left full-time studio work to become a vice president of A&R at Island Records, where he remained until the early 1990s. More recently, he formed an independent label and has since resumed his career in the studio. *Bridges to Babylon* is Fraboni's first major release since returning to active record production. He was involved with engineering and/or mixing nine tracks on the disc, and received a co-production credit on one song, Keith Richards' "You Don't Have to Mean It."

"Keith and I had just done this new record by the Wingless Angels, who are a Rastafarian group singing Rastafarian chants and playing native drums, em-



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bellished slightly with a little bit of tastefully placed guitar and keyboards," he says. "This was done outside at Keith's house in Ocho Rios [Jamaica], and you can hear the garden, the frogs and the crickets. It's a very ambient recording. When Mick and Don Was heard some of the recording Keith and I did for this project, they flipped, and Mick was like, 'We got to go after this!' So, that was really the beginning of my involvement.

"Although Don Was was chosen as the main producer," says Fraboni, "Mick was bringing in his people, like Babyface and the Dust Brothers, so Keith could then bring in who he wanted to

bring in, and he asked me to get involved."

Mick's decision to bring in outside producers to work on certain tracks led to a certain amount of friction between Jagger and Richards, and in interviews since the album was released, Keith has been openly critical of the Dust Brothers' work on the record. This is not exactly big news in the Stones world—the tension and interplay between Mick and Keith is part of what drives the band.

"It's not that there was yelling and screaming, but there was a kind of creative tension at the same time going on between Keith and Mick," Fraboni

comments. "Mick has been getting more involved in the making of the albums since *Steel Wheels*, and playing some guitar, and previously, Keith pretty much handled the band and the music. He'd take care of getting the tracks cut and Mick would be working on the lyrics, and once the tracks were there, he'd come in and sing them. Now, Mick's trying to have his hand in everything, and that has its pluses and its minuses."

Fraboni says Jagger was determined to give the record a more contemporary sheen than their past efforts, which explains why he brought in Babyface (whose work was not ultimately used), the Dust Brothers and Danny Saber. Unfortunately, Mick initially brought in the Dust Brothers and Babyface without consulting Keith. According to Fraboni, it was almost like the Stones were working on two different albums at once: one being a traditional Stones record mostly tracked live in the studio; the other the work of creative editor/mixers juggling different recorded elements to create songs.

"My goal was to keep the stuff more raw and not have all the rough edges taken off. Plus, the Wingless Angels recording experience with microphones 15 feet away was another thing. We did that with a lot of guitars [on the Stones record], where there would be a mic in the guitar amp and there'd be another mic 15 feet away from it in an isolated space. That really does add a lot of excitement, without having to introduce a lot of artificial information to create that effect.

"The other thing that was great is that I asked Charlie [Watts] if he was interested in keeping the front head on his bass drum, and he said, 'Can I?' I said, 'Of course you can!' Charlie later said nobody ever let him do that before in all these years of recording."

Both Ron Wood and Richards used a wide selection of new and old guitar amps, but, for the most part, old Fender tube amps were the number one choice. "When we were doing a song, we would go through about six different amps and see which one suited the song," says Fraboni. "Usually, when miking them, I would place one up close, such as an SM57, then another mic would be placed about a foot to 18 inches away, and it would usually be a condenser, like a 251, or a 269. My favorite Neumann is a 269."

As on many previous Stones albums, a number of guests were brought in to achieve the final musical blend, includ-

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ing keyboardists Billy Preston and Benmont Tench (of Tom Petty & The Heartbreakers); drummers Jim Keltner and Kenny Aronoff; guitarist Waddy Wachtel; bassists Me'Shell Ndegeocello and Doug Wimbush (ex-Living Color); sax titan Wayne Shorter; and vocalists Bernard Fowler and Blondie Chaplin. There was even some talk once the album was completed that the guests were more prominent on some tracks than the Stones themselves. Fraboni, however, dismisses that notion:

"Despite what people have heard, Charlie Watts played on the whole record, and Jim Keltner played with him on a lot of stuff, but Keltner was not playing the whole kit. He was set up next to Charlie, and he played a couple of toms and some cymbals and percussion. Charlie encouraged that, and it was his idea, because they're good friends and it spurred Charlie on even more. It was nothing but positive.

"What happened on some of the stuff was that his drums got looped and screwed around with [on] the Dust Brothers' stuff and a little bit of Saber's stuff."

Still, it's true that some of the Stones members played less on some tracks than on others. For instance, Keith only played one lick on the single "Has Anybody Seen My Baby," leaving the majority of the guitar work to Wood and Wachtel. "Keith wasn't too into what the Dust Brothers were doing," Fraboni notes.

"Has Anybody Seen My Baby" ran into further controversy when Richards' daughter heard the track and commented on how much it sounded like k.d. lang's "Constant Craving." Richards, who was mostly unfamiliar with the lang song, got ahold of both recordings and instantly realized there might be a problem. Then, only 48 hours before the record was scheduled to go off for pressing, the Stones' attorneys reached lang's organization and cut a deal: lang and her co-writer, Ben Mink, were given credit as writers on the song with Jagger and Richards.

"I can assure you it was not an intentional lift," says Fraboni. "The irony of this is that k.d. lang was down the hall from us at Ocean Way for about three weeks making her recent record, while they were cutting *Bridges to Babylon*. She came and visited a couple of times, but I guess she never heard that song while it was being worked on."

Despite the occasional friction and the ceaseless experimentation, the album was eventually finished, just days

before the band began rehearsals in Toronto for the start of their 1997-98 tour. The band appeared to be generally happy with the result, and it received a fairly strong critical response, too. Richards noted, "The key to making a good album is to go in with four or five good ideas and see what else comes out of that. I'm not interested in making pop records and having major hits. I'm just trying to do a body of work. The main thing is to have fun; anyone can do it. You can do it, if you try...and we did."

And so, while you're reading this, the Rolling Stones megatour will be going on to the next destination on

what will eventually be a 14-month world tour. Despite the predictable rumors that this tour will be the last Stones road trek, and *Bridges to Babylon* will be the final LP, Fraboni says he is certain the band will endure.

"The Rolling Stones are quite large in all their lives, and for Mick Jagger and Keith Richards in particular," he says. "When all the outside stuff is put aside, it's all really about music, and they love to play. All the differences and all the problems fall away immediately when they sit down and play. They still love what they do, and they still have a lot to say, musically." ■

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COAST TO

L.A. GRAPEVINE

by Maureen Droney

At Burbank's O'Henry Studios, Telarc engineer Michael Bishop gave me a tour of the setup for a groundbreaking 24-bit 192kHz session featuring bassist Ray Brown and vocalist Dee Dee Bridgewater. The Telarc label, best known for its high-quality classical and jazz recordings, has been looking to the future and recording a lot of projects to 5.1 as well as to stereo. At this session, with help from Stephen Lee of Canorus Inc. in Nashville (the distributor of dCS converters), they went several steps further, as well as recording live stereo and 5.1 mixes, the session was the first 24-bit 192kHz sampling session in the U.S. The techni-



Telarc engineer Michael Bishop at O'Henry Studios

cal setup was impressive: The main stereo recording as well as the vocal and 5.1 stems were laid onto DA-88 through a plethora of converters, with the main two-mix running off Bishop's favorite converter—the custom, proprietary Telarc Tandem 20 (sorry, only three exist and the units are not for sale) through a Prism interface. “The Prism allows you to do 20- or 24-bit recording onto the DA-88 Hi-8 format,” explains Bishop. “But you can only use six channels of 20-bit, because everything beyond 16 bits is recorded between tracks seven and eight, and track eight also carries another signal that holds the sync together for all that data.”

Vocals for the session were all recorded in stereo, with a pair of what look like AKG C12s but are actually prototypes of the forthcoming Canorus microphone. “They sound phenomenal,” Bishop says. “This mic uses the CK12 capsule, but the mic electronics and power supply are developed entirely at Canorus.”

Lee himself was set up in the back of the room with the dCS 192k converters using two Nagra Ds for recording. “Since we are recording at 192 k, each

—CONTINUED ON PAGE 192

NASHVILLE SKYLINE

by Dan Daley

New rooms. Nashville's suburbs are responding to a glut of studios and static rates in town by expanding, with a minimum of seven significant new rooms coming online early this year: two at the opulent East Iris Studios in the Berry Hill neighborhood, three new rooms augmenting the two existing studios at Sound Kitchen in Brentwood, and two new ones at Franklin's Dark Horse Recording. Demographics and attitude seem to be common denominators.

East Iris Studios is a \$3.2-million Tom Hidley design that sports Nashville's fifth SSL 9000 J (80 inputs in this case). Built by Michael Cronin Acoustic Construction, which has built most of Hidley's major rooms in recent years, the large control room features the new Kinoshita MESA monitoring system, with surround capability and a pressure front design room. “It energizes quickly, so you can really feel the bass response in that control room,” says Cronin. Cronin and Hidley took East Iris owner Chuck Allen on a tour of Hidley facilities, and Allen picked characteristics he wanted for his studio. What he got was railroad-flat layout of recording spaces a la The Iliad, the pressure front control room design of Capri Digital, and the mix-position imaging of The Tracking Room. The machine room holds a Sony 3348 and Studer analog tape machines. A second, smaller studio will be occupied by Pro Tools whiz Giles Reaves.

Allen, a musician with production ambitions, says he expects to manage the facility himself, and isn't intimidated either by his lack of experience in that department or the overall glut of studio space in Nashville and the rates pressure that brings. “I felt like there was a niche here, in terms of a studio in which acts could hang out as well as make records,” he says. “That's something you have in New York and Los Angeles—studios that are private, spacious and geared toward letting the artist roam around. With too many Nashville studios, it's ‘get in and make the record and let's get out.’ That's not the case here.”

Allen is setting his card rate at \$2,200 per day, \$300 lower than that set by most of the other large rooms that have come online in Nashville in the past two years. Allen said he based that figure on polling he conducted among producers and record companies. “That's kind of like the threshold,” he says. “I think it makes it easier to maintain a rate when it's set closer to what people can realistically pay.”

Dino and John Elefante, owners of the two-room Sound Kitchen in Brentwood, are equally enthusiastic

—CONTINUED ON PAGE 195

COAST

SESSIONS & STUDIO NEWS

NORTHEAST

Anne Hills and Cindy Mangsen recorded a self-produced new release for the Flying Fish/Rounder label at Cotton Hill Studios in Albany, NY, with engineers Robert Turchick and Scott Petito. Also, the studio recently installed a Pro Tools III system... Island recording artist Tricky worked on a new one with engineer Serge Tsai in the Turtle Creek Barn at Bearsville Sound (Bearsville, NY). The Barn is being outfitted with custom monitors designed by George Augspurger... Walter Becker and Donald Fagen tracked for the upcoming Steely Dan release on Revolution/Warner Bros. at Clinton Recording in New York City. Elliot Scheiner engineered on the 8078 in Studio A, assisted by Ken Ross... Producer Steve J and engineer Marc Fuller worked on material for Puff Daddy & Bad Boy Entertainment at Sweetfish Recording (Argyle, NY). The studio recently marked ten years in business... Neon Jesus finished work on their debut full-length (titled *Martian Blues and Jovian Sonatas*) at Sound Techniques in Boston. Tom Richards engineered and co-produced with the band... Leon Parker mixed his upcoming Sony/Columbia release at Bear Tracks Recording (Suffern, NY) with co-producer/engineer Joe Ferla and assistant Rick Pohronezny... Recent projects at Shelter Island Sound (New York City) included Babe the Blue Ox overdubbing for RCA with producer Steve Thompson, engineer Jim Rondinelli and seconds Matt Kane and Noah Simon... New York City's M.A.W. Studios (formerly known as Bass Hit) had Brandy in tracking for Atlantic with the Masters at Work production team, engineer Steve Barkan and assistant Oscar Monsalve on the SSL 4000 G+...



At The Track Factory (Queens, N.Y.), owner/engineer Yianni Papadopoulos (R) and artist Rakim (L) worked on Rakim's comeback LP, 18th Letter. Rakim tracked the majority of his vocals through the studio's Summit TLA-100A tube amp.



PHOTO: MEL WEISS

Former Velvet Underground bassist/singer Dog Yule came out of musical retirement to record with producer Pete Weiss at Boston's Zippah Recording. In the studio are (L to R) Weiss, drummer Malcolm Travis, Yule and assistant engineer Peter Linnane.

SOUTHERN CALIFORNIA

Atlantic Records artists Sugar Ray mixed some tracks at Image Recording in Hollywood with producer McG, engineer Steve Gallagher and assistant Terri Wong... At Larrabee West Red Ant recording artist Militia mixed songs with producer Emmanuel Dean, mix engineer Rob Chiarelli and second Cameron Webb... Heart recorded a new song, "Strong, Strong Wind," for their greatest hits collection with producer (and senior VP of Sony Music) Peter Asher and engineer Nathaniel Kunkel at Ocean Way in Los Angeles. Also in were Capricorn Records artists the Ugly Americans, mixing their new LP (out next month) with producer/engineer Jack Joseph Puig...

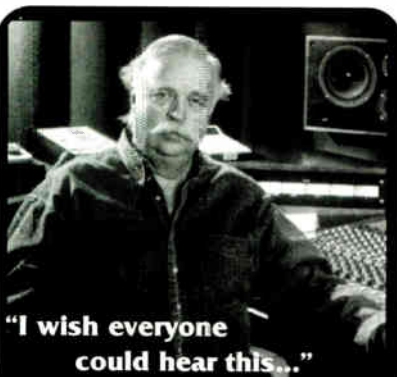
NORTHWEST

Steve Smith's Xtreme remote truck (based in Seattle) recently recorded shows by Everclear and Letters to Cleo in Portland and Jane's Addiction at the Key Arena in Seattle... At his Brilliant Studios in San Francisco, producer Norm Kerner has been working on new material with singer/songwriter Jewel, including her rendition of the "Star Spangled Banner," heard at last month's Super Bowl... Tung 'N' Grube recorded a self-produced project with engineer Brian Walker at Joe Hoffman Studios in Occidental, CA, and recorded (and mixed all tracks) at Prairie Sun Recording in Cotati, CA, with engineers Allen Sudduth and Joe Marquez and second Dylan Champagne... Chris Isaak cut basic tracks in Studio A at Hyde Street Studios (San Francisco) with producer Eric Jacobson, engineer Mark Needham and assistant Gabriel Shepard. Hyde Street recently opened Studio D, featuring an Amek APC 1000 with 64 channels of GML automation...

NORTH CENTRAL

Sounds of Blackness tracked the song "Victory Is Mine" at Burr Holland Recording in Minneapolis. Madjef Taylor recorded and mixed, assisted by Eric Olsen... T.V.T. Records artists Gravity Kills are recording their new one at Upper Room Studios in St. Louis with co-producer Roli Mosimann...

—CONTINUED ON PAGE 19*



"I wish everyone could hear this..."

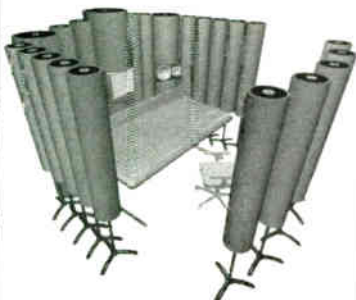
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CIRCLE #136 ON PRODUCT INFO CARD

NY METRO REPORT

by Dan Daley

It's not easy being green. Or purple. Or whatever. Selling clients on offbeat consoles in New York is tough, because as much as New Yorkers like to pride themselves on being different, they are as much creatures of habit as anyone. (They do have some strange habits, however.) An "offbeat" console isn't a pejorative description; it simply means something other than the primary, mainstream consoles, which in New York are still Neves and SSLs. But as the business gets ever more competitive, looking for ways to break out of the pack become more and more important.

Battery Studios became the first Manhattan for-hire music facility to install a Euphonix CS3000 desk last May, when it also added Boxer G-3 monitors and a new Studer A827 as a technology upgrade to an existing room. Battery, which also has two SSLs and a Sonic Solutions suite, was looking for something new, says general manager Susan Morrison. "The thought behind this room was that we already have two SSLs; we needed to go in another direction. We knew that there were a lot of people who liked the Euphonix sonically, and we knew that there were engineers who weren't familiar with its automation system. But what the console gives us in terms of performance for the price made us go with it."

Interestingly, while clients wanted to use the Euphonix room, Morrison found that some of New York's freelance engineers didn't. Her response: "We have staff engineers, and we assigned them to the Euphonix room. Clients were willing to use the house engineers, and the freelance engineers had to come to terms with the automation system. It's become a non-issue." Morrison was adamant about not giving away time on the console, either to prospective clients or to engineers for training purposes. "I offered training on the console, but not at the studio's expense," she says. "But it was definitely the fact that we had staff engineers who could run the console and who clients were comfortable with that made the transition a success."

Another unusual console is the purple Focusrite at Electric Ladyland Studios. The console is ten years old this year, and owner Allen Selby says that the first two years that it was in place, it was a difficult sell, "just like any new console or piece of gear is when it comes out at first. People have to get

used to it and see what the word on the street is, but after that, people started stepping up to the plate and the console developed its own following, its own clientele, which it still has. If you're going to go with something offbeat and different, you have to be willing to invest the time needed to wait out the market discovering it. In the case of the Focusrite, I think it was well worth the wait."

Aaron Keane, studio manager at Shelter Island Sound in Manhattan, says that he isn't sure whether the studio's 56-input MCI console is a liability or a drawing card. Unique in that it's probably the only Flying Faders-equipped MCI in the world, the console is both paid off (it was part of the equipment collection studio owner and Suzanne Vega producer Steve Addabbo got when he bought out Celestial Sound nearly a decade ago) and easy to maintain. That, says Keane, makes it easier to set rates affordably for what he considers the real attraction of the studio: a large collection of vintage outboard signal processing gear, including API 550 EQs and an EMT 250 plate reverb.

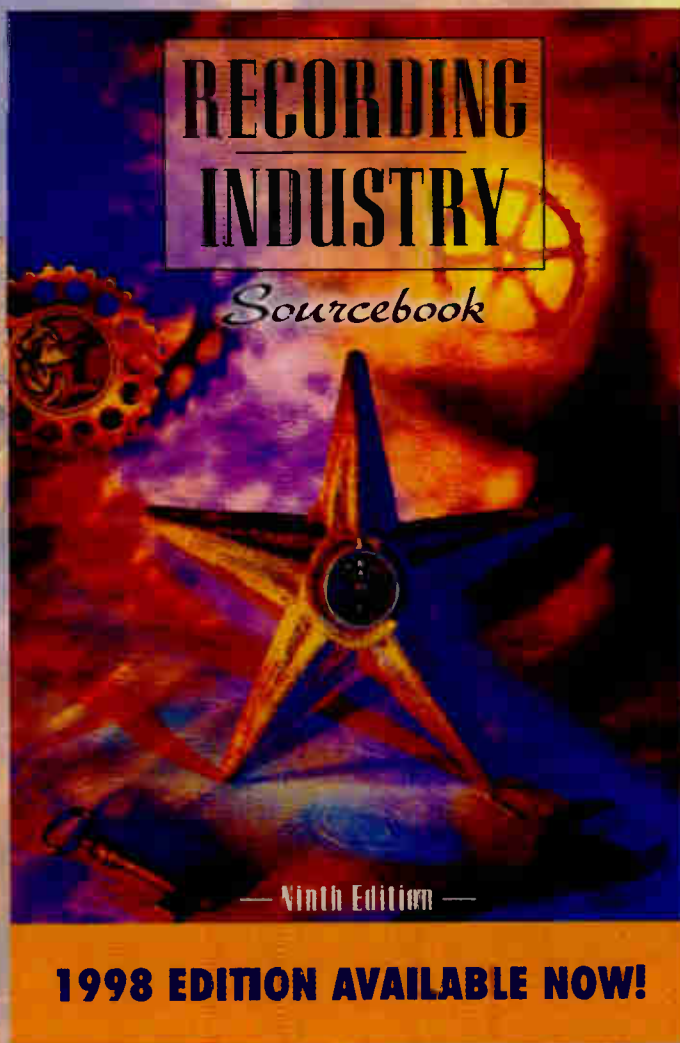
"The studio is very booked, and if we had an SSL or a Neve, we might be able to be a little more booked or booked at a somewhat higher rate," he says. (Card rate on the room at present is \$1,100 per day.) "But this console enables us to keep the rate where it is, and that's better, I think, for the long-term success of the studio. The console is easy to maintain, it's simple, and since we have so much good outboard, it's really only used to route signal and auxes, not for its EQ, and for its automation for mixing. It's a case in which the console does not define the studio; it's just another piece of gear that works to make the place complete." The studio recently upgraded to 48 analog tracks with the addition of a Studer A800 MkIII, and also added a Pro Tools system.

Speaking of unique, those looking for a Trident Series 80, which are becoming increasingly rare these days, can find one at the recently opened Jake's Kitchen Sink, a 24-track studio in the Village owned by composer John DeNicola ("Hungry Eyes," "Time Of My Life"). The studio will be a mixed use facility, used for DeNicola's production projects and available for for-hire rentals.

On the club side, The China Club reopened on Dec. 17 at its new location, 268 W. 47th Street, kicking off its second incarnation with one of the all-star jams that the club has been famous for (Rod Stewart and Steve Winwood were scheduled to appear). The new 16,000-

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square-foot China Club is outfitted with components from the JBL Soundpower Series. Two four-cabinet stacks of JBL Soundpower 222 double cabinets—each with a pair of 15-inch speakers and a 2-inch domed tweeter—are on either side of the 18-foot radius stage (a larger version of the one at the original China Club on Broadway at West 75th Street, which opened in June 1985). Above the dance floor, four more Soundpower 2-15 cabinets are hung in a 90° coverage configuration. Four JBL 212-A single-12 cabinets serve as rear-fill speakers on the “decks” that hold booths and tables. The system is powered by 12 JBL MPX 1200 amplifiers. A 48-input Soundcraft Series 5 console handles both FOH and monitor mixes via six submixes from the board. ■

New York items? Fax to East Coast editor Dan Daley at 615/646-0102 or e-mail dandwriter@aol.com.

—FROM PAGE 188, L.A. GRAPEVINE

Nagra is recording only one channel, using the other one for sync,” Bishop says. “To do this the head drums are actually in sync—it isn’t just the linear scheme like you would have normally; the machines have to be sample-accurate, since a sample at 192 k is considerably smaller than a sample at 44.1.”

The experiment proved slightly frustrating. “It’s actually a bit hard to play the 192k mix back, because it sounds so unbelievably good, but we can really only listen to it here, and then we have to go back to the 20-bit stuff to master from,” Bishop says. “Like it or not, we’re stuck with the 44.1, and the difference is night and day. The musicians especially loved the 192k mix. Dee Dee heard it immediately, how transparent it is—really like a lid has been lifted off the program.”

Bishop’s setup for the trio and vocalist in the studio itself was what he called “pretty standard” for a Telarc session. “The stereo vocals, which get panned hard left and right in the mix, are kind of a carry over from our classical recordings,” Bishop says. “On this session, I started out with the mics in a crossed figure-8 pattern, but the room sounded a little boomy, so I ended up using the cardioid pattern.”

Taking into account the surround aspect of the recording, Bishop used Sennheiser omnidirectional mics for the large room ambience, along with the Neumann “dummy head” focused on bassist Ray Brown as the interior pickup.

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All outboard preamps were used with the preamps placed in the studio rather than the control room to keep cable runs as short as possible. That's a classical technique also, as is the number of omnidirectional mics used. "They have a much more open quality to the sound," explains Bishop, "which is really important to acoustic jazz, although it may be too 'swimmy' for pop. Omnis are great because you can put them so close without having the proximity effect. You can do a lot more with an omni mic, although you have to keep in mind that they are unforgiving of the acoustic space you are in. For example, on the room mics I've added the little rubber rings that Sennheiser supplies that make them more directional in the high frequency to get a bit more high-frequency boost.

"Telarc has always been known as a label in the forefront of superior sound," Bishop says. "We were the first to have digitally recorded symphonic music, and when the CD came out we had a big stockpile of digital recordings. Now we're trying to do the same thing with high-density/high-definition recording in 5.1. This experiment with 192 k is to get an idea of where we're going to be in two years. We're already doing recording in 96 k, but formats aren't clear yet, so right now we've got all these directions to go in, and we're just trying to keep ahead of the game."

Caught up with producer/engineer Joe Chiccarelli (Tori Amos, American Music Club, Frank Zappa) at A&M's Studio D. You'll usually find Chiccarelli mixing only on SSL consoles, as was the case at A&M, where he was tracking the Japanese rock project Lindberg with a particularly stylish drum setup. DW's "Woofier," the oversized bass drum enhancer with a built-in D-112 mic, was set up in front of the main kick. "I usually set up a lot of mic combinations for the drum kit," Chiccarelli says, "and then depending on what the song is like I'll use different combinations. I've used the Woofier a few times. When you hit the main kick drum, the Woofier resonates, giving you close to the sound of a full-front bass drum head, but without the floppiness."

Other parts of the setup (see photo) included a heavily compressed U47 as a close overhead, M250s for far-away room mics, and, most unique, two baffles placed around the kit that were then miked on the outside with U87s. Okay, the baffles aren't unique, but miking them? "Like I said," he laughs, "I try a lot of different things. The baffles, of course, kind of compress the drums

a little bit and make them tighter. And once when I was using them, I noticed a strong low-end buildup on the outside. So I miked it, and I've found it can be a very useful sound, particularly for a Bonham-type song—kind of like putting a P.A. system in the room."

In the guitar corner, a fine collection of stomp boxes caught my eye. New to me was the Expandra, a Japanese unit modified by guitar tech Curtis Laur. "You're just starting to be able to get them in the U.S.," Chiccarelli says. "They're pretty cool because they don't smash up the notes as much as most distortion boxes, and you can hear the parts



PHOTO: MAUREN DRONE

Joe Chiccarelli in Studio D at A&M

much better. Curtis is great, by the way; he also does a mod with Rats, which,

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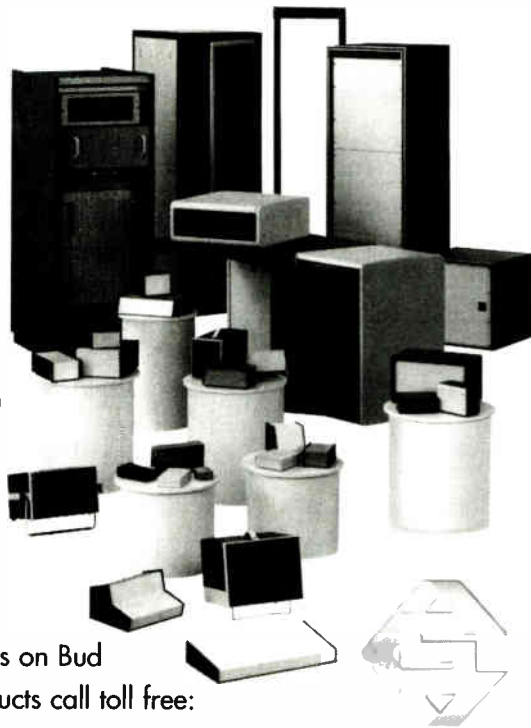
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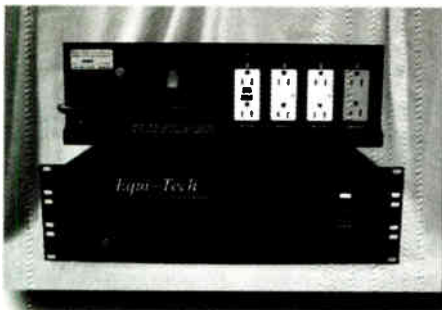
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when they come from the factory, have a low-end roll-off that makes them sound thin. Curtis has added a trim pot so you can get that bottom you want back."

Chiccarelli steps back and forth between the roles of engineer, producer and, lately, music supervisor for film and TV (*Suicide Kings* with Christopher Walken, Robert Altman's TV series *Gun*). "I'm really trying to be particular about the stuff I take on as a producer," he comments. "There's a lot of music around these days that I can't get excited about. So my philosophy is that when I'm offered a project to produce, I really have to question whether it's right for me, because its something I'll be giving months of my life to. I'm fortunate to also be a mixer/engineer, and when someone calls me to mix a record, I can get into it and make it the best I can, but my whole life doesn't have to be as attached as when I'm producing. I've also been doing some music supervision for a few small films and finding it to be very creative. I'm always out on the street checking out bands anyway, and now I've been able to help some young bands get started by getting them into a film."

Over at Tim Jordan Rentals, owner Rodney Pearson tells us it's been a busy few months. "At one point, we had ten Sony 3348s rented out, from projects for *Home Alone 3*, *Titanic* and *Alien 4* to Madonna's album and the Barbra Streisand/Celine Dion duet," Pearson says. "We also synchronized film and video to a live orchestra and choir for "The Big Picture," a tribute to 20th Century Fox film music at the Hollywood Bowl—that was very exhilarating, like a scoring date with an audience of 18,000 and no retakes! Now, we're excited to have a Fairlight MFX3 plus available for rental, which allows us to offer a complete package. The Fairlight can control a center-track audio machine through an Adrienne Box-50 and a Lynx module for inputting dailies—we can then edit the audio against nonlinear video using our FED V-MOD 100. This way, clients can tell us what they need to do and leave the synchronization details and setup to us. We also have the new Studer D-19 20-bit converters, which have been very popular, and we're looking forward to debuting our Sony 3348 HR, which features 24-bit recording with built-in 20-bit sampling. People are keen to use that, and we are getting a lot of calls already." ■

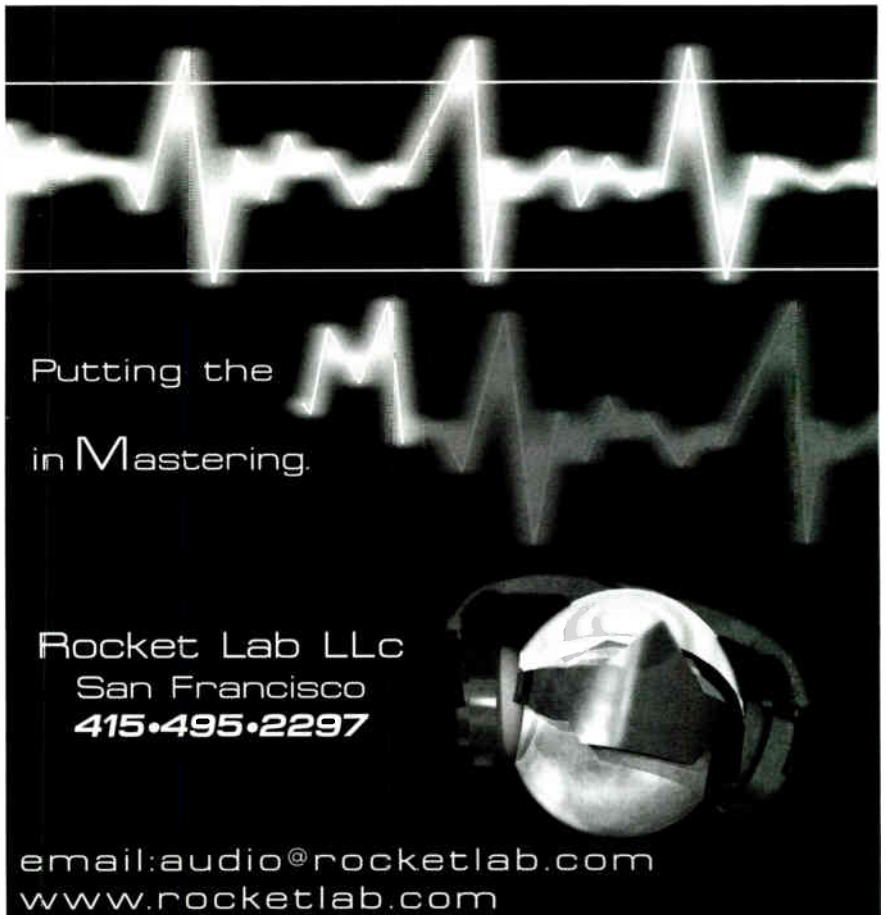
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—FROM PAGE 188, NASHVILLE SKYLINE

about the new tracking room and two new mix/overdub rooms that they will bring online in April. The new rooms are part of a 24,000-square-foot expansion that also includes an office building intended to lure music business-related companies to roost there. The new facilities will have a reconditioned Neve 8108, a Neve V3 Legend and an SSL G+ with Ultimotion, which brings Sound Kitchen's complement of Neves to four, the most of any studio in the area. But what really sets the studio apart, and what is driving the expansion, is Nashville's own changing demographics, says Dino Elefante. "People just like coming to Williamson County," he says, referring to Tennessee's most affluent area, which is ranked with Orange County, Calif., and Fairfield County, Conn., as among the nation's wealthiest counties. It has become a favorite residence for many artists, producers and engineers. Ironically, at \$1,500 per day, Sound Kitchen can meet its nut with a lower day rate than most of the other new large facilities in Nashville. "And we're still only 15 minutes and six exits from Music Row," Dino says. Sound Kitchen also benefits from the Elefantes' own in-house productions, most of which are for Christian artists, including John Elefante himself. However, adds Dino, "A lot of the time we can't get into our own studios because they're so booked."

Dark Horse Studios is adding two rooms to its original one, mostly to handle the overflow, says owner Robin Crow. He agrees with Elefante that location in Williamson County—he is near the county seat of Franklin—has much to do with his studio's success. "Maybe 25 percent of my clients drive out of their way to get here," he estimates. "The other three-quarters of them are from Williamson." Crow's confidence is underscored by his reaction to losing producer Scott Hendricks as a client. Hendricks, former Capitol Records chief, is building an elaborate studio in his new Williamson County home. "I'll miss him," says Crow. "He did his last five or six records here and he was great. But I'm so booked here, I need the two new rooms anyway."

Happy 30th birthday to Woodland Digital. Originally run by the legendary engineer Glenn Snoddy, Woodland has kept up with the times but is still a legacy of Nashville's earlier recording days. From the 4-, 8- and 16-track machines it started with, it now has two Neves: a vintage 44-input 8068 and a VR60 with Flying Faders automation. Woodland



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added mastering in 1971 and a second mastering suite, designed by Tom Hidley, that same year. Woodland added audio post capability when it purchased some used 35 and 16mm projectors, a black-and-white Sony videotape machine and monitors in 1971. In 1973, that came in handy when director Robert Altman recorded the soundtrack to his film *Nashville* there, as well as shooting some of the scenes. Later on, Jessica Lange worked at Woodland on the Patsy Cline biopic *Sweet Dreams*. At one point, as much as a quarter of all the records on the country singles chart had been done at Woodland. In the late 1970s, the studio changed hands several times and spiraled into a decline; both mastering rooms closed, and in 1988, the entire facility was shut down. It was reinvigorated in 1990 when former mastering assistant engineer Bob Solomon bought the studio and began to refurbish it. After a redesign by Steve Durr, Woodland was back up and running as Woodland Digital in 1991.

It was worth all the effort, including some acrimonious litigation with former partners, says Solomon in retrospect. But he feels that what lies ahead for Nashville studios might be even more difficult. "The business has slowed down all over in the last three years," he says. "For a while, everyone was speculating on new acts and new studios and new record labels. That's all coming crashing down now. Things have really thinned out." Solomon believes that Woodland's historical appeal to out-of-town rock acts will pull it through the hard times. Recent clients include Tonic and The Fixx. "Rock is our bread and butter at this point," he says. "With that, we can ride this retrenchment out."

I didn't meet him in Hollywood. I didn't meet him in New York. It was in Nashville that this writer managed to sit down and have dinner with Robert Duvall, who was in town for the premiere of *The Apostle* and to cut tracks for the soundtrack record (on Rising Tide Records) with Emmylou Harris. Emory Gordy produced at Masterfonics' The Tracking Room, where the entire date—vocals and all—was cut live, in keeping with the film's period-piece vibe. Duvall is gracious and charming, as well as very musical. He had good things to say about how Nashville the city and the studio town have changed since Robert Altman's celluloid version of 20 years ago. Duvall the singer is well documented in *Tender Mercies*. But Duvall the human being was very much pre-



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sent that night at Valentino's: That hooded brow of his that was so intense and menacing in films like *The Godfather*, *Sling Blade* and *The Great Santini* brightened as he told stories and jokes throughout the night. Nashville's film industry—already at \$200 million annually—got a nice shot in the arm from Duvall's visit. And so did I. ■

Send Nashville news to Dan Daley at danuriter@aol.com or fax 615/646-0102.

—FROM PAGE 189, SESSIONS & STUDIO NEWS

SOUTHEAST

Columbia Records artists Flick recorded in Studio A at Ardent Studios (Memphis, TN) with producer/engineer Joe Baldrige. Matt Martone and Joe Costa assisted. In Studio B, Skidd Mills mixed Seven Day Jesus' upcoming Forefront Records release with producer Brent Milligan... Old 97s mixed singles for Elektra with producer Wally Gagel, engineer Tom Lord-Alge and assistant Femio Hernandez at Miami's South Beach Studios... Lisa Brokop mixed for Sony at Masterfonics (Nashville) with producers Dan Huff and Paul Worley, engineer Jeff Balding and assistant Mark Hagen. Scott Phillips is the studio's new manager... The Sound Kitchen in Franklin, TN, had the Freddie Jones Band in mixing for A&M with producer/engineer David Z and assistant Todd Gunnerson... Cuban trumpeter Arturo Sandoval mixed his new N2K Encoded Music release at Criteria Recording in Miami with engineer Eric Schilling and assistant Chris Spahr. Soul Asylum were also in, wrapping up production on their new Columbia release... Michelle McCord overdubbed and mixed for Arista with producer Mark Sanders and engineer Clark Schielcer at Emerald Sound in Nashville... Latino Chrome and Enter Landscapes were in at Catalyst Recording in Charlotte, NC... Confederate Railroad cut vocals for an Atlantic Records project with producer/engineer Csaba Petocz at New River Studios (Fort Lauderdale, FL). Brad Kinney assisted... The Indigo Girls recorded guitar and vocals for an upcoming Angel Records compilation at Doppler Studios in Atlanta with engineer Eddie Miller and assistant Ken Stallworth...

SOUTHWEST

Dionne Warwick cut some tunes in Studio D at Dallas Sound Lab (Dallas) with producer/songwriter Rob Shrock. Chris Bell assisted... Everclear stopped in at

Counterpoint Studios in Salt Lake City to record three songs in front of a live audience for broadcast on local radio station X96...

STUDIO NEWS

Scream Studios (Studio City, CA) is celebrating its tenth anniversary this year, marking the occasion with the installation of an SSL 9000 J console... Sound Matrix Studios (Fountain Valley, CA) added a 24-track digital recording studio, featuring Alesis ADAT XT recorders and a Mackie 8-bus automated console... AFM Records/Aarondale Recording Services relocated to a new facility at 1441

North McCadden Place in Hollywood, CA. The studio is available to the public... Construction is under way on a new studio named Perfect Balance in Ann Arbor, MI. The new studio is owned by Solid Sound Inc... The Conservatory of Recording Arts & Sciences in Tempe, AZ, is now an authorized Avid/Digidesign education center and has added a number of Pro Tools 4.0 workstations. The Conservatory is presently the only accredited institution in the U.S. to offer Digidesign Pro Tools Course 135... Composer/guitarist Lyle Workman installed a Hafler 9505 Trans•nova Diamond amp in his private studio in Hollywood. ■

M-1

MICROPHONE PREAMPLIFIER

(ACTUAL SIZE)

Gloria Estefan, Dolly Parton, Neil Young, Lou Reed, Laurie Anderson, Bob Dylan, Madonna, Eric Clapton, George Harrison, Paul McCartney, Paul Simon, Joe Henderson, James Carter, Ernie Watts, Bill Hollman, Saturday Night Live, The Muppets and many others have done great work with the M-1. The M-1 is clearly superior, *satisfaction guaranteed*. Here's why:

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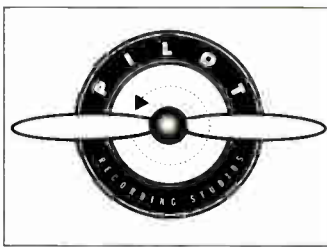
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—FROM PAGE 20, IT'S ABOUT TIME

ly delivers that toy you have been waiting for? Compare that to the three hours right after the package arrives. Subjectivity. It's what we do best.

The nearest I can tell, I personally have a subjective time dilation/compression potential of about 1,000:1. I think that any of us does if put into the proper situation.

CONFUSING THE PICTURE BY ADDING REALITY

Now take all the human subjectivity

stuff above and add to it the fact that the fabric of time turns out to be all bendy, twisted and folded—and really could use a bit of flattening after all. Nothing is as it seems. Reality slides and shifts under us even as we subjectively distort our very perception of the little sample of time that we so affectionately call “now.”

Without even getting near the really interesting concepts of folded time and what 44.1 would (not) sound like on a nice event horizon, I offer these two observations:

First, if we send a guy to another star at real close to light speed, rela-

tivity will squeeze the time right out of him, so by the time he gets home, ten generations of his family will have lived and died, and even Elvis sightings will have finally stopped. But he might only be a year or so older and will be destined to spend the remainder of his miserable life as a social outcast, searching for antique technology to play his carefully preserved Rolling Stones CDs (though, of course, he could still catch them live on any weekend).

But this velocity-induced time dilation only applies to UPN shows and (barely) to certain NASA outings.

So we move on to the next one, a little closer to home. A person actually gains a few milliseconds of existence on a coast-to-coast flight! In other words, he gets older than he would be if he had not flown. Not theoretical science-dweeb nanoseconds, but chunks of time big enough to cause audio problems. They tried this with two carefully synchronized atomic clocks—one in the plane and the other on the ground—and it worked. This is due, of course, to the fact that one is further from the pull of gravity at 35,000 feet. But you knew that, right? The curvature of space-time and all that. Great party trick (if you have an extra million bucks or so to spend and your parties tend to run real long).

If flying from New York to L.A. can delta enough time to seriously flange a drum track, maybe you shouldn't lift a digital recorder while it is recording in your studio, as you might end up with enough time compression to jitter the clock, thereby destroying that delicate stereo image you worked so hard to get. I leave it to you to do the math so you can decide if this is a joke or something to really worry about...

In any case, all this brings us to St.Croix's Third Law of the Universe: “The fabric of space-time ain't worth shit until it's been ironed.”

WE CAN'T EVEN TALK ABOUT IT ANYWAY

Today we use the term “real time” with the same defused, banal semi-automatic abandon as “hi,” “my place or yours” and “see ya.” And some of you abuse the term a bit more. It is for those that I say, “*real time*” does not mean “now”! It merely means that a given process or processor is fast enough to accept data at the input, perform the desired function and spit the result out of the output indefinite-

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ly (for any given relative state of ironed time dilation).

If a fancy DSP-intensive 8192 hand-phase vocoding pitch changer promises real-time processing, it should be able to shift your vocal up four keys all day, without getting behind. If it is less than real time, it won't be able to keep up, and it will have to be relegated to "offline" or "non-real-time"

**Whenever you ask
if it is real time,
ask what the total
throughput delay is.**

processing. If, on the other hand, it is "2x real time," it will keep up with a live feed but can also process a recording played into it at twice normal speed.

But, and this is what you have to watch for, absolutely *nothing* in the popular definition of the term "real time" tells you *how long it is going to take* to do all this processing!

BUT WAIT...

You may happily sing into your fancy new phase vocoding real-time pitch changer and wait 20 minutes while it crunches and processes your melodic poetry before your words of love and desire begin to appear at the output. And 20 minutes after you have ceased your heartfelt (although apparently flat by four keys) caterwauling, the pitch changer will desist in turn. And this, dear readers, is still technically and legally considered "real time." Remember that it's not just about cease and desist, but about the time *between* cease and desist.

So the next time you are asking about "real time" effects, remember that the question is incomplete until you ask the second part. Whenever you ask if it is real time, ask what the total throughput delay is. A/D conversion adds delay, processing adds delay and D/A conversion adds delay.

So watch out. If you begin processing that flat track at 11:55 p.m., you just might find that even though you started delay, you'll finish tomorrow.

It's just delay it is. ■

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*1996 Mix Audio Production Facilities Report

—FROM PAGE 41, THOMAS DOLBY

it's really the public themselves responding to the music. It's not all these layers of intermediaries like the radio programmer or the A&R person and so on. The frustrating thing for the artist is, I love this song, and I think the public will love this song, but the public are never going to know about it because all these people in between made their own minds up. Every now and then something makes its way through this obstacle course, and the public do decide about it, and probably say they like it. In my case, I had a Top Five single, and that's probably what most people know about my work, and yet I think it's one of the most frivolous songs that I've ever written. And there are other songs that are far more worthy that the public has never heard of because they didn't make it through that obstacle course. So one of the exciting things about the Net is that I put something up on a page, and the public gets to decide immediately.

Tell me about some of Headspace's recent alliances and what they mean in terms of the company's direction.

The first goal for us is ubiquity: We need everybody to be able to enjoy our technology. And there are several gatekeepers to the users, such as Microsoft, Netscape and Sun. Probably the most significant [alliance] is Sun, who scoured the street for audio technology for Java; they didn't have very good audio support, and they didn't have the time or expertise to build their own. They looked at a bunch of different systems, settled on Headspace and licensed our technology at the beginning of 1997. In Java 1.2, due out this year, the audio engine will be ours, and following that, that version of Java will make it out into the desktops. So if you are surfing the Net and encounter an RMF file, Java will handle it—you won't need a plug-in. That's probably the single most significant alliance we have.

We also have a licensing deal with Netscape to ship our Beatnik plug-in with Communicator. Then the core technology is on a bunch of different platforms, not just Mac or PC. As an example, Microsoft WebTV has a box manufactured by Sony and Philips and Mitsubishi that contains our audio engine. There's a rival from Oracle Netscape called NCI Network Computer

Inc. that is also using our engine. In addition to providing the engine for these boxes, we've done a fair amount of music work, the theme for NCI for example. And then independently from our Web site, we've been trying to grow the Beatnik community: We've had over a million downloads of the plug-in since April.

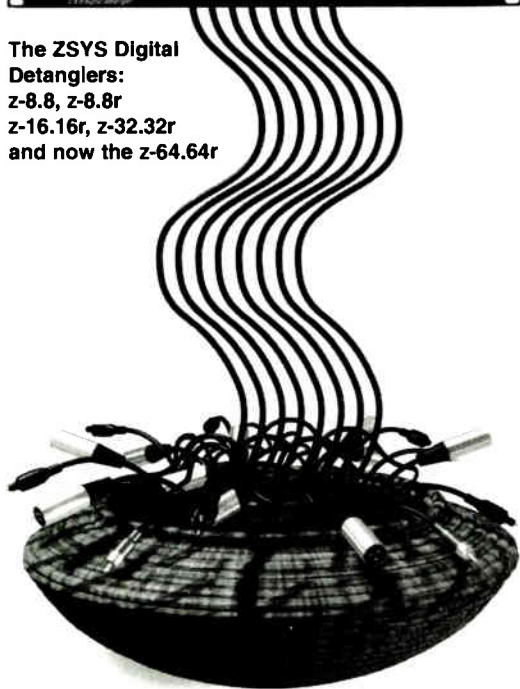
What's coming up for Headspace?

There are a couple things planned for early 1998. Up until now, to do really interesting interactive work with RMF, you've had to be able to learn code, but beginning in early '98, most of the major Web authoring tools are adopting Beatnik and RMF as their audio technology. So you'll be able to get Macromedia Dreamweaver, for example, with built-in support for RMF. So we hope to cover the authoring tools area, and by the middle of '98, the average authoring tool will have support for RMF.

We have two kinds of tools: One is making Web pages, the other tool [the Beatnik editor] is really more for musicians who want to get music on the Web. So let's say you're sitting at home with a rack of gear, using Vision triggering a bunch of synths and an Akai sampler, and you want to get your music



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online. The way that you would use the Beatnik editor, which is our tool for musicians, is that instead of sending MIDI from your sequencer out to your rack, or to your software, you would send it to the Beatnik editor, which sits alongside your sequencer on your PC desktop, and the sounds that you're playing on the Beatnik editor are the exact same bank of sounds that every user on the Net has. So that means you can compose a straightforward file—it's like General MIDI—save it as RMF, and it will sound the same for every user out there. When you have custom sounds—let's say you have your own drum loop or vocal track—you can create them in any tool you have, be it Pro Tools or SoundEdit 16 or Sound Forge in a PC. It pours it into the Beatnik editor, triggers it from the sequencer, and again, when you save as an RMF file, it will encapsulate the custom samples into the RMF file along with MIDI. And all of it is compressed down and encrypted when you save it out. So the Beatnik editor pretty much allows you to prepare the music that you have in MIDI/sample space and save it as an RMF file, with a guarantee that that RMF file will sound exactly the same across platforms, even WebTV.

How has running a company affected your music?

My energies are pretty much in the company. I write music in my head all of the time; music is sort of like aspirin after the headaches of running a small company. It's immensely challenging, and I certainly wouldn't change places with somebody who was just in the studio day in, day out, churning out another album, at this point in my life. I may even get back to that, but I've always gone to the place that was most exciting and most stimulating to me. In the early days, it was doing my one-man show and recording all these songs for my album, and a bit later it was making videos, and a bit later again, Hollywood movies, TV and commercials. Then it was games, and now it's the Net. I tend to stagnate if I repeat the same thing day in, day out. I need to get that jolt of being right on the cutting edge. You make mistakes that way. It's a lot safer to just fall back on the formula that made you successful in the past. But I've managed to get from blunder to blunder and still come out on top, so hopefully that's what's going to happen with Headspace. ■

Sarah Jones is an assistant editor at Mix.

—FROM PAGE 106, VOICE PROCESSORS

fers variable threshold and ratio controls and an LED bar graph indicating gain reduction for both compressor and expander. The EQ has two identical fully parametric sections, and sections may be sequenced in any order via rear panel jumpers. Six-segment LED meters show levels at the VP12's main and aux outputs. The main output may be switched to mic level. Price is \$599.

The 528E voice processor from **Symetrix** is an updated version of the company's 528, which it introduced more than a decade ago. The single-rackspace 528E features a 60dB gain mic pre, a de-esser, a "program controlled" expander/compressor section (expander and compressor threshold and compressor ratio are the only user-adjustable controls) and a 3-section parametric EQ. Metering is provided by LED bar graphs for each processing section, and the output stage provides a gain control and an Output Symmetry switch. Additional features include phantom power, mic/line input, -15dB pad on the mic pre and in/out switches for each section. Rear panel TRS connections provide insertion points (including a compressor sidechain insert jack) and allow resequencing the various sections. Inputs are XLR and output is XLR and TRS. Price: \$749.

The **Symetrix** 628 Digital voice processor combines a mic preamp, 20-bit A/D converter, de-esser, expander/gate, compressor and parametric EQ in a single-rackspace unit. The unit has mic (XLR) and line (XLR and TRS) inputs and provides phantom power and a -15dB pad. Rotary knobs provide real-time adjustment of dynamics and EQ, with parameters displayed on a numeric LED display. The de-esser has center frequency and threshold controls; the expander/gate section and compressor sections have threshold, ratio and release controls; the parametric EQ has a single set of frequency, bandwidth and gain controls for three selectable frequency ranges. Other features include bypass switches, output level control, stereo output (XLR and TRS), preset select (users may select from eight factory presets or create and store up to 119 custom presets) and metering via LED bar graphs. Analog outputs can be mic or line level. AES/EBU and S/PDIF digital outputs are selectable. The unit is also MIDI-controllable, and an RC-1 remote control (11 presets plus bypass) is optional. Price: \$1,199.

TL Audio's Ivory VP 5051 voice processor is a two-rackspace mono tube

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REQUIRES-

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- Hard Drive, system software 7.1 or greater
- 24MB RAM minimum
- 14" monitor (17" recommended).

ProTools 4.0 Software-

ProTools 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, relative fader groupings & group nesting, plug in MIDI personality files, multiple edit play lists, Sound Designer II™ functionality, Finder-style searching & sorting, and mmmore.



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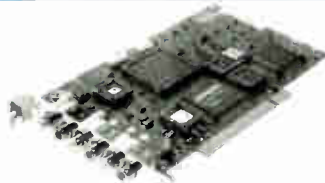
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- Auto sample rate convert to 44.1 or 48 kHz mono. WAV file format
- Choice of audio interface options



A Division of Avid Technology, Inc.

Audiomedia III™ Digital Audio Card

Available for both Macintosh and Windows OS systems, Audiomedia III will transform your computer into a powerful multitrack workstation. Compatible with a wide variety of software options from Digidesign and Digidesign development partners, Audiomedia III features 8 tracks of playback, up to 4 tracks of recording, 24-bit DSP processing, multiple sample rate support and easy integration with leading MIDI sequencer and other software programs.



PORTABLE HARD DISK RECORDING

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
- Process the master output with a specific inserted effect such as total compression.
- Simultaneous playback of 6 tracks in MASTER MDDE.
- 10 additional effect algorithms (30 total) including Voice Transformer, Mic Simulator, 19-band Vocoder, Hum Canceller, Lo-Fi Sound Processor, Space Chorus, Reverb 2, 4-band Parametric EQ, 10-band Graphic EQ, and Vocal Canceller.
- 120 additional preset effects patches.



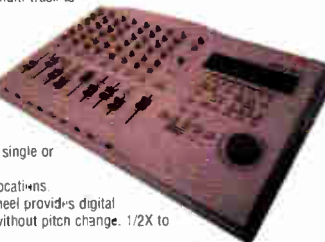
- In total, over 20 powerful and convenient features in editing/sync sectors have been added. Some require the optional effect, expansion board

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
- Built in 8 channel mixer, Ch 1 & 2 feature mic/line level
- 2 band EQ and 2 AUX sends per channel
- Cut/Copy/Move/Paste within single or multiple tracks.
- Built-in MIDI Sync, 6 mem locations
- Dual function Jog/Shuttle wheel provides digital "scrub" from tape or buffer without pitch change. 1/2X to 16X.
- Divide the drive into 5 separate "virtual reels", each with its own timing information.
- NO COMPRESSION!



CD & CASSETTE DUPLICATION

marantz CDR615 / CDR620 Compact Disc Recorder

Both next-generation stand-alone write-once CD recorders, the CDR615 & 620 offer built-in sample rate conversion, CD/DAT/MD/DCC subcode conversion, and adjustable dB level sensitivity. They also feature adjustable fade in/out, record mute time & analog level automatic track incrementing. A 9-pin parallel (GPI) port, headphone output with level control and RC620 remote are also included. The CDR620 adds a SCSI-II Port, XLR (AES/EBU) Digital In/Out and Digital cascading, 2x speed record, Index Recording and playing and defeatable copy prohibit and emphasis.



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 2min!

ACC2000XL / ACC4000XL

The XL Series feature "Extended Life" cassette heads for increased performance and wear characteristics. They also offer improvements in wow and flutter, freq. response, S/N ratio & bias.



STUDIO DAT RECORDERS

SONY PCM-R500



Incorporating Sony's legendary high-reliability 4D-D Mechanism, the PCM-R500 sets a new standard for professional DAT recorders. The Jog/Shuttle wheel offers outstanding operational ease while extensive interface options and multiple menu modes meet a wide range of application needs.

FEATURES-

- Set-up menu for preference selection. Use this menu for setting ID6, level sync threshold, date & time. Also selects error indicator.
- Includes 8-pin parallel & wireless remote controls
- SBM recording for improved S/N (Sounds like 20bit)
- Independent L/R recording levels
- Equipped with auto head cleaning for improved sound quality.

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, multi-protocol interfaces and more.

Fostex D-15TC/D-15TCR



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. The D-15TC comes with the additional optional chase and sync capability installed. It also includes timecode reading and output. The D-15TCR comes with the further addition of an optional RS-422 port installed, adding timecode and serial control (RS protocol except varispeed)

FEATURES-

- Hold the peak reading on the digital bargraphs with 9 levels of 5 different settings
- Set cue levels and cue times
- Supports all frame rates including 30df
- Parallel interface

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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



multi-patterned side address mic that combines vintage capsule design with advanced head-amp electronics, the E-300 has an unusually wide frequency response 10Hz to 20kHz & an exceptional dynamic range of 137 dB. It also features extremely low self noise of 28 dB. Ideal for even the most critical studio applications.

Own with optional ZM-1 shockmount

Unique powering of all Equitek Series microphones is accomplished with a pair of rechargeable 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 standard for studio performance.

FEATURES-

- capacitor elements.
- cardioid, Omnidirectional, & Figure 8 polar pattern settings.
- deposits of pure gold on specially-treated large diaphragms are aged through 5 years of use.
- timeless circuitry results in exceptional transient response and clean output even under extremely high SPL conditions.

SENNHEISER

MD 421



Over 20 years.

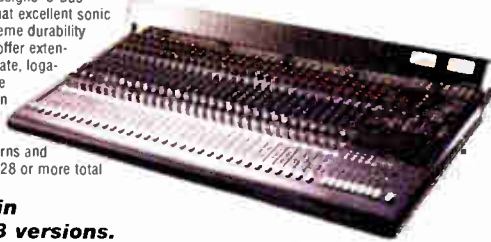
The MD 421 has become one of Sennheiser's most popular dynamic mics.

Large diaphragm, dynamic element handles high sound pressure levels, making it ideal for recording guitars and drums. The MD 421's full-bodied cardioid pattern, and 5-position bass control make it an excellent choice for most instruments, as well as group vocals, or broadcast announcers. One listen and you'll know why it's a classic.

MIXING BOARDS

MACKIE.

Get on the 8-Bus!



Since its introduction, Mackie Designs' 8-Bus Series consoles have proven that excellent sonic quality, practical features and extreme durability can be affordable. All 3 versions offer extensive monitoring, 4-band EQ, accurate, logarithmic taper faders, and expansive headroom. The 24x8 and 32x8 can be expanded using Mackie's 24-E Expander console which consists of 24 input channels and tape returns and may be daisy chained to provide 128 or more total input channels.

Available in 16x8, 24x8, & 32x8 versions.

FEATURES-

- Each channel includes Mackie's well-known Mic pre-amp and a -10/+4 switchable tape return
- 8-assignable submasters and a L/R mix master
- 4-band, true parametric EQ
- Extensive routing capabilities
- Optional Meter Bridges available
- Optional 24-E Expander console available
- Rugged all-metal chassis
- In-line monitoring effectively double: input channels

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.

FEATURES-

- 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 ADA* 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 multi-track. 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 capabilities include: bounce forward, cut, copy, move.
- Full-range EQ with mid-range sweep
- S/PDIF 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.

SIGNAL MONITORS

ALESIS
Monitor One



The award winning Monitor One provides the last critical link in the recording studio's signal chain, giving you an accurate reproduction of what is being recorded.

FEATURES-

- Excellent image and transient reproduction, powerful bass, and smooth, extended high frequency detail.
- Exclusive SuperPort speaker venting technology
- Ferrofluid cooled 1" silk-dome driver

TANNOY

PBM 6.5II



The PBM 6.5 II is the industry standard for studio reference monitors. They provide true dynamic capability and real world accuracy.

FEATURES-

- 6.5" low frequency driver and 3/4" tweeter
- Fully radially and ported cabinet design reduces resonance and diffraction while providing deep linear extended bass.

JBL

4206 & 4208



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.

FEATURES-

- 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.

SPiRiT

Absolute Zero



Absolute Zero monitors maintain a wide frequency response at high and low listening levels, both in- and off-axis for consistent results everytime.

FEATURES-

- High definition linear phase design
- Wide, controlled dispersion
- CAD optimized, low loss crossover
- Custom designed drivers
- Long throw 170mm LF driver
- 25mm soft dome HF unit on proprietary waveguide

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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 & S/M-2 free recording.
- Built-in MIC limiter and 20dB pad.
- TRS jack w/ level control for monitoring.
- Includes shoulder belt, AC adaptor, & battery.



PDR1000/PDR1000TC



The PORTADAT has fast become an industry standard location DAT machine. Popular for film and video production use, as well as ENG/FPV, the PDR1000 features a large backlit display, 4 motor transport and AES/EBU and SPDIF digital in/and outs. The PDR1000TC adds the ability to record, generate and reference to timecode as well as jam sync to convert absolute time to timecode.

FEATURES-

- 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.

NEW Options-

- **MS1000 Master Sync module** ensures drift will be no more than 1 frame every 10 hours.
- **HM1000 Headphone Matrix** provides a rotary switch for selection of Stereo, Mono Left, Mono Sum, & M/S (mid-side) Stereo modes.

SONY TCD-D10 PROII

A reliable, high-performance DAT recorder, the portable TCD-D10 PROII is designed with rugged professional use in mind. It has many enhanced features including absolute time recording, allowing immediate use of the tapes as source material for Sony's PCM-7300 series DAT editing system.



Fostex PD-4 V.2

The second-generation portable, professional TC DAT recorder from Fostex. Version 2 software includes many features and functions for improved performance in the field.

FEATURES-

- 4-head design • Punch-in/out
- Pre or post stripping of SMPTE/EBU timecode
- 3 in X 2 output mixer with 3-position pan functions
- Selectable 48V phantom powering and variable low-cut filters



EFFECTS PROCESSING

Lexicon PCM-80 & PCM-90 Digital Signal Processors

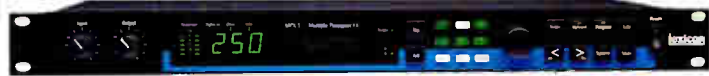


A great combination for any studio owner with an ear for the best. The PCM-80 delivers high quality multi-effects based on the legendary PCM 70, maintaining Lexicon's high standards for sonic clarity and extraordinary processing power. The PCM 90 is a digital reverb with its roots stemming from the studio standard 480L and 300L effects systems. Reverbs from telephone booths to the grand canyon, the PCM 90 is incredibly realistic, an excellent addition to any rack mount arsenal.

Buy a PCM-80 from B&H before December 25th, 1997 and receive a FREE Pitch FX Card & \$100 - a \$350 Value!

Buy a PCM-90 from B&H before December 25th, 1997 and receive a FREE Dual Reverb Card & \$250 - a \$500 Value!

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.electronic

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, phase, EQ, de-essing, compression, limiting, expansion, gating and stereo enhancement
- 20-key pad input
- "Wizard" help menus, 16-bit dithering tools, Tap and M/D 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 real-time 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.

Roland

SRV-330 Dimensional Space Reverb



The SRV-330 provides exceptional sound quality, using proprietary Roland Sound Space technology to achieve three-dimensional spatial effects with conventional two-channel playback.

FEATURES-

- Discrete stereo reverb algorithms for independent processing per channel
- 30-bit internal signal processing for a clear and accurate sound
- 300 preset and 100 user patches
- MIDI and real time control via remote, control and expression jacks

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.
- Cyrcumaural pads for long sessions.
- Steel cable, self-adjusting headband.
- 11-Hz-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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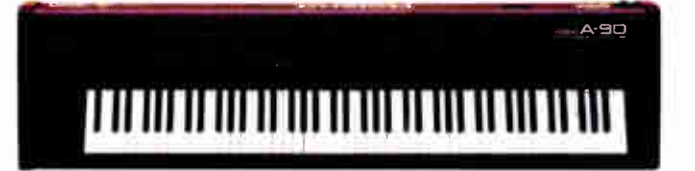
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KEYBOARDS & SOUND MODULES

Roland® 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.

- FEATURES—**
- Master Volume Slider and Global Transpose features
 - Proprietary 88-note hammer-action, velocity sensitive keyboard with aftertouch
 - 2 types of stereo-sampled grand pianos, various acoustic and electric pianos (including a great classic Rhodes)
 - Stores up to 64 Performances

Roland® JV-2080 64-Voice Synthesizer Module

Roland resets the standard with the incredibly expandable JV-2080 64-Voice Synthesizer Module. This amazingly powerful package offers unprecedented expandability, digital signal processing, and remarkable operational ease, housed in a 2-unit rack-mount design.



- FEATURES—**
- 64-Voice / 16-part multitimbral capability
 - 8 slots for SR-JV80 Series wave expansion boards
 - 3 independent effects sets plus independent reverb/delay and chorus
 - 6 outputs, Main Stereo and 4 assignable
 - **NEW** patch finder and Phrase Preview functions for easy access to all patches
 - Large backlit graphic display
 - Compatible with JV-1H80, XP-50, & XP-80.

KURZWEIL K2500 Series Music Workstation



Building on the same features that made the 2000 series popular, the 2500 utilizes the acclaimed V.A.S.T. technology for top-quality professional sound. Available in 76-key (K2500), 88 weighted key (K2500X) and rackmount (K2500R) configurations, the K2500 combines ROM based samples chosen from the best of Kurzwel's collection, on-board effects, and full sampling capabilities on some models (K2500S, K2500RS & K2500XS).

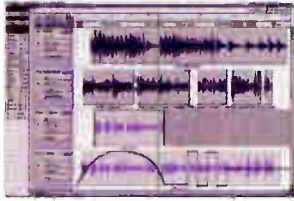
- FEATURES—**
- Full MIDI controller capabilities
 - 32-track sequencer • Dual SCSI ports
 - Advanced file management system
 - Sampling option available
 - Optional **DMTI** Digital Multitrack interface for data format and sample rate conversion with ADATs/DA-88s

MIDI SOFTWARE

Mark of the Unicorn 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, Velocity scaling and more—**ALL IN REALTIME.**

- FEATURES—**
- MIDI Machine Control. Quicktime Video playback. Sample rate conversion.
 - Spectral effects, pitch correction.
 - Real-time editing and effects processing.



- Full featured Notation section that rivals dedicated notation software programs.
- Playback using Quicktime Musical Instruments
- Virtual automated mixing
- Non-destructive MIDI output processing

SAMPLING

E-MU E-mu Systems, Inc.

e-6400 Emulator

The e-6400 offers the power of E-mu Systems' renowned Emulator Operating System (EOS) and superb audio quality in a package perfect for the budget-minded professional. The e-6400 comes with stereo sampling, 4MB of RAM and is fully upgradeable to E-mu's top of the line Emulator sampling synthesizers, the E4X, and E4XTurbo.



- FEATURES—**
- 64 voice polyphony (expandable to 128)
 - 4MB sound RAM
 - 2 CD-ROM's included (400MB of sounds)
 - 8 balanced analog outputs
 - Onboard graphic waveform editing
 - Load while play
 - Stereo phase lock time compression.

T H E N E W M P C !

AKAI MPC2000 MIDI Production Center



Whether you're producing rap or hip-hop, sequencing a rack of MIDI modules, or performing live, the MPC2000 gives you powerful tools to make your music shine. It's the NEW MPC!

- FEATURES—**
- Large 248 x 60 LCD Graphic display
 - 64-track, 100,000 note sequencer with linear drum machine style programming.
 - 16-bit, 32-voice stereo sampler
 - Standard SCSI interface

- Soft keys, Data/Digit wheels, cursor control and more.
- Keypad for directly entering sample points.
- Note variation slider gives you realtime control of any sound's tuning, attack, decay, or filter frequency.
- Floppy Disk Drive
- Powerful expansion options.

MIDI HARDWARE

Mark of the Unicorn MIDI Time Piece™ AV 8x8 Mac/PC MIDI Interface



The MTP AV takes the world renowned MTP II and adds synchronization that you really need like video genlock, ADAT sync, and word clock sync, even Digidesign superclock!

- FEATURES—**
- Same unit works on both Mac & PC platforms.
 - 8x8 MIDI merge matrix, 128 MIDI channels.
 - Fully programmable from the front panel.
 - 128 scene, battery-backed memory.
 - Fast 1x mode for high-speed MIDI data transfer.

Mark of the Unicorn Digital Time Piece™ Interface



Think of it as the digital synchronization hub for your recording studio. The Digital Timepiece provides stable, centralized sync for most analog, digital audio, and video equipment. Lock together ADATs, DA-88's, ProTools, word clock, S/PDIF, video, SMPTE, and MMC computers and devices flawlessly. It ships with "Clockworks" software which gives you access to its many advanced features and remote control of some equipment settings such as record arm.

OPCODE Studio 64X Cross Platform Interface



The Studio 64X is part of Opcode's new Studio X Series. This 64 channel MIDI interface is compatible with both Macintosh and Windows and features SMPTE synchronization as well as OMS (Open Music System) compatibility for total integration with any OMS compatible application.

- FEATURES—**
- Cross-platform Mac and Windows compatibility
 - 4 MIDI inputs and 6 MIDI outputs, 64 MIDI channels
 - Stand alone programmable patchbay, any in to any out
 - SMPTE timecode generation and synchronization
 - Front panel patchbay, SMPTE access and panic button

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voice processor with a mic/instrument preamp, expander/gate, compressor and EQ. The mic pre has phantom power and polarity switches, plus a 90Hz high-pass filter; the instrument input has a high/low-gain switch. The expander/gate offers threshold control; compressor controls include threshold, ratio and gain makeup and four attack/release times. The \pm -band EQ has shelving high and low filters with four selectable frequencies each, low-mid and high-mid peaking EQ (fixed-Q, four switched center frequencies) and a pre/post compressor switch. Additional features include: a sidechain insert point for frequency-conscious compression; stereo link; VU metering of input, output or gain reduction; and LEDs that indicate how hard the valve stages are driven. Outputs are balanced XLR/unbalanced TRS. Price: \$699. The Crimson VP 3051, a solid-state equivalent, is \$525.



Rane VP12

Tube-Tech offers the MEC 1A, a two-rackspace unit incorporating mic preamp, EQ and compressor. The mic pre section offers phantom power, polarity reverse, roll-off filter and 20dB pad switches, as well as a Hi-Z instrument input. The EQ section features high and low shelving and a selectable mid-band boost/cut with variable Q. EQ may be inserted before or after the compressor, which is based on Tube-Tech's Opto Compressor design. I/Os are transformer-coupled. Price: \$3,995.

Valley Audio's 401 Microphone Processor is a single-rackspace unit combining a mic pre with 48V phantom power, 3-band EQ, compressor/expander/gate and de-esser. The EQ

section features high/lowpass shelving and a 2kHz center frequency mid boost/cut. The compressor is fixed ratio (20:1), and attack and release times are program-dependent. The expander/gate offers variable threshold and range controls, fixed attack and program-dependent release. The de-esser provides two control frequencies (8 kHz and 4 kHz). Ten-segment LED bar graph meters indicate gain reduction and output levels, and each section features a clip LED. Main I/Os are XLR-balanced, and the unit also offers TRS Mic Pre Out and Line Send and Return connectors. Price: \$680. ■

Chris Michie is Mix's technical editor.

VOICE PROCESSORS

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—FROM PAGE 56, DVD-AUDIO

tests will not really serve any useful purpose at this point, except perhaps for the fact that there is not really any consensus yet on Sony's DSD bitstream system. Also, I am not really comfortable with using A/B/X testing to decide the format. I have been told by Elizabeth Cohen, the AES President, that there are many state-of-the-art listening tests that are known to be superior to the A/B/X test, though I am not personally knowledgeable about what they are.

Purcell: I don't like being part of any A/B test that I don't either take part in setting up or actually set up myself at my place. Because if I don't agree with the methodology—things like the switches used and how it is hooked up—then it doesn't have any validity to me. Even things as simple as which sample you play first can matter.

I see two ways to handle the tests. The best way is to let the manufacturers show up with their recording systems at several live recordings in several cities—I'm talking about a small number of microphones through a little mixer directly to two channels. Each manufacturer would be given a feed of the music directly from the mixer. The object would be to listen to all the formats to see which seems the most sonically neutral.

Another way is to have on half-inch analog several different types of music and then record that source to several different types of digital formats. Then listen to each of those compared to the source and see how diligently it records and plays back its representation of the music. That would be done at whatever bit resolution and sample rate that each system is capable of, but each system would also be listened to decimated to 44.1 kHz, to see how they compare, because you can never forget about the group of people that have CD players. Hull: Listening tests can be very prejudicial. I'm not sure there will be anything valuable to come out of these listening tests. What a classically trained musician or engineer wants in a recording format is completely different from what a rock

guitarist wants. Listening tests will only prove that everyone hears differently.

Should the DVD-Audio spec call for only one single combination of sample rate, resolution and number of channels, or should it be looser, perhaps settling on a group of approved audio playback standards? What are the pros and cons of each approach?

Ludwig: At a minimum, the format should have the ability to play a high-quality stereo signal and some kind of surround sound. Obviously, for all the people jogging with headphones it has to have the ability to fold back the surround channels down to stereo if surround is all that's on the disc, and to play back higher sample frequencies at lower sample frequencies.

You have to take the hardware manufacturers into consideration, and there will be companies that will want to sell a player for under \$300, or maybe even under \$100 some day. They could use a single sample-rate converter to deal with 96, 88.2, 48 and 44.1 if there is a decimator in there, which the DVD-Video players already have. So if a disc comes at 96, it would be decimated to 48, and if it came as 88.2, it could output at 44.1.

There is also the Sony DSD system to consider, which has a lot of good things about it. First, the 1-bit converters are very cheap to make. Second, it is kind of the Holy Grail of recording: You record with this hopefully completely transparent medium, and you can down-sample with very high quality to any rate and resolution you want. It has lots of versatility to it.

As far as surround sound, I think one of the most exciting things about DVD is the fact that it offers that possibility. Part of the DVD-Video spec allows multichannel, 48kHz discrete PCM. Pioneer has told me that they have three hand-built players in their lab which play 6-channel, 48kHz discrete, but to date there have been no consumer players introduced that accommodate that. When the audio specification comes, however, there will be new players that will be built to include the audio spec, and that would be a great time to incorporate 48kHz discrete surround.

Also, I think the spec should be flexible enough to allow for intelligent data compression schemes that have not yet been used. For instance, DTS would be a good company to come up with a data compression system that would be lossless, where you could perhaps have discrete 5.1-channel surround at 96 kHz with 20-bit resolution. It could look at the material up there, and if there is

truly nothing up there, it could get rid of that data that is being wasted. That would sound excellent. Also, compression systems allowing lossless data compression have been developed by Philips for DSD surround for DVD.

Purcell: If I were picking, the standard would be looser, with a number of different types of audio. Everybody I have talked to says, "DVD has all this potential. Why are you going to say that all you can do with it is 88.2?" As long as every player can play all the different types we agree on, we could do 88.2 and 96 kHz, or 88.2, 96, 48 and 44.1. We don't have to fight over the format; there can be more than one because of DVD's capabilities.

Hull: I would want as flexible a standard as the manufacturers could tolerate. I've been hoping that there would be some basic subset of features in common between DVD-Video players and DVD-Audio players. Ideally, the DVD-Audio spec could be flexible enough to allow the producers of the media the control over the resolution. For now, we need a loose format, so that players and media can be created. Then the consumer can decide what features they like and don't like. One thing that could happen is a format war for the high-resolution format. Is it 96kHz/24-bit or 88.2 or DSD? This could really slow down DVD acceptance. Also, there is a lot of consumer confusion over surround sound. A full-bandwidth multichannel surround standard is needed.

Assuming there is at least one part of the standard that focuses on high-fidelity stereo audio, what should the sample rate be? Is there any validity in the view that 88.2 kHz is a wiser choice than 96 kHz due to sample rate conversion consideration with the existing CD standard?

Ludwig: Yes, I think there is.

Purcell: I think that in addition to 96 kHz, there needs to be at least 88.2. There is a question as to whether anyone can perceive any difference between sample rates over 67 kHz. But in my experience, the big factor is going to 44.1. If you listen to 96 kHz decimated to 44.1, and listen to 88.2 decimated to 44.1, I believe that going from 88.2 gives you a much more accurate translation. And to overlook 44.1 and everybody who has units now would be a profound mistake.

Hull: From our trials here at Masterdisk, the 88.2kHz source converted to 44.1 sounded better than the 96k sampled source converted to 44.1, using converters available today. But converter

technology is constantly improving, so basing the format on that alone seems unwise. It's also my understanding that if the format allows for a separate "Red Book 44.1" layer, then it would not have to be sample rate-converted down from 96k. It could be mastered independently.

If it were up to you to define the standard for DVD-Audio at this time, without yet having participated in the ISC listening tests, what would that standard be?

Ludwig: I would define an open standard at the moment, one that would allow for the possibility of outboard boxes for processing new formats as they become available. But for sure it would include dual-layer, the ability to incorporate the Red Book CD standard. If that is not included, DVD-Audio is going to be a tough sell, whereas if it is included, it is going to ultimately be a fantastic thing for everybody involved.

Purcell: If we are talking about a 2-channel system, then it would be 24 bits at 88.2, along with possibly 96 kHz.

Hull: We have had only limited exposure to 96k, 24-bit recordings so far. Is it the best format that we can create? I doubt it. For now, I think it sounds very realistic and exciting. But the DVD-Audio standard should not be tied to this format forever. It's better to think of it as a carrier for digital audio capable of many formats and resolutions.

What steps, if any, are you taking at your facility to prepare for a DVD-Audio standard?

Ludwig: We have taken all the steps already. We have owned the Sonic Solutions DVD authoring software and hardware since December of 1996. In fact, as we speak, a 24-bit, 96kHz disc is being mastered in this facility of a classical pianist named Laura Kargul. It's a DVD-Video with the video blank. We already have 96kHz and 88.2kHz editing capability, and Daniel Weiss is slowly making processing modules that work up at those sample rates; he already has EQ and compression modules. We are just waiting for people to invent the echo devices and all the other toys that have finally come around at 44.1. We need the same things up at the higher rates.

Purcell: I just bought new space, and I am adding room and equipment to do everything there is to do with DVD, including the authoring. I figure the only way to learn about it is to do it.

Hull: We have the Sonic Solutions DVD Producer package that enables us to do DVD-Video authoring and audio mas-

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tering in all of the currently proposed formats, and Sonic promises to support all subsequent audio formats as the DVD-Audio spec evolves. More importantly, we are taking a very serious look at new creative uses of multichannel sound for record buyers. This isn't quad for the '90s—no panning ping pong balls, please. I can imagine some very compelling uses for multichannel and surround sound.

Do you see a consumer market eventually developing for a DVD-Audio disc?

Ludwig: I do think there is sufficient market interest in a new audio carrier, if the record companies get their way with dual-layer DVD. From everything that I have been told, the dual-layer disc does work; the question is the price and the reliability. If they can get the pressing prices down to the point where it is cost-effective to go to a single inventory in the record stores, every CD you buy would also be a DVD. If they can do that, there is no question in my mind that the number of DVD players that are audio-ready would definitely grow.

Purcell: A lot of people that I know say, "I think the consumer is satisfied with things right where they are." I am not certain that the consumer feels that he needs a better audio medium, and I don't think DVD-Audio will seem that much better to the normal consumer than the CD.

Hull: I believe a consumer market will develop. The music consumer currently has no idea of what any new format might be capable of. Sure, they think that the current CD is okay, but when they see what can be done with DVD, I think they will line up. These consumers are getting addicted to online services and over-the-Web audio delivery. I think new excitement in consumer audio is needed. ■

Mix's Media & Mastering editor, Philip De Lancie, is a mastering engineer, freelance writer and multimedia designer in Berkeley, Calif. He can be reached at pdel@compuserve.com.

INSIGHTS

—FROM PAGE 92, MARVIN CAESAR

ence value, the limit thresholds return to their original setting. It's basically a self-adjusting finite attack time; the amount of time it takes to lower the thresholds of the limiters is the length of time the limiters' overshoot may be in the clipper.

That's another invention of Donn's. "Clip" is not necessarily a four-letter word; clipping actually sounds better and is an enhancement for bass, just so long as the duration of the clip is kept under a certain amount of time. Taking advantage of that knowledge, Donn developed a way of predicting how long the signal would sit in clip, allow it to hit that duration and, if it was going to continue to be in clip for longer than that amount of time, to send a signal to the threshold of the limiters to lower the threshold.

Essentially, all Aphex products are analog in design, but are often protecting digital circuitry...

Yes. It is important to get as much resolution as possible when you first convert to digital; once you are in, you cannot get more. The Dominator is perfect for that application because it is transparent in the circuit until threshold, and then it protects the A-to-D converter from crashing. This is especially true if the audio will later be bit-rate reduced.

You protect your inventions with patents. And you rigorously protect those patent rights.

Not every single circuit is patented, [only] the ones we feel will have economic benefit. To file a patent and pay all the legal fees is expensive. In Europe, Japan and just about every place in the world, you have to pay yearly annuities in order to maintain it. It's an expensive proposition.

I note that one of your patents for the Tubessence preamp is for a reflected plate amplifier—using vacuum tubes to reduce power voltage with low plate dissipation. Where did that idea come from?

That was Donn's idea; he's brilliant. If you hear the term "Thinking outside the box"—he's never *been* in the box! *The circuit reduces the tube's Miller Effect? What is that?*

There are capacitances within the tube that reduce its high-frequency response. If you have really good tube circuitry, the Miller Effect is minimized, the high-end feels very extended but very natural.

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Unfortunately, the way the court system works in Europe—which is where I sued him—it was painfully slow. It cost me about two years [litigation] for one word. The American original patent had the words "up to" 360 degrees. The German translation used the word "um," which [means] "approximately." Behringer was able to milk that for two years as a [delaying tactic].

Is it up to you to translate your patents?

No. We hired a translator, so what do you do? Do you hire somebody to check your translator? One can only hope that enough people are so turned off by [Behringer's] methods of doing business. I was absolutely flabbergasted that Mackie kept on selling to Behringer's distributors in the U.S. If they had flexed their muscles back when this first happened four years ago, then [Behringer] would have just backed off and disappeared.

At least Mackie is suing them here through its U.S. distributor and associate manufacturer. And also seeking punitive damages.

Yes. There are no punitive damages in Europe. It's interesting that German law grew out of the Guild System; awards were set up as actual compensation, not as if the person did anything intentionally, because it was inconceivable that somebody would act in such a reprehensible way. Americans are much more practical, saying that "Yes, there are reprehensible people," and you have to have a system to punish these people.

If I knew in 1987 what I knew in 1997 when we finally collected [the \$500,000 settlement] after almost ten years, I would have done it differently. I would have fought [Behringer] much more strongly in the marketplace; it's up to users to decide if they will support [such a manufacturer's ethics].

How would you summarize the Aphex way of doing business?

There is a need to do things differently; not just for the sake of being different but doing it in a better way.

You said once that "A product must first be able to do nothing to the audio before it does anything else."

Yes. I meant that the signal path itself has to be absolutely transparent.

What plans are on the immediate horizon?

We are trying to expand the licensing of our circuitry to various manufacturers, including hearing-aid companies. We are also developing a remote-controlled mic preamp with a limiter in the initial gain stage. And more plug-ins for the DAW crowd; the next will be the Big Bottom.

We're also looking more at DSP; we feel very strongly that the only way is 32-bit floating-point. It's just a function of all the rounding and truncation that builds up when you're doing high-intensity processing. Eventually, you're going to lose resolution. No matter how well it is dithered.

Any advice for new company owners or entrepreneurs?

If I knew back then what I know now, I would never have dreamt that I could have made a success out of it. I'm shocked beyond belief. When I look at the history of Aphex, I cannot believe that I was so ignorant in so many ways. Now that I've been through it, I see all the pitfalls. You need tremendous amounts of energy and dedication. What would help would be a plan—a goal. I didn't have any technical background or any experience in the industry; I'm not a musician, so I had to learn how to relate to it.

Have you ever considered selling the company?

I've been approached, but I've not been in a situation where I've needed to sell out. Certainly I wouldn't give up my lifestyle that I enjoy, to sell out and make a salary. People have chased after me to go public. Remember that I started my career as an accountant doing audits of public companies. The last thing I would want would be people like me sniffing around my business and having to justify to stockholders about making an investment that may not pay off for two to three years. And show a consistent profit quarter by quarter. Real business does not work that way. ■

Mel Lambert currently heads up Media&Marketing, a consulting service for pro audio firms and facilities.



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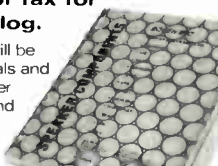
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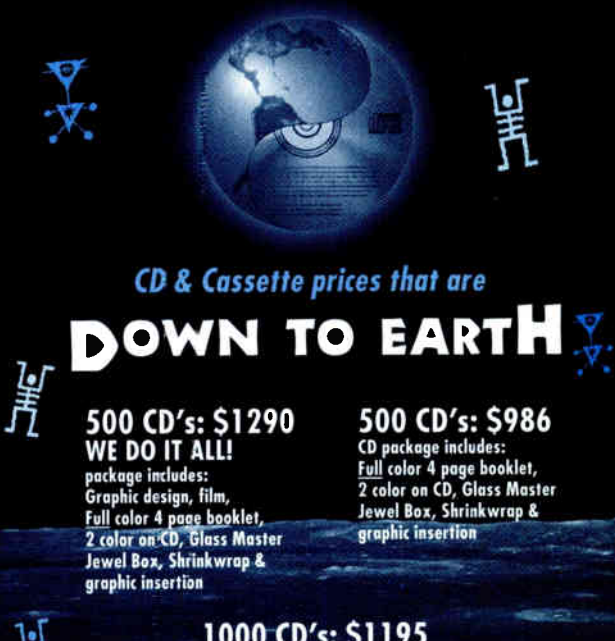
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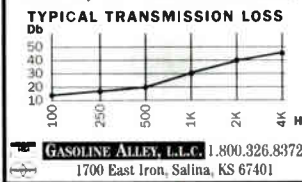
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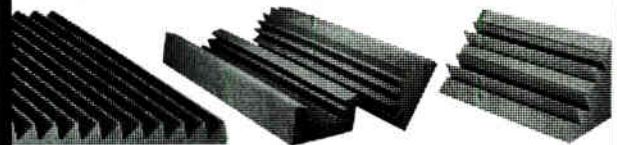
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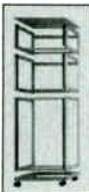
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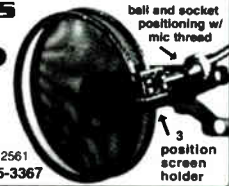
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
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- The small print:** No stated or implied discounts allowed on new equipment sales. Publishers reserve the right to refuse or discontinue any ad deemed inappropriate.
- Send coupon payment to:** Mix Magazine Classifieds: Attn: Robin Boyce-Trubitt, 6400 Hollis St., #12, Emeryville, CA 94608, tel. (800) 544-5530 or (510) 653-3307; fax (510) 653-8171. e-mail: mixclass@cardinal.com. Payment must be included with copy: check, Visa, MasterCard or American Express accepted. Sorry, no billing or credit available.

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—FROM PAGE 131, TANNOY AMS 8A

or phase distortion found in traditional two-way designs. The monitors' lack of coloration allowed my ears to immediately know what was going on where and from which aspect of the mix.

The AMS 8As can be really discouraging to listen to because they are so brutally honest. When I played back my work on Tracy Chapman's *New Beginning*, I immediately noted the bass was a little tubbier than I would have liked and the top wasn't quite as silky as I would have hoped for. And Hootie's *Fairweather Johnson* was a little bright in the top end, but the bottom was really clear and the midrange was right on. Comparing these results to what I heard on many other systems so many times, I knew the AMS 8As were providing the truth.

My mixing style suits the 6th-order LF alignment over the 4th-order tuning. This is contrary to Tannoy factory recommendations, but having the choice allows me to use what works best for my particular style. I prefer the added extension provided by the 6th-order setting to the more gradual roll-off of the

4th-order setting. Mixing on the AMS 8A, I realized that if I could get the mix sounding great on these monitors, the mix would translate to any speaker a consumer could have and still sound great. This results in saving time, effort and the bottom line, money.

Another advantage of active powered systems is consistency: The monitor, the amps and crossovers are constant, no matter where you use them. The more facilities I used the AMS 8As in, the more I learned about the acoustical deficiencies in the various rooms, allowing a firm reference point for accurate set up and consistent results.

THE END RESULT

When my work went to mastering from AMS 8A mixes, there was virtually nothing to adjust. Consequently, when they come back from mastering, I'm able to hear what should have or should not have been done and send it back so they get it right. The end result is better-sounding product for the artists and their fans.

The Tannoy AMS 8As are truly superior monitors. As I mentioned earlier, these are tools. As a mixing

tool, they are difficult to get accustomed to, because your preconceived ideas about monitoring are being challenged by a solution that is truly "tool" oriented. They require discipline, perseverance and a belief that they really are the truth.

For the serious working engineer/producer, truthful reproduction is a good thing as it demands that you improve your technique and become a better engineer. Frankly, I'm not interested in "warm and fuzzy." I'm interested in improving as a professional. Studio monitors are a lot like human beings: You must live and work alongside them for some time before you can draw a fair portrait of their qualities and imperfections. These monitors will not be returning to the factory.

Tannoy/TGI North America; 300 Gage Ave., #1, Kitchener, Ontario Canada N2M 2C8; 519/745-1158; Fax: 519/745-2364; Web site: www.tannoy.com. ■

Producer/engineer Don Gehman's long client list includes Barbra Streisand, the Bee Gees, John Mellencamp, Tracy Chapman and R.E.M. He also produced Hootie & The Blowfish's Platinum-selling debut, Cracked Rear View.

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YAMAHA 03D DIGITAL MIXER

SHORTCUTS TO SPEED UP YOUR SESSION

Priced at \$3,699, Yamaha's 03D digital mixer packs a powerful punch in a portable package. But try a couple of these insider techniques to take your 03D to the next level.

User Define Buttons: The available options for configuring these four buttons seem to suggest that they're used as alternatives to complete sets of controls (e.g., MMC, Automix, Channel, etc.) However, several hybrid combinations are useful. I use this most often:

1. Automix Record enable/disable
2. (MMC) Play
3. EQ enable/disable
4. Dynamics enable/disable

When updating fader moves on an existing Automix, you'll probably want to view the Fader Edit page. Assign a button to Automix record enable and you can enter Automix record without having to return to the Automix Main page. Assign another button to MMC (MIDI Machine Control) Play and the recorder/sequencer the 03D is synched to can be remotely started via MIDI, thereby putting Automix into Record mode. As an added benefit, once you enable Automix record ready, the button's LED flashes until you enter Record, at which time it lights continuously. Button assignments 3 and 4 allow you to see at a glance whether EQ or dynamics processing is enabled on a selected channel, and to enable/disable them without having to change menu pages.

Initial Scene: Scene Memory 00 resets all mix settings to their initial values, which is useful for "normalizing" the mixer after a session. However, if you tend to configure your mixer in basically the same way each time you record or mix, you should create one or more Reset Scenes of your own. For example, if you always use the same stereo effects processors, you can preset their master sends and assign their

returns to specific channels, configuring them as stereo pairs, perhaps with noise gates, special EQ, etc. The same goes for keyboards, drum machines and other input sources. Remember, though, that you will have to copy this scene into a new memory slot before altering it, so as to preserve the original.

Trim: When using any of the 16 analog input channels as tape returns, avoid using their trim pots to boost or cut track levels, as these settings are not recalled in scene memories, and therefore not in automixes either. Use the Trim option on the Fader Edit page to trim "by ear." The Trim option on the Extract page of the Automix menu allows more precise adjustments but is fairly complicated. Try this alternative, which allows changes in 1dB increments, while working much like the analog trim pots: Select the EQ page and return all bands to flat. Then set the Attenuation control to, say, -10 dB, and save the settings as a preset in the EQ library. Paste this EQ preset onto all of the channels that will be used for tape returns, and you'll have 10 dB of headroom, while retaining 86 dB of attenuation. You might also wish to make this arrangement part of your "Initial Scene" if you need to boost/cut signals routinely.

Mouse: When using the Automix button to cycle through the pages of the Automix menu there can be a significant delay (depending on how much data is in the mix memory) when moving from the Fader Edit page to the Event Edit page. That is because all of the data in the Event Edit memory must be loaded before the page comes online. Click on the menu



page tabs with the mouse and you can bypass the Event Edit page entirely, instantly going directly to the selected page.

Bulk Dumps: If you have a Mac or PC, you should use Yamaha's 03D Bulk Manager for Bulk Dumps. Download it from www.yamaha.co.jp/product/proaudio/homeenglish/technical/index.html. As Automixes are created from scenes, it is helpful to think of them as a set, and give them the same name and memory slot number. In other words, if you are mixing a song called "Dogs," and you store it in scene memory #3 as "Dogscene," when you create an Automix for that song, call it "Dogmix" and store it in Automix memory #3. This arrangement helps to keep things straight generally, but is particularly useful while executing Bulk Dumps. ■

Barry Cleveland is a San Francisco-based composer, engineer and producer. He also plays guitar with the improvisational quintet Cloud Chamber.

BY BARRY CLEVELAND

Pro Tools® 4.1 productivity breakthrough!

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HUMAN USER INTERFACE



A HUI™ GUIDED TOUR.

- 1 Assign Section.** V-Pot™ assignment control lets you configure Sends A thru E, pan and channel bus I/O functions.
- 2 Channel Strips.** Eight channels are considered the maximum human hands can handle at once. Stereo/mono LED meter bridge displays digital dBFS levels.
- 3 DSP Section.** Fluorescent display shows plug-in DSP parameters. Rotary V-Pots let you "tweak" settings with fingers instead of mouse.
- 4 Switch Matrix section** handles automation configuration and edit functions such as cut, paste, copy, delete, etc.
- 5 Control Room Section** controls I/O selection, master monitor level, and global muting.
- 6 Navigation Controls.** Scrub and shuttle wheel controls, timecode display, cursor controls, virtual "tape transport" buttons, window buttons for Pro Tools screens such as Mix, Edit and Transport, and keyboard shortcut buttons including Save, Undo, Edit Mode, etc.

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THE CHANNEL STRIP DESCRIBED.

- All eight HUI strips can be soft-configured in Pro Tools® 4.1 as an aux return, group or main master or channel strip.
- 7 Record Ready** toggles track record.
 - 8 Insert** calls up DSP plug-ins.
 - 9 V-Pot™s and V-Pot function selectors** can act as pan pots or aux sends. Built-in LED display gives visual indication and displays recalled settings.
 - 10 Auto** toggles automation modes.



THE HUI REAR PANEL REVEALED.

- 15 Built-in power supply.**
- 16 Digital comm ports** including two parallel/thru ADB mouse and keyboard sockets, RS422/RS232 serial connectors, MIDI I/O, and expander port.
- 17 Trigger ports** add foot switches for Stop/Play/Punch, On-Air, external console solo, etc.



Digital audio workstations need hands-on control. Not just a fader pack, but a whole "cockpit" of controls that you can get your hands — and even FEET¹ — on. Mackie's Human User Interface (HUI™) gives you 100mm faders to record and tweak level automation moves, virtual rotary controls for functions such as panning and adjustment of DSP plug-in parameters and dedicated function buttons for things like

muting, soloing, or "arming" a virtual Pro Tools 4.1 track. Then HUI lets you "touch update" levels as the motorized faders play back your automation sequence.

If we stopped there, we'd have beaten the knobs off any



conventional fader pack. But we also added a complete analog control room section and two of our renowned microphone preamps. For many post production applications, HUI provides all the mixer you'll need — including discrete/mono



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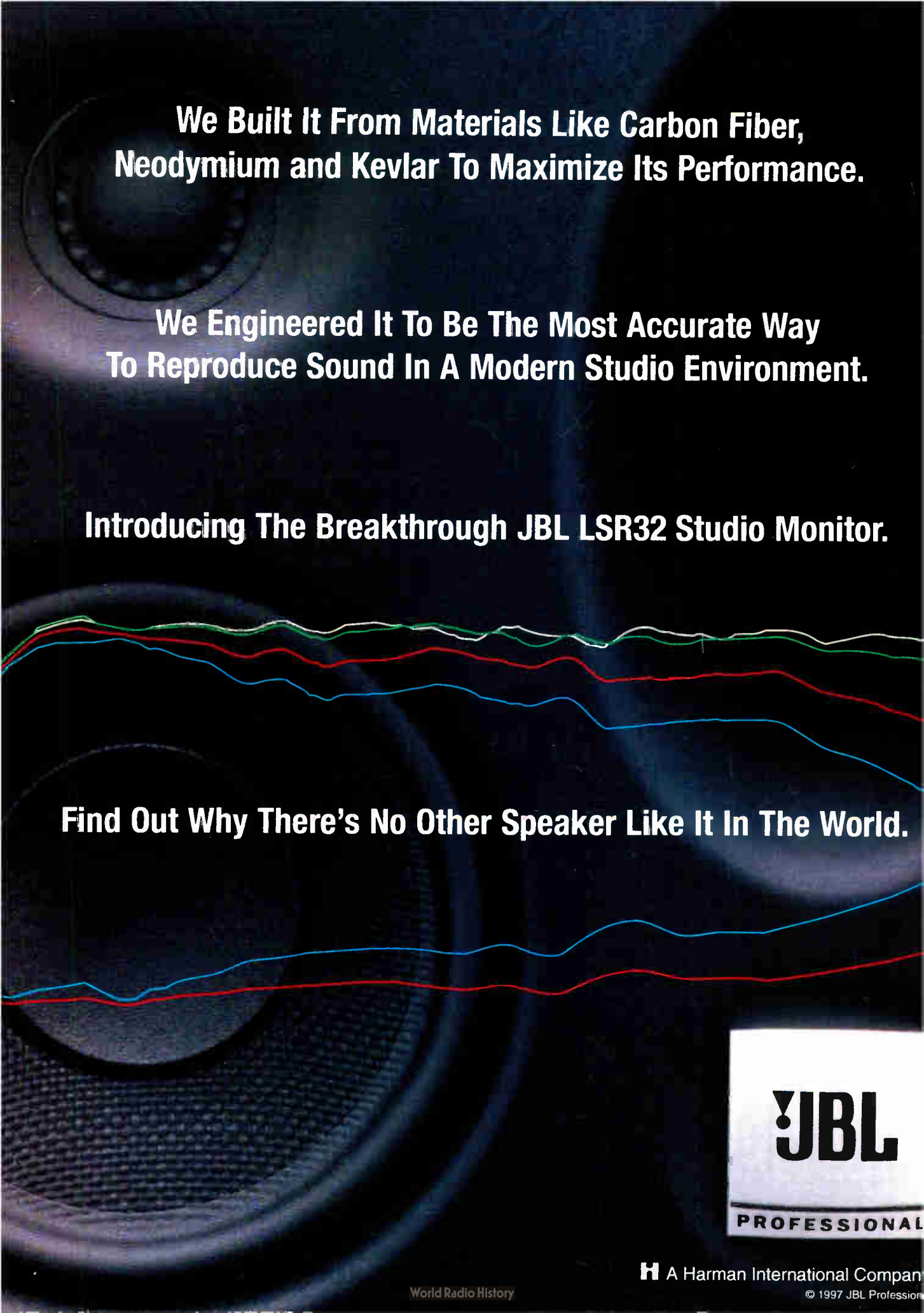
¹ See number 17 to left



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