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PRODUCTION NOTES

Quad Recording's two SL 9000 J Series consoles were used to mix 'The John Lennon Anthology' for EMI/Capitol Records, as well as the 'Wonsaponatime' single disc of highlights from the set. Rob Stevens, who produced and mixed the set with Yoko Ono, says, "Yoko and I had heard the tapes on a variety of top line consoles of various vintages. Some of the consoles brought out detail and clarity; others brought out an appealing warmth. From the SSL J, we got both the exceptional clarity and classic warmth that we were looking for."

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CIRCLE #003 ON PRODUCT INFO CARD

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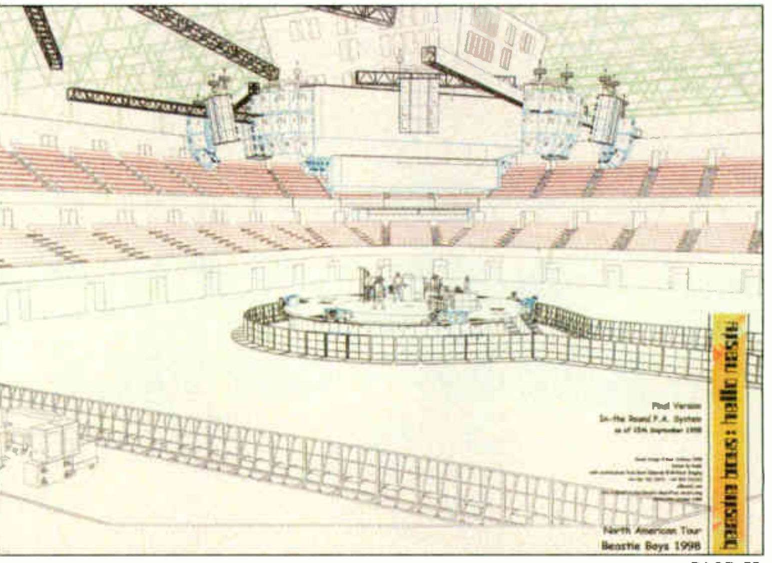

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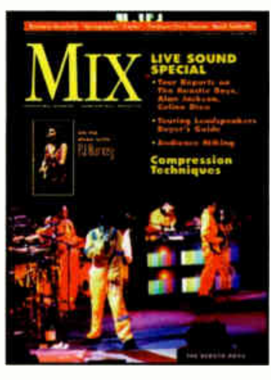
On the Cover: The Beastie Boys have been on tour promoting their hugely popular CD *Hello Nasty* with a P.A. provided by Britannia Row. For more on the production, see page 58. **Photos:** Steve Jennings.



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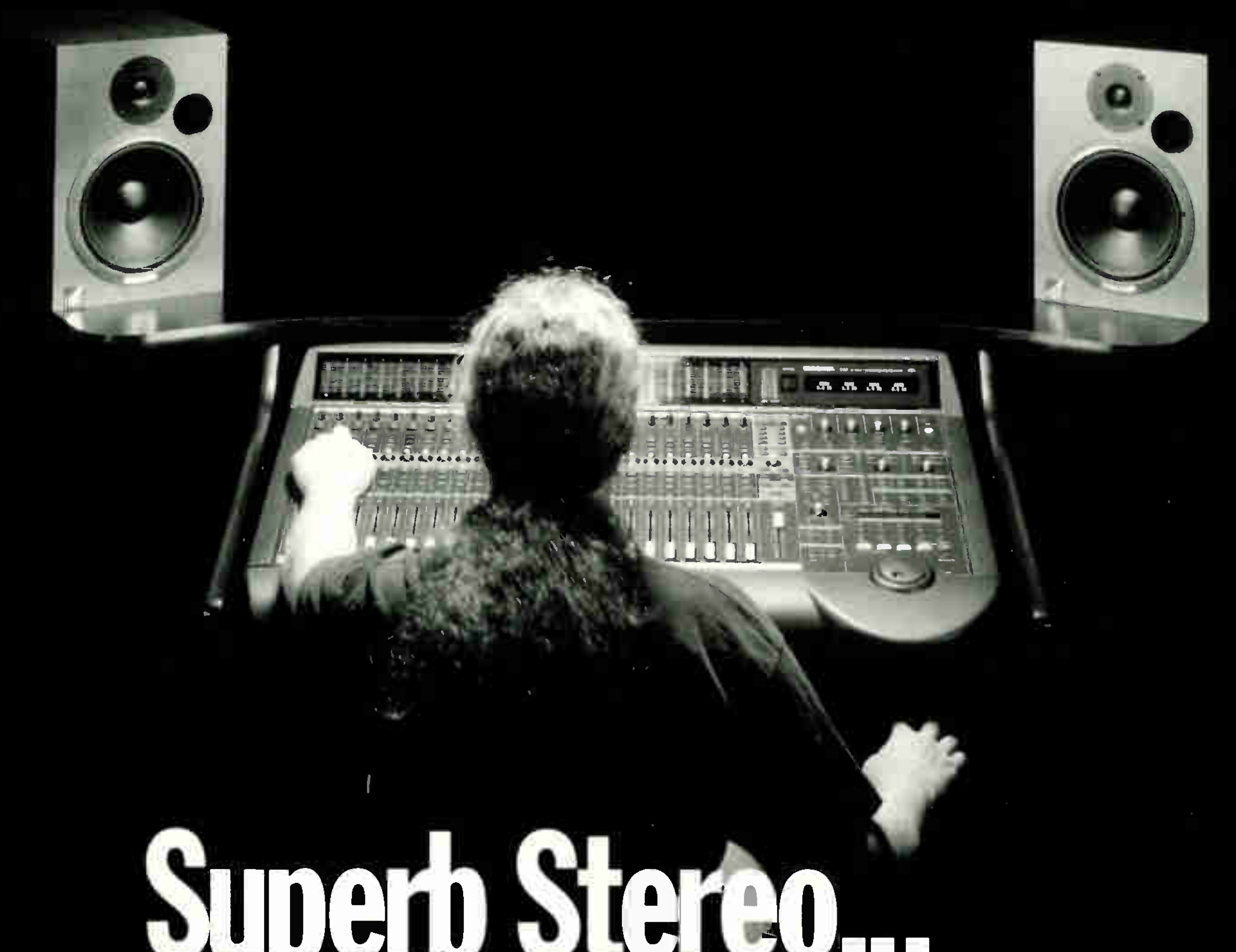

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CIRCLE #004 ON PRODUCT INFO CARD

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FROM THE EDITOR

A DIAMOND IN THE ROUGH

January is a good time to start thinking about new purchases for the year, and for many audio companies this includes both new and pre-owned (used) gear. Depending on your viewpoint, the phrase "used gear" may bring to mind images of snake oil hucksters and fast-talking car salesmen. Yet to others, those same words may conjure up visions of discovering a pair of U47s or an LA-2A at a garage sale or in pawnshop window. However, the reality about the used audio market lies somewhere in the middle, and the truth of the matter is that the used equipment market is an important link in the pro audio food chain.

Selling off older gear to help finance new purchases is a key factor that fuels growth in the audio business. So if a large touring company upgrades and sells last year's console to a smaller company, the buyer may in fact gain access to what was considered state-of-the-art just a few seasons back. And if that mixer was great back then, isn't it possible that it's also great now—aside from a few dings and scratches encountered along the way? So this particular case may offer the best for both parties, where everybody gets an upgrade.

At the same time, the word to the wise is *caveat emptor*. The key to making a smart used equipment purchase is buying the right piece, regardless of the price. For example, 3M's digital 32-tracks—certainly great-sounding recorders—were typically problematic from a service aspect, and the availability of spare parts today is dicey at best—another factor to consider when looking at used gear purchases. Yet buying a more recent model is no guarantee of success. As an analogy, a low price on a 1998 automobile may seem enticing, but if that car was previously used as a taxi or as a rental in a congested urban area, you may want to pass on that "bargain." And with the purchase of any used item, some advance research on the part of the buyer and careful consideration of the condition of the product is essential. Selected wisely, a substantial savings can come from buying used—rather than abused—equipment.

That said, bargains abound for the smart shopper, whether you're checking out *Mix* classifieds, the trade-in corner at an audio dealer, used equipment brokers, local musician papers—just about anywhere. A friend of mine bought a mint-condition (100 hours total) Tascam 80-8 ½-inch analog 8-track—a solid workhorse—for $350 at a Nashville store. I just picked up an Emulator II—still a cool axe—for $200. The experience was kind of like seeing a cute puppy at the dog pound—somehow I just had to take it home. And beyond local suppliers, the Internet has opened up new avenues for commerce, whether you're checking out music sources like Used Gear By Mail (www.ugbm.com), audio auctions such as Ham Brosious' Digibid (www.digibid.com), or the anything-goes, street bazaar action on E-Bay (www.ebay.com).

But wherever you look for used gear, the same rules apply: Think twice, shop smart and you may just find that diamond in the rough.

Happy hunting!

George Petersen
Editor

ABP
American Business Press

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FEEDBACK

TIMELY CORRECTION

In the lab analysis of the Hafler TRM8 Monitors (Field Test, Oct.'98), Jack Hidley states, "The speaker has a high degree of time alignment..." Time Alignment is my trademark and can only be used with loudspeaker systems that have been tested in my laboratory and have received written qualification to use the trademark. Time Align®, and the derivatives, Time Aligned™ and Time Alignment™ are trademarks of E.M. Long. The trademarks are licensed to companies for specific products that meet the criteria for their use. Hafler has not licensed the trademarks for any of their products.

Jack Hidley has provided very useful technical measurements, and I am happy to see *Mix* publish them. However, the impulse response shown in Fig. 2 (page 140) shows me that the TRM8 would not qualify for the use of the trademark. Perhaps you could publish a "correction" in a future issue so your readers will be fully informed about the use of Time Align.

Edward M. Long
San Jose, Calif.

SAD BUT TRUE

I wrote this piece for my Web site after reading the Nov. '98 edition of *Mix* and thought I'd pass it on to you.

When I first read that almost all symphony recording undergoes major editing ["Digital Editing for Classical Music: The Virtual Razor's Edge"], I thought it couldn't be true. World-class musicians, extremely talented musicians, who have practiced for years upon years, who play the classic compositions live in large halls around the world to appreciative audiences, could not possibly allow their work to be edited.

These symphonies are recorded with minimalist techniques, using the finest microphones and the most transparent mic pre's made, so as to capture the true sound of the orchestra. The fine tone of the wood of the instruments, the brass and silver that transform breath into sweet passages—edited? Talk about an unplugged and natural environment! And then you're going to edit this? Seems strange to me.

That is, until I started working with classically trained musicians. Now I understand why they do it. These musicians hear notes we cannot fathom, much less hear. They sense nuance and tone that just never comes up with the rest of us in the music world. In short, they are brilliant and they are perfectionists. They drive themselves crazy. I am a patient man, and I have survived sessions with these musicians. But I have watched them agonize over decisions in the process of editing, and we were only adding violin and harp to a world music piece! Thankfully, they too will finally accept the occasional flaw (Did you hear that, Pete? Me neither.) weighed against five more hours of performance and editing, and move on. But I wonder if they sleep at night.

Yes, I now understand but it still seems unnatural. When laying on a blanket on the grass, on a warm summer evening with wine, listening to the symphony in the park, I will no longer just reflect on how a man or woman could possibly compose all those parts to come together so beautifully. I will now instinctively listen for what parts may need editing if I were recording it. Not that I would want to edit, mind you, but knowing I would have to.

I kept my chin up when learning there was no Santa, but now this. And to think that some critics remark that popular musicians are not entirely unplugged when making the MTV specials. What will they say when they discover that classical music is edited?

Eliott James
Wateree Studio
www.eliottjames.com/wateree.htm

MORE ON DIGITAL EDITING

We were very glad to see Chris Michie's article "Digital Editing for Classical Music" in the November issue. It is always interesting to hear what our colleagues in the recording industry have to say about their experience with different platforms, etc. Evidently, you missed us in your investigation of sources for your article. We have been digitally editing classical music for nearly 20 years now and were pioneers in digital multitrack editing, a subject only touched on briefly in the article.

John Newton, our chief engineer and company founder, began his experience with digital editing during his association with Soundstream (Salt Lake City), whose founder, Tom Stockham, built the first digital tape recorder in the U.S. Soundstream also developed the first digital editor that could edit more than two tracks (i.e. four). Soundmirror ran Soundstream's East Coast operations from 1981 until Soundstream closed several years later. Soundmirror continued in our own digital explorations, however, and we were the first studio to own a Lexicon Opus 8-track digital editor, which still resides here today. We upgraded our Opus to 18 tracks and then 24 tracks before replacing it with the first, and possibly the largest, Sonic Solutions 24-track digital editing and surround sound platform in the U.S. Our Sonic has, in turn, been upgraded to a 36-track system, which is what we do most of our editing on today.

Soundmirror is regularly involved in projects that require digital multitrack editing, from orchestral to operatic to surround sound recordings. We have worked with artists such as Jessye Norman, Dawn Upshaw, the Berlin Philharmonic, the Boston Symphony Orchestra, the New York Philharmonic, Jose Carreras, Yo Yo Ma, Aretha Franklin and the Chicago Symphony, and with a myriad of record companies, including Philips Classics, BMG, EMI, Deutsche Gramophone, Nonesuch, Erato and Telarc. We would be more than happy to share our knowledge about digital multitrack editing and its importance in the field of classical music recording, as a followup to your digital editing article. Digital multitrack editing plays a role in an enormous number of classical music recordings now, and its use will only increase with the continued development of surround sound.

Anna Ross
Soundmirror Inc.
Jamaica Plain, Mass.

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CIRCLE #006 ON PRODUCT INFO CARD

World Radio History

CURRENT

SHOWCO REVEALS NEW CONSOLE AT LDI

The audio highlight of the recent Lighting Dimensions International (LDI) show in Phoenix was the unveiling of Showco's new Showconsole, a live performance board that consists of a completely recallable control surface connected via fiber optics to an 80-channel analog mixer in a triple-wide rack located at the stage. This marks the first time a sound reinforcement company has created its own proprietary console. The digitally controlled analog system is based on the Harrison Series12 and will also be marketed by Harrison for the installation market as the LPC (Live Performance Console). Showco vice president Howard Page was on hand to introduce the Showconsole and pointed out that the whole console can reset almost instantly.

Channels may be recalled to the control surface in "banks," and a single control surface may be interfaced with up to three 80-input mixers. "We've taken away most of the individual channel knobs, because an 80-input console would be prohibitively large and heavy," explains Page. "You want all the faders, but you only need to see one full channel at a time."

Each of the 80 channels in the input/mixer racks offers three mic inputs plus a line input, allowing the channel to switch on a scene-by-scene basis. "Let's say you've got a single guitar player in a country band playing three instruments," Page illustrates. "Now you only need one channel, because the acoustic guitar can come in on Mic A, the electric on Mic B and the mandolin on Mic C, each with their own settings for EQ, dynamics and gain."

The console opens up a range of creative possibilities that were previously unavailable to live sound engineers. "We've got a few months of fine-tuning and then we'll have one out on tour this year," Page says. The Showconsole is available to the touring market exclusively from Showco; sales to fixed venues will be managed exclusively by Harrison. Interested engineers will find a 2x3-foot poster from Harrison (info@glw.com) helpful. Inquiries regarding touring availability should be directed to Howard Page at Showco (hpage@vlint.com). —*Mark Frink*

EX'PRESSION CENTER FOR NEW MEDIA OPENS THIS MONTH

Ex'pression Center for New Media, a new digital media arts school, begins classes on January 11. The school is located in Emeryville, Calif., and offers "total immersion" style programs in two courses of study, the 2,160-hour Sound Comprehensive Program and a 2,178-hour Digital Visual Media program. Classes cover 3-D modeling, 3-D and 2-D animation, digital visual effects for films and video, Internet, music recording and mixing, sound effects, live sound, technical maintenance, 5.1 Surround Sound, design and acoustics. Classes will be taught by certified Ex'pression faculty as well as by professionals now working in the music and video arts industries.

Ex'pression recently named the two directors who will oversee the schools academic programs. Rob Gibson, formerly with the Academy of Arts College in San Francisco, will head the Digital Visual Media program. Duke Zaffery, formerly with Full Sail Real World Education in Winter Park, Fla., oversees the sound department. For more information visit www.xnewmedia.com.

1999 TEC AWARDS CALL FOR ENTRIES

The Technical Excellence & Creativity Awards Nominating Panel is accepting entries for product nominations for the 15th Annual TEC Awards, to be held September 24 in New York City. To be eligible, products must have been released and in commercial use during the period from March 1, 1998, to February 28, 1999. Categories are Ancillary Equipment, Amplifier Technology, Mic Preamplifier Technology, Computer Software & Peripherals, Microphone Technology, Sound Reinforcement Loudspeaker Technology, Studio Monitor Technology, Musical Instrument Technology, Signal Processing Technology (Hardware), Signal Processing Technology (Software), Recording Devices/Storage Technology, Workstation Technology, Sound Reinforcement Console Technology, Small Format Console Technology and Large Format Console Technology.

Companies wishing to nominate products should send: product name and qualifying category, date first commercially available (proof of shipment may be required; beta test sites do not qualify), and a contact name and telephone number.

Send all information to: TEC Awards, 1547 Palos Verdes Mall #294, Walnut Creek, CA 94596; fax to 925/939-4022; or e-mail KarenTEC@aol.com. All entries must be postmarked by Monday, February 1. For more information call Karen Dunn at 925/939-6149. ■

SOUNDSTONE TEAMS WITH IOMEGA AND LIQUID AUDIO

SoundStone Entertainment, an online music retailer, announced that it has teamed up with Iomega Corporation, a high-profile maker of removable storage systems, and Liquid Audio to develop a new mechanism for consumers to download and store music securely from the Web. The new technology is designed to enable users to download copyright-protected singles from SoundStone.com onto Iomega Zip disks, then listen to the music using Liquid Audio's Liquid Music Player. The joint effort will result in the online music industry's first music-of-the-month club, Tunus Collectus™. Internet users will be able to visit Tunus Collectus at SoundStone's site and download new music singles every month, using Liquid Music Player and Iomega's Record-to-Play® encryption scheme.

SoundStone recently launched its

—CONTINUED ON PAGE 16

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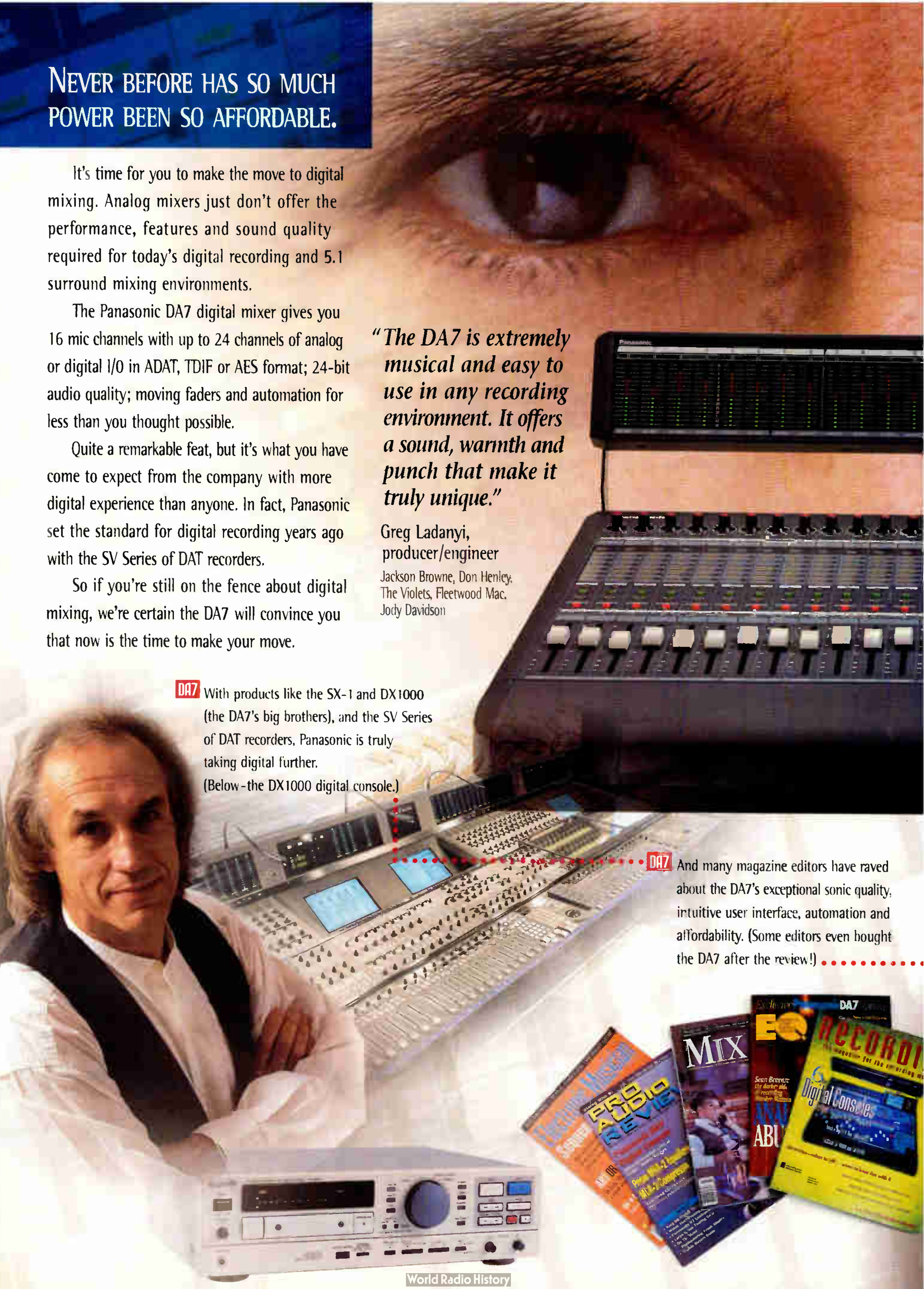

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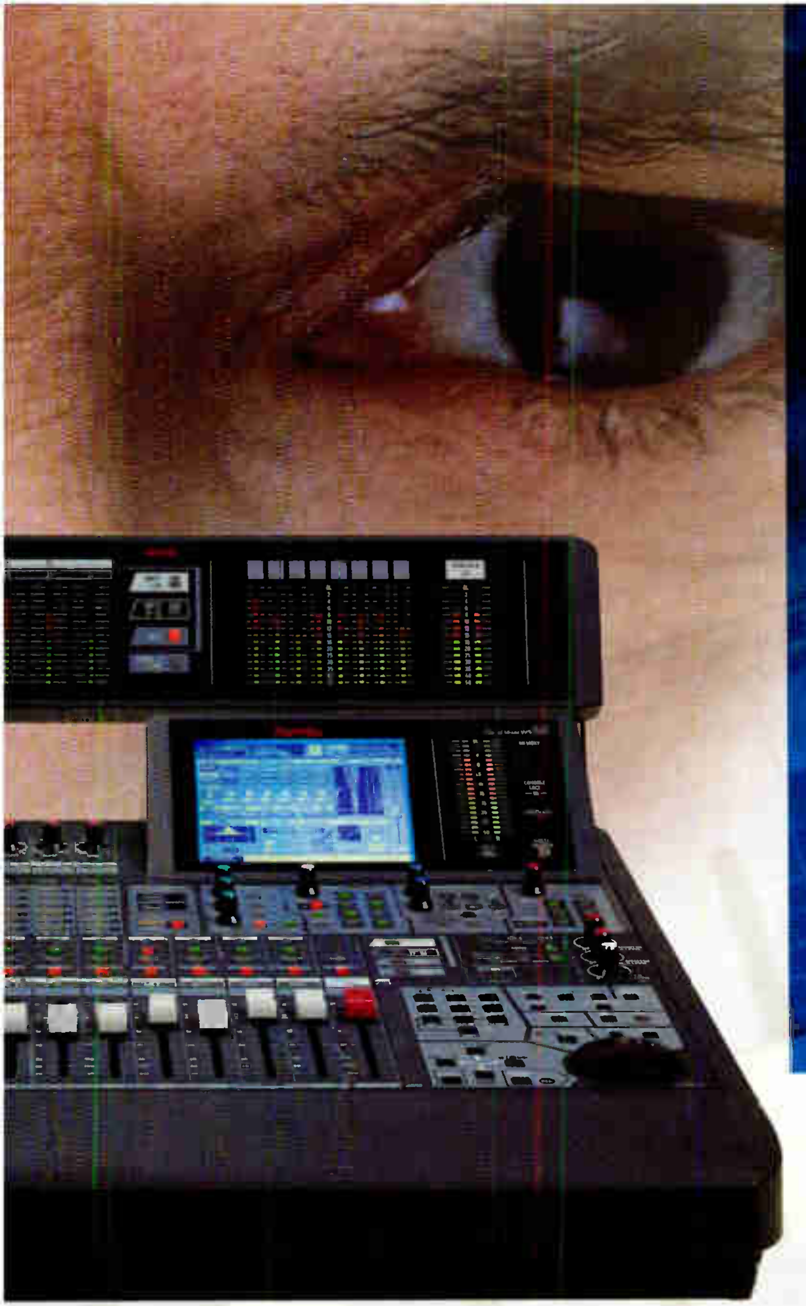

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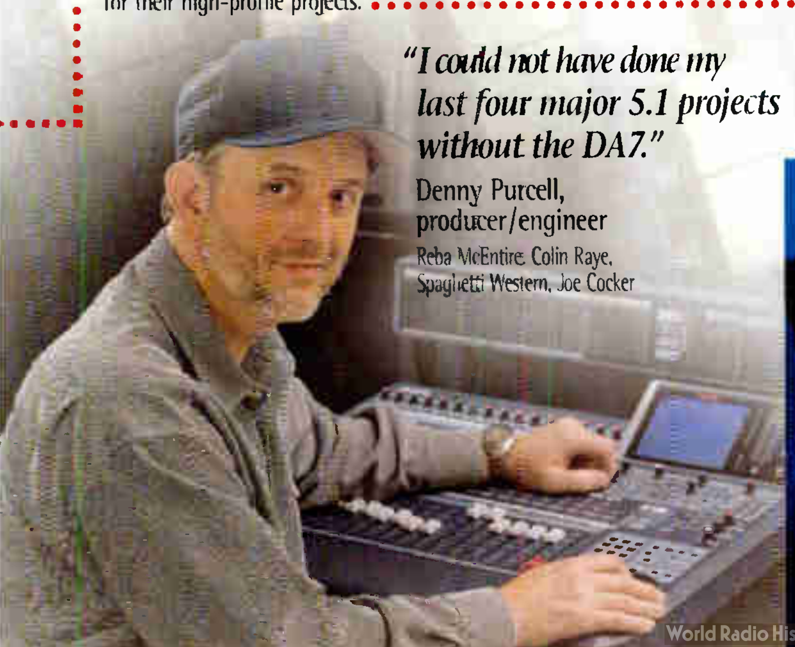

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Denny Purcell,
producer/engineer
Reba McEntire, Colin Raye, Spaghetti Western, Joe Cocker

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World Radio History

WORLD AUDIO NEWS

INDUSTRY NOTES

Solid State Logic North America news: **Brian Bair** was appointed to sales, western region; **George Horton** was appointed western region service manager. **Dave Hansen** was promoted to technical operations manager, eastern region, and **Ernie Fortunato** was promoted to eastern region service manager...Surrey, UK-based **Digital Audio Research Ltd.** announced its acquisition by **Harman Pro Group.** DAR will remain at the company's existing Chessington, UK, location and continue to operate as an autonomous division of Harman Pro...**BSS Audio** (Nashville) appointed **Joel L. Motel** as regional sales manager. Motel recently served at the Mark IV Pro Audio Group as national sales manager for the Klark-Teknik line...**Ned C. Jackson** was appointed president and CEO of **Telex Communications Inc.** (Minneapolis). Jackson recently served as VP and general manager at DuPont...The design, consulting and engineering firm of **Rosati Acoustics + Multimedia** (Boston) recently expanded its professional audio and video sales group by adding **Scott Andrus**, who will be in charge of sales and marketing...The **Berklee College of Music** (Boston) launched a publishing arm called Berklee Press, which will specialize in high-quality books, software, video and other products that help advance the careers of musicians. **David Kusek**, a 25-year music industry veteran, was tapped as director. The college also recently presented Distinguished Alumnus Awards to *Electronic Musician* Editor **Steven Oppenheimer** and *EM/Mix* contributor **Larry the O**, "in recognition of outstanding achievements in contemporary music and music technology."...**Maria Amezcua**'s recently opened public relations and strategic marketing firm, **Hyde Street Communications** (San Francisco), now represents TOA Electronics. For further info call 415/751-2602...**Nagra USA** (Nashville) announced the appointment of **Dan O'Grady** as sales and product specialist for North America...Software developer and publisher **True Audio** moved all operations from Escondido Calif. The new digs are at 387 Duncan Lane, Andersonville, TN 37705. Phone: 423/494-3388...**WaveFrame Inc.** (San Francisco) announced that it has reached an agreement with **Emu Corporate Enterprise**, a division of E-mu/Ensoniq to integrate the E-mu Post Card, a professional version of the Audio Production Suite into the WaveFrame platform as a sampling engine...**dSP** (Digital Studio Processing) announced the appointment of **Timelord International Ltd.** as the exclusive agent for Western Europe, covering the territories of Benelux, France, Portugal, Scandinavia, Spain and the UK...**Post/LA Expo**, the post-production trade show and conference that runs February 25-27 in Santa Monica, has appointed veteran journalists **Paula Parisi** and **Lorin David Kalisky** as conference directors. Kalisky will head the digital asset management portion of the conference, and Parisi will oversee all other areas...**Bag End Loudspeaker Systems** (Barrington, IL) signed a distribution agreement with **Thunnissen & Verhagen Muziekinstrumenten BV** of Rotterdam, The Netherlands, to be its exclusive distributor in Germany, France and the Netherlands...**Boynton Studio Inc.** (Morris, NY) announced the appointment of **William Scranton** as executive VP of sales and marketing and **Timothy Rendo** as executive VP of finance and operations; both have been designated part owners of the company with Roger Boynton...**Harris Corporation** (Cincinnati, OH) promoted **Cam Eicher** to manager of the Broadcast Center, the U.S. sales and telemarketing hub for the Broadcast Systems Division's line of distributed audio and studio products...**gauss-M2 Corp.** has moved to 28008 Harrison Parkway, Valencia, CA 91355. Ph: 805/775-4900. ■

—FROM PAGE 12, CURRENT

second online music retail site, www.rock.com, which is created by and for 15- to 24-year-olds and favors alt rock, alt country, electronic, hip hop, punk, metal and ska, and provides reviews, access to music trends and one-to-one interaction with music experts.

WINTER NAMM THIS MONTH

The NAMM International Music Market is coming up fast. The show takes place again at the Los Angeles Convention Center, running January 28-31. More than 1,100 exhibitors are expected. New to this year's show are two after-hours meeting places, located inside the convention center: The Talking Bull Tavern and the Rendezvous Cafe. These venues were created so attendees can extend the business day without having to leave the center as the exhibits close for the evening. For registration information, call 760/438-8001 or visit www.NAMM.com.

NEW WEB SITES

Meyer Sound (www.meyersound.com) has posted its popular Meyer Sound Design Reference Handbook, written by veteran SIM engineer Bob McCarthy.

Adamson Systems Engineering's new site at www.adamsonproaudio.com features a full online catalog, distributor information, up-to-date press releases and new product information.

ATR Service Company, a restoration and service facility for Ampex audio recorders, is on the web at www.atrservice.com. The site includes pricing on parts, restoration services, transport modifications and ATR Service's own line of custom electronics for the Ampex ATR-100 series recorders.

OSCAR-WINNING RE-RECORDING MIXER RICK DIOR DIES

Richard Dior, an Oscar-winning sound engineer who worked on *Apollo 13*, *Dead Man Walking* and over 2,000 movies and TV shows, died of a heart attack on October 26 at age 51. Dior worked for many years at Todd-AO East in New York, before opening Digital Cinema with Ken Hahn and Bill Marino of Sync Sound in 1997.

UPDATE

In our November issue, we ran an item on Robert Vosgien's mastering project at CMS Mastering. Vosgien had left CMS by the time the issue came out. He has been replaced by Ron Boustead, who recently finished up Peabo Bryson's holiday single "A Family Christmas." ■

World Radio History

PROFESSIONAL RECORDING EQUIPMENT

MANLEY

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COMPANY PROFILE: Manley Laboratories, Inc. in recent years has expanded and thrived under EveAnna Manley's leadership. Our 11,000 sq. ft. building houses our own machine-shop, printed circuit board manufacture, audio transformer winding, engraving, and silk-screening facilities. All custom design, R&D, assembly, testing, and quality control processes are performed with precision and pride at the Manley factory, located just 35 miles east of Los Angeles.

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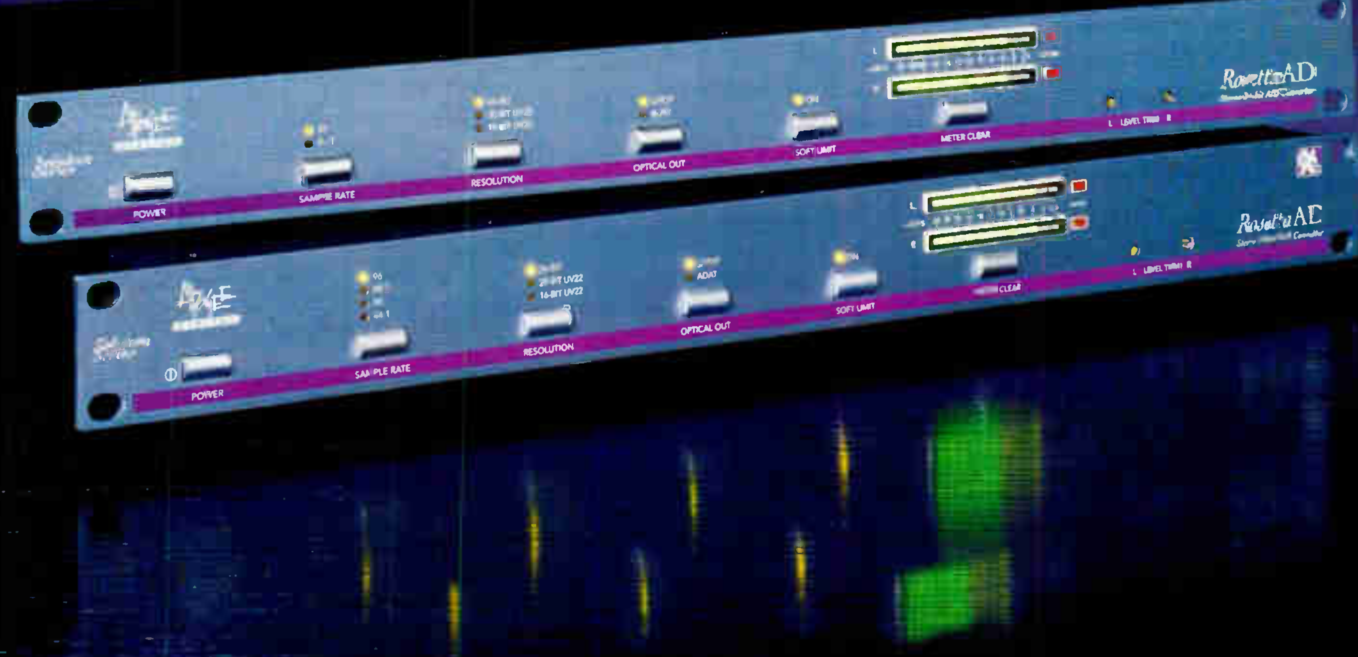

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*US SRP, 44.1/48 kHz version.

Two Parts Too Many?

PART 1 (GET IT?)—YOU AIN'T HOME FREE YET

On the few occasions when I have written two-part columns, both parts were written at one sitting, then I would realize the total was too long and split it into two parts. That generally worked well, as there was continuity. This time, however, I wrote the first part last month, and I am just sitting down (six weeks later) to finish the second part. There will not be profound style continuity, but I do remember what I wanted to say in this second installment.

Last month I spoke of the unspeakable horrors of A/D and D/A conversion. Well, as it is now six weeks later, and the art of conversion is about six weeks more advanced, or 1/9th-bit. Nothing you can hear yet, but every bit of every bit counts...kind of like saving up for a vacation—when you get enough, you get another one.

Last month I also said, "It is believed that, in the interest of keeping CPU load down to a reasonable level, the brain is most interested in *change*, and rapidly notices anything new and unusual..." Did I bother to mention that *I* am the one who believes that? I have been working with scientists for two decades to develop this theory, and serious strides have been made in this direction. It really does look like the brain puts a lower priority on stuff it has already heard, analyzed and understands. Just a bit of clarification.

And last month I mentioned, but did not elaborate on, the ridiculous belief that once it's digital, it's safe; that once analog audio has been converted to digital data, it is then immune to the plethora of horrible fates that threaten it in the analog world. *That* is what I want to attack today. Ha ha ha, ha.

INSANE, MISINFORMED, MARKETING-DRIVEN LIE #1

You can copy digital data forever, and it will not change.

I absolutely *love* this one. While it is true that one can reasonably hope for bit-accurate data copies on a hard drive when using the computer's copy commands, that's basically the end of it. Data on a disk can be accurately duplicated with no generational loss if it is copied as digital data (and you are lucky). But digital audio ain't quite so simple.

First, the obvious. Any time any lossy data compression *of any sort* has been used, the data can *never* again be trusted. This means compression, bit reduction and sample rate conversion. Remember the old discussions about how Dolby SR got weird if it was used on the multitrack master *and then* used on the 2-track mix? SR was great, but you could only use it once.

When duplicating digital audio, you can get away with... nothing.

Lossy data compression is, in my opinion, not great at all and should never be used. But, since it is used, remember that the same old analog law applies—while you might get away with it once, don't even think of trying it twice. Or better yet, *do* try it. This is the best way to learn. Take ten seconds of music, shove it through your fave lossy digital data reduction unit, save the result and repeat the cycle several times. Now listen. That'll teach ya. Copies of copies using data reduction are garbage.

When duplicating digital audio, you can get away with... *nothing*. This includes sample rate conversion; there is no such thing as a "little" bit of gearboxing.

Now, the not-quite-so obvious. When DATs first appeared, there was much talk of how they were going to save the world. Much too much talk. Endless praise about how we finally had a storage medium that would remain stable over time, a system we could trust, even rely on, for accuracy and long-term stability. How long did it take before we all learned how bogus *that* was?

DATs (and other audio data-only streaming systems) use error correction to deal with little dropouts, remember? Now, this wouldn't be a problem if that was all they really did—*correct* the errors. But while DAT players do recover redundant interleaved data to actually correct tiny errors when possible, they will in fact happily go on and synthesize, or make up, replacement data when they feel the need to do so. DAT machines reconstruct your music using interpolation (they take a guess), without notifying you, whenever they feel the need. And why do we care? Because they feel the need quite often!

Early DAT machines, and early tapes, were pretty horrible and would cross over the acceptable line from reconstruction to making-it-up-as-they-go-along quite often, like maybe every two or three seconds on a tape that had seen just ten plays! Some of the first pro DAT machines had error rates display modes that would show when errors were successfully recovered, and even show when the machines were guessing and altering your music. This stopped pretty fast, however, because these displays of just how unreliable DATs were became quite alarming to many.

Both machines and media have

—CONTINUED ON PAGE 209

BY STEPHEN ST.CROIX

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CIRCLE #011 ON PRODUCT INFO CARD

Speaking Out on Upgrades

NOTES FROM STUDIOPRO98

Dan Caccavo, Zoe Thrall, Tim Leitner, Blue Wilding, Laura Tyson, Bob Reardon, Robert Miller

PHOTOS: GEORGE KANATOUS

Last month in this column I started yet another discussion on the myriad dangers facing studio owners from the constant pressure to upgrade gear, both hardware and software. This problem has been getting a lot of attention lately, and it was the topic of an entertaining and enlightening panel (which I had the pleasure of moderating) at *Mix*'s StudioPro98 conference in New York City, held last June. This month I'm going to focus on what the folks on the panel had to say.

The session could easily have been a gripe-fest for studio owners and engineers, but I wanted other sides to get their licks in as well. Manufacturers, if they want to stay in business, are taking this issue pretty seriously. They're caught in a similar sort of bind as studio owners: On the one hand, if their products have a reputation for becoming obsolete in short order, they will lose sales; but on the other hand, it's impossible, no matter how much upgradeability they try to build into a product, to keep it on the leading edge forever. On yet another hand (hey, I'm a writer—I can do things like create people with three hands!), if they make their products *too* upgradeable, they'll saturate their markets, and sales of new products will fall off.

Like computer software manufacturers, a lot of audio companies are finding themselves in the "subscription" business as well as (or even instead of) the "black box" business. The ratio between the amount of support that sort of enterprise demands and its revenues can be quite a shock to a company that previously only had to worry about how many hardware units got out the door each month. So I invited several manufacturers to sit on the panel and present their cases.

Retailers, too, are part of the upgrade equation and can help customers with loan, rental, leasing or trade-in programs that can soften the blow should an expensive piece of gear prove obsolete, inappropriate or simply unfashionable. Dealers can also, if they are taking their job seriously, do a lot to facilitate communication between manufacturers and end-users.

BY PAUL D. LEHRMAN

The panelists from the manufacturing side were Bob Reardon, director of product development for desktop products at Lexicon, a longtime studio owner himself, as well as an experienced post-production engineer and friend over the years; Laura Tyson, regional sales manager for Roland; and Robert Miller, Northeast regional post-production specialist for Digidesign. The retail segment was represented by Blue Wilding from Dale Pro Audio in New York. To represent working studios, I was pleased to get Zoe Thrall, president of Avatar (formerly Power Station), from the record side; Tim Leitner, chief engineer at a New York boutique house McHale Barone, from the advertising side; and Danny Caccavo, staff engineer at Sync

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Keith Thomas – Grammy winning, multi-platinum, cross-genre producer

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World Radio History

CIRCLE #016 ON PRODUCT INFO CARD

Sound, who also owned his own shop for a long time and is an old friend, from the high-end post side.

Leitner, like most of us who pay the bills, sees the major problem as being able to strike a balance between being current and staying solvent. "We are dedicated to keeping our three main studios on the cutting edge," he said, "from 24-bit digital recording to using LCD screens rather than CRTs, and even 5.1 mixing in one room. Fortunately, even though these advancements come at a cost, what we are capable of accomplishing today greatly exceeds what we could do just a few years ago, and at a much lower cost. But since we have such a large investment in hardware, and because our business has been growing so quickly, we have chosen to keep our older systems in use and relegate them to less important rooms, where they are still functioning, if a little less efficiently than the newer systems."

Caccavo spoke about the pressures on a facility to upgrade: "I have found that, especially in the DAW community, many users are driven to upgrade merely because of 'fast and cool' factors. When presented with the 'latest and greatest,' many of us fall prey to our own gear-lust rather than using more appropriate factors to make a decision.

"The first thing you need to ask yourself when presented with an upgrade decision is: Will this upgrade ultimately make me more money?" he continued. "If I buy this upgrade, which will allow me to finish the job faster, can I raise my studio rates? Because if I can't, then I could end up making *less* revenue on each job. You really have to walk the line on this one. You don't want to be perceived as a taxi driver who overcharges by taking someone to LaGuardia by way of Kennedy, but you also don't want to work so quickly that you cut down too much on your billable hours—unless you increase your rates. And in the current cut-rate climate, this may not be easy."

Thrall talked about her struggles with adopting new formats: "At Avatar, I was dragged kicking and screaming into adding ADATs and DA-88s. I used to argue that these were not professional products, and they have no place in a state-of-the-art facility, but almost every day I have a client who is using one of those formats, and almost every major engineer and producer who's worked at Avatar has at some point had to rent one of them. I can't ignore numbers like that.

"The most important thing in making these purchasing decisions is to know who your clients are and to be aware of how your facility fits into the audio industry within your city," she continued. "A studio's business is driven by its clientele. Listen to them. Ask them questions about their needs, and evaluate them. If you find yourself continually renting a piece of equipment, it may be time to purchase it. On the other hand, renting new technology lets you see if radical changes are going to take place that will render it obsolete, and if that happens, you don't lose a large investment. Also, if you can establish a relationship with one or two local retailers, sometimes they will let you try something out for a week to see if your staff and the clients like it.

> **The most important thing in making these purchasing decisions is to know who your clients are and to be aware of how your facility fits into the audio industry within your city.**
>
> ***—Zoe Thrall***

Caccavo formulated a few useful questions that studios can ask themselves before committing to an upgrade: "Will it attract new clientele?" he asked. "Will your current clients even notice it if you don't tell them about it? Will they just think I'm showing off if I *do* tell them about it? Most of my clients are lukewarm on the idea of new stuff in the room. Their first reaction is usually, 'Does it crash a lot?' So I stopped telling them about it. When I went to a DAW-based system, for me it was really cool to eliminate the console, but most clients actually felt more nervous about the lack of tactile controls.

"Are you upgrading because of real competition," he asked, "or just because you want yours to be bigger than theirs? It is easy to be seduced by the latest MacWarehouse catalog or the latest postcard upgrade offer. After all, companies offer you upgrades because they *want* you to upgrade, not out of the kindness of their hearts.

"Whom are you really trying to please with this upgrade? The client, or yourself? If it's you, it doesn't necessarily mean you *shouldn't* do it. You might draw a parallel between your getting an upgrade and a guitar player getting a new amplifier that produces a tone that's more pleasing to him. Just as a better sound may inspire a better performance from that guitar player, a faster and cooler DAW may inspire a better 'performance' from you, the engineer.

"Of course," he added, "this may be complete bullshit, but hey, it's a great rationalization, isn't it?"

Thrall had some further words for manufacturers: "One thing they all tell us is that, 'If you purchase my product, your rate can increase by *x*.' That's usually a bunch of nonsense. When a manufacturer is talking to a studio, they should ask us about the sessions that take place there. If they know more about our business, it will be easier to sell us something—even to sell us something we hadn't considered. Doing your homework can pay off."

Leitner also spoke to the manufacturers: "From my experience, the companies that I have been dealing with have done a fairly good job of providing reasonable upgrade paths. My biggest complaint with manufacturers is really a matter of timing. Sometimes the desire to announce a new product with the latest and greatest features precedes actual shipping product by several months, if not longer. I don't want to buy and install buggy hardware or software, but neither do I want to make purchasing plans based on vaporware. I think that manufacturers need to act a bit more responsibly in this area."

From the hardware-makers' point of view, Lexicon's Reardon had this to say about his company's philosophy on making its products upgradeable: "Longevity and upgradeability are of concern during the design phase of all our products, and they're part of our 'value equation.' But that typically makes the products cost more initially. Achieving the correct balance between user expectations and technological and financial realities is a challenge. Our industry has plenty of examples of artistic and technological successes that

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were business failures—anyone remember ARP?"

Reardon thinks that issues of upgradeability are largely determined by forces outside of individual companies: "What is increasingly important is the adoption of standards," he said. "This will help more than anything to keep equipment from becoming obsolete. However, standards are increasingly driven from outside our industry. This makes the collaboration between users, professional organizations and manufacturers—to propose and develop achievable standards in a timely fashion—very important."

Roland's Laura Tyson talked about the difference between "hardware" upgrades and "software" upgrades. "If you buy a hardware-based digital workstation, are you stuck with the product exactly as it is the first day you take it out of the box?" she asked. "No. Many people perceive hardware-based recording systems to be closed-ended, and this is simply not true anymore. And thanks to the Internet, manufacturers now have a fast and easy method to distribute software upgrades to customers. Internet-based user groups help spread the word, so now it's impossible for a manufacturer to keep information about upgrades a secret, even if they wanted to."

Switching gears, she offered a blunt word of warning to her fellow manufacturers: "There used to be something called 'Customer Loyalty,' but now that's an oxymoron. Manufacturers cannot assume a customer will be loyal to a specific brand name. Each and every product a manufacturer builds must be well-designed, and desirable on its own, without relying on customer loyalty to boost sales. Sure, brand-name recognition will get you a long way, but if the product is poorly designed, it won't be successful."

Since the panel went on for an hour-and-a-half, obviously much more was said, but this will give you a taste of how these people see the issues. I'll give Danny Caccavo the last word: "Sometimes I'll listen to something I did ten years ago and be surprised at the quality and creativity I achieved without any DAWs at all. It's a sobering thought." Indeed it is.

Next month, a personal account of a trip to Upgrade Hell... ■

Paul D. Lehrman, editorial director of Mix's Web site, www.mixonline.com, is still using his original system software.

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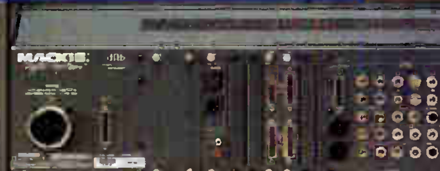
Greg Mackie, Founder



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THE MIX INTERVIEW

PRODUCER CHRIS THOMAS

THREE DECADES ON THE CUTTING EDGE AND THE CHARTS

There are more *famous* producers than Chris Thomas, but few, if any, can match his incredible string of artistic and commercial successes since he broke into the English recording scene in the late '60s. For three decades he's worked with some of the most exciting and influential groups and singers in rock music, selling untold millions of records. Here's a hopelessly abbreviated list of some of the artists he's worked with: The Beatles (*The White Album*); Climax Blues Band (four albums); Procol Harum (five albums, including *Home*, *Broken Barricades* and *Grand Hotel*); Roxy Music (five albums, from *For Your Pleasure* through *Viva*); John Cale (*Paris 1919*); Badfinger (three albums); Pink Floyd (mixed *Dark Side of the Moon*); Paul McCartney (*Back to the Egg*); Sex Pistols (*Never Mind the Bollocks*); The Pretenders (first three albums); Tom Robinson (*Power in the Darkness*); Pete Townshend (*Empty Glass* and *All the Best Cowboys Have Chinese Eyes*); INXS (*Listen Like Thieves*, *Kick* and *X*); Elton John (a dozen albums, including *Too Low for Zero, Sleeping With the Past* and *The One*); and Pulp (*Different Class* and *This Is Hard Core*).

The reason you don't hear more about Thomas is that, unlike many producers, he has no interest in self-promotion and he doesn't like to do interviews; he kindly acceded to our request mostly because he's a longtime chum of *Mix* technical editor Chris Michie. When Thomas came to the Bay Area this summer to see The Pretenders perform, he graciously stopped by *Mix*'s offices for an extensive interview, highlights of which appear below. Other nuggets from our talk will doubtless turn up in our "Classic Tracks" column down the road.

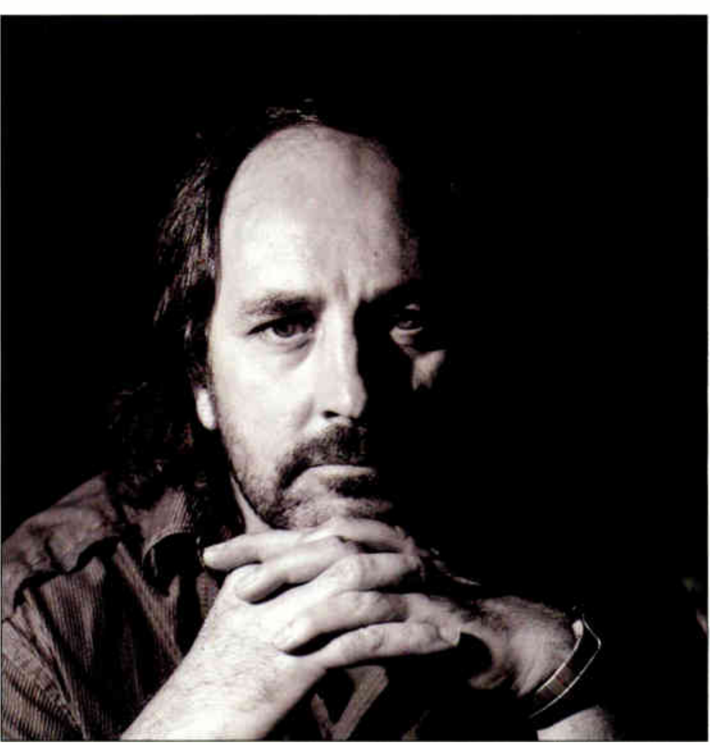

PHOTO MARK DOUET

BY BLAIR JACKSON

Did you come up in the recording world the conventional way—musician, tape op, tea boy, whatever?

Not really, no. I had been a musician, but really how all this came about was in 1965 I wrote to George Martin and asked him if he could give me any advice, and he gave me an interview at EMI. Then I went to see his managing director, because George was only an employee at EMI at the time.

What was in your mind at the time?

To be a producer, or an A&R man as it was called in those days. But I didn't want to fiddle around working my way to the top. I wanted to do it straight away. [Laughs]

What experiences did you have that made you qualified for that?

None, really. As a musician, I'd had an exhibition at the Royal Academy of Music when I was a kid. I played the violin, and I studied piano as a second subject there; actually, I enjoyed that more than the violin.

How did you get into pop music from that world?

I discovered Buddy Holly and fell in love with his records. I saw a photograph of him and realized that when I did the same [fingering] on the guitar, that he was playing D. So my life started to change from there. After playing the violin, I found the tuning of the guitar a bit confusing, so I went to the bass guitar, which was a complete cop-out, but very easy for me to play—it took about three minutes to get down the basics. Then The Beatles came out and completely blew me away. I remember the first time "Love Me Do" was played on Radio Luxembourg and you just knew it was going to change your life. So I got really hooked.

From there I started playing in bands, started writing. Pete Townshend wrote a song for one of the bands I had.

That was an exciting time to be getting into rock 'n' roll.

Yes, and there was a lot going on

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in that area, around Ealing. Before The Who were The Who, they were the High Numbers. And before that they were The Detours. The Stones were playing down the road. The English Birds, with Ronnie Wood, were around. Jim Marshall [of Marshall amps fame] was the local shop. I used to know Mitch Mitchell. Georgie Fame & the Blue Flames had been disbanded, and one day Mitch came up to me and said, "You play bass don't you?" I said, "Yeah." He said, "I'm going to Germany to rehearse with this American guy who plays guitar behind his back and with his teeth and stuff." I thought this guitar player must be some kind of exhibitionist, so I said, "Thank you very much, I'll stay here." Then a few months later I was watching *Ready Steady Go!* and there was Jimi Hendrix doing "Hey Joe" with Mitch on drums. I thought, "Oh Christ!" [Laughs]

By now you could have written a book about how you were underpaid!

Or I could be dead. [Laughs]

Anyway, getting back to your question about how I got into all this, [back in 1965] George Martin told me to speak to the managing director [of EMI], and of course I didn't, so I let the whole thing go for about three years. Then, at the end of 1967 I thought, "Oh-oh, I'm getting nowhere here." I realized that being in a band you were dependent on all these other people, and I also knew that if I'd ever been successful in a band, I would've wanted to stay in the studio and just make the records; I wasn't that interested in playing live.

So I contacted George Martin again. By this time he was at AIR London, before AIR Studios; when it was a production company. And I wrote him a letter saying, "I hope you remember me," and I explained what happened at EMI and he gave me advice again. I had another interview with George Martin, and then he fixed up for me to be interviewed by John Burgess and Ron Richards, and they put me on six months trial [employment]. That was obviously tea-boy, messenger boy, anything that was around to do. Basically they said, "Hang around. Come down to any session you like." So I went down to Hollies sessions with Ron Richards, and that was fun.

I'd been at AIR for two or three months when The Beatles started the *White Album*, so I asked George [Martin] if I could come down to those sessions and he said yes, so I sat in the corner for a couple of months.

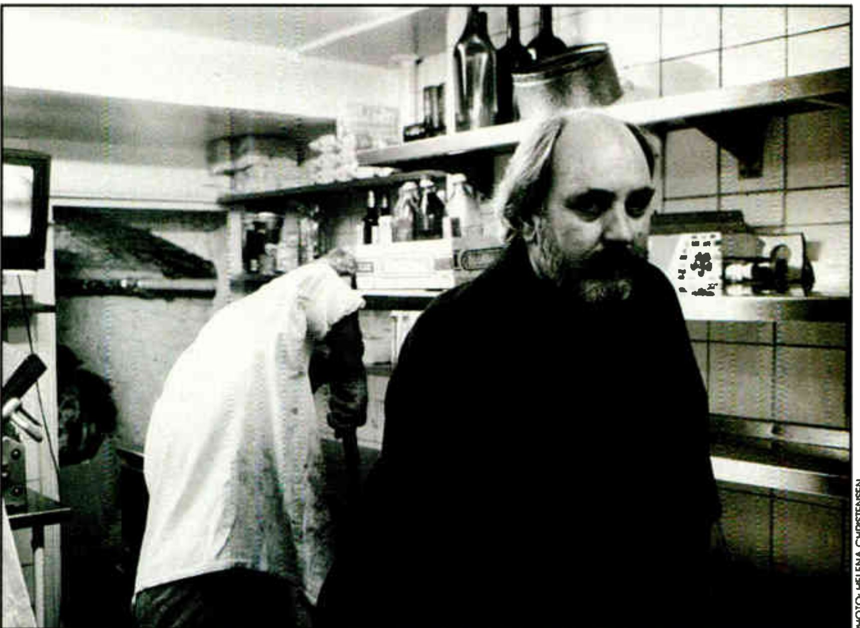
PHOTO: HELENA CHRISTENSEN

How did it strike you? Most famous band in the world...

Exactly. It was ridiculous. Obviously, I was extremely nervous around them at first. But not as nervous as I was about three-and-a-half months later when George went on holiday. I had just come back from holiday myself, and when I came in there was a little letter on the desk that said, "Dear Chris, Hope you had a nice holiday. I'm off on mine now. Make yourself available to The Beatles. Neil and Mal know you're coming down."

So I went down to the studio and didn't really know what to expect because I'd only been observing up to that point. I was scared stiff and couldn't speak for hours! Ken Scott was engineering. He was 21, I was 22. The tape op was probably 20. Here we were with the biggest band on the planet. But The Beatles completely ignored me, and I got quite worried. Then they had a little break after three or four hours and they were chatting about Apple, which was new then, and I was wandering around downstairs and I heard John [Lennon] say, "He's not really doing his job is he?" and I immediately took that to be about me. I thought, "This is it." I figured my whole career had about four hours left and then I'd get the bullet. George Martin would give me the bullet, and that would be the end of it.

So I went back upstairs and they started again and they were doing a take and somebody made a mistake, so I pressed the button to interrupt them to say, "Try again." And in that studio the interruption was a klaxon [horn]—this huge RRRRAWWWWK! [Laughs] And they didn't hear the mistake, so they came up to the control room to have a listen. And I thought, "God, if I've hallucinated this I'm in real trouble!" But they heard it, and then they went back downstairs and started again.

A producer is born!

[Laughs] Well, I had nothing to lose because I thought at that point the door was open and I was being yanked out of it. So I said it and did it and at the end of the evening, maybe 12 hours later, they were leaving and I said to Paul, "What happens tomorrow? Should I come down tomorrow?" And he said, "Yeah, if you want." He didn't say no! Whew. And I collapsed in a heap.

So I stayed there for about three weeks and we did quite a few songs, actually. Up until then the progress had been going very, very slowly, but we managed to knock out about half a dozen songs in that period: "Happiness Is a Warm Gun," "Piggies," which I actually got to play on—I played the harpsichord. I stayed on the album right through to the very end, and towards the end things really accelerated to the point where one night we used all three studios at Abbey Road. John was working with George Martin on "Revolution #9," I was working with George Harrison on "Savoy Truffle" in Number 2, and Paul went into Number 1 and did "Why Don't We Do It in the Road" on his own.

I've never really said I "produced" The Beatles, because that's being ridiculously presumptuous. But I did help on that record, and I played on a few songs. I've been very fortunate in the sense of having ridiculous fantasies come true—for instance, playing live

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[mellotron] with the other four Beatles on "Bungalow Bill" with George Martin up there producing. Incredible!

What was the first album you produced from beginning to end?

The Climax Chicago Blues Band, which we did at Abbey Road in two days. They were quite good. Their guitarist, Pete Haycock, was *really* good. He does a lot of work with Hans Zimmer now. He lives in Germany and works on Zimmer's soundtracks. But when it came to work with Climax Blues Band, I realized that technically I knew almost nothing, so it was very hard to utilize any of the things that The Beatles had learned—how to use compression, the whole technical alphabet really.

The real breakthrough for me, though, was with Procol Harum. They wanted to work with somebody new rather than somebody established. And [keyboardist/leader] Gary Brooker had been in The Paramounts, which was produced by Ron Richards, and he heard about me and asked me to do it. I was very nervous about this, because *Salty Dog* was the previous album, and that is an absolute classic record. The first record I worked with them on was *Home.*

It was quite funny: They were talking about how they'd been ripped off and didn't have any money. So I thought, "Well, I'll record them in stereo and that will be much cheaper than using 8-track." So the first thing we did was "Whiskey Train," and they came in to listen to it and Robin Trower said, "Can you put my guitar up a bit louder?" And I said, "No." He said "What do you mean 'No?'" I said, "It's on 2-track!"

You hadn't consulted the band?

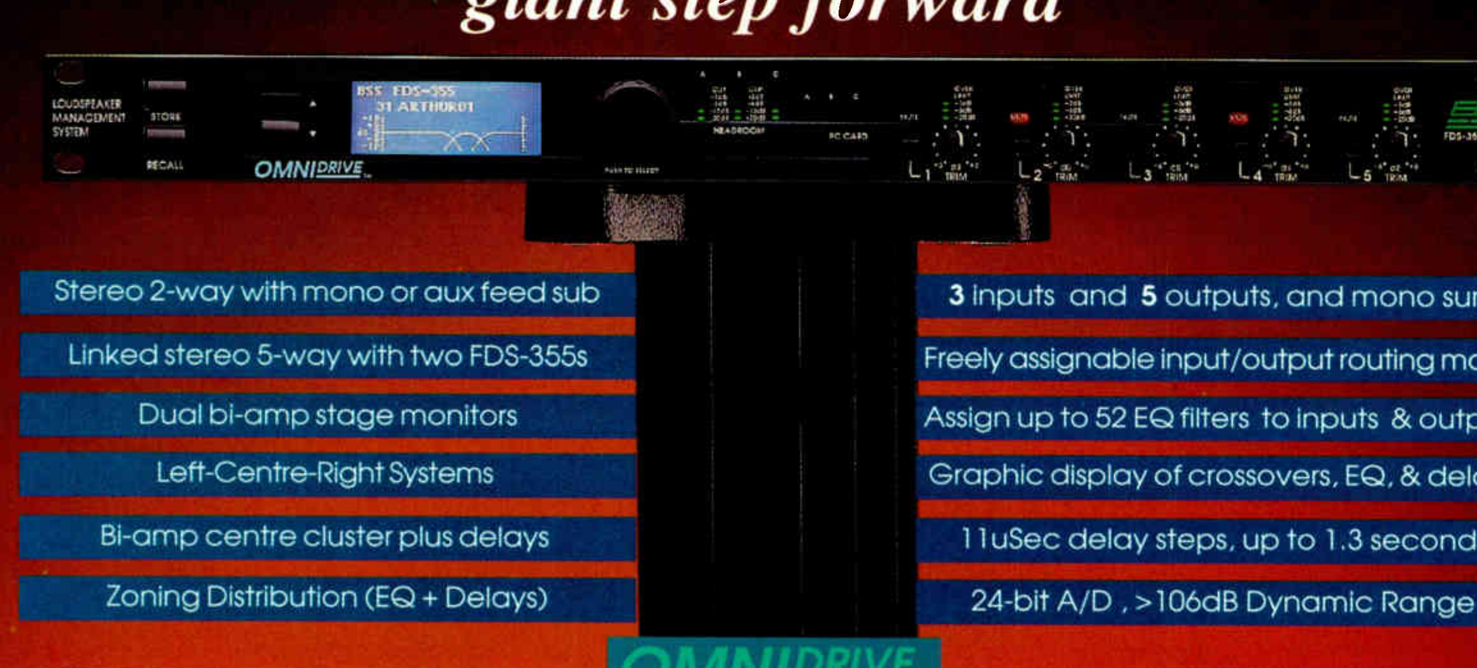
No. [Laughs] So, that's what's on the record; it's maybe the second take. After that we went to 8-track.

But here's another example of one thing leading to another. I did the live album with them and the Edmonton Symphony Orchestra, and John Cale heard what I did. He'd done an album with an orchestra and he liked that, so he contacted me about producing *1919.* Roxy Music, after their first album, contacted John Cale to produce them and they said, "Which studio would you like to produce us in?" And John said AIR Studios. Well, I was doing some stuff at AIR with Procol when Bryan Ferry came by to look at the studio. I met him, then the thing with John blew out, so Bryan asked me to produce them.

Now there was a band that had a strong frontman in Bryan Ferry, but also assertive and original musicians such as Phil Manzanera and Andy Mackay. How in control was Bryan at Roxy sessions?

Totally. Well, maybe not totally in control. He *tried* to be totally in control. But for instance, when we did *Stranded* [1973], the way we worked mostly was first we just put down backing tracks of keyboards, bass and drums. "What's this one called?" "Number 3." "Oh, okay, that's inspirational!" Half the time there were no lyrics written for these songs. Then, Phil would go in and put guitar parts down, and that actually was the point for me where the songs would turn into something. Then we'd build up these backing tracks to flesh it out, and that was always tremendous fun. Then Bryan would come in at the end and put his vocals on.

That seems like a real '70s way of working. It was that way in America, too, with a lot of bands—the lead vocal being put on the last day of the sessions as the record company awaited delivery of the record...



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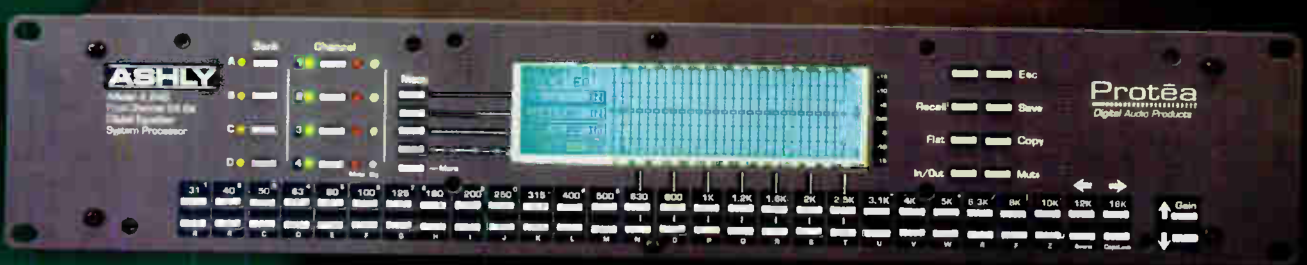

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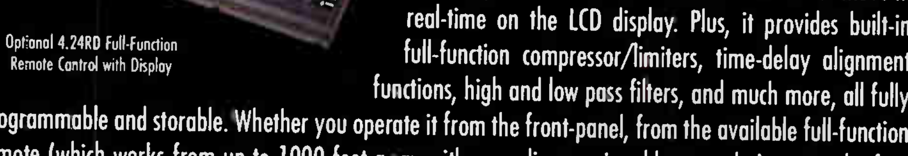

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That's right. Of course, until you have the vocal, you usually don't have the full melody there, so it's difficult to make everything else sympathetic to what the song's going to be. So it made it a little hit-and-miss sometimes.

Did Bryan always write the lyrics?

Oh yeah. He did all the lyrics. And the lyrics he was writing on those first albums were just outrageous—they were fantastic.

What do you get from working with a band for five or six albums in a row like you did with Roxy? Obviously something happens after the first album you do with a group that makes them want to work with you again...

From my standpoint, the reason I'd want to keep working with an artist is because I think I can still make a good record with them. That's the only reason to do it in the first place, so if that applies on record five, then you do record five, and if it doesn't, and it seems like it's going to be a waste of time, then you don't.

I would be remiss if I didn't ask you about mixing Pink Floyd's* Dark Side of the Moon. *Were all four of the Floyds involved in the mix, or was it mostly Roger Waters?

No, it was all of them. They were all there all the time because we were recording and adding things at the same time we were mixing. And contrary to some things I've read in the last ten years, there was a very nice atmosphere in the studio. They were funny, witty people to be around, and it was very productive.

At that time I had just done John

Cale and I was working on *Grand Hotel* [Procol Harum] at the same time. What I used to do was, after I finished working on *Dark Side of the Moon* at midnight—because they never used to work past midnight—I used to go down to AIR Studios and add more stuff to *Grand Hotel* and leave AIR at about 5 o'clock in the morning.

That sounds confusing, not to mention tiring.

Sometimes I'd even go to the wrong studio by accident! [Laughs]

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simultaneously, do they influence each other?

They're bound to. In a subtle way. I mean you're not going to put a horn part on the wrong record hopefully!

Are you surprised by the staying power of the Floyd record?

Yeah, 'cause I didn't like it when I finished it. [Laughs] The album before that was *Meddle*, which had "Echoes" on it, and I had hoped they were going to get into something like that, but *Dark Side* was just a bunch of songs. And bunches of songs are what I always did, so I thought, "Great—Pink Floyd. I'll get to do something strange and out of the ordinary." But that wasn't really the case.

How did you make the transition into producing new wave bands in the mid-'70s? At the time there was a real sense of these bands trying to break from the past, yet here you were—you'd worked with Procol Harum and Badfinger and bands who were definitely part of the old guard.

It wasn't a transition for me. It was all just music to me. I mean, when I first heard the Sex Pistols' demos that they brought to me, I thought, "This has the potential to be the best English rock band since The Who. It's a three-piece again—guitar, bass and drums."

After I finished working on *Dark Side of the Moon* at midnight, I used to go down to AIR Studios and add more stuff to *Grand Hotel* until about 5 in the morning.

Do you recall why they approached you?

I'd met Malcolm McLaren, and he was toying with the idea of managing the New York Dolls and first he asked me to produce them. Nothing came of that, but his next thing was he found the Sex Pistols; they tried working with Dave Goodman and it didn't work out for some reason, so Malcolm asked me. I said, "Let's have a listen," and I loved the demos. Then they sent the band around. Actually, John [Rotten/Lydon] wasn't invited, but the other three came out and I said, "Why me?" And Steve [Jones] and Paul [Cook] both liked a record I'd made with Ian Dury when he was in this band Kilburn & the High Roads, a thing called "Rough Kids."

The first single was "Anarchy in the UK," which made quite an impression...

"Anarchy" has something like a dozen guitars on it; I sort of orchestrated it, double-tracking some bits and separating the parts and adding them, et cetera.

It sounded so raw I think at the time I

—CONTINUED ON PAGE 210

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Hollywood VAULTS

Cold Storage For Hot Masters

by Philip De Lancie

It's clear from the recent history of the entertainment business that the public's appetite for the past is no less voracious than its craving for the new. This is obvious not just from the recent spate of movies based on the TV fare of yesteryear, or the theatrical re-release of classics such as *The Wizard of Oz* and *Touch of Evil*. Consider also the tremendous boom the music industry has enjoyed by reissuing yesterday's records as today's CDs, and the home video industry's lucrative trade in movies long since gone from theater screens. And even in "new media," where the mantra "content is king" has mercifully faded from overuse, the marketability of existing entertainment assets remains unquestioned.

Unfortunately, just as the economic value of existing content is now taken for granted, so too is the notion that the material will always be around, ready and waiting for reuse. Yet much of this material—prized by some for its profit potential and others as cultural history—has already exceeded all reasonable expectations for the longevity of its original medium. In the early days of audio tape, for instance, the emphasis was on achieving acceptable performance rather than preserving posterity, and few could predict the long-term interactions of the component materials used. Many original recordings have survived remarkably well, but countless others are either partially compromised or permanently damaged.

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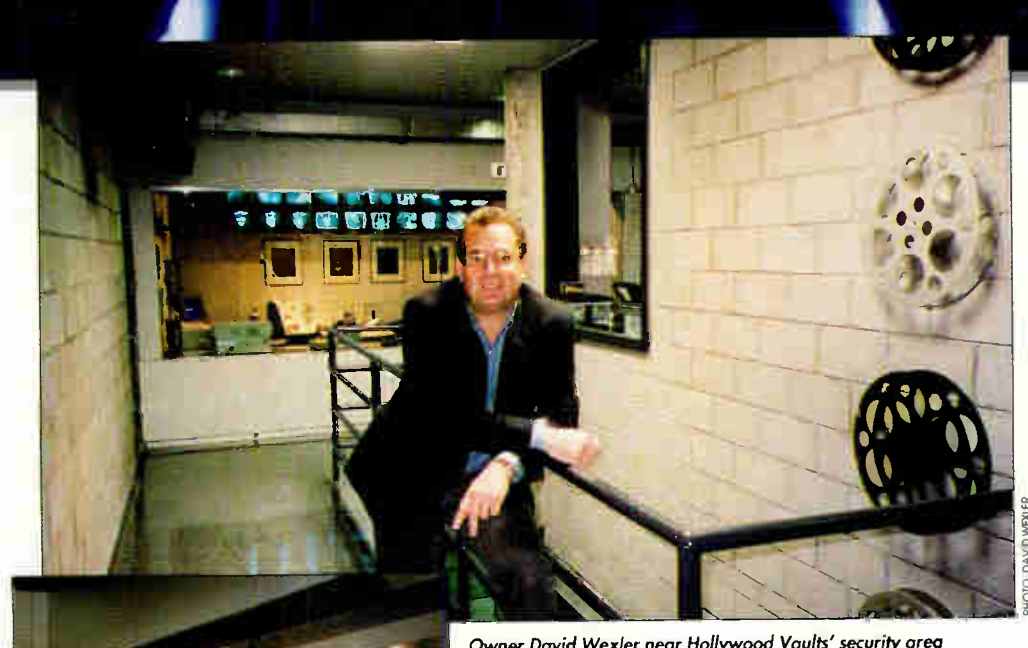

PHOTO: DAVID WEXLER

Owner David Wexler near Hollywood Vaults' security area

PHOTO: TOM BONNER

Cryogenic freezer units are available for cold storage of film and negatives.

PHOTO: TOM BONNER

The sealed entrance to the storage area safeguards against contaminants.

The solution to the preservation problem is two-fold: transfer older tapes to new stock—hopefully in a transparent, high-fidelity format—while at the same time stabilizing the condition of original masters through proper storage techniques. The fundamentals of retarding deterioration are well-established, though frequently overlooked. Oozing splices are replaced, hopefully before they stick to and tear off adjacent layers of oxide. The tapes are packed off tails-out with a smooth, even wind. And the masters are stored in a stable environment of cool, dry and clean air.

The storage step is the one that concerns us here. Whatever their merits as centers of recording activity, cities like New York, Los Angeles and Nashville are rarely thought of for their archival-quality air. In fact, it is doubtful that the climate of any spot on Earth meets year-round the ideal of low temperature and low humidity. So storing precious masters down in the cellar, up in the attic or under the bed—or even in a typical air-conditioned office environment—is not recommended. Nor is a locker down at the local self-store. The best place for masters is in a facility specifically climate-controlled with long-term storage in mind.

MASTER CONTROL

The major labels are no doubt aware of the preferred storage conditions for their tapes; the extent to

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which each has acted on this awareness varies according to its wisdom and resources. But what of the vast and varied collections of tapes that are in individual hands, or that sit in recording studio storage rooms, forgotten soon after the album is released? With more and more artists retaining or regaining control of their masters, the need for facilities to preserve those masters for the long haul is growing.

The trend toward greater artist and producer control has worked out well for David Wexler, owner of Hollywood Vaults, a storage facility he designed from the ground up for long-term preservation of film (photographic and motion picture) and tape (audio and video). The music industry in general may be less educated about the need for proper storage than the film and video industries, where, Wexler says, "the need for appropriate storage is a given." Even so, he estimates that about 50% of his business is now music industry-related.

Wexler started Hollywood Vaults in 1985, after an initial foray into filmmaking left him looking for a more entrepreneurial outlet for his talents. Over the years he has acquired a broad array of professional affiliations in his field, ranging from SPARS, SMPTE, American Film Institute, Technology Council of the Motion Picture-Television Industry, Society for the Preservation of Film Music and Association for Recorded Sound Collections on the one hand, to Society of American Archivists, Material Handling & Management Society, Self-Service Storage Association and American Society for Industrial Security on the other. In addition to operating Hollywood Vaults, Wexler is a design consultant to clients such as Walt Disney Studios, Paramount Pictures, Sony Studios, Technicolor Film Laboratory, CORBIS, Eastman Kodak Co., Steven Spielberg Foundation and Pearl Jam.

Because confidentiality is one of the fundamentals of Wexler's trade, the names of Hollywood Vaults' own clients are not publicly divulged. But a recent tour of the facility confirmed that they include some of this century's top names in entertainment (or their estates). In one vault you can see master tapes of albums by Platinum-selling recording artists, in another stacks of photo boxes containing images of some of our era's most important political and social figures, and in a third reels of film from early movie comedy pioneers. To emphasize his clients' stature without revealing their identities, Wexler has figured out that between them they have received more than 200 Oscars, Grammys and Emmys.

Access to the five main vault rooms, which are filled with high-density shelving units.

"Our record industry clients," Wexler says, "tend to be artists and producers who like to keep on top of their masters, to keep track of their own media assets. The labels should keep their collections in conditions like this, but often they don't. So it tends to be individuals who really care about their original materials. And producers are very often the ones that are in the best position to gather everything together, prepare it for storage, and make sure it gets put in an appropriate place." Wexler says he is working with the Music Producers Guild of the Americas to spread the word about tape preservation technologies.

Hollywood Vaults is obviously not the only facility catering to the storage needs of the entertainment industry. But Wexler is eager to point out some of the differences in approach between his facility and those of many of his competitors. "Most of the other places are not purely storage operations, but also delivery services. You call them up when you need a particular item, and if they are open, they bring it over to you. If not, you have to wait. And the materials themselves are generally stored in large, open warehouses. Everybody's stuff is all together, which can raise some concerns about security."

Wexler decided to take a different approach, based on the self-storage model but with an environment tailored for film, tape, photos and digital media. Hollywood Vaults offers no pickup or delivery services. Instead, each client has 24-hour access to a storage area containing only their personal materials. And while Hollywood Vaults can provide information and put clients in touch with professional archivists or librarians, the company does not directly aid clients in organizing or preparing their materials for storage.

PHOTO: TOM BONNER

WEXLER'S WORLD

What is most interesting about Hollywood Vaults as a potential model for record industry storage facilities is the building itself and the environment Wexler has created within it. The purpose-built structure on a quiet Hollywood side street was at capacity within two years of opening, leading him to undertake an expansion, completed in 1997. The addition maxed out the current site at 13,500 square feet, and left the $4 million facility about 70% full.

It is evident from the moment one arrives on the premises that Wexler has thought out every detail. Primary access to the building is through a secure ground-floor parking area where clients can load and unload materials at their leisure; a compressed air hose hangs nearby for blasting dust off of boxes be-

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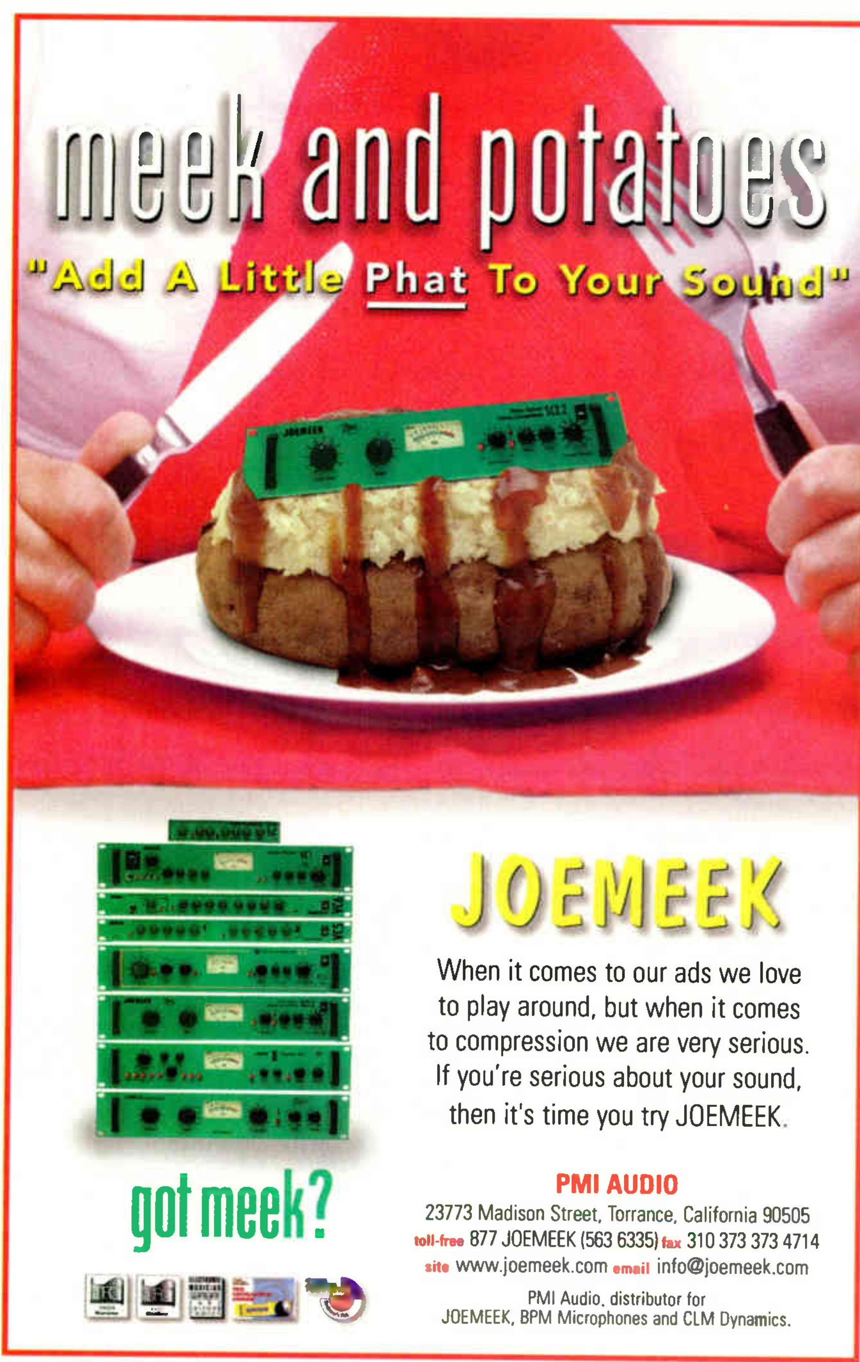
fore they are brought in. As you step toward the entrance, frosted glass panels glide back with a swish reminiscent of doors on the Starship Enterprise. Passing through a downward airflow that creates a barrier between inside and out, you enter a realm of gleaming glass, sparkling stainless steel, and glossy waxed linoleum floors set off against matte-gray cinderblock walls. Crisp, quiet and spotless, it feels wholly removed from the urban grit of the world outside.

The bulk of the facility's storage space is found in five main vault rooms, where high-density mobile shelving units may be cranked left or right to open up aisles for access to individual storage areas. The vertically adjustable shelving is two feet deep and either eight or nine feet high. Rented on a monthly basis, spaces are available in six sizes with total shelf widths ranging from 6 to 42 feet. A 6-foot "aisle vault," Wexler estimates, has room for about 850 10-inch reels of half-inch tape, while the 42-foot "double vault" could handle some 7,000. For less extensive collections, Wexler offers "media safes" and "media lockers" ranging from one to 13 cubic feet. And for true cold-storage of film and negatives, there are three "cryogenic freezer units." (The chilling of living beings for future revival is discouraged.)

Wexler maintains the vault rooms at 45° Fahrenheit and 25% humidity, conditions he says are optimum across the whole range of materials at the facility. The low humidity, he points out, is particularly important for audio tape formulations that are prone to hydrolysis (also known as "sticky shed" syndrome), in which polyurethane in the tape's binder absorbs atmospheric moisture, causing urethane molecules to migrate to the surface and gum up the tape path during playback. "At the least," Wexler says, "low humidity will prevent or slow that process by keeping the binder dry. But there is also some evidence suggesting that over time, very dry air can actually dry out the tapes, making them playable again, and eliminating the time-consuming, costly and potentially damaging process of baking the tapes before transfer."

Each of the vault rooms is equipped with carbon and particulate filters to remove contaminants from the air. Additionally, the fifth and newest room features "molecular sieve" filters to combat the "vinegar syndrome" that plagues "mag," the oxide-coated film used in audio production for movies. "The acetate base film used in mag," Wexler explains, "is a natural product made from cellulose acetate, which was originally cotton. As the mag ages, moisture and heat and iron in the oxide can cause the acetate to break down, which releases acetic acid (which smells like vinegar). Eventually the film base breaks down. It deteriorates, shrinks and becomes deformed, which causes the oxide to fall off. So in many cases the sound elements for a film present more of a preservation problem than the motion picture film itself."



CIRCLE #025 ON PRODUCT INFO CARD

HAZARDS AND SECURITY

While Hollywood Vaults' temperature and humidity systems are sufficient for most of the media types that come the company's way, there is one type of material that Wexler does not allow on premises: silver nitrate films, which are known to be highly flammable under certain conditions. The entire building is concrete, and Halon fire-suppression systems are installed throughout. But the facility is not set up to handle such films properly, and even if it were, the presence of such material would undermine one of the primary services the company offers its clients: the security

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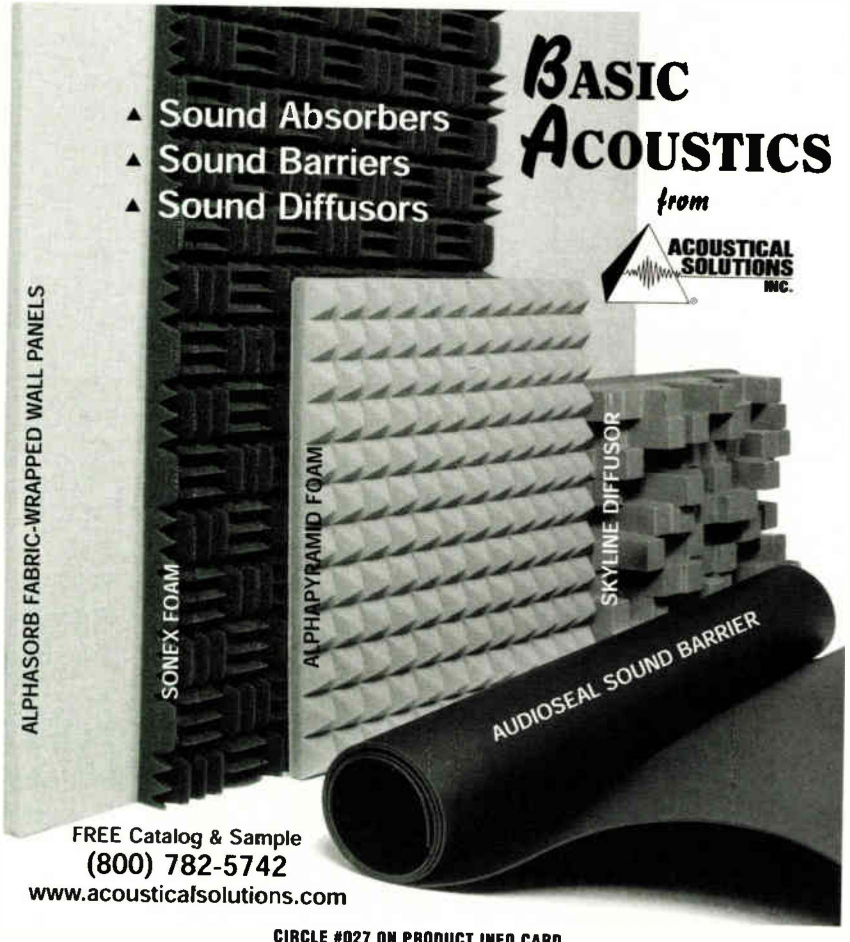

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CIRCLE #028 ON PRODUCT INFO CARD

of knowing their valuable assets are safe from harm.

For the same reason, Wexler does not maintain a backup generator: Storing a tank full of diesel on-site, he reasons, poses a potentially greater risk than does loss of power to the air conditioning and dehumidifying systems. "The vault rooms will hold their temperature and humidity for several days without power," he says, "as long as there is not a lot of traffic in and out. Even if there is a natural disaster such as an earthquake that keeps the power off, I wouldn't expect to see a lot of people rushing to the vault to pick up their tapes." Other systems such as lighting, security and access control are kept in operation during power outages by battery backup. And as for overall structural integrity in a quake, Wexler says the building is designed for a load of 450 pounds per square foot, nine times the seismic requirements.

If natural disasters are not much of a concern, what about a human hazard such as theft? It takes several successive stages of PIN-code controlled entry—the garage door, the main entry, the vault room and the individual vault—to get to the goods. Because Wexler can easily change the PIN-codes, former employees or clients can be immediately removed from system. And Wexler is on premises most weekdays, kept company in his office by 20 TV monitors fed by security cameras located inside and out. "A security patrol checks the building nightly," he adds, "and the facility is monitored by a central security station 24 hours a day for heat, smoke, fire, flood, temperature, humidity and intrusion."

It is clear from a tour of Hollywood Vaults that Wexler is devoted to detail, from the spit-polish of the floors to nice touches like jackets (it's cold in those vaults!) and work areas for clients (complete with phone, fax, Internet access and label makers). Though the facility does not represent the only viable approach to media asset storage, it certainly seems to be a model worthy of consideration by the record industry. (For a virtual tour, go to www.hollywoodvaults.com.) Hollywood Vaults and others in the field have shown how long-term preservation of original materials might be achieved, but without more in the music business following their lead, much of our recorded musical heritage may still be heading for a slow fade to silence. ■

Philip De Lancie is Mix*'s media and mastering editor.*

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CIRCLE #029 ON PRODUCT INFO CARD

Understanding

BY BARRY RUDOLPH

Compression is one of the most common processes in all audio work, yet the compressor is one of the least understood and most misused processors. Compressed audio is an everyday fact of modern life, with the sound of records, telephones, TV, radios and public address systems all undergoing some type of mandatory dynamic range modification. The use of compressors can make pop recordings or live sound mixes sound musically better by controlling maximum levels and maintaining higher average loudness. It is the intent of this article to explain compressors and the process of compression so that you can use this powerful process in a more creative and deliberate way.

Compressors and limiters are specialized amplifiers used to reduce dynamic range—the span between the softest and loudest sounds. All sound sources have different dynamic ranges or peak-to-average proportions. An alto flute produces a tone with only about a 3dB difference between the peak level and the average level. The human voice (depending on the particular person) has a 10dB dynamic range, while a plucked or percussive instrument may have a 15dB or more difference. Our own ears, by way of complex physiological processes, do a fine job of compressing by responding to roughly the average loudness of a sound. Good compressor design includes a detector circuit that emulates the human ear by responding to average signal levels. Even better compressor designs also have a second detector that responds to peak signal levels and can be adjusted to clamp peaks that occur at a specific level above the average signal level.

When sound is recorded, broadcast or played through a P.A. system, the dynamic range must be restricted at some point due to the peak signal limitations of the electronic system, artistic goals, surrounding environmental requirements or all the above. Typically, dynamic range must be compressed because, for artistic reasons, the singer's voice will have a higher average loudness and compression allows vocalizations such as melismatic phrasing and glottal stops to be heard better when the vocal track is mixed within a dense pop record track. With recording, the dynamic range may be too large to be processed by

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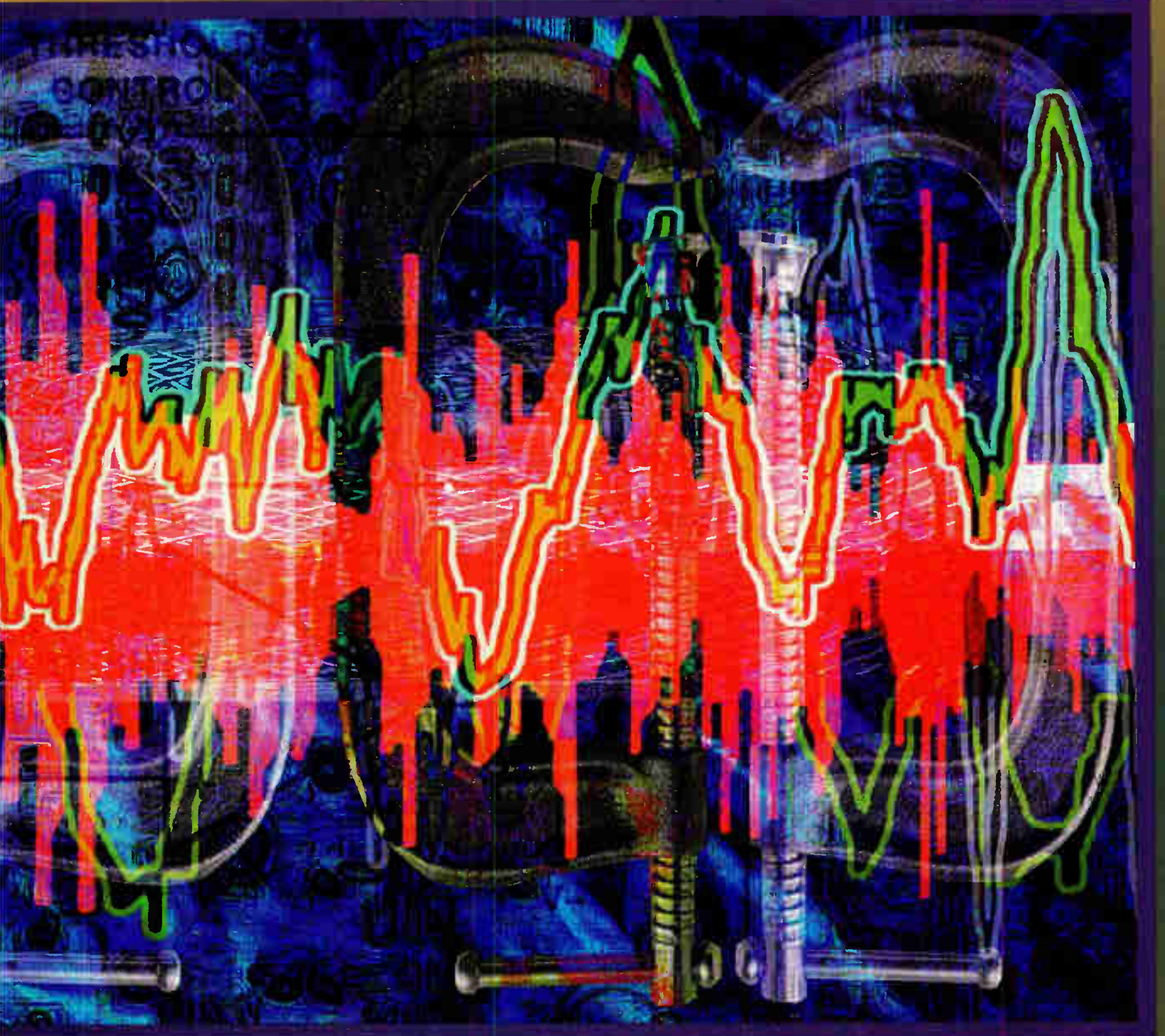
Compressors and Compression



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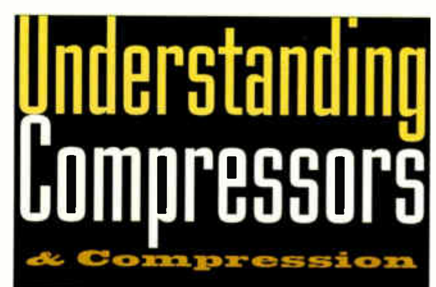

succeeding recording equipment and recording media. Even with the arrival of 90dB-plus dynamic range of digital recording, huge and unexpected swings of level from synthesizers and heavily processed musical instruments can overwhelm analog-to-digital converters, distorting the recording.

With broadcast audio, dynamics are reduced for higher average loudness to achieve a certain aural impact on the listener and to help compete with the noisy environment of freeway driving. The station-to-station competition for who can be the loudest on the radio dial has led to some innovative twists in compressor design. "Brick wall" limiting is where the compressor absolutely guarantees that a predetermined level will not be exceeded, thus preventing overmodulation distortion of the station's transmitter. (The Federal Communication Commission monitors broadcast station transmissions and issues citations and fines for overmodulation that can cause adjacent channel interference and other problems.) Another type of specialization that sprung from broadcast is called multiband compression, where the audio spectrum is split into frequency bands that are then processed separately. By compressing the low frequencies more or differently than the midrange and high frequencies, the station can take on a "sound" that stands out from other stations on the dial. Radio stations "contour" their sound with multiband processing to fit their playlist/format.

THE BASICS

There are four basic parameters on all compressors: compression ratio, threshold level, attack time and release time.

Ratio • Ratio is a way to express the degree to which the compressor is reducing dynamic range. Ratio indicates the difference between the signal increase coming into the compressor and the increase at the output level. A ratio of 10:1 would mean that it would take an increase of 10 dB coming into the compressor to cause the output to only increase 1 dB. Ratio is a constant value, as it doesn't matter how much compression is taking place; the ratio of the input change to output change is always the same. Compressors and limiters are really separated only by a loose definition: Generally, compressors have compression ratios up to 8:1, while limiters have ratios higher than 8:1. Most professional compressors have either fixed selectable ratios (such as UREI's 1176 with presets of 4:1, 8:1, 12:1 and 20:1) or continuous variable ratios (such as the dbx line of professional compressors). Some recent compressor designs instantaneously

FIVE TYPES OF GAIN REDUCTION

Gain reduction could be divided into five types based on the electronic method used. Knowing how they each basically work will help you in proper selection and in knowing why certain units always seem to excel in certain applications.

Optical isolators • The optical isolator section of compressors uses a light bulb (or an LED) to glow brighter or dimmer in response to incoming audio. A photocell (or phototransistor) is used to track the varying brightness of the bulb and change gain accordingly. This is a good example of an average responding detector. The inherent lag time that the bulb/photocell has in response to audio is factored into the attack and release time performance. The Teletronix LA-2 and the transistorized UREI LA-3 leveling amps are examples of this type of compressor. Compressors using this method are used a lot for bass guitar, vocals, program mix and drums. These compressors offer simple, natural sounding control (unless pressed hard).

FET • Field Effect Transistor compressors use a special transistor to vary gain. FETs were the first transistor to emulate tubes in the way they worked internally. Inherently a high-impedance device, the FET compressor sounds like no other box, and not many examples exist because of the expense of the extra attendant circuitry required. FET compressors are extremely fast, clean and reliable. I like to use these on vocals where a good amount of compression sounds good or better than the same amount with another unit, and on drums for room mics or individual drum mics. UREI's 1176LN peak limiter and LA Audio's Classic II stereo compressor/limiter are examples of FET-based compressors.

VCA • Voltage Controlled Amplifier compressors are the most versatile of all and so are the greatest in number. The VCA can quickly change gain in response to many different detectors looking at the same signal. VCA compressors are for the really tough cases where you want strict control over level and dynamics. However, they can be as gentle as any other compressor or anywhere in between. I like a good VCA compressor on vocals, drums, guitars, synths, bass, mix—basically anytime I need a compressor.

Vari-gain compressors • Variable Gain compressors include all units that incorporate discrete circuitry other than VCAs, FETs or opto-isolators. I put the Manley Variable-Mu tube unit in this category, and I like using these types for vocals, drums and stereo mix.

Computer based/digital compressors • Computer-based or digital compressors are now more prevalent, offering the ability to process audio in the digital domain under precise computer control. Digital audio stored in a computer has the advantage of being "predictively" processed. You can have zero attack time gain reduction as well as nearly infinite control of all parameters of compression on a moment-to-moment basis. The Waves L1-UltraMaximizer TDM plug-in for Pro Tools is one example of a software-based compressor. TC Electronic makes the Finalizer Express hardware unit for studio mastering. This is a single-rackspace, stand-alone, digital multiband compressor. ■

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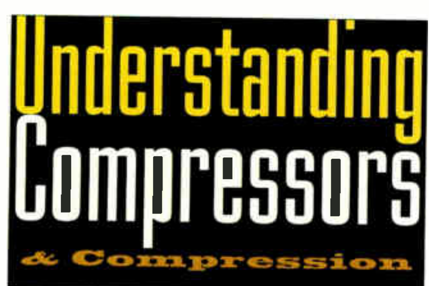

change ratio depending on the program's dynamic content and the constraints of the front panel control settings.

Threshold • Threshold is the level of the incoming signal at which the compressor amplifier changes from a unity gain amplifier (like a straight piece of wire, theoretically) into a compressor reducing gain. The compressor has no effect on the signal below the threshold level setting. Once threshold is reached, the compressor starts reducing gain according to the amount the signal exceeds threshold and according to the ratio control setting. Threshold level could be thought of as the "sensitivity" of the compressor and is expressed as a specific level in dB. The exact moment the compressor starts gain reduction is called the "knee."

"Hard knee" compression describes this moment as sudden and certain. "Soft knee" or smooth knee compression is a less obtrusive change from simple amplifier to compressor. Soft knee widens or broadens the range of threshold values necessary for the onset of compression. On quality compressors you can switch between hard and soft knee compression. The amount of gain reduction is measured and read on a standard VU meter whose needle rests on the 0 VU mark. The needle will deflect negatively downward to indicate how much gain reduction is occurring in dB. VU meters are RMS or average level responding and do not indicate fast or peak gain changes. LEDs are also used for VU meters, and they will better indicate peak levels. A well-designed compressor will have a good meter that reads input level, output level, gain reduction and any excessive peak output with an LED clip indicator. Once the amount of gain reduction is determined, the recording or operating level is readjusted with the output or make-up gain control on the compressor.

Attack • Attack time refers to the time it takes the compressor to start compressing after threshold has been reached. Typical attack times range from less than 1 millisecond at the fastest to more than 100 milliseconds at the slowest. Attack time settings affect the sound quality in terms of overall perceived brightness or high-frequency content. If you use very fast attack time settings, the compressor will activate very quickly, reducing gain instantly at the waveform level of the sound. Since transient information at the front or attack portion conveys brightness character, especially with percussive sounds, immediately reducing it with the compressor will dull the sound. Selecting a slower attack time will allow the transient portion of the sound to pass through before the compressor starts clamping. However, if the attack time is too slow, ineffective and tardy compressor action may result.

If you compress a snare drum track with a fast attack, you may notice a diminished or shortened attack of the front portion of the snare drum sound. Instead of a good "hit" at the beginning, you will hear a very short "blip." If the attack time were even faster, you wouldn't hear any snare attack at all. Adjusting the attack control to a slightly slower attack time will lengthen this blip back to the original snare attack length. Engineers use a compressor to get more attack out of a snare drum by using a low threshold and a high ratio. After making up gain with the output level

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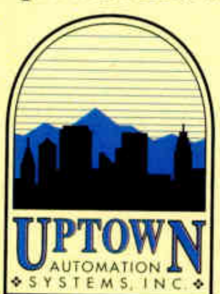

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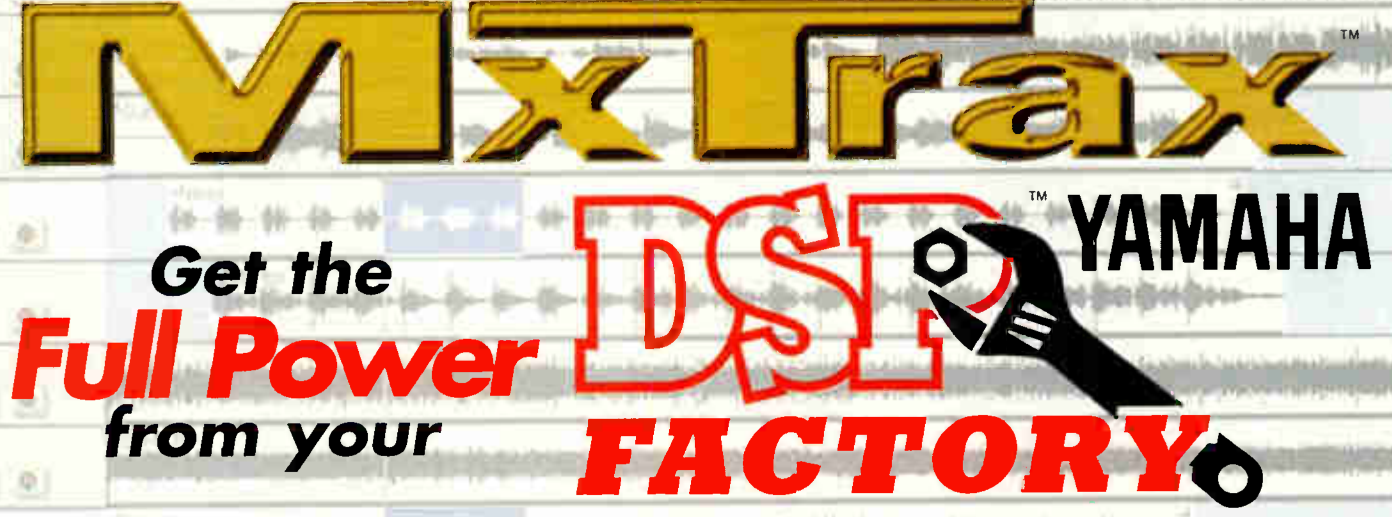

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control of the compressor, the attack portion ends up greatly amplified just before the compressor starts squashing the trailing portion of the snare drum sound. I like to mix this "twacked" sound with the original un-processed snare drum track.

Release • Release time is the time the compressor uses to return to unity gain after the input signal has fallen below threshold. The compressor is said to "release" from gain reduction. Typical release times on popular compressors go from as fast as 20 milliseconds to over 5 seconds. Most engineers envision their compressors doing their job of gain reduction quickly and then releasing quickly to get out of the way. For the most part this holds up for pop recordings, but super fast release times, along with a fast attack time setting, will distort low-frequency sounds, as the compressor is capable of gain change within the period of the sound's waveform. You can demonstrate this by using a very fast release on a bass guitar compressor and have the player play loud and sustained notes. Over-long release time settings are another form of distortion, since gain reduction is "stuck" clamping the sound down for an unnaturally long time. "Pumping" and "breathing" are engineer jargon words for obvious compressor artifacts or side effects with maximum compression. Sudden and usually unwanted deep gain reduction is called pumping, while a slower return (release) to operating level with a noticeable rise of the noise floor is called breathing. Newer compressor designs have clever predictive and adaptive schemes that reduce these side effects, making the compressor's action nearly undetectable or at least tolerable in most intense gain reduction situations.

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STUDIO COMPRESSOR CLASSES

Most full-featured modern compressors can be set to emulate three classes of compressors: regular compressors, peak limiters and leveling amplifiers. These compressor classes all differ primarily in attack, release, ratio and threshold settings.

Regular Compressors • Though there are no rules and many exceptions, for most music recording engineers tend to use a regular compressor with medium attack and release settings. Most of the time the engineer is looking for a modicum of level control with higher average loudness and some peak protection. Some producer/engineer teams prefer compression that is smooth, transparent and truer to the source sound's fidelity. This is achieved by using a quality compressor with a higher threshold and lower ratio with medium attack and release settings. This team is looking for a natural sound that doesn't sound compressed and retains most of its dynamic range properties. Another crew may opt for more severe and noticeable compressor action for a more "controlled" or tight sound. This would call for a compressor set with fairly fast attack and release times, higher ratio and lower threshold and low distortion under maximum gain reduction. With pop record productions, threshold and ratio preferences, along with compressor choice and usage, contribute to a certain production style.

Peak limiters • A peak limiter is a compressor with a very fast attack time, medium to fast release time, a high ratio

—CONTINUED ON PAGE 231

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CIRCLE #034 ON PRODUCT INFO CARD

THE BEASTIE BOYS

SOUNDING HUMAN

BY GREGORY A. DETOGNE

At the outset of 1986, few among the music industry's trendspotters and prognosticators cared to predict that three white guys from NYC would become the first rap group to top the album charts. But later that year that's just what happened when the Beastie Boys hit it big with *Licensed to Ill*, a volatile disc that blends hardcore punk attitude with the hyper-driven rants of hip hop.

Today, more than a dozen years later, the Beasties—Adam Yauch (MCA), Mike Diamond (Mike D) and Adam Horovitz (Adrock)—are back with *Hello Nasty*, their first album since 1994. Hitting the U.S. charts late last

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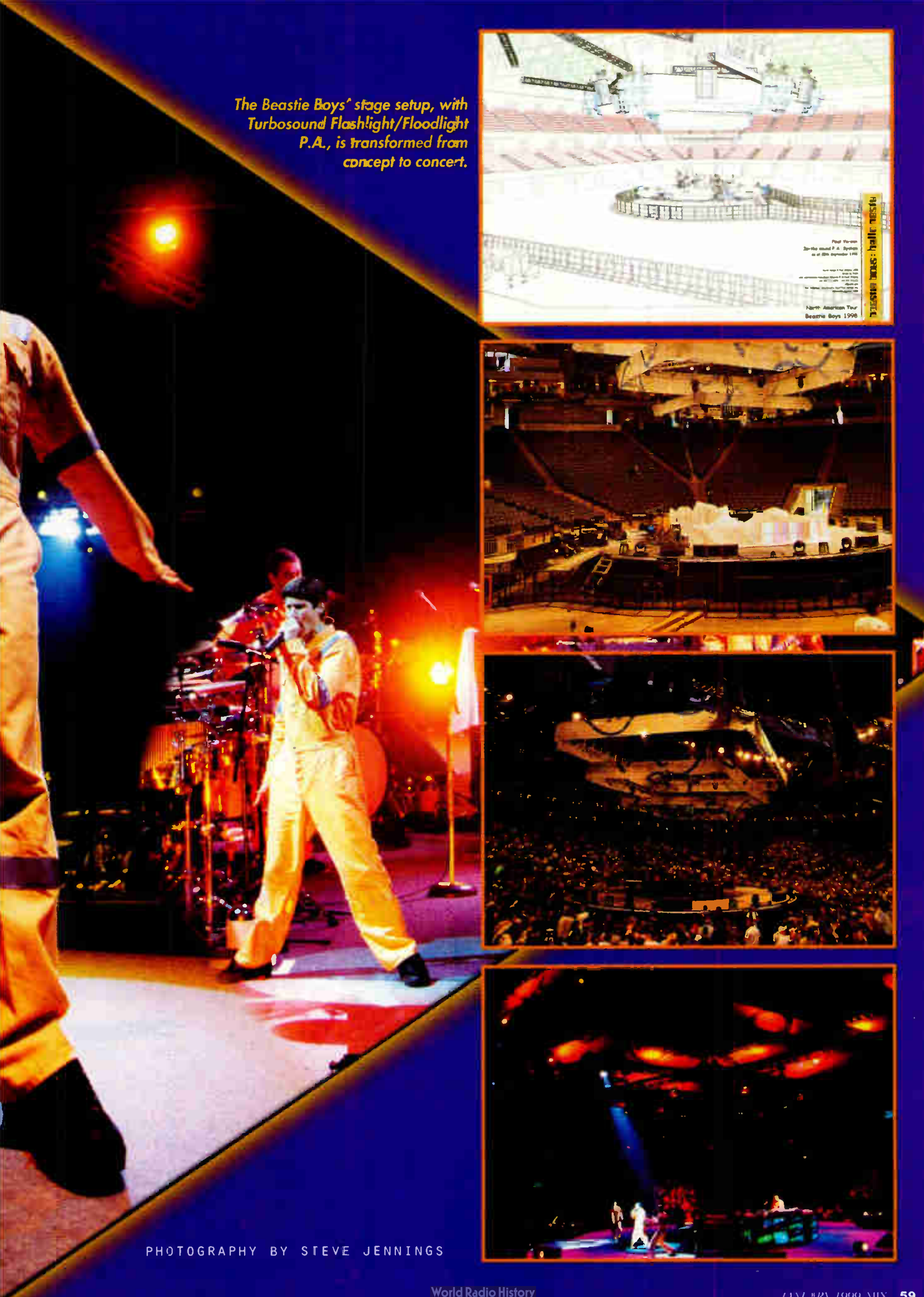

The Beastie Boys' stage setup, with Turbosound Flashlight/Floodlight P.A., is transformed from concept to concert.

PHOTOGRAPHY BY STEVE JENNINGS

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summer at Number One, the disc sold 681,500 copies in its first week, setting a sales record for the year.

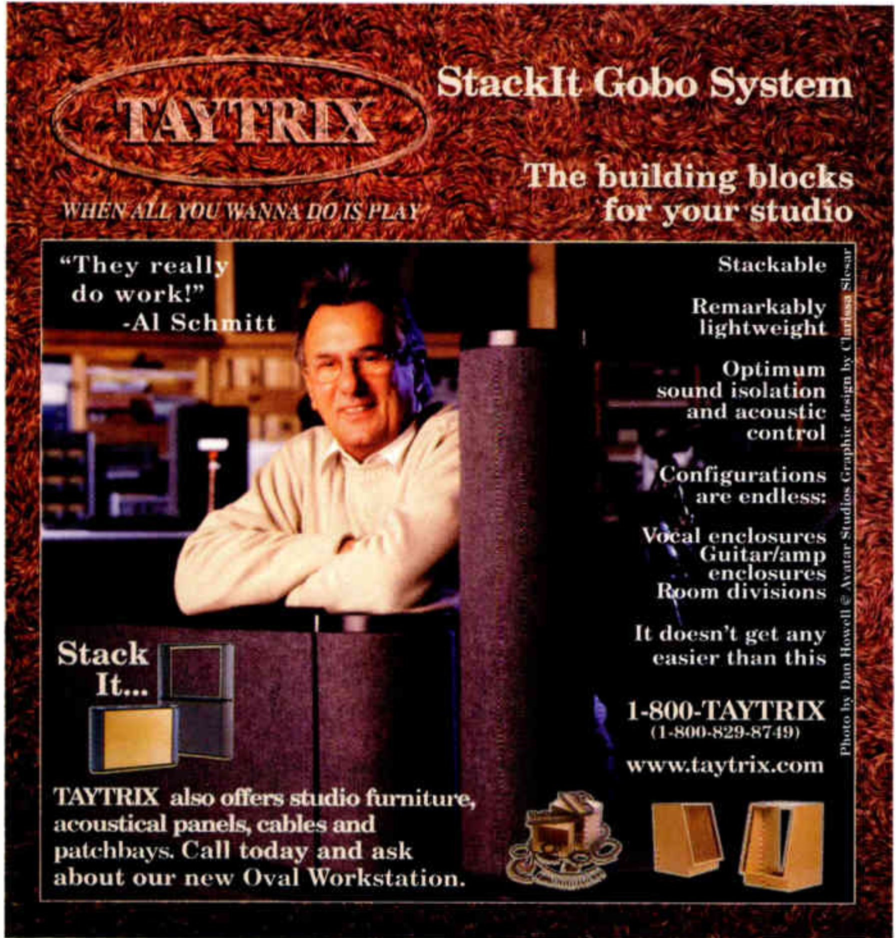
The debut of *Hello Nasty* was preceded by the first leg of the band's ongoing tour, which is slated to resume next month in Asia after a hiatus lasting a little over four months. Three unannounced dates introduced the live act last summer in Philadelphia, New York City and Washington, D.C. Next the band stormed the European festival circuit for six weeks, then returned to Yakima, Wash., for two weeks' worth of production rehearsals with an in-the-round P.A. rig supplied by Britannia Row.

As configured for the most recent U.S. leg of the tour (which ended on September 15 of last year), the system is based around six mid/high hangs, each of which includes eight narrow-Q Turbosound Flashlight enclosures and four wide-dispersion Turbosound Floodlight boxes. Arrayed to produce six stereo zones, the mid/high hangs are punctuated along a circular flyway by six arrays of low-frequency cabinets measuring four deep in two columns.

Designed by the UK's Brilliant Stages, the Beasties' stage measures 48 feet in circumference and features a revolving inner section. Led by crew chief Huw Richards, the Britannia Row crew responsible for the system's upkeep include Tim Woodworth, Bob Lopez, Wade Rice and Kirsten Smith. Paul "Paddi" Addison presides at FOH, with fellow veteran Beastie-ite Steve Wallace in charge of monitors. Addison hails from London and first became a fixture on the Beasties' tour as a Britannia Row systems engineer, "minding" the Beasties' previous FOH engineer, Mario Caldato Jr. (who is also the band's producer). When Caldato decided to come in off the road, Addison was a natural replacement. Wallace has been with the Beastie Boys since 1992. Having spent a number of years based in Minneapolis as an engineer for Southern Thunder Sound, he now conducts business from his home in Agoura Hills, Calif. Both Addison and Wallace directed the show's 360-degree audio activities using Midas XL4 consoles.

While grand in scale, the Beasties' stage presents a clean, minimalist aesthetic, made possible in part by bandwide use of Shure's PSM 600 Personal Stereo Monitor systems. As is often the case with in-ear monitoring technology, stage levels are so low that Addison felt obliged to provide "infills" for those in the near-field audience, who would normally get an earful from traditional sidefills and wedges. Ringing the stage in six groups, each infill battery includes two mid/high cabinets flanking a mid-only box. In addition, there are six groups of three sub-

The "beasts" of Britannia Row: (L to R) Wade Rice, Tim Woodworth, Steve Wallace, Huw Richards and Bob Lopez.



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woofers beneath the stage. Primarily intended for near-field use, these subs provide a solid measure of seismic ambience that is felt by all standing atop the riser.

In the dozen-plus years since the Beasties sprung *Licensed to Ill* on an unsuspecting public, they have traveled along a steady path of musical and creative evolution. As testimony to their ever-expanding range and depth, their current live show jumps between hardcore punk, the beat-boxing and scratching of hip hop, and even a peculiarly Beasties brand of Latin jazz.

As the band cross freely over these musical boundaries, they are joined onstage by an assortment of musicians. During the Latin-infused numbers, a keyboardist and a percussionist are introduced. Another drummer, known simply as AWOL, sits in for hardcore moments. For the trio's hip hop forays, Mix Master Mike (of DJ fame with the Invisibl Skratch Picklz) stands behind two turntables and pours out an all-vinyl sonic assault that you'd swear relies upon a hidden sampler or two—but it doesn't.

If anything has remained constant during the Beasties' stage career, it's that they are unpredictable. That being the case, it's extremely difficult for either Addison or Wallace to plan anything. "The set list is different every night, and quite often we won't even see it until a couple of minutes before the show," Addison says. "Then, just as often, the band won't stick to it anyway. So you have to stay flexible." Addison's Midas XL4 console goes a long way toward keeping things malleable. "With this band, there's no point in overcomplicating yourself with automation," he says. "That's why I think the XL4 is the perfect board. I can use as little of it as I want, or as much as I want, depending upon how the show progresses."

For Addison, keeping it simple also means storing a mere three scenes in the XL4—one for each musical genre the Beasties deploy. With the exception of his faithful Lexicon PCM42, which is wired directly to a fader on the XL4 that he keeps under his finger all night, Addison returns all of his effects via a Yamaha 03D. Serving as a MIDI slave to the XL4, the 03D changes with each scene and adjusts the level of the effects.

In addition to the PCM42, which he uses for dub delays and "all manner of odd noises the band and myself like" on vocals, Addison's collection of outboard processing gear includes a Roland SDE3000 for slap echo, a Yamaha SPX1000 for drum reverb, a Lexicon PCM 70 for vocal reverb and a dbx 120X boom box, which was put to work adding a bit of subharmonic strength to the punk bass. All of the Shure Beta 58A radio and hard-wired microphones used for vocals are compressed through dual-channel Summit tube DCL200 units, ten channels in total.

Despite the fact that an in-the-round setup is fraught with acoustical hazards such as a greatly intensified potential for feedback, Addison is quick to point out the benefits of the 360-degree plot. "Every speaker is actually closer to the audience," he says. "The coverage is much more even most of the time, and I've found that I can get away with much less compression. It's from about 160 Hz on down where the problems start. All of the energy you're pushing into the room starts coming back toward the center, and you can wind up with this

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Brendan Capucci/Steve Tasch: The Toy Specialists, NYC.
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Andy Hewitt: 2nd Sense, Watford, UK.
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Forrest Lawson: Frostbite Productions, Haskell, NJ.
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Dave Dusman: Recording Studio Manager, Eastman School of Music, University of Rochester.
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Barbara Hirsch: University of California – Santa Barbara.
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World Radio History

great big low/mid build-up in the center. Holes may open in the lower frequencies as well. You walk through the room and suddenly the bass disappears. Then you walk two more feet and it's back. I've worked with a number of systems in-the-round, and it's been the same with every single one. These are essentially generic problems you have to deal with."

For Addison, combating these ills and maintaining an aura of in-the-round equilibrium is a matter of mindful use of his BSS Varicurve EQ units. "You're always close to the edge with an in-the-round system," he says with the panache of one who enjoys taking calculated risks. "If you cut too much EQ, it stops sounding natural. If you don't cut enough, you end up with a mess, and halfway through the show things will be ringing and you won't be able to find them quickly enough. With the Beastie Boys, it's a matter of feeling your way through the show each night and striking a delicate balance. Then it sounds human."

Much to Addison's liking, Wallace is definitely not doing anything onstage that adds to the in-the-round feedback potentials or detracts from the fidelity of his audio high-wire act. Wallace keeps things church-mouse quiet with his Shure PSM 600 personal monitor-based design and finds that going the in-ear route has not only lowered stage volumes, but has added other benefits as well. "With the PSM systems, we could be playing in the round, in the square or on the flat, and it wouldn't make a difference," Wallace says. "Our sound onstage is completely consistent wherever we go. The band has gotten tighter as well. I've heard them comment that they can hear themselves singing and playing quite clearly—intelligibility is definitely up."

Prior to their discovery of in-ear technology, the Beasties regularly thrashed about onstage amid a roiling 120 to 125dB SPL din blaring from a monstrous contingent of wedges and sidefills. As the years passed, they became more concerned with issues of hearing loss and, led to a large degree by Adam Yauch, the band pressed Wallace into investigating whether in-ear systems would serve as a safeguard for their hearing while still meeting their monitoring needs. Wallace duly assembled PSM systems for the entire band during last summer's first production rehearsals, and the band soon took to the PSM units and Sensaphonics 2X earpieces. The only other monitoring devices used onstage are a drum thumper and a pair of wedges at the DJ position, which allow Mix Master Mike to cue his records with headphones off.

Like Addison's setup, Wallace's 48-channel XL4 is complemented by BSS Varicurve EQ. Also like Addison, Wallace found the levels of automation on the XL4 to be "just right" for the Beasties. "I group a lot of the input down to VCAs, so I can run a majority of the show to the center of the console," Wallace says. "With the scenes I program, I change my routing, effects on or off, and VCA levels. However, the individual channel sends aren't automated, so when it comes to pans or riding big, long reverbs, that's still done manually. The automation is at a level where I don't completely lose the feel of the mix, but it still takes away a lot of busy work and lets me concentrate on the show."

In managing the seven mixes he delivers to the band, Wallace uses BSS 402 and Varicurve compression to control the varied dynamics sent to the Beta 58A RF vocal mics. A BSS 901 with four selectable bands allows for

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frequency-weighted compression on Adrock's hard-wired Beta 58A microphone. To compensate for the inconsistencies inherent in vinyl, Summit TLA 100 single-channel tube compressors are inserted at DJ left and right. BSS 402s are inserted on the snare top channel, on an Akai MPC3000 sampler triggered from the drum stand, and on acoustic bass, electric bass and clavinet.

"With all the in-ear devices in use, I didn't want to attempt to tune my mix with racks and racks of graphics," Wallace says of his use of compression on vocals. "This way, if I need a tweak in the top end, or there's something welling up or not sounding right in an individual voice, I can make very exacting adjustments without affecting the overall quality of the mix. I don't maintain a lot of extra EQ. For me, anything beyond what's required gums up and changes the quality of everything."

There are a total of 41 inputs on the stage, and claws, clamps and custom mounting devices are widely used in order to minimize the number of mic stands. Shure SM91A and Beta 52 mics are used on kick drum, and Wallace and Addison combine their outputs to tailor the sound according to the needs of each mix. Snare top and bottom are miked with Shure Beta 57As, rack and floor tom get SM98As, and AKG 414s are used for hat and underhead cymbals left and right. In the percussion section, conga low and high are miked with SM98As. Beta 56s are used for djembe high, bongos and timbales. Djembe low is captured by a Beta 52, with a very necessary gate at FOH. Korg left and right, a clavinet/bass station, Rhodes, acoustic bass, electric bass and DJ left and right are input via active DIs from Countryman. One of two electric guitar sounds is available on demand—a Sennheiser 421 serves up a "clean" signal, while a Sennheiser 409 performs with the required grit when something considerably "dirty" is required.

As of this writing, both Addison and Wallace are preparing for the resumption of their in-the-round routines. After the Asian leg winds down, no solid plans have been made regarding the tour's future. But what do you want? Let the Beastie Boys remain unpredictable. ■

Greg DeTogne is a freelance writer and frequent contributor to Mix.

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State of the Sound Reinforcement Industry

This will be a year to remember. Heading into the Y2K election year, there will be a lot of special events, and everyone who's not on tour (or on the guest list) will be buying concert tickets "like it's 1999." At the same time, changes in both the business climate and technology are transforming the craft of live sound. A sample of opinions from a few leading North American sound companies reveals the outlook for sound reinforcement in the last months of the 20th century.

CHANGES IN THE BUSINESS ENVIRONMENT

Everyone we spoke to predicted tighter competition for touring services. "I see the standard kind of tours that have gone out for the past 20 years on a downward cycle," notes Ken Porter of Spectrum Sound, Nashville. Increased competition for entertainment dollars and leisure time has created a "spectacle mentality" that favors large-scale productions, which in turn seem to get larger just to show a profit for everyone concerned. And, whereas an act's touring sound company could once operate fairly autonomously—separate from lighting, video projection and concessions—today's production extravaganzas require a great deal more co-operation and multitasking. "The sole focus of a touring sound company used to be doing the best possible job, right down to the J-box on stage," notes Dave Shadoan of Sound Image, San Marcos, Calif. "Today everybody is doing an exceptional job, but when you have to diversify into other areas, you lose some of your focus."

Another trend that many noted is that the length of tours has shortened. With shorter tour legs, trucking expenses make up a proportionally larger chunk of the budget. Michael Jackson of Pro-Media (www.promediausa.com) points out that more acts are picking up quality regional sound instead of carrying one company across the country. John "Klondike" Koehler agrees. "An artist can head for a particular region and pick up a company with state-of-the-art speakers for less than it would cost to bring it across country," says Koehler, who sees regional touring as the greatest growth area for mid-sized companies. In fact, Klondike Sound (www.klondikesound.com) has built a solid reputation in New England as a regional vendor, but is also touring for the third year with folk phenom Ani DiFranco.

"There's an increasing impetus to look at the bottom line in tour service bidding," says Tom Source of A-1 Audio, Los Angeles (www.a1audio.com). "The market is very competitive, not only for top-quality audio, but also good value." Source points out that larger pro audio companies are making increased efforts to diversify, so that no single market segment controls cash flow.

BY MARK FRINK

CONSOLIDATION

"The most interesting change that's not over yet in sound is the consolidation trend, not just from content

—CONTINUED ON PAGE 76

World Radio History

TOUR PROFILE

Alan Jackson & Deana Carter

Country's Double Feature

Alan Jackson is as prominent as ever on the Nashville charts with his new album, *High Mileage*. He's all over the tube in national Ford truck commercials, and then there's his tour that's taking him across the U.S. and Canada in the company of country siren Deana Carter.

PHOTO: PAUL NATKIN

PHOTO: PHOTO RESERVE INC.

Between August and the publication of this article, 80% of Carter's live shows were slated to be on the same bill with Jackson. When traveling together, they are hard to miss out on the interstate. Five trucks move Jackson's gear from town to town, while a single rig transports Carter's.

However, true to his traditionalist mind-set, when Jackson hits the riser and steps up to his Beta 58A vocal mic, it's all about the music—there are no gimmicks. As a natural foil to Jackson's hard-core country sensibilities, Carter's music rocks out with a completely different energy of its own.

Carter opens each show, appearing onstage with brother Jeff Carter on guitars and vocals, Loretta Brank on fiddle, Paul Kramer on guitars and mandolin, Steve Mackey on bass, keyboardist Vic White and drummer Angelo Collura.

Jackson kicks off his show with an electric set, followed by an acoustic set. Then he's plugged back in for the third and final set, which features many of his mega-hits. From his place at center stage down front, Jackson is backed from stage right to stage left by steel guitarist Robbie Flint, guitarist Danny Groah, utility player Tom Rutledge, drummer Bruce Rutherford, bassist Roger Wills, Mark McClurg on fiddle and Monty Parkey on keys. Pulling double duty, tour manager Tony Stephens fills in on harp for some songs. Three video screens managed by Performance Video bring live close-ups of the onstage action to the crowd, along with other clips of Jackson "visualbilia."

Showco (represented on the tour by crew chief Kevin Gilpatric, Gary Brown and Wade Griffin) provides a Prism rig for both acts—eight columns per side in its standard configuration. As with most country tours of this magnitude, the Jackson/Carter show has regularly played warm-weather venues ranging from state fairs to sheds, as well as the reverberant world of arenas.

Phil Somers, a seasoned vet who ran his own sound company and specialized in big-name jazz accounts before moving to Nashville in 1981, mixes Jackson on a Gamble EX-56 console. Monitor mixer Chuck Young rides herd over a combination of Showco SRM wedges and Future Sonics in-ear systems.

Everyone on the Jackson/Carter tour seems completely affable and easygoing. "There's no time for attitudes," Young points out. "This is Nashville." Somers and his "ready-for-anything-so-why-worry" work ethic easily fall into the genial pace. Gain and tonality are among his main FOH objectives, so Somers avoids automation and sets up routing so that he can mix from the center section of the EX-56, where there are eight stereo groups.

"I basically maintain one stereo group per player," Somers says. "So I can pretty much pick up whatever instrument is playing in the center section. The Gamble has very narrow modules, so it's easier for me to stay in the center rather than trying to hop around grabbing at things. That way, I can concentrate on listening to the show rather than on looking for the correct fader."

During the course of a night's work, Somers deals with a number of cues and a good mixture of musical textures running the gamut from slow ballads to up-tempo, high-energy hits. To manage the diverse nature of the show, a MIDI controller can access about ten reverb scenes. Somers keeps a pair of AMS RMX-16 units in the effects rack for snare and tom on slower-tempo material and ballads. For up-tempo and mid-tempo songs, three Yamaha SPX 900 units are employed. The Lexicon 224 is the primary vocal reverb.

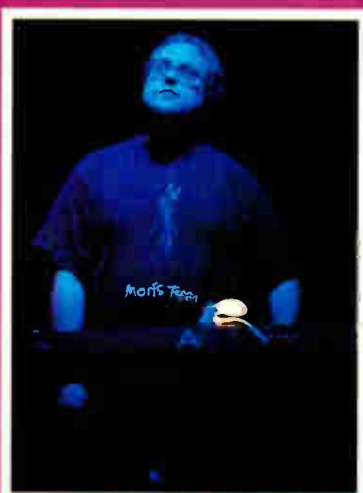
Somers creates a rockabilly slap echo on vocals with a pair of Roland SDE 3000 delays, while a BBE Sonic Maximizer adds a little definition to Jackson's vocal in reverberant rooms.

BY GREGORY A. DETOGNE

—CONTINUED ON PAGE 72

World Radio History

PJ Harvey



The bandmembers include Rob Ellis (drums), Jeremy Hogg (guitar, slide and lap steel) pictured, above left and Eric Drew Feldman (keyboards) above right. John Parish (guitar), also plays drums and bass through a Yamaha QY-20 bass keyboard, which includes drum and keyboard sounds. The QY-20 is run through two fuzz pedals and then via DI to the P.A.

PJ Harvey is out on the road to promote her latest release, *Is This Desire? Mix* caught the show during a four-month leg in U.S theaters.

Monitor engineer Nigel Fogg uses eight channels of Klark Teknik graphic EQs. Two channels of Summit compressors are assigned to Harvey's Shure PSM-600 in-ear monitor system (the rest of the band monitor on wedges). "Because bandmembers switch instruments, there's a lot of resetting and cueing throughout the show," Fogg says.

FOH engineer Rob Coles is carrying only control and monitors and picking up a local P.A. for each show. He uses a pair of programmable Klark Teknik DN-3600 graphic EQs—"If the system is EQ'd properly, then Polly's vocals speak for themselves"—and uses a BSS 901 4-band frequency-conscious compressor on lead vocal. The BSS 901 "allows you to dip in at different places to compress or take out frequencies where you need to, rather than just using wide band compression or de-essing," explains Coles. Additional rack effects include two PCM 70s with standard and 3.01 ROM cards, and a Yamaha 990 for delay. "I don't use any gating with this band because of the dynamic nature of the drumming," Coles says.

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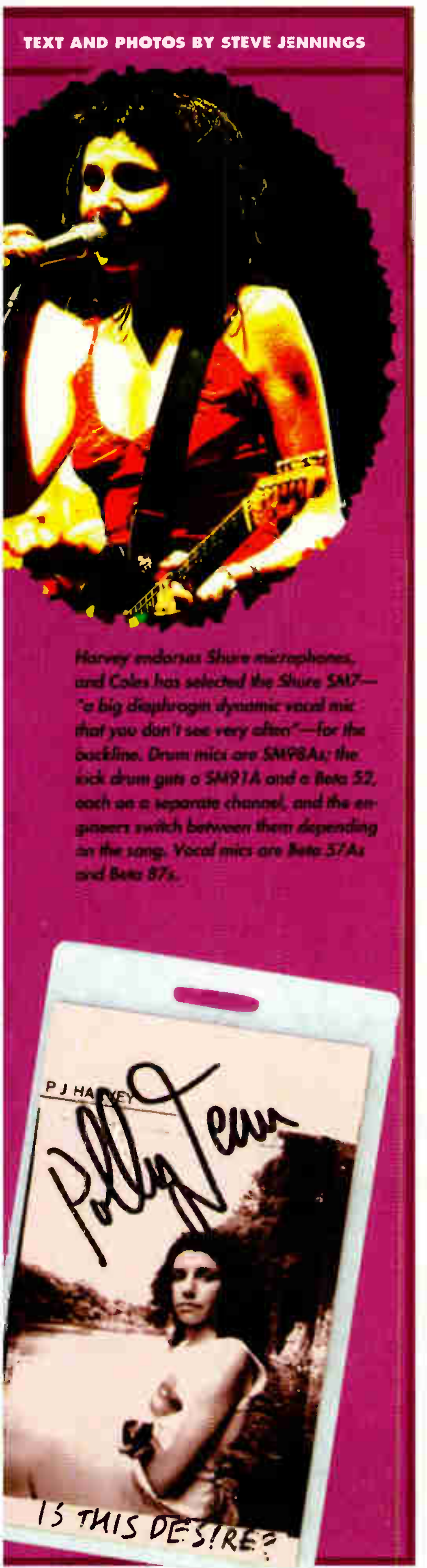
TEXT AND PHOTOS BY STEVE JENNINGS



Harvey endorses Shure microphones, and Coles has selected the Shure SM7—"a big diaphragm dynamic vocal mic that you don't see very often"—for the backline. Drum mics are SM98As; the kick drum gets a SM91A and a Beta 52, each on a separate channel, and the engineers switch between them depending on the song. Vocal mics are Beta 57As and Beta 87s.

ALL ACCESS

Celine Dion

SOUNDCRAFT BROADWAY DEBUTS WITH CELINE DION

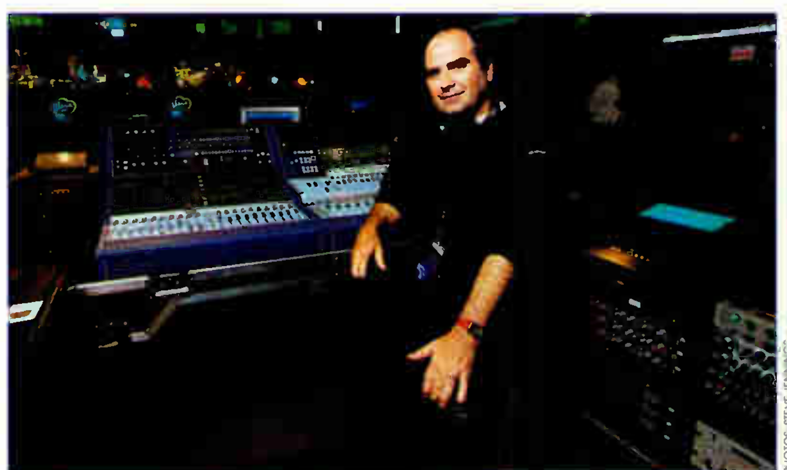
In its much-anticipated working debut, Soundcraft's Broadway console is now being used by FOH engineer Denis Savage to control up to 80 mic channels and tape cues on Celine Dion's current world tour. Savage has chosen to configure the modular, digitally controlled analog console with one 20-channel input "surface" and one VCA submaster/aux group/master output surface. Savage can easily access any 20 of the 80 inputs at any time, and has programmed the console to recall essential channels to the working surface as needed. All group assignments, send and return levels, fader levels and mutes are separately programmable, though Savage chooses not to recall preset EQs, since he often modifies them during the show.

Savage had been in consultation with Soundcraft for many months before Dion's longtime sound system provider (Solotech Inc. of Montreal, Quebec) took delivery of the console last summer, and he quickly became comfortable with its innovative design. "It's just like a normal board," says Savage, who has previously mixed Dion on Soundcraft Europa and 6000 consoles. "[The Broadway] makes so much more sense than running around on two or three consoles," he says, pointing out that the console's instant resettability is useful when Dion appears with other artists. "In two weeks we'll be doing an awards show—I'll mix all the bands on this console," says Savage.

In addition to instantly recalling Savage's presets during the show, the Broadway offers eight 20-input banks, or pages, which may be instantly recalled with the touch of a button. "I typically keep my first four banks for the show and use the other four banks for inputs 1-20, 21-40, etc.," he explains. "I can get to any input really fast if I have to."

The Broadway is just one of many technical innovations in the Solotech sound system. For the first time, Dion is appearing in-the-round, and the all-Meyer Sound system, designed by Solotech system engineer Francois Desjardins, is entirely self-powered (except for 48 Crown-powered DS-2 bass cabinets). The Meyer cabinets are typically hung in eight clusters made up from two standard configurations, one of which includes two of Meyer's new PSW-6 cardioid subwoofers, and all 57 powered speakers are constantly monitored via Meyer's RMS system. Desjardins has implemented a BSS Soundweb system to control the distribution of audio signals to the various cluster components and also uses the PC-based Soundweb application to dial in EQ and delay as prescribed by the Meyer Sound SIM system.

—Chris Michie



FOH engineer Denis Savage at the Soundcraft Broadway console he is using on Celine Dion's world tour. The all-Meyer Sound PA is configured for 360° coverage (shown here at the San Jose Arena).

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—FROM PAGE 69, ALAN JACKSON & DEANA CARTER

Other "primary helpers" in the Somers FOH gallery are a pair of Apogee CRQ12 equalizers, which, along with providing main system EQ, add gain to Jackson's vocal to compensate for his sometimes loud audiences. Equalization from two Klark-Teknik DN-410s is applied to background vocals left and right, and to upright bass. Industrial Research TEQ DG-4023A EQ is included as a Jackson channel insert, as well as for backing vocals and some main system EQ. Rounding out the list is a contingent of Summit and dbx compressors for channel inserts, backing vocals, bass, fiddle and mandolin.

Overall, Somers has been given somewhat of a loose leash with his mix. "I had a discussion with Alan when I was hired in January of 1996," he relates. "And I asked him what he was looking for in his audio presentation. He essentially said he wanted good, intelligible vocals and a sound that was oriented toward the style of his recorded material. So I lean toward the album mixes, but we have different players, so I try to add a live feeling by taking a few more liberties with effects and other characteristics, which add spontaneity."

Jackson prefers an onstage mix that "creates an intimate nightclub atmosphere for him, with studio quality," monitor mixer Young explains. "In his early days, he developed a fondness for standing in that magic pocket within the band that is easy to find in the close quarters of a nightclub stage. As he worked his way up into the studio, he quickly began to appreciate the sonic quality he got from his headphone mix. Today, my job is to bring him the qualities of both worlds in my live mix onstage, where all of this is at his disposal."

Young mixes from a 52-channel Yamaha PM4000M console (Jackson and his band, The Strayhorns, require a total of 20 monitor mixes). Power is provided by Crown 36x12 amps, and a Showco "deep rack" allows 40 spaces for, among other units, a Yamaha REV7 and SPX 900, as well as a Lexicon PCM 80, which Young occasionally employs to "fatten up" lead guitarist Danny Groah's Telecaster. BSS DPR-402 compressors are used on kick and snare, with a pair of DPR-504 4-channel gates. A dozen BSS VariCurve FCS-926 digital units are controlled remotely.

Ramsa S-5As cover the drum kit at rack and floor tom positions, with a B&K 4011 at kick. Sennheiser 409s pick up steel and lead guitars directly at the amp. Jackson's voice is captured by a Beta 58A, as are all other vocals, with the exception of drummer Bruce Rutherford, who likes a Beta 56. DIs take care of acoustic guitar, fiddle, mandolin, piano (left-right), upright bass, banjo, synth and tic tac.

"When you're singing in clubs, you're going to sing into an SM58—that's the standard," says Young. "Alan got used to the mic there, and even to this day, it still simply lends itself to his voice. We've upgraded to the Beta 58A just because it's a little smoother and has a little better rejection."

Standing behind a band mix coming from two Showco SRM wedges, Jackson receives his vocal only from an outside pair of SRMs. Frontfills line the stage, and bass player Roger Wills uses a single wedge in tandem with a single ear-

PHOTOS: PHOTO RESERVE INC

L to R: Phil Somers and Mike "Max" Maxson (FOH mixers for Alan Jackson and Deana Carter, respectively), Chuck Young and Bob Bussiere (monitor mixers for Jackson and Carter, respectively).

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piece from a Future Sonics system. Other configurations range from stereo wedges to a Future Sonics ear mix used by drummer Rutherford, augmented by a wedge mix and an 18-inch sub. Young directs multiple feeds to Rutherford, including one for ears, another that arrives at a Mackie 16-channel mixer, and stereo left and right of everything. "That way, he can take or leave whatever he wants, whenever he wants," Young says with the confidence of someone who has all his bases covered.

SMOOTH TRANSITION

A natural logistical consideration with double-bill acts is how to quickly manage set changes. "With the exception of our shared use of the Prism system, we are totally separate in every way," notes Young. "So the Carter crew can tear down right after their show and load out during the set change. They are usually gone by the time we're ready to get started with Alan. That makes for an extremely smooth transition."

FOH mixer, Mike "Max" Maxson, actually began at the monitor desk with Carter and company in March 1997. He made the switch to FOH in May of that year and was given the directive to make things sound like a band, not an artist being backed by a group of musicians.

Maxson mixes from a Crest Century console, and he relies on some limiting, compression, and a Spartan amount of effects from an Eventide H3000 and a Yamaha SPX90. Extremely natural-sounding, his mix is further refined by Behringer Composers and Ultra Q units, Drawmer DS-201 gates, BSS VariCurve FCS-960 equalization, and a BBE Sonic Maximizer. Inputs arrive at his desk from a phalanx of hard-wired Beta 58A vocal mics, as well as Carter's Shure U2 UHF wireless system, outfitted with a Beta 58A capsule. SM98As gather signals throughout the drum kit at points including snare bottom and overheads left and right, while an SM91 stands in at kick. DIs are in abundance to accommodate the proliferation of acoustic instruments, which in this case include fiddle, mandolin and guitar

Bob Bussiere mixes monitors from a Crest LMX, feeding a stage dominated by Shure's PSM 600 Personal Stereo Monitor system. Bussiere runs three of the in-ear mixes through subwoofers for "feel," which is especially useful when the band performs on non-Jackson dates without the Prism system. Two sidefills provide a basic left/right house mix, just in case someone pulls out their earpieces during a show or a monitoring problem arises, which, Bussiere happily reports, has never occurred.

Prior to embarking on the tour, Bussiere spent a number of days in rehearsals with the band establishing the foundation of his mix. "They all told me they wanted a rocking house mix," he recalls. "But that's a very subjective thing. I could've let them mix their own versions of a 'rockin' house mix,' and each would've been completely different. I thought the best way to please everyone was to give them exactly what they wanted with their own personal monitor systems. Now everyone has their own mix, plus they have control over it from their own beltpacks."

Bussiere outfitted five members of the band—including an initially reluctant Carter—with Shure's PSM 600 UHF wireless systems, each of which includes its own transmitter and receiver. (Drummer Collura took a hard-wired PSM approach.)

"At first, Deana was of the opinion that no monitors at all was a better option than having to wear earpieces," Bussiere says. "She loves to hear the sound of the P.A., and she thought that the PSM system would isolate her. Eventually, her brother Jeff got her to try them, and her attitude changed. I use a pair of Shure SM81 condenser mics downstage left and right to capture some of the P.A. for her, which I tweak via two of the stereo mic inputs in the master section on my desk. Those channels are routed to a built-in compressor-gate, so I simply adjust the threshold of the SM81s according to the venue, and she's digging it. I pretty much give her a full house mix at a very comfortable level. It's definitely not on Full Stun."

In this day and age of country going mainstream, and young country grabbing radio airplay and the headlines, the Jackson/Carter tour provides a rich sampling of complementary yet unique styles—a bit of the traditionalist with a splash of the contemporary. "Seeing and hearing Alan Jackson and Deana Carter together is a nice combination," Somers says, echoing the sentiments of fans and the rest of the crew. "There's a lot of good material in this show, and it plays well to the audience. Everyone seems to enjoy both acts, regardless of whether they came thinking they would or not." ■

Greg DeTogne is a freelance writer based in the Chicago area.

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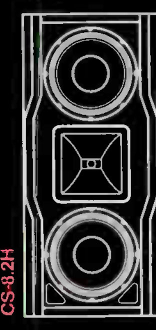

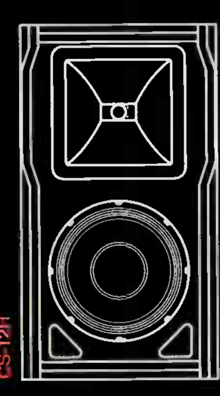

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Power capacity	300W RMS - 600W program	300W RMS - 750W program	300W RMS - 750W program
Maximum output	118 dB (SPL @ 1M)	129 dB (SPL @ 1M)	133 dB (SPL @ 1M)
Nominal impedance	Full range 4 ohm	Full range 8 ohm	Full range 8 ohm
Horn	#CD-101 1.0" exit compression driver nominal coverage angle/-6dB: Horz. = 90° Vert. = 45°	#CD-9045 1.4" exit compression driver nominal coverage angle/-6dB: Horz. = 90° rotatable Vert. = 45° rotatable	#CD-9045 1.4" exit compression driver nominal coverage angle/-6dB: Horz. = 90° rotatable Vert. = 45° rotatable
Optional horn	n/a	#CD-6045 1.4" exit compression driver nominal coverage angle/-6dB: Horz. = 60° rotatable Vert. = 45° rotatable	#CD-6045 1.4" exit compression driver nominal coverage angle/-6dB: Horz. = 60° rotatable Vert. = 45° rotatable

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current investments in better technology. However, many of those interviewed predicted that a generational change in technology will soon begin. "Pro audio is going to become more digital, eventually migrating all the way to the power amps," suggests Scott Harmala, director of engineering at AudioTek (www.atkcorp.com). "Some day the quality of digital sound will come close enough that you'd be hard-pressed to tell it from analog, but the potential for signal integrity throughout a large, complex system, plus its recallability and resettability, are the real keys to [digital's] future success." Harmala points out that the biggest challenge facing manufacturers is connectivity and interoperability of digital control and signals. "Maybe the AES spec is the way to go," he comments. "It's difficult to get everybody to agree on a particular format or protocol, but it's simply got to happen for digital technology to break loose." The AES standard will be published later this year.

"There are a few manufacturers that have already developed technology that is close to the proposed standard," says Jeff Barryman of Jason Sound (www.westsun.com), who chairs the AES's SC-10-2 committee. He expects that other manufacturers with proprietary technology will soon produce gateways to translate to and

ADVICE FOR YOUNG ENGINEERS

All of our interviewees value the experienced staff and freelancers they employ, and offered the following tips to young would-be sound engineers.

Ken Porter suggests that entry-level people adopt the entrepreneurial spirit to do whatever it takes to make the production successful for everyone, as a team member. "It's harder to find employees that want to make the clients happy all the time and are willing to do what it takes to make the job work," Porter says. "I'm seeing a lot of kids that just want to push the faders and twist EQ or effects knobs, but don't understand how to put up a system and make it sound good."

Tom Source offers the same advice he would have given 15 years ago: Get practical experience, either in the shop or on tour. "And work on developing your interpersonal and political skills," he adds. "All things being equal, the person with the better interpersonal skills will go further in their career."

Dave Shadoan mentions that finding a good band, working hard and learning audio systems inside and out are just the beginning. "Tune your ears!" he emphasizes. "Understand the intricacies of a song—we have a lot of people out there that understand sound, but not the songs." He also suggests spending less time on gadgets and more on learning how to make a song sing. "Learn how to mix. I'd much rather hear a guy mix on, say, an 800B with no effects, than a guy with a rack full of gizmos who can't use them properly."

"First, find a very understanding person to live with," Mike Jackson counsels. "Then learn as much as you can about everything, including electronics, physics, acoustics, business, design and architecture, because it all factors in. It's a much wider skill set than most people comprehend, and the people who become the most successful are the ones who understand the most about everything, not just pushing up the faders."

Scott Harmala thinks that the term "engineer" is used too loosely and does not accurately reflect the level of technical knowledge typical among sound engineers. "I think the best asset a person starting out can have is a well-grounded understanding of the physics and technical aspects," he advises. "With all these new widgets and solutions, it's giving us more capability, but it's also adding a layer of complexity. If you're familiar with the underlying concepts and fundamentals, it becomes easier to grasp the new technologies as they come along."

"Learn physics," is also Jeff Barryman's advice. "It's just amazing how many people you run into, even now, whose careers are hindered by the fact that they don't understand the basics of sound propagation or learn the psychoacoustics of hearing." However, he doesn't think young people are intimidated by software, quipping. "You know the joke: 'This system's so complicated, it's going to take a 12-year-old old to figure out.' No, it's worse than that! It's going to take an 8-year-old!"

—Mark Frink

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from the standard protocol, including MIDI gateways. "I'll go out on a limb and predict that by this summer we'll have it," Barryman says.

Barryman further comments that touring sound systems are less often configured in the traditional "monolithic" style. "We're seeing a lot of work where the venue size varies radically over the course of a single tour," he explains. "That, plus the trend toward diversification, whereby inventory utilization is maximized, is forcing us all to make our systems more versatile and flexible." Barryman also notes a resurgence of interest in line arrays. "There's a lot of sound companies laughing quietly because they've been doing this for years," Barryman comments, "but I must say that V-DOSC has brought a level of analytical precision to the management of line arrays for which they deserve a lot of credit."

"Lightweight amplifiers have, at long last, been accepted as viable products," adds Koehler. "I think we'll see other manufacturers following suit." Another trend that he and Jackson point out is the acceptance of self-powered loudspeakers, which can provide benefits including fewer racks, less truck and stage space, quicker setups and multiple zones control. "It seems like P.A.s are getting smaller, and I think that's because manufacturers are getting better," Jackson continues. "We've had a couple of situations where the artist's engineer has pre-judged the speakers' ability because of their size, when in fact they were more than enough."

DIGITAL CONTROL AND MEASUREMENT

FFT measurement of speaker systems via either SIM or Smaart Pro is becoming the standard rather than the exception. As laptops improve and their costs come down, it becomes more practical to set up and optimize sound systems with the aid of software. "One nice thing about Smaart Pro is that it speaks MIDI, and you're able to have your computer add some speed and convenience to setting EQ filters," notes Jackson. Koehler adds: "I'm interested in solving acoustical problems without more processing."

Source notes the increased use of digital control devices from BSS and XTA. "Even if a [loudspeaker] manufacturer has a processing box, these are getting substituted," he points out. "Also, the communications backbone has become a critical link in large special events, which is why we've made investments in fiber optics and switching technology."

Harmala acknowledges the role fiber plays in large-scale productions, but points out that swapping the passive copper wires in a traditional snake to something that's active can introduce gain structure problems. For example, splitting the digital signal to the various consoles used in live sound poses a knotty gain management problem, since someone has to control the gain stage at the head end of a digital transmission system. "Sooner or later, someone is forced to tweak a channel's trim so that their fader is in the right place, affecting the operators of the other consoles which now all live downstream of the first preamp," Harmala explains.

Not everyone is fully committed to digital control. "We're contemplating leaving the digital domain," reports Shadoan of Sound Image. "After five years of trying digital processors, we've concluded that our P.A. never sounded

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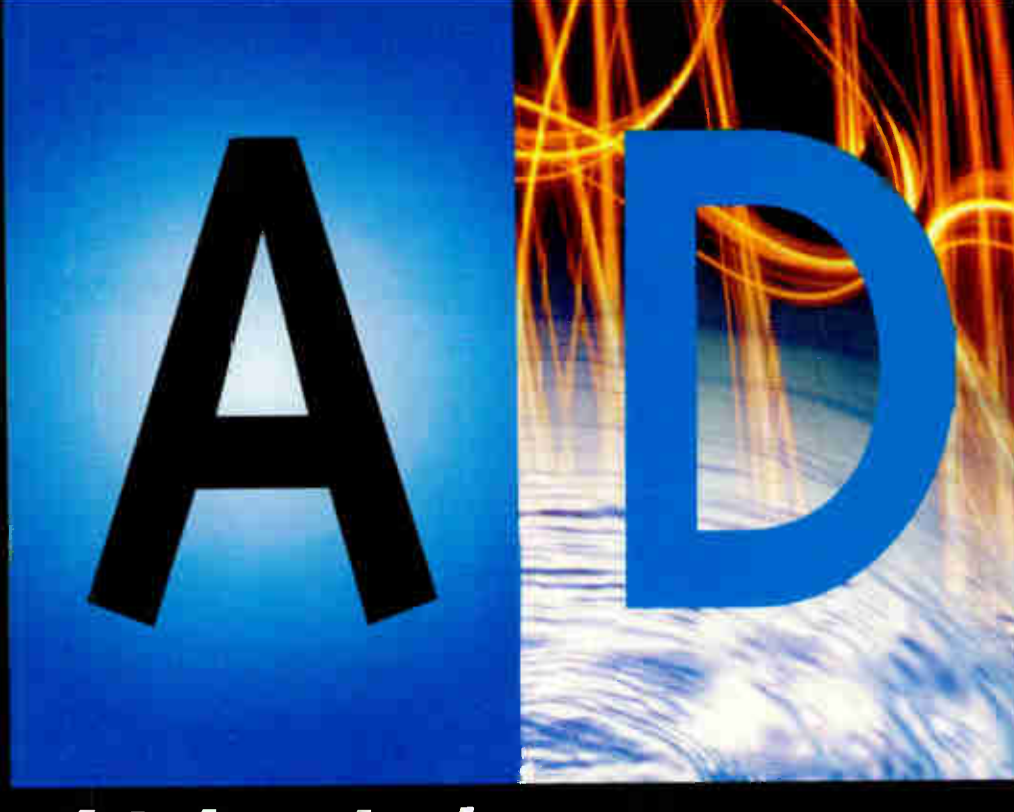

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as good as with our old Phase-Loc analog card-frame crossovers, and we want to take that a step further. Right now we're in the process of researching a system controller for our G-5 speakers using Class A circuitry." Besides an all-analog drive rack, Sound Image is refining the "above-the-box" rigging on the bumper-bar side of their speakers and also completely re-engineering their drive snakes. "We're going to new connectors borrowed from the aerospace industry," says Shadoan.

LOOKING FOR NEW PRODUCTS

Digital consoles were last year's buzz in the studio industry, and everyone we spoke to is looking forward to a digital board that will interface with outboard electronics processing at the FOH position. "We're also looking into 24/96 technologies—new digital front end components we buy will meet that standard," says Source, who is also examining alternatives and improvements in AC power and distribution, particularly balanced power.

"We're waiting for a couple of players to come to market with their digital

NEWSFLASHES

Stadium installations: A new sound system was completed at **Giants Stadium** (Meadowlands, NJ). The P.A. includes 568 EAW speakers powered by 159 Crest Audio amps with NexSys control, and a Peavey Mediamatrix system. The **Kohl Center** in Madison, WI, has a new Turbosound P.A., including four main four-way clusters, the largest of which consist of five TSW-721 21-inch bass enclosures, five Flashlight 780 boxes and five TFL-760HM high/mid downfill enclosures. The Kohl Center is home to the University of Wisconsin's Badgers basketball team. AKG reports that the sound system at **Ravens Stadium** (Baltimore, MD) makes use of the company's SolidTube mic...Ramsa SX-1 mixing consoles were used on tour last summer by **Pearl Jam, Sonic Youth** and **Beck**. Gear for all three tours was provided by Rat Sound of Sun Valley, CA. Gold Line reports that Pearl Jam's front-of-house engineer, Brett Eliason, is also using a Gold Line DSPCIW Digital Real Time Analyzer and an MX4 4-channel multiplexer...The **Fitzgerald Theater** (St. Paul, MN), which is home to Garrison Keillor's "A Prairie Home Companion" radio program, installed a new Soundcraft Series Five console for front-of-house and monitor mixing...Mike Konopka's **Thundertone Audio** (Chicago, IL) provided audio services for Ray Davies' long Storyteller tour, as well as for Chicago appearances by Marcia Ball, Irma Thomas and Tracy Nelson; the Tragically Hip; and the Staple Singers...NYC-based sound company **Sound Associates** has acquired **Theater Technology Inc.** Theater Technology's president, Louis Shapiro, will join the staff of Sound Associates...Memphis, TN's **Orpheum Theatre** took delivery of a new Klipsch Professional loudspeaker system. Also in Memphis, the **Majestic** movieplex installed Klipsch loudspeakers in eight of its 11 theaters...Last year's **Summer Sound Music Festival** in Charlotte, NC, featured performances by **Stevie Nicks, Clint Black** and **Boz Skaggs**. Sound company **Spectrum Sound** (Nashville)

—CONTINUED ON PAGE 84

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console," notes Harmala. "Our approach to new technology is to embrace it, yet be very cautious until we're confident and it's proven itself. We do a lot of multiple-act shows, so resettability is a big issue for us."

Jackson is also waiting for a satisfactory digital live console. "On current digital live consoles, if I have to make a really fast EQ move on a channel, I've got two or three buttons to push before I can adjust the EQ," he notes. "I have yet to see a nice hybrid—a console that feels comfortable, has the benefits of instant recall and doesn't cost a million bucks."

"We bought a lot of stuff this past year," was a common response. "We'll concentrate on width in inventory that enables us to serve a broader market with more simultaneous deployment," says Koehler. "I'd like to see the [Meyer] PSW-6 on a smaller scale. It's an incredible problem solver, but it's a bear."

"Our inventory includes loudspeakers and amplifiers that we'll eventually replace," notes Jackson. "Immediate efforts have been 'nuts and bolts' oriented, trying to make the gear that we have do more, be more flexible and work in more different situations. We're not looking for any big-ticket items just now."

Perhaps the last word belongs to Sound Image's Shadoan, who points out that the return on investment in the sound rental business has been declining for years. "Sure, shorter tours and tighter budgets [have hurt profitability], but I think ticket sales were off," Shadoan says. "I look at the movies as a parallel industry that was in trouble and kind of reinvented itself, from both a marketing and a technological standpoint; we need to do the same." ■

Mark Frink is Mix*'s sound reinforcement editor.*

—FROM PAGE 82, NEWSFLASHES

provided sound reinforcement gear for the main stage, including an EAW KF900 PPST loudspeaker system distributed by QSC's RAVE (routing audio via ethernet) system. QSC's Powerlight amps powered the EVI X-Array system used for the **Second Annual New York Jazz Festival** that took place in Battery Park. Performers included **George Clinton**, **The Coltranes** and **Kevin Eubanks**...BSS reports that **Electrotec Productions** outfitted all of its summer tours with BSS equipment, such as the FDS-388 and FDS-355 Omnidrive crossovers, MSR-604II mic splitter and the FCS-926 Varicurve EQ...**Portobello's Nightclub** in Dublin, Ireland, completed installation of a new JBL Marquis Series sound system including six MS112 cabinets and four MS125 enclosures as subwoofers...London's **West One Four** club has a new sound system, centered around a 24-channel Spirit LX7 console...The 800-seat **Teatro Sao Pedro** in Sao Paulo, Brazil, took delivery of a new Stage Accompany P.A., including eight Performer P27 mid-high cabinets, eight Bass B15 bass cabinets, 4 Entertainer E24 cabinets, two PR3 amplifier racks, four SA1600 amps, four SA2310 graphic EQs, four Leader L24 floor monitors and two Champ C29 full-range cabinets. The system was designed by Jose Nepomuceno of Sao Paulo's **Acustica & Sonica**. ■

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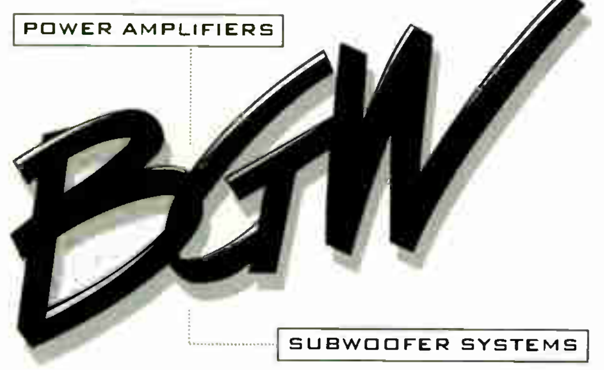

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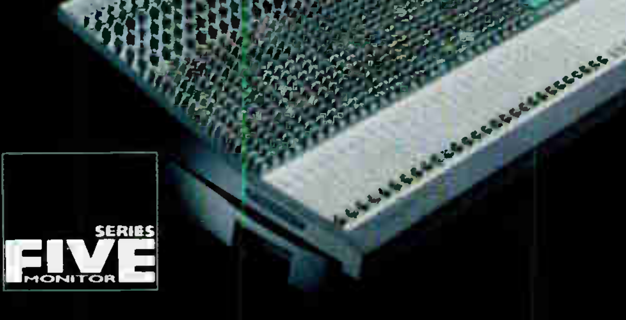

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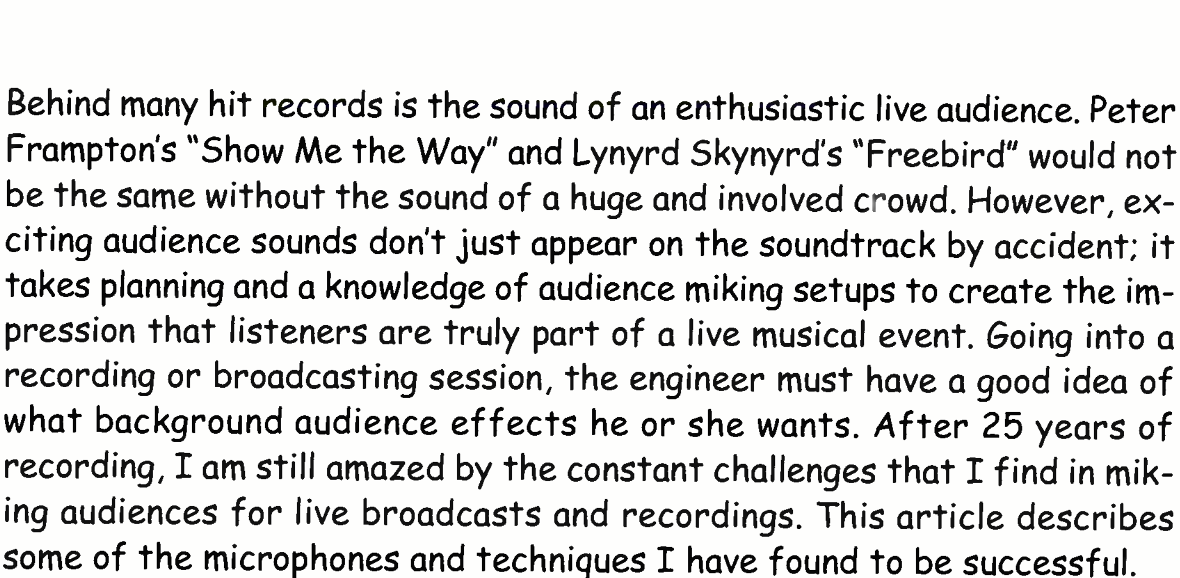
Recording the Audience



Behind many hit records is the sound of an enthusiastic live audience. Peter Frampton's "Show Me the Way" and Lynyrd Skynyrd's "Freebird" would not be the same without the sound of a huge and involved crowd. However, exciting audience sounds don't just appear on the soundtrack by accident; it takes planning and a knowledge of audience miking setups to create the impression that listeners are truly part of a live musical event. Going into a recording or broadcasting session, the engineer must have a good idea of what background audience effects he or she wants. After 25 years of recording, I am still amazed by the constant challenges that I find in miking audiences for live broadcasts and recordings. This article describes some of the microphones and techniques I have found to be successful.

PHOTO: STEVE JENNINGS

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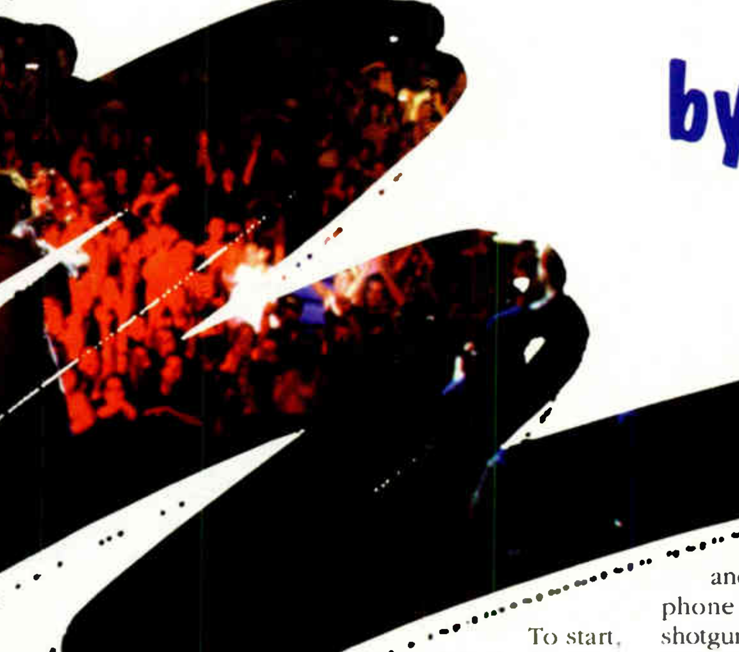
Tips on Microphone Selection And Positioning,
Or How to Aim Shotguns at People and Get a Good Response



by Bob Skye

To start, let's look at the types of microphones most suitable for audience miking. I typically select shotgun mics as a first choice, though I also use cardioid and omnidirectional mics in certain situations. Among shotguns, the AKG CK69-ULS is my current favorite for getting quality audience recordings, though I have also used this mic in other applications and regard it as a valuable all-around recording tool. The CK69-ULS shotgun element mates with the C480B body, which means it's adaptable to a number of capsules manufactured by AKG including the ever-popular CK-1 cardioid capsule. Also, the CK69-ULS capsule has two parts, and the mic may be set up as either a long or a short shotgun.

The AKG C647 is a small shotgun-looking hypercardioid microphone designed primarily for podium use, but it also makes a terrific audience microphone. It features a flexible gooseneck, is lightweight and is very easy to clip onto just about anything. Further, the price is right, and the off-axis characteristic is reasonably smooth.

Something to remember about shotgun mics is that the ultra-directional pattern is created through cancellation and addition; multiple signals reach the microphone element via the many slotted ports on the shotgun body. Inevitably, not all frequencies cancel and add ideally, and off-axis response can be very "peaky." A lot of microphones measure out well on paper, and the general specification may look great. But you have to be extremely aware of the off-axis frequency response of your microphones, particularly in live work. A quality microphone with good off-axis rejection will reject a lot more unwanted rear signals, such as the P.A. This is important if you choose to place audience microphones on the stage facing back toward the audience, as I do. Find out what the polar pattern looks like, and if you have an opportunity to test it, do so. Using a microphone with poor off-axis response in live situations can result in undesirable coloration of the overall sound of your mix.

MIC LOCATION AND POSITIONING

My typical audience miking setup includes two microphones, one on either side of the stage, facing the audience. I try to locate them as close to the null of the main loudspeakers as possible. By the null, I mean to the side of any loudspeakers, not the rear where you'll get a fair amount of low-end energy, and not the front, where you have all the horns and high-frequency drivers. Yes, low frequency is omnidirectional; however,

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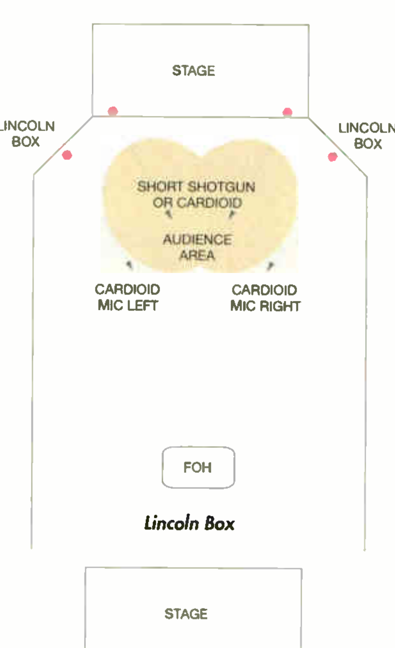
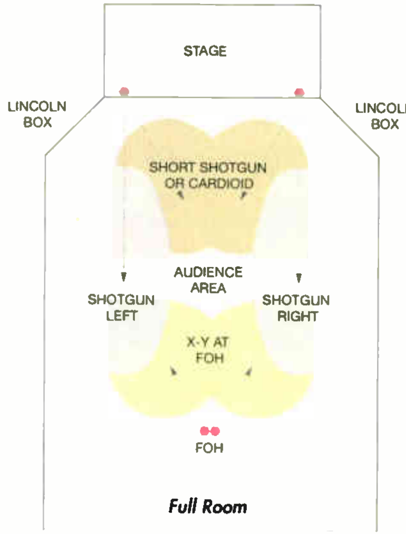
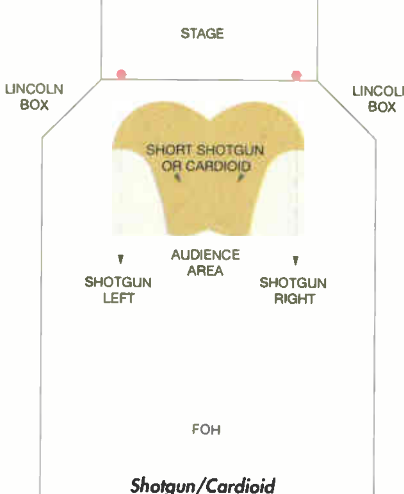


Lincoln Box



Full Room



Shotgun/Cardioid

The three microphone plots show alternate positioning strategies for miking the audience: In "Lincoln Box," a pair of cardioid mics is placed in the boxes either side of the proscenium and aimed at the audience. These mics are supplemented by short shotgun or cardioid mics placed at the extreme edges of the stage.

In the "Shotgun/Cardioid" plot, pairs of cardioid and shotgun mics are placed stage left and stage right. Cardioid mics are aimed at the nearest segment of the audience; shotguns are aimed farther back into the audience area.

In the "Full Room" plot, the "Shotgun/Cardioid" plot is supplemented with a further pair of cardioid mics arranged in an X-Y pattern at the FOH mix position, and aimed toward the stage.

typically most of the low end is rolled out of audience pickup mics anyway, so it's not a major issue.

Another possible audience mic position is at the front-of-house mix position where a stereo pair would do nicely, though signal delay relative to the main loudspeakers and any onstage mics will be unavoidable. (The delay can be matched during mixdown, of course, but only if there is a mixdown—not likely for a live radio broadcast—and if the audience tracks are recorded separately.) The room ambience picked up on audience mics, with or without the delay between the stage and at the front-of-house position, can be a very exciting artifact to include in a mix.

PZM microphones, hemispherical pickup pattern, placed on front-side walls work well in some situations. In some venues, the room geometry may be such that neither the band nor the P.A. is sonically "visible" to PZM mics on the front-side walls, so the audience response tracks should sound terrific.

Another setup involves wide-spaced cardioid mics or omnis hung from the ceiling. In low-ceilinged clubs or small venues, short shotgun mics on the ceiling aimed across the top of the audience can provide a more uniform audience blend. I try to group my audience pickup and take in as many individuals as possible in that group. At the right distance, the blend of the group becomes "tight," and the resulting applause is much like the sound of hard, consistent rain on the roof.

However, small clubs with low ceilings can present a particularly tough challenge. You must somehow get a picture of the audience in your stereo spectrum without hot-spotting the one jerk in the front who is muttering something about somebody's dog.

OUTDOOR VENUE MIKING SETUPS

When setting up audience mics at an outdoor venue, there are three main factors to consider. First, where is the audience? Most of the audience is far from the stage front and the typical microphone pickup points. There may be no convenient spot to put the microphones within the audience area. To bring the audience to the microphones, you need to use "long-throw," or shotgun microphones.

Second, how do you want the au-

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Miguel Lourtie ○ Systems Engineer - EXPO '98 ○ Lisbon, Portugal

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Mike Klasco ○ UPA-1P Review ○ DJ Times Magazine, May 1998

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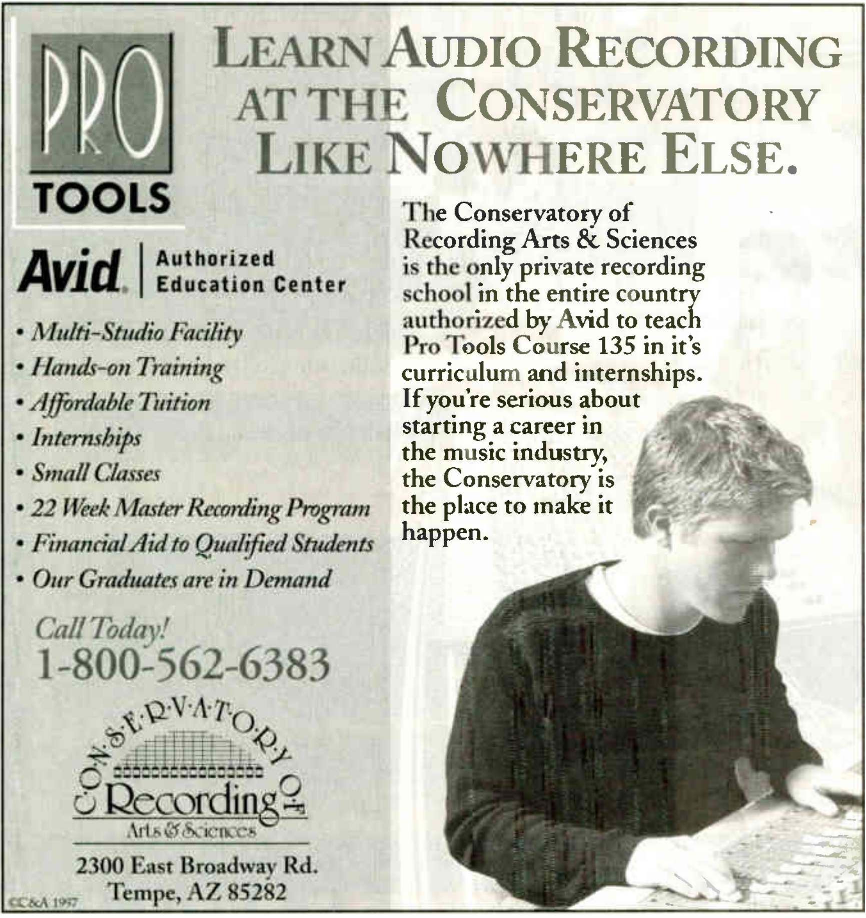

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Omnidirectional microphones may also be used for audience miking, but be careful—omnis will pick up everything, and the results can be either great or horrible. In general, I use omnis in more ambient spaces, where the sonic characteristics of the room are worth capturing. My favorite omnis are the Earthworks TC30Ks; they are clean, accurate, flat and allow me to tailor the room sound to blend with the direct mix from the stage inputs. However, the nondiscriminatory characteristics of omni mics can leave me at the mercy of just about anything that goes on in the room. With a spontaneous and volatile crowd, omni mics may not be the best choice.

HORSES FOR COURSES

Finally, there are nontechnical factors that will affect your microphone selection and positioning choices. Every one of my projects demands that I give the best I possibly can, and when I am doing exacting work for discerning clients, I tend to use my best precision microphones. On the other hand, it does not make good sense to put out your most valuable assets when you know that stage diving is the rule. For such events, Shure SM57s have been the audience microphones of choice—and they do work well. I have had several pairs of Sennheisers thrown off the stage and immersed in 18 inches of liquid mud (Sennheiser provided great repair and a quick turnaround). I've also had union engineers return microphones to me with fresh wood stage splinters protruding from the grille covers. "I don't know how it happened," they shrug.

If the object of the exercise is to record the room for the sake of the room, then it's anybody's artistic call. If the object is to record audience, to get audience response as part of a musical reocrding, then the objective is to get a great recording of the performance and allow the audience (in that performance) to add the audience's appreciation, not to add coloration or other distracting artifacts to the performance. Your off-axis coloration, the type of microphones you use, where you place them and what direction, are all going to play a part in a large sonic equation. The laws of physics and good horse sense will always prevail. ■

Bob Skye is owner of Novato, Calif.-based Skyelabs, a mobile broadcast and recording company that has served clients such as Anita Baker, Pearl Jam and U2.

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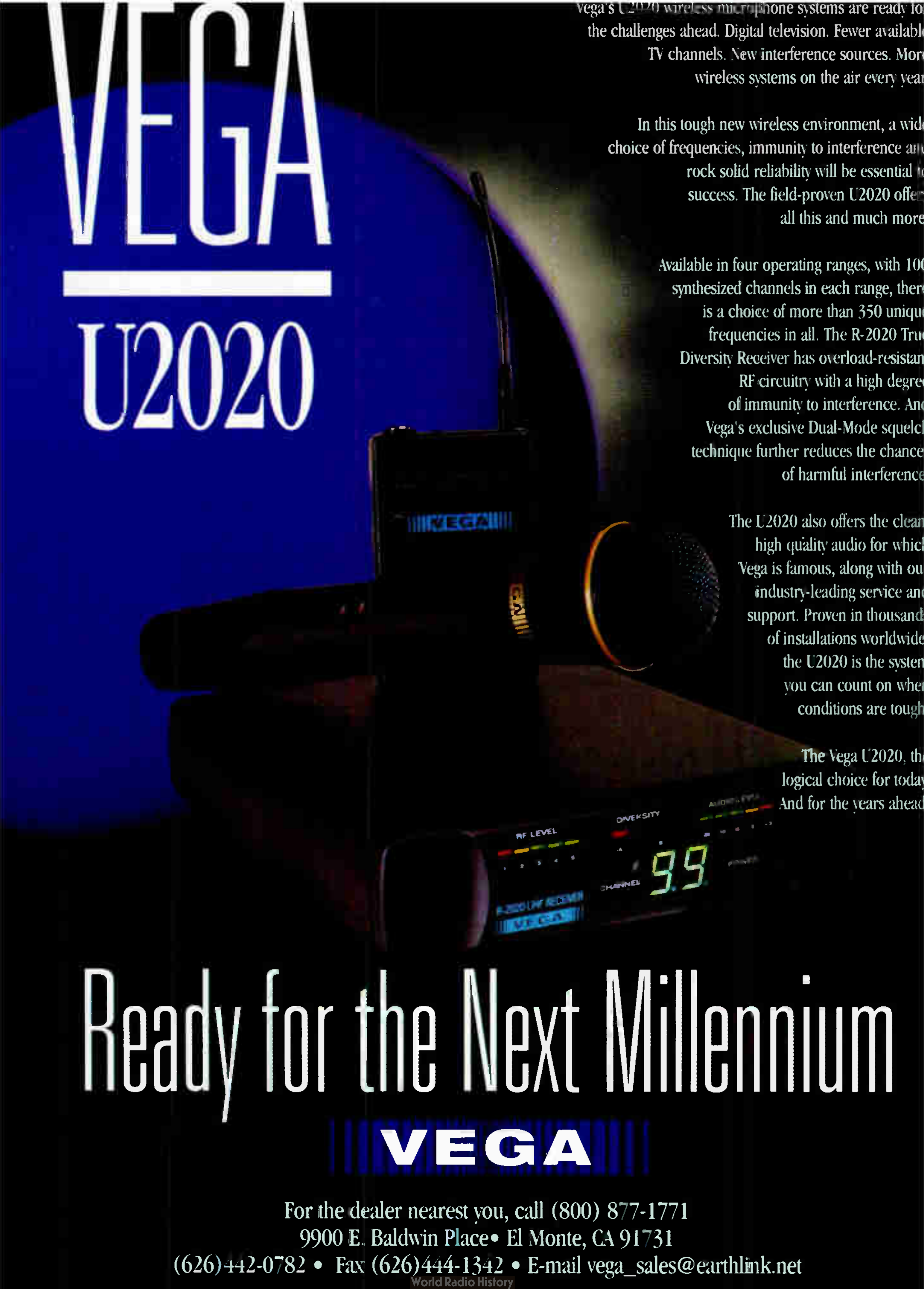

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New Sound Reinforcement Products

YAMAHA X SERIES POWER AMPS

Yamaha (Buena Park, CA) has introduced the X Series Power Amplifiers, a range of 2-channel, 3U rackmount Class AB amplifiers that includes two models for 8 or 4-ohm applications and one 70/100-volt model. The XS350 ($699) delivers 230 watts per channel into 8 ohms (350 W/ch at 4 ohms, 700 W at 8 ohms, bridged mono). The XS250 ($599) offers 170 watts per channel into 8 ohms (250 W/ch at 4 ohms, 500 W at 8 ohms, bridged mono). The XS150 ($699) is designed for 70- or 100-volt distribution systems and is rated at 150 watts per channel. Front panel LEDs indicate power, signal present, clip and protection status. Rear panel controls for the XS350 and XS250 include channel input trim controls and variable filters, which may be set for low-cut or subwoofer applications. A switch allows for 2-channel, bridged or parallel operation. Inputs include XLR and barrier strips; outputs are five-way binding posts.

Circle 314 on Product Info Card

TELEX UHF WIRELESS SYSTEM

Telex (Minneapolis, MN) introduced the UR-700 UHF Wireless Microphone System, which operates in the 690 to 725MHz UHF frequency range. Featuring Telex's Posi Phase™ auto diversity circuit for best reception, the UR-700 Receiver will operate with either the HT-700 handheld microphone transmitter (available with a range of dynamic and electret elements) or the WT-700 transmitter and a lapel microphone. The half-rack UR-700 Receiver offers line and mic level outputs on XLR and ¼-inch connections and provides several front panel LED indicators for optimizing signal levels and indicating diversity action. The unit operates from the supplied AC adapter or any nominal 12-15 volt AC/DC 300mA supply. Battery life (9v) is eight to 12 hours. Price of the handheld system is $675; the lapel system is $617.

Circle 315 on Product Info Card

SAMSON DESKTOP MONITOR SYSTEM

The DMS80 Desktop Monitor System from Samson (Syosset, NY) consists of a pair of full-range speakers and a 40 W/ch stereo amplifier with 5-band graphic EQ. Input selections include Line, Aux/CD and Mic/Instrument, switchable from the front panel, and there is an EQ defeat switch. LEDs indicate audio signal level and AC power on. The Mic/Instrument input has its own level control, and there is a separate line level subwoofer output. The system includes a built-in AC power supply. Price is $239.99.

Circle 316 on Product Info Card

COMMUNITY TWO-WAY WEDGE MONITOR

Community Professional Loudspeakers (Chester, PA) has introduced the XLT41E two-way wedge monitor, the latest in the company's XLT/E series of loudspeakers. Including a ferrofluid-cooled 12-inch woofer and a titanium HF driver with a 1-inch exit, the XLT41E may be used as a wedge monitor (up-angle to the performer is either 45 or 60 degrees) or as a pole-mounted P.A. The built-in crossover includes PowerSense™ dynamic driver protection circuitry; two HF voicings may be selected. Provided with two ¼-inch input jacks and two Neutrik Speakon connectors, the system may be passively crossed over or bi-amped (the internal crossover may be substituted for an electronic crossover). The cabi-

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net is 13-ply Baltic birch and includes a steel input panel and an integral steel handle. Frequency response is 55 Hz to 18 kHz, and weight is 50 lbs. Price is $826.

Circle 317 on Product Info Card

JBL INTROS TWO CONE SPEAKERS

JBL Professional (Northridge, CA) introduced two new high-output cone midrange transducers, the 2012H 10-inch and the 2020H 12-inch loudspeakers. Featuring an innovative magnet structure that includes

a larger magnetic gap and symmetrically placed shorting ring for reduced distortion, the units offer a flat impedance curve over the entire pass band, allowing for constant power delivery at all frequencies. Jason Sound Industries of Vancouver has been using the 2020H 12-inch woofer in the company's proprietary P.A. system for the Lilith Fair tour and also specified 2012H 10-inch woofers for the R23 speakers it provided to Livent Productions for "Fosse," a Broadway-style musical tribute.

Circle 318 on Product Info Card

DOD LINE MIXER/ DISTRIBUTION AMPLIFIER

DOD (Sandy, UT) offers the SR606 Line Mixer/Distribution Amplifier, a versatile single-space rackmount unit that can function as a 6-input stereo line mixer; as a six-by-six buffer amplifier; or as a distribution amplifier, splitting a single input into six outputs, or two inputs into three outputs. Each channel features its own rotary gain and pan controls, and there are master input and output pots. I/Os are balanced ¼-inch TRS connections; outputs feature LED clip indicators. Price is $299.95.

Circle 319 on Product Info Card

BSS AUDIO GRAPHIC EQUALIZER

BSS Audio (Nashville, TN) has introduced the FCS966 Constant Q graphic equalizer in the mid-priced Opal Series. Constant Q filters provide a smooth and more predictable interaction between adjacent faders (filter width is constant whatever the fader gain setting), and the resulting EQ curve closely resembles the actual fader positions. Separate HF and LF contour filters are provided, and there is a sweepable 18dB/octave highpass filter. Any EQ fader in the center detent position is automatically bypassed, minimizing noise. A high-quality relay switches the input signal directly to the output connectors in the case of a power failure. An eight-segment LED meter and clip indicator shows output level and warns of signal clipping. All I/Os are electronically balanced, with optional transformer balancing. Connector choices include XLR, ¼-inch TRS jack and Phoenix/Combicon screw terminals. Price is $1,095.

Circle 320 on Product Info Card

ALLEN & HEATH 4-BUS MIXER

The new GL2200 4-bus mixer from Allen & Heath (Sandy, UT) is available in 12-, 16-, 24- and 32-channel configurations. Based on the GL2000 design, the GL2200's mic/line inputs feature individual phantom power, 4-band semi-parametric EQ, six aux sends, four-segment LED metering and 100mm faders. Additional features include group mute switches, two stereo inputs and two stereo FX returns. Channel direct outputs, a built-in oscillator and pink noise source and talkback facilities ease recording tasks; the updated power supply allows for backup or remote DC supply. Individual channel circuit boards simplify maintenance.

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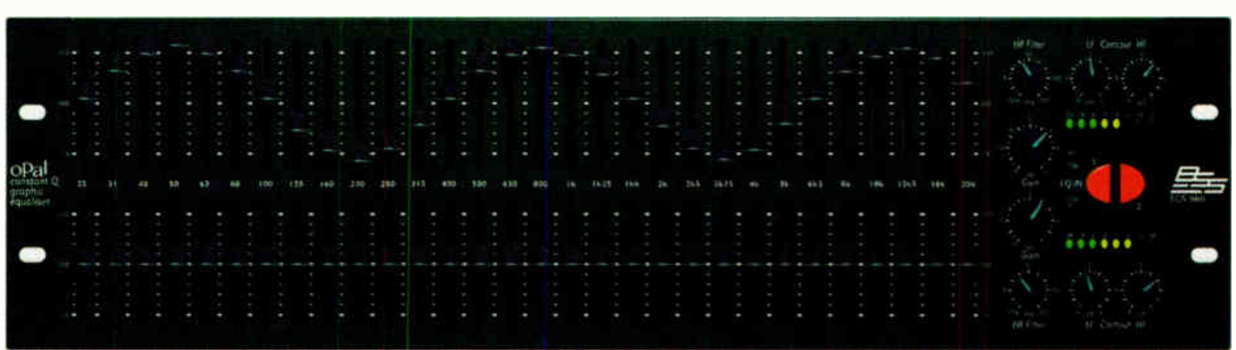

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POWERHOUSE STUDIO

A FLORIDA DRUMMER IN RURAL MASSACHUSETTS

"I guess it was The Beatles on Ed Sullivan," says Stuart Covington when asked how he got started in the music business. "I always loved music as a kid, and seeing The Beatles on Ed Sullivan was bigger than life." By the time Covington reached high school, he had saved enough money to buy a drum set, and he played in a band called The Epics through the mid- to late '60s.

Growing up in Jacksonville, Fla., Covington went to high school with future members of Lynyrd Skynyrd and later played with Skynyrd bassist Leon Wilkerson in the King James Version. After spending his college years in Atlanta, he returned to Jacksonville and formed a band "with some guys out of Indiana." The group, Powerglide, stuck together for 12 years.

"I always loved recording, so as Powerglide progressed, I kept buying more recording gear," recalls Covington. "I was always the person, in all the bands I was in, who put the P.A. together. I was the audio tech in the band, even though I didn't run sound."

By the time Powerglide broke up, Covington owned a major portion of the band's recording gear, and in 1991, having paid off the debt on the remainder of the equipment, he found himself with the components of a 16-track, 1-inch studio setup. "I said, 'Well, what the heck, I might as well make some money out of the studio business,'" he recalls. "I haven't quit spending money on it since!"

Occupying about 1,000 square feet in the basement of Covington's house in rural Ayer, Mass., Powerhouse Studios consists of five rooms: a 13x20-foot main room with an attached 12x14-foot amp room/iso booth; a 13x18-foot control room, also with an attached 5x7-foot iso booth; and a 12x20-foot lounge that can serve as an additional recording space.

An experienced carpenter, Covington designed the studio with the help of a friend "who sells audio gear" and built most of it himself, including a floating ceiling and double-thickness sheetrock insulation throughout. "We didn't use any technical equipment to tune the rooms," says Covington of the acoustic design. "We basically just used our ears and experimented with sound treatments until we liked the way it sounded."

Though Covington may sound casual about the studio's design, the equipment list is serious. The console is a 48-channel Soundcraft Ghost (24-channel mainframe with 24-channel expander), and monitors include Genelec 1030s, Tannoy 6.5s and JBL LSR32s in soffits. Recorders include an Otari MTR-90 MkII 24-track (15/30 ips) and 24 tracks of Panasonic ADATs. Covington typically mixes to Panasonic 3700 and 4100 DAT machines and also cuts reference CDs.

Outboard racks are crammed with modern and vintage processors. Reverbs and multiprocessors include units from Lexicon, Yamaha, Eventide and SPL Electronics. A Korg 2000 and an ADA D4 round out the delays. Compressors include two UREI LA-4s, a UREI 1178 (stereo), an Audio Arts 1200 and four channels of dbx. The studio also boasts a UREI 546 stereo 4-band parametric EQ, gates from JBL, Ashly Audio and Symetrix, and a TC Electronic Finalizer for tweaking final mixes and mastering CDs.

The microphone selection is comprehensive. In addition to prime recording mics such as a Neumann U87, two AKG C414 EBs, and an AKG SolidTube, Powerhouse offers a range of Beyerdynamic ribbons and condensers, plus such staples as Shure 57s and 58s, Sennheiser 421s and EV RE20s. Keyboards include a Hammond C-3, Yamaha CP-70, Fender Rhodes and Arp Odyssey. An IBM 166MHz computer with a 5GB hard disk runs Cakewalk Pro Audio and Sound Forge 4.0, and the MIDI setup includes a Kurzweil PC88 keyboard, Alesis and Kawai drum modules, an Akai sampler and a Roland Octapad. Covington also owns a vintage Linn drum machine.

Among the many vintage amplifiers on hand are Ampeg SVT and B-12 bass amps and Mesa/Boogie, Fender, Marshall, Silvertone and Kustom guitar amps. Drum kits include both new and vintage Ludwig sets.

Covington records all types of music, including gospel, blues, jazz and singer/songwriters, but his most frequent bookings are with Boston-based rock bands. "Sometimes I engineer, sometimes I produce, sometimes I co-produce, and occasionally I play drums or keyboards for the artists that come in," says Covington. "In general, though, I try to help the band realize what it is they're after and guide them into making things sound good."

For more on Powerhouse Studio, check out the Web site at www.powerhousestudio.com. ■

BY CHRIS MICHIE

Chris Michie is a Mix technical editor.

World Radio History

JOHN SNYDER

FOR THE LOVE OF THE MUSIC

Four-time Grammy-winning producer John Snyder gets to have a lot of fun. When he's not busy producing living legends like Dave Brubeck, George Shearing and Joe Williams, he's making records with younger comers such as saxophonist David Sanchez, pianist Danilo Perez and trumpeter Tom Harrell. For a change of pace he fishes and bicycles and makes records at a Bayou-side studio-cum-leisure complex in Louisiana with people such as James Cotton and Clarence Gatemouth Brown.

Between producing gigs, Snyder supervises compilations and reissues, everything from the Jefferson Airplane (*After Bathing at Baxter's* and *Bless Its Pointed Little Head*, among others) to Miles Davis (*Miles in the Sky*, *Miles Smiles*) and Glenn Miller (*Moonlight Serenade*, *Carnegie Hall Concert*).

Snyder apparently does it for the love of the music, as evidenced by his claim that he'd give it all up in a second if he could play lead trumpet in the hard-working, globe-trotting legacy edition of his all-time favorite band, the Count Basie Orchestra. That position, however, is filled, so Snyder continues on recording the music he loves.

Snyder's recently completed projects include two 1998 Christmas records—one each with George Shearing and Etta James—and a Jim Hall/Pat Metheny collaboration. He's also just completed *I Remember Bill*, star arranger Don Sebesky's piano-less tribute to piano great Bill Evans, which features Tom Harrell, nascent sax legend Joe Lovano and guitarist John Pizzarelli. Snyder also completed *Quintet*, the second record by 19-year-old slide guitar phenom Derek Trucks. Upcoming projects include a tribute to Bob Dylan by various blues artists and a possible follow-up to Snyder's popular *Paint It Blue: Songs of the Rolling Stones*, which will feature Stones songs covered by the likes of Luther Allison, Johnny Copeland, the Holmes Brothers and Gatemouth Brown, among others.

PHOTO: ERIC RUDOLPH

How did you become a record producer?

I was born in Charlotte, N.C., in 1948. In Charlotte in those days, there was one record store; really a hi-fi store with a few records. So I joined the Capitol Record Club—the first record I got was Miles Davis' *Birth of the Cool*, which scared me to death! I'd never heard a Beatles record until way after the fact, but I knew every Miles record. And so I took up the trumpet.

I was pretty serious about music in high school, playing trumpet everywhere I could, and got a music scholarship to the University of North Carolina, where I got a degree in music ed. Then I went to law school at UNC-Chapel Hill. I went to law school because I'd done well in a criminology class and was urged to study law by that professor, and because the dean of the UNC law school was a big music fan and really wanted me there!

Also, it was the late '60s and law schools were looking for diversification—women, blacks, weirdos—and I fit the weirdo category. I didn't love it, but I went through the whole three years of law school. I thought law school would be more serious than it was, but it was just a memory thing; you jump through the hoops and you pass. So I jumped and did pretty well.

After law school I was interviewing for jobs at banks and insurance companies and I knew this was not for me. So I wrote to all the entertainment law firms in New York City and to one record producer, Creed Taylor, founder of CTI Records, who wrote me back and said, "If you're in New York come and see me." I drove up and met with a few law firms and with Creed, and he hired me on the spot.

This was 1973; my job was to run CTI's publishing companies, listen to the tapes that came in, look over the contracts. It didn't hurt that I knew every record Creed had ever made! One day Creed said, "Hank Crawford's coming in tomorrow and we need some songs." I picked out some songs for Hank, and they took every one. After that, Creed asked me to continue to look for songs. So I started spending evenings in the office listening to a lot of

BY ERIC RUDOLPH

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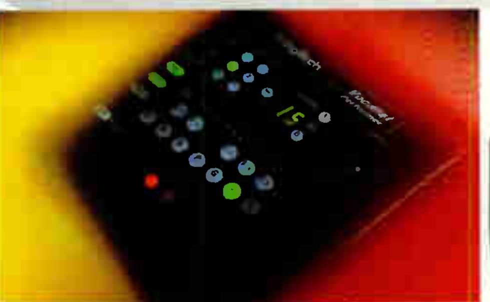

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records. Then CTI started to go downhill because of the branch distribution setup they had but could not support. I took over the jobs of many people who were fired, and eventually touched on almost every job at CTI—manufacturing, A&R, distribution, creative services, everything. It was an education in the record business I doubt you could get these days. Then, finally, CTI just went out of business.

So I went to A&M in 1975 and started a new label called Horizon, and we recorded artists like Ornette Coleman [*Dancing in Your Head*] and Dave Brubeck [*Dave Brubeck Quartet 25th Anniversary Reunion* and *Dave Brubeck & Paul Desmond Duets*] and that lasted a couple of years. I tried to sign George Benson to A&M just after he left CTI and before he went to Warner Bros. and sold 10 million records, but A&M wouldn't give me the money, so I didn't get George. You can't win 'em all.

After A&M, in 1977, I started my own record company called Artists House with Ornette [*Body Meta, The Quartet*], Paul Desmond [*Paul Desmond*], Art Pepper [*So in Love, Lover Man*], Chet Baker [*Once Upon a Summertime, The Quintet*], Gil Evans [*Solo*] and others. That lasted five years; I kind of got run out of town by MCA with a bad distribution deal. So then I was sort of on my ass for a couple of years.

While I was out of work, I was Mr. Mom back in North Carolina. Fortunately, John Hammond was a mentor to me and was always trying to get me work at CBS. Finally, I called John one day and said, "I've really got to get back." He said, "Well, you know I'm the old fart at CBS now and they don't pay me any attention." I asked him to introduce me to Ahmet Ertegun, founder of Atlantic Records, which he did, insisting that Ahmet's office put him through even though Ahmet was in his dentist's chair at the time! John talked me up as Ahmet was getting dental work done.

Ahmet hired me and I ran a jazz division that I created. And there were some blues records they asked me to take care of, so I ended up with a staff of five or six people. Ahmet wasn't comfortable with that, even though his chief of staff had made it happen. He tried to fire me one day, but I talked him out of it.

By now it was 1987, so I wrote Ahmet a report on how to make money putting his jazz records on CD,

John Snyder (L) with slide guitar prodigy Derek Trucks

which he didn't think was possible. I gave it to him on a Monday, and he fired me later that day! He was also generous with the severance pay, but I was really glad to get out of there; it was like a totalitarian state.

So from then on, I've been independent. I do a lot of reissue work for RCA and GRP, and I worked at Sony for a number of years also doing reissues. But that's just sort of rent money, because basically what I've done since then is make jazz records—everything from Tom Harrell, Danilo Perez, Paul Desmond, Dave Brubeck, Chet Baker and Gerry Mulligan to Ornette, Cecil Taylor and Sun Ra. I've been lucky. I also started making blues records about five years ago and have had pretty good success with that. I had a contract with PolyGram for five years and with Telarc for six years, to produce jazz and blues records. I have a wide range; I do Bobby Short's records and James Cotton's. I do some gospel, some classic R&B.

What are you excited about right now?

I've just done my second record with Derek Trucks, a young slide player who I think has an incredible future; he's certainly had an incredible past. He's 19 and has been on the road with his own band since he was 11. His uncle is Butch Trucks, the drummer in the Allman Brothers. Since Derek's been on the road almost half his life, he's received his education through the mail and by phone.

He's extremely smart; he's like a sponge. He said to me recently, "Hip me to Plato." I said, "Hip you to Plato? Go practice your instrument!" But I gave him Bertrand Russell's *History of Western Philosophy* and he just soaked it up. He's into all kinds of music; world music, Indian music.

Derek likes to play Coltrane and Miles and he loves Sun Ra. He went through his blues phase from 12 to 13, then he had to move on; it wasn't interesting enough for him! I think of him as a Weather Report or Mahavishnu type of artist, as an alternative to the neo-traditionalism that is so in fashion now in jazz, through the Wynton Marsalis influence. That's what interests me about him.

Let's talk about how you work. Do you do a lot of rehearsals before you start a record?

That depends on the situation. When I recorded Sun Ra, I was determined to make really good-sounding Sun Ra records. Sonny's records had always been made under the oddest of circumstances. And after I made my first Sun Ra record [*Blue Delight*] and it sounded pretty good, I was determined to make an organized Sun Ra record, which is probably an oxymoron. So we had two or three days of rehearsal for this new record [*Purple Night*]. We get to the date, at RCA, with Don Cherry and 20 musicians, and Sonny and his musicians started playing this music we hadn't rehearsed; it was just sort of going along. And Sonny wouldn't talk, he would just play. Suddenly there was this sound, it was like a big spaceship just took off, exactly that image—I could see it, it was just great. But it wasn't anything that we'd rehearsed!

After the date I asked Sonny, "Why didn't you do any of the songs that

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we'd rehearsed?" He said, "Think of it this way: I'm a football coach. We practice all week long but we don't play the same game on Sunday that we did all week."

So despite that experience, I'm always surprised that rehearsals don't play a bigger part in pre-production, but when you are hiring musicians from various parts of the country, it is hard to get them together a week or a month ahead of time.

So how do you approach a recording?

It depends on the musical genre. I find that blues artists are more malleable and workable; they're not uptight about it. Jazz artists are much more proprietary about what they do, and the influence you have is much more subtle; I don't direct jazz dates as much as I do with a blues record.

I listen carefully. I've been in bands, I know what they do, what they're going through, and I always try to pick out something great, something really positive about what somebody's playing. And then they know I'm listening, and it makes it easier for me to tell them when they're not doing something well.

You work in a lot of different studios...

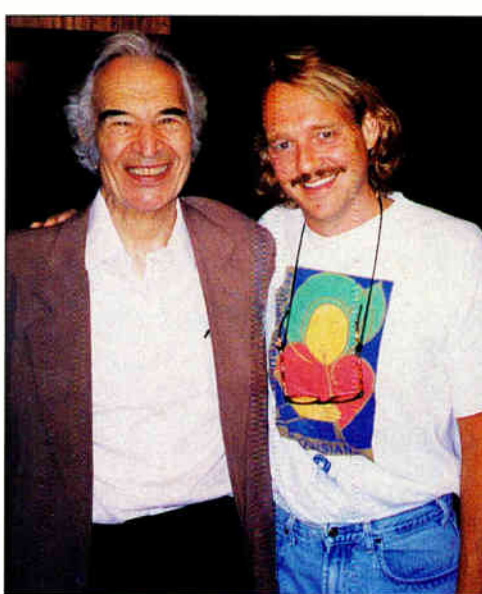
There's a studio in Maurice, Louisiana, where I've made more than 20 records, called Dockside. At Dockside, the studio environment becomes an active participant in recording. It's on a 12-acre estate; there's a lake stocked with fish—you can't fail to catch a fish there—and there are tennis and basketball courts and miles of flat country roads for bicycling. And they've got two vintage Neve boards and two Studer analog machines. You bring musicians there and they sleep, eat, work and play there. It creates a real mutuality, a kind of community of interest, and everyone's very relaxed. There are no problems, the food's good, and I always get great records out of there.

Let's go over the nuts and bolts of how you record.

We record the bass direct; we have an amp but don't use it much. The guitars are isolated but not direct, so you need great amps. It's like a meal: The better the ingredients, the better the result. I've also had access to some great instruments through Dockside, like a 1956 Gibson Les Paul and other wonderful stuff. You put an instrument like that in a guitar player's hand and he plays better. He knows he's got a world-class instrument there.

We use Neumann mics a lot: 67s, 47s; the mic selection at Dockside is pretty good. They also have Telefunken U47s, Neumann M49s, AKG C24s and, of course, workhorse mics like Sennheiser 421s, Shure 57s and AKG 414s.

Telarc, where I've made many



John Snyder (R) with Dave Brubeck

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records, has its own equipment for recording direct-to-2-track, and it is also good. Their thing is 2-track and picking the right room. It's fine to make a classical recording direct-to-2 in a great hall, but it's not great for the blues records and is not always the best way to cut jazz. But the sound is always superb. They usually run a DAT for the direct-to-2-track and back it up with 48-track recording, for remixing to surround sound. Telarc favors Neumann M50s and M49s, among other mics.

But Telarc doesn't just do direct-to-2-track. The late Junior Wells' last record was for Telarc, *Live at Buddy Guy's Legends*. We cut on 24 tracks of ADAT at Buddy Guy's Chicago club and then mixed to 5.1. I believe this record was the first live 5.1 blues recording. I think 5.1 is the future. If you listen to the Junior Wells record in 5.1, you think you are in Buddy's club. There is nothing two-dimensional about that recording.

Tell me what it is like making these blues records.

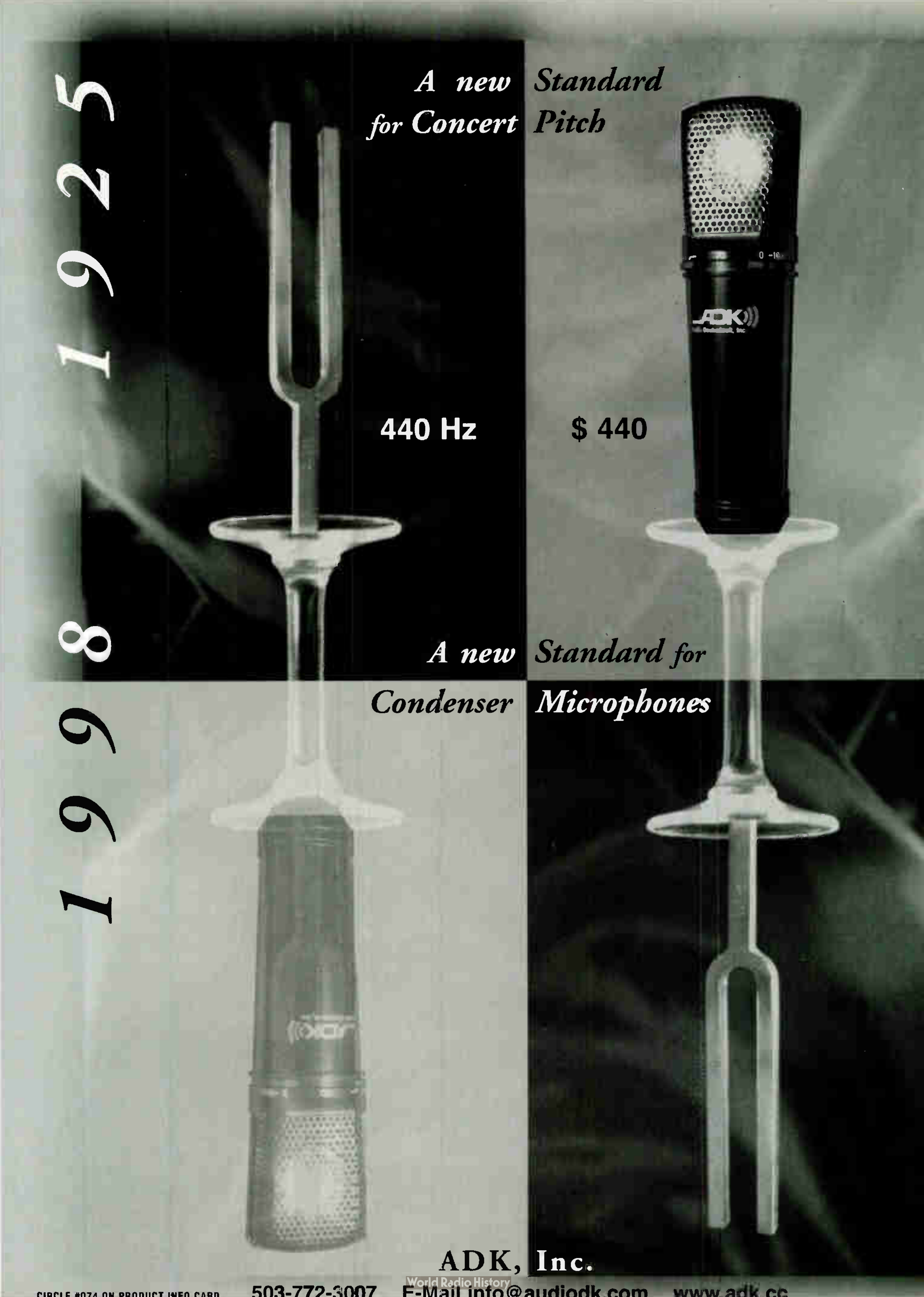
We try to keep it fun. We have a lot of laughs down there at Dockside. We often cut the tracks in three days, sometimes less, not often more, because the budgets aren't that big. Then we spend a couple of days overdubbing and three or four days mixing. They're seven- to ten-day records; I've certainly made them in less time. If they give you $25,000 to make a record, you've got two or three days at the most to track and then two or three days to mix. I don't really like to make those kinds of records because the budgets create such constraints, but you do what you have to do.

I usually have a tape of some preliminary version of what I want for each song. I try to rehearse the first day and run through the songs. But when you're using studio cats, they'll usually just say, "Look, we'll rehearse the song and then record the song and then go to the next one," which is fine.

I just love the chaos. For me, the fun is going into the studio, where no one has the faintest idea of what we're going to do, and then you bring order to the chaos. It's like cleaning up a dirty house. The house is a wreck, and you just put it back together. I know the music is in there someplace; you just have to go and find it.

What's your goal in recording these legendary blues artists like Gatemouth Brown, James Cotton and the late Junior Wells?

World Radio History



World Radio History

My thrust with blues guys is to make a great record and hopefully win a Grammy and sell a lot of records so that their live performance money goes up.

That happened with Gate, with Junior and with Cotton: Their live fees increased dramatically, and I'm really happy about that. The main way these guys make money is from working live, and I want to see that they get the best money possible for all these shows. With Gatemouth Brown, we got Eric Clapton to play on the record. Actually, Gate didn't know who Eric Clapton was! We got Eric to play on Gate's record along with Ry Cooder and other people, and all of a sudden Gate sells 100,000 records and his performance money triples, and to me that's the whole point.

You've also made several records in the last few years with the great singer Joe Williams, who is still going amazingly strong as he nears his 80th birthday.

There's a true gentleman there. He's also a guy who always has a lot of fun. I grew up listening to Joe Williams singing with Count Basie. Count Basie was my band! I wasn't one of those Duke Ellington guys— it took me a few years to appreciate Ellington—but Basie I got right away. As a kid who played trumpet, my goal was always to be lead trumpet player in the Count Basie band, and it still is. If I could play lead trumpet in the Basie band today, I'd do it!

The Count Basie Orchestra, the legacy band, is still a truly great band.

I'm telling you! We did the *Live in Detroit* record a few years ago, reuniting Joe Williams with the Count Basie Orchestra for the first time on record in a very long time. That was a thrill. Since that recording, for which the Basie band got together a real book to use with Joe, the band and Joe have been doing a lot of live dates.

Talking about Joe Williams reminds me of how close we are to the beginnings of jazz. A hundred years from now it will be like classical music—everyone will be dead and gone. We know people who knew people who were there at the beginning. But not for long. Joe has a famous quote about how one day soon there won't be anyone left who ever heard Billie Holiday sing live.

So I think we're living in a golden time, at least for the music. Maybe it was more of a golden time 20 years ago or so. But still, today is a golden time. Guys like Joe Williams, Max Roach, Dave Brubeck, George Shearing—the older guys who've seen it and been there—they were all friends with Louis Armstrong and Charlie Parker and Miles Davis. And so the chain of jazz is just a short chain. We've seen the links being formed in those people's lives. It's an amazing thing.

Sometimes if I'm in a record date and I'm having problems with the musicians focusing or getting in the right frame of mind, I'll tell them what I think, which is that music is a powerful medium that can change people's lives, that can make people feel good and bring something positive into the world that wasn't there before. That's an amazing thing, and the world needs more of that.

And if we have the opportunity of doing that—creating something that's going to last who knows how long, and will affect people's lives in a positive way over and over again—we've done a good thing. I don't know what could be better than that; I really don't. That's why I consider myself a lucky person to be able to work with people who can do that; it's a wonderful thing. ■

Eric Rudolph is a New York-based freelance writer.

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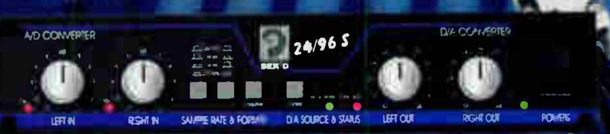

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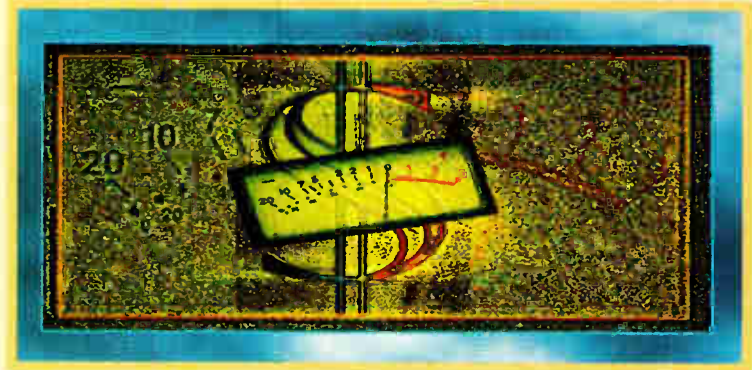


Surround audio: Read about it, learn about it, prepare for it, experiment with it, buy a few more speakers. But don't bank on it. Not yet, anyway.

Even though surround has that irresistible combination of technology, uniqueness and flat-out fun that comes along only once in blue moon (not to mention a catchy shorthand, "5.1"), don't let those qualities obscure the fact that there's an awful lot that has to happen before most studios see any real, consistent money out of it. As good as surround is—and I'm no Luddite here: when done well, it sounds fabulous—its success is contingent on a number of factors, most of which are well out of the control of the recording community.

The politics of surround audio are as complex and Machiavellian as those of the DVD standard. To give a little historical perspective, when the CD was introduced in 1982, it had basically two progenitors—Sony and Philips. Working as a team—a team, it should be noted, that had or was about to have significant content power with Philips' ownership of PolyGram and Sony's forthcoming acquisition of Columbia Records' assets—the two multinationals established a formal standard rather quickly and efficiently, which sent a strong message to the consumer electronics and entertainment industries that this was not vaporware, that it worked. The CD was sufficiently different from previous media—a critical component to any marketing campaign. Consumers responded, as did content providers. By 1985 the CD was entrenched; by the early '90s, it was the dominant music format in the U.S.

It would be nice to think that the CD paved the way for other optical disc formats. CD-R has certainly become popular and profitable for recording studios. Making money on CD one-offs has become a small

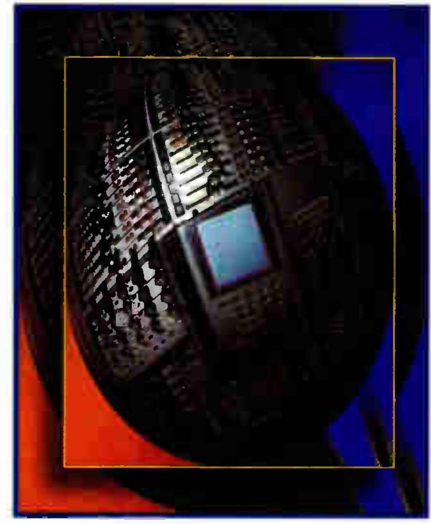
—CONTINUED ON PAGE 115

The Business of Buying

WHEN, HOW AND WHY TO LEASE EQUIPMENT

Leasing business equipment and technology has become a standard way of life for a majority of American companies. An estimated 80% of all U.S. businesses lease some or all of their equipment; of the $563.1 billion spent by U.S. businesses on productive assets in 1996, $168.9 billion—30%—was leased.

The leasing of professional audio equipment gained popularity about a decade ago, as the upper end of the equipment market continued to climb



in sophistication and price. The day of the million-dollar audio console was imminent.

Banks have been primary lenders to the studio industry for years, but as the stakes grew and the equipment and operations of the industry became more opaque to nonprofessionals, many

—CONTINUED ON PAGE 112

World Radio History

QUARTERLY

BY DAN DALEY

Get Yer Red-Hots!

THE COMMODIFICATION OF PRO AUDIO RETAIL

There is a scene in the film *Moscow on the Hudson* in which Robin Williams' character, a defecting Russian circus musician, stumbles into a supermarket and, confronted with the American cornucopia of product choices after a lifetime under the Soviet system, breaks down crying. It's easy to understand his pain: On the one hand, such plenty after such paucity would certainly provoke tears of joy; but the bewilderment brought on by so many choices could also account for tears of confusion.

You may have noticed that your local audio retailer has begun to look a bit like a supermarket recently. While the pro audio industry's transformation into a commodities market has been well-documented, the effects of this shift are still taking shape.

The technological foundations for this shift were laid in the early 1980s with the arrival of Tascam and Fostex 4- and 8-track recorders. These affordable multitracks spawned a personal recording industry that has affected (or infected, depending upon your point of view) every aspect of the recording industry. Retail changed in response, starting in 1988, when musical instrument store Manny's Music bought Manhattan pro audio dealer Audio Techniques to establish an independent pro audio arm to augment the bursting back room of the store on West 48th Street. Two years later Sam Ash, whose Manhattan store was located directly across the street, opened its own pro audio division.

A decade later, the focus has shifted to Florida, where MARS and Thoroughbred Music are headquartered, and Southern California, home to Guitar Center—the model of expanded mom-and-pop stores grown into nationwide chains—augmented by catalog sales companies such as Musi-

—CONTINUED ON PAGE 122

"Superstores" such as B&H Pro Audio attempt to offer one-stop shopping to audio professionals. For more on B&H, see p. 114.

World Radio History

Biograph: FLETCHER

Colorful and Controversial Pro Audio Dealer

Fletcher was brought up in Brooklyn and Queens, until he was old enough to run away to the circus, which is how he describes the neighborhood around Avenue A and East Houston Street in the East Village, where he learned his freak fundamentals in the early 1970s. Since then, he has been a fixture on the professional audio scene, easily recognizable by a mohawk of varying dimensions ("goes between six lanes and ten lanes," he explains), a Harley Davidson, extremely pronounced opinions expressed in a loud voice between drags on an unfiltered Camel (though he recently quit after 25 years) and occasional threats of physical violence.

PHOTO: EVEANNA MANLEY

Despite the menacing exterior and sometimes gruff manner, Fletcher (the only name he reveals) is a regular guy—friendly, devoted to his family and dedicated to what he calls "good sound."

After stints as a guitarist in New York bands, he came to the realization that he could make more money behind the scenes. "These guys hired me to move equipment and balance their sound one night for 20 bucks," says Fletcher. "At the end of the night, they each got paid $17.50 for the gig and I had $20. I figured being on the crew was a better racket than being in the band."

After a move to the Boston area, where he married Sue, he worked as a freelance engineer. Boston in the mid-'80s, however, was past its entertainment prime. He and two other engineers decided to pool their equipment for rental to make extra money. "But one night Sue comes home and says, 'Honey, you better sell one of those things in your rack or else we're not eating dinner tonight,'" Fletcher recalls. "I hadn't worked in four months, and I was becoming an 'Oprah'-ologist."

Fletcher's first pro audio sale, in 1989, was a pair of his prized LA-3A compressors to Ed Evans, then chief engineer at Power Station Studios in Manhattan. The deal went down only after Fletcher had gone through every previous letter of the alphabet cold-calling studios from *Mix*'s Northeast studio directory. He and his partners in the rental pool then started Mercenary Audio, named for their freelance engineering careers.

Mercenary and Fletcher became advocates of analog, mainly, he says, because digital didn't live up to its promise. But he did it with a certain, shall we say, flair for the conspicuous. At the 1996 AES convention in New York, he hot-rodded a 1975 stock Harley-Davidson golf cart (the motorcycle maker was then owned by AMF Industries, which manufactured golf carts under the HD brand), adding reclining bucket seats from a wrecked Chevy Chevelle and removing the single-jug panhead gas motor and replacing it with an EZ-Go electric motor, which made it acceptable to drive around the show floor. It carried a banner emblazoned "Analog's Back And It's Pissed."

The following year, at the L.A. AES convention, Fletcher created a piece of alleged artwork—a battered Alesis ADAT and a Mackie mixer impaled on a 4-foot spike—entitled "Shit on a Stick" and displayed it in his booth. It was his artistic interpretation of the meatballing of pro audio equipment, as the age of low-cost mass manufacturing kicked into high gear. Alesis didn't agree with his aesthetic vision. AES officials threatened to close his booth down and eject him from the show if he didn't take it down. After some bluster about First Amendment rights and possible retaliation, Fletcher dismantled the display.

Mercenary occasionally operates a recording studio, depending upon what gear is on hand and how Fletcher feels on a given day. The company took a shot at manufacturing its own pro audio gear several years ago. "We lost a phenomenal amount of money and figured that it was better to kick the plug out and let that patient die," he says of the venture.

But Mercenary now handles digital gear as well as analog equipment, now that digital is beginning to approach its real potential, says Fletcher. "I'm even mixing to digital these days," he adds. "I was never really just an analog guy—I was someone who simply fought for good audio. They were telling us back in 1978 that digital was the greatest thing around, and here it is 1999 and they're just starting to get it right."

Fletcher continues to live and work in the Boston area. He has quit smoking but continues to voice his strident views. The only argument he ever really lost, he admits, is one to his wife on the naming of their second daughter. "My first is named Sydney, and we call her Syd," he says. "I wanted to name the second one Nancy. I couldn't get that one past my wife." ■

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STAT Of the Month

WHO'S THE FAIREST OF THEM ALL?

Celebrating the 40th anniversary of its chart sections, *Billboard* magazine recently ran enough Top Ten lists to choke David Letterman. But the list that caught our eye was the one that named the record producers with the most Number One hits of all time. Here they are (with the hit numbers in parentheses):

1. George Martin (23)
2. Barry Gibb (14)
3. Lamont Dozier (13)
3. Albhy Galuten (13)
3. Brian Holland (13)
3. Karl Richardson (13)
7. Jimmy Jam (12)
7. Quincy Jones (12)
7. Terry Lewis (12)
10. Walter Afanasieff (9)
10. Mariah Carey (9)
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—FROM PAGE 108, THE BUSINESS OF BUYING

banks became skittish at providing large loans to studios. A recession in the early 1990s didn't help, and a surge in the number of start-ups shortly thereafter—in part a by-product of affordable technology that saw many home studios moving into the commercial stage—presented lenders with potential customers with short credit and business histories.

Several leasing companies specializing in pro audio entered the scene during this period. The largest is Terminal Marketing, in the New York City suburb of New City, Westchester County. But in recent years the number of leasing companies has grown across the country. Banks remain a big player in the credit aspects of this business, but leasing specialists have been significant in helping many studios get started.

TYPES OF LEASES

Most studios can't afford to make large

World Radio History

capital purchases, such as consoles and digital recording systems, outright without adversely affecting cash flow. With a straight bank loan, the buyer owns the equipment (the lessor retains title to the equipment until the term of lease has run its course, usually between three to seven years), contingent, of course, on continuing to pay off the loan. And with low interest rates available, bank loans look attractive. However, many banks are reluctant to make loans on expensive technology; in the event of default, the bank simply becomes one more creditor, and even if certain items are pledged as collateral, banks are not in the studio business and are generally not happy about having to hold auctions to recover their money. Leasing, then, becomes an alternative.

There are basically two types of leases: the so-called "true" lease, in which there is a market-value buyout at the

—CONTINUED ON PAGE 115

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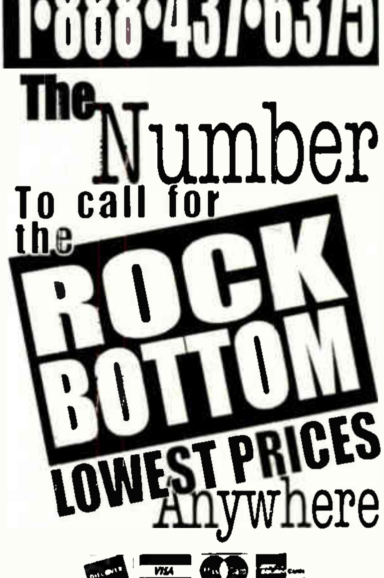

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TravelWise

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Well, maybe not. But there is a way to increase your odds of getting out of the zoo at the back of the plane. The key is to be flying a decent number of miles already. If you're racking up more than 25,000 miles per year, you can deal. That's the minimum amount set by most major airlines to achieve the first of several elite status levels.

The first thing you want to do is consolidate your flying. Choose one airline that best suits your usual destinations, enroll in their frequent flier program and concentrate your air travel with them. Once you hit 25,000 miles, you've qualified for elite status for the following year. At that point, contact the airline's elite desk (call the general reservations number and ask for it). Then request that you be awarded elite status for the remainder of the *present* year, as well. Indicate that you intend to keep flying this airline if they agree. There's a good chance they will. If not, ask for the name and number of the local marketing manager for the airline and talk to him or her about it.

Once you achieve elite status, you can start to upgrade yourself out of coach. This gets easier as you hit successive levels of elite—50,000, 75,000 and 100,000. Most airlines have a set number of miles for upgrades (and won't negotiate them or their annoying overnight delivery charge if you don't request them well in advance) or will use set amounts of "sticker" upgrades. However, frequent fliers

—CONTINUED ON PAGE 114

World Radio History

—FROM PAGE 113, TRAVELWISE

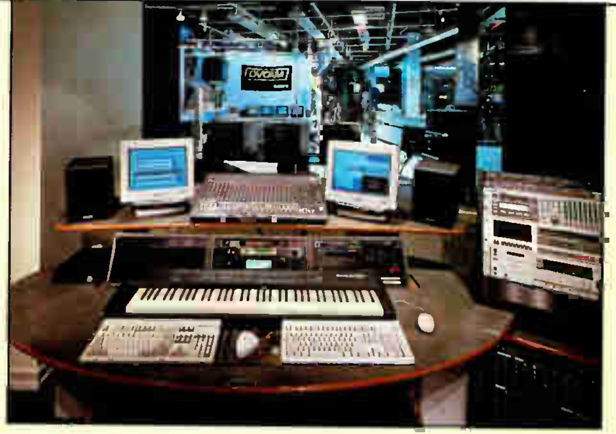
can often negotiate a free upgrade at the gate. Airlines generally hold two "revenue seats" for paying passengers until two to four hours before departure. Get to the gate early and ask if you can be on the wait list for these.

I've found that reaching the highest level possible on one airline makes the most sense in terms of getting the perks. However, at that point, or at any time after reaching initial elite status, you could also start lining up a second airline. Being elite on a second carrier will allow frequent flyers to play them against each other to a degree.

One way to get a second carrier on your side faster is to fax or mail a copy of your most recent mileage statement from the airline you have elite status with, stating that, if they would grant you basic elite status for the remainder of the year, you'd start flying with them. The more active your statement and the more miles you've flown that year increases your chances of a second carrier saying yes. The quid pro quo is that they'll request that you fly at least the minimum miles necessary during the rest of the year to qualify for that same level of elite for the following year.

Again, the key here is to be flying at least 25,000 miles a year to start with. Anything less and your petitions will wind up in the round file. But if you do fly at least that much and follow the plan, you, too, can get free drinks to go with the free peanuts. ■

B&H TAKES THE PRO AUDIO PLUNGE



Back in the old days there were boundaries you could count on. Roger Maris defined the number of home runs a human could smack in a single season when he yanked a Tracy Stallard meat ball over the old Yankee Stadium right field porch. Presidents dallied with mistresses the general public could accept. And damn it, there was a clear division between pro and MI audio gear! Audio equipment manufacturers now release gear so inexpensive that amateurs can avail themselves of feature sets many pros would not have been able to afford several years ago.

New York City's B&H, a privately owned single store with no chain affiliations, had specialized in catalog sales and video equipment. Several years ago, the store's owners looked at the declining cost of recording gear and decided to enter the market. They hired John Storyk to design a listening environment that mirrored a typical recording studio and set up the entire space so that all of the equipment—speakers and microphones, for example—can be accessed off of touchscreens for quick and accurate comparisons.

B&H brass set up a five-year plan for the audio department, expecting it to take that long to turn a profit. However, the first anniversary recently passed, and by that time they were already in the black. Where did they find the customer base? For starters, the store's video customers have shown increased awareness and interest in audio products, according to Al Spinelli, head of the Pro Audio Department. "We found that our video customers were becoming more audio savvy," Spinelli says. "We're a big Avid dealer, and we also carry the Media 100 nonlinear editing system." Spinelli says that in addition to sound for film, a lot of the video clients who migrate to B&H need live sound gear for their applications.

The John Storyk-designed listening environment at B&H.

Pro audio buyers generally know what they need when they step into a store, but MI clients need more education. B&H decided to go after "the best salesmen on 48th Street," according to Spinelli, who notes that sales people are all salaried. Commissions tend to push sales personnel to drive a sale when it might not be right for an individual, he believes, and the ethical conviction that the client should be served rather than slammed seems to be more than lip service at B&H. "We have a policy of no spiffs," Spinelli says. "We feel that motivates salesmen improperly and could conflict with what would be best for the customer."

Like many of you, I've bought lots of audio gear. Sometimes I know exactly what I want and know that I'll need no post-sales assistance. Picking up the phone and shopping price is the way to go in that case. However, there are other times when it would be extremely helpful to listen to four or five mics, for example, in a well-tuned room. At B&H they give you a set of headphones and record you to a hard drive on a variety of mics. This is handled very neatly—a Mac sits out of sight behind a wall, with an Audio Media III card dumping your takes to disk. When you've tested all of the mics in your price range, you can listen to the playbacks through the 'phones. Very helpful. If you're in Manhattan, give it a shot.

—*Gary Eskow*

World Radio History

—FROM PAGE 108, YOU'RE SURROUNDED

but regular profit center for many facilities. The same will likely go for CD-RW, though the falling price of hardware is starting to allow the recordable media to migrate to end-users themselves (less than $500 for a home CD recorder). Nonetheless, CD-R burners are becoming as ubiquitous as cassette decks in studios.

However, it won't necessarily go down that way for DVD and its audio variant. Instead of the relatively smooth, strategic moves that the two CD innovators were able to make, DVD comes with the equivalent of a technological paternity suit, with 16 major patent participants and countless smaller ones. Political maneuvering has resulted in numerous delays in format specifications and marketing moves. (You've heard of corporate cultures? Better believe in corporate egos, too.) That, in turn, scared off a lot of content providers in the beginning; the DVD-Video format is nearly two years old, but major film studios Fox and Paramount only agreed to provide content for the format in mid-1998.

On the DVD-Audio front, the format's final specification was delayed by almost a year (Version 1 came out soon after fall AES), no doubt partly because of a bitter rivalry between DTS and Dolby over compression schemes. And the major record labels are not exactly chomping at the bit to remix and remaster their catalogs in surround. They would love to see a replay of the 1980s, when consumers replaced entire collections of records and tapes with CDs; however, the music business is now run by bean counters, not musicians, and the guys with the green eyeshades have not seen any evidence that there is, or will be, a significant demand for surround discs in the immediate future. Underscoring this was a recent comment in *Replication News* quoting a BMG Records representative at a recent DVD confab as admitting that the label is "a little bit scared of upsetting the lucrative CD market for DVD-Audio."

Considering that the CD took a full decade to become the dominant species, I don't want to make it seem as though I'm asking DVD to pull off the trick in just a couple of years. The bottom line here is, get ready, get set, and let's see just where the surround deal leads. At the moment—and it could be a short moment—it sits somewhere between a fad and a trend on the cultural phenomenon scale. In the meantime, buy stock in speaker companies. ■

—FROM PAGE 113, THE BUSINESS OF BUYING

end; and the dollar-option lease, in which the entire cost of the equipment is amortized over the term of the lease, save for a token sum that varies according to state and local regulations. Most often it's $1; some states, such as California, require $101. The difference is critical to the IRS, and thus to lessees.

"Intent to own" is the rule that the tax people use in determining how and how much of a lease can be deducted from taxes. A "true" lease has the residual value of the equipment determined at the end of the lease term. As Chris Marchese, senior account executive at Commercial Credit, a pro audio leasing specialist in Irvine, Calif., explains, "There's no Kelly Blue Book for pro audio; you have to see what the equipment's value is at the time the lease expires based on what else is out there, because technology in this business changes so fast." But in a true lease, the entire payment—principal and interest—is deductible, treated as through it were a rental for tax purposes.

With a dollar-option lease, the fixed, token sum at the end—which is what allows it to technically fit the definition of a lease vs. a loan—is also construed as an intent to own by the IRS in most

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instances. The finances are thus treated the same as a loan: The interest portion of the payment is fully deductible, and the equipment is subject to standard depreciation schedules (usually over a period of five years, though not necessarily at an even 20% a year; check with your accountant).

The dollar-option lease is the one most often used in pro audio, and as explained, it's really more like a straight loan in the legal guise of a lease. "I don't even know why they call it a lease," observes Doug Pell, East Coast lease manager with J.G. Capital Corp., a 15-year-old leasing company in Manhattan Beach, Calif.

Aside from the tax benefits, a lease can be less entangling than a straight loan. The lessor retains ownership of the equipment, and that serves as its collateral. Default on payments, and they take the equipment back. "As lessors, we're not putting liens on other equipment or cross-collateralizing bank accounts or homes," explains Marchese. "Out interest is in the equipment."

TYPICAL LEASE

Outlining a typical dollar-option lease for a hypothetical $300,000 console, Doug Pell calculates a $6,300.56 monthly payment on a five-year (60-month) lease. While the interest is arrived at by using a money factor, reverse calculations indicate a 9.5% annual percentage rate (APR), which Pell, a former studio owner who leased equipment from the same company he now works for, says is toward the lower end of what's available. Make the last payment along with the buyout payment, and the title is yours.

However, there are some other considerations, says Pell. On a $100,000 lease, for instance, cutting the term from 60 months to 48 months reduces the amount of interest payable over the course of the lease from approximately $35,000 to $27,500, without affecting the interest rate. This trade-off will cost the lessee slightly less than an additional $200 per month to a 60-month payment of approximately $2,250. "Everyone knows cash flow is king, and they've heard the horror stories of businesses going under because they can't pay their leases," says Pell. "But the truth is, if you can afford to squeeze out a little bit more money each month, you can reduce your overall term costs substantially. That's always worth considering in a lease."

Some key points to note in a lease agreement are the term (length); the interest rate (running around 11 to 12% for purchases under $100,000, less for larger purchases; also expressed as a "lease factor" or "money factor," a decimal-place inversion of the actual APR); nature of payments (monthly, quarterly, semi-annually); down payments (usually first and last month's payments, with a 30-day lag before regular payments begin); warranty pass-through (almost always, but ask; remember, you don't own the equipment, the lessor does); and having all of the rights and responsibilities of both the lessor and lessee spelled out clearly in writing (such as how late fees are computed). There is a growing trend toward writing lease agreements and other contracts in standard English rather than obscure legalese—if your agreement is less than clear on key points, have an attorney look it over.

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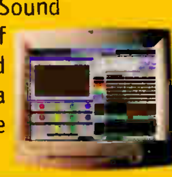

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The studio industry is a mom-and-pop business. People often play games with their financials. —Doug Pell, J.G.Capital

CREDIT CHECK

There is the "damned if you do, damned if you don't" aspect to the credit check. As Pell explains, "The studio industry is a mom-and-pop business. People often play games with their financials—they overstate losses and expenses so as to pay lower taxes. But if they're not showing profits, that can put them in between a rock and hard place when it comes to a credit review." This, he adds, is one of the reasons that argues in favor of using a leasing company that specializes in pro audio. "We and others tend to give more weight to someone's payment history than some of the other factors," he says.

Still, getting approved for a lease is a pretty straightforward process. Expect an application to ask questions about how long the business has been in operation, how it's structured (corporation, partnership, LLC, etc.), some basic personal information on the company principals (home addresses, phone and social security numbers, own or rent their homes), and references from banks, other lessors, members of the industry and vendors. If the studio is a relatively small business, the lessor may pull a personal credit history from a reporting company such as TRW, often going back three to five years, as well as check average bank balances over a year. "That's really just a thumbnail sketch," says Marchese. "In the process, you're also trying to get a feel for the person and his or her business. You have to go with gut instinct some of the time."

Gut instinct works both ways, and lessors have been hit by scams. Marchese cites South Florida's Dade County as one hot spot where a lot of pro audio lease fraud has taken place. In the typical scam, as he explains it, a prospective "client" is in league with an equipment seller on a relatively modestly priced piece of equipment, say around $30,000. "We can do the deal, but we don't require an actual inspection to see if the customer got the equipment," he says. "We do a verbal, asking the customer if it arrived and was working properly. If it is, then we release the money to the seller." However, often there's

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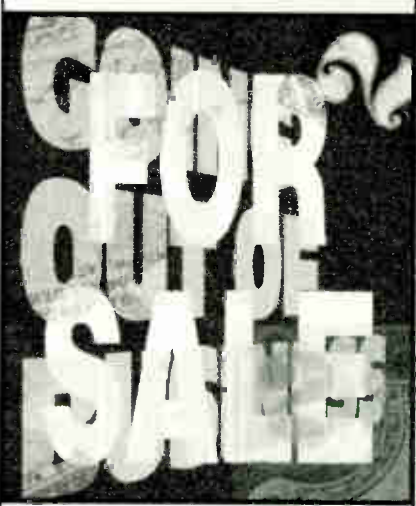
no equipment, just a bogus invoice. The lessor gets the standard first and last month's advance payments, and then nothing else. Buyer and seller disappear. Marchese says he's also aware that certain markets are oversaturated with studios and equipment at given times (such as Nashville is now). "That's not to say we wouldn't do leases in those situations," he says, "but we'd want to scrutinize the market a bit more than we might otherwise."

Customers need to stay alert, too. Not every leasing company hanging out a shingle has your best interests at heart. Lou Gonzales, who has leased all of his many consoles at Quad Recording in Manhattan (including a pair of SSL 9000J boards and an Axiom MT), recalls that his early leasing experiences were less than pleasant. "I definitely had problems when I first started leasing years ago," he says. "It was mostly a matter of not having the end-of-term buyout made clear from the start. There can be all sorts of hidden fees and costs. And also, don't forget that they still own the equipment right up until the end. Even if you've made the very last payment, if you forget to exercise

CASUALTIES OF WAR

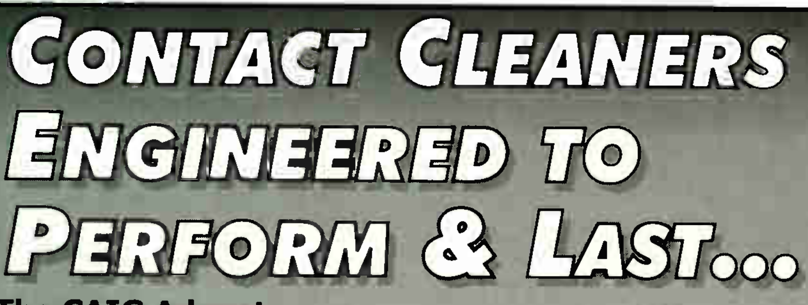
Whenever a Wal-Mart or Home Depot rolls into a town, it often sweeps away the independently owned and operated retailers who served those communities, often several generations' worth. And when a pro audio/MI superstore moves into the outskirts of town, local music stores experi-



ence what their counterparts in hardware, pharmacies and book sales have already gone through.

Hewgley's Music opened in Nashville in 1956 and stood in the same downtown location all of its 43 years—until last September, that is. This past fall, co-owner Jim Broadus, who had started working there as a clerk in 1962 for store founder J.G. Stone and who had purchased the business from Stone in 1983, announced the store's closure. Broadus attributed the decision to a number of factors, including Nashville's rapid growth, which has virtually eliminated free parking downtown ("Who's going to pay $10 for parking to buy a $5 set of strings?" he muses), as well as the closing of Opryland last year. But at least half of the decision is attributable to the arrival in 1997 of Thoroughbred Music, with MARS moving in the following year.

"It's not a level playing field



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anymore," says Broadus, who asserts that the superstores can buy wholesale from manufacturers at significantly deeper discounts than any independent retailer can. "They get a much better cost basis when they buy in those kinds of volumes."

But that phenomenon is doing more than just changing the rules; it's also changing the very fabric of the manufacturer-retailer relationship. "The manufacturer's rep is becoming an endangered species," say Broadus. "The superstores can make one phone call from their corporate headquarters and supply 22 stores simultaneously. The relationship between the retailer and the rep is no longer going to exist, and that means that the kind of hands-on knowledge about equipment that reps could convey one-on-one with retail sales people isn't going to be there anymore. And that will hurt the customer in the long run."

Broadus is not angry with the superstores, saying that it's a reality affecting numerous other retail sectors. However, he cautions that customers may be trading price for service wherever it happens. And in the musically dense environment of Nashville, he specifically notes that the city's musician base is crowded with endorsers who often undercut the retailers. "You have thousands of people in Nashville who endorse everything from guitar strings to guitar straps," Broadus says. "I used to design sound systems for Opry performers, and after I spec'd out a system for them, they'd say, 'See you later, Jim,' and go right to Peavey and buy the components direct for less. Gibson and Fender both have offices in Nashville just to handle all their endorsers. It has a big effect on sales here, and I don't think the chains have figured that one out yet."

Broadus, who expected to take a sales position with a major MI manufacturer after the store closed, had one prediction for the future of pro audio/MI retail: "In five years, one of them won't be here." ■

the one-dollar buyout, to send them that last dollar, you could technically lose the equipment. And the really bad companies can 'forget' to remind you that you're at the end of the lease. But if you have a good leasing company, it can keep you in business."

EARLY TERMINATION

One of the biggest bones of contention in equipment leasing is early termination. Lessors hate it, and many are reluctant to agree to it in the lease agreement. Some also impose penalties. In short, the way most lease agreements are worded, the lessee has to pay the full amount owed on the lease, including interest, whether the lease runs its full term or not. The lessee can try to find a buyer for the equipment, which would reduce the principal owed, but the leasing company makes its money from the interest. Marchese says that there is sometimes room to negotiate the cost of an early termination, but expect to find resistance to that from lenders in most instances.

But once a studio has entered the lease game, it can use early termination to its advantage under certain

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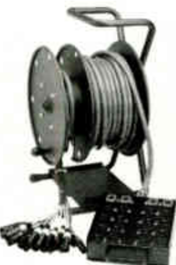

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circumstances. Once a lease passes its halfway point, it can make sense to terminate early (as long as there are no additional penalties specified for doing so) and trade up to new equipment by using the residual value of the original piece of equipment as leverage. Let's use the hypothetical $300,000 console again. In year four of the five-year lease, the lessee still owes $151,200 of the $378,000 (including interest) original loan. If the original console has a residual value of $150,000, that can be applied to a new $300,000 console, giving the studio a much newer piece of technology for nearly half the monthly payments. "Some studios just keep on rolling leases over after they start," says Pell. "It allows them to stay with the newest technology. Others simply want to own it at the end of the lease term." The caution here is to choose equipment with the highest value-retention over time; that generally means proven technology. Adroit choices at one point can generate savings later.

SIZE MATTERS

Most lease companies won't deal in numbers less than $10,000. Upper lending limits generally depend upon the financial credentials of the lessee. However, most lease companies also limit the term of any lease, regardless of size, when it comes to computer-oriented equipment and mass-production items. These include PC-based workstations and modular digital multitracks. J.G. Capital limits leases on these items to three years, citing low, sometimes negative, residual values.

Leasing can free up a studio's capital for other purposes, and allow a studio to move to the next level. It can also provide significant tax relief under the right circumstances. But in the end, remember that a lease is simply another kind of credit; and whenever you borrow money, remember that nothing it buys you is yours until that last dollar goes out the door. ■

—FROM PAGE 109, PRO AUDIO RETAIL

cian's Friend and B&H (which has opened a much larger Manhattan store). You can now purchase a $20,000 mixer and a $250 guitar under the same roof. More to the point, you can also purchase a $250 mixer and $20,000 guitar in the same place, which illustrates the radical changes wrought by technology, production economies and an MTV-fed, mass-market culture.

One way manufacturers have reacted to these market changes is by adapting their product development to fit new models. "There's more of everything, but a plethora of the same things," is how Mike Descoteau, a sales director at Dale Pro Audio, describes the situation. "When one company has a hit product, it seems like the others all follow and you a get this screaming redundancy of products. [At the same time], all of the manufacturers want you to do one-stop shopping with them." Certainly, it seems as if products come in waves now; several years ago at the AES convention it looked like the year of the powered monitor, and more recently the large-diaphragm microphone has become the Beanie Baby™ of pro audio.

A wide range of choices is ostensibly a good thing. But manufacturers seem to be following a path of vertical integration, in which each company offers products for any and all applications. In some cases, manufacturers have gone the OEM route, purchasing or licensing a design and putting their brand on it after a few changes. The key, some will tell you off the record, is adapting their product lines to fit the direction in which retail is moving. "The whole thing is about building brand awareness," says one marketing VP on condition of anonymity. "When someone walks into one of these mega-stores, you want them to see your equipment all over the place—mixers, outboard gear, speaker, microphones, you name it. That's the way retail is going. Manufacturers have to react to that."

Chicken or egg? Did technology change retail, or is it the other way around? Certainly, manufacturers are adapting to new sales formulas. But they may also be feeling the effect of changes in the *business* of pro audio. Ham Brosious, a co-founder of Audio Techniques who now specializes in equipment brokering and studio liquidations (at one time he was the leading MCI console and tape machine salesman in the U.S.), told me once, "The basis for a store like Audio Techniques was eroding. Pro audio dealers

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wanted exclusive sales on a few consoles, and now you had 15 stores in the New York area that sold Mackies. A lot of pro audio dealerships were based on a few product lines, and the manufacturers realized there was no longer an advantage in having an exclusive distributorship. We had MCI, and Martin had Otari. As Otari moved to other distribution methods and as MCI faded, the dealerships that relied on having them exclusively suffered."

The question for manufacturers and dealers, or retailers, then, is how to respond to changes, no matter the driving force. Expansion by acquisition seems to be the logical step at this point. MARS began with four ACE Music stores purchased by company founder Mark Begelman. Pro audio companies have also grown their pro audio divisions via acquisitions. Take a look at Harman Industries, which over the years expanded its holdings from speaker manufacturer JBL to console maker Soundcraft, to tape machine maker Studer to live sound processor BSS. Or use Peavey as a model—a major vertically integrated manufacturer that recently bought a majority interest in console/amplifier maker Crest Audio. Such vertically oriented operations provide the economies of scale needed to produce a lot of equipment cost-effectively. And commodification is the result. So the forces acting upon manufacturers are similar to the forces shaping retail. You can't change one without changing the other.

The fundamental shift in retail is now taking place on a massive scale—between MARS, Thoroughbred and Guitar Center, there are close to 50 megastores selling combinations of pro audio and music gear. All have announced that they will add more stores, and all are adding tangential products and services to their bread-and-butter—equipment sales.

Individual stores have also transformed into technology bazaars: In 1997 audio/video retailer B&H Superstore (see sidebar) opened a new 35,000-square-foot facility on Ninth Avenue in Manhattan, with four hands-on suites designed by John Storyk for customer evaluation of equipment and A/B comparisons using interactive touch-screen monitors. The store also includes a 100-plus-seat seminar room to host monthly educational events and seminars for staff and customers. Acknowledging the wide variety of both customers and technology these days, store manager Gary Eisenberger observed that the design concept "enables customers to access product knowledge totally at their own pace," adding that the store functions as "a year-round AES convention." Underscoring the degree to which this technology now parallels other retail environments, Eisenberger says that B&H has "created the ultimate pro audio, pro video and photo shopping experience."

There's plenty of action in other areas, too: Gibson, maker of fine guitars for more than 100 years, has embarked on a venture to open 50 Gibson Guitar Cafes across the U.S.; Fender has a clothing line. The business of making or selling either pro audio or MI equipment will never resemble the cottage industry it once was.

None of this ensures that homogenization will be the rule in the future. The industry is still heavily populated with small manufacturers with limited product lines, targeting small niches. "And that's the most exciting part of any trade show these days," says Descoteau, "finding the guy with a ten-by-ten booth on the perimeter of the floor who's making and selling something new. They're out there." ■

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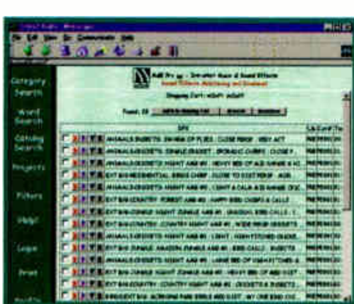
CIRCLE #090 ON PRODUCT INFO CARD

PREVIEW

ALCORN MCBRIDE DIGITAL AUDIO MACHINE

The AM-3 Digital Audio Machine™ from Alcorn McBride (Orlando, FL) is a book-sized audio playback device that can store hours of stereo digital audio and play it back on demand. Designed for theme park attractions, interactive kiosks and trade show displays, the AM-3 may be triggered by external contacts or programmed to loop continuously when powered. Flash memory or PC-Card hard disks (sold separately) store and replay .WAV audio files, which are editable on a PC using supplied software. Complex series of clips may be constructed via playlists, and RS-232 messages provide comprehensive control. The AM-3 operates on 110/220 VAC or 12 VDC.

Circle 327 on Product Info Card



SERVERSOUND AUDIO RETRIEVAL SYSTEM

ServerSound from mSoft Inc. (Woodland Hills, CA) is a cross-platform hard disk-based audio retrieval system designed for use with multiple DAWs connected to an NT server and also allows for remote access via T1/T3 lines or the Internet. The system, which operates on Mac, PC and UNIX platforms, includes a complete database of all commercial SFX libraries plus many music libraries and provides complex search functions, including optional SQL and Informix queries. ServerSound may be used simultaneously by multiple editors in a facility and allows for the storage and distribution of any type of media file. Multiple file format conversions are supported, and the system is based on browser technology, anticipating future platform trends.

Circle 328 on Product Info Card

AVALON TUBE COMPRESSOR/EQ

The VT-747SP from Avalon Design (San Clemente, CA) combines tube and discrete circuitry for the best of both worlds. Features include a stereo Class A opto-compressor with spectral control, stereo Class A 6-band discrete passive program EQ, vacuum tube bypass on both channels, large gain reduction VU meter and twin 60dB-range LED output meters. Additional features include extremely high headroom (+36dB input before overload), low noise (-92 dB unweighted) and internal regulated power supplies. Price is $2,495.

Circle 329 on Product Info Card

MIDIMAN MIDI INTERFACE/SMPTE SYNC BOX

MIDIMAN (Arcadia, CA) is shipping the BiPort 2x4s™ dual platform 2-in, 4-out MIDI interface and SMPTE Sync Box, with SMPTE and MIDI Time Code reader/writer/regenerator functions. The unit can be remotely controlled via PC or Mac software (included) or front panel buttons, and LED indicators allow full SMPTE control without a computer. A built-in timecode reader/writer/regenerator supports all common MTC and SMPTE formats, as well as 64 MIDI output channels (via four independent MIDI Out jacks) and 32 MIDI input channels (via two independent MIDI in jacks). The BiPort 2x4s is Apple Geo-Port compatible and supports both Windows MME and Mac OMS. Price is $149.95

Circle 330 on Product Info Card

RAVEN MDB-1 MIXER/DI/PREAMP

Raven Labs (Sylmar, CA) offers the MDB-1 combination mixer/direct box/buffer/preamp, a compact and versatile battery-powered unit with three independent ¼-inch inputs (each with its own accurate level control), a balanced XLR output, and auxiliary send and return connections. Designed to act as a quality direct box or preamp, the unit has an additional input to mix with the primary signal and also accepts a stereo input on one of the front panel TRS connectors. A Mute button mutes the primary output while leaving the aux send unaffected, easing onstage instrument tuning. Dual 9-volt batteries provide over 100 hours of operation. Noise is rated at -105 dB. Price is $299.

Circle 331 on Product Info Card

World Radio History

PREVIEW

SUMMIT AUDIO MPE-200 MIC PRE

Summit Audio's (Soquel, CA) MPE-200 is a 2-channel mic preamp with highpass and lowpass filter sections and a comprehensive 4-band equalizer on each channel. First in Summit's new Element 78 product line, the MPE-200 includes a discrete Class A high-level analog path designed by Rupert Neve and includes storage and reset capabilities that allow the user to compare up to 25 memory settings. The MPE-200 offers MIDI control, and settings may be copied between units. Additional features include floating and balanced output transformers. Price is $4,495.

Circle 332 on Product Info Card

LEADER TALENT TALK INTERCOM

The Talent Talk™ Intercom System from Leader Sound Technologies (Vancouver, BC) provides foldback, talkback and program interrupt capabilities for smaller production/post studios. Talent Talk System 31-2 has two mono and one stereo input (all balanced line level with XLR connectors and looped outputs) and interfaces with -10 and +4 equipment. Two talkback channels allow operation from two studios, and each input channel offers 48-volt phantom power and program interrupt level control. XLR stereo program outputs combine both mono talkback inputs and the stereo cue mix input. The stereo headphone amp can drive a variety of headsets, and passive Talent Boxes can be daisy-chained for multiple headphones, each with gain control. A push-to-talk footswitch is optional.

Circle 333 on Product Info Card

STAGE ACCOMPANY STUDIO MONITOR

The M57 studio monitor system from Stage Accompany (Bay Ridge, NJ) features a SA 8535M Ribbon Compact Driver™ for mid/high frequencies and two SA 1205M woofers. Mounted in a d'Appolito arrangement in a resonance-eliminating "box-in-box" cabinet constructed of double 18mm wood layers, the components feature a neutral and linear response and extreme dynamics handling (1,000W maximum input).

Circle 334 on Product Info Card

VIRTUAL SOUND & VIDEO V-CART

Virtual Sound & Video (Princeton, NJ) debuts the V-CART, a digital "cart" replacement system for the Macintosh. Designed for broadcast, theater and industrial applications, V-CART features a 10,000-entry playlist and offers play, loop, segue, auto-cue and jog functions, with 120 on-demand keys allowing instantaneous playback of cues for each "show" and dynamic editing of playlists during a show. Playlists may be assembled via drop-and-drag operations and logging features allow playlists to be saved to text files or a database (templates included). V-CART operates with all Digidesign PCI-based hardware cards and Macintosh Power PCs. Price: $699.

Circle 335 on Product Info Card

KORBY CM3 TUBE MIC

Korby Audio Technologies (Pittsburgh, PA) debuts the CM3 vacuum tube microphone. Supplied with a fully regulated power supply, shockmount, handmade wooden case and 25-foot cable, the mic offers cardioid, figure-8, omni and intermediate patterns, all controlled from the power supply. Features include an anodized brass mic body, handmade capsule element, 3-micron gold-sputtered mylar di-

aphragm and hand-selected 5703 vacuum tube. The diaphragm may be upgraded to 1.5 microns. Price is $2,700.

Circle 336 on Product Info Card

SOUNDFIELD 5.1 SURROUND PROCESSOR

SoundField (distributed by Transamerica Audio Group, Thousand Oaks, CA) offers the SoundField 5.1 Surround Processor, a single-rackspace unit that accepts the W, X, Y and Z signals from the four capsules in a SoundField microphone and outputs in a variety of surround formats,

World Radio History

Preview

including 5.1. Outputs in LCRS may be encoded into 2-channel Dolby Surround using a Dolby Processor. With the addition of an optional card, the unit will output in formats of up to eight channels, including 7.1. Front panel controls include Front Width, Rear Width and Rear Focus, allowing rear information to be blended into the front channels. As well as converting B-format information generated by SoundField MKV or ST250 microphones, the Surround Processor may be used to process B-format recordings.

Circle 337 on Product Info Card

NHTPro REFERENCE MONITOR SYSTEM

NHTPro (Benicia, CA) offers the A-20 Studio Reference Monitor System, a pair of two-way speakers and a separate control unit that includes a 250 W/channel stereo amplifier. The system features a frequency response of 45 to 20k Hz, ±2 dB, and is capable of 117 dB SPL. A five-position wall proximity control tailors the system's bass response for a variety of placements, and there is a five-position crossover optimization control. Additional features include a headphone output and clipping indicators, along with meters to show SPL, temperature and line voltage. The complete A-20 system is $1,900.

Circle 338 on Product Info Card

CIRRUS LOGIC SAMPLE RATE CONVERTER

The Crystal® CS8420 sample rate converter chip from Cirrus Logic (Fremont, CA) supports all standard rates from 8 to 96 kHz (within a 1:3 or 3:1 ratio) and will automatically convert the input to the required output sample rate. Featuring 24-bit input and output resolution, the chip supports 16- and 20-bit word lengths and incorporates appropriate dithering algorithms. Dynamic range is 120 dB, and THD+N is typically -117 dB. Pricing is $13.90 in 1,000-piece quantities.

Circle 339 on Product Info Card

HOT OFF THE SHELF

Sections of the **Meyer Sound Design Reference**, a handbook created by veteran SIM engineer Bob McCarthy, have been posted at www.meyersound.com; the printed version may be ordered by calling 510/486-1166... **New Sensor Corporation** offers U.S. military JAN subminiature tubes. The "New Old Stock" is unused and in its original packaging. Call 212/526-0466 or visit www.newsensor.com... **PROMUSIC is now the exclusive U.S. distributor for the Soundtrax Music Library**, a 13-CD collection produced in Sydney, Australia. PROMUSIC also has added the Elements collection. Demo CDs are available for both collections. Call 888/600-8988 or visit www.promusic-inc.com...The new **TOA Electronics Product Guide** includes a detailed Series 900 module chart and an instruction guide for configuring TOA modular wireless systems. Call 800/733-7088...**The Svetlana Electron Devices Audio Tube Catalog** features detailed technical specs and performance curves. Call 650/233-0429 or visit www.svetlana.com... **The ARX Systems CD-ROM** contains information on ARX amps, signal processors, equalizers and speaker systems, plus related documentation. For a CD-ROM, send an e-mail to duncan@arx.com.au or visit www.arx.com.au...**TRF Production Music Libraries** adds five new CDs: Celtic Fusion, in the Bosworth Series, New Age from the Musictrack series, Comedy (from the Bosworth collection) and Techno/House/Dance and R&B/Hip Hop from the Powersound series. All five releases contain 60-, 30- and 15-second versions. Call 800/899-MUSIC...The 148-page **Jameco Electronics catalog** features thousands of ICs, components, tools, test equipment and computer products. For a free catalog, which includes over 350 new products, call 800/831-4242 or visit www.jameco.com...**Middle Atlantic Products** intros two single-rack-space power distribution/sequencing units. The 15-amp PDS-615R provides six-step, time-delayed sequencing to six rear AC outlets. The PDS-2X315R is identical but uses two 15-amp circuits to power three outlets each. Prices are $560 and $611.25, respectively. Call 973/839-1011...**Nemal Electronics' catalog** of cable, connectors and related products is available online at www.nemal.com or may be ordered by calling 800/522-2253...**TecNec's Broadcast Product Catalog** features 800 new products. TecNec is the leading distributor for over 750 different manufacturers, including Canare, Kramer and Shure. Call 800/543-0909 or surf to www.tecnec.com...The **Molex MicroCross™/P&D-D (Plug & Display-Digital) connector** supports a bandwidth of over 2 GB on digital lines, enabling a single video connection to host systems for digital displays. Call 800/78-MOLEX...**Pomona Electronics' Model 6273** fully insulated BNC 50-ohm coaxial cable offers protection against shock hazards by featuring fully insulated BNC connectors at both ends and a 500 VRMS max. rating. Call 909/469-2900 or visit www.pomona-electronics.com. ■

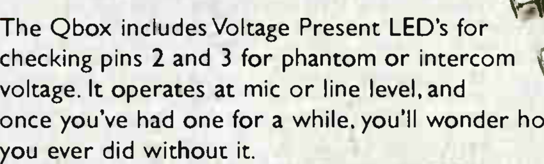
World Radio History

Testing...

. . . 1, 2, 3, 4,. . . it takes more than one kind of tester to get the job done on the road or in the studio, and we have a lot of them ready to ship your way. On the right is our new SC-48EP speaker cable checker. It tests EP cables with 4-pin and 8-pin connectors for shorts, opens, and cross-wiring. For systems with 6-conductor systems, we have the SC-46EP. Both models also check standard 3-pin XLR's. Down at the lower left of the page is our SC48NL, the companion 4-pin and 8-pin NL connector cable checker.

To your left is the Qbox audio line tester, featuring a complete set of tools for the person who has to find out what went wrong and fix it. For sending signal up a line it has a built in tone generator and a built-in microphone. For monitoring signals it has a built-in speaker and amp (along with a headphone jack for private listening).

The Tester checks cables with virtually every possible combination of XLR, 1/4", or RCA Phono connectors for shorts, opens, and cross-wiring.



The Qbox includes Voltage Present LED's for checking pins 2 and 3 for phantom or intercom voltage. It operates at mic or line level, and once you've had one for a while, you'll wonder how you ever did without it.

This practical, affordable phase checker gives a clear visual indication of driver polarity. Just play the source CD through your system and point the tester at the drivers you want to check.

The Phase Checker comes with a carrying case and source CD. It's powered by a standard 9V alkaline battery with an auto-off feature to preserve battery life.

Put your cables to the test — not your patience — with these handy testers.

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New Hardware/Software for Audio Production

STEINBERG CLEAN

Steinberg (www.steinberg.net) releases Clean, a CD recording/audio restoration application for Windows. Clean offers four audio restoration modules, based on WaveLab technology, specifically designed for cleaning up recordings made on vinyl, cassette, etc. All four modules can be applied simultaneously and adjusted in real time; up to 99 titles can be accommodated per track list. The package includes WaveLab Lite, adding audio editing functionality. The program supports all standard CD burners using disk-at-once mode. Retail is $99.

Circle 340 on Product Info Card

TELEX CDP 2001 CD DUPLICATOR

Telex (www.telex.com) debuts the CDP 2001, a desktop CD duplicator for multimedia and audio applications. A Direct SCSI interface connects directly to a CPU/EDAT Duplication Workstation, or the unit offers self-contained operation. Multiple slave CD-R enclosures can be connected with a Versatile Media Interface card (free with multi-unit configurations), enabling high-volume CD duplication—up to 280 CDs at a time; the VMI card also supports DVD-R duplication. Up to three VMI cards may be installed in each master unit. The CDP 2001 is $5,695.

Circle 341 on Product Info Card

TRACER 32-BIT DIAMOND CUT AUDIO RESTORATION TOOLS

Tracer Technologies (www.tracertek.com) recently began shipping the 32-bit version of its Diamond Cut Audio Restoration Tools, a PC-based real-time application for cleaning up noisy recordings. The new 32-bit version processes audio twice as fast and adds new features such as a Virtual Valve Amplifier (which emulates a variety of vacuum tubes), area harmonic exciter, expander/gate, compressor, de-esser, 10-band paragraphic EQ with dual-function display, filter effects and effects presets, RIAA EQ curves and spectrum analyzer. Price is $199. A live version, featuring a real-time feed-through mode, is due this month.

Circle 342 on Product Info Card

LUCID ADA FOR SONIC SYSTEMS

Lucid Technology (www.lucidtechnology.com) introduces the ADA8824, an 8-channel, 24-bit A/D and D/A converter designed for use with Sonic Solutions SonicStudio workstations. The two-rackspace ADA8824 connects to SonicStudio's 16•24 card via rear panel Sonic USP I/O connectors; I/Os include eight analog XLR, eight AES-3 and two S/PDIF ports. Features include oversampling delta-sigma A/D converters with a dynamic range of 113 dB, 44.1 or 48kHz sampling, 15-segment high-resolution LED metering, and the unit can lock to external AES reference or word clock sync. Retail is $3,295.

Circle 343 on Product Info Card

BITHEADZ UNITY DS-1 SAMPLER

The Bitheadz (www.bitheadz.com) Unity DS-1 digital sampler for Mac and Windows is a real-time 64-voice multitimbral sound module offering extensive MIDI implementation, 24-bit/48kHz resolution and phase-locked stereo signal path. It also features two stereo oscillators per voice, two assignable filters per voice (13 filter types to choose from), 6-stage envelope modulators, 6 LFO waveform options (synchable to MIDI clock), an arpeggiator and various effects processors. Supported file formats include Sound Designer I and II, AIFF, CD-Audio, .WAV and many instrument maps. Also included are a 16-channel mixer and 250 MB of sounds. Price is $449.

Circle 344 on Product Info Card

Upgrades and Updates

The **Tascam CD-RW5000 CD Recorder** (www.tascam.com) is a $1,299, two-rackspace unit featuring XLR and RCA analog I/Os, AES/EBU digital in, S/PDIF co-ax and optical digital I/Os, sync start and auto/manual track increment functions, plus support for all CD media. Tascam has also announced an agreement with **Sonic Solutions** (www.sonic.com) to provide file format compatibility between SonicStudio systems and Tascam's MMR-8 recorder and MMP-16 player...**A free software upgrade for Roland's VS-880** can be found at www.rolandus.com. New features include CD-R backup capability, auto mixing, microphone modeling and voice transformer effects...**Cakewalk's Metro 4** has been updated with new notation editing and printing capabilities. The software lists at $249; upgrades are free to those who purchased Metro after September 1, $19 for other Metro 4 users. Visit www.cakewalk.com for details...**Electronic DNA watermarking technology** for broadcast content is the result of a collaboration between Digigram and Solana Technology Development Corp. The encoder will be included, at no charge, on Digigram cards and in developer kits...Steinberg North America (www.steinberg.net) announced it will **distribute the Mixman Studio Deluxe application** from Mixman Technologies (www.mixman.com). In other **Steinberg** news, Cubase 3.6 is shipping. ■

World Radio History

by Chris Michie

Touring loudspeaker systems are a big-ticket item for any sound company, national or regional. And, unlike outboard gear or microphones, new packages don't generally come out annually. In this special buyer's guide, we have focused on systems introduced in 1998 or early 1999.

We have attempted to make the chart comprehensive, but there are some omissions. We excluded some big names

Company	Product Info No.	Product Name	Price	Frequency Response	Max. SPL @1 meter	Dimensions	Weight in lbs
acoustic 626/964-4700	210 (See p. 208)	A2112	$550	55Hz-18kHz+/-3dB	126dB	17"W x 29"H x 14.38"D	67
		A2115	$595	50Hz-18kHz+/-3dB	129dB	19.75"W x 29.5"H x 17.38"D	83
		A2212	$795	50Hz-18kHz+/-3dB	129dB	20"W x 41"H x 17.75"D	117
		A2215	$895	45Hz-18kHz+/-3dB	132dB	19.75"W x 46.5"H x 20.5"D	125
		A3112	$995	55Hz-19kHz+/-3dB	132dB	20.5"W x 32.5"H x 22.75"D	110
		A3115	$1,095	50Hz-19kHz+/-3dB	134dB	24.25"W x 36.75"H x 20.5"D	126
		A3212	$1,295	50Hz-19kHz+/-3dB	134dB	20.5"W x 47.75"H x 19.75"D	154
		AS118	$695	38Hz-200Hz+/-3dB	132dB	21.78"W x 30"H x 19.75"D	81
		AS215	$795	42Hz-200Hz +/-3dB	134dB	42"W x 24"H x 22"D	140
		AS218	$1,095	26Hz-80Hz +/-3dB	139dB	48.5"W x 29.38"H x 30"D	164
		SubTeq 2.6™	$1,890	26Hz-80Hz +/-3dB	139dB	30"W x 29.38"H x 48.5"D	153
Adamson 905/683-2230, www.adamsonproaudio.com	211	LX12	$1,200		127dB	14"W x 24.5"H x 18"D	68
Apogee Sound Inc. 707/778-8887, www.apogee-sound.com	212	ALA-5	$4,571	50Hz-17.5kHz +/-3dB	136dB	43"W x 17.88"H x 15.31"D	125
		ALA-9	$7,000	50Hz-17.5kHz+/-3dB	142dB	64"W x 22"H x 22.5"D	260
		FH-4	$4,995	50Hz-17.5kHz+/-3dB	140dB	29"W x 35.9"H x 29.5"D	200
Audio Composite Engineering 760/741-3787, www.audiocomposite.com	213	G-5	$11,495	50Hz-18kHz+/-3dB	131dB	45.25"W x 47.75"H x 23.75"D	210
Aura Sound Division 310/643-5300, www.aurasystems.com	214	RS-8.1P	$1,995	25Hz-25Hz+/-3dB	127dB	22.5"W x 36"H x 30"D	140
Bag End Loudspeakers 847/382-4550, www.bagend.com	215	Crystal-R	$3,020	80Hz-18kHz+/-3dB	129dB	14.5"W x 39.5"H x 17"D	110
		Opal-R	$2,420	100Hz-18kHz+/- 3dB	126dB	14.5"W x 25.5"H x 17"D	77
		Quartz-R ELF	$3,640	18Hz-65Hz+/-2dB	131dB	30"W x 40"H x 31"D	237
		Sapphire-R	$2,350	100Hz-18kHz+/-3dB	126dB	14"W x 24"H x 17.5"D	68
		TA1200-C	$670	75Hz-20kHz+/-3dB	119dB	14.5"W x 21.5"H x 12"D	39
		TA2000-C	$790	70Hz-20kHz+/-3dB	121dB	17.5"W x 22"H x 19"D	56
		TA5000-C	$990	50Hz-20kHz+/-3dB	123dB	22.5"W x 28"H x 19"D	70
Carvin 800/854-2235, www.carvin.com	216	1562	$370	40Hz-19kHz+/-3dB	129.8dB	17"W x 44.25"H x 15.25"D	70
		1584	$370	50Hz-19kHz+/-3dB	126dB	22"W x 31.5"H x 15.25"D	63
		1588	$600	45Hz-19kHz+/-3dB	132dB	25"W x 48.5"H x 19.25"D	124
		MP210T	$290	64Hz-16kHz+/-3dB	129dB	23.5"W x 17.5"H x 18.25"D	50
		SW1802	$700	35Hz-kHz+/-3dB	129dB	48"W x 31"H x 24"D	152
		TR1502	$350	48Hz-9kHz+/-3dB	130.8dB	20.25"W x 30"H x 18.75"D	65
		TR1503	$450	48Hz-19kHz+/-3dB	130.8dB	24"W x 36.75"H x 18.75"D	88
		TR1801	$400	37Hz-2kHz+/-3dB	125dB	24"W x 36.75"H x 18.75"D	79
		TR1802	$470	37Hz-19kHz+/-3dB	132dB	24"W x 36.75"H x 18.75"D	84
Community Professional 610/876-3400 www.community.chester.pa.us	217	AF1	$8,880	300Hz-18kHz+/-3dB	145dB	28"W x 46.5"H x 45.5"D	385
		AF10	$5,280	40Hz-300Hz	139dB	28"W x 46.5"H x 45.5"D	310
		AF2	$6,720	300Hz-18kHz+/-3dB	141.1dB	28"W x 46.5"H x 45.5"D	305
		AF3	$6,720	300Hz-18kHz+/-3dB	139.6dB	28"W x 46.5"H x 45.5"D	305
		AF4	TBD	80Hz-18kHz+/-3dB	TBD	28"W x 23.3"H x 45.5"D	240
D.A.S. Audio 860/434-9190, www.dasaudio.com	218	ST-15	$1,399	50Hz-20kHz	129dB	20.1"W x 28"H x 15"D	73
		ST-152	$1,795	35Hz-20kHz	135dB	22"W x 44"H x 19"D	141
		ST-18	$1,249	35Hz-300Hz	130dB	20.1"W x 28"H x 28.4"D	110
Eastern Acoustic Works 508/234-6158, www.eaw.com	219	KF400a	$7,080	62Hz-20kHz+/-3dB	126dB	19.75"W x 36.5"H x 19.75"D	160
		KF750aF	$9,800	50Hz-16kHz+/-3dB	145dB	27"W x 31"H x 34"D	235
		KF750F	$6,225	50Hz-16kHz+/-3dB	145dB	27"W x 31"H x 34"D	195
Electro-Voice 616/695-6831, www.electrovoice.com	220	T-251+	$1,030	50Hz-16kHz+/-3dB	135dB	19.2"W x 32.2"H x 23.6"D	78
		T-252+	$1,332	50Hz-16kHz+/-3dB	135dB	19.2"W x 49"H x 23.6"D	114
JBL Professional 818/894-8850, www.jblpro.com	221	HLA 4895	$7,650	110Hz-18kHz+/-3dB	140dB	33"W x 52.5"H x 35"D	48
		HLA 4897	$4,070	34Hz-150Hz+/-3dB	138dB	33"W x 52.5"H x 35"D	50

World Radio History

LOUDSPEAKERS BUYER'S GUIDE

commonly associated with loudspeakers, such as Clair Bros. and Showco, as their proprietary systems are not sold through the usual channels, if at all. Some major systems, such as Electro-Voice's X-Array, were omitted because the products were introduced before January 1998. And there was not enough room to include information on input connectors, rigging options, recommended subwoofers and amplifier power ratings. Readers should contact the manufacturers for further details.

For the purposes of this chart, the category of touring loudspeakers does *not* include in-ear monitors or wedge monitors, unless the latter were also designed to be pole-mounted as a small P.A. Prices and specifications were provided by the manufacturers.

Woofer(s)	Midrange unit(s)/HF unit(s)	Notes
1x 12"	1" exit, 2" diaphragm, proprietary CD conical horn	Trapezoid cabinet, 13-ply Baltic birch. 1" titanium compression driver is Ferrofluid-cooled. 5-year warranty.
2 x15"	1" exit, 2" diaphragm, proprietary CD conical hom	Same as A2112
2 x12"	1" exit, 2" diaphragm, proprietary CD conical horn	Same as A2112
2 x15"	1" exit, 2" diaphragm, proprietary CD conical horn	Same as A2112
1 x 12"	1.4" exit, proprietary CD conical horn	Trapezoid cabinet, 13-ply Baltic birch. 1.4" titanium compression driver is Ferrofluid-cooled.
1 x 15"	1.4" exit, proprietary CD conical horn	Same as A3112
2 x 15"	1.4" exit, proprietary CD conical horn	Same as A3112
1 x 18"		13-ply Baltic birch trapezoid cabinet
2 x15"		Same as AS118
2 x18"		Same as AS118
1 x 26", horn loaded		Horn loaded. Patented TeqGlide™ motor piston drive.
1 x 12"	1" exit compression driver, Acoustic Waveguide	Weather resistant, internal 2-way passive crossover. NC rigging points optional.
2 x 15", vented bass	2 x 1" throat drivers, loaded by dual waveguides	Typically used in vertical arrays of four cabinets or more. Requires PLA-5 ($1,036) or D-1 ($4,843) processor.
2 x 15", vented bass loaded by dual waveguides	2 x 10," horn loaded/2 x 2" throat drivers	Typically used in vertical arrays of three cabinets or more. Requires PLA-9 ($1,036) or D-1 ($4,843) processor.
1 x 15", horn loaded	1 x 10," horn loaded/1 x 2" throat driver, horn loaded	Tri-amped trapezoid cabinet. All drivers are Ferrofluid-treated. Requires F-4 ($1,036) or D-1 ($4,843) processor.
4 x 14" neodymium cones	2 x 1.5" exit neodymium compression drivers on conical waveguides/4 x 1,3/4" diaphragm compression tweeter	Constructed from Nomex® honeycomb composite materials. TrakStak® rigging system.
1 x 18" 1808 Neo-Radial		Lowpass 63Hz - 125Hz crossover recommended.
2 x 12"	1.4" exit compression driver with 3" titanium conical waveguide	Full range, long throw speaker. Integral fly points and ATM compatible.
1 x 12"	1.4" exit compression driver with 3" titanium conical waveguide	Compact full range, long throw speaker. Integral fly points and ATM compatible.
4 x 18"		Requires ELF-1 ($2,680) processor
1 x 12"	1.4" exit compression driver with 3" titanium conical waveguide	Trapezoid wedge monitor cabinet can also be arrayed.
1 x 12"	1.4" exit compression driver with 3" titanium conical waveguide	Time Aligned passive compact system, carpet covered.
1 x 12"	1.4" exit compression driver with 3" titanium conical waveguide	Time Aligned compact full range system, carpet covered, with stand adapter.
1 x 15"	1.4" exit compression driver with horn	Trapezoid cabinet, Time Aligned passive system.
2 x 15"	1" titanium driver	Bi-ampable
1 x 15"	1 x 6.5" cone/1" titanium driver	Bi-ampable
2 x 15"	2 x 8" cones/titanium horn	Bi-ampable
2 x 10"	Fostex 100W	Floor monitor with stand adapter
2 x 18", vented box		
1 x 15"	titanium hom	Bi-ampable
1 x 15"	1 x 8" cone/titanium horn	Bi-ampable
1 x 18"		
1 x 18"	titanium hom	Bi-ampable
	2 x M4 4" throat compression drivers/2 x EM282 2.8" compression drivers, 3 x VHF100 1" driver	Drivers are Ferrofluid-cooled. 300Hz/1.8kHz/7kHz crossover recommended.
3 x 15", horn loaded		300Hz low pass crossover recommended.
	1 x M4 4" throat compression driver/1 x EM282 2.8" compression driver, 1 x VHF100 1" driver	30 degree H x 40 degree V coverage pattern. Drivers are Ferrofluid-cooled. 300Hz/1.8kHz/7kHz crossover recommended.
	1 x M4 4" throat compression driver/1 x EM282 2.8" compression driver, 1 x VHF100 1" driver	60 degree H x 60 degree V coverage pattern. Drivers are Ferrofluid-cooled. 300Hz/1.8kHz/7kHz crossover recommended.
2 x 10"	1 x EM282 2.8" compression driver/1 x VHF100 1" driver	30 degree H x asymmetrical V coverage pattem for downfill. Drivers are Ferrofluid-cooled. 80Hz/800Hz/7kHz crossover recommended.
1 x 15"	4" compression driver with 1.5" exit	Trapezoid cabinet suited for monitor or PA applications
2 x 15"	4" compression driver with 1.5" exit	Bi-ampable, 2-way internal crossover (1.25kHz)
1 x 18", folded hom		
1 x 15"	1 x 8," horn loaded with integral phase plug/1 x 1.4" exit compression drive on 65x45-degree CD hom	Self-powered full range, tri-amplified system in a trapezoid cabinet
2 x 12"	1 x 10," horn loaded with integral phase plug/1 x 2" exit compression drive on 35x35-degree CD horn	Self-powered full range, tri-amplified system in a trapezoid cabinet
2 x 12"	1 x 10," hom loaded with integral phase plug/1 x 2" exit compression drive on 35x35-degree CD horn	Full range, tri-amplified system in a trapezoid cabinet. Requires MX8600 ($3,772) processor.
1 x 15" DL15ST	DH2T 2" diaphragm (1" exit) compression driver on 60x40 rotatable horn	Trapezoid cabinet, 2-way system (recommended crossover at 1200HZ)
2 x 15" DL15ST	DH2T 2" diaphragm (1" exit) compression driver on 60x40 rotatable horn	Trapezoid cabinet, 2-way system (recommended crossover at 1200HZ)
1 x 14", 1 x 10"	2451SL titanium diaphragm, 1.5" exit compression driver	Unique aluminum Spaceframe™, Differential Drive™ transducers. Requires DSC 260 ($1,933) or DSC 280 ($4,734) processor.
2 x 18"		Unique aluminum Spaceframe™ with ultra-rigid carbonfiber enclosure. Requires DSC 260 ($1,933) or DSC 280 ($4,734) processor.

World Radio History

Company	Product Info. No.	Product Name	Price	Frequency Response	Max. SPL @1 meter	Dimensions	Weight in lbs
LEM by Generalmusic 615/297-1587	222	K Series K-3	$995	65Hz-20kHz	124dB	21.3"W x 19.5"H x 21.1"D	11
		K Series K-6	$1,250	52Hz-20kHz	127dB	21.3"W x 19.5"H x 25.8"D	11
MacPherson 847/674-3535, www.macpherson-inc.com	223	M15X	$2,275	60Hz-17kHz+/-5dB	127dB	25"W x 16.5"H x 16.5"D	75
Martin Audio Ltd. (TGI N.A.) 519/578-0213 224, www.martin-audio.com	224	W8C	$3,899	120Hz-18kHz+/-3dB	135dB	22.1"W x 31.5"H x 36.4"D	157
		W8CM	$3,299	120Hz-750Hz+/-3dB	142dB	22.1"W x 31.5"H x 36.4"D	172
		W8CS	$2,799	45Hz-200Hz+/-3dB	138dB	22.1"W x 31.5"H x 36.4"D	134
		W8CT	$5,599	750Hz-18kHz+/-3dB	146dB	22.1"W x 31.5"H x 36.4"D	266
McCauley Sound 877/MCCAULEY, www.mccauley.com	225	EA-3	$2,725	70Hz-18kHz+/-3dB	132dB	21"W x 30.5"H x 30"D	180
		EA-4	$3,495	70Hz-18kHz+/-3dB	135dB	21"W x 51.5"H x 30"D	275
		EA-6	$1,535	15Hz-800Hz+/-6dB	123dB	21"W x 30.5"H x 30"D	150
		EA-8	$2,415	15Hz-800Hz+/-6dB	126dB	21"W x 51.5"H x 30"D	250
		MCX515	$1,325	85Hz-17kHz+/-3dB	126dB	18"W x 18"H x 10"D	75
		SA212	$2,035	75Hz-17kHz+/-3dB	132dB	22"W x 42"H x 14"D	123
		SA218	$1,500	32Hz-650Hz+/-3dB	130dB	22"W x 42"H x 30"D	140
Meyer Sound 510/486-1166, www.meyersound.com	226	MSL-6	$20,600	65Hz-16kHz+/-4dB	145dB	42.52"W x 42.75"H x 32.38"D	475
		PSW-6	$15,000	32Hz-100Hz+/-3dB	140dB	42.52"W x 42.75"H x 32.38"D	442
		SB-1	$15,000	500Hz-15kHz+/-4dB	110dB	54"W x 54"H x 48.5"D	293
		UPA-1P/UPA-2P	$4,900	100Hz-16kHz+/-3dB	133dB	14.5"W x 22.4"H x 14.5"D	77
MTX 800/225-5689, www.mtxaudio.com	227	P12H	$320	36Hz-20kHz+/-10dB	122dB	19"W x 24.5"H x 15.25"D	45
		P15H	$400	35Hz-20kHz+/-10dB	124dB	22"W x 28.75"H x 16,3/8"D	61
		P15SRB	$330	34Hz-130Hz+/-10dB	128dB	22.75"W x 28.75"H x 17,5/8"D	63
		P215H	$480	36Hz-20kHz+/-10dB	127dB	22"W x 46.75"H x 16,3/8"D	87
		PWR112	$500	39Hz-18kHz+/-10dB	124dB	17,5/8"W x 25.5"H x 13,7/8"D	58
		PWR115	$550	30Hz-18kHz+/-10dB	127dB	22.75"W x 28.75"H x 17,5/8"D	78
		PWR215	$750	32Hz-18kHz+/-10dB	130dB	22.75"W x 47.75"H x 17,5/8"D	120
		PWRS15	$400	35Hz-145Hz+/-10dB	129.5dB	22.75"W x 28.75"H x 17,5/8"D	78
Panasonic 323/436-3500 www.panasonic.com/proaudio		WS-AT200	$499	70Hz-20kHz+/-10dB		15.5"W x 22.7"H x 11.8"D	7
		WS-AT250	$435	30Hz-500Hz+/-10dB		15.5"W x 22.7"H x 11.8"D	7
		WS-AT300	$599	70Hz-18kHz+/-10dB		18,7/8"W x 27,5/16"H x 15"D	58
		WS-AT350	$599	70Hz-500 Hz+/-10dB		18,7/8"W x 27,5/16"H x 15"D	58
		WS-AT80	$295	70Hz-20kHz+/-10dB		11"W x 16.9"H x 9"D	3
Peavey Electronics 601/483-5376, www.peavey.com	228	QFactor 2212	$5,000	100Hz-18kHz+/-3dB	134dB	24.25"W x 45.75"H x 27.88"D	205
Professional Audio Systems 760/431-9924, www.pas-toc.com	229	DF-2.2	$1,574	50Hz-16kHz	126dB	17.25"W x 21.25"H x 17"D	72
		FT 2.2	$1,358	50Hz-16kHz	126dB	17.25"W x 21.25"H x 17"D	72
		LT-2	$4,159	200Hz-16kHz	139dB	26"W x 36"H x 42"D	185
		RS 2.2	$1,917	40Hz-16kHz	129dB	17.25"W x 35.35"H x 24"D	124
Radian Audio Engineering, Inc. 714/288-8900	230	RPX-108P	$745	80Hz-20kHz+/-3dB	125dB	17.5"W x 12"H x 12"D	26
Renkus-Heinz 949/250-0166, www.renkus-heinz.com	231	CE3-TA	$4,200	55Hz-17kHz+/-3dB	135dB	21"W x 32.5"H x 23.74"D	175
		CE3-TLO	$3,100	60Hz-350Hz+/-3dB	140dB	21"W x 32.5"H x 23.74"D	210
		CE3-TMHA	$5,400	350Hz-17kHz+/-3dB	139dB	21"W x 32.5"H x 23.74"D	162
SHS Audio 800/475-7686, www.shsaudio.com	232	S-3RX	$495	50Hz-16kHz+/-3dB		21.5"W x 19.5"H x 15"D	64
		SD-15	$239	60Hz-18kHz+/-3dB		19"W x 24"H x 12"D	41
		ST-15X	$578	48Hz-16kHz+/-3dB		21.5"W x 27"H x 17.5"D	77
		TR-12	$278	65Hz-22kHz+/-3dB		17"W x 20"H x 17"D	35
		TS-1812	$739	45Hz-22kHz+/-3dB		21.5"W x 79"H x 17"D	99
SLS Loudspeakers 417/883-4549, www.slsloudspeakers.com	233	112RT-1	$2,625	55Hz-20kHz+/-3dB	132dB	17"W x 28"H x 14"D	68
		T3R-FT	$4,995	40Hz-20kHz+/-3dB	136dB	25"W x 48"H x 25"D	210
Stage Accompany 800/955-7474, www.stageaccompany.com	234	Performer P2-29S	$3,987	60Hz-30kHz+/-3dB	135dB	20.8"W x 45.7"H x 17.9"D	60
		Bass SB45S	$3,387	30Hz-250Hz+/-3dB	136dB	45.1"W x 28.9"H x 26.5"D	229
Technomad Inc. 800/464-7757, www.technomad.com	235	Berlin 15/H	$1,699	50Hz-17.5kHz+/-3dB	127dB	21"W x 33"H x 11"D	90
		Cairo 15/C	$1,649	38Hz -17.5kHz+/-3dB	127dB	21"W x 33"H x 11"D	103
		NOHO/C	$999	60Hz-17.5kHz+/-3dB	118dB	15.5"W x 21"H x 11"D	58
		Paris 616	$755	65Hz-17.5kHz+/-3dB	116dB	8.3"W x 26.1"H x 7.3"D	25
		Vienna 16	$599	85Hz-17.5kHz+/-3dB	111dB	8.3"W x 16.3"H x 7.3"D	18
Woodworx Audio Products, Inc. 910/855-5600, www.woodworx.com	236	WAVE Series WX 6A	$593	68Hz-16kHz+/-3dB	113dB	13.5"W x 25"H x 12"D	42
Yamaha 714/522-9011, www.yamaha.com	237	F12	$1,050	55Hz-20kHz+/-10dB	n/a	19.7"W x 28.1"H x 14.76"D	15
		F15	$1,249	45Hz-20kHz+/-10dB	n/a	22.6"W x 33.66"H x 17.13"D	18
Yorkville Sound 716/297-2920, www.yorkville.com	238	F28	$1,499	35Hz-2kHz+/-10dB	n/a	11.22"W x 23"H x 25.78"D	33
		E5808	$799	45Hz-180Hz+/-3dB	135dB	27.5"W x 31.25"H x 22"D	117
		EF1004	$1,449	55Hz-19kHz+/-3dB	132dB	19"W x 42.5"H x 20"D	121
		EF2004	$2,069	55Hz-20kHz+/-3dB	130dB	26.3"W x 45"H x 18.3"D	187
		EF356	$859	60Hz-16kHz+/-3dB	128dB	17.34"W x 21.87"H x 14.38"D	60
		EF404	$959	45Hz-19kHz+/-3dB	128dB	21.75"W x 25.5"H x 19.86"D	80
		EF508	$1,099	50Hz-19kHz+/-3dB	126dB	18"W x 28"H x 14.25"D	189
		ES1004	$1,399	45Hz-300Hz+/-3dB	133dB	27.5"W x 42.5"H x 22"D	185
		ES700P	$1,099	45Hz-125Hz+/-3dB	131dB	23.75"W x 17.25"H x 24.21"D	90
		ET604	$1,059	50Hz-16kHz+/-3dB	130dB	16"W x 30"H x 16.5"D	84
		TX95	$2,149	30Hz-150Hz+/-3dB	131dB	24"W x 51"H x 24.8"D	176

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Woofer(s)	Midrange unit(s)/HF unit(s)	Notes
1 x 12" coaxial	coaxial compression driver	Bi-amp capable, may be used as floor wedge
1 x 15" coaxial	1.5" compression driver	Bi-amp capable, may be used as floor wedge
1 x 15"	2" compression driver with slot CD horn	Biamplified, may be used as a wedge monitor or stand mounted or flown. Requires CCM15X ($321) processor.
1 x 12" loading mid horn on CD horn	1 x 6.5" cone on toroidal CD horn/1" compression driver	3-way system in trapezoid cabinet. 750Hz/3.5kHz crossover recommended.
2 x 12" cones loading low mid horns		Longthrow mid enclosure. 120Hz/750Hz crossover recommended.
1 x 15" loading port assisted folded horn		Horn loaded trapezoid bass cabinet. Low pass 120Hz crossover recommended.
	3 x 6.5" cones on toroidal horns/6 x 1" compression drivers on CD horns	2-way long throw high mid/HF enclosure. 750Hz/3.5kHz crossover recommended.
1 x 12"	1 x 2" extended HF compression driver	Horn-loaded, longthrow hi-mid cabinet with 30x30-degree coverage
2 x 12"	1 x 2" extended HF compression driver	Horn-loaded, Hi-Q longthrow hi-mid cabinet
1 x 18"		80Hz crossover recommended.
2 x 18"		80Hz crossover recommended.
1 x 15"	1 x 2"	Coaxial monitor, also usable as an arrayable downfill. Built-in crossover.
2 x 12"	1 x 2"	Built-in crossover.
2 x 18"		
2 x 12" MS-12	3 x @" throat MS-2001A compression drivers	Full-range self-powered arrayable concert system (integrated processor).
2 x 18" MS-818, 4 x 15" MS-415		Self-powered cardioid subwoofer (integrated processor).
1 x 12" MS-12	2" throat MS-2001A compression driver	Self-powered parabolic sound beam for extreme long throw (integrated processor).
1 x 12"	1 x 3" diaphragm compression driver	Self-powered (integrated processor). Available with 100x40-degree HF horn (UPA-1P) or with conical 45-degree horn (UPA-2P)
1 x 12"	1 x compression driver on a 90x90-degree CD horn	
1 x 15"	1 x compression driver on a 90x90-degree CD horn	
1 x 15"		
2 x 15"	1 x compression driver on a 90x90-degree CD horn	
1 x 12"	1 x compression driver on a 90x40-degree CD horn	
1 x 15"	1 x compression driver on a 90x40-degree CD horn	
2 x 15"	1 x compression driver on a 90x40-degree CD horn	
1 x 15"		
1 x 12"	1 x 35mm compression driver on a 60x40-degree SCWG horn	Trapezoid high-impact molded resin cabinet.
1 x 12"		Trapezoid high-impact molded resin cabinet. Requires WS-SP2A ($360) processor.
1 x 15"	1 x 35mm compression driver on a 60x40-degree SCWG horn	Trapezoid high-impact molded resin cabinet.
1 x 15"		Trapezoid high-impact molded resin cabinet. Requires WS-SP2A ($360) processor.
1 x 8"	1 x 25mm tweeter on a 60x60-degree SCWG horn	Trapezoid high-Impact molded resin cabinet.
2 x 12" horn loaded	1 x 44XT Ferrofluid driver with a 60x40 horn	
1 x 15" concentric	2" compression driver	Requires TOC-S2 ($2,000) processor.
1 x 15" concentric	2" compression driver	Requires TOC-S2 ($2,000) processor.
1 x 12" concentric	2" compression driver	Requires TOC-L2A ($2,000) processor.
1 x 15" concentric	2" compression driver	Requires TOC-R2 ($2,000) processor.
8" coaxial	1" exit compression driver	Stage monitor with 45 and 35 degree angles may also be pole mounted
2 x 12"	2 x 6.5" carbon fiber cones/2 x 1" compression drivers	Requires X14 ($1,100) processor.
4 x 12"		Requires X14 ($1,100) processor.
	3 x 6.5" carbon fiber cones/6 x 1" compression drivers	Mid-high module. Requires X14 ($1,100) processor.
1 x 15"	Titanium compression driver	Full-range 2-way system.
1 x 15"	3" x 7" HF horn	Full-range 2-way system.
1 x 15"	Titanium compression driver	Trapezoidal full-range 2-way system, incorporates 18dB/octave crossover.
1 x 12"	Powerline	Trapezoidal compact 2-way system.
1 x 18"	1 x 12"/Powerline	Tower stack design (HF unit pole-mounted on LF unit)
1 x 12"	6" ribbon, horn loaded	Two-way design, passive x-over (1300Hz) available.
1 x 15"	1 x 10" horn loaded/6" ribbon, horn loaded	3-way system. 350/1400Hz crossover recommended, or BSS-388.
2 x 15" (SA 1502)	1 x SA 8535P ribbon compact driver	Trapezoidal MF/HF cabinet for medium to large PA applications. Complete system includes PR2 amp racks.
3 x 15" (SA 15)		LF cabinet for medium to large PA applications.
1 x 15"	1 x 2" compression driver	
1 x 15"	1 x 12"/1 x 1" compression driver	
12" coaxial	1 x 1" compression driver (coaxial)	
2 x 6.5"	1 x 1" compression driver	
1 x 6.5"	1 x 1" compression driver	
2 x 6.5"	1 x 1" exit compression driver on waveguide	Passive internal crossover
1 x 12"	1 x 3" titanium compression driver	Trapezoid cabinet, bi-ampable
1 x 15"	1 x 3" titanium compression driver	Trapezoid carpeted enclosure
2 x 18"		
1 x 18"		Requires EP508 ($199) processor.
2 x 15"	1" B&C compression driver, 60- x 40-degree horn.	Trapezoid full range system. May be bi-amped with EP1004 ($199) processor.
2 x 15"	2" B&C compression driver, 60- x 40-degree horn/ 1 x B&C tweeter.	Full range system. May be bi-amped with EP2104 ($199) processor.
1 x 12"	1" B&C compression driver, 90- x 40-degree horn.	Full range system. May be bi-amped with EP350 ($199) processor.
1 x 15"	1" B&C compression driver, 90- x 40-degree horn.	May be bi-amped with EP400 ($199) processor.
1 x 15"	2" B&C compression driver, 60- x 40-degree horn.	Full range system. May be bi-amped with EP508 ($199) processor.
2 x 18"		Requires EP1004 ($199) processor.
2 x 10"		Self-powered subwoofer
2 x 10"	1" B&C compression driver, 60- x 40-degree horn.	Full range system. May be bi-amped with EP600 ($199) processor.
2 x 18"		Requires TX8P ($849) processor.

World Radio History

EARTHWORKS Z30X

MICROPHONES AND LAB 102 PREAMPLIFIER

In 1996, Earthworks came seemingly out of nowhere with the TC30K, an omnidirectional microphone that featured response up to 30 kHz and got rave reviews. "Baby B&Ks" was a description heard often, and the shape was certainly suggestive of B&Ks.

However, Earthworks did not come out of nowhere. The company was founded in 1979 by audio legend David Blackmer (the "db" of dbx) and was first engaged in moving earth and reconditioning the old brick mill building where the company is now housed. Earthworks followed up the TC30K with the TC40K omni, which upped the response to 40 kHz and garnered yet more acclaim. By the time the QTC1 (yet another omni with lower noise and higher sensitivity) was released, the cry from recording engineers for a cardioid version of these wondrous instruments had become a din.

The Z30X is Earthworks' answer to the call and, let me say right up front, it fulfills every expectation. To ensure full appreciation of the company's handiwork, Earthworks has also introduced the Lab 102, a high-quality, 2-channel mic preamp.

Like most of the Earthworks microphone family, the Z30X is long and slim and has no ancillary features: No HPF, no pad, no pattern switch. It's a cardioid microphone, plain and simple, with a ⅜-inch Mylar diaphragm. At about eight ounces, the Earthworks is pretty much of a lightweight and is relatively easy on the pocketbook: The Z30X is $750, or $1,600 for a matched pair.

SPARTAN PANEL LAYOUTS

For most of my evaluation of the Z30X I used it in conjunction with the $1,500 Lab 102 preamplifier. (The preamp is also available in a single-channel form as the $750 Lab 101.) The Lab 102 comes in a single-rackspace box that, like most mic preamps, features rather Spartan front and rear panel layouts. For each channel, the front panel has a polarity switch, phantom power switch and indicator LED, standby switch, stepped gain switch (with 6dB steps), clip LED and variable output pot. The clip LED begins to flash at 90% of the maximum level before clipping, and the LED stays on for a period proportional to the signal; if hard clipping occurs, the LED stays on for a full second. This is one indicator that actually gives some useful information.

The rear panel has, for each channel, an XLR input and two XLR outputs. One of the outputs offers a stepped output level; the other's level is controlled by the front panel output level pot. Additionally, the variable output is available on a ¼-inch TRS jack. I used the variable output almost exclusively. The Lab 102 has some heavy-duty specs, such as its ability to accept peaks up to 14V (10V RMS) at the input and output up to the same 14V, and its frequency response, which is stated as 1 to 200k Hz, give or take a half a dB! Alrighty, then.

I used the Z30X on a number of different sources, and, while no microphone is ideal for every application, the Z30X proved extremely versatile. I first used it to record the great wind player Paul McCandless who, for this session, played mainly soprano sax. I set the mic on a stand, went into the control room, plugged it into the Lab 102, and brought up the level to be sure it was working. Boy, was it working. I hadn't even placed it yet and it immediately sounded luscious, full and even across the spectrum. And it sounded even better once I worked the placement some. To say I was impressed right off the bat is an understatement.

The Z30X captured a phenomenal amount of detail—even the sound of the keys being fingered was absolutely accurate. "Clarity" and "detail" are words I've seen in every single Earthworks microphone review I've read, and those are indeed the best words to describe the sound of the Z30X. This first impression held through every single trial I gave the microphone, even in those few cases where I didn't feel it was the best tool for

BY LARRY THE O

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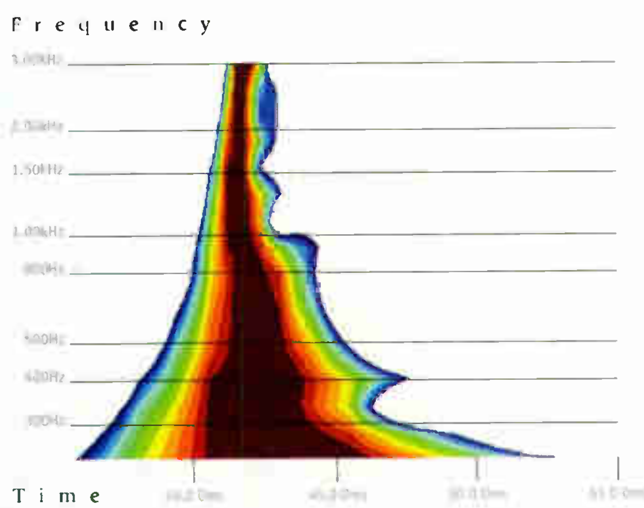
VA4 TECHNOLOGY

It's about Time.

Introducing the new KF700 Series



This wavelet image indicates amplitude in color (brown represents 0 dB, violet represents -12 dB) over time (horizontal axis) by frequency (vertical axis). The smooth, steep, tightly-packed slope through the upper midrange clearly shows the unified arrivals of critical vocal intelligibility information.

In the 1980's the KF850's Virtual Array Technology™ eliminated interaction between array modules in the horizontal plane.

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the job.

Using a matched set of Z30Xs—which came in a beautiful cherrywood box—I recorded myself playing vibraphone, trying several configurations, including coincident, ORTF and spaced. As with such experiments in the past, the spaced pair gave the best results. Vibes are a very revealing source for testing microphones, as the tone is pure and bell-like, which often reveals "hot" areas in many microphones' responses. Further, when multiple notes are ringing there is frequently very strong interaction between the harmonic partials of the notes, which has actually overloaded the capsules or preamps (it's hard to know which) of some microphones I've tried. The Z30Xs were completely unfazed (so to speak) by this behavior. Once placement was tweaked, the Z30Xs produced a beautiful, wide stereo image that was even throughout the range of the instrument. Imaging was exceptional, with the highest notes full right, lowest notes full left and the center of the keyboard dead center in the image.

While I had the mics set up for recording the vibes, I took the opportunity to try putting the Z30Xs through a different mic pre—one of good, but not outstanding, quality. The sound of the microphones was still superb, but the test clearly demonstrated the Lab 102 to be of outstanding, not just good, quality, with the greatest difference being in openness and accuracy of the high frequencies. Setting the Lab 102's gain for this recording, I noticed that the Z30Xs are capable of quite high output levels, up to 10 volts into 5 kilohms.

I also tried using several "workhorse" microphones, including Sennheiser 421s and Shure Beta 87s, with each of the preamps, which, as expected, showed the Lab 102 to be the better mic pre and the Z30Xs to be far superior microphones.

I loaned the mics to the multitalented Nick Peck who, in his guise as a recording engineer, was recording a live album of Ali Akbar Khan in concert with a small orchestra. Peck used the Z30X pair as distant mics to capture the sound of the 40 musicians in the hall and raved about the clarity and openness of the sound, as well as the imaging, which he found quite remarkable.

I couldn't very well evaluate a pair of small-diaphragm condenser microphones without trying them as drum overheads. As a drummer, I am rather fussy about drum overheads, but I do not exaggerate when I say that I liked the Z30Xs better than any other microphone I have ever tried, except for B&Ks. As with the vibes, the imaging, balance through the kit (even the kick was well balanced in the mix), and, most notably, clean reproduction of the high end, on cymbals and snare especially, were awesome. There was no washy smearing on the cymbals; the articulation was perfect. In fact, for a real grungified bash-and-smash sound, the Z30Xs truly might be too good!

While recording drums, I tried using the Z30Xs as tight mics on snare and toms. (Alas, I ran out of time before trying one on the kick.) Tonally, these tests were just as pleasing as the others: all the snap and crack one could ask from a chrome snare, and both body and attack on the toms. The Z30Xs seemed perfectly happy to take the high SPL—the mic is rated for a max input level of 145 dB SPL—but the resulting output from the snare mic was so high that every gain setting of the Lab 102 except the absolute lowest resulted in occasional clipping. At that point, I wondered whether the lack of a pad on the Lab 102 could be a problem if recording a serious pounder of a drummer. (I tend to hit the drums pretty hard, but drummers used to playing at very high volumes do hit harder.)

About this time, I was thinking the Z30X could do no wrong. I wasn't too far from the truth, but I did finally find an application that left me just slightly less thrilled with this astonishing instrument. I tried the Z30X for voice-over work and found it less than ideal in two ways. First, I am often looking for some

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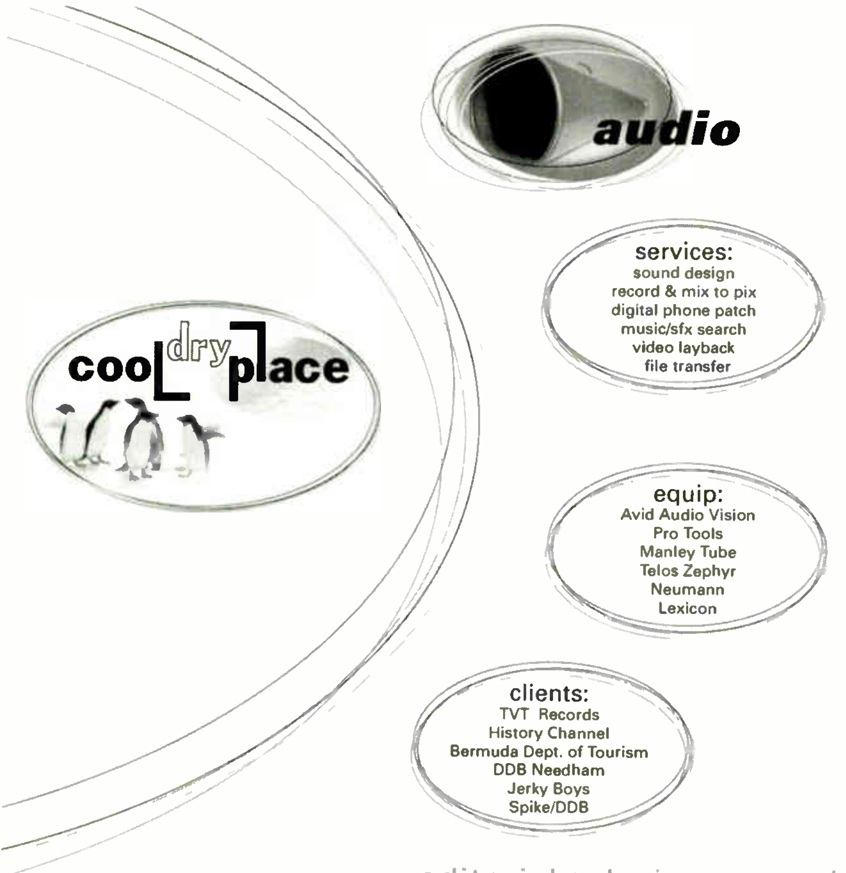

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sort of distinctive coloration when recording vocals, and while I would certainly say the Z30X has its own sound, it did not provide the "character" I was looking for. Of course, every voice is different, and vocal applications vary widely, so I can envision a case in which the Z30X would excel at vocal recording, but that was not the case in the uses I had for it. Still, it didn't sound bad on voice-over, it just wasn't my first choice.

The only other aspect of the Z30X I could cite as a shortcoming was the proximity effect, which was very pronounced when working the mic close (6 inches or less). Recording an actor who likes to work very close on the mic, I applied substantial LF roll-off and still was getting too much bass, which eventually had to be rolled off during post-processing. However, this same characteristic was a plus when tight-miking toms on a drum kit.

SOME SMALL GRIPES

I should mention some of the Lab 102's flaws. Although fanaticism in the pursuit of fidelity is a great virtue, it sometimes leads to small decisions, regarding features, where I disagree. For one, the Lab 102 has no AC switch. This is something I find particularly annoying. There are several circumstances in which I prefer to power a piece of equipment down without unplugging it. The Lab 102 also uses an outboard power transformer, but Earthworks has wisely opted for the tolerable "lump in the line" approach rather than the classically inconvenient "wall wart."

The other point where I differ with Earthworks is in the Lab 102's use of unbalanced outputs. To be precise, the signal cold conductor is not connected to ground (as the rear panel graphics indicate), but it is a signal return, not a 180° phase-flipped image of the signal hot conductor. Earthworks asserts this was done to avoid adding another stage to the signal chain, which I do appreciate, but I think there are many applications where engineers would choose to put the preamp close to the microphone and have their long cable run be from the preamp to the console or recorder, rather than from the mic to the preamp. In this circumstance, it is desirable to have the superior common mode rejection, which balanced lines allow, of interference that may be picked up along the run. The degradation of one more line amplifier (which,

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knowing Earthworks, would be of impeccably high quality anyway) would be worthwhile to me in exchange for making it easier to rid my audio of the far greater degradation the cruel world can impose in transit. Further, the unbalanced outputs put the Lab 102 more at the mercy of the topology of the input stage of the next piece of equipment in line. Perhaps Earthworks will consider a balanced option in future products.

I conducted several experiments to check the off-axis response of the Z30X and found that the only noticeable tonal alteration was some roll-off in the low frequencies. At the null points in the mic's pickup pattern the recording contained virtually no direct sound at all, just a little bit of room reverberation. It is my opinion that this smoothness in the off-axis response is a major contributor to the spectacular results I got using the Z30Xs in a spaced pair configuration. In my tests, the Z30X's noise level was never audible above the quiescent noise in the studio, but I did not have the opportunity to work with them in a room as critically quiet as a good Foley stage. (The Z30X noise spec is given as 22 dB SPL, A-weighted.)

Earthworks also gave me the opportunity to evaluate the Z30XL ($900 each, $1,900 for a matched pair), a hypercardioid version of the Z30X. I used this mic for voice-over work (in order to minimize room sound) and it was used extensively for Foley recording in a less-than-optimal environment that similarly required a tighter pattern to avoid unwanted pickup. The Z30XL's characteristics were, of course, nearly the same as the Z30X. I detected just a wee bit more coloration in the off-axis response, which I would expect in a hypercardioid, but Nick Peck, who did the Foley recording wearing his sound designer hat, disagreed, saying that decreased level was the only effect he heard in off-axis pickup. Peck remarked especially on the clarity of low-level detail when recording effects like paper being manipulated.

By now, dear reader, you must have noticed the great quantity of superlatives I have dispensed throughout this review. On rare occasion, I review a product that absolutely floors me and leaves me so enthusiastic I am almost embarrassed by how my own copy gushes. The Z30X is such a product; put simply, it just kills. To me, microphones and speakers are the toughest things to really get right and the most exciting when they are. My ardor for this microphone is rooted in my love of sound and music, my perfectionist nature and the thrill of coming across a tool that not only meets but exceeds my standards.

Not to be given short shrift, the Lab 102 is also an exceptional piece, providing extremely accurate and quiet amplification, and is plainly the ideal companion for the Z30X.

Everyone's mic cabinet can use another pair of good, small diaphragm condensers and everybody's rack can hold one more high-quality preamp.

Value for the money is simply not a question for the Z30X and Lab 102, and neither is performance. At these prices, the only question should be when you will place your order.

Special thanks to Nick Peck for his contributions to this review.

Earthworks, Box 517, Wilton, NH 03086; 603/654-6427; fax 603/654-6107. Web site: www.earthwks.com. ■

Larry the O is a musician, engineer and producer whose San Francisco-based company, Toys In the Attic, provides a variety of music and audio-related services.

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Great River Electronics MP-2

TWO-CHANNEL MICROPHONE PREAMP

Simplicity is an art unto itself. A master chef can cook an amazingly complex dinner requiring hours of work, but sometimes a simple meal—made with fresh ingredients—can taste better than an elaborate 9-course production. And the situation with electronic gear is similar: Flashing lights, hundreds of knobs and onboard LCD readouts may be pretty—and occasionally useful—but there's no substitute for high-quality parts and a straightforward circuit design.

Such is the case with the Great River Electronics MP-2, a distinctly *non*-flashy 2-channel mic preamp that provides excellent performance of its seemingly simple task, by placing top-grade components in a Class A discrete design in an unassuming chassis. And in a world filled with dozens of "me-too" mic preamps created from the same couple of chipsets, it's refreshing to pop the cover on the MP-2 and actually see a discrete transistor circuit, with Jensen input transformer coupling.

Like its name—the MP-2 refers to mic preamp/2-channels—the MP-2 is outwardly to the point. The rear panel only has four audio connectors: two XLR inputs and two XLR outputs (all pin 2 hot), along with a removable IEC power cord socket for the *internal* power supply—no wall warts here! On the front panel, the controls for each channel are plainly laid out, with toggle switches to select -15dB pad, polarity (phase) invert and phantom power on/off. You won't find plasma metering with an infrared remote for tweaking meter ballistics: The MP-2 has a simple (there's that word again) clipping LED on each channel that lights when the output is -3 dB below clipping; it ain't fancy but it does the job. Gain is set by a 24-position rotary switch with 22 steps in 2dB increments for 22 to 64 dB of gain. Besides the ability to get from maximum to minimum settings easily, this continuously rotary control offers one other hidden advantage: The two settings on either side of the control's "6 o'clock" position set the input to +14 dB unity gain, although this is not marked or indicated on the front panel.

Each channel also has a front panel ¼-inch, high-impedance (greater than 500kilohm) input, which is useful for direct injection applications. There is no external mic/DI input switch—plugging into the ¼-inch jack automatically disables the mic input and brings the Hi-Z signal into the gain section after the phase reverse and pad circuit. Used with the High-Z input, the stepped gain control has a range of 8 to 50 dB.

Other than the unmarked unity gain positions, running the MP-2 is plug-and-go. My first session with the preamps turned out to be percussion overdubs on an acoustic guitar album, using an AKG C414 ULS in omni position to record a suspended finger cymbal hit with a metal striker. The track was cut directly to an Alesis M20 20-bit ADAT, and in this particular case, I was looking for a triangle-like tone, but with a faster attack and less sustain than a triangle. This would provide a good test of the MP-2's ability to track transients as well as offer a chance to check out its high-end frequency response. The results in both cases were excellent; the attack was crystal-clear, with a nice, shimmering decay that was exactly what I wanted.

Next up, I used the MP-2 with a pair of CAD's excellent VX2 tube microphones, criss-crossing the mics' figure-8 patterns in a Blumlein arrangement to record a group of singers cutting background tracks. This track featured very wide dynamics, ranging from *fortissimo* to a quiet murmur, and spotlighted the MP-2's quiet EIN spec of -129 dBv (unweighted, 22kHz bandwidth). The sound was pure, uncolored and there was no trace of noise whatsoever. A few days later, using the MP-2 on two Audio-Technica AT-4051s used as drum overheads on a rock session emphasized the fact that this preamp offers ample headroom when you need it most. Even on snare—using an Audix D4 dynamic—the difference between the MP-2 and the stock preamps on my Soundcraft 600 console was immediately apparent.

The front panel High-Z inputs are a nice touch, and while they won't cause me to replace the tube DIs I already have, the MP-2's high-impedance did a fine job of capturing different guitar pickups, from my 1964 Hofner Beatle bass to my 1997 Gibson Les Paul Special Double Cutaway. The sound was clean and punchy, and adding a tube compressor after the preamp provided everything I was looking for.

At $1,250 ($625/channel), the Great River MP-2 offers a clean, natural, preamp and DI reproduction at a great price. So who could ask for more? Well, Great River offers the MP-2 in alternate versions: The MP-2M ($1,550) and 4-channel MP-4M ($2,575) add output transformers; the MP-2H ($1,575) has output transformers and unbalanced ¼-inch outputs. An MP-4 ($1,975) 4-channel preamp is also available. In addition, a transformerless model is $1,250 for two channels (MP-2X), $1,975 for four channels (MP-4X).

Great River Electronics, 3056 East 65th Street, Inver Grove Heights, MN 55076; 651/455-1846; fax 651/455-3224. Web site: www.greatriverelectronics.com. ■

BY GEORGE PETERSEN

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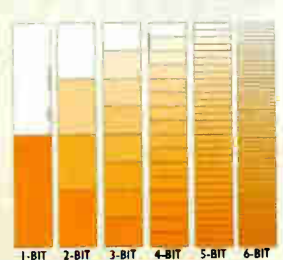

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SYMETRIX 562E

WINDOWING EXPANDER/GATE

Released at the last Winter NAMM show, the Symetrix 562E Windowing Expander/Gate is a full-featured 2-channel gate or downward expander. In addition to all the usual controls and adjustments, a feature called Window Advance allows the entire leading edge of transient signals to pass through the 562E cleanly. Thus, the full impact of a drum's attack is allowed through at even the fastest settings, without clicking or popping.

The 562E under review spent last summer in my FOH effects rack, along with a couple of popular gates by other manufacturers. I used the 562E for drum inputs on many live shows, mostly on kick, and the drums' attack sounded so natural that on several occasions visiting engineers doubted that the gate was working at all. Only by reducing the gate's range to zero and opening it up while they listened on headphones could I convince them that it was, however transparently, gating their kick drum. The Windowing Expander/Gate provides the full impact of the drum's leading edge, and it may be the best tool for cleaning up the kick for live sound that I've heard.

To recap, a gate on a drum input will automatically shut it off when signal falls below an adjustable threshold. This both eliminates the off-axis sounds of adjacent drums and allows the live engineer to turn the drum channel up louder than would normally be possible without feedback. Obviously, there are other applications in live sound, such as turning off noisy inputs and taking room ambience out of vocal mics, and there are a host of uses for gates in the recording studio.

The Window Advance is a four-stage, all-pass filter that delays the signal through the gate just long enough (about 20 microseconds) for the detector to open before the signal has started passing through the VCA. The gate's envelope is able to track the attack of fast-rising percussive transients by anticipating them, thereby eliminating the "click" that occurs when the waveform is "chopped" on fast attack settings. The Advance switch has two settings, marked Min and Max, and my trials on drum kits revealed that the Max setting should be used to open the gate as quickly as possible. This setting adds a bit of phase shift at higher frequencies, but this is by far preferable to missing the transient on the percussive sounds.

Front panel controls include a knob that, at full counterclockwise, offers 80 dB of gating. Turned clockwise, the control provides downward expansion at a ratio of up to 1:3. When the signal falls lower than 25 dB below the threshold, the expander ratio reverts to 1:1 in order to prevent low-level breathing. Similar in concept to compression, downward expansion scales the signal back by a ratio rather than just shutting it off, and it is better suited than straight gating for noise reduction tasks requiring subtle control.

The Threshold control is accompanied by a green and a yellow LED that shows when the signal is below or above threshold. A vertical row of four red LEDs displays gain reduction of 3, 12, 30 and 60 dB. Other front panel controls adjust attack, hold and release times with a generous range of settings. The fastest attack time setting (fully counterclockwise) is labeled Auto and is meant to be used with the Window Advance setting; it ensures that the gate opens enough before the signal needs to be turned on so that it doesn't click.

In order to tune the gate's detector to ignore unwanted sounds that could trigger it inadvertently, a lowpass filter sweeps up to 1k and a highpass filter sweeps down to 400 Hz. The EQ filters are 12 dB per octave, providing minimal phase delay that the Windowing feature keeps up with easily.

Rear chassis connections include XLR and ¼-inch TRS jacks for balanced and unbalanced connections. Each channel also has a TRS insert jack for the key signal (tip wired return, ring wired send). The key input may also be used to trigger the gate from an external source. A three-way switch on each channel sends the filtered or unfiltered key signal to the channel's output so that the key signal can be monitored.

Symetrix's new gate easily meets the high level of engineering standards set by the company's other recent analog and digital products. At a list price of only $579, the 562E offers performance not available in gates costing much more.

Symetrix Inc. 14926 35th Ave. W., Lynwood, WA 98037. Phone 425/787-3222; fax 425/787-3211. Web site: www.symetrixaudio.com. ■

BY MARK FRINK

Mark Frink is Mix's sound reinforcement editor.

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SPL Electronics Transient Designer

ANALOG DYNAMICS PROCESSOR

The Transient Designer from German manufacturer SPL Electronics is the latest addition to the company's advanced line of analog processors. Perhaps best known for its Vitalizer dynamically adaptive equalizer, SPL has a history of producing equipment that accomplishes complex and unique sound processing with intuitive controls. The new Transient Designer furthers this mandate.

The Transient Designer offers an alternative way to manipulate dynamic range. The terse manual explains that the "temporal expiry of a signal" can be modified in two primary ways: by accelerating or slowing the transient portion of a signal, and by shortening or lengthening the sustain portion. Unlike a compressor, which "globally" alters the dynamic range of an entire audio signal according to a set of time constants (attack, decay, ratio and release), the Transient Designer uses a level-independent process called Differential Envelope Technology® to maintain identical envelope processing, regardless of input signal level. So the idea of setting a level threshold for the onset of operation, as you would with any compressor, is meaningless. This implies that low-level signals are not altered and that the process is constant and instantaneous.

The Transient Designer splits an incoming signal into two paths for separate and constant processing by Attack and Sustain sections. These processes occur in parallel, are mutually exclusive and do not interact with one another. In the Attack section, the first of two envelope followers looks at the instantaneous dynamic shape of the input signal and produces a mirror image reference envelope. This process occurs within one to two microseconds. The second envelope follower tracks the same input signal waveform but produces a mirror image with a much slower attack portion. If you were to superimpose the two envelopes on top of each other graphically, you will see an amplitude "Difference" area between the two different attack portions. This amplitude difference produces a voltage that is used to control a VCA that passes the signal to the output. The front panel Attack knob mixes or adjusts the amount of this difference voltage. For very short moments, positive attack values as set by turning the Attack control to the right (+) will emphasize the front or attack portion of the signal. When you turn the Attack knob to the (-) or negative direction, a softening or smoothing of attack is obtained. Attack periods can be amplified or attenuated up to 15 dB.

In the Sustain section, the signal path is divided again to feed two envelope followers. The first reference follower faithfully traces the natural signal. The second follower also follows, but with a much slower—or longer—sustain characteristic built in. Again, the difference in voltage between these two envelopes is used to control the VCA. Adjusting the Sustain control on the front panel to the right (+) or positive direction will cause an increase in envelope sustain while negative or (-) settings shorten decay or sustain levels. Sustain periods can be amplified or attenuated up to 24 dB.

FRONT AND REAR PANELS

SPL has made the Transient Designer very simple to operate; only the salient Attack and Sustain parameters are adjustable. Both the Attack and Sustain controls are detented in 1dB steps. This works out perfectly for the ±15 dB of Attack adjustment—one click equals 1 dB. However, as the same type of pot is used for the Sustain control and for the ± 24dB Sustain adjustment range, you will need to rely on the front panel labeling in dB for resetabilty. Signal present LEDs and hard-wired relay bypass switches are provided for each channel.

The single-rackspace Transient Designer offers four channels of processing, or two stereo pairs (each pair of two channels is linkable). The two Link buttons tie channels 1 and 2 together, with one acting as master, and link channels 3 and 4, with channel 3 as master. Linked channels also share bypass switch functionality. SPL highly recommends using the link function when processing stereo signals to maintain a coherent stereo image.

The rear panel has four sets of Neutrik XLR connectors for balanced I/O for all four processors. Instructions for unbalancing inputs or outputs are in the manual. A ground lift switch isolates circuit ground from chassis ground, useful for dealing with ground loops or hum problems. The unit is built in a sturdy steel and aluminum cabinet and has solid printed circuit construction and a 15VA toroidal transformer power supply with a choice of 115-volt/60Hz or 230-volt/50Hz mains operation.

IN THE STUDIO

I tried the Transient Designer in as many situations as possible and, as I expected, the unit excelled in processing percussive sounds. The four channels are great for drum kits, or drum machines when you want to separately "redesign" the transients of

BY BARRY RUDOLPH

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feedback and the comb filtering "Grateful Dead bootleg sound effect" artifacts, which can plague recordings of reinforced audio. Although a similar production could have been created with Pro Tools and some choice plug-ins, the result might not have equaled what we were able to achieve through the collision of real waves in real space. Few readers are looking for monitors applied simultaneously for recording live and reinforced sound, yet the success with which we were able to use the BM15As in this unconventional way indicates something of their prowess.

Though Dynaudio lists the frequency response as 40 to 20k Hz (±3 dB), I found the bass response more prominent than this spec might suggest. In addition, Dynaudio instructs users to position each monitor with its off-center port closest to its stereo partner (ports on the inside, tweeters on the outside) in order to enhance bass coupling.

Indeed, during the BM15A's extended visit to my studio, I was consistently impressed with the chocolatey goodness of their mid to low frequencies—perfect for the piano samples I was frequently using during this period, and perfect for the Sade and Tracy Chapman I would listen to during breaks. At the same time, the BM15As did not want for snap or punch, from *Gettin' Jiggy* with Will Smith, to heralding Stravinsky's *Rite of Spring*.

As with any self-respecting near-field monitor (actually, Dynaudio catalogs the BM15As as near/mid-fields), these pups can bark, with SPLs maxing out at 105 dB at 1 meter. Simply put, from project studios looking for an all-purpose pair to larger studios searching for some serious near-fields, the BM15As are worthy contenders.

The BM15As list for $3,599/pair and are compatible with Dynaudio's BX30 subwoofer system (to 22 Hz), which lists for $2,999.

Distributed by AXI Inc., 357 Liberty St., Rockland, MA 02370; 781/982-2626; fax 781/982-2625. Web site: www.aximarketing.com. ■

Arthur Bloom's An Orchestra's Guide to the Young Person *was the subject of a documentary on NPR's* Performance Today *last summer and was performed by the Israeli Chamber Orchestra conducted by Philippe Entremont in November at the Kravis Center of the Performing Arts in Florida. He can be spammed at ArthurBloom@compuserve.com.*

—FROM PAGE 149, LAB ANALYSIS: DYNAUDIO ACOUSTICS BM15A

a vented aluminum bobbin. The deep dome increases stiffness without resorting to hard materials that are not as well-damped. The non-shielded, ferrofluid-cooled motor structure is vented into a sealed, plastic cup in order to lower the tweeter's resonant frequency and linearize the tweeter's phase response at crossover. All of this is secured onto a cast aluminum waveguide/faceplate. A three-legged aluminum cage is mounted onto the front of the faceplate to protect the diaphragm. Diametrically opposed voicecoil leadouts provide stability and balance and are terminated by dual ¼-inch male connectors.

The amplifier has a balanced XLR input with a +4/-10dBm sensitivity switch. Trim pots for both the woofer and the tweeter range from –3 dB to +3 dB. The amplifier's neatly arranged, double-sided, glass epoxy circuit board has plated-through holes. All components and construction are of top quality. A low hum field toroidal transformer is used in the power supply.

ACOUSTICAL CHARACTERISTICS

Like the Yamaha NS-10M and Sundholm Acoustics monitor (both of which we have tested), the BM15A's sonic footprint resembles that of a consumer loudspeaker. These monitors are not flat and they are not designed to be flat. They enable the recording engineer to hear the track the way much of the population hears it, as if through a home stereo, rack system, portable system, or automobile. In fact, except for the decade between 500 Hz and 5,000 Hz, the response is smooth. The off-axis response isn't flat either, but it's smooth and well-controlled, tapering only -2 dB from 1,000 Hz to beyond 10,000 Hz.

The transient response reveals that the acoustic centers of both woofer and tweeter are correctly aligned, without any physical offset. As well as being time-coherent, the transient response is well-damped.

The distortion response, which was measured at around 95 dB SPL, indicates that the THD remains at approximately 1%, except for the tweeter's upper response limit. The spectral contamination, a test comprised of an input of multiple tones, tests the speaker's self-noise. This particular speaker system had an impressive signal-to-noise ratio of around 55 dB. ■

Rob Baum and John Schaffer are engineers with Menlo Scientific, an independent acoustic lab based in Berkeley, Calif. For more on testing methodology, visit www.mixonline.com.

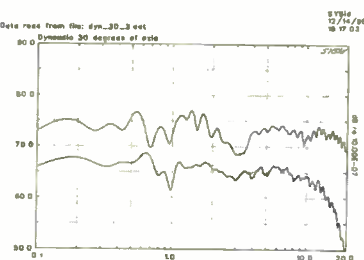

Figure 1: BM15A's on-axis and 30° off-axis frequency response: Off-axis response is smoother than on-axis.

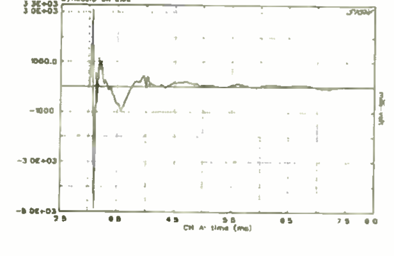

Figure 2: Impulse response shows time coherence between woofer and tweeter, and an overall damped response.

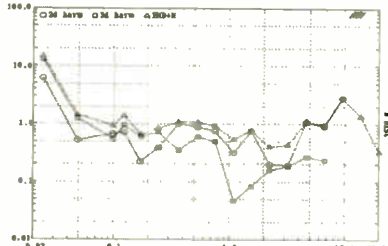

Figure 3: Distortion vs. frequency: Distortion remains at around 1% except for upper limit of tweeter. THD+N = Δ trace, 2nd harmonic = ○ trace, and the 3rd harmonic = □ trace.

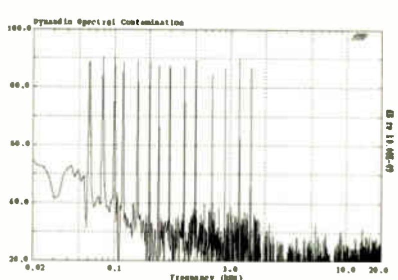

Figure 4: Spectral contamination test compares a series of input tones (tall spikes) to speaker output. The resulting nonlinear distortion products show very low self-noise (-55 dB).

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CIRCLE #103 ON PRODUCT INFO CARD

BY TOM KENNY

POST · SCRIPT

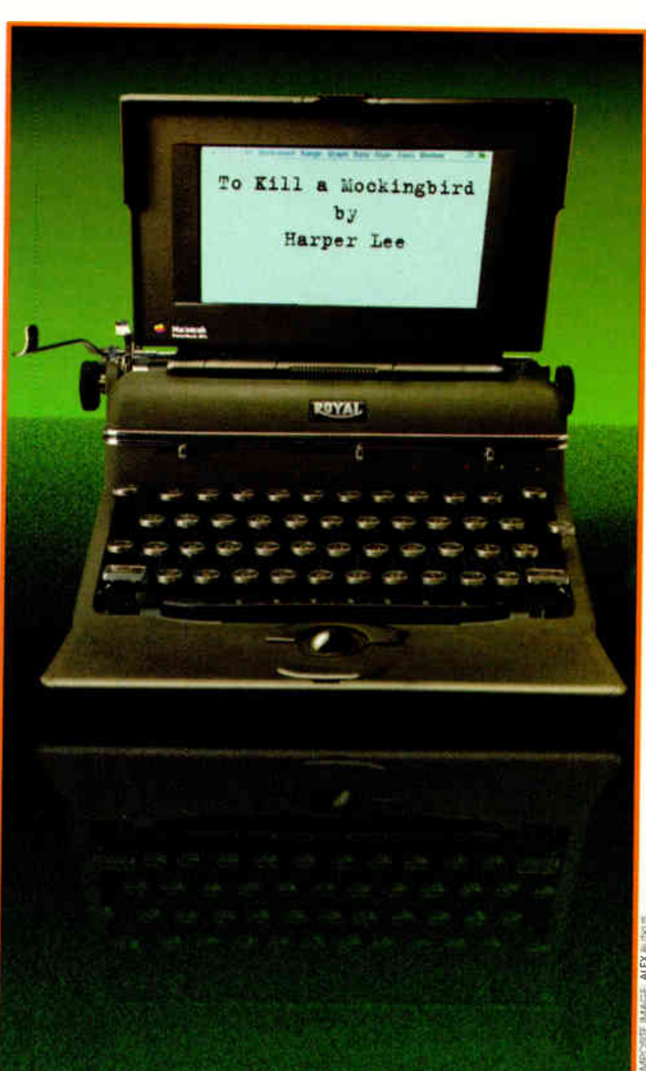
SOUND FOR FILM

THE HARPER LEE CONUNDRUM

by Larry Blake

I have never regarded myself as a cutting-edge guy. I don't think I've ever been "the first" to do anything in film sound, and if by accident one day I find myself blazing virgin sound trails, you won't get me to admit it. The game of Championship Calendar interests only the footnoting film sound historian in me; the rest of my brain and soul could care less.

Regardless of my approach toward the cutting edge, more often than not I find myself giving technology a gentle push downhill, if only because of the potential efficiency (read: ease of use) that high-tech toys allow. In a column around this time a year ago, I listed all of the parts in the film sound world that would collectively comprise my ideal Christmas gift. The other day it occurred to me that my long-term wish list is growing shorter and shorter. I purchased a workstation last year, and by now it's pretty much filled up with all of the stuff that I need to do my work: dozens of gigabytes of hard disk storage, RAM-based sampling, loads of plug-ins, 24-bit editing, 24 outputs and so on. There are very few items left on the list.



COMPOSITE IMAGE: ALEX BUTKUS

That's the good news and the bad news.

Why bad? At this point I feel as if I have no excuses. If I can't creatively come up with an interesting sound to fit a film, one that sounds great and helps tell the story, then I should change professions.

To some extent, even the good news—the freedom offered by my equipment—is bad, and having so much technology at my disposal worries me. There's always a creative spark that comes from the friction of not having enough time and money. In many instances, that spark can also come from being restricted by one's tools. Look at notable films that have been made on the cheap, and then look at their sequels: *Rocky*, *Jaws*, *American Graffiti*. Then there are the notable exceptions of *The Godfather* and *Mad Max* (well, at least their first sequels).

More directly to the point here would be The Beatles. It's no secret that they only had 4-track recorders during their most fertile period from 1963 to 1967. They would bounce (or as they called it, "tape reduce") from one 4-track to the other, but all in all, I don't think you can find a Beatles recording that used a total of more than 16 tracks. To most musicians today, this makes no sense. How did they cheat? The answer is that they didn't. They had almost no guest musicians (other than George Martin and the odd orchestra), they didn't spend more than five months doing any one album, and their lives were packed with movies and tours, not to mention being under perhaps the most intense media spotlight ever. They simply (!) had incredible talent, matched by hard work and (pertinent to this discussion) technology that gave them just enough room to experiment.

I think the solution is not to avoid the toys (this col-

—CONTINUED ON PAGE 155

World Radio History

FACILITY SPOTLIGHT

LIVING IT UP IN A COOL DRY PLACE

by Gary Eskow

When the stock market took a nosedive back in the late '80s, the advertising industry felt the shock. Big-ticket clients suddenly drew in the purse strings, and agencies scurried around trying to find ways to cut costs.

This was just about the time that MIDI was coming into full stride, and project studios began cherry-picking jobs that had previously been the exclusive domain of the larger music houses. Eventually, many of these smaller studios added workstations, sync boxes, video decks and the like, allowing them to offer audio post, sound design and original music services on a one-stop-shopping basis.

In response, some of the larger advertising agencies, which had historically staffed in-house music departments with music producers whose job was to get a spot into the hands of the right composer and oversee that part of the creative process, decided that bringing music production and sound design in house might result in additional savings. They also felt that giving copywriters and art directors access to music production personnel on a daily basis would help eliminate some of the last-minute, hit-and-miss guesswork that often accompanies the creation of a jingle or score—generally the last piece of the puzzle that gets worked on before broadcast. The big story used to be that video houses were adding audio rooms; now the agencies themselves are adding audio rooms.

PHOTO: LARRY SILLEN

Cool Dry Place president and executive producer Geoff Smith, seated, with senior engineer Barry Rose in Audio One, the Yamaha 02R and Avid AudioVision suite at DDB Needham.

DDB Needham Worldwide Communications Group Inc., a major Madison Avenue shop, now has its own variation on this theme. Cool Dry Place, a wholly owned subsidiary of DDB, was founded in 1996 in order to provide clients with high-quality broadcast post-production services under one roof, at reasonable rates.

DDB producers began turning inward in the early '90s for post-production on test spots—those commercials that are not intended to

—CONTINUED ON PAGE 156

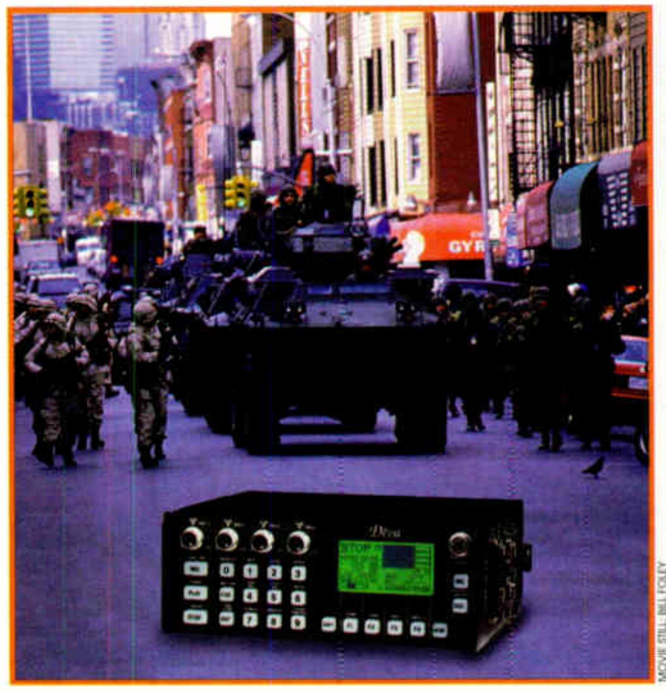
DEVA ON LOCATION

HARD DISK RECORDING FOR FEATURE FILM PRODUCTION

by Jeff Wexler

I always try to attend AES conventions, yet every year—even as the exhibits get more elaborate with more manufacturers showing product—I usually feel left out. As a production sound mixer working primarily in feature films, the equipment and tools we use have changed very little in the past 30 years. Most recent advancements in audio have come with the digital revolution, but digital recording—at least for production—has only really just begun. So, I went to AES in 1996 and was overwhelmed by the vast number of exciting DAWs and digital studio recorders, but, as always, these have limited application for the job I do. I was somewhat disappointed in not finding that one terrific new piece of equipment for production sound, when I noticed a little black box in a small, unassuming booth off in the corner of the vast exhibit floor.

However, it was not immediately clear exactly what this box was intended for. It looked somewhat like a CB radio but had buttons on it labeled Rec and Play and Stop. The person at the booth told me it was a digital audio recorder that recorded directly to hard disk. I was intrigued.



MOVIE STILL: BILL FOLEY

Production mixer Jeff Wexler, C.A.S., used the Deva on location for The Siege.

I had already been involved in the use of DAT on feature films, well before anyone else was willing to take the plunge with a totally new format. Also, at the time, I was the co-owner of a sound transfer facility, so experimenting with a new format was not so difficult. I was in control of both sides of the equation: the production recording on this new format, DAT and the transfers that had to be made to the then-required format, which was 35mm mag film.

Of course, technology had not advanced to the point where a full-sized, computer-based DAW, which is terrific for post-production, could be brought to the set to record production sound. I was sure

—CONTINUED ON PAGE 158

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—FROM PAGE 152, SOUND FOR FILM
umn is about me maxing out on them after all), but to not let them restrict your imagination. Just because it's easier to do a trick doesn't mean that your use of it will be dramatically better. Thus the acronym for MIDI: Mindless Idiots Demanding the Impossible. Yes, it's wonderful to have one's orange-juice squeezer go counterclockwise at the head of every verse, but what does that have to do with the music? It's a snap these days to create phasing, yet I doubt that you can find a recording in that past three decades that takes more *cool* advantage of phasing than that great '60s single "Itchygoo Park."

A key component in the whole sound effects/sound design world is the element of serendipity. You're looking through your library for one sound, and then you come across another one for another scene. There's no question that this is the source of some of the greatest work in sound effects, and you should always make sure that you build this time into your schedule and your procedures. In the same vein, you should try to do as much effects recording as you can and not rely on libraries. These "techniques" are constants and have no relationship to how this material will eventually be cut (mag film or multitrack, expensive workstation or inexpensive sound card).

The precision of repeatability offered by editing on workstation and RAM-based samplers can have its potential downside, and can be counteracted by "randomizing" your *modus operandi*. Perhaps the most serendipitous-at-the-core sound design job is the "electronic tonalities" score for the '50s sci-fi classic *Forbidden Planet*. A key technique employed by Louis and Bebe Barron in creating their atmospheres was actually the sound of equipment dying. I wouldn't recommend that anyone try a late-'90s version of this by trying to record a hard disk crashing. You probably won't hear a thing, what you do hear certainly won't be that interesting, and your experiments will be really expensive!

A Faithful Reader wrote a telling response to my September column in which I extolled the virtues of technology allowing us to do much with very little outlay of cash. He said that a friend had spent eight years working on one album, a good portion of that time wasted with obsessing over equipment purchases. In his great book on screenwriting, *Adventures in the Screen Trade*, William Goldman cogently states that anything that prevents you from going in your room, closing the door and writing is not in service of your art. The only thing that matters is the work itself, and it's all too easy these days to get seduced by the whiz-bang tools.

There's this illusion that happiness/ease-of-use/proficiency/creativity...all these and more can be had only for the price of a new software update. But having the shiniest, newest toy does not have any relationship to whether or not the work will be of interest to anyone. It's not as bad as the playground, where the kids with the shiny new shoes and matched gym outfits are invariably the worst players, but it's up there. I've always been wary of comments by sound people that begin, "We couldn't have done it without..." since those sentences invariably lead to extolling the virtues of this year's model.

I definitely don't mean to say that these shiny high-tech tools are a crock. They are so helpful in contending with ridiculous post-production schedules, partly because much of this new technology allows (or, even worse, only *appears* to allow) us to work faster. The same has been said for most previous innovations in film sound (punch-in recording and console automation come to mind first): They will allow you to make changes faster, therefore you'll work faster. It's no secret, and certainly not an original observation, that clients eventually negate any speed benefit. Every time we pull a rabbit out of the hat in post, doing more in less time, producers start expecting to see bigger rabbits coming out of smaller hats. Or something like that.

I am trying to grapple with what I'll call The Lee Conundrum, named after Harper Lee, who wrote *To Kill a Mockingbird*, which is not only my favorite novel but also the source of my favorite film. I assume that Ms. Lee wrote it on some old cast-iron manual typewriter, if not longhand. Would it have been better had she had the easy power of revisions (which bring corrections, right?) that computers offer? Does she use a computer today? If she were to publish another novel, writing on a computer, how would that affect the final outcome?

(Getting back to The Beatles, when they got back together a few years ago to do some new songs for their Anthology videos and records, they used modern-day multitrack techniques. I'll leave it to you to take this discussion to its logical end.)

The answer seems to be that, though neither low-tech nor high-tech equip-

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ment will guarantee you any level of quality, what matters is that you keep in mind the goal: great drama on the screen, which in your case may be great music on disc. Make sure that you use gear to reduce the repetitive, labor-intensive drudgery and to make your job less stressful, not more stressful.

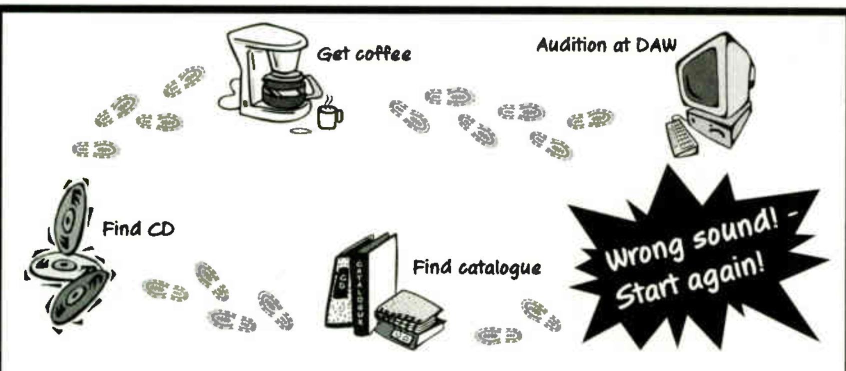
So many of the tools taken for granted in business today (overnight delivery, e-mail, fax, pagers) at some level provide only the *illusion* of efficiency. This illusion is a by-product of the speed of communications that is offered, although frequently the only result is anxiety brought on by procrastination. In other words, if I see someone balancing a portable computer on one knee while connected at an airport phone, I am not impressed.

Look at Hoover Dam. It was designed and built long before computers were an integral part of civil engineering. It was completed on time, on budget, against great odds, and it will last hundreds of years. Were it to be built today, I'm sure that computers and e-mail, etc. would be viewed as "essential tools." But would Hoover Dam 2000 be *better* in any respect? I think not.

Getting back to my personal equipment, there are still some items that I'm looking for, including a better microphone for my field recording kit (the current one is a bit noisy for quiet BGs). Back in the studio, I'll be getting a workstation control surface to do more mixing prior to the mix. And certainly I'll fork over the $$ for that odd software revision or two. Just for bug fixes, mind you.

You can write to this low-tech wannabe at P.O. Box 24609, New Orleans, LA 70184; fax 504/488-5139; or via the Internet: swelltone@aol.com. ■

Larry Blake is a sound editor/re-recording mixer who lives in New Orleans for reasons too numerous to mention, although one of them would have to be that most of his friends here think of 24 tracks as the number of paths to the Union Passenger Terminal.



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—FROM PAGE 153, COOL DRY PLACE

be broadcast. As the in-house team began compiling a reel of work, confidence escalated. "We were slowly purchasing more editing equipment, and producers saw that we had the same gear as outside facilities, and that we could contain costs, work on tight deadlines and deliver quality product," says CDP president Geoff Smith.

Chief audio engineer Barry Rose has been with DDB for ten years, and he cuts sound on an Avid AudioVision workstation. Dailies come into the shop on Beta SP, and Cool Dry Place editors execute a rough cut, which Rose begins working on. If the spot is for television (lots of major radio campaigns originate at DDB, including work for Anheuser-Busch), Rose will clean up or replace dialog, sweeten the tracks with effects, and at times add some sound design work.

"With recent upgrades, we now have access to Pro Tools, and one of our two audio rooms has a Yamaha 02R, which we really love," Rose says. "But the AudioVision is a remarkably easy environment to record into, and I can slip sounds around to picture with no problem." Little actual musical composition takes place in-house—DDB still hires outside houses for scoring and jingle work—but Rose will take snippets from CD libraries and create effects in AudioVision by combining tracks and layering them. Radio calls for even more inventiveness, according to Smith.

"When the visual element is not compelling—or nonexistent, such as in radio—sound design needs to bring

World Radio History

a much more wide-open feel to the process, and Barry does a great job for our creatives and producers," Smith explains, recalling a Nutrageous spot that Rose worked on for DDB Needham client Hershey. "I used everything we had laying around here in that spot, including a bunch of stuff I pulled off of CDs," Rose interjects. "I think we used the Sound Ideas, Hollywood Edge and DigiFX libraries to help get across the writer's idea. The concept was that of an old radio drama, with cartoon-like sound effects used to describe what the writer was saying—very over-the-top ways of describing the sensation of eating the bar. We used pops, whistles, punches, garbles, explosions—you name it—all edited within the Avid."

One critical limitation of AudioVision, according to Rose, is that it cannot access the plug-ins that add so much functionality to Pro Tools. "At the present time, if you want to access effects—I'd make a lot of use of DINR, the Digidesign noise reduction plug-in, for example, as well as some effects and dynamics processing plug-ins—you have to export your session to Pro Tools. That seems like a needless extra step to me."

Although Avid acquired Digidesign in 1995, the two entities are still finding their way to full integration, says Smith. "It seems that Pro Tools and Avid have yet to integrate. All indicators are that they will be integrating the two products into single platform in 1999, and we're really looking forward to that day."

Which is not to say that AudioVision, as presently constituted, does not offer any DSP functionality. Rose says that its internal EQ is quite acceptable for broadcast work, "and I use the reverse clip, time compression/expansion, and pitch-change functions all the time. One of the things I really like about the equalization is that you can apply it per clip, without having to assign it to an entire track." AudioVision has 16 physical inputs and outputs, with a total of 24 virtual tracks within the machine. "I never run out of memory applying effects and EQ—we're running a Mac 9600 computer at 300 MHz, with 128 megs of RAM. All of our backups go to JAZ 1-gig disks," Rose says.

Although Rose is a fan of the 02R's automation package, AudioVision often allows him to bypass it, letting him utilize the console for its scene memory and as a digital router, taking signals by tielines from video decks, his workstation, and a variety of CD and DAT machines located throughout the facility. "Again, there's a lot you can do within AudioVision—automate clip levels, execute fades, and apply compression and EQ," he says. "It's not the same level of automation that you get with a digital board like the 02R, but you can squeeze a lot out of it."

DDB Needham is obviously the big-bear client for Cool Dry Place, but up to 40% of the facility's business comes from outside clients, including other agencies, corporate clients and a smattering of record labels. Smith clearly is interested in developing outside relationships, though the in-house spots continue to fuel equipment acquisition.

"Some of our recent projects include recording sessions for the Jerky Boys' new comedy CD, the 30-second TV spot 'Night School' for Frito-Lay, and we recently completed a project for DDB that involved over 300 separate radio spots for Radio Bermuda," Smith says. "This contract allowed us to move up the schedule on our second audio room, especially in terms of how quickly we were able to purchase new gear. We're looking to bring this room online in the first quarter of 1999." ■

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—FROM PAGE 153, DEVA ON LOCATION

that this little box was a controller for some CPU hidden under the table, but that turned out not to be the case. The entire recorder, battery and removable hard disk were all enclosed in this small but rugged unit. I was told that Deva (the name affectionately given to it by its creator, Glenn Sanders of Zaxcom) was only a prototype and that the software was far from fully developed. In fact, I believe it was not functioning as a real recorder at this time. But I was promised that it would be a real product very soon.

At AES, I had seen a few other devices—also not truly operational or fully functional at that time—such as the StellaDAT and the Nagra ARES C recorder—but Deva really captured my attention. However, I remember thinking that it would never be a reality. How could Zaxcom (unknown to me at the time) produce a viable product when the prototype they were showing looked like something built in a garage and wasn't functioning?

A few years later, after I had successfully completed several other pictures using DAT with only minor difficulties, I saw Deva again. This time it was a fully functional hard disk recorder, still in the same little rugged black box, but it offered four tracks of 20-bit digital audio on a hard disk and ran for three hours on an NP-1 battery. I realized that soon I would be able to have in production the same benefits of the digital technology used in the DAWs, and I could throw it over my shoulder and record sound on location in the middle of the desert if I needed to!

I have completed two feature films using Deva: *The Siege*, directed by Ed Zwick for Twentieth Century Fox, and *Fight Club*, directed by David Fincher, also for Fox. I didn't do all of *The Siege* but only the last six weeks of production in Los Angeles; the first 12 weeks were recorded by Alan Byer in New York. All of *Fight Club* was shot in Los Angeles with production audio recorded entirely by the Deva.

My experience with Deva has been wonderful. There have been a few difficulties, mostly relating to software revisions, but even with the problems encountered, none were ever fatal—Deva made a perfect 20-bit, 48kHz recording every time. It has been more trouble-free than any other piece of equipment I have ever used, including my first Nagra III.

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in feature films, I knew what needed to be done. For one, I had to convince the producers that although we were going to be using new technology, we would also do everything the *old* way. The old way, in this case, was DAT, which the producer was comfortable with. If Deva failed, the producer was confident that nothing would be lost. I also had to convince the production company that this new technology was not going to produce any difficulties for them or cost any more money.

As Deva is really a new way of doing things—even more so than DAT—there were a number of issues to be solved. Both *The Siege* and *Fight Club* were to have normal daily mag transfers done so we could see projected dailies. At the end of the shooting day, I had to deliver to the transfer house something that could be transferred to mag film. Since very few transfer facilities had Deva, Coffey Sound Services (the distributor) agreed to lend Fox a unit for the transfer room. On *The Siege*, I sent in the hard drive and transfers were made to mag by playing out from the Deva. This all worked perfectly. The hard drives were cycled back to me to be re-used the next day, and the DAT cassettes (recorded concurrently on the set) were put on the shelf to be used as the masters. The DAT, of course, was a 16-bit recording, somewhat inferior to Deva's 20-bit, but certainly acceptable during this experimental phase. This procedure would change on *Fight Club* as Deva gained new capabilities.

On *Fight Club*, we recorded to the hard disk and also, in mirror mode, to an outboard 2GB Jaz disk. At the end of the day, the Jaz disk was sent in and transfers of selected takes were made to mag (for dailies), and a one-to-one of everything was made to a Tascam DA-98 8-track. By transferring to DA-98, the tracks were in a format accessible to all who needed to deal with them. Currently, the expense of the Jaz disks makes them unacceptable as a daily consumable media that the production company would purchase, so the Jaz disks, like the hard disks, are re-used over and over. This procedure will change as well, probably by the time I start my next film. Sanders has demonstrated the Deva recording (in mirror mode) to DVD-ROM. DVD would allow the production sound department using Deva to send in the DVD purchased daily by the production company to transfer and to serve as the archived master for all to use at a cost of ap-

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There has been much discussion in the professional community concerning the features needed on a location disk recorder, with many people undecided about what we really require. Do we need 20-bit recordings? Do we need four tracks? Do we really need random access in production? Without debating all of the issues here, I can say from personal experience that it is really neat to be able to play back instantly any segment or take, on the disk, and then punch Record to start a new recording with no tape shuttling required and no fear of recording over previous material.

Another feature built into Deva is the automatic pre-roll that records up to ten seconds of pre-roll before program material is actually needed. When you go into Record, Deva automatically puts down at the head of the segment up to ten seconds of timecode and program—that's ten seconds before you even pushed Record! This ten-second pre-roll has been terrific for telecine sessions, which now can be done much faster than ever before. As fast as lock-up has been in the past, even with a proper DAT recording with pre-roll, using Deva has proven to be a real savings in time and money in telecine.

I think the technology represented today by Deva will be the technology that is used by virtually everyone in production in the near future. The benefits of digital recording over analog have been well established, and recording sound files, rather than audio, to a rugged field recorder with file format compatibility (Deva supports the major industry-standard file formats, including broadcast .WAV and SDII) makes all the sense in the world. These sound files, easily transported, easily copied and easily manipulated by all those involved in the recording process, make production and post-production work much more efficient. Multiple access and multiple transfers are all easily accomplished, and everyone is assured of the preservation of production quality as everyone is essentially working on the same sound. ■

Jeff Wexler, C.A.S., has been a production sound mixer since 1969. Besides Fight Club *and* The Siege, *recent credits include* Jerry Maguire, As Good As It Gets *and* Independence Day. *He is currently building Coral Sea Studios, a world-class music studio and post facility in Cairus, North Queensland, Australia.*

World Radio History

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World Radio History

BY BLAIR JACKSON

RECORDING • NOTES

FOUR DISCS, 26 YEARS

THE MAKING OF BRUCE SPRINGSTEEN'S "TRACKS"

by Dan Daley

PHOTO: RON DELANY

Bruce Springsteen's impressive career was launched with *Greetings From Asbury Park* in 1973. He was signed based on demos supervised by the legendary John Hammond Sr. Two years and two albums later, *Born To Run* made the Freehold, N.J., native a household name, and by 1984, *Born in the U.S.A.* had made him a mega-star. But a dozen or so albums over more than 25 years of recording barely scratch the surface of this prolific artist's career. When recording studio albums, he would often ignore all the songs he'd been working on between records, and he's famous for recording more songs than he needed for many of his albums: For example, for *Born in the U.S.A.* about 60 tracks were recorded in total; on *Human Touch* in 1992, around 40 songs went into the can.

The Springsteen canon is massive, so it's no surprise that the retrospective undertaken by Springsteen and his team in early 1998—a four-disc collection called *Bruce Springsteen: Tracks*, released in November—was an archival endeavor of Homeric proportions. *Tracks* offers many songs no one but Springsteen and his inner circle have ever heard before. Aside from those rarities are treats such as the four-song demo that John Hammond produced for Springsteen's Columbia signing and several B sides of singles, such as "Pink Cadillac," which was slated to appear on *Born in the U.S.A.* but which wound up being relegated to the flip side of the "Dancin' in the Dark" single instead.

"We knew that this was going to be quite an undertaking," recalls Toby Scott, who has worked as an engineer for Springsteen for the past two decades. Scott was Chuck Plotkin's engineer at the producer's studio, Clover, in Los Angles in 1978 when Plotkin was called in to finish mixes for *Darkness on the Edge of Town*. Over time, Springsteen came to rely more and more on Scott, both in the studio and for recording live performances, and Scott has handled nearly all of Springsteen's recording work since 1980. But one of Scott's greatest contributions is a computerized database that he began working on in 1985; Scott created it in order

—CONTINUED ON PAGE 175

World Radio History

"SESSIONS AT WEST 54TH"

BEHIND THE SCENES AT PBS' HOT MUSIC SHOW

by Eric Rudolph

PHOTO ©CAROLINE MCNAMARA

Liz Phair

Now in its second season, the hip weekly PBS series *Sessions at West 54th* has become television's most reliable source for high-quality live performances by an eclectic array of artists from the pop, blues, country and jazz worlds. Most of the one-hour *Sessions* programs present two acts for about 25 minutes each, and fill the remaining time with interviews conducted by the show's host, ex-Talking Heads frontman David Byrne, himself a guest during the first season.

Much of the show's appeal comes from the feeling of intimacy in the performances—at its best, the show seems like a private concert for friends. It's taped in Manhattan before a live audience of around 200 on Stage A of Sony Music Studios' cavernous West 54th Street facility (which was once a Fox movie soundstage). The visuals (it's a six-camera shoot) and sound are both top-notch, and that's a major reason why *Sessions* has been able to draw such a wide range of musicians, including Ben Folds Five, Beck, Richard Thompson, Elvis Costello and Burt Bacharach, Liz Phair, Cowboy Junkies, Lyle Lovett, the Pat Metheny Group, Lou Reed, Taj Mahal, Lucinda Williams, the Afro Cuban All-Stars, Jimmy Scott and many others.

PHOTO ©CAROLINE MCNAMARA

Burt Bacharach and Elvis Costello

"The idea of the *Sessions* sound is for the audience to hear what the acts hear onstage," says the show's recording/mixing engineer, Tom Cadley. This means bringing the audience right onto the soundstage, figuratively speaking. This is accomplished, in part, by using one of recording's oldest and simplest microphone arrangements: the three-mic overhead configuration commonly known as the Decca Tree (coined by classical engineers for Decca Records many years ago). Cadley says the Decca Tree defines the sound of the show: "You're definitely hearing the room; you hear what the musicians hear onstage, not my idea of what it should sound like using this or that reverb unit."

With such a wide variety of musical styles, the role of the Decca Tree is subject to a lot of variation. "For an acoustic act like the Del McCoury bluegrass group, I'll lower the Decca Tree so that I can focus the mics and get

—CONTINUED ON PAGE 178

Tom Cadley with Summit Audio DCL-200 compressor/limiter and Meyer and Genelec monitors in Sony Music Mix A

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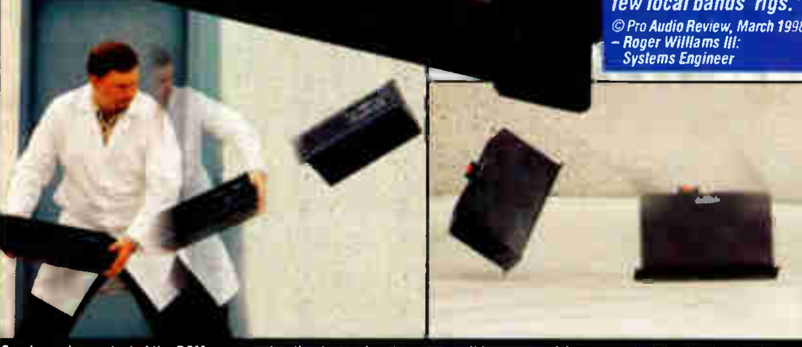

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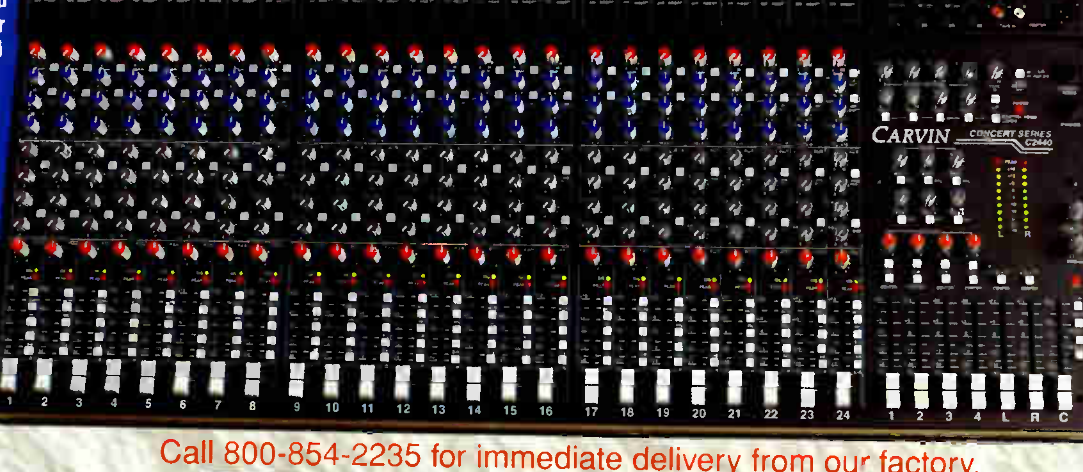

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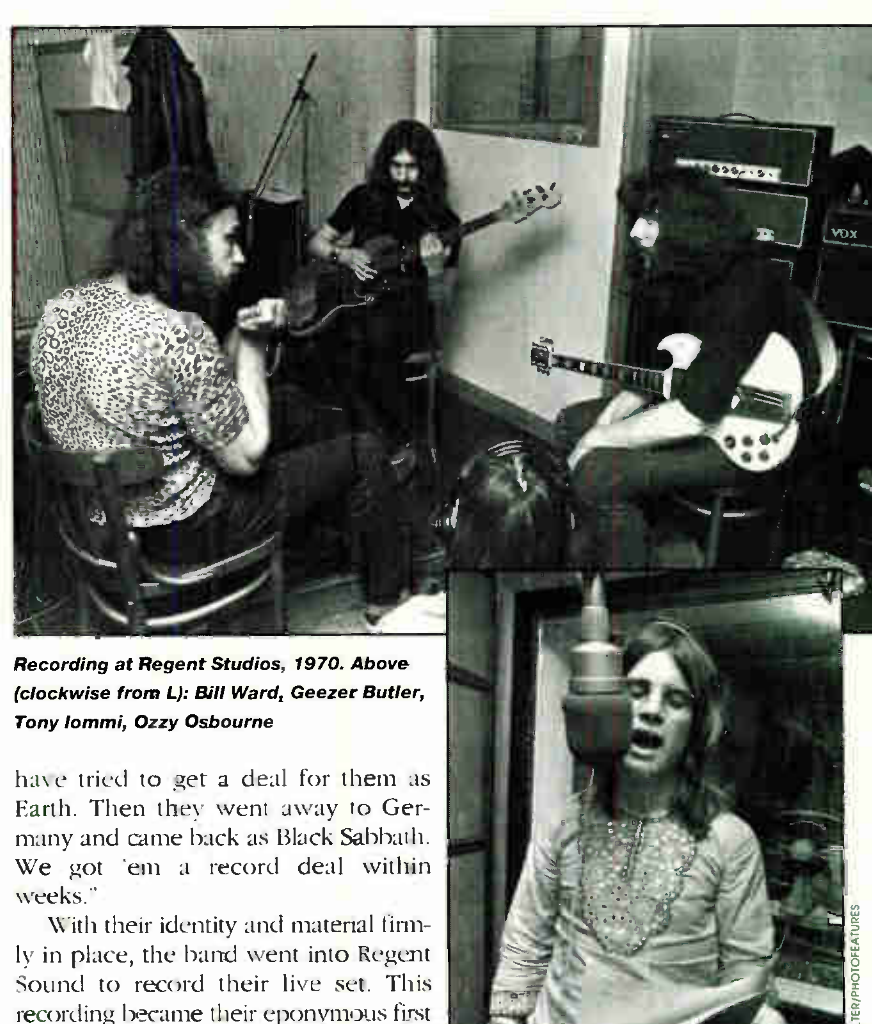
BLACK SABBATH'S "PARANOID"

by Russell H. Tice

In the fall of 1970, Black Sabbath mounted an aural assault on the music world with the release of their second album, *Paranoid*, storming the charts in their native England and in America. The album showcased the band's innovative, uncompromising hard rock sound with songs like "War Pigs," "Iron Man," "Electric Funeral" and the title track, a relentlessly driving ode to alienation. Black Sabbath formed in Birmingham from the remains of the British blues revolution and the late-'60s psychedelic meltdown. Guitarist Tony Iommi, bassist Terence "Geezer" Butler, drummer Bill Ward and the inimitable vocalist/madman John "Ozzy" Osbourne began as a jazz/blues combo called Earth and went on to virtually define the style now known as heavy metal.

Tony Hall, a British DJ and music business figure, barely knew what he had when his company, Tony Hall Enterprises, signed the band to their first contract: "I just thought they were a great little blues band, four good players who deserved to make a record. I signed them as a blues band and would have tried to get a deal for them as Earth. Then they went away to Germany and came back as Black Sabbath. We got 'em a record deal within weeks."



Recording at Regent Studios, 1970. Above (clockwise from L): Bill Ward, Geezer Butler, Tony Iommi, Ozzy Osbourne

PHOTOS ©CHRIS WALTER/PHOTOFEATURES

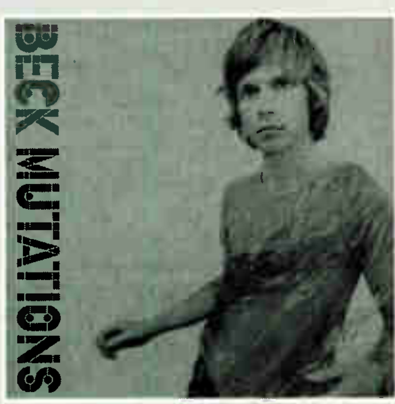
With their identity and material firmly in place, the band went into Regent Sound to record their live set. This recording became their eponymous first album, released Friday, February 13, 1970. It created an underground sensation and even made a dent in the *Billboard* charts—not bad for an unknown

Cool Spins

The Mix Staff Pick Their Current Favorites

Beck: *Mutations* (Geffen)

Beck is an artist who transcends genre by filtering styles through his own identity in a way that makes them his. *Mutations* encompasses everything from country to psychedelic, from folk and moody rock to Brazilian, yet it's wholly of a piece. Recorded and mixed in two weeks last spring with Radiohead producer/engineer Nigel Godrich, much of *Mutations* was cut live in the studio. It may seem stripped down compared to Beck's last release (the gonzo hip hop *Odelay*), but close listening reveals that there is, in fact, all kinds of stuff going on (headphones recommended). Instrumentation glides from sitar to harpsichord, quica and strings without stumbling; liberal doses of percussion and careful attention to vocals keep the whole thing vibing. There's an omnivorous intelligence at work here, and a real playfulness that manages to be both humorous and earnest—*Mutations* radiates an easy exuberance. Casually and supremely creative.



Producers: Nigel Godrich and Beck Hansen. Mix engineer: Nigel Godrich. Studio: Ocean Way (L.A.). Mastering: Bob Ludwig, Gateway (Portland, ME).

—*Adam Beyda*

Brad Mehldau: *Songs: The Art of the Trio, Volume Three* (Warner Jazz)

—CONTINUED ON PAGE 184

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band with a recording budget of roughly 600 pounds. "Two days for tracking, 10 to 10, and two days for mixing, 10 to 6," remembers engineer Tom Allom. The musicians weren't around for mixing or mastering. No one was more surprised than the band at its success: "We didn't think it'd ever do anything," remembers Geezer Butler. "Recording the album was just something we did on the way to Denmark."

For the band's follow-up, *Paranoid*, Rodger Bain, who produced their first three records, brought the foursome to the then-primitive Rockfield Studios in South Wales for preproduction. "The band were cranked up as if they were on stage," Bain recalls. "The building we were in was a fairly old barn. The whole of the roof actually did move. I can remember Ozzy saying, 'Why don't we record here?' 'cause the atmosphere of the place and the people were so great." (The band has maintained a re-

BLACK SABBATH RETURNS

by Baird Hersey

It has been 20 years since the original Black Sabbath disbanded amid a haze of drugs, alcohol and acrimony. During the intervening years the band members have forged successful solo careers, as the group spawned an endless procession of lesser imitators. With the passage of years, however, the ill will dissipated and the substance intake shrank to manageable levels, paving the way for the original lineup of Ozzy Osbourne, Tony Iommi, Geezer Butler and Bill Ward to convene once again. On December 4 and 5, 1997, two performances were recorded in Birmingham at the NEC Auditorium for a live album, appropriately titled *Reunion*. Ozzy has stated categorically that "one of the best shows I ever did" occurred the second night, from which most of the record is culled. The finished work, featuring nearly two hours of classic Black Sabbath material, proves that the band has certainly remained as potent as ever.

PHOTO: JACKY SALLOW

At A&M Studios, 1998: Bob Marlette, Tony Iommi and Ozzy Osbourne.

The concert was recorded 24-track analog by engineer Thom Panunzio with remote recording provided by Manor Mobiles. Preliminary mixes were done at Rockfield Studios in Wales. It was completed on the 72-input SSL 6072 in the Mix Room at A&M Studios in L.A. by Bob Marlette, who also produced two new studio cuts recorded in the aftermath of the concerts. "Tony and Ozzy called me and I came in just to do the studio tracks," Marlette explains, "Then, once we were in there working on the studio tracks, they asked me to do the remix on [the live tracks]."

For the live material, Marlette called on the formidable resources of the A&M outboard closet. "I used every tube compressor that A&M had," he says. "I was even going into other rooms and pulling stuff out; massive amounts of anything that was tube—a lot of LA-2As and Pultecs, a lot of Neve modules; there were all these 1073s floating around. Basically every piece of outboard gear I could get in. It was mostly a combination of adding and subtracting frequencies. I would start on the SSL EQ, narrowing the bandwidth, really selecting and removing some of the tones that I didn't like, pinpointing and carving them out, then putting them back in a warmer way through either the Pultecs or the 1073s, in addition to tube compressors, fattening them back up minus

—CONTINUED ON PAGE 170

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PHOTO: ©CHRIS WALTER/PHOTOFEATURES

Bill Ward tracking drums

lationship with the studio's proprietors, brothers Kingsley and Charles Ward, that continues through to the present. Rockfield and nearby Monnow Valley Studios, now world-class facilities, are still run by the two brothers.)

"The biggest chunk of time was spent in the rehearsing and routining stage," explains Bain, "the object being that when you go in to record you're not sort of experimenting in the studio. What you're doing when you go into the studio is transferring it into a recorded version."

"We did the backing tracks for *Paranoid* in the same place that we did the first album—Regent, a little 4-track just off Tottenham Court road in the West End," remembers Allom. "It was a good-sounding studio; we always got good results in that room. It was an absolute shithole, but it worked. [The console] was some custom-built thing; just a piece of old dross. Terrible thing—it didn't even have any midrange. We had to get it modified to get some midrange. We had two 1-inch 4-track Studers. We did have a Pultec. We had some Neumann mics; I think we had a couple of 67s. We finally acquired an old M49. We had a couple of old AKGs, whatever the forerunner of the 414 was. We had some old 64s, the pencil mics. I recorded Bill Ward's drums stereo using those pencil mics. Very few people recorded drums stereo back then. I thought it might be a good idea."

According to Bain, "The bass was recorded with a split lead—one was direct, the other was off the cabinet. It was loud." The dearth of outboard gear wasn't a major problem at the time: "Mic placement was probably one of the key ingredients," he notes. "Having a successful album under our belts would have given the luxury of spending more time."

"We started *Paranoid* at Regent Sound" recalls Ozzy Osbourne, "and then we moved to this magnificent 16-track, Island Studios. That's where we wrote the song 'Paranoid.'" Overdubs and mixing were completed in the same state-of-the-art facility on Basing Street. Island Studios was built by Chris Blackwell, owner of the successful Island Records, in a converted church. The mix room was upstairs, where the prayer and supplication had taken place, and the main tracking room was in the basement crypt. The consoles at Island were built and modified by the legendary British audio designer Dick Swettenham, who had built desks for Olympic Studios, as well. Swettenham's consoles featured in-line compressors and equalization. Monitoring was generally through Tannoy speakers in Lockwood cabinets.

Once at Island, the 4-track basics were bounced to 16, giving the group more space to experiment with different

—FROM PAGE 168, BLACK SABBATH RETURNS

the frequencies that were ugly. I always start out by removing what I don't like first and then I build up the quality of the big picture."

Unlike most "live" albums, this one actually is a valid document of the performance. "I think there's two snare drum hits I missed," admits Bill Ward. "Nobody's going in there and overdubbing or anything else. This is a raw live album." Guitarist Tony Iommi, the mastermind behind the majority of the monstrous riffs, adds, "We've left some of the clunks on it. We tried to keep it how it was, so if the tuning was a little bit off, it was off. We didn't want to go in and polish it all up. You can hear that."

"I wanted to keep it as pure as possible," Marlette adds. "I wanted the audience to feel like they were seeing a show, not a sort of edited, shined up, overdubbed thing. Anyone in the audience who would buy that record would know better. I wanted them to feel like 'I was in the 27th row and I was watching a great Sabbath show.' Actually, I did use some stereo-enhancing boxes. There's certain places where you feel that some of the audience is coming from behind you as well."

For the new studio songs, "Psycho-Man" and "Selling My Soul," Black Sabbath stepped into the world of Pro Tools production, courtesy of Marlette: "I think Pro Tools is just a wonderful tool that helps you create whatever you want to create. Everything was manipulated into Pro Tools, and once it reached its final form, it would be bounced to analog. I wanted the benefit of analog, but the versatility of Pro Tools."

Ozzy liked working with the system as well: "It's a lot easier, to be honest with you, but I couldn't f—ing turn the thing on! You can chop things around, no missing, and it's so easy. We wrote the two songs in no time at all."

The recording process differed from the usual Sabbath approach as well: "It was Ozzy and myself there," relates Iommi. "It enabled us to put down the ideas quick, and if that didn't work, then to scrap 'em and put something else down." With just Iommi and Ozzy present, the guitar and vocals were recorded using programmed rhythms. "It was just to get the basic idea," Iommi continues, "then Bill would come in and play the drums. You've got to be careful with using click tracks because of the feel."

"Tony is such a classic guitar player," Marlette offers. "I wanted to make sure we captured Tony. I almost always put several mics on there—57, 47 FET, 414 and like maybe an 87 back a little. Almost always, I'd end up going back to the 57. It just works, it sounds right. It was recorded in a fairly small room. I'd bus all the mics to one track and we'd do multiple takes. Bass was a combination of DI and mic. I think we used a B-15 on that. We recorded the drums in Studio A, the Neve console."

The new songs were also finished in the Mix room, and mastered at A&M by David Collins. As of this writing, the band was preparing for a full-fledged U.S. tour slated to begin New Year's Eve. With the possibility of a new studio album looming in the distance, it appears that Black Sabbath are back—music world beware. ■

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sounds. For Iommi's guitar leads, for example, "It was double-tracking if not triple-tracking," Bain says. "It would be a close mic and an ambient mic that would be way off. But it was the combination that gave it that punch and gave it the size of the sound." Still, Bain says that the guitar sound derived much of its power from its simplicity: "I think the secret to that was really 'cause it was straightforward. You know, if you put compressors on something, EQ it over the top, you lose that power; it just weakens the whole sound. The original way we worked was to keep it really raw."

Ironically, the biggest hit the group would ever know entailed the least amount of work. "'Paranoid,' the actual track, I did when everybody went for a lunch break," Iommi explains. "I just sat in the studio and came up with this idea." Drummer Bill Ward has a very clear memory of the afternoon: "He was just playing it on his own in the studio. Geezer plugged in his bass, I sat behind my drum kit, we automatically grooved with him and Ozzy started singing. We didn't say a word to each other; we just came in the room and started playing. I think it was about 1:30 in the afternoon; Tony had the riffs, and by 2:00 we had 'Paranoid' exactly as you hear it on the record."

Bain pressed them to record the song: "It had a very strong beat, a powerful riff. I remember pressing the talkback and saying words to the effect of, 'That's pretty good. What is that?' and sort of getting disbelief. They said, 'You're joking.' I said, 'No, that's really good, that's a really strong riff.' They

said, 'We're just pissing around. We just made it up.' I said, 'Well that's great, let's do it!'"

The song was originally titled "The Paranoid" by Geezer Butler. "I wrote the lyrics and Ozzy just read them as he was singing it," he says. The antisocial nature of the words didn't hinder the song's popularity in the slightest. In fact, the honesty in downer lines like "I tell you to enjoy life/I wish I could but it's too late" seemed to appeal to disenchanted youth of the early '70s.

The unusual distorted guitar solo was recorded straight and then processed during mixing "through a sound modulator of some sort," recalls Iommi, most likely one of the many assorted effects boxes Bain collected at the time.

Ozzy remembers being a bit surprised that the song they'd knocked off in such a short period became the title track for the album: "I remember going home with the tapes and I said to my then-wife, 'I think we've written a single.' She said, 'But you don't write singles.' I said, 'I know, but this has been driving me nuts on the train all the way back.'"

Bill Ward's reaction was similar: "I thought 'Paranoid,' in comparison to some of the other songs, like 'Hand of Doom,' was a little bit light, to be honest with you. I thought, 'This is a bit of a pop song.' I didn't really pay a whole lot of attention to it." But when the record company received the finished tapes, they smelled a hit in "Paranoid." "I think it was the only one that could be picked

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Top: Renowned producers at StudioPro98 (L-R): Ed Cherney, George Massenburg, moderator David Schwartz, Nile Rodgers, Tommy LiPuma, Barry Beckett. Above: Mel Lambert introduces the panel on modular digital multitracks, moderated by *Mix* editor George Petersen.

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as a single, because all the others were too long!" laughs Iommi in retrospect.

"In actual fact the *Paranoid* album was going to be called *War Pigs*," recalls Ozzy, "and then we wrote 'Paranoid' at the very last minute. I mean, if you look at the album sleeve, it's got a guy in a pink leotard and a shield and a sword. That was supposed to represent the War Pig. A pink pig. They printed the album sleeve and changed it to *Paranoid* at the very last minute."

"We were looking for a single," says Joe Smith, who signed the group to Warner Bros., "and they were hard to get. There was still resistance in Top 40 radio to playing any single by one of these bands. If somebody's going to take a shot, 'Paranoid' was the record to take a shot with. Also, it was a great title for a single at the time."

The single climbed up to Number Four on the British charts when it was released in the late summer of 1970. The album, *Paranoid*, was released September 18, 1970, the day Jimi Hendrix died. It rose to Number One in the UK and Number 12 in America and helped propel Black Sabbath to the status of a major headliner, earning them notoriety worldwide.

Although the single only made it to Number 61 in the States, Black Sabbath had a special distinction at Warner Bros., as Joe Smith relates: "What astounded us was the sales. Black Sabbath was our most efficient seller. There's a certain curve where the sales end. With Black Sabbath it never ended. It never totally stopped. The fever would be gone, but you'd still be selling 5,000 a week or 10,000 a week, so we never had returns with Black Sabbath. They had six Platinum albums in a row; multi-Platinum albums. There is a feeling among kids now that they missed something and here's a chance to get it back, and Black Sabbath is one of the very few groups in that genre that's out there playing."

Nearly three decades later, "Paranoid" has appeared in the set list for nearly every show of every major incarnation of Black Sabbath or Ozzy Osbourne's solo career. It has been re-recorded and re-released a number of times on various live albums, as well as appearing in multiple motion picture soundtracks and even a beer commercial. As rock musicians of all ages continue to turn to the band for inspiration, "Paranoid" retains the most mainstream popularity of all their compositions, still garnering regular airplay on classic rock radio. The band itself is an institution, one of the founders of its genre, and with the recent reunion of the original lineup and singer Ozzy Osbourne spearheading the massively popular Ozzfest, it seems certain that their influence will continue for a long time to come. ■

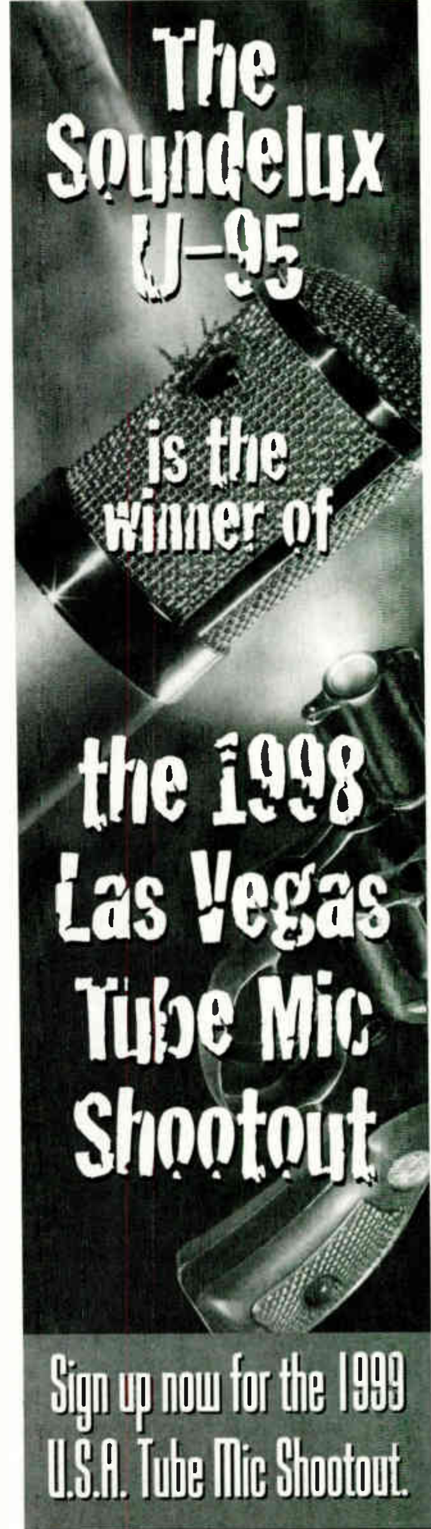
—FROM PAGE 164, BRUCE SPRINGSTEEN

to help Springsteen find specific songs in his rapidly growing treasury of demos, outtakes and songs that didn't make it onto albums, so Springsteen could keep rotating them into his ever-changing live sets.

"In February [1998], Bruce had been recording material for a new album, and in the middle of it he just stopped and said, 'Let's do the boxed set,'" recalls Scott, who began the project working from his home in Whitefish, Montana. "That's what we had always referred to this project as. We knew since the 1980s that he would do it at some point." Springsteen gave Scott a list of more than a hundred songs, and Scott began researching them in the catalog. Most of the material was in rough-mix form, and for a time the creative crew of Springsteen, Plotkin and manager Jon Landau considered releasing those mixes, even doing a tentative initial mastering session to see what they would sound like. But a listening session in June among the three produced a decision—prompted mainly by Landau—to do remixes from the original masters.

Meanwhile, Sony Music had been alerted that the project was under way, and the record company's corporate machine ground into gear, creating its own timetable and setting a September deadline for master submission. "We didn't even have a final list of songs for the project in June, and here we were facing a three-month deadline in which we were going to have to find, remix and master dozens of songs," recalls Scott. "It was almost overwhelming."

Almost. But the database project Scott had started and maintained helped enormously in locating the desired multitrack reels. These were sent to Springsteen's South Jersey estate, a working farm with several additional buildings on the property, one of which—a 185-year-old farmhouse—is his personal recording studio (profiled in *Mix* in June '96). Scott had first put Springsteen's home recording setup together back in 1982, when the artist was working on *Born in the U.S.A.* and recording new songs to cassette. Springsteen had be-



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come enamored of the stark tonal quality he could achieve with an acoustic guitar and a cassette, and that experience eventually contributed to *Nebraska*. But as Springsteen seemed to increasingly enjoy working outside the conventional studio setting, Scott offered to put together a more sophisticated recording operation for him. Initially, it was an 8-track MCI recorder and a 16-input Trident Trimix console, which would mix down to the early digital F-1 format, which essentially was little more than a stereo A-D converter and a VHS VCR. "It was awkward, but it was digital and 16-bit, either 44.1 kHz or 48 kHz," says Scott. "He did over a dozen songs on that format, and two wound up on the boxed set. He really needed a home studio back then, if only so we didn't end up mastering cassettes for the rest of his career."

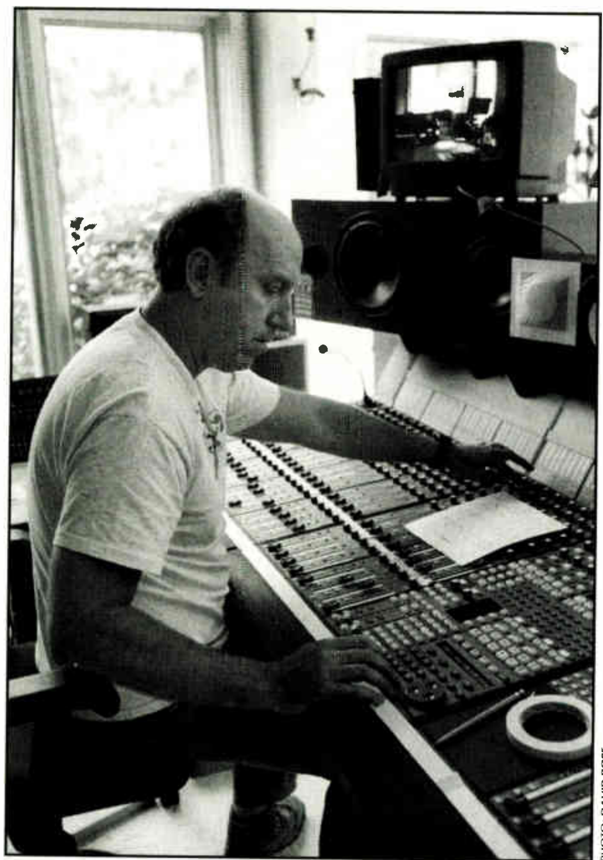
PHOTO: DAVID ROSE

Toby Scott works on a mix in Studio A at the farm. The TV image shows Studio C, the living room.

Beginning in late June of last year, Scott organized how to get the songs for the boxed set (which had grown to 128 in number) located and remixed if necessary in the increasingly short window ahead of them. The solution was to turn the farmhouse into a recording complex. By this time, the home studio had been considerably updated—after going to 24-track analog (another MCI machine, an expanded Trident; later a 62-input Amek Angela and the first of what would be two of the early Sony 3324 digital multitracks), it now features a 96-input Euphonix CS2000 console and a pair of Sony 3348 digital multitracks, with mixdown mainly to DAT. Over the years, as he updated the database of recordings, Scott's thoroughness extended to having original masters transferred to digital multitrack formats, and this helped considerably when the boxed set project began—by then most of the masters were already transferred to digital. The Euphonix room was dubbed Studio A. Next, it was arranged for Kooster McAllister's Record Plant Remote truck to come to the estate, where it would act as Studio B, parked across the driveway from the farmhouse. Finally, longtime Springsteen mixer Bob Clearmountain came onboard. Because of scheduling conflicts, he worked from his SSL-equipped home studio in Los Angeles, and Scott arranged for ISDN lines and an EDNet digital conversion system to be linked to the New Jersey site. Engineer Ed Thacker was brought in to do mixes on the Euphonix, and Thom Panunzio, who was an assistant engineer for producer/engineer Jimmy Iovine on *Born To Run* at the old Record Plant Studios in Manhattan, was hired to mix from the Record Plant truck.

"We realized that there was no way to meet the deadline of September 10 if we just used one studio to remix all of this," Scott says. "The math just didn't work. And there were scheduling issues to deal with when you have more than one mixer. Ed was available from July through September; Bob was booked almost through August; Thom had time in the end of July and all of August. So we had to have multiple studios working and multiple mixers mixing at the same time, if necessary."

Through early August, Scott was coordinating virtually all of this by phone, awaiting the birth of his first child in Whitefish. He hired engineer Greg Goldman, whom he had worked with before, to act as his eyes and ears on the ground in New Jersey. All the mixers shared Yamaha NS-10 monitoring in common—Springsteen's own favorite studio speaker—coupled with dB Technologies A-D converters (Clearmountain used Apogee converters). This gave an element of consistency to the project, which would cover 26 years' worth of Springsteen recordings and encompass a broad array of recording formats and technology.

Artistically, Plotkin assigned songs from various eras of Springsteen's career among the three engineers chronologically. "The earlier stuff went to Thom, because he was actually around for some of it," Scott explains. Thacker was also given some of that material, as well as a lot of the middle period Springsteen. Clearmountain remixed later pieces, from the *Human Touch* era forward. "As a result, there was enough material so that most of the time the mixers weren't crossing over between eras," Scott says. "For instance, CD three is all Thacker and CD four is all Clearmountain. And the material itself has so much internal variation between periods that there really isn't a consistency issue in most of it. It stands alone. Besides, we've all heard a few Bruce Springsteen mixes before."

Thacker's connection to Springsteen was peripheral until he was called for this project. He had been friends with Plotkin for years and had been working in recent years on music projects with E Street Band keyboardist Roy Bittan. However, that, combined with a highly evolved working knowledge of the Euphonix console, made him a good choice for Studio A, says Scott. From Thacker's point of view, the experience was much more than simply a gig. "Bruce's records had been a big influence on me as an engineer in terms of their power and content," he observes. "The interesting thing about them is that they're not as guitar-driven as you might remember them. Once I opened up the tapes I realized that the guitars are more like the foundation of the rhythm and the keyboards have these little interlocking melodies that really give you the hook." After mixing 38 of the 66 songs in the boxed set, Thacker found, too, that Springsteen had changed his attitude toward reverb. "We all recall his vocals as being very big and sitting in the track surrounded by reverb," he says. "But in several instances he asked me to make the vocals drier than they might have been 20 years ago; make them a little more personal. We weren't

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trying to re-create the past with this project; the songs and the music do that themselves."

A typical day in August, when all three engineers were working simultaneously on mixes, was both complex and cacophonous. Panunzio and Thacker would generally set up a mix during the evenings, returning the next morning to complete it. Springsteen would call in during the afternoons and show up between 4 p.m. and 7 p.m. to listen to mixes and make any suggested changes. Plotkin was also present, adding his input.

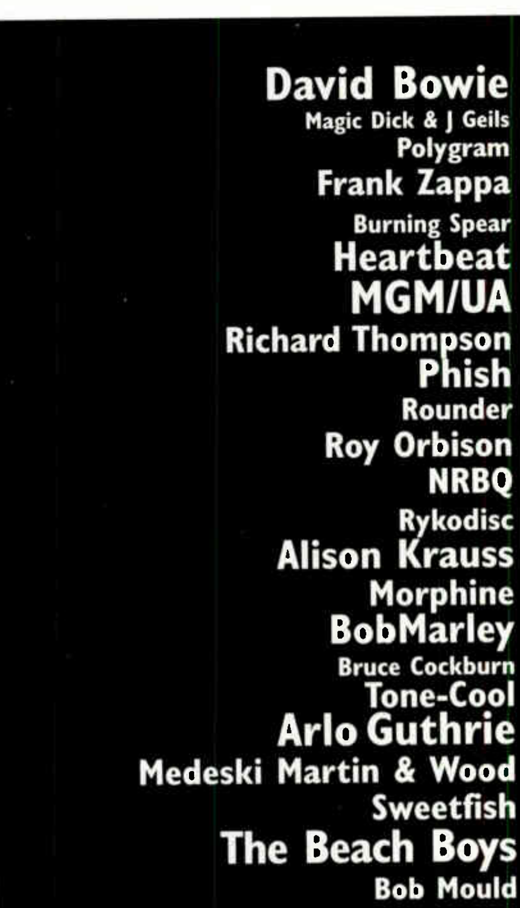
Meanwhile, Clearmountain was doing the same, but with a three-hour time difference, with his mixes being played back in real time over NS-10s in the living room at Springsteen's recording compound. By then, Scott's wife had delivered and he was back on-site and, along with assistant engineer Ross Petersen (who was also assisting Thacker in Studio A), using the mornings to handle any maintenance tasks that had cropped up overnight. "It got so you could hear music coming from all over the place," Scott recalls of those bustling dog days of summer. "It was an old building, and you could hear everyone's mixes coming through the walls around you." It was a beehive-like production line that was creating what would eventually become 66 songs for *Tracks* in less than 90 days.

Thom Panunzio had specified the Record Plant Remote truck, which ran on an external generator for the first few weeks until Kooster McAllister found a 240-volt source in the greenhouse attached to the farmhouse. But inside, it could have been the Record Plant in Manhattan, circa 1975, with McAllister's discrete API console and the classic outboard complement that included Pultec EQP-1As, Fairchild 670s and LA-2As. "Some of this stuff had originally been recorded 20 years ago, and they wanted to re-create that effect for this mix," McAllister says. There was an occasional overdub, as well. "In a lot of cases, Bruce had started a song and then moved on to the next one, so some of them needed a guitar part or a tambourine or a harmony," he recalls. "Bruce just stood in the back of the truck and did it. Usually in one take."

For Panunzio, who had assisted engineer/producer Jimmy Iovine on *Darkness on the Edge of Town* at the original Record Plant, it was a time trip. "It was a flashback to open up the tapes and hear me and Jimmy talking over the talkback. When you think about it, there's no other artist who could have had so many great songs not make it onto their records in the first place."

At the same time, Scott had rented (and learned to operate) a Sonic Solutions workstation, chosen because it was the same platform that mastering engineer Bob Ludwig would use for the finished productions. Scott loaded the final remixes into the Sonic's hard drives. He assembled them in sequence and according to which disc they would reside on for the final boxed set, setting spacings and doing crossfades and other editing tasks. "That would make the mastering stage go that much faster," he says. "And once we had material to fill one of the CDs, that would give us all a chance to reevaluate it artistically in sequence."

Mastering was completed in a week, from hard drives sent to Gateway Mastering in Portland, Maine. Scott, Plotkin and Springsteen capped that process off with three days of listening there, making final tweaks to the four-disc set be-



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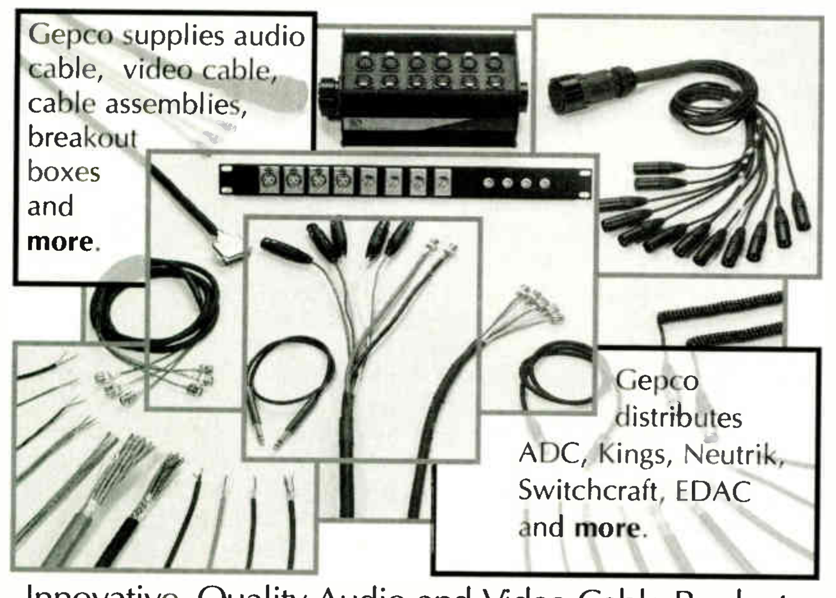

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Scott credits everyone who worked on the complex project as contributing to its on-time completion, from the technical aspects to the artistic wrestling that went into choosing which songs would appear on this career-defining showcase. But the project also had one other tangential accomplishment that seemed to particularly gratify Scott's orderly proclivities: Sony Music has recently created its own archive database, and in doing so has made extensive use of Scott's cataloging efforts over the last decade. "Now I can just call up Sony and get whatever Bruce Springsteen song I need," he says. Which will be very helpful for *Tracks II*, if it ever happens. ■

—FROM PAGE 165, "SESSIONS AT WEST 54TH"

a direct pickup with a clear image," Cadley says. "That works because the act is five guys around a mic who walk up to do their solos. For someone like Liz Phair, with a loud rock band, the Decca Tree will be up near the lighting grid, and it will be mixed in essentially as a drum reverb." Cadley says his left-center-right Decca setup is most often fitted with three Neumann TLM 170 omnidirectional mics.

To work successfully with the wide range of acts that appear on *Sessions*, Cadley must be familiar with all types of music. "You have to know things like how important the clave is to a group like the Afro Cuban All-Stars," he explains. "It's easy to lose a clave with all the horns and percussion going on. Fortunately I never wanted to be a specialist, and my experience doing jingles, where you would cut a Coke spot for Latin, easy listening and rock stations all on the same day, turned out to be wonderful training." Cadley began his career as Bob Clearmountain's assistant at Bearsville Studios in upstate New York and has since engineered rock records for Joan Jett, Charlie Sexton, Midnight Oil and others.

Cadley records the show on a Sony 3348 48-track digital machine and mixes to a Sony PCM800 in Sony Music Studios Mix A, through a 96-input SSL analog board. (The audience tracks and host are tracked on the PCM800.) He uses Genelec and Meyer near-field speakers, leaving the room's giant built-in Boxer monitors alone. To get an idea of what the show sounds like on a single-speaker television, Cadley uses the built-

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in speaker on a Studer 2-track recorder, set across the room from the mix position like a TV would be in a living room. "That's how I can tell if the bass is sitting right," he says. "If it's too loud, it blows out the speaker, and if it is too low you can't hear it at all. I learned this from Bob Clearmountain; some people at Media Sound apparently discovered how much that little speaker in the Studers sounds like a TV."

So who does Cadley mix for—the person who casually flicks on the set or those who run the sound through their stereo system? "I mix for the person listening through their stereo, and I do it quite dynamically. A lot of people who mix music for television use a lot of compression so that everything's really loud. I don't care for that approach. It's quite easy for a person to turn up their sound level on the TV during a soft passage." (*Sessions* is currently mixed only for stereo.)

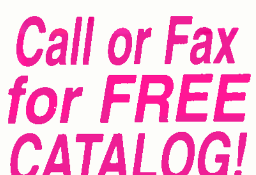
Cadley keeps the outboard gear minimal. "I use a Summit Audio DCL-200 dual compressor-limiter for most everything I do," he says. "It's warm and you can adjust the attack and release. For reverb I plug in a ton of gear," he adds, pointing to the array of equipment sitting behind him. "Then I'll ultimately use only two or three things, mostly a couple of small room programs from the board's Lexicon 480L. I'll often use an AMS RMX reverb unit for those canyon-like echoes on long sax solos."

Cadley is usually involved in all aspects of the production, including the microphone choices. He eschews piano transducers because of problems with hot spots and left hand definition. And as the lids are normally closed for camera purposes, he has devised his own solution—a pair of Schoeps MK4s (with Avalon preamps) attached under the lid, padded with foam, with the head angled down. "The Schoeps are set right above the piano's big iron support beams. People look at it and say, 'Well, you'll get the sound of the beams really nicely,' but the coverage is smooth and even, and it has some sense of space, which is what I'm after."

The drums get Coles 4038 ribbon mics set high above the kit. "That's my drum sound; I use 57s and 58s or Audix D3s for the snare and toms. I like the Audix mics because they're small and camera-friendly. The kick gets an M88. But those additional drum mics are mostly for added definition; the overhead Coles are what I use most. They've got a big diaphragm and a nice top-end roll-off that keeps the cymbals from going sizzly and loud," Cadley says. The bass is usually taken direct, though Cadley sometimes adds a mic to get the cabinet sound as well.

Choice of vocal mic turns out to be an area the musicians usually have an opinion about. "Acts come in here during their tours and they're used to using Shure SM57s and 58s, which makes sense because they are so road-worthy," Cadley states. "But as good as they are, they don't sound as good as a condenser mic. However, we've learned that some people are very attached to certain mics," especially the ubiquitous SM58s. "We tried to use my main *Sessions* vocal mic, the AKG 535, with Brian Setzer, and he just wasn't comfortable with it and asked us to put in an SM58. For a vocalist the mic is their instrument, and they need to be comfortable. Some bands come in with unconventional vocal mics that we end up using, like Phish, which had Neumann KMS 150s, which were great," Cadley says.

Elvis Costello was also intimately involved with the choice of his vocal mic. "He really wanted a 58; again, he is re-



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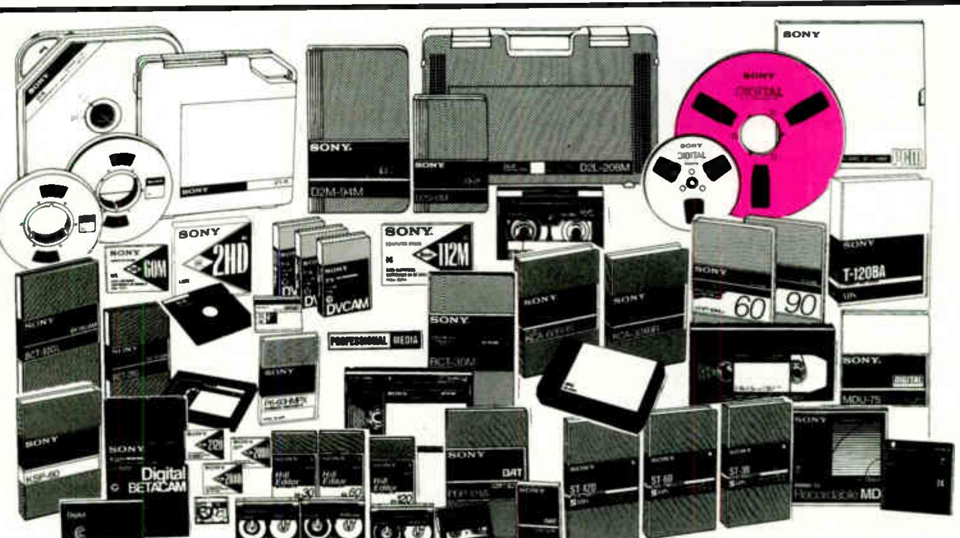

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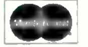

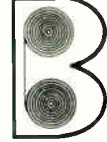

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ally comfortable with them. I wanted to try a Microtech UMT 70, but it can't be handled, and working with the mic and stand is part of Elvis' stage presence. So we gave him the AKG 535, a condenser mic I feel sounds good on everyone, and which can be handled. I don't have to add any false top to an AKG 535. If I'm not fighting bleed, which I am constantly doing with *Sessions*, I can use it flat." (The AKG 535 has a 2dB rise between 7 and 12kHz to project vocals. Cadley paired the AKG with a Martech preamp.)

Cadley says that on the Costello-Bacharach show (a challenging one that featured a total of 29 musicians and vocalists), the string section presented special problems because of its proximity to the drums and vocal monitors. For the tour, the violins had Shure SM17s Velcro'd to the instruments, but Cadley says that is far from ideal. "The best sound from a violin is about two feet overhead, but with the drums bashing and the monitors you just can't do it." His solution was to place four Neumann TLM 170s (through Neve preamps) in front of each string group about six feet high, "to get some air and something a little less harsh that I could work into the mix. I used the TLM 170s because they're not too directional, so they would pick up the entire area. Through brutal EQ I was able to get the P.A., monitors and all the other things out of them. The viola and cello took similar treatment. Mixing *Sessions* is about maintaining the spatial relationships that you see. We added the Neumanns so it doesn't sound like the violins are all in your face." Coles 4038 ribbon mics were used for the trumpet, and Neumann KM 84s for the sax and flute, all with Hardy preamps.

Cadley had originally thought the Decca Tree would play a much larger part in the final sound. "I thought it would be great to use on a string section. However, with the regular pop rhythm section out there and the number of monitors, it became just a bunch of noise, and I couldn't hear the violins. So the Decca Tree ended up being the main reverb," when the audio post-production commenced.

Though most of the *Sessions* artists are not contractually entitled to post-production input, many become quite involved with the process. "I try to get the FOH engineer in here working with me for at least some of the time," Cadley notes. "I talk to the artist after the soundcheck, and I ask them to come in and listen to the live mix; I always give them a DAT and a CD for the tour bus, no matter how bad my live mix may be. With a lot of artists we talk on the phone after they've listened; Paula Cole spent several hours going over the mix right after the show.

"I'm surprised by how many artists I never hear from; they apparently think, 'Well, it's just another TV show.' That seems so strange to me because, as we've learned recently with video releases and various nostalgia kicks, these types of programs live on a long time." In the case of the Costello-Bacharach show, both the artists and Kevin Killen—engineer/mixer on the duo's record—were involved. "Kevin isn't here right now because of a scheduling conflict," Cadley explains during a break in mixing that *Sessions* installment. "But he was here for the show and we mixed one song together, and we've been in constant touch about the shape the mix is taking."

Some artists go even further, bringing in their own mixers. "Pat Metheny has worked with Rob Eaton for ten years," Cadley says. "He mixed the show, and it's going to be great. Lou Reed is quite comfortable with my friend John Harris, so he took over, which is also great."

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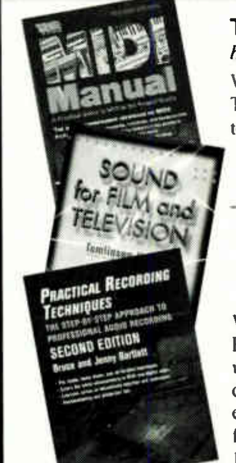

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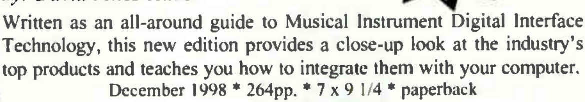
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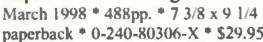
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Although sitting in a state-of-the-art studio mixing a television show that constantly features some of the day's most provocative artists may sound like a dream job, *Sessions* is a weekly show and the schedule is tough. When we spoke the hour-long Costello-Bacharach show was getting special post attention; Cadley was on his second day of mixing. However, it was still early in the week, and there were many more shows to complete before the weekend. "Normally, with the shows featuring two pop acts, I'll mix each 25-minute segment in seven hours," Cadley explains, "and do the whole show in one 14-hour day. It's a rough schedule—we start taping in late August and finish before Christmas, and then I basically take the rest of the year off." ■

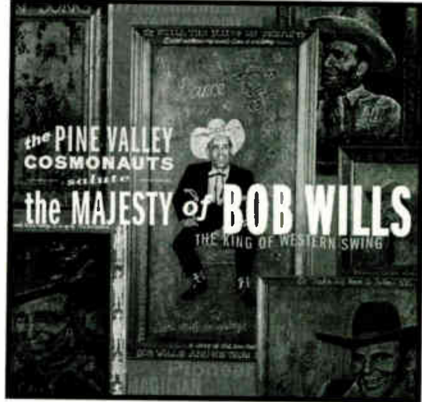
—FROM PAGE 167, COOL SPINS

There's a quiet, beautiful sadness to much of the music on this intoxicating disc. Pianist Mehldau and his able Trio mates—bassist Larry Grenadier and drummer Jorge Rossy—play with a tremendous grace and lyricism throughout, the melodies spilling out of Mehldau's instrument with a pleasing fluidity. The ten-song collection is split between Mehldau's moody originals and cover tunes ranging from the Rodgers & Hart standard "Bewitched, Bothered and Bewildered" to Radiohead's haunting "Exit Music (For a Film)," which begins with a passage that sounds like Beethoven's *Moonlight Sonata* and then evolves into a swirling rhythmic river. There is also a Nick Drake cover ("River Man") and a reading of the oft-covered "Young at Heart." Mehldau sounds like he has one foot in the conservatory and the other at the bench with Bill Evans; it's an intriguing blend of the formal and the free. Mehldau is also prominent on saxophonist Joshua Redman's excellent fall '98 release, *Timeless Tales for Changing Times*.

Producer: Matt Pierson. Engineer: James Farber. Studios: Right Track (NYC), Sony (NYC, mixing). Mastering: Greg Calbi, Masterdisk (NYC). *—Blair Jackson*

***The Pine Valley Cosmonauts Salute the Majesty of Bob Wills, the King of Western Swing* (Bloodshot Records)**

Led by the Mekons' Jon Langford, the Pine Valley Cosmonauts float somewhere between retro country and cowpunk. The playing on this inspired release is for-real Texas Playboys swing, complete with a sweet little horn sec-



tion (Poi Dog Pondering's Paul Mertens and Dave Max Crawford) and a respectfully restrained assortment of bluegrass strings played by John Rice (fiddle, guitar, mandolin, banjo), the Bottle Rockets' Tom Ray (bass) and KMFDM's Mark Durante (pedal steel). Wills was also known for putting the back-beat behind country, and that's capably handled by Mekon Steve Goulding. But the vocals on these classic songs, from the first track—y'all-ternative folk rocker Chris Mills on "Home in San Antone"—are offbeat in a great rock 'n' roll way. Other singers include roots country artist Jimmie Dale Gilmore, as well as Robbie Fulks, Langford and fellow Mekon Sally Timms. The sound of modern, rough voices joyfully careening through Wills' catalog is what makes this a spirited tribute to one of country's, and rock 'n' roll's, pioneers.

Producers: Jon Langford, Mark Durante and John Rice. Engineer: "Kengineer" Sluiter. Additional recording: Baron Von Trumfio and

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Mike Hagler. Studio: Kingsize Sound Laboratories, Chicago. Mastering: Not listed.

—*Barbara Schultz*

The Band: *Jubilation* (River North)

This third album by the most recent incarnation of The Band finds the Woodstock, N.Y., group moving away from the big R&B sound of their previous disc, *High on the Hog*, in favor of a more folksy and intimate approach that suits them very well. The title of the CD, *Jubilation*, is somewhat misleading, because the disc's dominant mood is actually a wistful melancholy, and no one communicates that better than Rick Danko, whose lead vocals on "If I Should Fail" and "Book Faded Brown" ooze

with weary resignation. Then again, the lovely "High Cotton" finds Danko optimistically crooning "The sun feels great, I can tell today it's gonna shine," so he has the CD's happiest moments, too. Levon Helm's distinctive, backwoodsy growl gives every song he sings the classic Band sound, and keyboardist/saxophonist Garth Hudson is, as ever, the most imaginative support player any group could hope for. Eric Clapton and John Hiatt make impressive guest shots, but it's the core sextet and a few of their Woodstock friends who give this fine set its textural richness and downhome warmth.

Producers: Aaron Hurwitz and The Band. Engineer/Mixer: Aaron Hurwitz. Studio: Levon Helm's studio (Woodstock, NY). Additional Recording: Bearsville Studios (Bearsville, NY), The Clubhouse (Germantown, NY). Additional Mixing: NRS (West Hurley, NY). Mastering: Bob Ludwig, Gateway Mastering (Portland, ME).

—*Blair Jackson*

Archers of Loaf: *White Trash Heroes* (Alias Records)

The rollicking marching band drum cadence, slashing guitars and inspired singing that open this record made me feel like a door was kicked open. Since this doesn't happen often, I dove in and was thrilled to be taken through ten completely different atmospheres in 42 minutes. It's a powerful journey through alternately hilarious and breathtaking rock, smart pop, quietly desperate old-South blues, noise,

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angular art-math music and so much more. Hailing from Chapel Hill, N.C., this 7-year-old band is pegged as having a "collegiate" sound, but there is a blend of raucousness and true emotional depth to the music that a wide range of folks could appreciate. There's some nice, crispy guitar and vocal sound processing, with judicious keys and electronics added for emphasis—and I could kill for the thick/present bass sound. A mature work that's bigger than the sum of its parts.

Producers: Brain Paulson and Archers of Loaf. Engineer: Brian Paulson. Mixers: Brian Paulson, Mitch Easter and Archers of Loaf. Studios: Ardent Studios (Memphis), Sound of Music (Richmond, VA), Reflection Studios (Charlotte, NC; mixing), The Fidelitorium (Kernersville, NC, mixing). Mastering: Roger Laim at Masterdisk (NYC).

—*Anne Eickelberg*

Imogen Heap: *I Megaphone* (Almo Sounds)

With record companies searching high and low for the Next Alanis (seems like only yesterday they were looking for the Next Nirvana) this is a good time in the music industry for tortured, confessional women singer/songwriters. Imogen Heap's CD has the requisite doses of anger, relationship miseries and personal insecurities, but her songwriting is actually quite original, and she has the vocal chops

to put across her ideas effectively. The musical settings for her musings are consistently interesting, too, with quirky keyboard washes turning up in the strangest places to punctuate her thoughts. There's some straight-ahead rock, too, but mostly it's a songwriter's album, so the vocal is paramount. If the CD has a major flaw it is that the songs are relentlessly bleak, with no relief. An artist can get away with that once, but I, for one, want to hear more emotional colors from her next time out.

Producers: Guy Sigsworth, David A. Stewart, David Kahne. Engineers: David Kahne, Phil Bodger, Nick Addison, Roland Herrington, Pete Norris. Studios: Rak (London), Master Rock (London), Quad (NYC), Chapel (L.A.). Mastering: Greg Calbi/Masterdisk (NYC).

—*Blair Jackson*

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COAST TO

L.A. GRAPEVINE

by Maureen Droney

What was formerly The Lighthouse in the Valley Village section of North Hollywood has re-opened as BAY 7. On a recent visit, I found engineer/producer Joe Barresi ensconced in Studio A overdubbing on the Neve 8058 console with Hollywood Records rockers Loudmouth. Studio A has been enlarged—the back wall was moved back a few feet by BAY 7 owners Dave Rouze and Jeff Sheehan, leaving plenty of room for Barresi's "overdub package" of equipment, along with his large collection of Spice Girls (!?) memorabilia.

Barresi, a guitar player whose engineering credits include L7, The Melvins, Jesus Lizard, Hole and Weezer, admits to having that highly contagious audio disease whose main symptoms include an insatiable desire to accumulate amplifiers, stomp boxes and esoteric outboard. "It helps to have my stuff here," he says. "In this case, the band brought their main equipment with them, but having my gear available saves on rentals and also helps me get sounds I like; instead of using a cabinet that's been on the road for two years, we have one that's just been reconed."

Barresi has been co-producing with Loudmouth drummer John Sullivan and describes the band as "kind of like Deep Purple, Zeppelin, Guns N' Roses

—CONTINUED ON PAGE 191

PHOTO: MAUREEN DRONEY

In session at BAY 7: producer/engineer Joe Barresi (foreground, center) with Loudmouth. Studio owner Jeff Sheehan is in white.

In the Green Room at New York's Chung King Studios, studio owner John King (L) joined producer Russ Titelman, working on a new project on the room's 183-input Neve Capricorn.

NY METRO REPORT

by Gary Eskow

Quad Recording has been a fixture on the New York scene for 22 years. When Lou Gonzales first opened the facility (to record a *Sesame Street* album—he engineered and contributed kazoo parts), the business climate in the Apple was far different from what it is today. In particular, decisions regarding console installation involved a wholly distinct set of parameters. Studios tended to build their own boards, and the freelance engineering business was not a factor. "Engineers had to learn how to use one particular board or design concept," Gonzales says, "and it wasn't so easy for them to hop between studios."

The standardization of consoles by SSL, Neve and others has changed things dramatically. Now Gonzales is taking the next step, having signed a deal with SSL that will make Quad's Studio B the first room in the country to offer an Axiom-MT. The stakes are high—if you'd like a fully loaded Axiom-MT, be prepared to shake your jeans to the tune of almost a million bucks. Although his decision to purchase the new board puts him in uncharted waters, Gonzales was relaxed and amiable the day we met.

Gonzales has been studying the digital console market for several years, and he believes that one of the Axiom-MT's design features sets it apart from the competition and will allow Quad to book Studio B enough to turn the board into a money maker. "The big hoopla about this board is its resettability," Gonzales says. "The console lets a mixer segue between different songs effortlessly. Let's say you're mixing song B and the producer walks in wanting to hear song A. In today's world you'd have to spend an hour-and-a-half to bring that song online, and then you'd eventually have to spend the same amount of time putting song B back to the point where you left it. With the Axiom-MT, all you have to do is execute a few keystrokes and either tune is exactly where you left it. That's a big advantage for album work—there will be no more staring at a monitor and matching EQs. This instant recall is the feature that sets

—CONTINUED ON PAGE 196

World Radio History

COAST

NASHVILLE SKYLINE

by Dan Daley

The big news in town is the possible purchase of **Masterfonics** out of its Chapter 11 bankruptcy situation. The suitor is **Emerald Sound Studios**. As of mid-November, Emerald owner Dale Moore was reportedly pursuing individual settlements with various creditors of Masterfonics (which filed for Chapter 11—restructuring—protection at the beginning of 1998), though Moore declined to confirm or deny that. Underscoring the lengthy history of both facilities, one of those settlements would have to be with Milan Bogdan, general manager of Emerald for the past four years and a former co-owner of Masterfonics. Bogdan would have had to drop ongoing litigation against Masterfonics owner Glenn Meadows to allow any sale to occur.

Acquisition of Masterfonics by Emerald would create Nashville's largest studio facility, with four recording rooms, a mix room and two mastering studios, as well as the broadcast operations that Emerald has developed over the last two years. Such a move would also reflect the ongoing consolidation of the music industry in Nashville in recent years as the fortunes of country music, which continues to be the primary revenue source for most major studios in the city, trail off overall. (Including massive sales by several artists, notably Garth Brooks, Shania Twain and LeAnn Rimes, country as a genre was actually up by approximately 5% in Q3 '98. However, adjusted for reality—i.e., Brooks is an anomaly and Twain is actually a pop artist—rank-and-file sales continue to slide, and Nashville has lost more major labels than it has spawned in the last two years.)

Both Emerald and Masterfonics are anchor facilities for Nashville, presently and historically. Moore purchased Emerald, then a one-room studio, from producer David Malloy, the late Eddie Rabbitt and songwriter Even Stevens in 1985. Tom Hidley was brought in

—CONTINUED ON PAGE 194

Transcontinental Studios (Orlando, Fla.) installed an 80-channel SSL 9000 J Series console with the 959J 8-channel monitoring system. The console has been used to mix singles for the group N'Sync. At the board are (front to back) studio vice president and chief engineer Joe Smith, chief technician Niels Kastor and assistant engineer Alan Armitage.

SESSIONS & STUDIO NEWS

NORTHEAST

At his **Bopnique Musique Studios** in Chelmsford, MA, **Anthony Resta** recorded and performed drums and percussion on three songs for Java/Capitol artists **Splashdown**. **Brian Carrigan** and the band are producing; **Glen Ballard** is the executive producer...**David Clayton Thomas** tracked for a self-produced independent release at **Bear Tracks** (Suffern, NY) with engineer **Doug Oberkircher** and assistant **Steve Regina**...**Queen Esther** tracked in Studio A at **EastSide Sound** (NYC) with executive producer **Michael Golla** and engineers **Lou Holtzman** and **Federico Panero**...At **Pie Studios** (Glen Cove, NY) Norwegian vocalist **Sissel** worked on her first American solo release with producers **Rick Chertoff** and **Rob Hyman**, engineer **William Wittman** and assistant **George Fullan**. **Chieftains** leader **Paddy Maloney** took advantage of the singer's presence at Pie and brought in a song from his

—CONTINUED ON PAGE 198

Prophet Sound recently moved to a new location in Boston. The five-floor facility was acoustically redesigned by Rob Rosati and now includes two studios and mastering and MIDI production suites. Studio A, pictured, features a Neotek Elite console.

World Radio History

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—FROM PAGE 188, L.A. GRAPEVINE

and Black Sabbath all rolled into one." Basic tracks for the record were cut at Ocean Way's Studio One with Allen Sides engineering, then the project settled into BAY 7, where Barresi, a Sound City alumnus and a definite vintage Neve aficionado, seems quite content. "This room used to be kind of claustrophobic, but widening the control room made a big difference," he comments. "The band digs it here—we have our own separate area, and they like the vibe. Also, the staff is excellent: They're always around when you need them—if you want coffee, that refill is right in your hand."

A quick view of Barresi's outboard stack shows an international theme: a Sontec EQ ("on the stereo bus") and a Russian-made Sovtek head—"a good-sounding bass amp," he says. "Often I'll take the bass off tape and re-amp it through the Sovtek. At first people thought I was crazy, but this thing runs 12 hours a day for weeks at a time and it still sounds great." Down the line is a German-made Palmer speaker simulator with controls for deep, flat, bright, normal and mellow ("it gives a good combination of cabinets and sounds really natural"), an Edison stereo imager and a rack of British-made Helios modules. "That's what's left of my circa-1968 Helios console," Barresi laughs, "the kind of board early Stones and Zeppelin records were cut on. It cost a lot to refurbish, but the preamps are great." Nearing the end of the row of boxes we find Geoffrey Daking preamp/EQs ("beautiful, with amazing top end, kind of a Trident A-Range equivalent—he also makes compressors that I'd like to pick up"), a Mutator, an RCA BA6A enhanced with Spice Girls stickers and some Valley People Dynamites.

"We've actually stripped it down quite a bit," Barresi says of the guitars on the Loudmouth project. "Normally I'd use multiple amps and cabinets, but we're going for more of a '70s old-school guitar sound with a sameness in tone throughout the record. It's pretty much just guitar straight into a head, one cabinet, done. On a lot of tracks we're using an amp that's been out for about two years called a Naylor—it's handmade in Detroit, and it's pretty spectacular. Between that and the 50-watt Marshall, we're just about covered."

The band and Barresi keep their options open nevertheless—out in the studio plenty of stacks are at-the-ready, from an Acoustic 360 bass rig for that "John Paul Jones" sound and guitar equipment including a 1968-69 100-watt PlexiLaney to heads from Sound City, Selmer, Soldano and a real beauty, a classic, turquoise, 1950s Class A Watkins Dominator.

Barresi also keeps handy a trunk that holds his collection of approximately 150 guitar pedals, with his newest acquisition being the tiny Woolly Mammoth built by Z-vex. "Z-vex boxes are all handmade, hand-painted and signed," Barresi explains. "You call up and order what you want, and in a couple of weeks it appears in your mailbox." The Woolly Mammoth controls consist of pinch, roll, EQ and output—other Z-vex items include the Fuzz Factory and, Barresi's favorite, the Seekwah, a psychedelic little gem that filters and arpeggiates, sort of like a tremolo-enhanced wah-wah pedal.

In that trunk you'll also find Lovetones' boxes with names like Doppelganger, Big Cheese and Meatball. "I use pedals for mixing as well," continues Barresi. "My friend Jonathan Little, who works for Conway, built something called the PCP (Professional to Cheesy Pedal) interface that I use all the time. It's a three-way re-amp box with level control, phase switches and a combiner, so you can take anything off tape, combine it and change levels. It also has a built-in DI, and it's purple with green lights—it looks very cool."

We could have gone on delving into that roadcase of esoteric treasures, but Barresi had to get back to work—I did catch a glimpse of a couple of "salt shaker" microphones that he swears are from the U.N. and sound great on bass drums...

On the way out I stopped for a chat in Studio B with BAY 7 co-owner Jeff Sheehan, an engineer whose credits include Counting Crows, Nirvana, L7 and the Texas Tornadoes. It turns out BAY 7 came about when Sheehan and Rolling Stones tech Dave Rouze hooked up and discovered a common interest in recording and equipment.

"Dave had a studio at his house that I started working in and eventually ended up running for him while he was on the road," Sheehan says. "We'd both been accumulating gear and keeping a lot of it in storage, and somehow it became a logical extension that we would open a studio. We started looking around, and this place had a great location—it's right off both the Hollywood and the 101 freeways and less than half a mile from Ventura Boulevard, with plenty of parking and lots of restaurants nearby that deliver. For many people, it's very convenient."

The two-room facility is now equipped with vintage Neves in both rooms. Studio A's desk features a Class A 8058 28x16x28 that has 52-in monitoring capability and tape machines that include

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a Studer A800 MkIII, an MCI JH-16/24 and an Ampex ATR 102 half-inch deck. The monitors remain as they were at Lighthouse—a George Augspurger three-way system with JBL components—and there's plenty of outboard, from a Fairchild 670 to dbx 165 and 160xs to LA-2s and LA-2As, Langs and Pultecs. There's also a 9-foot concert grand piano.

The spacious control room of Studio B houses a custom combination Neve 8038 with Flying Faders that is owned by producer and BAY 7 friend Don Was, who previously had it in an, obviously, large room in his house. Made up of two consoles combined by Neve guru Pat Schneider and equipped with 48 custom black-face Flying Faders, the board boasts 80 inputs. Although there is a 9x9-foot recording booth, Studio B is set up for mixing, with two Studer A800 MkIIIs, an Ampex ATR 104 and custom two-way main monitors with TAD components. Outboard includes dbx, Fairchild, Alan Smart, SSL, Trident, Focusrite, GML and lots more.

Although open for only three months on the day I visited, BAY 7 had already been host to mixes for PolyGram artist DJ Hive, RCA/Kneeling Elephant's Fly, and the Tom Werman-produced rockers Supersuckers. "Everybody who's been in so far is a friend, or a friend of a friend," Sheehan says. "We've been lucky, and we've had great word of mouth. I've worked in a lot of studios, and we're putting that experience to work here in trying to create a comfortable environment with great equipment. We're really eager to please, and I think that comes across to our clients."

Over at A&M Studios, engineer Marc DeSisto was just finishing up some mixing for Melissa Etheridge's upcoming release. The album (recorded at both A&M and Sunset Sound, with the bulk of the mixing done in A&M's SSL E Series-equipped Mix Room) was produced by Etheridge with guitarist/songwriter John Shanks, and was DeSisto's first project with the husky-voiced singer.

A Boston native, DeSisto is an all-around audio type who does remotes and live sound as well as studio recording. He has worked with Don Henley, Mark Knopfler, Joe Cocker, John Mellencamp, The Samples and Melanie Doane, and he was brought onto the Etheridge project by co-producer Shanks.

"John, who is Melissa's longtime guitarist, and I had worked together previously on a few records," explains DeSisto. "When he started co-producing with Melissa at A&M, they were working in Studio B, which I know like the back of my hand, so they called me in to help out. The studio was totally jammed with equipment, with something like 60 guitars and hardly an inch of space to walk between them! We had Kenny Aronoff on drums, who has also played with Melissa for a long time, Pino Paladino on bass, and John and Melissa on guitar. I brought in my M149 to try on Melissa's vocal, and she liked the sound of it a lot. Then we got rolling and things went pretty fast; we cut basics for 12 songs in a week, with Melissa singing and playing guitar. It was great—Melissa's live performances, both singing and playing, were truly amazing."

The show moved on to Sunset Sound for overdubs, including keyboards with Patrick Warren on Chamberlin and The Wallflowers' Rami Jaffee on B3 and other assorted keys. More basics were also cut at Sunset with Steve Ferone on drums.

"We did things differently for different songs, with quite a bit of experimentation," continues DeSisto. "Some of the tracks, instead of being cut with the whole band, started with a loop, acoustic guitar and vocal, and were built

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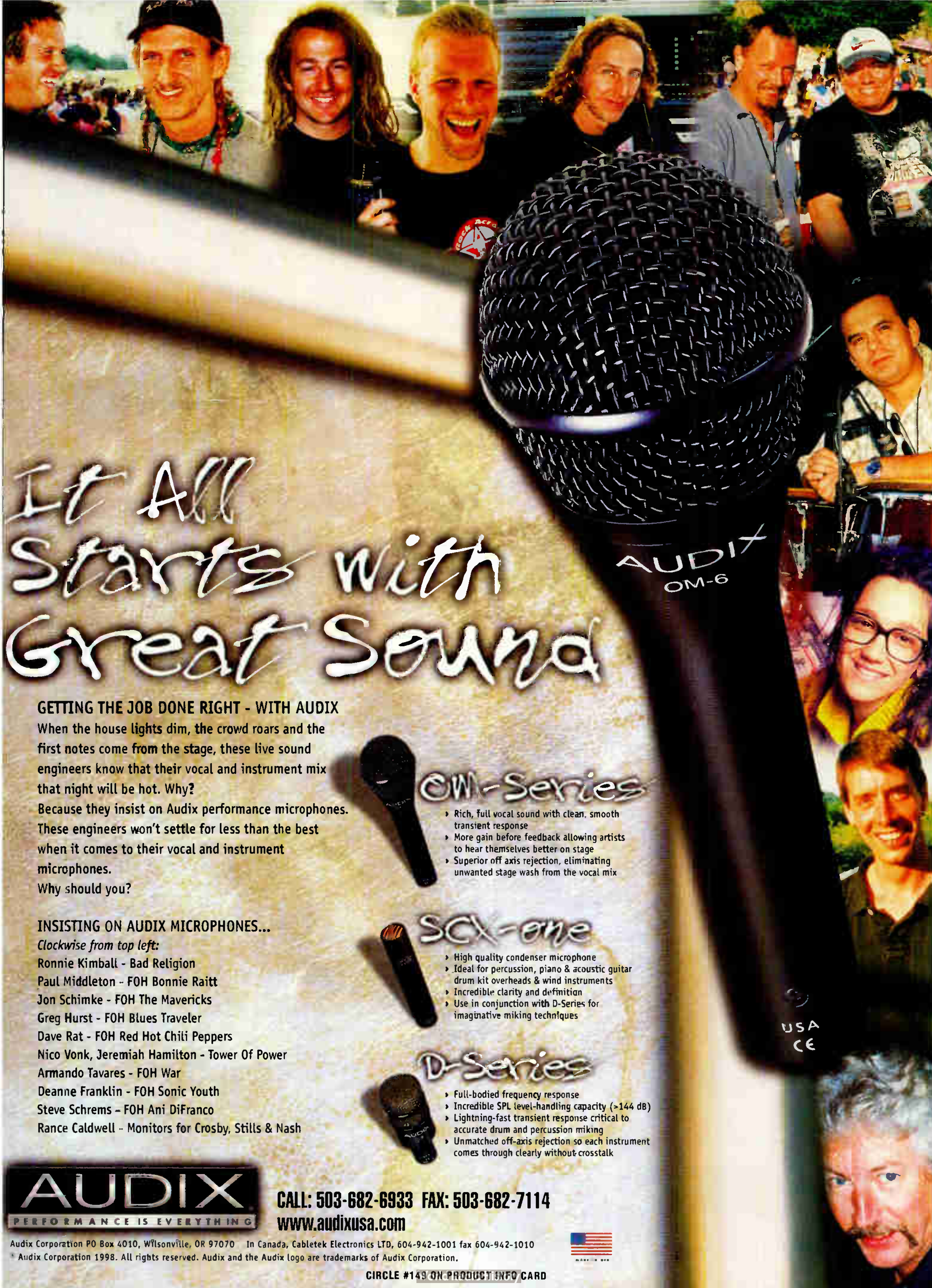

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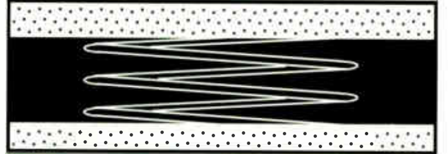

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In The Mix Room at A&M: Co-producer John Shanks (L) with Melissa Etheridge and engineer Marc DeSisto

up from that. Another fun thing we did for effects was to record a few things with the performers actually playing in the live chamber at Sunset Sound."

The Etheridge album was recorded to analog tape, using BASF 900 at plus 5. "I've become a big BASF fan," DeSisto says. "It was actually a tip from Joe Chiccarelli and some of my other friends to try it. I've found it to be exceptionally quiet, with a wonderful range from bottom to top. It's got a nice warmth to it, but it doesn't alter the sound, and it was great for this record, where a lot of our tones came from vintage guitars and amps. We used very little EQ on our guitars, relying instead on different combinations of pickups, guitars, amps—it really seems that when you're not using much EQ, sounds find their place in the track more easily. Both John and Melissa are big collectors of amps and guitars and are fanatics about pedals, so we had a lot to choose from. We used a Fender Bassman, Fender Deluxes, a Tremolux and also a new amp we had a lot of luck with called TopHat—the TopHat really screams.

"A real convenience in working with all those amps was that we had a guitar amp switcher that [guitar tech] Brett Allen brought in," DeSisto adds. "We could switch between six amps and have various combinations on at the same time; so, instead of having to go out into the studio to change things, we could leave everything set up. That made things come together pretty quick. Having Brett there to look after guitars was a wonderful thing in general—it makes such a difference in things like sustain when the guitars are intonated properly."

The basic guitar setups included SM57 microphones, Pultec EQs and either a Fairchild, 1176 or Universal Audio compressor. "The Universal Audio has a very unique tone," DeSisto says. "Just don't look at the meter while you're using it!"

DeSisto, who has been an independent for nine years, cut his engineering teeth at A&M, both as an assistant and as a first engineer, and he credits that training for a lot of his work habits these days. "I was really fortunate to get to work on so many really great records there," he says, "like Pink Floyd's *Momentary Lapse of Reason*, and with Robbie Robertson, Tom Petty, Pat Benatar...people who were into doing it until it was right. I spent a lot of time with both Shelly Yakus and with Jimmy Iovine, who paid me the great compliment of having me do some engineering on U2's *Rattle and Hum*.

"Part of my A&M training that has really paid off is the habit of taking lots of notes—I'm kind of a fanatic about that. At A&M, when Jimmy Iovine wanted Bono's SM58 I knew which one it was, and on this project we also did that a lot. We kept notations on mics, serial numbers on amps, preamp combinations, fader positions—everything—so we could get back to a sound we liked if we needed to. We recorded a lot of songs, and it's really quite a record. Working with Melissa and such incredible musicians was an outstanding experience. Although there will be several mixers on the final record, I feel very fortunate that I'll get to be one of them." ■

Got L.A. news? Fax Los Angeles editor Maureen Droney at 818/346-3062 or e-mail msmdk@aol.com.

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The Spirit Digital 328 represents a refreshing departure in digital console design, retaining the ease of use of a conventional analog console, yet providing all the advantages of 24-bit digital. The 328 is nothing like a computer with faders. The key to the 328 is the unique "E Strip", which avoids the need for tedious menus and brings instant access to all 16 channel inputs, 16 tape returns, auxiliary sends and returns, EQ and effects for each channel. Included as standard are two on-board Lexicon effects processors, two dynamic processors, Tascam TDIF and Alesis ADAT optical interfaces and a built-in meterbridge, with no hidden "options" to add to the cost. If you want the functionality of a digital console, but the common sense approach of an analog 8-bus board, you need to check out the Spirit Digital 328. It's a refreshing change!

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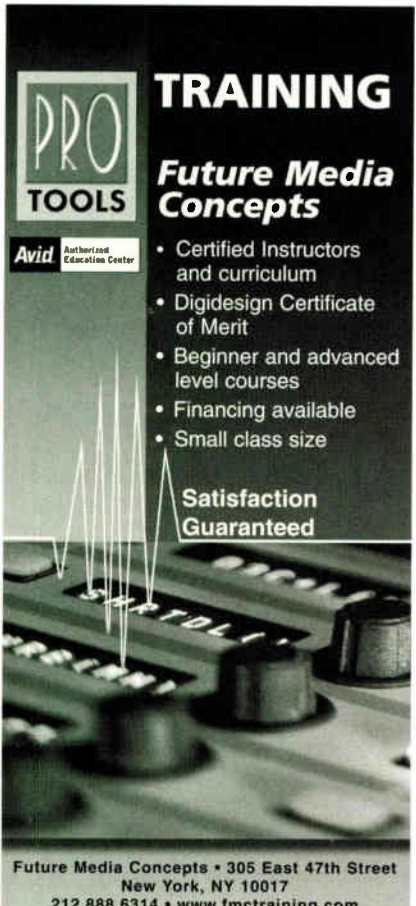

CIRCLE #143 ON PRODUCT INFO CARD

—FROM PAGE 188, NY METRO REPORT

the Axiom-MT apart from every other digital console on the market, and believe me, I researched them all."

Quad is known for its work in the hip hop and contemporary R&B fields, and Gonzales confirmed that engineers working these styles are particularly adventurous. "They want to get their hands on as many tricks as they can," he says, "and I'm sure that this board will attract hip hop artists and engineers to Quad." Gonzales adds that Quad is also attracting more rock sessions, and he plans on building up that area of the business as well.

The Axiom-MT is a 96-channel surround sound-ready board. Every control is dynamically automated, and there are 48 multitrack, 12 main mix and 12 aux buses, as well as over 200 mix returns. Gonzales also stresses the fact that Quad currently owns a pair of SSL 9000 J consoles, which will interface neatly with the Axiom-MT. The new console will keep Quad several steps ahead of the project studio environment, to say the least.

Suffern, N.Y, is a funky town—I can say that 'cause I went to high school there and played for coach Jerry Magurno, just as Walt Weiss did after me. (Why Weiss made it to the big leagues instead of me remains a mystery.) Spyro Gyra's Jay Beckenstein liked Suffern enough that in 1982 he built himself a studio there—**Bear Tracks**—along with his partner, the late Rich Calandra. Business has grown steadily over the years, and today the studio handles a wide array of major label projects. When *Mix* checked in recently, Beckenstein was tracking his next album at Bear Tracks, with help from engineer Doug Oberkircher, who lives next door to the studio and has tracking facilities at his place as well.

Beckenstein brought in a horn section to play on the new album, and these backing parts were originally tracked to Oberkircher's ADAT rig. Bear Tracks general manager Phil Brennan says that Beckenstein and crew have extremely high standards regarding the sound on tape of horn performances; the ADAT recordings did not yield the sound they were looking for, and so it was on to plan B, which involved re-cutting the horn section to an Ensoniq PARIS digital recording system.

According to Brennan, everyone associated with the session was extremely pleased with the sonic quality of the PARIS recordings, as well as the ease of its operations. Brennan says that Bear Tracks will be making a decision regarding the purchase of a hard disk recording system in the near future. "The final contenders are PARIS and Pro Tools," he says. "PARIS has a lot of pluses—it sounds sumptuous and is very cost-effective. Pro Tools has the third-party plug-in market, and that continues to be attractive as well. Ensoniq claims that its relationship with third-party plug-in manufacturers is growing, and we hope that's the case. Jay really felt that PARIS captured the essence of what the horn section sounded like. As a business decision, I believe that a hard disk recording system is essential for any studio that wants to attract clients in the metropolitan area." ■

E-mail your New York news to New York editor Gary Eskow at scribeny@aol.com.

—FROM PAGE 189, NASHVILLE SKYLINE

to renovate the control room, and an SSL 4000E console was installed. A mid-priced second recording studio was later added, as was a broadcast division, and space was rented to a tenant post-production company, all of which were revenue generators. These helped allow Emerald to sit out the expensive technology arms race—which saw over five new state-of-the-art studios come online, along with a total of five SSL 9000 J consoles and the first U.S. installation of Sony's Oxford digital board—that began engulfing Nashville in the mid-1990s.

Meadows, long regarded as one of the world's premier mastering engineers, took an opposite strategic tack in his studio's development. After purchasing a controlling interest in the studio in the 1970s from founder Mack Evans and later buying out another investor to become sole owner, Meadows expanded the facility, surviving an earlier bankruptcy filing in 1984. The facility's two mastering suites were eventually augmented by a mixing studio, whose SSL G console was fitted with Nashville's first—and only—AT&T digital core; Studio 6, a mid-sized tracking studio; and, in late 1995, The Tracking Room, a very large, stand-alone recording studio (designed, like the rest of the facility, by Hidley), which featured Nashville's first 9000 J console.

Though The Tracking Room can be credited with igniting a flurry of high-end studio building in Nashville (beginning a period that saw the arrival of Ocean Way and a twin-9000 installation at Starstruck Studios), it can also be posited that The Tracking Room represented the excess of a Nashville in the midst of a music

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sales boom whose exuberance often clouded real-world judgment. Masterfonics and other studios expanded along with record label artist rosters and publishers' writer rosters. Both the record business and the studio business have seen severe contraction in the last two years. Many in Nashville also cite as a specific reason for Masterfonics' economic woes the fact that Meadows made significant capital investments in his facility—a reported $3.2 million in The Tracking Room alone—without purchasing the real estate they were located in.

In other news, **Ocean Way/Nashville** will be installing a 96-input Neve VR console with GML automation into its Studio B. The VR, purchased from recording artist Kenny G, is replacing the Sony Oxford digital console, which will be moved into the facility's third studio, replacing an API board. The VR was heavily modified by John Musgrave—who is also partners with Ocean Way/Nashville co-owner Gary Belz in a new technology company that specializes in modifying Neves—in collaboration with George Massenburg. Mods include, among other options, an 8-bus film-surround mixing section and channel processing upgrades. ■

Send Nashville news to Dan Daley at danwriter@aol.com or fax 615/646-0102.

—FROM PAGE 189, SESSIONS & STUDIO NEWS
band's forthcoming release, to which Sissel added lead vocals...

SOUTHERN CALIFORNIA

At **Skip Saylor Recording** (L.A.), Almo Sounds artists **Ozomatli** tracked and mixed for an upcoming release with producer **T-Ray** and engineer **Anton**. **Wayne-O** was in with producer **Budda** working on a new Sony release engineered by **Lamont**. **Daniel Romero** assisted on both sessions...Righteous Brother **Bill Medley** tracked vocals for a national Dr Pepper spot in Studio A at **The Village Recorder** (West L.A.); in Studio F novelist **Jackie Collins** narrated the book-on-tape version of her *L.A. Connections* series...**Boot** (grand prize winners of the Disc Makers Independent Music World Series) cut new tracks at **Music Grinder Studios** (L.A.) with engineer **Dave "Rainman" Banta**...**Sean "Puffy" Combs** has been frequenting several studios at **The Record Plant** (L.A.), producing various projects, including a remix of the **Smashing Pumpkins**' "Ava Adore." **Carole King** was also in with producer/engineer **Humberto Gatica**, tracking and mixing a song for the *You've Got Mail* soundtrack. **Jan Fairchild** and **C.J. DeVillar** assisted...At **Ocean Way (Hollywood)**, **Jewel** mixed her new release, *Spirit*, with producer **Patrick Leonard**, engineers **Kevin Killen** and **Ross Hogarth**, and assistants **Rob Banerjee** and **John Sorenson**...**Sugar Ray** recorded and mixed their new release at **Scream Studios** (Studio City) with producer **David Kahne** and engineer **John Travis** on the studio's SSL 9000 J...

NORTH CENTRAL

R. Kelly fininshed final mixes for his new Jive/Zomba release in Studio 4 at **Chicago Recording Company** with engineers **Stevo George** and **Tony Masserati**. Also in were Reprise rockers **Flaming Lips**, recording and mixing with producer/engineer **Peter Mokran**...At **Madjef Productions**, producer **Gary Hines** and engineer/producer **Jeff Taylor** recorded and mixed the single "Nothing Keep U Down" for the Virgin Records soundtrack to *Down In the Delta*...Swedish combo **Loosegoats** tracked and mixed a new album at **Smart Studios** (Madison, WI) with producer **Brian Paulson** and engineer **Mark Haines**...

SOUTHEAST

Mariah Carey payed a visit to **Criteria Studios** in Miami, continuing work on new material for Columbia. The 48-track digital project was engineered by **Dana Chappelle** with assistance from **Chris Carroll**. Visit the studio's new Web site at www.criteriastudios.com...**Matt King** tracked at **Masterfonics** in Nashville with producer **Billy Joe Walker**, engineer **David Thoener** and assistant **Glenn Spinner**...At **American Holly Studios** (Charleston, SC), original Drifter **Calvin Taylor** worked on a solo project with composer/arranger **Kevin White** and engineer **John Uhrig**...**Christy Sutherland** overdubbed for Giant Records at **Sound Emporium** (Nashville) with producer **Garth Fundis** and engineer **Dave Sinko**, then mixed with engineers **Chuck Ainlay** and **Mark Ralston**...Over at Nashville's **Emerald Sound**, **Patty Loveless** tracked for Epic with producer **Emory Gordy** and engineer **Russ Martin**...Indie rockers **Nova Express** recorded with producer/engineer **Rob Tavaglione** at **Catalyst Recording** in Charlotte, NC...Epic artists **7 Mile** tracked for a new release at **Doppler Studios** (Atlanta) with producer **J-Dub**, engineer **Ralph Cacciurri** and assistant **Jason Rome**...

SOUTHWEST

At **Colorado Sound** (Westminster, CO) former Cream/Traffic drummer **Ginger Baker** led his new jazz Quintet through their paces during tracking sessions for a

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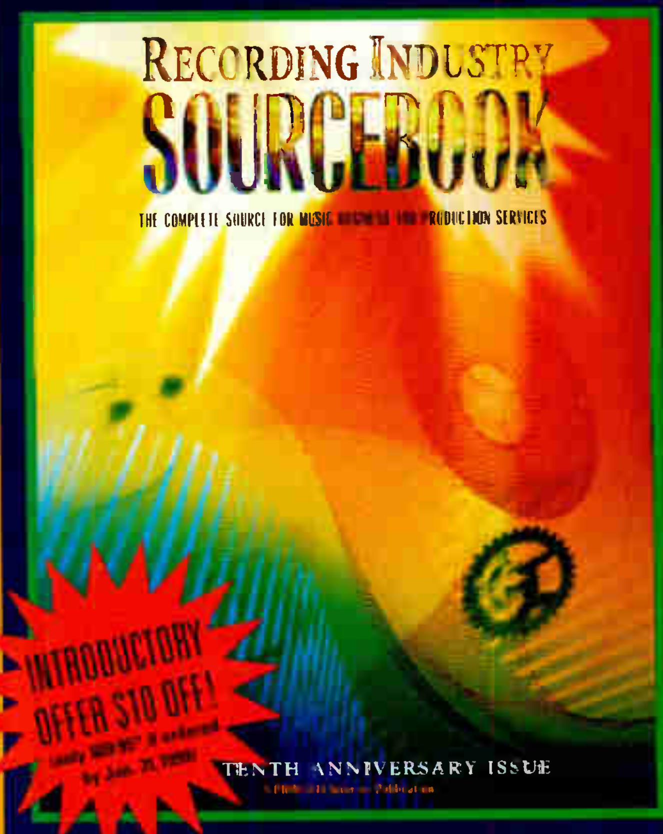

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new CD. Baker produced with Ron Miles, and Danny Kopelson engineered. Also, Steve Miller stopped in during a recent tour to record tracks for a U.S. Post Office ad campaign, produced by Karl Westman and engineered by Jeff Shuey...

STUDIO NEWS

Boston-based Goin' Mobile added 32 tracks of Tascam DA-88 to its remote truck, complementing 32 tracks of ADAT. The company is celebrating its 13th year of location recording... Opened recently in Oakland, CA, recording and audio post facility Studio 880 offers an 1,800-square-foot live room with two iso booths and 48 tracks of analog and digital recording...Royaltone Studios (North Hollywood, CA) promoted studio manager Jane Scobie to vice president. Now in its fourth year of operation, Royaltone recently hosted sessions for Toto, Mudhoney, Royal Crown Revue and Rod Stewart...The Cleveland Institute of Music added an array of Tascam gear to its facilities, including DA-38 and DA-98 mulititracks and a DA-30 MkII DAT recorder...The Eastman School of Music (Rochester, NY) installed a SADiE 24•96 workstation to complement its four Genex 8000 digital 8-tracks...Nashville public radio station WPLN recently moved to new facilities designed by the Russ Berger Design Group. The 11,500-square-foot building includes four on-air control rooms, as well as equipment rooms, edit suites and offices...Laughing Tiger Studios (San Rafael, CA) installed a custom SSL 4052 G Plus console with Ultimation, Total Recall and E Series EQ throughout...Burlington A/V Recording Media hosted a listening session at Avatar Studios (NYC) to preview the new Quantegy GP9 analog tape for industry professionals. ■

PHOTO: TERRON SHOEMAKER

Giant Sand tracked and mixed with producer Jim Dickinson for V2 Records in Studio A at Ardent Studios (Memphis). Standing (L to R): bassist Joey Burns, engineer Sally Browder, assistant Jason Latshaw and Dickinson. At the kit is John Convertino; in front is singer/guitarist Howie Gelb.

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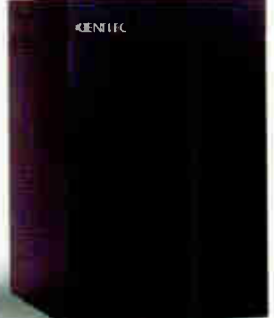

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Record Plant Remote has been an industry leader in location recording for over 20 years. We've kept abreast of new developments in audio technology without sacrificing our sonic integrity. Some of our recent clients include MTV, Aerosmith, Elton John, Michael Bolton, Spin Doctors, R.E.M., Live, Meatloaf, Wynton Marsalis, John Mellencamp, Keith Richards, Chuck Berry, Guns N' Roses, Whitney Houston, Pavarotti, INXS, James Taylor, Emmylou Harris, Shawn Colvin, Billy Ray Cyrus, Mary Chapin Carpenter, Trisha Yearwood and Harry Connick Jr. Our reputation speaks for itself!

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Now more centrally located at the legendary Muscle Shoals Sound Studios. Remote recording services for music, video and film production. 24/48-track analog or digital capability with video interface. API console, vintage processing gear. Full complement of mics and accessories. Recent projects include the Cowboy Junkies, John Mellencamp, Chris Ledoux, Metallica, Beck, No Doubt, Blues Traveler, Bruce Hornsby, Los Lobos, Mickey Hart, Robert Cray and Joan Osborne, The Album Network, Westwood One and the PBS "On Tour" concert series.

Quad Recording Studios

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Quad Recording is excited to announce the opening of its Penthouse studio, beautifully designed as a tracking and mixing room and featuring a 96-input SSL G+ with Ultimation. Opening up a fifth studio is a wonderful way for Quad to celebrate its 20th anniversary. Studios A and III each have an SSL 9000J console, making Quad the only facility in New York with two of them. Studios B and C each have SSL 4000E consoles with G Series computers and Total Recall.

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Located 35 minutes east of NYC, Lobo Recording is the place to achieve your creative goals. Recent acquisitions include an SSL 9096J, Neve VR 72, Studer D827 and Yamaha C7 Grand Piano. Other equipment includes Amek Angela IIs, Studer A827s, A80s, ADAT XTs 64 tracks and an extensive list of microphones and outboard gear. Please call for more info.

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Three brand-new studios with 56-ch Cadac & 24-ch MCI consoles, 48-tk/96-tk hard disk (Akai) and linear digital (ADAT), plus 2-inch 24/16-tk, all formats. Also, outboard by Avalon, TC, Bellari, Aneus Melcor, ADM, Neve, ART, dbx; monitors by JBL, Altec, UREI, Yamaha (Crown, Audio Techniques amps); Korg Trinity, Kawai EP 308, Weber grand. Downtown, beaches, entertainment, hotels, restaurants. Control rooms A&B linked to mix studios and mix room via fiber optics. Liquid Audio uplink.

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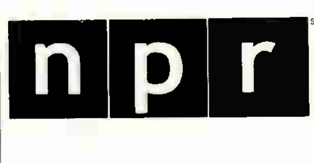
The idea of a Control Room inside a truck's lorry came when the Rolling Stones decided to record *Exile on Main Street* at Mick's house, Stargroves. The Helios console found popularity with The Who, Faces, Led Zeppelin, & Deep Purple. Credits including *Sticky Fingers*, *Physical Graffiti*, Zep III & IV, & Bob Marley LIVE!, the original "Mobile" is fully modernized and now in the U.S.



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Located in downtown Washington, D.C., Studio 4A offers a spectacular recording environment well-suited to all music genres. Studio 4A, at 2,600 sq. feet, is one of the largest recording facilities on the East Coast. We offer digital and analog multitrack recording, an extensive mic collection, digital editing suites and CD mastering. NPR also offers satellite uplinking, fiber and ISDN capabilities worldwide.

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Midcom Remote Services

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Midcom is a full remote audio production facility providing 24/48-track recording to the music, video, film, and live broadcast industries. Credits: INXS, No Doubt, Bush, Metallica, the Black Crowes, Eddie Money, Queensrÿche, Jackyl, Anthrax, Dolly Parton, Mark Chestnutt, Aaron Tippen, Alan Jackson, Dallas Cowboys Radio Network (1991-1997), Aida, Nixon in China, The Aspern Papers (PBS Great Performances). Awards: three Emmys, two Gold Medal IRF/NY, Best Program SECA and an RIAA Gold record.

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HARD DISK RECORDERS

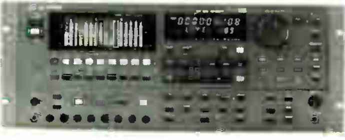
Roland VS1680 Digital Production Studio

The new VS-1680 Digital Studio Workstation is a complete 16 track, 24-bit recording, editing, mixing and effects processing system in a compact tabletop workstation. With its advanced features, amazing sound quality and intuitive new user interface, the VS-1680 can satisfy your *wanderlust*.

FEATURES–
- 16 tracks of hard disk recording, 256 virtual tracks.
- 24-bit MT Pro Recording Mode for massive headroom and dynamic range.
- Large 320 x 240 dot graphic LCD provides simultaneous level meters, playlist, EQ curves, EFX settings, waveforms and more.
- 20-bit A/D D/A converters
- 2 optional 24-bit stereo effects processors (VS8F-2) provide up to 8 channels of independent effects processing.
- New EZ routing function allows users to create and save various recording, mixing, track bouncing, and other comprehensive mixer templates for instant recall.
- 10 audio inputs: 2 balanced XLR-type inputs w/ phantom power, 6 balanced 1/4" inputs, and 1 stereo digital input (optical/coaxial)
- 12 audio outs: 8x RCA, 2x stereo digital & phones.
- Direct audio CD recording and data backup using optional VS-CDR-16 CD recorder.

AKAI DR16 16-Track HD Recorder

The Akai DR16 is a digital hard disk recorder with sophisticated non-destructive editing functions for near instant data access. Recording & playback is as straight forward as tape. The DR16HD ships with an internal 2GB drive for 24 minutes per track of record time.

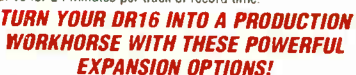


TURN YOUR DR16 INTO A PRODUCTION WORKHORSE WITH THESE POWERFUL EXPANSION OPTIONS!

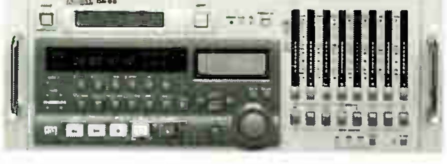
- ***MT8** Mixer controller* • ***DL16** Remote control unit* • ***IB801S** SCSI Interface board*
- ***IB802T** SMPTE interface board* • ***IB803M** MIDI interface board* • ***IB804A** ADAT interface board*
- ***IB805R** RS422 Interface board* • ***IB806B** Bi-phase interface board*
- ***IB807V** VGS monitor interface board* • ***EQ16** 16-channel digital EQ board* • ***ALX50** Remote Cable*

DIGITAL MULTI-TRACK RECORDERS

TASCAM DA-98 Digital Audio Recorder



The DA-98 takes all the advantages offered by the DTRS format and significantly ups the ante for the professional and post-production professional alike. With enhanced A/D and D/A converters, a comprehensive LCD display and full compatibility with the DA-88 and DA-38, the DA-98 delivers the absolute best in digital multitrack functionality.



FEATURES–
- Confidence monitoring for playback and metering
- Individual input monitor select switch facilitates easier checking of Source/Tape levels
- Switchable reference levels for integration into a variety of recording environments with internal tone generator
- Digital track copy/electronic patch bay functionality
- Comprehensive LCD display for easy system navigation
- Dedicated function/numeric keys make operation easier
- Built-in sync with support for MMC and Sony P2
- D-sub connector (37-pin) for parallel interface with external controller
- Optional RM-98 rack-mount ear for use with Accurde 200 system

DA-88 A standard digital multitrack for post-production and winner of the Emmy award for technical excellence, the DA-88 delivers the best of Tascam's Hi-8 digital format. Its Shuttle/Jog wheel and track delay function allow for precise cueing and synchronization and the modular design allows for easy servicing and performance enhancements with third-party options.

DA-38 The DA-38 was designed for musicians. Using the same Hi-8 format as the highly acclaimed DA-88, the DA-38 is an 8 track modular design that sounds great. It features an extremely fast transport, compatibility with Hi-8 tapes recorded on other machines, rugged construction, ergonomic design and sync compatibility with DA-88s.

ALESIS ADAT XT20 Digital Audio Recorder

New

The New ADAT-XT20 provides a new standard in audio quality for affordable professional recorders while remaining completely compatible with over 100,000 ADATs in use worldwide. The XT20 uses the latest ultra-high fidelity 20-bit oversampling digital converters for sonic excellence, it could change the world.

FEATURES–
- 10-point autolocate system
- Dynamic Braking software lets the transport quickly wind to locate points while gently treating the tape.
- Remote control
- Servo-balanced 56-pin ELCO connector.
- Built-in electronic patchbay
- Copy/paste digital edits between machines or even within a single unit. Track Copy feature makes a digital clone of any track (or group of tracks) and copies it to any other track (or group) on the same recorder.

SOFTWARE

SONIC FOUNDRY CD Architect & CD Factory

CD Architect is the perfect solution for designing professional audio CDs to Red Book spec on Windows NT and Windows 95. Sample audio from compact disks, record from DAT, or digitize material through a sound card. It comes complete with an editor including dozens of effects and tools to process sound files and can optionally operate as a Sound Forge plug-in. CD Factory adds a CD burner, SCSI card and cable for a complete production package.

FEATURES–
- Multi file playlisting
- Master volume faders (-96dB to +20dB)
- Adjustable envelope levels for any region
- Mix or crossfade overlapped regions
- Convert from mono to stereo on the fly
- Multiple levels of undo/redo
- Up to 99 tracks with 99 sub indexes per track
- Make glass-masters directly from burned CDs.

STUDIO DAT-RECORDERS

Panasonic SV-3800 & SV-4100

The SV-3800 & SV-4100 feature highly accurate and reliable transport mechanisms with search speeds of up to 400X normal. Both use 20-bit D/A converters to satisfy even the highest professional expectations. The **SV-4100** adds features such as instant start, program & cue assignment, enhanced system diagnostics multiple digital interfaces and more. Panasonic DATs are found in studios throughout the world and are widely recognized as the most reliable DAT machines available on the market today.

FEATURES–
- 64x Oversampling A/D converter for outstanding phase characteristics
- Search by start ID or program number
- Single program play, handy for post.
- Adjustable analog input attenuation, -4/-10dBu
- L/R independent record levels
- Front panel hour meter display
- 8-pin parallel remote terminal
- 250x normal speed search

TASCAM DA-30MKII

A great sounding DAT, the DA-30MKII is a standard mastering deck used in post-production houses around the world. Among many other pro features, its DATA/SHUTTLE wheel allows for high-speed cueing, quick program entry and fast locating.

FEATURES–
- Multiple sampling rates (48, 44.1, and 32kHz).
- Extended (4-hour) play at 32kHz.
- Digital I/O featuring both AES/EBU and S/PDIF.
- XLR balanced and RCA unbalanced connections.
- Full function wireless remote.
- Variable speed shuttle wheel.
- SCMS-free recording with selectable ID
- Parallel port for control I/O from external equipment.

Fostex D-15

The new Fostex D-15 features built in 8Mbit of RAM for instant start and scrubbing as well as a host of new features aimed at audio post production and recording studio environments. Optional expansion boards can be added to include SMPTE and RS-422 compatibility, allowing the D-15 to grow as you do.

FEATURES–
- Hold the peak reading on the digital bargraphs with a choice of 5 different settings
- Set cue levels and cue times
- Supports all frame rates including 30df
- Newly designed, 4-motor transport is faster and more efficient (120 minute tape shuttles in about 60 sec.)
- Parallel interface • Front panel trim pots in addition to the level inputs

D-15TC & D-15TCR

The D-15TC comes with the addition of optional chase and sync capability installed. It also includes timecode reading and output. The D-15TCR comes with the further addition of an optional RS-422 port installed, adding timecode and serial control (Sony protocol except vari-speed)

SONY PCM-R500

Incorporating Sony's legendary high-reliability 4D.D. Mechanism, the PCM-R500 sets a new standard for professional DAT recorders. The Jog/Shuttle wheel offers outstanding operational ease while extensive interface options and multiple menu modes meet a wide range of application needs.

FEATURES–
- Set-up menu for preference selection. Use this menu for setting ID6, level sync threshold, date & more. Also selects error indicator.
- Includes 8-pin parallel & wireless remote controls
- SBM recording for improved S/N *(Sounds like 20bit)*
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MIDI Time Piece™ AV
8x8 Mac/PC MIDI Interface

The MTP AV takes the world renowned MTP II and adds synchronization that you really need like video genlock, ADAT sync, word clock sync, and even Digidesign superclock!

FEATURES–
- Same unit works on both Mac & PC platforms
- 8x8 MIDI merge matrix, 128 MIDI channels.
- Fully programmable from the front panel.
- 128 scene, battery-backed memory.
- Fast 1x mode for high-speed MIDI data transfer.

Digital Time Piece™
Digital Interface

Think of it as the digital synchronization hub for your recording studio. The Digital Timepiece provides stable, centralized sync for most analog, digital audio, and video equipment. Lock together ADATs, DA-88's, ProTools, word clock, S/PDIF, video, SMPTE, and MMC computers and devices flawlessly. It ships with "Clockworks" software which gives you access to its many advanced features and remote control of some equipment settings such as record arm.

OPCODE

Studio 64XTC
Mac/PC MIDI Interface

The Studio 64XTC takes the assorted, individual pieces of your studio-your computer, MIDI devices, digital and analog multitracks and even pro video decks, and puts them all in sync.

FEATURES–
- 4 In / 4 Out, 64 channel MIDI/SMPTE interface/patchbay with powerful multitrack & video sync features
- ADAT sync with MIDI machine control
- Simultaneous wordclock and Superclock output, 44.1kHz or 48kHz for perfect sync with ADAT, DA-88 and ProTools
- Video and Blackburst in (NTSC and PAL)
- Cross-platform Mac and Windows compatibility

SAMPLING

E-MU

e-6400
Sampling and more!

The e-6400 from EMU features an easy interface that makes sampling easy. Automated features like looping, normalizing and more allow you to flexibly create your own sound palettes or access any of the 400 sounds provided on 2 CDs for unlimiting sound creation. It is upgradeable to 128MB of RAM (4MB standard) and features 64 voice polyphony, 8 balanced analog outputs, SCSI, stereo phase-locked time compression, digital re-sampling and more. A dream machine.

KEYBOARDS & SOUND MODULES

Roland

XP60 & XP80 Music Workstations

The XP-80 delivers everything you've ever wanted in a music workstation. An unprecedented collection of carefully integrated features provide instant response, maximum realtime control and incredible user expandability. The XP-80 features a pro-quality 76-note weighted action keyboard while the NEW XP-60 features the same sound engine in a 61-note keyboard.

XP80 FEATURES–
- 64-voice polyphony and 16-part multitimbral capability
- 16 Mbytes of internal waveform memory; 80Mbytes when fully expanded (16-bit linear format)
- 16-track MRC-pro sequencer with direct from disk playback. Sequencer holds approx. 60,000 notes
- New sequencer functions like "non-stop" loop recording and refined Groove Quantize template
- Enhanced realtime performance capability with advanced Arpeggiator including MIDI sync and guitar strum mode and Realtime Phrase Sequence (RPS) for on-the-fly triggering of patterns
- 40 insert effects in addition to reverb and chorus
- 2 pairs of independent stereo outputs; click output jack with volume knob
- Large backlit LCD display

SR-JV80 Series Expansion Boards

New

Roland's SR-JV80-Series wave expansion boards provide JV and XP instrument owners a great-sounding, cost-effective way to customize their instruments. Each board holds approx. 8Mb of entirely new waveforms, ready to be played or programmed as you desire.

Boards Include–
Pop, Orchestral, Piano, Vintage Synths, World, Super Sound Set, Keys of the 60's & 70's, Session, Bass & Drums, Techno & Hip-Hop Collection.

KURZWEIL

K2500 Series Music Workstations

The K2500 series from Kurzweil utilizes the acclaimed V.A.S.T. technology for top-quality professional sound. Available in Rack mount, 76-key, and 88 weighted key keyboard configurations, these keyboards combine ROM based samples, on-board effects, V.A.S.T. synthesis technology and full sampling capabilities on some units.

FEATURES–
- True 48-voice polyphony
- Fluorescent 64 x 240 backlit display
- Up to 128MB sample memory
- Full MIDI controller capabilities
- 32-track sequencer
- Sampling option available
- Dual SCSI ports
- DMTi Digital Multitrack interface option for data format and sample rate conversion (Interfaces with ADATs or DA-88s)

KORG

Trinity Series Music Workstations DRS

Korg's Trinity Series represents a breakthrough in sound synthesis and an incredible user interface. It's touch-screen display is like nothing else in the industry, allowing you to select and program patches with the touch of a finger. The 24MB of internal ROM are sampled using ACCESS which fully digitizes sound production from source to filter to effects. Korg's DSP based Multi Oscillator Synthesis System (MOSS) is capable of reproducing 5 different synthesis methods like Analog synthesis, Physical Modeling, and variable Phase Modulation (VPM).

FEATURES–
- 16 track, 80,00 note MIDI sequencer
- Flexible, assignable controllers
- DRS (Digital Recording System) features a hard disk recorder and various digital interfaces for networking a digital recording system configured with ADAT, DAT recorder and hard disk.
- 256 programs, 256 combinations
- Reads KORG sample DATA library and AKAI sample library using optional 8MB Flash ROM board

TRINITY PRO X — *88 Weighted-key/Solo Synth*
TRINITY PLUS — *76-key/Solo Synth*
TRINITY PRO — *61-key/Solo Synth*
TRINITY — *61-key*

*(Digital IF, SCSI, Hard Disk Recorder, and sample Playback/Flash ROM functions are supplied by optional upgrade boards)

MONITORS

KRK

V8
Powered Studio Monitors

These new powered studio monitors from KRK supply 130 watts of clean performance. Their 8" woofer & 1" silk dome tweeter ensure crystal highs as well as the bass response needed for today's studio environments.

FEATURES-
- 49Hz - 22kHz
- Magnetically shielded for use near video monitors

Hafler TRM-8
Powered Studio Monitors

Winner of Pro Audio Review's PAR Excellence Award in 1997, Hafler's TRM8s provide sonic clarity previously found only in much more expensive speakers. They feature built-in power, an active crossover, and Hafler's patented Trans•nova power amp circuitry.

FEATURES-
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FEATURES-
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Panasonic
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New

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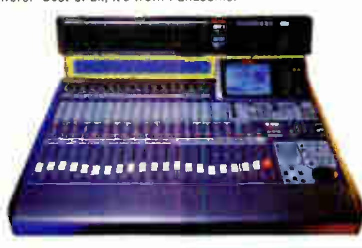

TASCAM
TMD1000 Digital Mixing Console

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FEATURES-
- 4 XLR mic inputs, 8 1/4" balanced TRS inputs.
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MIC PREAMPS

Focusrite
Green 3 "Voicebox MKII"

New

The Voicebox MKII provides a signal path of exceptional clarity and smoothness for mic recording, combining an ultra-high quality mic amp, an all new Focusrite EQ section optimized for voice, and full Focusrite dynamics. The new MKII now includes a line input for recording and mixdown applications.

FEATURES-
- Same mic pre section as found on the Green Dual Mic Pre includes +48V phantom power, phase reverse, and a 75Hz high-pass filter. Mute control and a true-VU response LED bargraph are also provided
- EQ section includes a mid parametric band with frequency and gain control as well as a gentle bell shape to bring out the character of the voice.
- Dynamics section offers important voice processing functions of compression and de-essing combined with a noise reducing expander
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FEATURES–
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- Real-time gain maximizer
- Variable slope multi-band expander
- Multi-band compressor • Word Clock Sync
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PCM81
Multi-Effects Processor

The PCM-81 has everything that made the PCM80 the top choice among studio effects processors, and more. More effects, more algorithms, longer delay and full AES/EBU I/O.

FEATURES–
- 300 Presets include pitch, reverb, ambience, sophisticated modulators, 20 second stereo delays, and dynamic spatialization effects for 2-channel or surround sound applications
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- PCM card slot

EQUALIZERS

Focusrite
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The Green 2 Focus EQ is suitable for a variety of applications combining a Focusrite equalizer section with a multi-source input section. Use it as a high-quality front end for recording applications or patch it into the send/return loop to upgrade a single channel of console eq, either way, it sounds great.

FEATURES-
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- VU metering via a 10-LED bargraph
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COMPRESSORS

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- Compression In/Out and VU/compression meter switches
- Twin balanced XLR outputs with one DI XLR output for stage use
- Enhancer In/Out switch and enhance indicator
- Internal power supply 115/230V AC

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Blue Series 160S
Stereo Compressor

The dbx 160S combines the best features of all the great dbx compressors in a well-built unit where the craftsmanship is as stunning as the engineering is innovative. This is truly a desirable compressor.

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—FROM PAGE 20, TWO PARTS TOO MANY?

gotten better. But be warned! "Better" is still not good. This still happens. Run that old DAT test again. Make a tape, play it ten times, then make a direct digital copy, then again, and so on, until you have a 15th generation DAT (remember, we are testing to see if there is damage, so we want it obvious). Now compare it to the original. Quite a shock, huh? Just like years ago. And this is happening to your real originals as the years take their toll as well.

The only truly safe archival storage today is non-mag optical. Maybe later there will be a faster, more pleasant way to archive and master, but not now. Too bad. Oh, yeah—you'd better burn three copies of everything you really need to keep as well, just in case one of the disks had manufacturing contamination or becomes damaged.

MISGUIDED, PATHETICALLY CONFUSED OLD WIVES' TALE #2

Once you are digital, you don't have to worry about noise and headroom anymore.

I won't insult you by raking over the obvious here. Noise and headroom considerations in digital are just...well, *different*. True 16, 20 and 24-bit digital audio are far quieter than old analog tape was, but far, far touchier. You all know that as you pushed analog tape harder it just got fatter and softer, and at some point this actually became a desirable trait. Recording was pretty easy—just get the Record heads to glow a faint orange, and you had a hit.

And you also know that you *must* push digital as far as you can to get that inverse distortion crap as low as possible. But, if you push just a tiny bit too far, you get the most horrible garbage imaginable, and that has *not* become a fad. We all have tools to let us get within small fractions of a dB of this Audio Hell, but it still takes skill and experience to get it there. More skill and experience than it took to do it on analog tape. Can you say "7FFFFF?" Or more importantly, can you hit it?

So the classic noise vs. headroom battle is not only alive and well in digital recording and mixing, but it is much, much more touchy. We are faced with a *more narrow* acceptable-level window, in fact! Yes, it is quieter and cleaner, but you really have to know your stuff to get it right. You *do* have to worry about noise and headroom.

I told you I wouldn't insult you by dragging you through the obvious, but sometimes this one self-evident point is lost in the hype. I mean, you *know* you have to print hot, and you know why. But it also applies to every bounce, every mix and every time you apply DSP of any sort. Every step must be optimized because every step destroys TDR—just like analog.

The classic noise vs. headroom battle is not only alive and well in digital recording and mixing, but it is much, much more touchy. We are faced with a more narrow acceptable-level window, in fact!

Take EQ. If you add 6 dB at 10k with destructive EQ, and change your mind later and "un-EQ" the 6dB boost back out, you have forever thrown away 6 dB of dynamic range. Ick.

TRAGICALLY ACCEPTED, MALICIOUSLY DISSEMINATED DECEPTION #3

Digital EQ is better than analog EQ.

Not quite that simple. Most digital EQ *is* analog EQ! Most digital EQ is IIR, or infinite impulse response. IIR is merely a digital model of the same old analog EQ; both are done by phase shift. It has *all* the bad problems of analog EQ—ringing, horrible phase shift, group delays and so on—*and* the additional problem of DSP word length and digital headroom. My, my.

But don't despair. There is a true digital EQ family, FIR (*finite* impulse response). It takes a lot more DSP power to pull it off, but a true zero coefficient FIR EQ has *no* phase shift, no ringing, no slur, no slush! A properly designed FIR EQ sounds incredible—well, actually, it has no sound at all. You just get EQ. FIR EQ is one of the main reasons I moved on to digital audio. Try one and judge for yourself.

BACK TO THE FUTURE, OR SHOULD I SAY, BACK FOR THE FUTURE

Finally, I leave you with this cosmic truth. If you have the time to track it, you have the time to back it!

None of the data-quality issues discussed above matter much if your data isn't there when you go to get it the next day, week or month, do they? While a small dropout in an analog 24 can easily be fixed with clever use of common tools, a tiny ding in a disk can mean you spend the next day calling all the original musicians back in, and the day after that consulting with your lawyers. So *please* back up! Back up! Back up! Do it! I've got it—every time you see a Nike ad that says, "Just do it," rush over and back up your data. It could literally save your life. It has saved mine many times. ■

SSC doesn't back up his columns because he figures he can always get a copy from you if he needs one. Please don't ever tell him he's wrong.

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• 5.1

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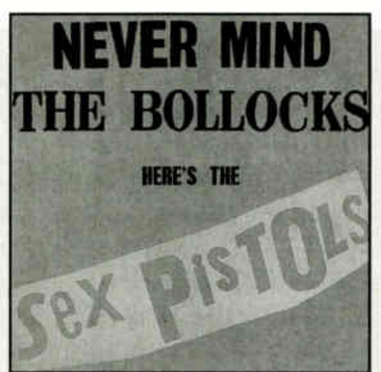
—FROM PAGE 40, CHRIS THOMAS

assumed that it was live-in-the-studio.
Oh no, it wasn't like that at all. It was quite labored. The vocals were labored, as well.

Were they cool with that aesthetic? I thought they were into working fast, being spontaneous.
We did the backing track without John being there. John was being kept in the dark by Malcolm the whole time. He didn't even know they were in the studio...

To what end?
I don't know. That's to do with them, or with Malcolm at least. Then it came time to do the vocal and John appeared in the control room. He had this amazing presence to him. So he went in to sing "Anarchy," and he basically just screamed into the microphone. So I went in to speak to him, and I tried to explain to him that I didn't think it was going to work like that. And he said, "Well, what should I do? *You're* the one with the track record." I said, "Let's go down to the pub." He was nervous and I probably looked straight and old to him. He was about 20; I was probably 30, which was a gap, especially then. But bit by bit we worked on it and it came together. And the reason it did come together as well as it did is they were serious. The publicity line is that Malcolm got these four no-no's and invented the whole thing, which is obviously not the case. John was quite brilliant. I remember when we mixed it, the others were asleep but John was sitting right behind me and he was really enthusiastic about it.



The publicity line is that Malcolm McLaren got these four no-no's and invented the Sex Pistols, which is obviously not the case. They were serious. John (Rotten) was quite brilliant.

So they were disciplined enough that you could ask for multiple takes or whatever you needed?
Oh, definitely. But the whole making of the album was very weird because they kicked out Glen [Matlock, bassist] and we went into the studio on Boxing Day [December 26] and it was just Paul and Steve, and that afternoon we did "God Save the Queen," "Pretty Vacant" "EMI" and they put down a backing track for another tune, but they couldn't figure out what to do because it was just guitar and drums. I think they invited Glen in as a session guy, but he said no. So I asked Steve if he thought he could play some bass on it, and he went out there and first take he just plays the root notes of the chords he's been playing, because he's used to playing the bar chords. And that was it—that was the Sex Pistols sound. Because beforehand, when we did "Anarchy," we spent a day doing the backing track and edited it all up from different takes because it was very loose between bass and drums. Now it was just like a rock because Steve was just playing exactly what he did on the guitar, except on the one string. So suddenly it sounds like this tank rolling down!

Did your colleagues in the profession ask you how you could sink so low?
[Laughs] They certainly did. Every single one of them! "My God, what's he doing now?"

What were the early Pretenders sessions like?
They were fantastic. I'd known Chrissie [Hynde] for a long time. The first time I worked with her was on a Chris Spedding album; she did backing vocals. Chris called her and a couple of other girls in, and it transpired that the other girls couldn't sing and she could. So we got her back and tracked her to make up the parts, thus making her other two friends extremely annoyed. So I knew she had a great voice.

I remember one time she asked me, "Can you help me?" She wanted to be a singer. I said, "You've got a great voice, but that's not really going to be

World Radio History

enough. What you're going to have to do is write. You need to write, and you need to get into a band." Then the next thing I heard was "Stop Your Sobbing" on the radio, and I thought, "Great, she's cracked it. She's got a band." But she still wasn't writing. And then she contacted me and said, "Can you produce us?" And she sent me a tape with four demos on it: "Tattooed Love Boys," "Up the Neck," "Brass in Pocket" and "Private Life." It was a broad spectrum, from sort of new wave things to a sort of an attempted reggae thing, to "Brass in Pocket," which I saw as being like an almost Al Green-type thing, with Al Jackson drums on it. I spotted that song and thought that was the single. But it was quite slow the way they did it, and it needed a little bit more bounce in it. I went to see them live at the Marquee and I thought they were fantastic.

But the other thing that happened was I'd been working with Paul McCartney on *Back to the Egg* and that had gone on for a really, really long time, and I didn't want to get into the studio with another band particularly. So we decided we'd just cut a single [for The Pretenders], and we agreed we'd do a four-day week and I'd only work from 2 till 8. This was at Wessex. And that ended up working great because instead of hanging around the studio and living there for 15 hours a day, we'd go in and *bang!* we'd be down at the pub drinking at 9 o'clock in the evening. There was fantastic energy at those sessions.

That must have been quite a contrast working with McCartney, who obviously had his own way of working well-established by then, and The Pretenders, who were this fresh, young band.

Well, at one point I was working with McCartney and The Pistols at the same time!

But The Pretenders' album—it just got better and better as we kept working on it; it was great. Then we went from Wessex down to AIR Studios with Steve Nye [engineering].

It seems as though so much of the best music in England came out of just a few studios: Wessex, AIR, Olympic, Townhouse.

Trident was very big in the early '70s, too. That's where The Beatles had done "Hey Jude."

In America there were some very definable aesthetic changes in studios through the '70s—the rooms became deader, there was more building tracks from the rhythm section up and less live playing. Did that happen in England as well?

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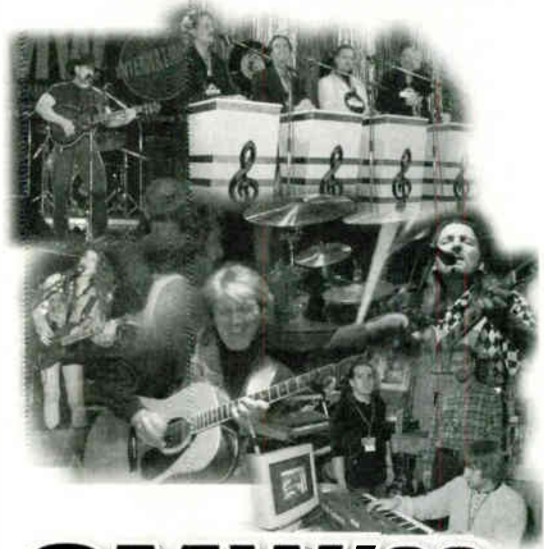

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It did happen. I remember bringing a P.A. into Wessex for The Pretenders because it was so dead it used to drive me crackers. So I used to put the drums through a P.A. just to give it some thump. They weren't going to allow me to rip the carpet off the floor.

You worked with INXS during what most people would agree was their best period. And they had a very identifiable sound, with the heavy kick drum with lots of reverb on it and the slashing rhythm guitar cutting across the beat. How much did you influence that band sonically, or is what we hear the way the band arranged itself in a sense?

Well, those are two different things really. The way the instruments sound is one thing, and I'm sure I influenced that a lot. But certainly the rhythm thing—that interplay—all came from [guitarist] Andrew Farriss and the way he would write and demo his songs.

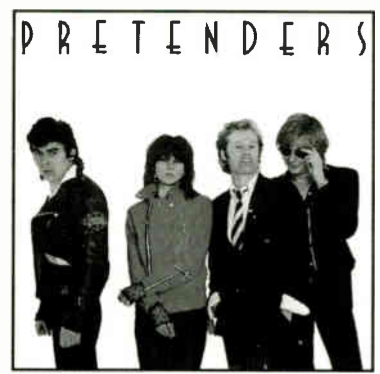
There's a story linked to that that sort of encapsulates the way I work sometimes. When we did our first album together—*Listen Like Thieves* [1985]—I was worried about the average and standard of songwriting that we had, and right at the end I thought, "Well, we've got to drop one song, and if we can get a new song that—if you grade them from one to 12 and drop number 12 and replace it with a new one that's, say, better than number seven, then you raise the average of the whole album. So there was some hemming and hawing about that, and then Andrew brought in three demos—two songs that had been completed and he played me a thing that was just this riff—*dink, dink, dink-a-dink*—and it was great. I thought, "I could listen to that groove for ten minutes!" I said, "Let's work with that groove." So we went with that and in just two days it turned into the song that eventually broke them, "What You Need."

I always thought INXS were underrated. It was obvious they could really play.

Oh, they were a great band! I remember before I worked with them seeing them at the Hollywood Palladium in 1984. That gig was incredible; it was one of the best gigs I ever saw by any band. God, they were good. Michael [Hutchence, lead singer] was absolutely brilliant. And the style of their music—it was funk but it was white and rock; a great mixture.

When you work with a youngish band these days, like Pulp, obviously you bring years of experience and your impressive track record with you into the studio. Is that at all intimidating to a band?

Well, they'd done their homework on me when they contacted me. I've been fortunate in that it's always been a case



I remember bringing a P.A. into Wessex for The Pretenders because the room was so dead it used to drive me crackers. I used to put the drums through the P.A. just to give it some thump.

of the band contacting me rather than me being hired through a record company. So it hasn't been a manufactured arrangement. That's good because it shows they trust me, and if you haven't got the artist's trust, it doesn't matter what you do in the studio, you're not going to get anywhere.

Do you generally learn early on in the relationship what the artist liked about your work? "Oh, I love that first Pretenders album..."

Sure, it's always because they liked this record or that record. But they don't normally refer to them saying, "We want our record to sound like that." But your records are what you've done, and they give an indication of what you can do.

Do you find that musicians know more about recording than they did 20 years ago?

I think so. There's obviously more information out there about recording.

And more home studios, too. So the people who come into the big studios often have had some recording experience.

Exactly. That's true.

Has that changed what you do at all?

Not really. Because the essential thing, if you want to be crude about it, is people want to make a hit record. So that means I'm still in there advising them to chop a few bars out of this part over here, maybe suggesting they change this riff, and that sort of thing. I've always been very interested in arrangements. The technical side is interesting, as well, but that's more just a means to an end.

I don't want to imply that I'm in there all the time changing these songs around; not at all. Most of the time I don't have to say anything about that. That's one of the advantages of working with great writers. I love working with writers. That's the person I always respond to most in a band.

Have you ever had a period of burnout?

Yeah. I'm probably in one now. The first record I did with Pulp, *Different Class*, is definitely one of the best records I've made. I'm real pleased with that. The songs are fantastic—Jarvis is such a great writer. And they'd been around for a long time and for this success to happen to them—in England they sold more than a million albums, which is really a lot there. Then they went on the road for a year and they found that difficult. And being under the looking glass was difficult for them, as it is for most people, and it made it difficult for Jarvis to write for the last album, and it went on for about 18 months. In fact, Bryan Ferry was in the studio at Olympic when we were starting out on this last Pulp record and he was telling me it had taken him two years, and I said, "I just cannot do that sort of thing." Well, ha-ha-ha. The next thing I know the record I'm working on drags on for 18 months! Of course, you're not in the studio that whole time. But even when you have a weekend off, you're still carrying that record with you. You can't really mentally file it away until the record's in the shop.

Do you know what you're doing a year from now?

Definitely not!

How about six months from now?

No. I'm not even sure about next week.

Does that feel good?

Definitely! [Laughs] ■

Blair Jackson is executive editor of Mix.

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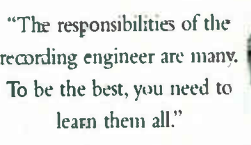

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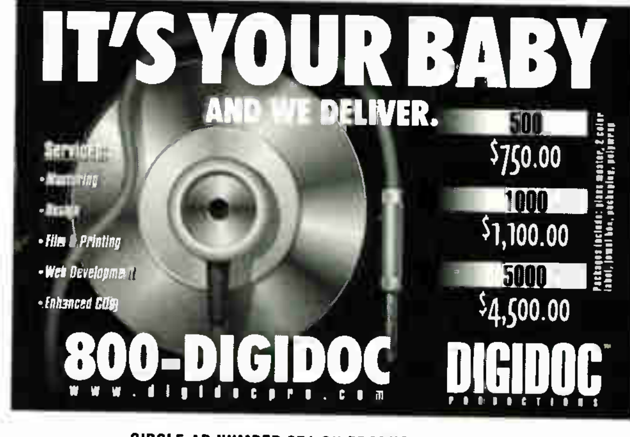

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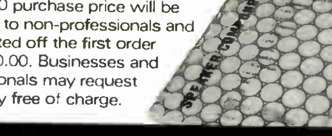

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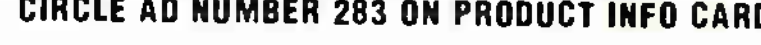
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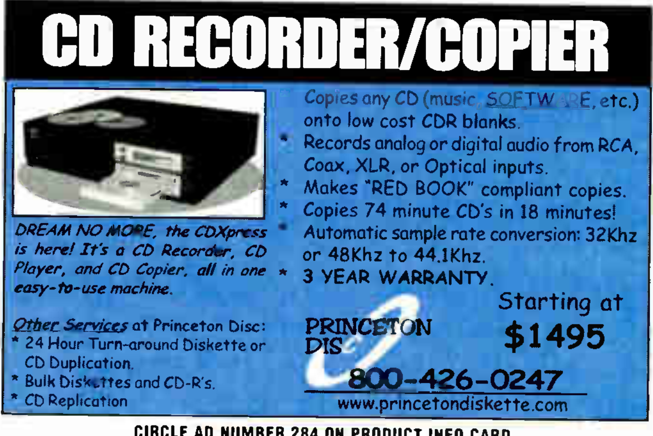

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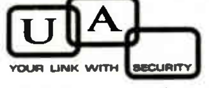

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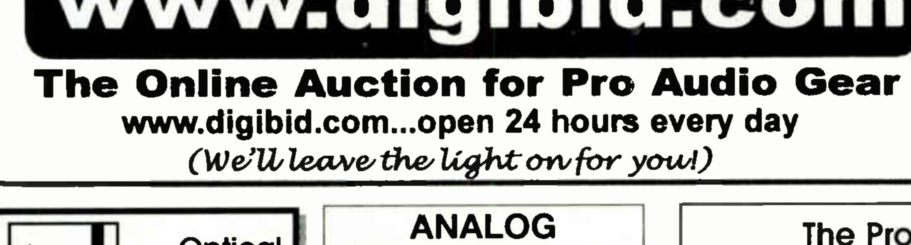

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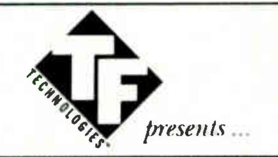

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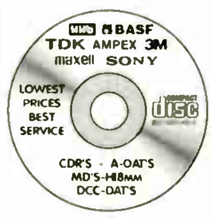

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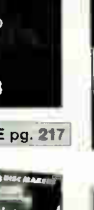

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World Radio History

—FROM PAGE 56, COMPRESSORS
and a high threshold. The task for a peak limiter is to stop or control only the very quick, sudden peak levels that will overload the succeeding audio stage. Peak limiters are used in all broadcast transmitters, satellite transponder uplink audio feeds and in many digital audio systems where digital "overs" are not tolerated. Recording engineers sometimes chain a peak limiter after a compressor so they get the best of both worlds: They maintain a higher average loudness with the first compressor, and then protect the digital recorder from flash peaks with the peak limiter. This arrangement is good for recording a widely dynamic singer who also has poor mic technique—a nasty combination for the recording engineer. Aphex Systems makes a unit called the Compellor that combines a compressor, a leveling amp and a peak limiter all in one box.

Leveling amplifiers • The leveling amplifier is a compressor with a medium attack time, a medium to slow release time, a high ratio and a low threshold. The purpose of a leveling amp is to be constantly leveling the signal, always in gain reduction, holding the audio signal down in a smooth way (ergo the name). The average loudness of the program audio becomes higher since lower-level sounds are amplified, and louder sounds are leveled off. The slow release time ensures that sound level doesn't drastically change or "pump" up and down as it would with a faster release time setting. Early leveling amps had few controls: Ratio, attack and release settings were all internally fixed. Tube leveling amps are popular for bass, guitars, program mixes and vocals because they exert a smoothing action that works well for many production styles. The Teletronix LA-2 is the classic tube leveling amp.

USING COMPRESSORS IN MUSIC

Trying to arrive at proper recording level can be like chasing a moving target, especially if you are working with inexperienced musicians or singers. It is easy to just "pack" the signal from a widely dynamic singer into a compressor, crank it way up and call it a day! On the other hand, the creative and caring engineer may use an equalizer in the sidechain of a compressor to selectively compress certain problem frequencies of the singer's voice. The sidechain input is a direct path to the compressor's detector circuitry, where an external signal can also trigger compressor action. Using an equalizer in the sidechain makes the compressor more (or less) sensitive to sounds within the EQ's frequency passband. Other sidechain compressor applications are de-essing and ducking. De-essing is accomplished by connecting an equalizer to the sidechain of a peak limiter and boosting, with a medium to high Q, the "s" frequencies anywhere from 1.5 to 6 kHz (depending on the singer). Strong "s" sounds are quickly reduced without (one hopes) too much consequence to the rest of the vocal sound's signal. Ducking is gain reduction that is triggered from a different audio source altogether. The most common usage is to "duck" or lower a music bed (track) whenever a narrative voice-over is active.

SOME PRACTICAL EXAMPLES

Bass guitar • Generally, bass guitars seem to sound better when using some compression. I sometimes rely on the compressor to pull up some additional bottom end and warmth. I like to use a leveling amplifier for bass guitar such as an LA-2, Anthony DeMaria Labs or a Tube-Tech CL-1B compressor set up as a leveling amp. Based on the song's tempo and/or the bass player's style of playing, I might start with ratios of 5:1 with a medium threshold setting, medium attack and a slower release time. Unless you are looking for a pumpy effect or have a very wild bass player that the producer would like to squash, I rarely compress bass guitar more than about 5 dB max VU.

Vocals • A lot of anguish and pain surround the recording of vocals. Maybe some singer insecurities, producer apprehensions and overall great expectations weigh on the arrival of a stellar vocal sound. It's about preferences, and vocal sound is subjective and contextual within the backing track. It does not exist on its own unless you are recording an a cappella performance. What I might think is a great vocal recording on a certain CD may be not be what the singer and producer are looking for to convey the emotional import of the artist, the song's lyric or the vibe of the song. At the first vocal recording session, you will want a starting point vocal sound that fits the singer, the song and the production. This starting point sound will work well to capture the immediacy of the moment and hold up later in mixdown. After mic selection, mic preamp selection and EQ setting, a compressor type is decided. Although there is much interaction between all these components, my starting point settings are predicated upon a +4dB level coming from this mic/preamp/EQ chain. For vocals, I tend to use compressors with adjustable attack and release time controls. I like tube-based compressors, although for more difficult control problems I would go to a VCA-based unit. If you were to set the threshold at about 0 dB, the ratio at 4:1, the attack and release at middle positions and adjust the output level for a good recording level, you'd have about 3 to 6 dB of compression and probably make most people happy. This is just a good starting point, and you should get in there and change those settings to your own taste.

Stereo mix compression • A popular place to apply compression is on the entire stereo mix as it is going to the master tape. Stereo compression is also applied "after the fact," such as in mastering, but there is a big difference. If you are mixing your record into a compressor ahead of the master tape recorder (or DAW or whatever), then you are mixing many sources (tracks or elements), each with its individual dynamic content. Making mix moves (especially big gain changes) directly affects the compressor's action, which, of course, affects the relationship of all the other mix elements, that is, the *whole* mix! If you do not use a stereo compressor at mix and compress at mastering, then you have just the dynamics of a 2-channel stereo mix for the compressor to react to. Many engineers and producers mix into a compressor and then have the mastering engineer compress again, while others prefer to wait until mastering to compress digitally. A good starting place for the stereo mix compressor is a lower ratio with medium attack and release time settings. Set the threshold (and output level) so that you can hear an increase in level (average loudness) when you A/B the compressor in and out of circuit. Remember, this is just a starting point! You may want to use a higher ratio to control peaks better and/or a lower threshold for more compression and denser overall finished sound.

As with all audio processes, learn to recognize the effects of compression (the pitfalls and advantages of using it), and, as always, use your own ears to go for sounds that you like and that improve the sound of the music. ■

Barry Rudolph is an L.A.-based recording engineer. E-mail him at brudolph@worldnet.att.net, or visit his Web site at http://home.att.net/~brudolph/.

World Radio History

NEVE FLYING FADERS

THE "NO SECRETS, NO MARKS, NO FEAR" APPROACH

Now campers, don't try this at home alone. These tips are based my perspective of working on a Neve VR, but should apply to other Neve Flying Faders systems as well.

SAVE, SAVE, SAVE

In order to have the system work at utmost efficiency, I automate and save every song, idea, interlude that I work on.

Label and save your mixes so

A typical Flying Faders screen

you can find them a millennium later. Use the "notes" column on the MIX/PASS page freely, explicitly and frequently. Use the [New Mix] as a broad outline subject. Change to a new Mix status with notes at major changes. For example: Mix1 is track levels, Mix2 is backgrounds, Mix3 is re-mix, etc. When a major change is taking place, such as BG vocals, leads or rhythm section, note that "this pass was where the background voxes were at the right level, but the know-it-all producer made me change it." Because every pass is numbered and always retrievable in RAM, you don't have to save as often to be able to retrace your steps.

Anytime I'm about to do something I'm not sure about—status, group or weird stuff—I usually officially save a mix to disk, and start a *(New Mix) for marker sake. When I want to start the concept of a mix-over, I go back to Mix1/Pass0 but keep my existing mix concept in RAM for mixing and merging.

MUTE MAGIC

Use the Flying Faders Solo System in Multi Mode to mute count-offs and other unwanted noise. Individual momentary and Latched soloing: First set the solo box to Multi Mode, then go to the Other Key box. Hold down the shift key while you hit the Other button on the center module until you find Set Solo Bank. Now, release Shift and hit Other. You will be ready to select faders for solo groups, but you want to deselect any faders that are selected (green select). Hitting Other once more returns you to mix operation mode. Faders that are muted in automation can be auditioned without disturbing their automation status by holding down the Flying Fader's Solo button while it's playing. If you hit the console's Mute button, it will write that move to the mix even though you heard the whole performance.

MIDI HEADS...

Use the 3&4 Mix outputs as exclusive sends to stereo samplers, and for making stereo comps with effects for bouncing. You can easily adjust the overall output level, and hear what you are sending, by listening through Mix Monitor 3&4.

SNAPSHOT PASTE MIXING

Using the Smart Key S11 Store and Set Store to do snapshot paste mixing is great for doing quick, accurate multi-move rough mixes. For various quick snapshot, new, automated levels, mute and VR mute statuses always take one basic home shot with the VR mutes off—to have a pass to return to. If you're not ready to automate different BG Levels, different sections when you get it right, hit S11 and Label—you may want to mask certain unwanted functions to protect them from EQ/insert/cuts/VR board mute moves. Push run/enter stores and press Set Store as each section occurs, and the computer will write these positions as an automated move, using the home set after each section not needing any specific changes. Example—Set Store:

1) A—Home basic mix (basic rough groove)
2) B—Bsec BG to Chorus
3) C—BG @ Chorus
4) A—Home basic mix (can use for second verse)
5) B—Bsec BG to Chorus 2
6) D—BG @ Chorus #2 (different new notes added)
7) E—Bridge BGs
8) A—Home basic mix
9) D—BG @ Chorus (use also for last chorus & groove—groove on out and fade).

LIVING IN MASTER TOUCH

Set Option window (TRM/GRP/SOLO/MAST ISO) to engage Master Touch globally. In the main menu, set the momentary Set button to Select All Faders And All Mutes, then release. Press Shift and the Master Record Light on the global module section. This will latch the automation record button to permanent "on."

Now we're ready to do what I call "subtractive mixing." Go through a song, adjusting levels as you go. When you return to the top, all moves will be erased except for the last or existing position you're in, so remember to disengage from Master Write after you have made a move that you want to keep.

After you've made moves on, let's say, a vocal fader, disengage the fader to be in Soft Trim, while the Master Status remains in Master Touch Absolute. Faders can be disengaged locally by touching Auto Match or holding Select while holding the Record Fader button. Mutes can be disengaged locally by holding the Select button, while simultaneously holding down the Mute button.

Once you've subtracted all your faders and mutes, except for a few slight trim things, hopefully it's time to print. Happy Mixing! ■

BY JIMMY DOUGLASS

Jimmy Douglass is a New York City-based producer/engineer. He just finished work on the second Ginuwine album.

World Radio History

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CIRCLE #151 ON PRODUCT INFO CARD

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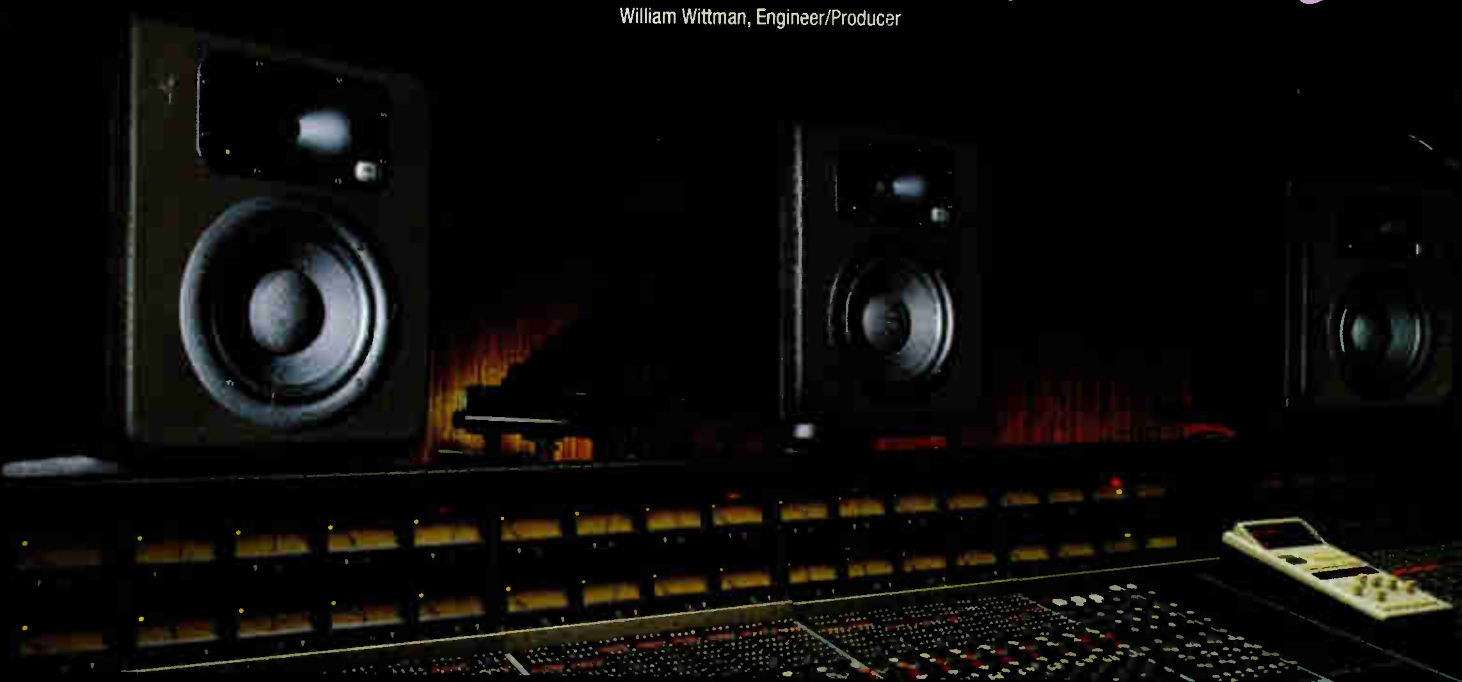
William Wittman, Engineer/Producer



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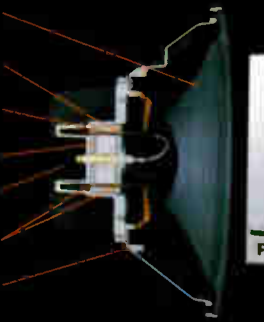

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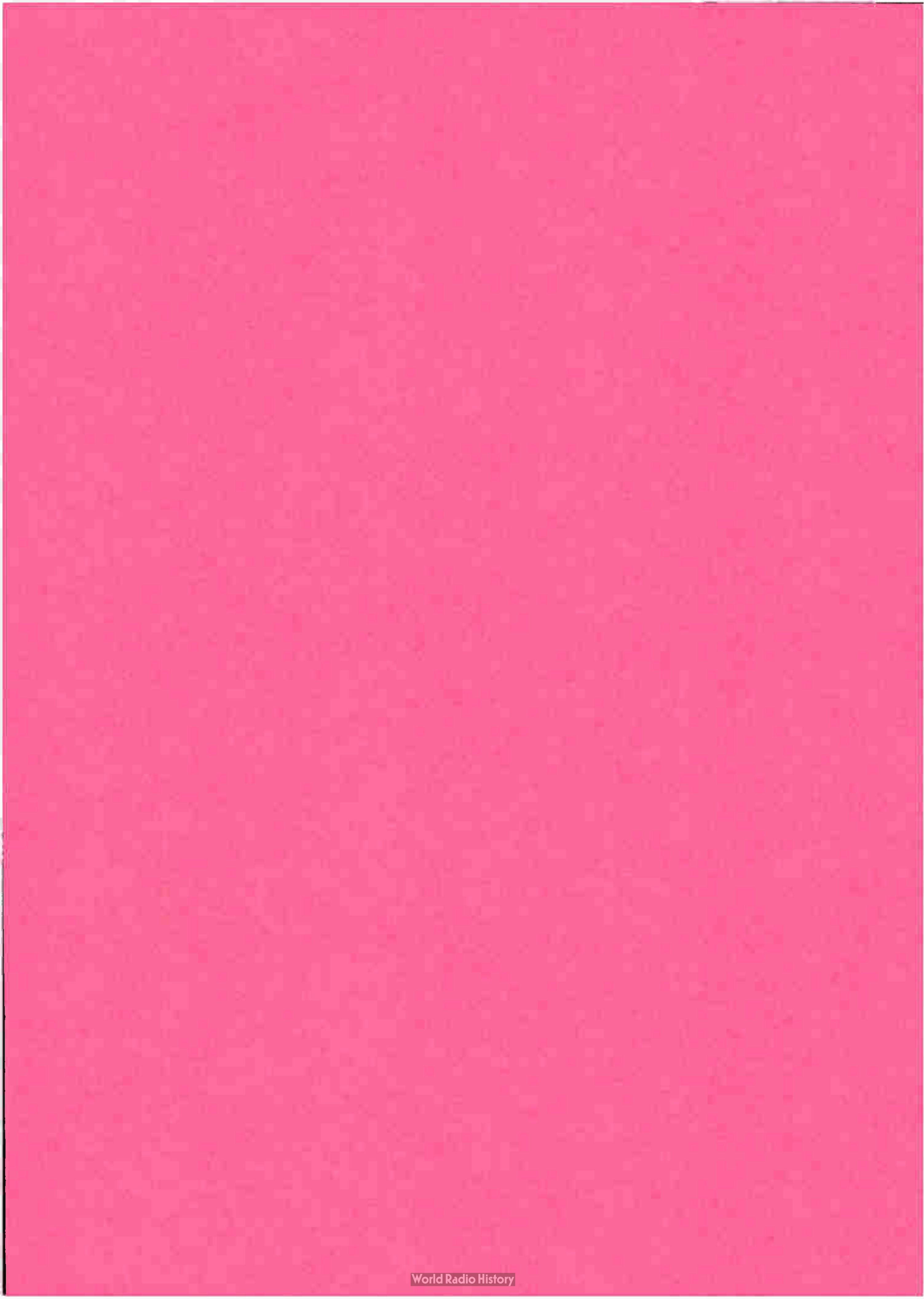

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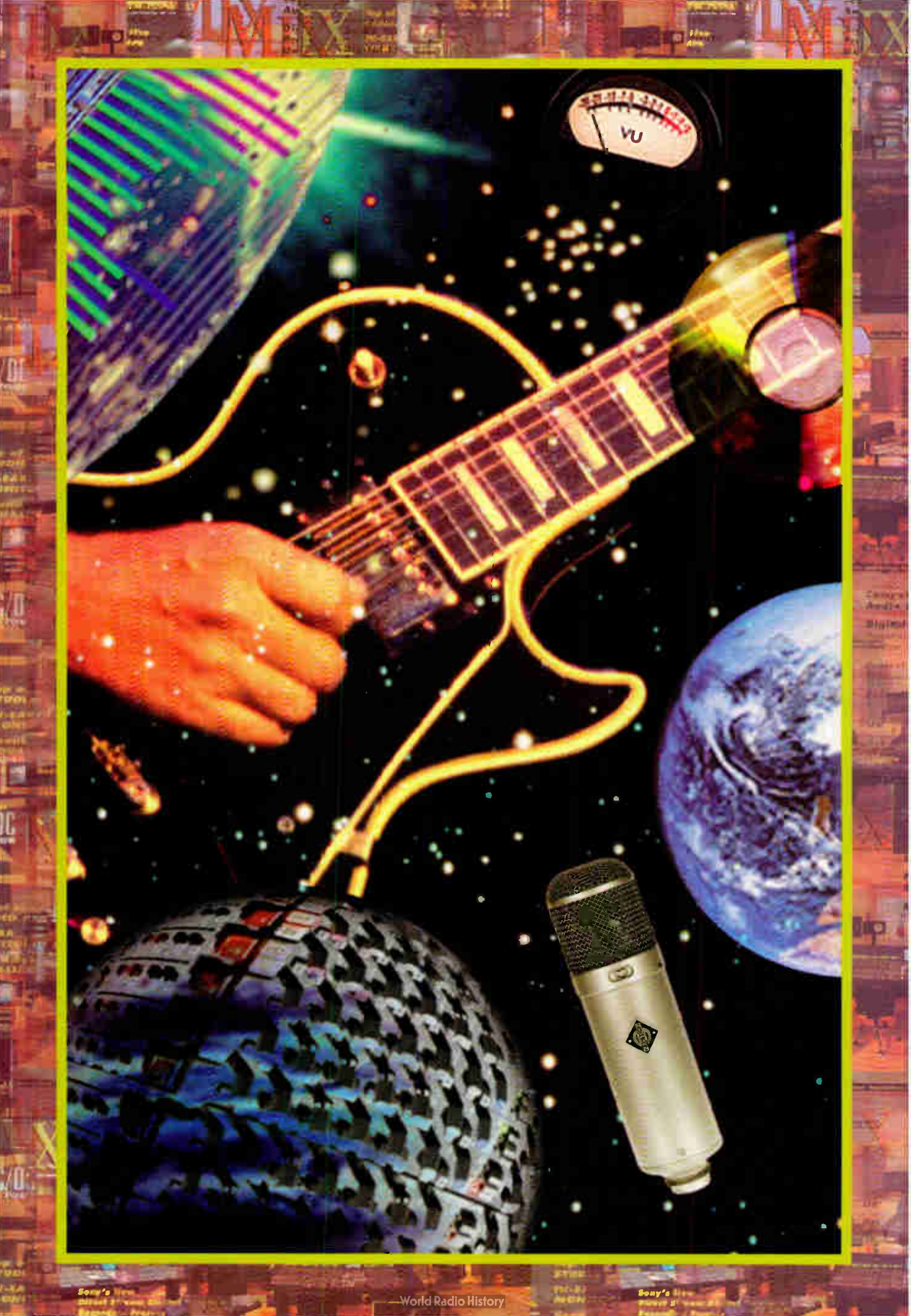

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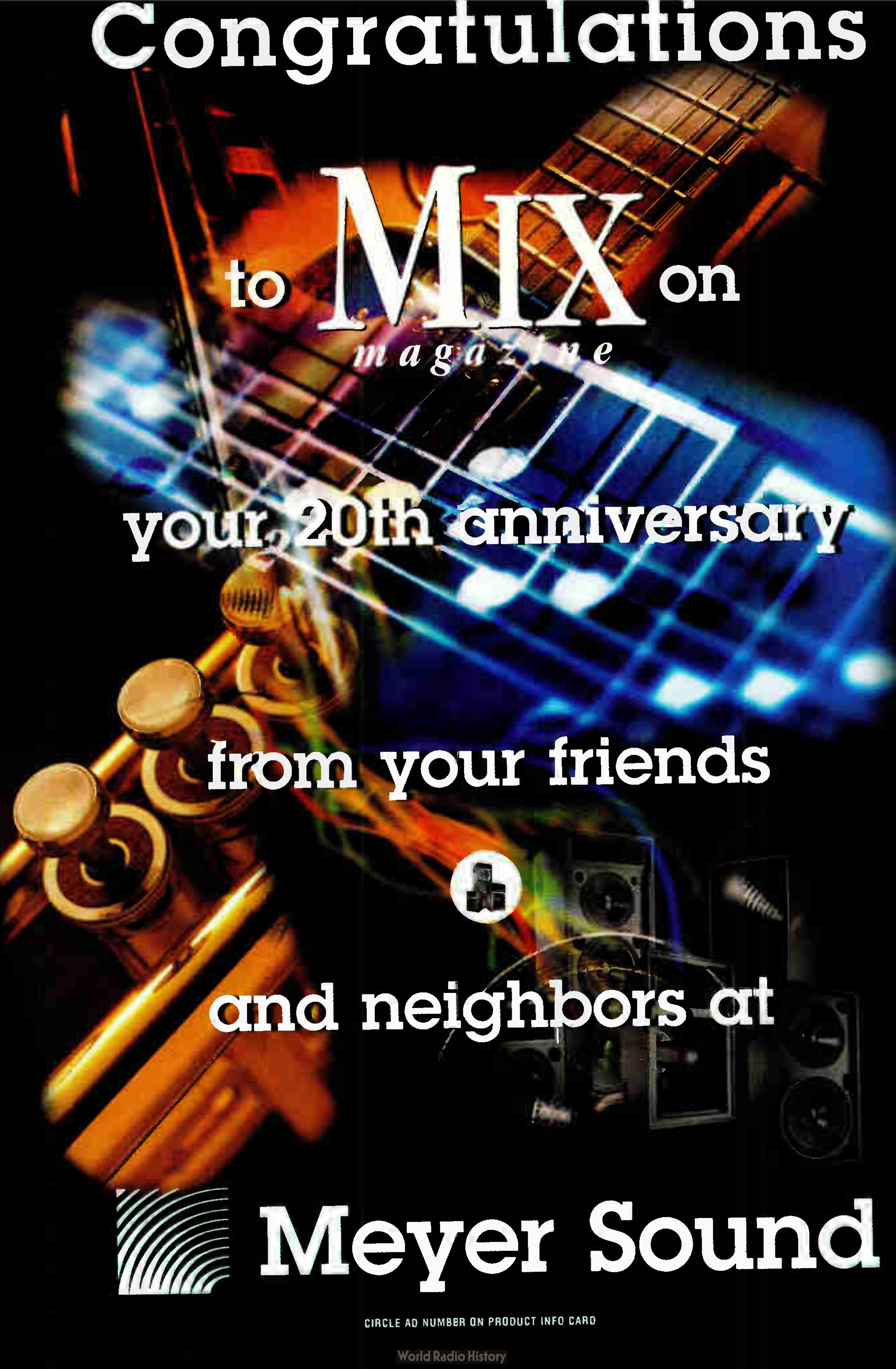

World Radio History

from the editors

Welcome to our special 20th anniversary issue of *Mix*.

To those who have been here from the beginning of this remarkable odyssey, it doesn't seem possible that two decades have passed since *The Mix* was launched as a one-shot directory of recording studios in the Bay Area. The changes we've seen, in both this publication and the pro audio industry, have been so many and so mind-boggling that these 20 years seem more like a lifetime. For better or worse, the changes have transformed a once small and easily defined industry (and a small but very ambitious magazine) into forces that have had a tremendous effect on the lives of millions. Maybe it sounds pretentious, but the music and sound industry, as chronicled in these pages, has truly changed the world, and we're proud to have been a small part of this revolution.

Above, the 1997 Mix staff on the steps of the Emeryville, Calif., headquarters. Far left, the men and women in black from the New York office. At left, the Los Angeles duo take a break outdoors.

In this retrospective, we wanted to give a glimpse of the history of not only *Mix*, but the people, companies and events that have shaped professional recording and sound production since 1977. We have tried to spotlight the prominent figures, the movers and shakers, the groundbreaking trends and products that have made our industry the worldwide force that it is. Having said that, we know that there will be people and companies that we may have omitted. If you are among the missing, please don't hold it against us; the limited size of this publication made it impossible to include everyone.

It's been quite a ride these past 20 years, from the good old days of 8-track analog and razor blade editing to the brave new world of multiple digital formats and 48 tracks in the spare bedroom. We at *Mix* have tried our best to give our readers both the broad picture and the essential details—not an easy task. We like to think that most of the time we've succeeded, and the fact that many of you have been reading since that first tabloid issue in September '77 is proof of sorts.

We hope you enjoy this "Twenty Years of *Mix*." Without you, it would not have happened. Thanks.

The Editors

The *Mix 20th Anniversary* issue is a supplement to the September 1997 issue of *Mix*.

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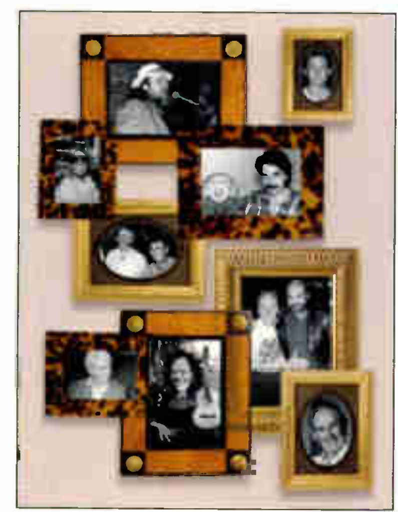

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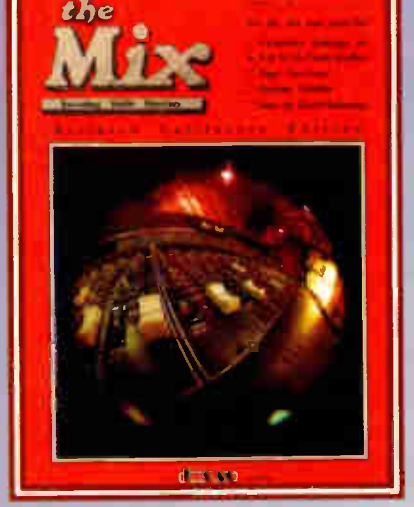
Founded in 1977
by David Schwartz and Penny Riker Jacob

World Radio History

The Way

The Early

Nineteen seventy-seven was a time of longer cars, longer sideburns and longer attention spans. It was also a time when it took a lot longer to get information. We had no fax machines, no personal computers, no Internet and—to the consternation of a least two people in Marin County, Calif.—no comprehensive directory of recording studios, where a musician or producer could turn for information on this rapidly growing field. David Schwartz and Penny Riker Jacob—the former a musician and engineer, the latter a singer who also did voice-over work—felt there might be a need for such a publication. The expression "They didn't know what they were getting themselves into" never applied more than to these two dreamers in the spring of '77.



First cover

Looking back on those days from the lofty vantage point of 1997, when *Mix* has become the world's preeminent magazine for professional recording and sound, it seems more than a little strange that this venture was launched in the San Francisco Bay Area, much less that it would actually be successful. After all, the big-time centers of recording, the homes of major record labels, were 400 and 3,000 miles away, in Los Angeles and New York. It should be remembered, however, that the Bay Area spawned much that was revolutionary in both music and culture in the 1960s and '70s. Beginning with Haight-Ashbury's Summer of Love in 1967, San Francisco was a magnet for bands and musicians, giving birth to such seminal groups as the Jefferson Airplane, Big Brother & the Holding Co. (with Janis Joplin), Santana and the Grateful Dead. They "did their thing" in such hallowed halls as the Avalon Ballroom, the Straight Theater and—setting the stage for a whole new industry—Bill Graham's Fillmore Auditorium.

And the bands recorded here, too. Few of the studios that hosted them remain today (two are profiled in this issue), but the 16-track listings in the first issue of *Mix* attest to their existence: The Automatt, Beggs/American Zoetrope, Coast Recorders, Different Fur, Funky Features (now Russian Hill), Wally Heider Recording, Music Annex, Pacific Recording, the Record Plant...

Over in Marin County, there was an 8-track operation called Tres Virgos Studio. Owned by engineers Alan Rice and Robin Yeager, and Mike Stevens (later business manager of *Mix*), the studio was also the hangout of David Schwartz and Penny Riker Jacob. Both Midwestern transplants, the two had come to San Francisco, if not with flowers in their hair, certainly with music in their souls. While working with the Tres Virgos team—writing songs, producing demos and jingles—they began to realize they were in the middle of an expanding universe.

by Hillel Resner

World Radio History

it Was

Days of Mix

The Mix staff in 1978. Bottom: Penny Jacob; middle (L-R): Bill Laski, Skeeter, David Schwartz, Mary Loman; top: Sandy Cann. Inset: Proud father David Schwartz displays the first issue of The Mix.

World Radio History

Jacob: It was a very exciting time. If you look at that period from the late '70s through the '80s, there was a real growth spurt in technology and the music business. A lot of wonderful things were happening—multitrack, all of it just exploded during that time.

Schwartz: From that point, because the equipment became a little more affordable, you didn't have to be a pro audio business-type to have a studio. You could kind of get in the game as a producer or as a musician or an independent engineer and be very valid with equipment you could buy and use in your own place.

Jacob: We were at the same level when we started the magazine as a lot of these people. We were starting a little studio, and we were very interested in it, and we wanted to make it a success. We wanted to know where the studios were and how much they charged and what kind of equipment they had.

Although *Billboard* magazine published a directory that included recording studios, Schwartz and Jacob believed a publication that provided more detailed information might appeal to the burgeoning population of both professional and semi-professional recordists. Neither Schwartz nor Jacob, however, had any experience in publishing. So in December 1976, they approached Dennis Erokan, publisher of *BAM*, a Bay Area music magazine, with the idea of putting out a directory of studios as a supplement. Erokan was receptive to the idea and assigned Bill Laski, *BAM*'s advertising director, to work with the fledgling publishers.

Erokan: The music industry in the Bay Area was not only taking off, but the infrastructure around the musicians was forming, and there was a sense of pride in the area. David and Penny came to me with the idea of taking the recording studio side and really running with it. It seemed like a can't-lose idea.

The staff, circa 1981. Bottom (L-R): Mary Holland, Ellen Goldstein; middle: Gail Rosenberg, Debbie Russell, David Schwartz, Penny Jacob, Susan George; top: Tim Gleason, Hillel Resner, David Gans, Bruce Dancis, Mike Stevens.

BIRTH OF "THE MIX"

Assisted by the staff at *BAM*, Jacob, Schwartz and Laski began the task of identifying and contacting as many recording studios as they could find in Northern California. Relying primarily on phone book listings and whatever information they could glean from music publications and local pro audio retailers, the group began building a database (on paper, of course; it would be a number of years before *Mix* acquired computers). Studios were mostly called on the phone, and the intrepid reporters also visited as many facilities as they could, asking questions and taking photos. In those days of typewriters, typesetting and paste-up, it was a staggering amount of labor.

About nine months later (appropriately enough), in September 1977, *The Mix* was born. An introductory letter from Schwartz and Jacob declared the publication's purpose.

"The recording scene in Northern California is bursting with musical talent, well-equipped facilities, creative thinking and unlimited potential. *The Mix* has been put together to increase the communication in this mysterious and often misunderstood world of professional and semi-professional recording. As the first comprehensive studio directory, *The Mix* will fill an information gap for musicians, producers, engineers and others."

Published on newsprint, tabloid-sized, with a four-color photo of a recording console (a Harrison) on the cover, this "Special Issue of *BAM*" ran 72 pages and featured listings of 112 studios in the greater Bay Area, divided according to the number of recording tracks.

In today's world of MDMs and disk-based recorders, where the number of tracks a studio offers does not necessarily define its creative capabilities, the 4-, 8- and 16-track listings of the *The Mix* seem not only antiquated, but downright quaint. But at that point in the development of the industry, to open up a publication and see this array of studios, both on the entry level and cutting edge of the multitrack revolution, was both thrilling and challenging.

The Mix provided a medium for this exploding creative milieu to publicize and become aware of itself. For the first time, the folks at a place like Paradise Studio in Glen Ellen, whose listing in *The Mix* said they had a Speck 16x8 mixer and Otari 5050 ½-inch 8-track, could riffle through the pages of a magazine and learn that Funky Features in San Francisco had a 3M 16-track and a board that was "a charming antique combination of Ampex and Shure mixers." Here was a publication that gave detailed information about a business that, until then, had in many ways been underground.

Schwartz: I think we helped to show them that they weren't isolated, in a kind of business that was very isolated generally. Before The Mix, *how did people know where a studio was, or what was in it? These places didn't have signs over the doors, you couldn't walk in and kick the tires...What we were able to do was show that every-*

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body was in the same boat.

In addition to the studio listings, which were the backbone of the magazine, the first issue of *The Mix* also included articles like "How to Make the Most of 4-Track" and "Standard Requirements for a Proper Master Tape." Then, as now, it was practical information for people trying to make recordings, and the template stuck.

NO TURNING BACK

To say that the premier issue of *The Mix* was a wild success would be an overstatement, but it did receive a lot of notice and it generated quite a bit of excitement in the recording community. About 40,000 copies had been printed and were distributed free through the *BAM* circulation chain to studios, pro audio retailers and other music-related establishments. It didn't take long for word of *The Mix* to spread.

Jacob: When that first Northern California issue came out, everybody else was saying, "Hey, when's ours coming out?" All of a sudden, people in L.A. and New York and everywhere else were saying, "We need one of these for our town." So at that point, the magazine acquired a life of its own, because it was very much market-driven.

In November '77, Schwartz and Jacob headed to Los Angeles, where they spent a month visiting studios, talking to the owners, taking photos and getting people to fill out questionnaires. This time, it didn't take nearly as long to produce a final product, and, in February 1978, the first Southern California edition of *The Mix* arrived. It was 56 pages and contained listings of 155 studios, ranging from 4- to 24-track facilities.

Included in the listings were such venerable studios as A&M, Capitol, Cherokee, Conway, Devonshire, Larrabee, Record Plant, Sound City, Sunset Sound and Village Recorders—all still around today, though possessing distinctly different equipment than they listed then. Also included was a listing and full-page ad for Brother, the Beach Boys' studio, featuring a photo of a swim-suited surfer rushing into the studio with his surfboard under his arm. (You had to be there.)

After the second issue of *The Mix* came out, it started to become apparent that this "one-shot" publishing venture just might have a future. Studios were turning up everywhere, and it seemed clear there was an ongoing need for the information *The Mix* was providing. Schwartz, Jacob and Laski also began to realize that their direction was diverging from *BAM*'s, which was focused more on the interests of musicians. *BAM* was aimed at the consumers of the market served by *The Mix*, which was shaping up as more of a trade magazine. In March 1978, Schwartz and company met with Erokan and negotiated a buyout of the magazine. *The Mix* was on its own.

IN BUSINESS

In the spring of 1978, operating as Mix Publications, the new publishers set up their own offices in Berkeley—in Laski's house. The first thing they needed was an art director, and, at the suggestion of a local quick printer, they hired the elegantly named Henry Harrison McUmber—"Skeeter," for short. With the addition of typesetter Sandy Cann and editorial assistant Mary Lowman, the staff was in place—and they had their work cut out for them.

Jacob: That initial group of six people worked incredibly hard. We're talking about 14-hour days, intense energy—because we were all high-energy people.

Schwartz: We were on adrenaline... It felt like we were on a mission. There was a real sense of purpose there—that we were doing something that people had responded to, and the best thing we could do was exactly what we were doing—and the faster we could do it, the better.

The second Northern California edition—the first to be published by Mix Publications—came out in April 1978, with 80 pages and 118 studio listings. A second Southern California edition appeared in September and had the distinction of being the first—and the last—issue of *The Mix* to be hand-delivered by the publishers. Having lost the services of *BAM*'s distribution network, Schwartz, Jacob and Laski, assisted by some friends in Los Angeles, drove from studio to studio, dropping off bundles of the magazine from a station wagon and Laski's BMW. Talk about class.

Having successfully launched the studio directories, the publishers decided it was time to branch out and provide listings of new pro audio equipment, the lifeblood of the growth taking place in the industry. In November '78, timed to coincide with the AES convention in New York, the first *Mix* New Products Directory was published. Featured in this first-of-its-kind directory were such then-cutting-edge products as the Ursa Major Space Station digital delay/reverb, the White Instruments 4300 ⅙-octave equalizer, Auratone's Model 5PC Super Pro-Cube monitors, Shure's SM81 studio condenser mic, Sound Workshop's ARMS automation system, the Tascam Model 15 mixer, the Otari MX-7800 1-inch 8-track recorder and the Marshall 5002A Time Modulator (developed by future *Mix* columnist Stephen St.Croix).

Lacking the funds to have the New Products Directory shipped directly to the AES show, the *Mix*ers had the magazines flown to New York, then loaded the several thousand copies into a station wagon and drove them into Manhattan.

Jacob: The thing I remember is that the load was so heavy in the back that the front wheels were lifting off the ground! And then we got to the Wal-

Serious journalists: David Schwartz, Penny Jacob and Hillel Resner, circa 1986.

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There's lots of hype these days about PCI digital audio recording systems. Companies spend a ton of money on advertising, claiming future support by a myriad of different software companies. What are we supposed to do? We need instant solutions! Our projects are due now not "soon".

Emagic, known for it's integrated professional MIDI, Digital audio and Scoring software has created a cross-platform, PCI busmaster digital audio recording card with 8 discrete outputs for less then $800: Audiowerk8. Since the product's launch last Spring, thousands of users worldwide have attested to the incredible ease of installation and use and the warmest analog to digital conversion in the business. The Audiowerk8 works on both Windows and MacOS computers just like Logic Audio, the sequencing software it was designed to work with from the start.

Version 3.0 of this award winning music production tool now offers a rich compliment of real-time DSP effects such as Equalizers, Filters, Reverbs, Chorus, Flangers and Delays with up to 8 inserts and sends per track, depending on your CPU.

The combination of Logic Audio 3.0 and Audiowerk8, allows the completion of professional production jobs on a very tight budget.

There's a whole slew of new features such as: punch in on the fly, cycle recording, contiguous synchronization of audio to MTC and much more. You can even use 2 Audiowerk8 cards and get a total of 24 physical audio tracks and 16 outputs.

Rather than calling a dozen companies to get a technical issue resolved, make a single call to a single source and get back to work. Compatibility and support problems become a thing of the past.

So what's the deal? Logic Audio & Audiowerk8, true integration, guaranteed compatibility, professional results. See your dealer or give us a call. The choice is simple. One company, one complete solution.

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the enthusiasm of these young people who had something unique—a combination of enthusiasm and know-how in a niche field. If you know what you're doing, you can mine that niche for gold.

Although Hurwich didn't invest immediately, he did give *The Mix* a favorable deal on a suite of offices in a light, airy building he had just remodeled in west Berkeley, across the street from Fantasy Studios. In the summer of 1980, the magazine moved to 2608 Ninth Street, where it would remain for the next eight years.

IT'S A MAGAZINE

In their new offices, with room to breathe, the crew of *The Mix* set about creating a more professional publication. The magazine had become a monthly in September '79, and in July 1980 it made the jump from a tabloid to a standard-size magazine, printed on coated paper, with four-color advertising throughout. And, in another major move, *The Mix* became simply *Mix*.

Other changes followed quickly to what had become a widely read magazine, with readers throughout most of the U.S. When the decision had been made to go monthly, the publishers realized that *Mix*'s directories would need to expand beyond the four geographical regions (plus new product listings) that had made up the magazine to this point. In 1980, the first Tape-to-Disk issue was published, featuring listings of mastering facilities and record pressing plants, and in 1981, a parade of new directories graced the pages of *Mix*. The first listings were published of Texas and the Southwest and the North Central U.S. (mainly Chicago); a Video Focus special issue examined the growing field of audio for video, then being fueled by the emergence of music videos; a Recording Services issue looked at audio education, remote recording and studio maintenance; and that August, the first issue devoted to acoustics and studio design was published. The audio industry was growing, and *Mix* was trying to cover all the bases.

In this period, too, *Mix* began to become more of a magazine. That is, while the listings were still the backbone of the publication (and the feature that continued to draw new readers from around the country), more thought was being put into the articles, into finding competent writers and covering what were then the hot topics in pro audio. Larry Blakely, in his column "Progressions," wrote *Mix*'s first article on "digital audio discs"—a year before their introduction; in "Studioscope," Dennis Buss and Chris Haseleu explored the business side of running a studio; Dr. Richie Moore and David Schwartz wrote about console automation, discussing such products as Harrison's Auto-Set, Neve's Necam and the SSL Studio Computer; John T. Mullin wrote about his development of the first U.S. tape recorder; Wendy Germain contributed *Mix*'s first article on "Women in Audio"; Bruce Pilato talked to Todd Rundgren about making music videos; Ed Long discussed the breaking technology of near-field monitoring; and on "The Other Side of the Tracks," Mr. Bonzai took a humorous look at studio life in such fictionalized accounts as "Gunfight at the EQ Corral."

Cindy Lukk and Jane Byer at the TEC Awards, 1991.

NEW FACES

With the increase of editorial content beyond the directories, it became apparent to the publishers that additional staff was needed to edit and manage the growing flow of copy. Of course, financial resources were still limited, and trained editors weren't begging to go to work for five dollars an hour. In December 1981, in hope of finding some help, an ad was run for a "semi-part-time" proofreader in the University of California newspaper. In what turned out to be a large bit of luck for *Mix*, a local musician and production professional named George Petersen answered the ad.

Petersen: I was producing multimedia programs and teaching college classes in cinematography, film editing and sound design at various schools around the Bay Area. And I wasn't making enough money—I was working nights as a union theater projectionist. I had an interview with David and Penny, and I told them I had read Mix *since day one and knew all about the products and technology involved. They didn't want to hire me because they thought I was overqualified. So I asked them if they thought they were* under*-qualified, and they couldn't come up with an answer to that. I started working the next week.*

Organized—executive editor Blair Jackson, circa 1986.

Although hired as a proofer, within weeks Petersen was writing feature articles, and on one occasion, when both publishers left the country to attend a European AES show, he had to put together an entire issue (May '93) by himself. Being able to run with the ball was a prime job requirement in those days, and Petersen rose through the ranks, eventually becoming product editor, then senior editor and, on Schwartz's departure in 1994, the editor of *Mix*.

Not long afterward, another need was answered when *Mix* sought a managing editor to deal with outside writers and bring some order to the growing number of articles to be scheduled and edited. Blair Jackson, the longtime managing editor of *BAM*, applied for the job and was speedily accepted.

Jackson: I was brought in, basically, to organize the editorial department at the behest of the art director, who was going insane. I knew nothing about audio—I was a real babe in the woods. I came from music criticism and years at BAM, *and my recording studio experience consisted of going to a listening party at Fantasy Studios for a new Journey album and interviewing Rick James at the Record Plant. I thought the console* was *the recorder!*

During this period, another key player would come on the scene, much to the relief of then-ad-director Hillel Resner. No longer able to keep up with increasing volume of advertising (the November 1982 *Mix* was a staggering 182 pages in size), Resner hired a young refugee from Los Angeles as a sales rep. Jeff Turner had been

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a recording engineer at United Western studios; he had no sales experience, but he definitely knew the difference between a mixing board and a tape machine. After logging several hundred thousand miles on airplanes, Turner would eventually become associate publisher and, in 1997, publisher of *Mix.*

Like all magazines (all companies, for that matter), *Mix* would experience its share of staff turnover through the years. In many areas, though, it has been amazingly low; more than one-third of the staff whose names appeared in the 15th anniversary issue (1992) are with the magazine today, or work for it as freelancers. Many, like Anne Letsch, director of operations and manufacturing, who joined *Mix* as production manager in 1984, find it hard to imagine working anywhere else.

Letsch: Nothing ever stays the same here. That's part of the challenge, but also part of the appeal, because things aren't stagnant. We've grown, we've got different products, and I've been part of the growth. And the people here are dedicated to their products, they have a passion for it.

THE SWEET SMELL OF SUCCESS

Between 1982 and 1987, as the recording industry expanded and digital technology took center stage, *Mix* experienced a sensational period of growth. Its main competitor in those days was *Recording Engineer/Producer (RE/P),* a venerable, long-established magazine that was based in Los Angeles and rooted firmly in the large studio recording market. The *Mix* publishers and staff saw that the audio industry was growing in new directions beyond the traditional studio, and that less-expensive technology was creating a whole new landscape of music and sound production. The recording schools that *Mix* had been the first to write about and include in its directories were turning out thousands of aspiring professionals; independent studios, armed with cost-effective multitracks, were springing up left and right; a new emphasis on high-quality sound in movies and television was bringing about a revolution in post-production; and technological advances in live sound reproduction were changing the face of sound reinforcement from small clubs to arenas. *Mix*, with a small army of capable, well-informed contributors, was writing about all these topics—for the people who were doing the day-to-day work.

Rudy Trubitt and Robin Boyce-Trubitt at the TEC Awards, 1993.

The publishers of *Mix* made a deliberate effort to expand the magazine's circulation beyond the 20,000 or so people who had been traditionally defined as the "core" of the industry. After *M.I.* magazine—*Mix*'s musician-oriented startup—had to be folded in 1981 (a casualty of the recession), the publishers incorporated some of its content in *Mix* and set out to place *Mix* on newsstands. It was a move that brought the magazine to the attention of many new readers and also created a new revenue stream for the struggling company. By 1985, when *Mix* became the first audio industry magazine to have its circulation audited by BPA (the business magazine auditing bureau), the magazine had a total circulation of more than 25,000. By 1990, that figure would nearly double.

As the '80s progressed, *Mix* also grew in size. The October 1983 AES/new products issue was a mammoth 268 pages, and the following year's AES issue hit 300 pages for the first time ever—something *Mix* readers would become used to as the years went by and they struggled to squeeze copies of *Mix* into bulging trade show lit bags.

CHANGES 'R' US

As the photos and other articles in this special issue will attest, the changes in both the content and appearance of *Mix* have been many over the years.

The magazine has been redesigned four times (in '80, '87, '91 and '94), and, in 1991, the subtitle of *Mix* was changed from "The Recording Industry Magazine" to "Professional Sound and Music Production."

In 1988, *Mix*'s directories of audio facilities and services were consolidated for the first time in an annual directory. In 1994, the listings on which *Mix* was founded were removed from

Publisher Jeff Turner and Anne Letsch, director of manufacturing, 1989.

the magazine altogether, replaced by an annual publication now called the *Mix Master Directory.*

In 1985, *Mix* launched the Technical Excellence and Creativity Awards, the first program to recognize the achievements of "behind the scenes" audio professionals. Since then, the TEC Awards have become an enormous success, each year bestowing much-deserved honors on the stars of our industry, as well as the innovative products that drive this amazingly creative field. (For more on the TEC Awards, see page 102.)

Electronic Musician, which *Mix*'s publishers purchased in 1985 when it became clear that the MIDI revolution deserved a magazine of its own, has gone on to become the premier publication in its field and a success story in its own right.

Several new publications and special supplements have been launched, as well, including *Hypermedia* (1988); the *Mix Spanish Edition* (1990); *Live Mix* (1993); and *Sound for Picture* (1994). Some of these have thrived, while others have been discontinued; but they have all provided a wealth of information for recording and sound professionals.

Mix Bookshelf, begun as a simple one-page resource guide in *Mix* in 1982, has grown to become the leading mail-order service for books and other information software on recording and sound. Hundreds of thousands of catalogs are mailed annually to musicians and sound professionals throughout the world.

MOVING ON

As a business, *Mix* has been through many changes as well, something not unusual in the competitive economic climate of the late '80s and early '90s. In 1988, soon after moving to new

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quarters in Emeryville, Calif., *Mix's* publishers realized that for the company to continue to grow, it would require more capital than they had ready access to. So, in January 1989, Mix Publications (including both *Mix* and *Electronic Musician*) was sold to Act III Publishing, a newly formed company owned by television mogul Norman Lear. Shortly thereafter, Penny Riker Jacob left *Mix* and returned to the studio business (today she is an editor at Microsoft in Seattle).

Although the association with Act III proved to be a bumpy ride (Lear found the waters of the publishing world a little too rough and returned exclusively to television and movies), *Mix* experienced its greatest growth period during the following five years. Fueled by the expansion of the audio industry that resulted from low-cost digital formats, the magazine continued to increase in both size and circulation. By 1994, more than 50,000 copies a month were going out to readers in nearly 100 countries, and *Mix* was averaging 224 pages an issue.

That year, the company was sold to Cardinal Business Media, a publishing conglomerate in Philadelphia, and *Mix* became one of the jewels in its crown. David Schwartz left shortly thereafter to pursue a career in multimedia, a field he had championed since its earliest days. Hillel Resner, the last member of the triumverate that had run the business since the early '80s, added editor-in-chief to his publisher title and headed the magazine until the end of 1996, when he resigned to run the Mix Foundation and TEC Awards. Jeff Turner then took over as publisher of what is the leading pro audio magazine in the world.

If *Mix* today—like much of the industry—is a little more "corporate" and a little less free-form than it was in those heady days of '77, it has remained true to its original mission of "increasing communication in this mysterious and often misunderstood world of professional and semi-professional recording." We don't always get it right—and when we don't we can count on readers and advertisers to tell us (in faster and faster ways, in this brave new world of e-mail); but we always try our best to write about the subjects that readers care about—which, fortunately, happen to be the ones we care about ourselves. As David Schwartz used to sign his monthly editor's letter: "Keep reading." We'll keep writing. ■

MIX SPINOFFS

Musician's Industry (M.I.): Launched by *Mix* in 1980, *M.I.* featured stunning cover photos of electronic instruments and articles that examined the latest trends in music technology. Edited, in various incarnations, by Dan Forte, Steve Carraway, Bruce Dancis and David Gans, *M.I.* did not survive the recession of the early '80s—but its spirit lives today in the pages of *Electronic Musician*.

Electronic Musician: In 1985, MIDI technology was revolutionizing the music industry—and popping up more and more in the pages of *Mix*. Rather than shift their own editorial focus, *Mix's* publishers decided to buy a tiny magazine edited by musician and author Craig Anderton. The road wasn't easy, but thanks to strong editorial and a dedicated staff, *EM* now has a circulation of more than 62,000 and is read by technology-hungry musicians throughout the world.

HyperMedia: Published as a special edition in the summer of 1988, *HyperMedia—The Guide to Interactive Media Production*, anticipated the coming of electronic convergence and the Age of Digital Media. From digital workstations and CD-ROM to the visions of Ted Nelson and John Scully, *HyperMedia* was about the technology that was (then) lurking around the corner.

Mix Spanish Edition: First published in 1990, *Mix—Edicion en Español* began as a special supplement aimed at the growing pro audio market in Mexico. Under the editorial leadership of Alex Artaud, the Spanish Edition grew to become a quarterly in 1994 and a bi-monthly the following year. The publication has won legions of devoted readers and now boasts a circulation of more than 20,000 throughout Latin America.

Sound for Picture: *Mix* has covered audio post-production for video and film since the early '80s, and this coverage increased as more and more studios began turning to the screen for their livelihood. Launched in 1994 as a bi-annual supplement, *Sound for Picture* looks at the people, projects and products on the cutting edge of audio for visual media.

Mix Master Directory: Founded as a directory of studios, *Mix* devoted dozens of pages each month to listings of facilities and services. In 1988, the first attempt was made to collect all this information in one publication, and the *Mix Master Directory* was born. In 1994, the listings were removed from *Mix* altogether, and today the *MMD* carries on as a resource guide for the industry.

Mix Bookshelf: Begun in 1982 as a single page in *Mix* offering a modest selection of books on recording and sound, Mix Bookshelf has grown to become the largest mail-order business in the world specializing in information resources for music professionals. If you can't find a book on audio or music production in the Bookshelf catalog, it may not exist.

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The more things change, the more they stay the same.

During the last 20 years, *MIX* magazine has proven that it knows the audio business. Yamaha congratulates *MIX* on its consistent quality and servic

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If you only need two analog inputs and eight analog outputs (again, all 20-bit!), on-board DSP, and a breakout box loaded with RCA audio connectors, then say hello to **Darla by ECHO™**—priced to fit just about anyone's budget at only $349. (No, that's not a misprint.)

All three systems are compatible with audio recording and editing software applications that "talk to" the Microsoft Windows 95 .WAV device driver—which means you don't have to give up your favorite software in order to take advantage of the fantastic sound quality that Layla, Gina, and Darla offer. You can, for example (with full apologies to all of the fine software programs we're unintentionally leaving out), run Cakewalk Software's Cakewalk Pro Audio™. Or Steinberg's Cubase Audio™ and WaveLab™. Or Emagic's Logic Audio™. Or Innovative Quality Software's SAW Plus™. Or Sonic Foundry's Sound Forge™. Or Syntrillium Software's Cool Edit Pro™. (In fact, a custom version of Cool Edit Pro comes with each Layla, Gina, and Darla system, so you can be up and running even if you don't already own multitrack recording software.) Plug-ins? You bet. Including perennial favorites from Waves and Arboretum Systems.

And since getting up and running is half the battle (a battle we firmly believe you shouldn't have to fight) all three systems are true Plug and Play™ compliant. We even give you a utilities disk that examines your system before installation, so you know exactly what performance you'll be able to achieve.

Don't worry. We haven't forgotten our Mac-based friends. Our PowerPC-compatible systems (same hardware, new drivers) are coming this summer. Prepare to be stunned.

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Building on the technological innovations that arose from the 20/20*bas* development, our intrepid engineers, messieurs Kelly and Dick, set out to create an active monitoring system that would be a perfect complement to the digital audio workstation environment. Requirements: small footprint, reference-quality frequency response, non-fatiguing to the ears over long periods of use, magnetically shielded, and *way* cool looks (!). The result: the **Tria™ Triamplified Workstation Monitoring System.** This integrated three-piece system comprises a floor-mounted VLF (Very Low Frequency) driver housed in a cabinet that is also home to five separate power amplifiers, active crossovers, and a full set of calibrated trim and level controls, plus

RØDE™ NT1

Large Diaphragm Condenser Microphone

Hot on the heels of the awesomely successful NT2 comes the **NT1**, a true large diaphragm condenser microphone. Like its predecessor, the NT1 boasts low-noise transformerless FET circuitry, and features the highest quality components. With a 1" gold-sputtered diaphragm inside a proprietary shock-mounting system, a unique head design that provides both durability and pop filtering (while remaining acoustically transparent), and a wide dynamic range that makes the mic ideal for use in a wide variety of applications, the NT1 is destined to become a fixture in the modern project and professional studio. And at only $499, it's just plain scary.

World Radio History

waiting for.

two biamplified satellite speakers, each with a 5-1/4" poly-propylene driver and 1" neodymium soft dome high frequency driver.

What's truly remarkable is that the biamplified satellite speakers reproduce frequencies down to an incredible 55Hz, so the listener experiences full-range sound when positioned in the near field environment (that is, sitting in front of a computer screen). With the addition of the VLF, the system response reaches down to 35Hz, resulting in full bandwidth audio reproduction that is as accurate, precise, and pleasing to the ear as our award-winning 20/20*bas* system. You simply must hear **Tria** to believe it. Even then, you may not believe the price: $849. (Yes, that's for the *entire* system.)

The **20/20p**™ is a direct field monitor designed to provide an affordable pathway into the world of powered speakers. Utilizing the proven 20/20 design, the system comprises a 20/20 cabinet with two full-range 100 watt power amplifiers—one of the amps drives the powered cabinet, the other drives a passive 20/20 satellite. The resulting sonic clarity is exactly what you'd expect from a system bearing the 20/20 name: extended low frequency response, exceptionally clear midrange, and sparkling high end. What does this kind of audio quality cost? A low, low $599 per pair.

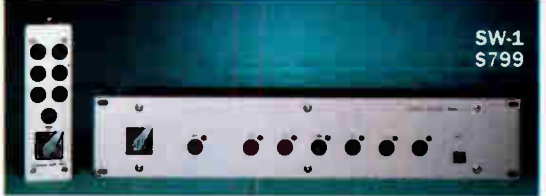
As with all of our active monitoring systems, the **Tria** and **20/20p** offer continuously variable high and low frequency trim controls, input gain controls, balanced inputs with combination 1/4"/XLR connectors, and full magnetic shielding.

TRIA VLF BACK PANEL

TRIA SYSTEM $849

20/20p BACK PANEL

20/20p SYSTEM $599


SW-1 $799

SW-1 Speaker Switcher

Bet you were almost going to pass over this part. After all, a speaker switcher isn't exactly the most exciting product in the world. But the **SW-1™ Speaker Switcher** delivers breakthrough performance and functionality, thanks to the clever engineering of Peter Madnick, who has long been a fixture in high-end audio equipment design. (He's actually pretty scary, possessing serious chops in both the analog and digital domains.)

What makes the **SW-1** unique among switchers is its ability to simultaneously handle both active and passive monitoring systems. Of the six pairs of speakers that can be connected, up to three sets can be active. Switching among them is as easy as pressing a front-panel button. Or use the included remote control so you never have to leave the sweet spot when switching. Naturally, the audio path is beautifully transparent and the switching noiseless. There is one thing about the SW-1 that we haven't quite figured out: If you own a pair of Event monitors, why would you have any other speakers that you needed to switch to?

NT1 $499

EMP-1 $299

EMP-1 Microphone Preamplifier

What better to complement a RØDE Classic, NT2, or NT1, than a custom microphone preamp that combines superior sonic performance with the features demanded by today's studio professionals? (Okay, we admit the thing sounds pretty amazing with other brands of mics as well.) First off, you should know that the **EMP-1™ Microphone Preamplifier** was designed by engineering wizard Peter Madnick. Why is that important? Because, in Peter's own inimitable words, it means that the unit features a transformerless design utilizing a common-mode choke input /*translation: RF interference is virtually eliminated*/, a superior differential input /*translation: EM interference is suppressed*/, and servo-controlled DC to maintain zero DC offset /*translation: There are no distortion-inducing capacitors*/. Ahem. Thank you for those fascinating explanations, Peter.

Put in terms the rest of might have a chance relating to: The EMP-1 offers ultra low noise operation, selectable phase, low cut filtering, phantom power, a line output (for running directly into *Layla*, perhaps?), and an internal power supply—all in a downright sexy little box. Now, what does all that mean? It means that the EMP-1 is a mic pre worthy of your finest microphones. (Don't let its low $299 price tag fool you. This preamp is the real thing.)

We're Event Electronics. Thanks for taking the time to see what we're about. We hope you like what we're doing; please let us know. We'd love to hear from you.

For more detailed information on any of our products—and for amusing photos of prominent members of our industry caught in embarrassing situations—visit our Web site, **www.event1.com.** Or e-mail us directly at **info@event1.com.** Literature on specific products may be obtained by calling **805-566-7777, ext. 555.**

Specifications and features are subject to change.

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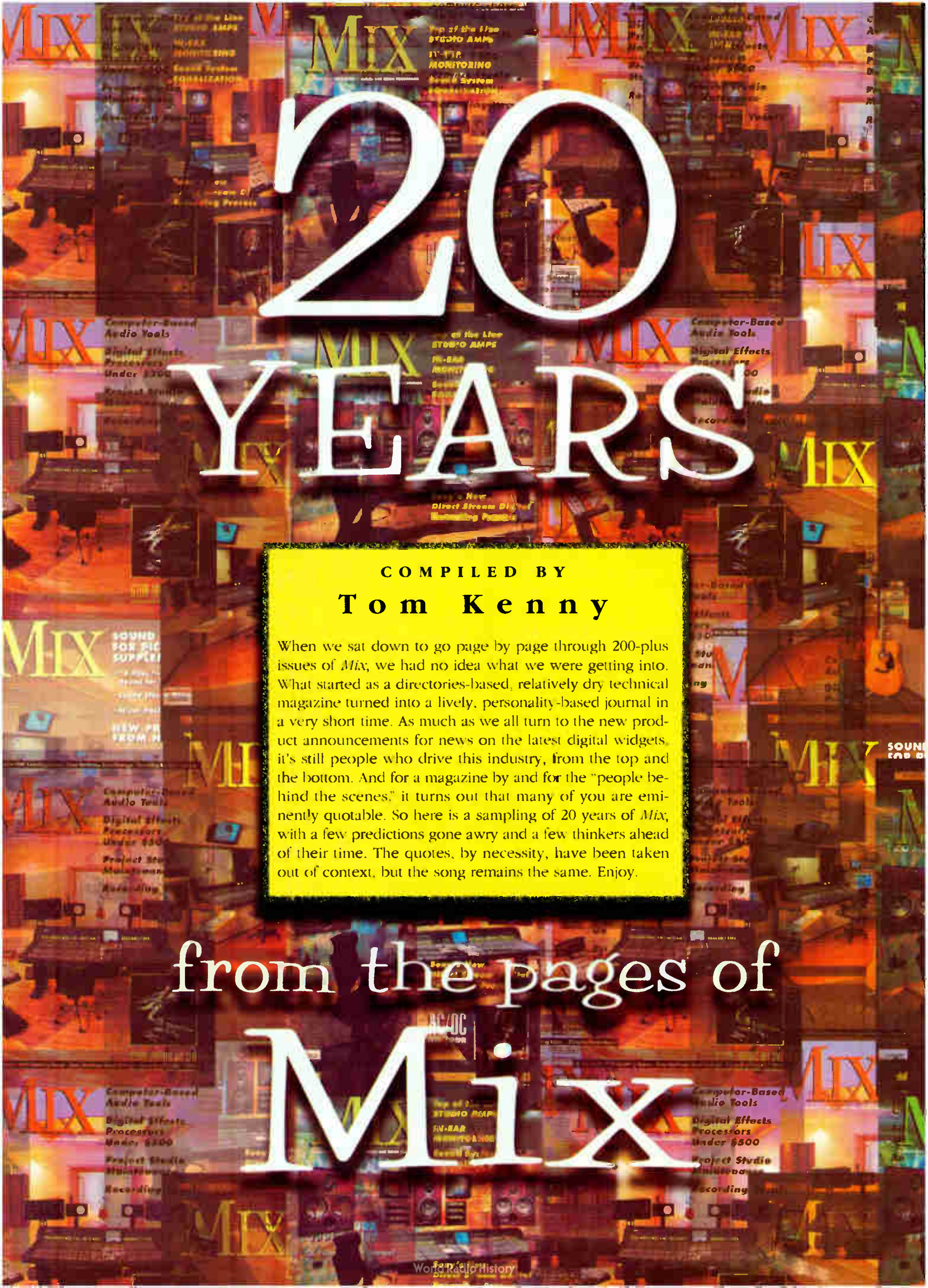

20 YEARS

COMPILED BY

Tom Kenny

When we sat down to go page by page through 200-plus issues of *Mix*, we had no idea what we were getting into. What started as a directories-based, relatively dry technical magazine turned into a lively, personality-based journal in a very short time. As much as we all turn to the new product announcements for news on the latest digital widgets, it's still people who drive this industry, from the top and the bottom. And for a magazine by and for the "people behind the scenes," it turns out that many of you are eminently quotable. So here is a sampling of 20 years of *Mix*, with a few predictions gone awry and a few thinkers ahead of their time. The quotes, by necessity, have been taken out of context, but the song remains the same. Enjoy.

from the pages of Mix

World Radio History

Mix
Tom Hidley
Jingle Biz
Roy Segal
Apocalypse Now
Listings
N. California & Northwest Studios
FREE
Mix
AES: 1982 New Products
Special Report:
Studio Monitors
Al Kooper
Drum Synthesizers
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Jan Hammer
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Designers
Tom Hidley
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Chips Davis
Understanding Tape Heads
Jean-Michel Jarre
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Directory:
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and Suppliers
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of Audio/Video Recording
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· The Top of the Line
· Post-Production Choices
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and Canadian Studios
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15TH
ANNIVERSARY
SPECIAL
ISSUE
PRODUCING
IN THE
DIGITAL FUTURE
MIX
MIX
OUR BIGGEST
ISSUE EVER
NEW PRODUCTS
FOR AES!
GEORGE MARTIN:
YESTERDAY & TODAY
TROUBLESHOOT
YOUR ADAT/DA-88
MIX
Top of the Line
STUDIO AMPS
IN-EAR
MONITORING
Sound System
EQUALIZATION
Sony's New
Direct Stream Digital
Recording Process

1977

The First Article: With a little planning and some attention to certain details once inside the studio, a 4-track session can be as productive and creative as a session in any larger, more fully equipped studio, and a lot cheaper!...The best way to determine if it's the right place to go is by paying the engineer—who is usually also the owner—a visit. Often, a lesser equipped studio can yield a better product when the environment and engineer are mellow than the flashy studio where the engineer is a jerk!

—John Altmann and Steve O'Hara, "Making the Most of Four-Track," Sept. 1977

1978

Hello, Digital!: I expect to see a lot of changes in studios in the upcoming years. I expect to see an increased use of automation. I would like to see recording consoles have the ability to automate the EQ, the echo sends and echo returns as well as other effects and to basically be able to re-create everything that went down in a previous session...I also expect to see digital recorders on the market very soon. There are some machines on the market today that are remarkably quiet. As soon as the major manufacturers are able to put a digital recorder on the market for a competitive price, magnetic recording will quickly become obsolete.

—Skip Saylor, "Independent Engineers Forum," Sept. 1978

Small-Town L.A.: Everybody's always talked about L.A. being overbuilt since 1961, and when Wally Heider walked out of Western and said he was going to build two rooms of his own, people thought the world was coming to an end. And then there was the other spate when Sound Labs started up in '70 and Larrabee sprung up and Village came on somewhere in the late '60s or early '70s, and suddenly it went from about 12 rooms to now about 40 rooms that people would say are "A" rooms. I would like to think that there are about ten rooms that are "A" rooms, or maybe 40 "A" and "B" rooms; and then about a hundred more.

—Tom Hidley, Dec. 1978

1979

Up Close and Personal: One of the ways of overcoming the problems and confusing effects caused by early reflection enhancement is to use the technique of Near Field Monitoring™. The monitors are placed approximately 3 feet from the listener and about 3 feet apart. This usually means right in back of a mixing desk or up over the meters. In some cases, the monitors may be suspended over part of the console desk, if it is a large one. The concept is not new, but the problem has been a lack of a suitable monitor.

—Ed Long, "Innovations: Near Field Monitoring," Jan. 1979

Our First Letter!: Dear *Mix*, In regard to the January '79 "Brain Tickling" article (Vol. 3, No. 1), there is just one more point which I would like to make. One of the charges leveled against Aphex has been that it is a "black box." Indeed, until recently, the Exciter circuits themselves were encased in steel and epoxy. That procedure came from the desire to protect ourselves from imitators until our patent protection was complete. That situation has been resolved, and patent issuance is imminent. Under that legal protection, we have opened the circuitry for inspection and invite questions about any aspect of the Aphex theory and circuitry. The Aphex Aural Exciter is not a black box.

—Marvin Caesar, President, Aphex Systems Ltd., "Feedback," March 1979

Don't Look Back: I think quad was a difficult time for all of us because it was really put on us by the hardware manufacturers, and it got to the point where it just died a natural death. I think it's still a marvelous medium to be used in a natural ambient manner, though. I made many albums that way. In fact, there was one album, Neil Diamond's *Jonathon Livingston Seagull*, where we actually recorded the thing on the Burbank stage with ambient microphones, and it was wonderful. It created a real "stretch" in the orchestra.

—Armin Steiner, "Armin Steiner: Mixing Business With Pleasure," by David Schwartz, March 1979

The Way It Was: Rather than "overdub city," we're working with more basic, live kinds of sounds. I think analog is still going to be with us for a good number of years. Analog has reached a very high degree of proficiency, and to abandon that kind of system, within the next ten years, I really don't think is going to happen.

—Glen Snoddy, "Nashville Sounds of the '80s," by David Schwartz, Dec. 1979

1980

Change USA: My feeling is that anything that you do in a recording studio today...you have to be willing to

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change it in three years...totally change it. Otherwise, you shouldn't be in the business.

—Guy Costa, "Hitsville USA: Guy Costa and Motown Studios," by David Goggin, Feb. 1980

Goin' Home: Today many of us are very concerned about the status of the record industry. Record companies are cutting back on their spending and affecting not only the recording artists, but mixing engineers, independent recording studios, professional recording equipment manufacturers, equipment suppliers, etc...as well. One area that will be the least likely hit and will continue to grow by leaps and bounds is the home recording industry. Individuals who desire to record their own music with economy recording equipment will continue to hock their houses, cars, etc., to purchase equipment to use in heir living rooms, basements and/or garage-type studios.

—Larry Blakely, "Progressions: Changing Times and New Directions," March 1980

No Lies: A control room must not lie, misrepresent or deceive you. It must be an honest reflection of what is going on on the other side of the glass...It would be nice to think that rooms could be built without electronic equalization, but we've found that even the finest monitor systems will alter their characteristics over time, depending on temperature, humidity and even the power that they handle.

—Tom Hidley, "Tom Hidley: World-Class Studio Designer," by David Schwartz, July 1980

We Got Time: Some people seem to think that every time something new appears, like automation, for instance, the primary value is in saving time. Well, it's true, certainly, that an automated board can save a lot of mixing time. But due to human nature, what invariably happens is that you discover new things that were impossible or inconceivable before and you wind up working more hours than without the technology. That kind of attitude was very prevalent among those of us working on the picture. It's one of the reasons it took so long to finish, but it's also one of the reasons it turned out so well.

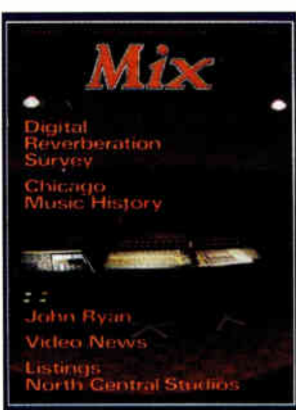
—David Rubinson, "Apocalypse Now: Oscar-Winning Sound," by Tom Donald, July 1980

Sun Shines: "Actually, the board Sam used was a radio board that had been modified to do what it was supposed to do in a recording studio," says Stan Kesler, who played bass and steel guitar on many sessions at Sun. "It had six inputs. He used five microphones, and he had to use one input for the echo return on the slap back tape machine. The echo was done mechanically and electronically. You feed a signal into a tape machine that is on playback. As it records, the separation of the heads is what gives you the delay. It records here and plays back here," Kesler illustrates with his hands, "which is a 2- or 3-inch difference. Then you bring it back through the board and mix it with the regular signal and you've got the echo."

—Rose Clayton, "Sam Phillips: A Place in the Sun," Aug. 1980

Remember "Digital Audio Discs"?: In the past few months, there has been a lot of talk about the various proposed systems for digital audio discs. As it stands, it looks like the first digital audio disc players will be special "audio only" discs made for the Philips videodisc system. There will either be a "PCM" adaptor to connect to the videodisc player or the new videodisc player will include a built-in PCM audiodisc capability. In either case, this will add $500 to $1,000 to the price of the videodisc system. According to JVC and Panasonic, these systems are slated to reach the market in the last quarter of 1981. These particular digital audiodiscs will look the same as the videodisc and be approximately 10 inches in diameter. They will provide two hours of stereo or one hour of 4-channel sound per side.

—Larry Blakeley, "Progressions: Digital Audio Discs," Sept. 1980



1981

What We Do: What I try to do is make a record that is true to the artist. If he's a young artist just starting out, he's brought into a very foreign environment. A recording studio is really the most bizarre foreign environment in music. It's very cold, very technical, and all these things seem to take precedence over his music. Suddenly, there he is, facing an aluminum stand with a microphone hanging in front of his face, he's totally sealed off from the world by a set of headphones—I don't know how in the hell they do it! God, what a situation!

—Norbert Putnam, "Norbert Putnam: Bringing It All Back Home," by Sam Borgerson, Feb. 1981

Bravo for Stereo: Most television-industry professionals when asked about stereo television sound will reply that it's coming...but a long way off. Some doomsayers say that it won't work at all...something about a 6-foot audio spread and a 19-inch picture, and where do you put the speakers, and do we pan the hoofbeats left to right with picture, and so on. Surprise, folks, on December 8, 1980, a premium entertainment network called Bravo (similar to Showtime and HBO) went on the air in full stereo. The marketing concept of one-upsmanship on the competition was the inspiration to action.

—Ken Fay, "And Now...Stereo Television," Feb. 1981

Mullin on Tape: The most unforgettable moment in my life was the one when I stood before my Magnetophon tape recorder and pressed the Playback button for the first time in the presence of Bing Crosby, John Scott Trotter and Bing's producers, Bill Morrow and Murdo McKenzie. Everything was at stake. By invitation, I had been present with my colleague Bill Palmer to record the first radio show of the 1947-48 season in the ABC studio complex in Hollywood. And now we were to hear the result of our efforts and to be judged by perhaps the most critical ears in the world of radio and recording.

—John T. Mullin, "The Start of Something Big: The History of the Tape Recorder," March 1981

Well, We Do Play Games: Computers may or may not be appropriate for your operation, but we would like to share some basic information about small computers and the difference in

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various systems. Depending on the system, programs are available that can do anything from write letters, bill credit customers or analyze studio expenses—to being able to let your employees or clients play sophisticated video games.

—*Dennis Buss and Chris Haseleu, "Studioscope: Small Business Computers," May 1981*

Can You Say, Project Studio?: You should have heard the remarks when TEAC fist came to exhibit at the AES (Audio Engineering Society) convention. "You can't be serious! What part do they have in a professional recording equipment show!" At each subsequent show, the manufacturers of low-cost recording equipment increased. After a few short years, the industry seemed to be divided into "Pro" and "Semi-Pro."

—*Larry Blakeley, "Progressions: Multitrack for the Masses," July 1981*

Sweep It up 3dB: There's no such thing as a producer's school. There are some engineering schools, but all the good engineers I've met have had hands-on experience. They start out sweeping floors and somehow work their way into getting the job. Even if you went to an engineering school, you would probably still have to sweep. But you'd be a better sweeper because you'd know what you were sweeping around.

—*Brian Ahern, "Producer's Desk: Brian Ahern," by James Riordan, Sept. 1981*

If Only It Were That Simple: In editing there is one rule to remember! Always cut copies, never cut original materials unless, of course, it is your own and you take full responsibility for your action. The following is a list of items which you will need to do a proper job with as little mental anguish as possible:

The best *metal* splicing block money can buy (plastic is for the birds), a package of single-edge razor blades, a roll of white splicing tape, a thin-lined alcohol marker (the kind that is permanent, not the water-color variety that smudges and smears), a good desk lamp with a goose-neck or spring-tension arms, a flashlight, scissors, a bunch of white cotton film editor's gloves (available at all professional motion picture supply houses and many photo stores and cost around $5.00 per dozen), a roll of recording tape you can play around with and ruin, headphones, a recorder/reproducer with mic, a degausser, absolute quiet.

—*Earl R. Dingman, "The Fine Art of Tape Editing," Sept. 1981*

1982

LEDE, All the Rage: When LEDE acoustic design is coupled to an optimized phase-coherent electronics system, tapes translate exactly from the control room to any playback system...What you hear in our LEDE control rooms is a very close approximation of the actual information on the tape. What you hear is what you get without having to make subjective projections of how it will sound elsewhere. This is accomplished through design, not outboard equalization, traps or gimmicks.

—*Chips Davis, "LEDE Comes of Age," July 1982*

Don't Forget!: I like to spend money on maintenance. Many studio managers, particularly accountants or absentee studio owners or whatever, feel that maintenance is a drag because you can't write up a work order for maintenance and charge the client for it. Maintenance is something you've got to eat.

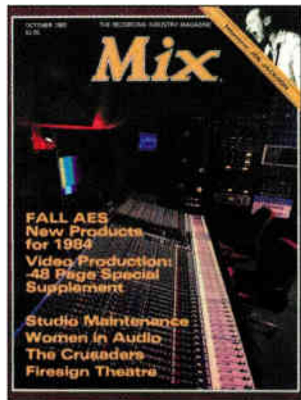
—*Wally Heider, "Multitrack Revolution," by Larry Blakeley and George Petersen," Aug. 1982*

First Pohlmann: Perhaps in the future we will return to a simpler concept in which a studio once again contains only a few and maybe only one piece of equipment. And as you might imagine, it will be digital equipment. The simple fact is digital devices can be operated faster and easier because of their inherently computer-aided nature. To be maximally cost-effective, we would expect a recording studio of the future to be wholly computerized. That one piece of equipment—that monolith—will be the studio computer.

—*Ken Pohlmann, "Visions of the Future: Brave New Studio," Aug. 1982*

Time to Retune: What I've heard on digital tape recordings I don't like because I hear a high-frequency hash (about 12 kHz and up). I think that digital audio disks are going to happen, and mixers are going to have to get their technical chops together. They just can't indiscriminately use microphones in a haphazard manner anymore. The quality is going to have to come back. With digital, you have the capability of doing full dynamic range recordings, and you have a whole industry that doesn't know how to do this.

—*Bill Porter, "Bill Porter, Part 2" by Larry Blakeley, Sept. 1982*



1983

First Product Review (and first Craig Anderton): Programmable drum units with digitally recorded drum sounds have been around for a while; however, their expense (typically $2,500 to $3,000) has—until now—limited their availability to all but the most affluent studios and groups. That situation is certain to change with E-mu's introduction of the Drumulator, a digital drum unit that holds its own against the competition but, thanks to extremely efficient use of computer technology, lists for under $1,000.

—*Craig Anderton, "The Beat of a Different Drummer: E-mu's Drumulator," June 1983*

What's This MIDI Thang?: Sequential Circuits' Prophet 600 and Roland's JP-6 are the first instruments to enter the market equipped with a new Musical Instrument Digital Interface (MIDI), an important new development in the electronic music industry. MIDI-

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equipped instruments can be connected with a single cable and work together as a unit, and many such devices can be operated synchronically—and MIDI promises to make home computers a part of more electronic music systems, too.

—*Digital Interface Standard for Instruments, June 1983*

Frank, We Miss You: "Dwarf Nebula" started off as a piano exercise. During the time we were doing *Uncle Meat*, I was working with an engineer [Richard Kunc], who was real cooperative, just trying to do any kind of weird thing we asked him to do. During the '60s, who knew what was right? "Let's try this. Plug it in backward and see what happens." So we were dealing with different types of short-term distortion, and he built a little box and three push-buttons; we called it the Apostolic Blurch Injector. And we took various tracks of different types of material and cranked them up into the distortion range and then, by poking the buttons, you'd get these little rhythmic bursts of white noise, brown noise, pink noise and gray noise—in a rhythm that you'd select. But instead of being derived from a noise generator on a synthesizer, it was completely distorted voices, instruments, percussion, whatever.

—*Frank Zappa, "Interview With Frank Zappa," by Dan Forte, June 1983*

Before He Was King: While recording, Was tries to adhere to what he calls the "science of zengineering." "The only way to engineer is not to engineer at all," he declares. "I try to make the process of taping as invisible as possible, and to do that I make some sacrifices. Occasionally, I don't watch the levels, and if you turn the sound off you can hear the meters pegging in tempo."

—*Susan Borey, "Music Notes: Was (Not Was)—Zengineering Explained," July 1983*

Miking Michael: Bruce Swedien comes here to do things like the Michael Jackson/E.T. album. For that, he brought a 60-piece orchestra in here and did the whole thing live with Michael. Bruce uses a Shure SM-7 on Michael's vocals...Michael has a fairly soft voice and needs something I like to call the "dynamic urgency," which is something you get from dynamic mics that you just can't seem to get from condenser mics. You can get this presence with this mic.

—*Allen Sides, "Ocean Way's Allen Sides: Vocal Miking Specialist," by Mick Thompson and Bill Friday, Nov. 1983*

1984

More Inputs!: When the number of inputs reached 64—and kept on going up—people started to wonder whether the Grateful Dead's recording session at Fantasy Studio D in Berkeley was some kind of record-breaker. The Dead had to bring in a 10-channel Neve mixer to augment Fantasy's 56-input console, and engineer Phil Kaffel notes that several mics have been set up but won't be plugged in until they're needed as the sessions progress...So the question is, does anybody know of another recording session that used so many microphones and mixer channels?

—*David Gans, "Music Notes: Query to Engineers," April 1984*

The Great Pretender: If I want to play guitar, then I will. It's simple. I'm not "working in a man's field"—I'm just doing what I like to do. I think that's discrimination. talking about roles. If I wanted to get a band together, and I said, "female guitar player wanted," I might as well say, "Jewish guitar player wanted" or "black guitar player wanted." That's got nothing to do with music, to me. It's just discrimination, and I'm not even going to discriminate between different kinds of discrimination, which all that "role model" kinds of thing implies.

—*Chrissie Hynde, June 1984*

He's the Boss: What happens with Bruce is different from most of the people I work with. I'll pretty much go for it sounding like a record, and then they'll come in and pull it apart because it usually sounds too slick to them. Bruce doesn't want to sound like "a record"—he wants it to sound like a bunch of people just playing instruments onstage, or wherever.

—*Bob Clearmountain, "On Mixing for the Boss," by David Gans, July 1984*

CD Beware: The problem is, on some CD recordings, the recording is a little too real. I hear full-fidelity music and other full-fidelity sounds such as air conditioners, noise ventilators, street traffic and poorly designed acoustics. The sound on a CD can be as smooth as a baby's bottom, and about as naked. Extraneous acoustic junk which otherwise becomes lost in the analog replication chain is now unashamedly present in the consumer's living room. The CD will clearly require a re-thinking on the part of the audio engineers, as to technique.

—*Ken Pohlmann, "Audio Applications: Digital-Quality Acoustics," Aug. 1984*

They Tried: At a May press conference in New York, a little David named CompuSonics announced its intention to take on the Goliaths behind the Compact Disc.

—*Neil Weinstock, "Digital Discussions: Compusonics, Another Digital Audio Standard," Aug. 1984*

An Argument With Legs: I still feel that a well-made disk is sonically superior to the same product on CD. It's interesting that digital technology is the most controversial thing in the industry. You could line up ten engineers and five would love it and the other five would say it's terrible.

—*Doug Sax, "Holding the Line Against the CD," Dec. 1984*

Off by a Few Years: We expect that in 1990, the worldwide sales volume of both CD and LP will be around 550 million disks each, and within five years after that, the LP will largely disappear.

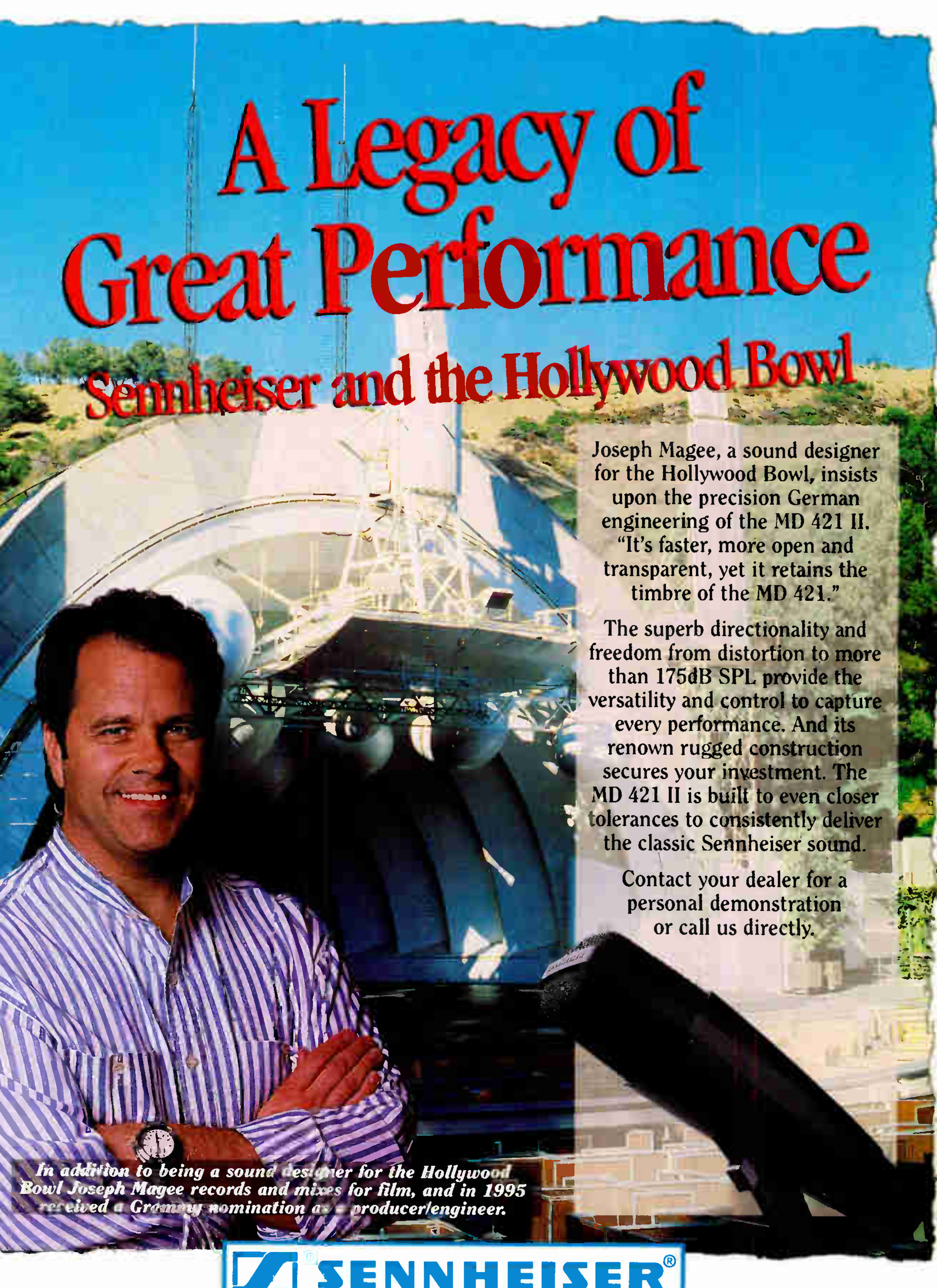
—*Emile Petrone, "Interview With Emile Petrone, Chairman of the Compact Disc Group," by Ken Pohlmann, Dec. 1984*

1985

So Fast: By the time you read this, it will probably be obsolete. As the ad says, digital audio is transforming us all.

—*Ken Pohlmann, July 1985*

World Radio History



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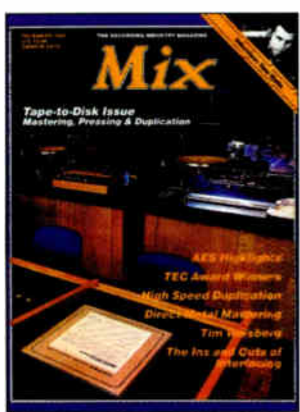
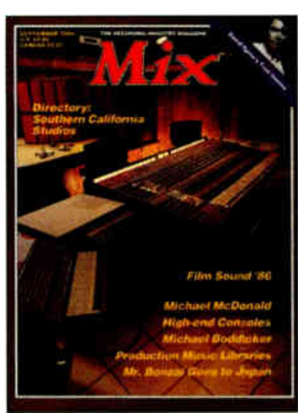


Hello, Audio Post: A studio was either a recording studio with a video machine hooked up, or else the other way around: a video facility with audio machines plugged in. It always looked so makeshift, with a television sitting on top of some rack they wheeled in. My concern is how functional things are, and something that temporary can't be functional.

—Ken Hahn, "Sync Sound Teaches Machines to March," by Dan Daley, Nov. 1985



1986

Before She Was Our L.A. Editor: You have to be careful to not kill creativity with efficiency and rigidity, and usually record companies are pretty supportive and understanding...Of course, for lower-budget projects, you have to just hurry up as best you can. There can actually be a real excitement to doing things quickly. An adrenaline gets going that can spark creativity and spontaneity.

—Maureen Droney, "Money Makes the Records Go Round: Producers & Engineers Talk Budgets," by Linda Johnson and Blair Jackson, Feb. 1986

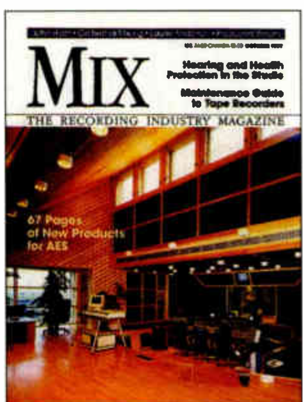
The Time Is Now: I realize I talk about computers a lot in this column, so my apologies if you're up to here with the latest news about who has what software and what updates are planned. But the concept of computers being the "wave of the future" in music is no hype: I'd have to go back to the multitrack tape recorder to think of a more universally applicable musical device. If you don't have a computer now, you surely will before too long.

—Craig Anderton, "M.I. Update: As the Disk Turns," March 1986

Bravest of the Brave: No, I *never* get an idea and then try to force equipment to do it—that doesn't work. I go the opposite way: I turn everything on in my house all at once and try to respect what each piece of equipment can do and let it teach me what I can get out of it. Those are my instruments, more than violin or keyboards or a pencil. Those are my tools. I need to know really well how to use them.

In shooting [*Home of the Brave*], I was not as familiar with the tools. You not only have sound, lights, projection, electronics—you have cameras, SMPTE, an entire interface system. So when you say, "action" on that set, 500 machines are going *BVVVVVWWOHH*! It's incredible. You can feel it in your feet coming through the floor.

—Laurie Anderson, "Laurie Anderson Gets the Movie Bug," by David Gans and Bonnie Simmons, Aug. 1986



1987

Well, It Sounded Good: On June 29, 1986—what has become known in the European audio industry as "Black Sunday"—one of Britain's most prestigious newspapers ran a story that sent shock waves through the record and electronics industries in Europe. "Compact discs are about to be made obsolete by a new generation of audio cassette dubbed digital audio tape," ran the opening line of a featured article in Rupert Murdoch's newspaper, the *Sunday Times*. "DAT," it continued, "will give quality far superior even to that of compact disc."

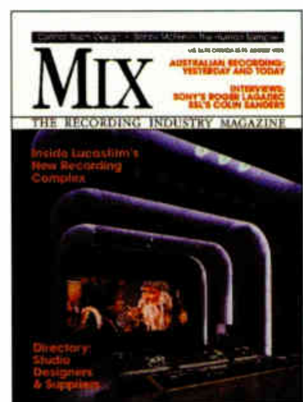
—Barry Fox, "The Great DAT Scare," Feb. 1987

Mono, Dammit!: The main objection I had was that they were going to release those awful, so-called "stereo" mixes which have been the bane of my life for the past 20 years and more, and which have perpetuated this kind of myth that I recorded all their early records in stereo. The truth is that all those first recordings were done in mono. They were *not* stereo, and were never intended to be stereo mixes.

—George Martin to Iain Blair, "The Beatles on CD: An Interview With George Martin," May 1987

Wagner's Not U2: Rather than spot-miking, it's more fun to move the players around—not major redistribution, but moving them back and forward as required. I always make slight modifications for the music: If it's a Wagner program, I will set the orchestra differently than a program of modern music. I would want a deeper seating with the Wagner program; because of the weight of the brass, I would put them back a bit to get a better balance between the brass and strings.

—John Eargle, "Orchestral Miking: Two Views," by George Petersen, Oct. 1987



1988

Here It Comes!: Attention studio owners: While you were busy booking sessions, trying to make the monthly payments so the bank doesn't repossess your new console (an exciting new concept in banking: a full-service bank with cash machine, drive-up window and a 64-input SSL), the requirements for a world-class studio just changed again. Now, unless you have several CRTs, personal computers, hard (or

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optical) disk drives, and a workstation, you just aren't happening.

—Ken Pohlmann, "Insider Audio: The Workstation Cometh," Feb. 1988

He Warned You: Since this is my first column in this magazine, I will do something that I have not done in over 20 years (and that was in front of my school principal). I am about to voluntarily explain myself. I am not really a writer. I am only a guy who writes, and I am the guy who writes this column. I try to write about the truth. This may be the truth as I see it, or as I think it will be. In this column, I talk occasionally about the past, sometimes about the present, but usually about the future.

—Stephen St.Croix, "The Fast Lane: Openers," March 1988

1989

Never, Never, Never: In a way, it may be that many of us have been simply seduced by technology. We've been led subtly to believe that a synthesizer has the power and detail—the lace and filigree—of a large orchestra, a group of talented musicians playing together. That's not true now, and it won't be even in the future. The detail of a big room filled with musicians working together and feeding off each other, both mentally and harmonically—however foolishly romantic it might sound—will never be replaced by machinery, no matter how sophisticated it may get.

—George Massenburg, "Lace and Filigree: The Search for Transparency and Detail," Sept. 1989

Home Studio Battleground: In June, the Los Angeles City Department of Building and Safety ordered the closure of producer/songwriter Chas Sanford's home studio, Secret Sound L.A., claiming the business violated residential zoning laws. This occurred not long after a meeting was held by a new, informal organization of about 40 major recording facilities, the Hollywood Association of Recording Professionals (HARP). HARP formed because studio folks wanted to talk about common business issues, like insurance and bill collection. When HARP members saw a brochure about Sanford's studio, they began to wonder about zoning laws.

—"When Is a Home Studio Not a Home Studio?" by Linda Jacobson, Tom Kenny and Randy Alberts, Sept. 1989

1990

Long Before EQ: The so-called upper-echelon home recording formats—and even a number of smaller but more elaborate rooms with 24-track equipment—are making a comeback on the commercial scene, and in so doing are changing the complexion of the recording industry marketplace, affecting a balance of power that was once ruled by budgets the size of Tiananmen Square. They are becoming, for lack of a better term, "project studios," facilities whose existence is based on a core of a few clients working within a single layer or two of the industry.

—Dan Daley, "Studio View: Turnstyle Productions," Feb. 1990

True Stereo: In January of 1988, I heard stereo for the first time. This may seem like an odd statement coming from an audio engineer with 15 years of experience...That's not as strange a statement as it may seem if you consider what the word "stereo" means. Most people mistakenly think of stereo only in left-right terms and not by its full meaning, which includes depth.

—Barry Diament, "Mastering Monitoring: Some Thoughts on Stereo," June 1990

Audio at MacWorld?: Every time I walked by the Digidesign booth at San Francisco's MacWorld Expo in April, there was a huge crowd on hand checking out the demos there. In this three-day event that had more than its share of remarkable new products, Digidesign's were among the most noteworthy, particularly for *Mix* readers.

—Paul Potyen, "The Byte Beat: Playing With a Full Deck at Digidesign," July 1990

Double Up: Well, as we got more tracks, we did more overdubbing, and I always liked to overdub voices. One of the things I started doing as an engineer was double-tracking voices. You talk about deficiencies in equipment and acoustics—these days you can go in, find all the dead spots and correct them in no time. But that wasn't the case in that era. It was trial and error, and so I discovered that double-tracking the voices let me fill in some of the holes in the sound. I'd also move the singers around the mic to alter the way it sounded in relation to the first track, to fill in the sound. I did that with The Bachelors, with The Kinds, virtually everyone.

—Shel Talmy, "Producer's Desk: Shel Talmy," Oct. 1990

1991

I really think that digital is where it's going. Even dinosaurs like Bruce [Swedien] and I are not going to stop it [laughter].

—Al Schmitt, "NARAS Roundtable: Modern Recording & Production Techniques," Feb. 1991

Nashville or Bust: "The misconception is that people move here because their careers are over in Los Angeles," says Josh Leo, former L.A. session guitarist and now producer and vice

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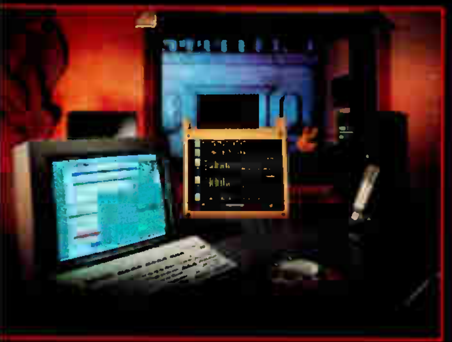
What are you waiting for?



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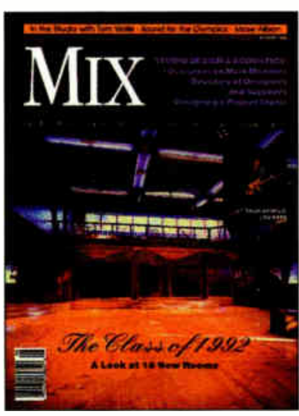
World Radio History

president of A&R for RCA Records in Nashville. "You'll find that people work harder and longer here than they do in L.A. We all moved here to play music. If we skimmed off the top of all the serious, major musicians and put them in a room, you would find that's most of the people who have moved here."

—*Missy Baker, "The L.A.-Nashville Connection," June 1991*

First Time Around: No, it doesn't stand for Medical Doctor. It doesn't stand for Mogen David, or even Mad Dog. It stands for MiniDisc.

—*Ken Pohlmann, "Insider Audio: MD," Aug. 1991*



1992

Where There's a Need: It takes so long to set up and adjust a complex recording board that my first instinct was that there had to be a better way. I went to the AES convention in 1987 and looked at all the console designs. I couldn't believe it: $500,000 consoles that couldn't even reset! Our group had the ability to handle the technology, so we raised a little bit of money, built a garage-type operation, and went to Los Angeles AES in 1988 with a small prototype. What happened during the AES demos was that all the big studios got very excited at the concept of total, computer-controlled reset.

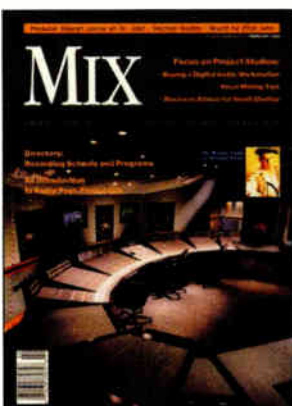
—*Scott Silfvast, "Euphonix: Scott Silfvast on Digitally Controlled Console Design," by Mel Lambert, March 1992*

Sometimes We Miss: Digital Compact Cassette was the brightest star in Las Vegas at this year's Winter Consumer Electronics Show.

—*Phil De Lancie, "Tape & Disc: Philips Formats in Fore at CES—DCC Models Unveiled in Vegas," April 1992*

The Revolution: I'm not sure whether this is a review of a product or a phenomenon, as no device in the recent history of professional audio has created such controversy, speculation and conjecture as the Alesis ADAT. Announced in January 1991, the long-awaited system uses a modular approach to digital multitrack recording, at a price that's comparable to the least expensive pro analog decks available.

—*George Petersen, "Field Test: Alesis ADAT," Oct. 1992*



1993

Sound On (Off) Stage: When it comes to outdoor concerts, what's a song for audience and engineer can be a headache for the local yokels, depending on how the wind blows. Literally. But the proliferation and variety of sound ordinances leave some pros scratching their heads. When does music become noise? Where do those guys with the little meters come from? What will Johnny Guitar say?

—*Maria Conforti, "Noise Regulation Perspectives," Jan. 1993*

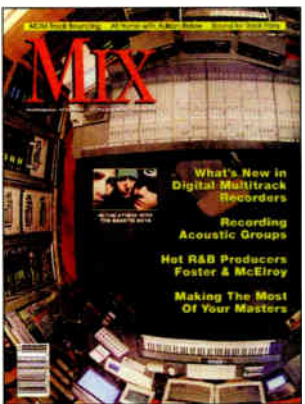
Don't Give Me Numbers: When they talk about dB, like "Give me +3 dB at such and such a frequency," I don't get along with people like that. I like to hear what they feel and not to tell me how to do it. And now, very few people come to me and talk like that. I guess I'm lucky.

—*Rudy Van Gelder, "Rudy Van Gelder: Jazz's Master Engineer," by Jeff Forlenza, Oct. 1993*

1994

Bye Bye, Moviola: The beginning of the end (as they say in cheesy horror movies) of mag-film-based sound editing was a modest ad that appeared last summer in an issue of the movie biz trade paper *Daily Variety*. It announced three "items" for sale: two 60-input re-recording consoles (one with Massenburg automation) and 100 35mm Moviolas. Although the ad had no return address on it, both the console descriptions and the phone number told anyone who cared the name of the Major Studio that was doing the housecleaning. Since we can be pretty sure that they weren't going to be replacing these dozens of (presumably) ancient Moviolas with *new, improved* Moviolas, strike one more nail in the coffin of sound editing on film.

—*Larry Blake, "Sound for Film: One More Digital Nail in the Mag Editing Coffin," Jan. 1994*



King George: When I started working at *Mix* in 1981, I never imagined that I'd be taking over this space from the co-founder of the magazine, David Schwartz. Now, having written some 500 articles and a couple of books, I have a pretty good handle on *Mix* readers and what they want to see in the magazine. But who is this Petersen guy anyway?

—*George Petersen, "From the Editor: The New Regime," Sept. 1994*

Birth of a Classic Column: Originally, I thought I might open Classic Tracks with some heavy Beatles or Stones tune, but a funny thing happened on my way to doing number one: I saw the Disney film *The Lion King* (twice) and re-fell in love with "The Lion Sleeps Tonight," a mere snippet of which is sung by the gruff but lovable warthog Pumbaa and his wise-cracking meerkat buddy Timon in the film. When the original version by The Tokens was re-released this past summer, I bought a copy for my *Lion King*-obsessed 4-year-old son, cranked up the big speakers in my living room and was immediately blown away by

—CONTINUED ON PAGE 97

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Rob Bull
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Rusty Ippolitto
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Donny Medaris
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High Voltage/IL
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Front of House Engineer
Tours include
Joan Osborne, Spin Doctors

Andrew Baldwin
System Technician
Tours include
Anita Baker, The Cranberries, Kiss

Jake Mann
System Technician
Kiss Tour

Greg Handcock
System Technician
Tours include
Reba McEntire, Rolling Stones, Soundgarden, Moody Blues

Kathy Wolter
Monitor Engineer
Emmy Lou Harris

Richie Agamemnon
System Technician
Ozzy Osbourne Tour

Ed Conrad
System Technician
Tours include
Robert Plant & Jimmy Page, Billy Joel, Rolling Stones

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Sebastian Krys
Engineer
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Felipe Elgueta
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Mike Fossenkemper
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Credits include *Madonna, Elton John, Color Me Badd, Blues Traveler*

Eric Stolz
Additional Engineer
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New Adventures in Hi Fi

David Dubow
Recording Engineer
Credits include *Bruce Springsteen, Pointer Sisters, Julio Iglesias*

in the mix

Albert Kadavy
Audio Engineer
For *Ace Ventura* CD-ROM

Mark Hagen
Engineer with Bruce Swedien and Quincy Jones
Credits include Michael Jackson's *Bad*, *Dangerous*, and *Thriller*

Dean Jamison
Engineer/Assistant
to Producer Ed Seay
Martina McBride, Ricochet, Colin Raye

Derrick Perkins
Co-Producer/Programmer
for Grammy Award winning
Producer/Artist Stevie Wonder
Credits include
Conversation Peace

Chris Fogel
Recording Engineer for
Grammy winning producer Glen Ballard
Alanis Morrisette
Jagged Little Pill

Graham Lewis
Recording Engineer
Vince Gill
High Lonesome Sound

Chris Evans
Recording Engineer for
Grammy Award winning single
"Slow Jams" from Quincy Jones' album
Q's Juke Joint

Caram Costanzo
Recording Engineer
Credits include *Stone Temple Pilots, Pearl Jam*

Carl Verna
Assistant Director
Music Video/Film Production
Toni Braxton, Ginuwine, The O'Jays, The Fugees

Brian Glazen
Line Producer/Production Manager
The Fanatics, Soulmates, Bio-Dome

Chris Shepard
Recording Engineer
Smashing Pumpkins
Mellon Collie and the Infinite Sadness

Phil Tan
Additional Engineer
Mariah Carey's #1 single
Always Be My Baby

on a hot set

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Will Edwards
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Studio Surviv

by David Schwartz

When *Mix* opened its doors 20 years ago, the publication's primary goal was to define the recording industry by the studios and the people who operated them. Massive directories filled each issue, targeting areas of the country and spec'ing out what one might find inside the soundproof chambers of those facilities.

Looking back at those early issues, we became interested in those survivors who were plugging away at their studios then and are still at it today. We wanted to know what has kept them doing what they've been doing all this time. And why? And how?

Of course, the advantage of talking to the "old-timers," as Ardent Recording's John Fry pointed out, is that "they have so many experiences that, if they don't remember exactly how something happened, they're not very bashful about making things up." So we trust that the comments and observations presented here are at least in close proximity to events and situations that actually occurred.

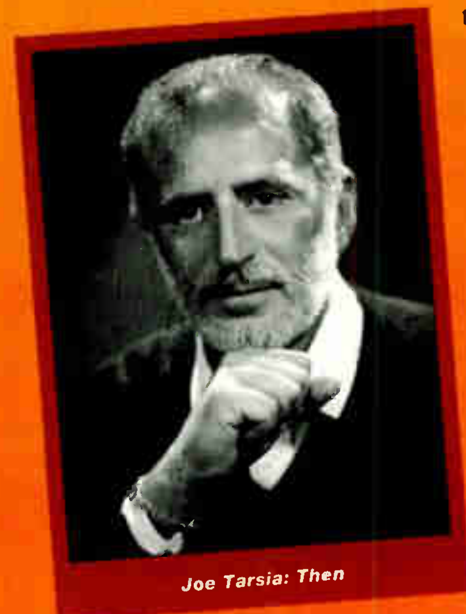
World Radio History

ors 12

who beat the odds

Philly's Big Cheese: Sigma Studio's Joe Tarsia

Joe Tarsia, the first president of the Society of Professional Recording Services, began working as an electronics service technician in Philadelphia during the late 1950s. Back then, Philly was a hotbed of musical activity, hosting the instantly phenomenal *American Bandstand* TV show, producing an emerging parade of pop stars and forming the beginnings of a seminal rhythm and blues movement.



Joe Tarsia: Then

Tarsia scored a job out of college with consumer electronics pioneer Philco, where he worked in the product research division, moonlighting with a small TV service business on the side. His technical prowess soon led to calls for servicing tape recorders at AMS Studios, which did recording work for the *Bandstand* show. After a few years at AMS, and a few more as chief engineer at the Cameo Parkway record label, he came to the realization that to stay in the recording business he would either have to move to L.A., New York or open his own studio.

Tarsia swallowed hard, borrowed $45,000 from the bank and opened an 8-track room in a space that he shared with the Frankford/Wayne mastering facility in August of '68. He called the studio Sigma, a name that came to him while staring down at the place mat on a Greek restaurant.

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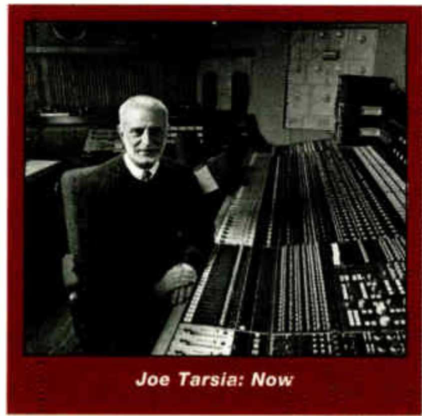
Sigma was pretty close to an instant success, quickly grabbing the bulk of Philly's pop R&B work, much of which came from the talents of producer Thom Bell, and the Kenny Gamble and Leon Huff production team, who were turning out hit after hit of the Philly Sound. By 1980, Tarsia had eight recording rooms going in Philadelphia and a satellite New York City facility, which had opened in 1976. But by the early '80s, many things had begun to change in the recording business.



Joe Tarsia: Now

"About that time, the word 'disco' became a dirty word, and then Thom Bell moved to Seattle, and Gamble and Huff's contract with CBS expired. The biggest adjustment for Sigma in the '80s, though, was coping with the reality of people's ability to do the first- and second-tier developmental work at home on computers.

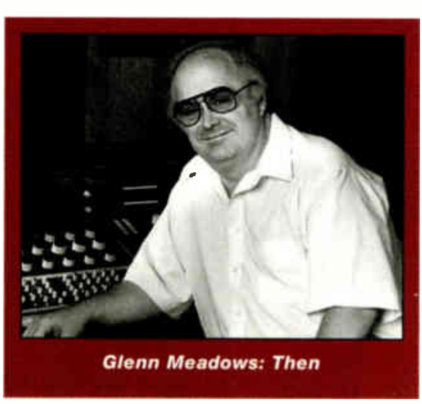
"Rates really went stagnant in the early '80s and haven't really recovered much from that time. The '80s were a reality time of adjusting to the new world, adjusting to electronic music and to the proliferation of turnkey studios. The turnkey studio gave the opportunity to a lot of people like hobbyists or doctors' sons to get into the studio business. And they became competition, even though they rarely made money.

"One unfortunate trend of the '80s," says Tarsia, "was the development of the freelance engineer, because he stood between the producer and the studio. The studio was then forced to supply the technology that particular freelance engineer thought was necessary. It was no longer my decision of what my studio needed.

"What that took away from the independent recording studio was their sound and their style. At one point in time, I could tell you what studio a record came out of by the sound of the record. There were very distinctive characteristics, not only from the facility but from the people who engineered there and who created that sound."

While Sigma started as strictly a music facility catering to the record business, to survive they've diversified into media services, including audio-for-video, radio production and CD/cassette duplication. "One of the things a studio has to do today is be its own customer. In Sigma's case, we are involved in not only selling studio time, but selling productions. We put together the creative people and creative ideas and go to a label or a catalog company in a special market and sell creative packages that we can produce in the studio.

"My advice to young people who want to get into the studio business," says Tarsia, "is not to become a slave to the technology. The technology is changing so fast that you could bet the house and the farm on a console or a 48-track digital storage system and find out before you'd paid for it that it's no longer the right technology."



Glenn Meadows: Then

Nashville Bridges: Glenn Meadows' Masterfonics Makes the Connections

"The toughest thing in this business," says Masterfonics owner Glenn Meadows, "is trying to get the people in the record companies to understand what it costs to provide the level of technology and support that they expect. We're making an effort to educate these people as to what all this stuff costs and why studio rates need to go up from where they are."

Considered one of the country's most technically progressive studio operators, Meadows got his start in the business working in Atlanta as a freelance maintenance engineer at a studio called Sound Pit. He moved to Nashville in 1975, started working at Masterfonics and now owns the facility.

Glenn Meadows: Now

"Back in the early '80s, we ran into significant financial problems," he recalls. "We were referred to an independent business management consultant who offered to help straighten it out, and working with him basically turned the business around and allowed us to continue to grow. He helped us restructure our debt, and we were actually able to pay our creditors back in half the time we said we would."

Getting studio rates in parity with costs is a goal that Meadows shares with many studio owners, though he agrees today's realities demand diversification of services. "In the mid-'70s, people got $225 an hour for a 16-track studio that had maybe a total investment of $80,000 to $100,000. That compares to today's rates of $2,500 a day for a room that cost $2 million to build and equip. This only makes sense when you have other revenue centers that can make it work."

Meadows' efforts are also applied toward expanding the musical palette of Nashville's recording projects. "We would like to be at the leading edge of bringing musical talent to Nashville that has never worked here before.

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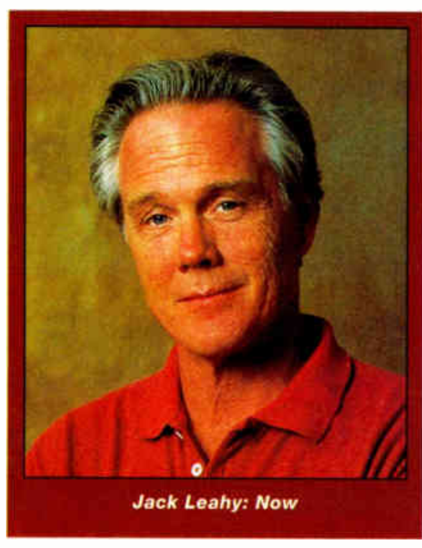
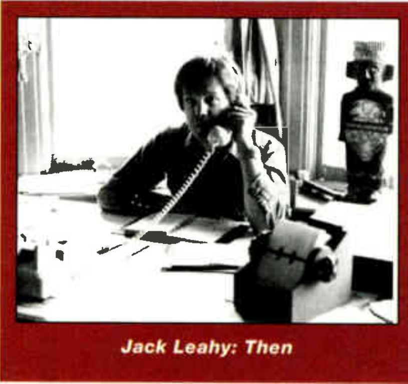
Nashville is finally breaking out of its stereotype of just doing country. We're starting to be recognized as a world-capable recording environment, where all styles can be recorded. The musician and songwriter talent pool in this town is just incredible. The number of people who have moved here from other markets—New York and L.A. and from all over the world—to be in this recording community is just amazing."

Even though Nashville may appear to be a migratory destination for recording people, Meadows advises incoming engineers to be capable of living for a year off of savings. "The schedules that the producers and record labels run require their booking of people far in advance to make sure they get who they want. Even for an established engineer from L.A. or New York, it's going to take time logistically just to work into the normal schedule of available acts and available projects for people to give you a try. That's a survival reality."


Jack Leahy: Now

Jack Leahy: Keeping the Funk at Russian Hill Recording

In the mid-'60s, near the heart of Haight-Ashbury, Jack Leahy was in the graphics business with a company called Funky Features, one of the original companies producing and overseeing the printing of San Francisco's psychedelic posters. He had two partners and operated out of a building across the street from a house occupied by Big Brother & the Holding Company. In about 1968, the graphics business got too hectic for Leahy's taste, so he sold his interest to his partners and, having been a guitar player in the early '60s folk era, he thought it would be fun to build a 4-track recording studio.


Jack Leahy: Then

Leahy kept the name Funky Features to save further legal expense, at a time when the San Francisco music scene was very much an unfunded start-up. "A friend named Stan Markam came over one day with a guitar player named Carlos Santana, who at that time could not even afford an amplifier. He plugged his guitar into my hi fi set so I could hear what he sounded like. That's kind of where we were back then."

The driving force of Leahy's business adventure in the early days was his ambition to have a "competent multitrack studio," at a time when multitrack was in its infancy. In 1973, Leahy added a partner, Bob Shotland, to the operation, and before long they began designing, planning and building Russian Hill Recording studios, which was a three-year project from planning until it opened in 1980.

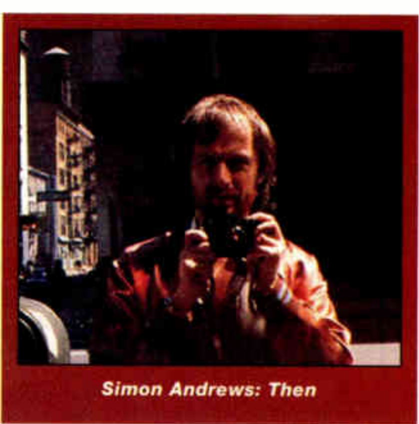
Originally a two-room facility, Russian Hill now has cycled through two remodels in each studio and also includes two new Pro Tools editing suites with a third editing bay on the way. The two also opened the John Storyk-designed Crescendo! Studios this year, near the core of San Francisco's advertising district. "It is an advertising-only facility, with two large mixing rooms with digital workstations and voice-over capability.

"I think the most difficult thing for me in this industry," says Leahy, "has been the ongoing struggle to maintain an independent studio. It is a highly competitive business, very capital-intensive and requires constant reinvestment in hardware. The project studio has had a real impact on what we do, and so much of our traditional business is being done by people in an off-line situation or in their homes. We specialize in added elements, like food service, fax and Internet connections, creature comforts, etc., to make the days more productive for executives and producers who are dealing with multiple tasking while they are at the studio."

To survive as an engineer, Leahy advises the same formula he's been using to train engineers for the past 20 years. "Basically, the mechanical skills that every engineer needs are a good pair of ears, a good education and the experience to recognize what it is one is hearing and how to manage the techniques of recording. But on the practical side, and over the long term, the engineer has to be psychologically prepared. In a competitive world, clients become attached to engineers, and the engineers with a following are the ones with long careers."

Simon Andrews: Staying on the Right Track

Simon Andrews, owner of New York City's Right Track Recording Studios, was managing a couple of regionally successful acts in the early 1970s when he realized that it just wasn't the career for him. "I didn't enjoy it, I lost money


Simon Andrews: Then

at it, it just wasn't working for me," he says. "But I saw a tremendous need for a mid-level studio in Manhattan for acts such as mine—midrange acts. There were basically just a couple of

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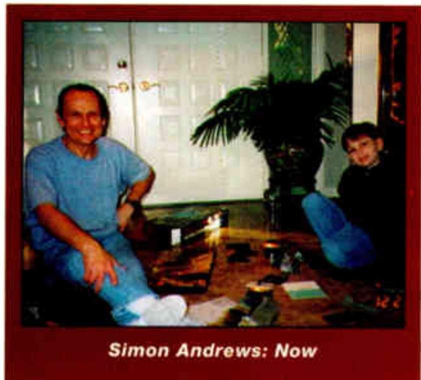
major studios in New York, and if you weren't a top star, you didn't get good treatment. So when my act broke up in 1975, I put together a studio down on 24th Street. It opened up at the beginning of 1976.

"In retrospect, I think the hardest part was the very beginning, when you pretty much have to do everything yourself and you can't make a mistake," he continues. "I did everything from engineer to maintenance, the bookings, everything. Being the kind of guy who thinks he can do anything he sets his heart to, I just learned how to do it."


Simon Andrews: Now

Convinced he was on the right track, Andrews upped the ante in 1979. "I was offered a premises in midtown Manhattan—a run-down old Times Square building that had been used as an opera house. It was about 6,000 square feet, and I was offered it at a very reasonable rent. At about that same moment, Frank Filipetti became affiliated with Right Track, and I was then able to leave him in charge of the engineering aspect of the studio, so I could concentrate full-time on the ownership duties."

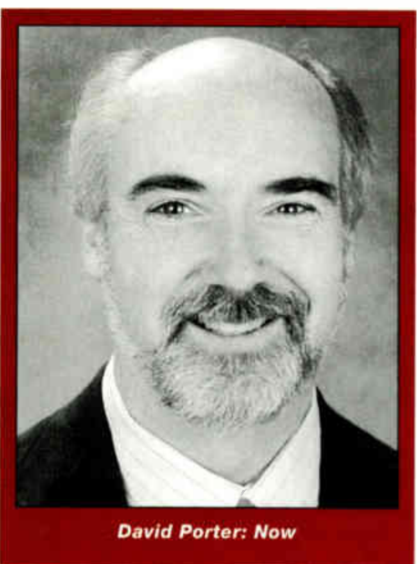
Right Track crossed the hump into the big-time studio world in about 1983, according to Andrews. "We were one of the first in New York to install an SSL console, in 1982, and immediately it became a huge success. We added a second one in 1983, when we opened our second room on 48th Street. By 1984, we were recording so many stars that by May of 1985 we had four of the *Billboard* Top 10 that had either been recorded or mixed at our studio."

Andrews' formula for survival in the studio business shows no surprises, just good client-oriented business sense. "It sounds fairly simplistic, but you have to have the right equipment, the right acoustical environment, the right support services, the right atmosphere within the premises...and they all have to work at 100 percent. If you keep doing that consistently, you'll do okay. But it's much easier said than done."

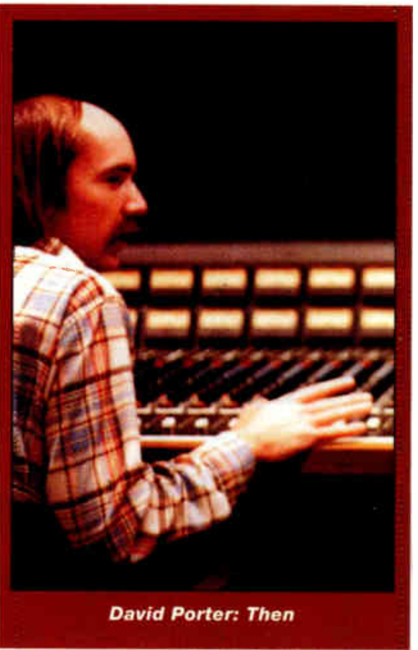
It's About Managing the Talent: Music Annex's David Porter

A more recent (1990) SPARS president, David Porter launched his Music Annex recording studio in the San Jose foothills in 1973 as a Tascam 4-track home studio. By 1975, he had moved up to eight tracks and soon expanded out of the house into a commercial San Jose building as a 2-inch, 16-track facility.

"I knew this was going to be my career," says Porter, "when I quit my day gig in 1975 working for Recording Specialties. The line of demarcation for me was that I could gross twice as much in my studio as I could working for an hourly wage. At the time, I was making $1,100 to $1,200 a month working, and when I was doing $2,500 a month at the studio, I said, 'I think I can pay my bills and still pay myself $1,100 to $1,200 a month,' and that was my criteria."


David Porter: Now

Porter's next big step came in August 1977 when he and new partners David Elder and Harn Soper made the leap to a 12,000-square-foot building in Menlo Park, 40 miles south of San Francisco, where they built three rooms: a music room, a media room and a rehearsal space. "That was a make-it-or-break-it decision," says Porter. "We were either going to succeed and be viable, or it would put me under."


David Porter: Then

Rapid growth and track expansion continued at a frantic pace, and in 1984 Music Annex was approached by Apple Computer to create an audio cassette to help launch the new Macintosh computer. Within two months, this contract made Music Annex into a full-fledged duplication facility with an output of 100,000 tapes per month.

"Apple took us from being a relatively minor player to tripling in size within about a year," Porter says. "We went from doing $400,000 to $500,000 a year to nearly $2 million in about 18 to 24 months. And we never looked back. That was kind of the point at which we became a real company with a corporate look on things, as opposed to Dave's sole proprietorship with a few of his pals."

In 1986 Porter jumped into the big-league advertising market by opening up a 3,000-square-foot, two-room facility in the heart of San Francisco's ad agency district. Meanwhile, the duplication business had ballooned so much by 1989 that it required its own facility, which he opened in the East Bay town of Fremont.

Today, Porter pilots a mothership that includes 15 studios and 45 employees in two buildings 40 miles apart. "The toughest thing to deal with

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who beat the odds

in my job is managing very creative people. They are very opinionated in what they want, both technically and creatively, and I spend a lot of time trying to satisfy their requirements for the workplace, and at the same time make this place profitable. Talent drives this business, and I understand that I am a talent manager in a lot of ways. My success or failure is determined by how good the people are that I hire, and how well I can create facilities by and for them, and then manage them.

"My biggest fear in life, because the technology seems to be getting cheaper at certain levels, is that my engineers who have strong client relationships will go off and build their own boutiques. The underlying problem with that, of course, is they are then going to be expected to provide the same amenities and technical support and level of technology that their clients had back at the big shop. Eventually, the boutique, if it survives, stops looking like a boutique and starts looking like a facility, and that's why we have this ongoing shuffling of the deck in the studio business. My constant problem is that I've got to provide something so stable, so good, so powerful that my engineers aren't tempted to leave."

Street Smart: Jimmy Dolan and Streeterville Studios

"If you are prepared and can think on your feet, the surprises and developments and idiosyncrasies that always come with every project don't become problems," says Streeterville Studios' director of development and co-owner, Jimmy Dolan.

As an 18-year-old rock 'n' roll drummer and singer, Dolan began his recording career at Chicago's Streeterville as an apprentice/delivery boy in 1971. "Part of what drew me to the recording business was the idealistic thinking that was present in the late '60s and early '70s as I was considering what I wanted to do as an adult.

"Being exposed to the recording industry, I became aware that there was a diverse community of people of all styles doing recording and film projects. The results and the professionalism of the person were more important to the project than where that person came from, what they looked like or what their background was. This aspect of the recording industry gave me the passion to make this my career within the first three or four months of becoming a delivery boy at Streeterville."

Streeterville has been around since 1969, when it opened as a three-room facility with one music studio and two audio post-production rooms. In 1979, it doubled in size, adding two more music rooms. Another 10,000 square feet were added in 1985—five new rooms.

Today, the operation is a seven-room music and audio post mothership. "Part of our success and our ability to sustain has been to be on some level of the cutting edge without putting ourselves in any too extreme position. You've got to have the ability to react to the changes that are happening. For example, today we're dealing with the reality that the technology is already upon us that allows every announcer in the world to have their own little recording setup at home so they can optimize themselves for any client anywhere. The top talent does this today."

Dolan advises newcomers that the best way to survive in this business is to maintain a constructive attitude and learn how to think. "How you think and handle yourself in the situation that you're in truly sets the stage for whether you get more work. You are being looked at as a person who has to come up with a successful answer that's not only going to be successful at this moment, but two or three weeks later it needs to look and sound even better. The people around you, who are depending on you, need to feel comfortable and trust you. That trust sustains engineering careers for years and years, much more than just understanding how the equipment works."

Jimmy Dolan: Then

Lou Gonzales: Now

Quad's Lou Gonzales on Being Your Own Customer

"You know how when you're a kid you want to be a fireman or something?" asks Lou Gonzales, owner/operator of Quad Studios in New York City. "I had this incredible drive and fantasy to have my own recording studio. It wasn't about trying to build a business or making money; I just wanted a studio."

A talented and energetic electronics engineer, Gonzales began his career in radio, as both an on air personality and technician at WADO. His move to the studio came in his mid-20s. "One day I was sitting in the office of the chief engineer of the station, and while he was in the bathroom, a phone call came in from Mirror Sound recording studio asking for help. I took the call and told him I'd send somebody right over. So I sent myself over, and that was the beginning of my change from the radio to the recording business."

Gonzales then spent several years as an independent recording engineer before putting together Quad Recording in 1978. "I was working with two producers from *Sesame Street* who wanted to do a Broadway show album for something they were going to try

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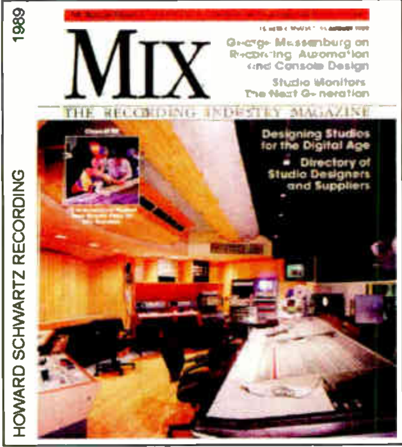
1997 CRESCENDO!

1996 AR STUDIOS

1995 CRAWFORD POST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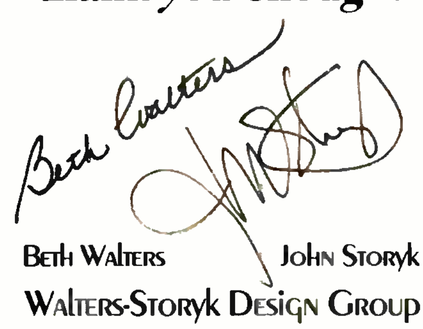
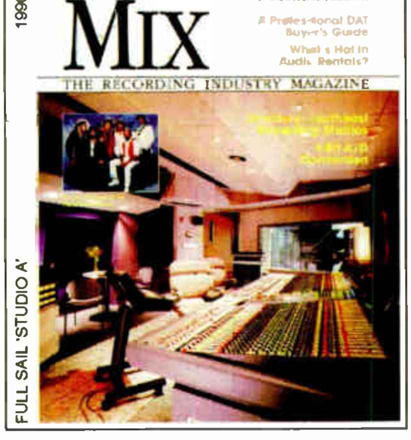


BETH WALTERS JOHN STORYK

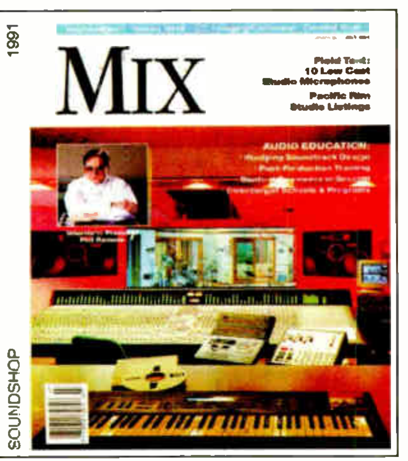
WALTERS-STORYK DESIGN GROUP

1990 1991 TEC 1993 1996 WINNER

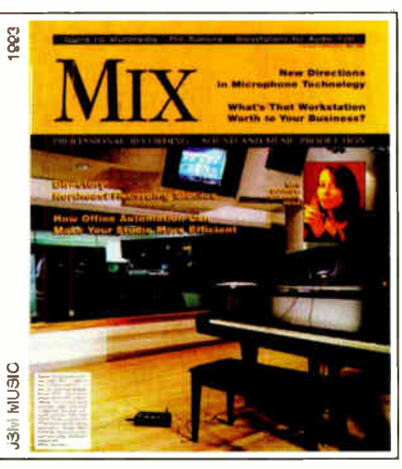
1995 COTTON HILL STUDIOS


1990 FULL SAIL 'STUDIO A'

1993 QUINTESSENTIAL SOUND


1991 SOUNDSHOP

1992 NATIONAL VIDEO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to sell. On a handshake, they agreed to bring me a couple of *Sesame Street* projects if I built a recording studio and gave them studio time to do their speculative work.

"Also at that time, I was lucky enough to meet a very talented guy

Lou Gonzales: Then

who was working as an auto mechanic. He opened the trunk of my car one day to do some work on it and he saw a couple of 2-inch masters I had left there. He called me and said that he had always wanted to learn about the recording business. So we got together and one thing led to another, and before long, he and I were building our first studio at Quad back in early 1978. We started with an old API 16-channel console and an Ampex MM1000 16-channel tape recorder. I think it was May 1, 1978, that we started doing the *Sesame Street Block Party* album.

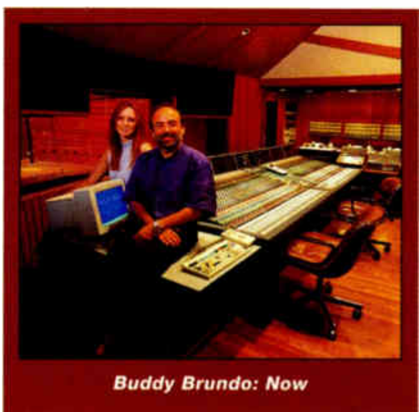
Quad began with one large tracking room, which grew in popularity for the next for five or six years. By the early '80s, though, the tracking business in New York had started to dwindle as MIDI and synthesized recording had moved most of the action into control rooms. "The next two studios I built had gigantic control rooms and little recording space. Then in the late '80s, the one tracking room I had left started to get calls for work—even though it needed renovation badly—because it was one of the few big rooms left in town. About that time I also decided to start doing live recordings of country bands, so I built another tracking room.

"Then I finally got up the courage to lease two pieces of equipment, a Harrison 32x32 console and a Studer 24-track tape recorder. From that point on, I was committed to the business and couldn't think of it as a hobby anymore. I realized it was okay to borrow money to buy equipment if you could figure out how to make the equipment earn the lease payments."

Equipment purchasing is a very personal decision for Gonzales, because he sees himself as the ultimate customer. Unlike many studio owners who move from engineering to management, Gonzales is an engineer first, and every new piece of gear must pass his own critical trial before it goes into service for clients. His test is to keep his studio the kind of place where he would like to work. "Unlike a businessman who builds a business and hires people to make those decisions for him, I was the one that had to make all those decisions. I'm a recording engineer first, and a businessman second."

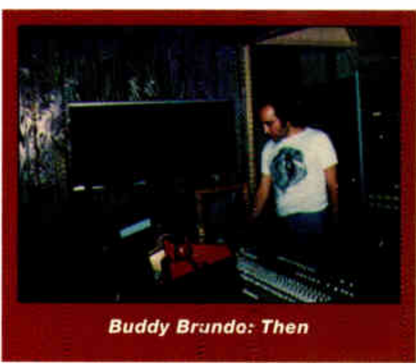
Ready for Anything: Buddy Brundo and Conway Recording Studios

When recording at L.A.'s highly regarded Conway Recorders, an artist might just might snag more than a studio tan. "My philosophy was to have studios that are outside-oriented," says Buddy Brundo, Conway's major domo and owner for 21 years. "All of the stu-


Buddy Brundo: Now

dios have landscaped grounds and big picture windows looking out on gardens. In my earlier career, as an engineer in the '70s, it just got too claustrophobic being locked up in all these rooms that were a door behind a door behind a door kind of places. I wanted to do things a little differently. I moved to California to be outside, not inside."

Brundo started working as an assistant to a scoring mixer for Universal in the early '70s. He got hired to engineer


Buddy Brundo: Then

at Conway in 1972 when the operation was just one small studio with a 12-input Opamp console. By 1976, Brundo was doing so much engineering at Conway that he and his wife, Susan, decided to buy the studio. "Both of our parents had always been in business, and we were ready to learn from having our own business. We were either going to leave here and do something else or buy this place. So we bought it, and here we are, 21 years later, and we've expanded to 36,000 square feet and three studios."

Soon after taking over the studio, Brundo began looking to build more record business (the studio had concentrated on film sound for most of its existence). He took his first big technology gamble and replaced a 32-channel API console with one of the first 60-channel Neve 8108s in L.A. "That was a defining moment because we went from doing one kind of music into becoming more of a rock 'n' roll operation."

The cost of technology is not for the faint of budget, and, as every studio owner knows, this situation is not getting easier to deal with. "The 8108 I bought for only $105,000. And that's when studio rates were higher than they are now. I just bought an SSL 9000J—$100,000 is almost the tax on a console like that. And our rates are lower now! When you're betting on technology, every decision you make could be your last."

Some challenges for L.A. studios come with the territory, according to Brundo. "The home studios really had an impact on business, but I think the biggest threat to our business wasn't really that, or the gas crisis or the recession, but happened more recently with the riots and the earthquake. That

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Congratulations, Al, on winning your 7th Grammy!
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Don't tell Al Schmitt that names aren't important in recording. He has recorded, mixed, and produced some of the greatest names in history—everyone from Elvis to Frank Sinatra, Madonna to Steely Dan, Barbara Streisand to Toto, and Natalie Cole to the Jefferson Airplane. His Neumann mics (which he has been using and collecting since the mid-1950's) have even helped him win six Grammy Awards for Best Engineer. "I believe they are the best microphones in the industry," he says.

And when you also believe, as Al does, that great sound comes from good microphone technique (and not from constant EQ adjustments) you want to use the very best mics you can get. The natural choice for Al is Neumann. And while he has great affection for all of his Neumanns, he has grown particularly fond of his new M 149 Tube. "Like the original M 49, the M 149 Tube never lets me down," he says. "It's an extraordinary microphone—clean and crisp."

Being the award-winning professional and sound perfectionist that he is, Al has chosen to record the voices and instruments of so many of our favorite artists—Tony Bennett, Jackson Browne, Willie Nelson, Quincy Jones, Diana Krall, Dr. John, Michael Bolton, and many, many others—through his favorite mics.

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CIRCLE AD NUMBER ON PRODUCT INFO CARD

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really put a damper on L.A. business for a couple of years. A tremendous amount of my business is not L.A.-based. So a lot of people who came from Europe, Mexico or any other place in the U.S. said things like, 'I'm not going to L.A. Are you crazy? We'll fall in a hole.' That really hurt our business."

Brundo sees consumer demand for audio quality as a wild card in developing technologies such as DVD and home theater but is nonetheless positioning Conway to take advantage. "As far as I'm concerned, the record companies have never been able to deliver to the user the quality we have here. Half-inch analog is amazing, and the only way they're going to duplicate that in the home is to go 96k, 24-bit, which we are trying to get DVD to do. There could be a lot of remastering, and that could be the next step. We're ready for anything."

The Importance of Being Ardent: John Fry and Ardent Recording

Memphis-based Ardent Recording owner John Fry found his way into the recording business because, as he says, "I was unable to find honest employment." His modesty is obvious to anyone who has watched, over the past 30-plus years, the steady stream of blockbuster R&B and rock 'n' roll records such as "Soul Man," "Knock on Wood" and *Led Zeppelin III*, emerge from Ardent, one of the most enduring and technologically advanced studios in the country.

"As a kid, I had a big interest in music and in electronics. I was brought up on the great rhythm and blues music of the late '50s and mid-'60s, and especially the English rock bands. I remember thinking, 'Boy, that's great, this is something really important. This is too cool to miss.' I later realized that what the English bands were doing was taking a lot of our R&B music and feeding it back to us in an Anglicized form."

Not unlike many of today's start-ups, Fry assembled a garage studio when he was in junior high school. "We recorded garage bands in that garage studio. Ultimately, we moved

John Fry: Now

into a rented store building where we were from 1966 to November of 1971.

"Once we got out of the garage and really into the business, we had some great breaks. One of the greatest was

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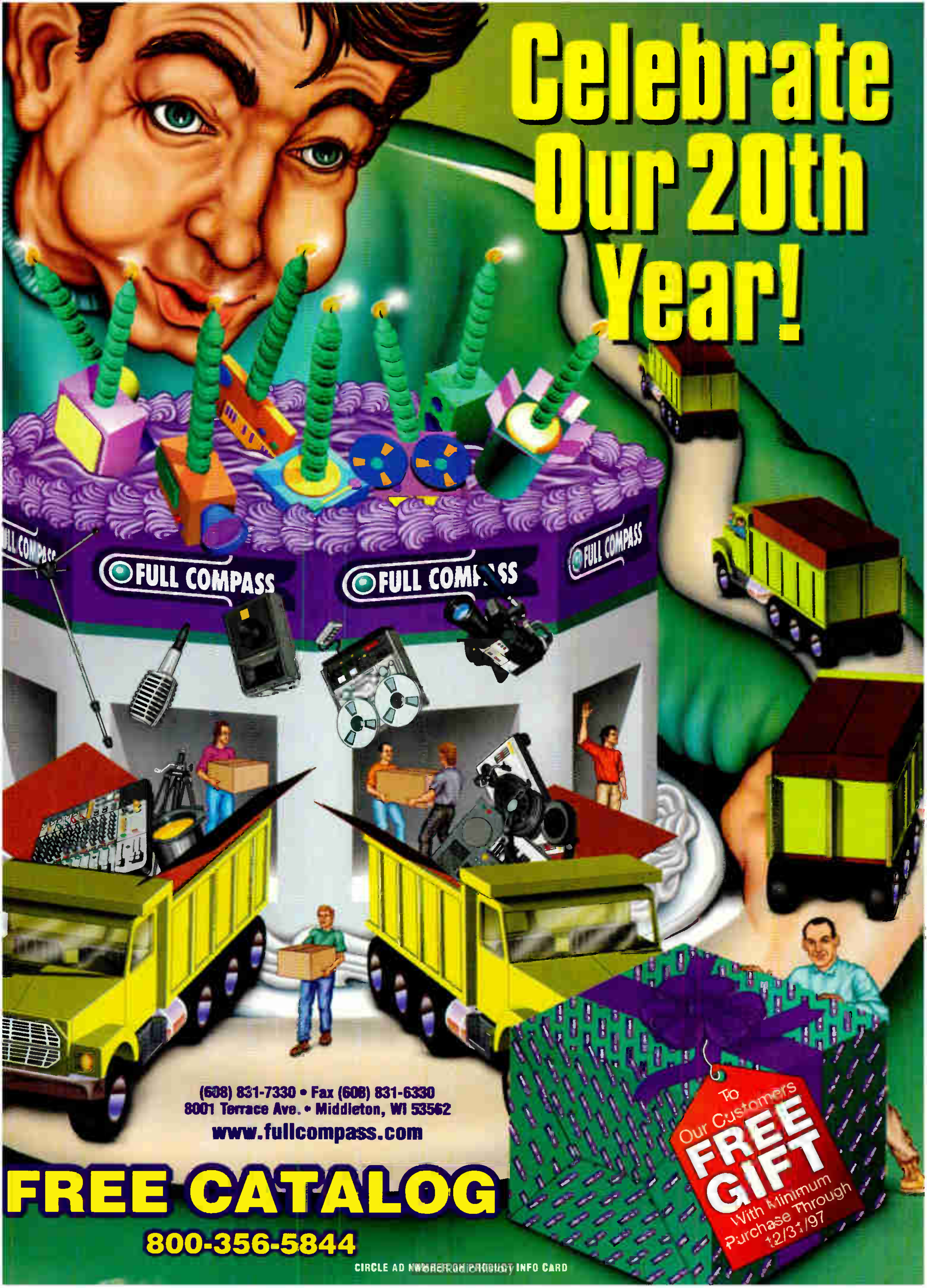


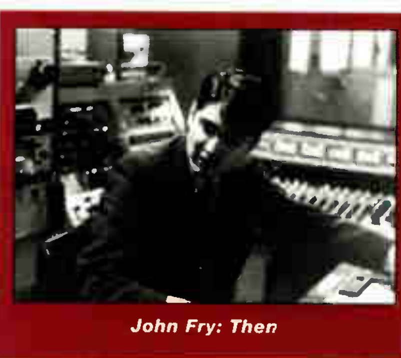
World Radio History

12 who beat the odds

that Stax Records, a big independent label, was Memphis-based, and we started at a time when they were really expanding. They had their own studio facilities, but they needed to use outside studios, as well. We became kind of their auxiliary studio, doing most of their remixing for a number of years, and a good deal of recording. So we got to work at kind of a pivotal moment with some of the great names in the R&B business."

In 1971, Ardent moved into the building they occupy to this day, adding on several times since then. Ardent now consists of three music recording studios, to go with an empire that includes a very successful contemporary Christian record label, which is distributed by Forefront Records, and a youth-oriented gospel label that is a booming part of EMI Christian Music.

This relationship with Forefront represents more for Fry than just clientele. "When I was a kid, I was a child of the '60s and had no particular religious or other convictions. Somewhere along the way, God's been very gracious to me. I guess I would describe myself as an adult convert to Christianity. So being able to get involved in the contemporary Christian business is not just being in the record business to make money, although we want to have a successful company.



John Fry: Then

For me, personally, there's a real mission aspect to it."

In addition to the label activities, Ardent has long been active as music publishers, serving their artists and writers. "It's a good revenue producer, and we have a lot of songs from working closely with developmental artists who we've also signed as writers. Being owners of intellectual property as well as producers of the content has been a very important part of our business philosophy."

Fry's philosophy for survival boils down to: "If you're prepared to be surprised in this business and figure that change is normal, then you won't be disappointed. For example, there was a time not long ago when somebody said to us that we'd never buy another analog recorder. Well, surprise...the newest recorders I've got are analog."

For 17 of its 31 years, Ardent has been a SPARS member. "I finished a term as president last year and am now chairman of the board. I have found that participating in a civic sense in the industry is important for longevity. When you do that, you're giving something back to the industry that's been good to you, and that's always a good investment. And when you begin to talk to your colleagues all over the country, you find out that you are not alone. Other people experi-

—CONTINUED ON PAGE 114

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~ George Peterson, **Mix Magazine**, January 1997

"Every manufacturer loves to use buzz words like transparency, warmth, and musicality when describing their own products. For my money, A R T is justified in using exactly those words to describe the Pro VLA. It's one of the few products I've encountered that has caused me to rethink the way I work in my studio. That's high praise indeed"
~ Jim Miller, **Electronic Musician**, June 1997

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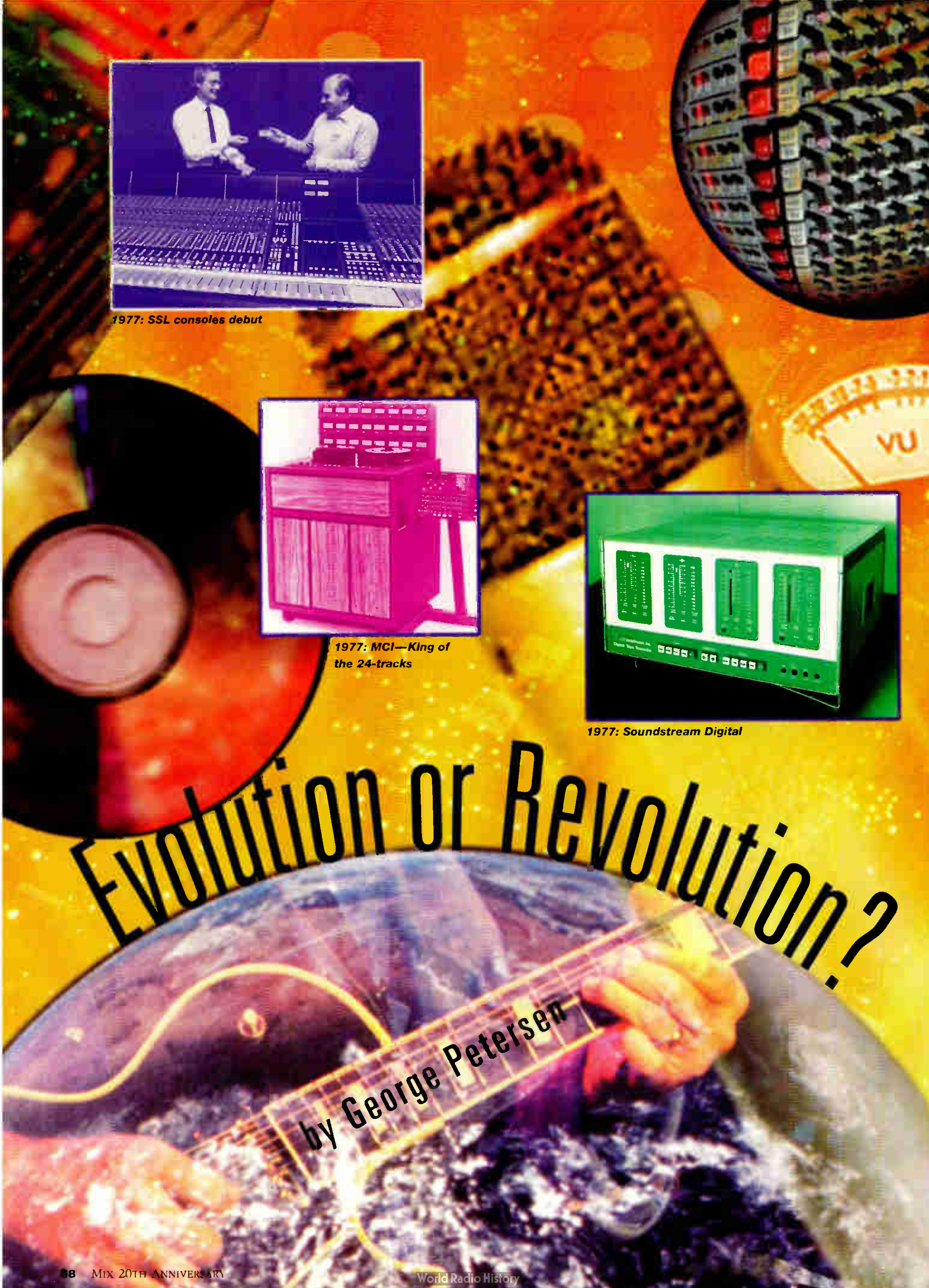


1977: SSL consoles debut

1977: MCI—King of the 24-tracks

1977: Soundstream Digital

Evolution or Revolution?

by George Petersen

World Radio History

A Technology Retrospective

Technologically, the past 20 years have been one wild ride. And chronicling the changes over those two decades has turned out to be somewhat of a detective story, as many of the companies involved in the early years (such as MCI, Quad-8 and Soundstream) are out of business, while other well-known players—among them 3M, Mitsubishi and Ampex—have abandoned their audio hardware lines.

That said, let's look back at some of professional audio's technology milestones of the past 20 years. Given the space limitations, I have not attempted a complete listing of every company or product—just a few that somehow changed the way we all work. Please accept my apologies if this report doesn't include one of your favorite products, such as Sony's 1982 F-V7ET (a handheld vocal mic with onboard vibrato and echo effects) or the 1996 AES debut of J-Con's ¼-inch to 3-pin AC plug adapters, designed for converting AC extension cords to audio cables.

So if you were involved in audio during this 20-year span, enjoy this walk down memory lane; if you weren't, here's what you missed:

1977: The Revolution Begins

Two decades ago, the concept for *Mix* magazine emerged from a perceived need for a directory that would provide producers, engineers and musicians with comprehensive data on the burgeoning recording studio industry. Today, it's difficult even to recall those pre-Internet, pre-fax, pre-cellular, pre-cable, pre-CD, pre-FedEx, pre-MIDI, pre-MADI, pre-PC, pre-MTV, pre-Mac, pre-DOS, pre-DAT, pre-DAW days.

In record stores, vinyl was king and 8-track was the leading prerecorded tape format. Studios were filled with gear from such wonderful (yet now nearly forgotten) names such as, Allison Research, Ursa Major, EXR, MasterRoom MicMix, Dokorder, Stephens, Quad-8, Scully, SAE, Phase Linear, Tapco, BTX, Q-Lock, Lang, Pulsar, MXR, Electrodyne, Universal Audio, Marshall Electronic, EECO, Cooper Time Cube, Spectra Sonics, Roger Mayer, Quantum, Sphere, Tangent, Neptune, Interface Electronics, Orange, DeltaLab and—just for the fun of it—let's throw in a couple padded, blue-sparkle Kustom bass amps. Fortunately, some of the good stuff lives on: Anthony DeMaria Labs makes a swell knock-off of the UREI LA-2A, while Manley Labs still produces Langevin and Pultec gear. And API is back, keeping those great EQ's and consoles coming.

It is perhaps surprising that so many of the key suppliers of studio gear in 1977 are still in business: AB Systems, ADA, Akai, AKG, Allen & Heath, Altec, Amek, AMS, Aphex, API, Ashly, Audio Design/Recording, Audio-Technica, AudioArts, Bag End, Barcus-Berry, Beyer, BGW, Bryston, Carvin, Cetec Vega, Community, Conquest, Crest, Crown, D&R, dbx, Denon, DOD, Dolby, EV, Eventide, Furman, Galaxy, GoldLine/Loft, Gotham, Hafler, Harrison/GLW, HHB, JBL, Klipsch, Korg, Koss, Lexicon, McIntosh, Marantz, Marshall, Micro Technology Unlimited, Nady, Nagra, Nakamichi, Neumann, Neutrik, Neve, Otari, Peavey, QSC, Roland, Schoeps, Sennheiser, Sescom, Shure, Solid State Logic, Sony, Soundcraft, Speck, Studer Revox, Studiomaster, Symetrix, Tascam, TC Electronic, Tektronix, Telex, 360 Systems, Whirlwind, White, Wireworks, Yamaha, Yorkville and dozens of others.

A fair number of products available in 1977 are still in production, especially microphones. On a drum session—then or now—you might use a Beyer M88 on kick, Sennheiser MD-421s on rack toms, Electro-Voice RE20 on floor tom, Shure SM57 on snare, Neumann U87s on overheads and an AKG C-414 on hi-hat. But generally, in terms of recording studio technology, 1977 was worlds away from 1997.

Certainly the technological changes over two decades have been startling, but one of the most interesting contrasts between these two eras is in the persona of the audio engineer. More often than not, in the pre-'80s era, studio owners and engineers had extensive experience in electronics and circuit design. Part of this stemmed from the high degree of maintenance required by audio systems of that vintage (fader grease, anyone?), but, equally, from a need to create custom products (or modify existing ones) to create a workable recording environment. In fact, according to a summer 1977 studio equipment usage survey conducted by *Billboard* magazine, the most common consoles in U.S. studios were custom designs (14.5%), slightly edging out MCI at 14.3%, followed by Tascam (8.6%) and—in diminishing order—API, Auditronics, Neve, Electrodyne, Langevin, Spectra Sonics, Opamp (available in kit or finished form), Quad-8, Harrison, Audio Designs, RCA and Sphere.

At Solid State Logic's first public appearance at the 1977 AES convention in Paris, the company debuted the 4000 A Series console, complete with Studio Computer. Though a well-

World Radio History

known UK studio owner remarked, "No one will ever buy a console with a television in it," the board had all the foundations of the 4000 range: in-line channel, small fader, track arming and dynamics on every channel, along with computer-controlled automation and tape machine control.

Other than custom monitor designs—typically developed from JBL or Altec components—control room speakers were almost the exclusive domain of the Altec 604E (a two-way, co-axial 15-inch woofer/compression driver design), either in stock "utility" cabinets, custom enclosures, modified third-party designs (Big Reds) or some combination of all of the above. Common variants combined the 604E with an alternate crossover, either home-brewed or commercial, such as Doug Sax's Mastering Labs model. Over the years, the affinity for the 604E may have waned in the studio, but the speakers would later regain popularity as the basis for the UREI 813.

Of course, same as today, every 1977 studio needed a variety of speakers, and leading this category were the venerable JBL 4311 and Auratone Cubes.

At this time, Ed Long, under the name of Calibration Standard Instruments, was introducing the MDM-4 Near Field Monitor™ with his then-revolutionary concept of near-field speakers. Long (who holds the trademark for the terms Near Field Monitor and Time Align) would continue to make his mark on the industry with his involvement in UREI crossovers and ELF™ subwoofers. It seems safe to say that in 1977, no one could have predicted the impact that the MDM-4 Near Field Monitor would have on studios

1977

▸ Milestones

Apple II unveiled
First Dolby Stereo films released
First commercial digital recordings
Near Field Monitor™ developed

▸ Beginnings

Apple Computer Inc.
Audio Control
CCS Audio Prods (Musicam USA)
EAR Pro Audio
Micro Technology Unlimited
Mix magazine (*The Mix*)

▸ Anniversaries

100th—Berliner invents audio disc
100th—Edison invents analog phonograph
50th—Electro-Voice

1977: Everybody needed Auratones

worldwide 20 years later.

Steve Wozniak and Steve Jobs incorporated Apple Computer in January 1977. The Apple II—the first PC with color graphics—was delivered four months later. It didn't have a disk drive but was only $1,300, including a whopping 4K of RAM.

In March 1977, David Cox and Hal Chamberlin founded Micro Technology Unlimited (MTU) and started shipping music synthesis software and 8-bit D/A converter boards for microcomputers. In 1979, MTU's Delplay-12 was the first professional-quality direct-to-disk DAW on a microcomputer; and a sample-accurate waveform editor followed in 1980. Now offering its Krystal DSP workstation, MTU is the oldest company in the field.

Furman Sound was selling its PQ-3 parametric EQ/preamp—the first rackmount box for the M.I. market—although nobody believed musicians would buy rackmount gear. Now, 20 years later, things are a little different...

Nationwide, MCI was the leading manufacturer of 2-inch analog 16- and 24-track machines and, with Ampex and 3M, controlled 83% of the market, followed by Studer with a 3.1% share. The 8/4/2/1-track market was dominated by Ampex (37.3%), in large part due to its popular 440 Series, followed by the 1977 debut of its superb ATR-100 Series, considered by many to be among the best 2-tracks ever made. A smaller share was held by Scully, which also marketed a 1-inch, 12-track deck, a format that never really took off. Tascam made history by introducing the 90-16, the first 1-inch, 16-track recorder.

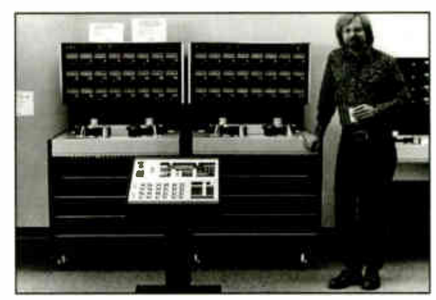
It should be noted that 1977 was the year in which the first commercial digital recordings were made using Dr. Tom Stockham's Soundstream Digital system. After demonstrating some opera demo recordings at the spring 1977 AES in L.A., Stockham was invited by Lincoln Majorca of Sheffield Records to cut *The Art of Fugueing* album on his Town Hall label.

1978

Blast-Offs and Fizzles

3M, a major supplier of professional analog recorders, with its M Series of multitrack and 2-track machines, had spent several years developing a digital recording system, including two years of joint research with the BBC. The result was the 3M Digital Audio Mastering System, which consisted of a 32-track deck (16-bit, 50kHz audio on 1-inch tape at 45 ips) and a 4-track, ½-inch mastering recorder.

Although the 3M system was a year away from actual deliveries, engineer Tom Jung (now of DMP Records)


1978: Studer A800s arrive.

agreed to beta-test the prototypes at Sound 80 in Minneapolis, using them as a backup system during sessions being cut direct-to-disk (lacquer disks, *not* hard disk!). The digital session tapes were judged superior to the disk masters, and in December 1978, the first commercial albums cut on the system were released.

Priced at $150,000 ($115,000 for the 32-track and $35,000 for the 4-track), the first two-machine systems were installed at Sound 80 and in Los Angeles at A&M Studios, Record Plant and Warner Bros. in early 1979.

Also on the digital recording front, Sony unveiled the PCM-1600, a 2-channel recording processor that stored digital audio on ¾-inch videotape. The advantage of the system

1978: 3M Digital System

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1978: Sony PCM-1600 system

(which would eventually become the PCM-1610/PCM-1630 format now used in CD production) was that it used modified video editing controllers to simplify the process of digital editing. A number of companies, such as Van Webster's Digital Sound Recording in Los Angeles, installed systems and began offering digital editing services to the public.

For those on a budget, Sony's PCM-1 ($5,500) was a 14-bit system that also stored audio tracks on videotape. The PCM-1 arrived a bit before its time: Four years later, Sony's PCM-F1 would make budget digital a reality for thousands of studios.

At AES Europe, Sony also showed a prototype digital machine that recorded 24 tracks on 1-inch tape. It never went into production, but it did lay the groundwork for Sony's highly successful DASH-format machines.

In 1978, Eventide Clockworks followed up its successful H910 Harmonizer™ with the H949, having greatly improved performance (out to 15 kHz!), while offering +1/-2 octave pitch shifting and a whopping 400 ms of delay. A year later, a new daughterboard added "intelligent" deglitching for smoother operation. Based on its success, Eventide came out with its Instant Phaser, Instant Flanger and Omnipressor products. In 1987, the H3000 became the first software-based Harmonizer. The next-generation Ultra Harmonizer DSP4000 arrived in 1993, and today its flexibility continues to be expanded via regular software updates.

1978

- **Milestones**
  - First digital 32-track multitrack
  - First video-based digital editor
  - Yamaha NS-10M debuts
- **Beginnings**
  - Eastern Acoustic Works
  - Genelec
  - McPherson Loudspeakers
  - Opti-Sound/Opti-Case
- **Anniversaries**
  - 50th—George Neumann Co.
  - 20th—First stereo LPs sold
  - 20th—IC's developed at T.I.

SSL's 4000 B Series, with more sends, expanded EQ and a different dynamics section, debuted in 1978. The first 4000 B went to Munich's Country Lane Studios and is still in use today. Only six B Series consoles were produced. In the States, two were installed in L.A. at the now-defunct Kendun Recorders and the old Third Street Record Plant; the first board used for post went to Producers Color Service in Detroit.

MCI, the undisputed leader in analog multitracks, unveiled a 32-track analog deck that recorded on 3-inch tape. It went nowhere. MCI did much better with its JH500 and JH600 Series consoles, which were launched in 1978 and soon became ubiquitous. In fact, ten years later, MCI still held the leading share (17%) of consoles in 24-track studios.

Otari began shipping its 5050B, an analog transport that became the standard for affordable, rugged recorders and remained in production until a few years ago.

One multitrack design that became popular was the Studer A800, with the first machine arriving in North America in 1978 for installation in Guy Charbonneau's Le Mobile remote recording truck. Incredibly enough, 18 years, thousands of sessions, tens of thousands of miles and (probably) dozens of head stacks later, that same machine is in service today, although many years ago Charbonneau did upgrade the original from 16- to 24-track (and added a second A800 for 48-track dates).

In 1978, UREI entered the speaker market with its 813, a large monitor based on a modified Altec 604 co-axial driver and a second 15-inch woofer handling sub-bass. A year later, the company would introduce its 811 (single co-ax driver) and 815 (co-ax plus two subwoofers). However, the 813 was clearly the best of the bunch, becoming so popular that years later, other manufacturers—such as Tannoy, KRK and JBL—were building monitors with dimensions tailored to fit into UREI 813 soffits.

The year's most inauspicious debut: Yamaha's consumer hi-fi group unveiled the NS-10M speaker. At the time, no one in pro audio used them, and they didn't rise to prominence for another five years, when they began replacing Auratones as the most common reference speaker.

In January 1978, keyboardists marveled at the Sequential Circuits Prophet 5, a programmable 5-voice polyphonic synth offering lush, fat, rich analog sounds with the ability to store and immediately recall various settings. Despite a lofty $4,500 price tag, the synth was a hit, and sounds of the Prophet's analog string and brass patches became an inescapable staple of pop music for years.

1978: Behold the Synclavier

But from a technology standpoint, the 1978 launch of New England Digital's Synclavier—the first commercially available, real-time digital synthesis instrument—was a monumental achievement. Over the years, the Synclavier would develop from a musical instrument to an all-encompassing digital production environment, breaking new ground by combining keyboard sampling and synthesis with its Tapeless Studio™ and Direct-to-Disk™ recording technologies.

1979: Fairlight co-founder Kim Ryrie at the helm

1979

Changes Afoot...

Ironically, one of the major changes in 1979 came not from a high-end digital gizmo, but from a down-market analog device. Sony's TPS-L2—its first Walkman® personal tape player—brought consumers a whole new way of listening to music. Suddenly, recording engineers found themselves needing to check mixes not only on Aura-

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and 4035 monitors (BiRadial horn plus single- or dual-15 woofers, respectively). Offering high SPL capability, and a large sweet spot, these were an ideal match for the growing dimensions of control rooms and post-production suites, where the number of people in the listening area seemed to increase

1980: Mitsubishi X800

exponentially every year, especially in the agency market.

The compact disc standard was proposed and later adopted by the Digital Audio Disc Committee. Product introduction in the U.S. was still three years away.

Designed to compete with Sony's PCM-1600, the JVC DAS Series 90 Digital Audio Mastering System was another 2-channel recording/editing system that used U-matic tape as the storage medium—but it was incompatible with PCM-1600 tapes. In November, Sony showed the PCM-1610 system, which eventually became the standard medium for CD mastering for more than a decade.

Mitsubishi began delivering its 2-track, reel-to-reel digital machines in X80 ("portable") and X80A (floor console) versions. Best of all, the decks' extensive error-correction circuitry allowed tape editing using conventional splicing. At the fall AES in New York, Mitsubishi previewed its X-800, a digital recorder storing 32 tracks of audio on 1-inch tape running at 30 ips.

For the first time, companies specializing in "digital rentals" began appearing in the New York, L.A. and Nashville markets, bringing digital multitracks to a wider audience.

Aphex began *selling* its 602B Aural Exciters, which had previously been available only on a rental/royalty basis. The price was only $2,750!

Speaking of signal processing, 1980 offered a lot of advances and products that remain desirable today. dbx launched its 900 Series of modular signal processing. AMS introduced the DMX 15-80 stereo digital delay line, with a then-impressive two seconds of memory at a bandwidth of 18 kHz. Lexicon introduced its PCM-41 DDL. EMT's new Model 251 ($20,000) sported a 32-inch-tall, upright enclosure that looked more like the controls to a spaceship than a spatial processor. The 251 offered seven reverb programs and 16-bit/15kHz performance.

On the console scene, Sound Workshop showed its Series 20, 30 and 40 models—the latter with eight (!) aux sends and ARMS automation. Neve debuted the 8108, which could store up to four console assignments. Solid State Logic countered the challenge with the introduction of its SL-4000E with Total Recall.

1981

The Video Age Arrives

Neve introduced Necam II automation for the big studios, and Soundcraft launched the Series 800. Available in recording, P.A. and monitor versions, the Series 800 went on to sell in the zillions (relatively speaking) over the next ten years.

Fostex formed a U.S. division in May 1981 and showed the Model A8, a new multitrack that recorded eight tracks on ¼-inch tape at 15 ips—yet another format.

Just as Mitsubishi began delivering its X-800 32-track digital machines, Sony countered by unveiling its PCM-3324 digital 24-track, which was still two years from shipping. The original PCM-3324 retailed for $150,000—today, the newest-generation PCM-3324S is priced at slightly more than one-third that amount.

B&W introduced its 801 speakers, which even today remain a favorite of classical music engineers. On the big sound front, Westlake brought out its TM-3 (three-way bi-amp) and TM-4 (four-way tri-amp) studio monitors.

Signal processing kept improving. DeltaLab showed its AcoustiComputer dual delay; Lexicon introduced the Super Prime Time programmable delay; and AMS launched the RMX-16 reverb (still a sweet box). But my "1981 Vision of the Future" award has to go to Eventide's SP-2016 effects processor. Priced at $9,000, it featured plug-in software changes via a bank of ROM sockets. This would become the first effects box to offer new sounds via third-party DSP "plug-ins."

June 1981: Michael Nesmith releases *Elephant Parts*, an album of songs done as video clips and released on video only. The video-only concept didn't fly, but the clips were stylish and entertaining, ideally suited for cable networks such as MTV, which debuted in August 1981.

The burgeoning music video industry soon became a double-edged sword: While young bands fought to get $50,000 for a recording budget, the labels busily planned for music videos budgeted at up to $100,000 each. Sud-

1981: Sony's Rick Plushner (in dark glasses) shows off a PCM-3324 prototype to Chris Stone and Record Plant crew.

denly a band's commercial viability began to depend on the video's "look," and the music was almost secondary.

In August 1981, IBM introduced the Personal Computer, perhaps the decade's most significant development. Hardly a powerhouse, the original 8088-based PC had 64K RAM, a blinding 4.77MHz speed and was

1981

- **Milestones**
  - IBM PC introduced
  - First CD produced
  - First DSP "plug-ins"
  - MTV begins broadcasting
- **Beginnings**
  - Fostex U.S.
  - Gepco International
  - Hot House Professional Audio
  - Rane Corp.
  - Simon Systems Engineering
  - Trident USA
- **Anniversaries**
  - 25th—Young Chang

World Radio History

GregGoldman

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priced at $3,000 ($6,000 for a version with color graphics). At least it included MS-DOS 1.0...

1982: The Sony PCM-F1 brings low-cost digital to the masses.

1982

CD and Surround Sound Debut

January 1982: Commodore intro'd the C-64, with 64K RAM and color graphics. At $595, it eventually sold 20 million units and became a major keystone in the early days of MIDI.

Oberheim introduced the DMX drum machine and, combined with its OB-Xa programmable synth and DSX 8-track sequencer, created The Oberheim System—a complete synth/drums/ sequencing workstation. The system had a 6,000-note capacity, but it was not MIDI, which was still a year off.

Neve announced the first digital mixing console, known as the Neve DSP, a large, full-scale design. The console featured CCR (Complete Console Reset), full assignability of controls and automation of all console functions. The electronics package was located remotely, an approach that became commonplace years later with products such as the Euphonix Crescendo. The BBC took delivery of the first DSP, a 48-channel model.

Dolby debuted its Consumer Surround Decoder, a home device for extracting the surround channel from a Dolby Surround-encoded film played on a stereo VTR. Years before its time, the product fizzled, but it laid the groundwork for a coming revolution in home theater, which would be fueled by the arrival of Beta/VHS HiFi decks and Dolby Pro Logic-equipped stereo components in years to come.

CD players and discs were introduced in Europe and Japan; the U.S. launch was slated for 1983. Meanwhile, for consumers who wanted to make digital tapes of their CDs, Sony showed the PCM-F1, a digital audio recording system based on the EIAJ 14-bit PCM specification for digitizing audio and storing it on videotape. The concept of a two-piece system (connecting a PCM processor to any VCR [Beta, VHS or U-matic] for recording) was unpopular with consumers, but at $1,900, Sony's PCM-F1 was a hit with studios. The Technics SV-P100 ($3,000) went one step further: It was a 14-bit EIAJ processor combined with a VHS transport. Years before DAT, it was the first digital audio cassette recorder, and Mobile Fidelity even released a few projects—such as Pink Floyd's *Dark Side of the Moon*—on PCM VHS tapes.

1982: Neve Digital Console

PCM processors from Aiwa, Akai, Sansui, JVC and Technics rigidly stuck to the 14-bit EIAJ standard; only Sony's PCM-F1 (as well as the later PCM-701/501/601 units) and the Nakamichi DMP-100 (a black-finish F1 with improved analog components) offered a choice of (switchable) 14- or 16-bit performance. A few brave souls—myself included—went so far as to make multitrack recordings using two synchronized PCM-F1s. One thing was certain: Whether stereo or 4-track, the democratization of digital had arrived.

Finally, Quantec introduced the QRS Quantec Room Simulator, which 15 years later is still considered by many to be among the best reverbs ever built.

1982
- **Milestones**
  - MIDI standard established
  - Dolby Consumer Surround debuts
  - First digital console
  - Sony PCM-F1 launched
  - CDs released in Japan, Europe
- **Beginnings**
  - Ensoniq
  - Rane
- **Anniversaries**
  - 10th—First PCM recorder, Denon

1983: Sony's Toshi Doi and Studer's Roger Lagadec celebrate the DASH announcement.

1983

Small Disc, Big Prices

The CD finally arrived in America, but the players were expensive, and the availability of titles was limited. Record labels figured out that the CD was the key to a gold mine; despite the premium charge for CDs, royalties on older recordings were paid at the old vinyl rates, and CD reissues soon became a major part of the record business. Mindful of this, The Beatles refused to have their material released on CD until years later, when the royalty issue had been resolved.

January 1983: After years of behind-the-scenes meetings between U.S. and Japanese manufacturers, the Musical Instrument Digital Interface was demonstrated to the public for the first time at Winter NAMM. Sequential Circuits founder Dave Smith used a Prophet-600 to control a Roland synth via MIDI. At the time, no one dreamed how important this day was.

Also in January, Apple launched the Apple IIe ($1,300), a 1MHz machine with 64KB of RAM and a whopping seven expansion slots, which—in the years to come—provided a happy home for numerous MIDI interfaces that became part of the growing computer-based music industry. Two months later, IBM countered with the PC-XT. It cost $5,000 and included 128KB RAM, a 360K floppy drive and a whopping 10MB hard drive. Most people wondered what they'd ever do with that much storage.

Sony finally began delivering its PCM-3324 digital 24-track. The first U.S. sale went to John Moran of Houston's Digital Services.

Crown announced the TEF® System 10, a spectral analyzer/acoustical measurement system in a 40-pound case.

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– Chis Stone, Film Composer

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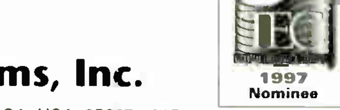

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1983

▸ Milestones
- Apple IIe debuts
- MIDI unveiled to public
- IBM PC-XT debuts
- DASH format announced
- Beta HiFi debuts

▸ Beginnings
- Acoustic Sciences Corp.
- Antex
- Juice Goose
- RPG Diffusor Systems
- Steinberg

▸ Anniversaries
- 25th—Gotham Audio (now GPrime Ltd.)
- 20th—Philips Cassette debuts

The $14,500 price included a 96KB RAM computer with a green phosphor CRT.

After 25 years of building calibration and instrumentation mics, Brüel & Kjaer entered the studio market with the 4003, 4004, 4006 and 4007—four new mics designed specifically for studio and location use.

Yamaha introduced the DX7, bringing FM synthesis to the masses. Over the next four years, 200,000 DX Series units were sold worldwide.

At AES in New York, Sony, Matsushita, MCI and Studer announced the DASH (Digital Audio Stationary Head) standard for digital multitracks. The standard called for 2-, 4-, 8-, 16-, 24- and 48-track formats and was compatible with Studer and Sony recorders already in development.

Those on smaller budgets were interested in the Fostex B16, the first ½-inch, 16-track—retail was an affordable $5,900. And dbx began shipping its Model 700 Digital Audio Processor, which like the PCM-F1 and PCM-1610, stored audio on videotape. However, the Model 700 used Companded Predictive Delta Modulation rather than Pulse Code Modulation and sampled at a rate of 640 kHz.

Soundcraft unveiled the TSR-24, its first in-line design, while Soundtracs' CM-4400 was the first compact console with an onboard microprocessor.

In a packed demo room at AES, visitors marveled to the sounds of the Kurzweil 250, the first ROM-based sampling keyboard to successfully reproduce the full complexity of acoustic instruments, with natural-sounding pianos, thick drums, lush strings and choirs, and more. It was almost $16,000, and it sounded great.

1984

The Macintosh

Thankfully, Orwell's Big Brother didn't arrive in 1984, but Apple's innovative halftime commercial during the Super Bowl telecast announced the Macintosh, a 128K, 8MHz machine with a 68000 processor. Retail: $2,500, including built-in 9-inch monitor.

CD players were originally hailed by Sony as "perfect reproduction," yet somehow, a year after their release, improved second-generation hardware designs were unveiled. DADC, the first U.S. CD plant, opened in Terre Haute, Ind.

Previously known only for its consumer hi-fi gear, Akai entered the M.I. market with the MG1212, a 12-track analog recorder/mixer that recorded on proprietary ½-inch cassettes. The format showed up later in a rack-mount, recorder-only version. Neither was successful.

1984: E-mu Emulator II (shown here with Digidesign's Sound Designer sample editing program, which arrived a year later)

In musical instrument technology, E-mu Systems introduced the Emulator II, which in terms of sound quality, flexibility and processing power was light-years ahead of its predecessor. It retailed at $7,995, and, over the next four years, the EII and other E-mu products become standard fixtures in studios everywhere. The EII was followed in 1988 by the EIII (16-bit sampler) and in 1994 by the Emulator IV—the first sampler with 128-voice polyphony. E-mu eventually capitalized on its digital audio expertise with the Darwin, a stand-alone 8-track (expandable) disk recorder/editor.

MXR Innovations ceased operation. A year later, the company's principals went on to form two separate companies: Alesis and Applied Research & Technology (ART).

Later in the year, Ensoniq launched Mirage, the first mass-market sampler. At $1,700 and backed by an excellent library of sounds, it was highly successful, although actually creating samples on the unit proved nearly impossible for the do-it-yourselfer.

Speaking of sync, Nagra joined the timecode revolution and announced the Nagra IV-S TC—essentially a version of everybody's favorite location recorder equipped with a center-track timecode head and onboard SMPTE reader generator. A dozen years later, it's still the industry standard.

The fall AES offered more tools for cost-effective production, such as the Tascam MS-16 1-inch, 16-track and the Amek/TAC Scorpion 8-bus console. Available in two frame sizes, with up to 32 or 40 channels, Scorpion sounded great, was built like a tank and priced under $6,000. *Lots* of these would appear in studios and venues over the next few years. Maybe it was the name...

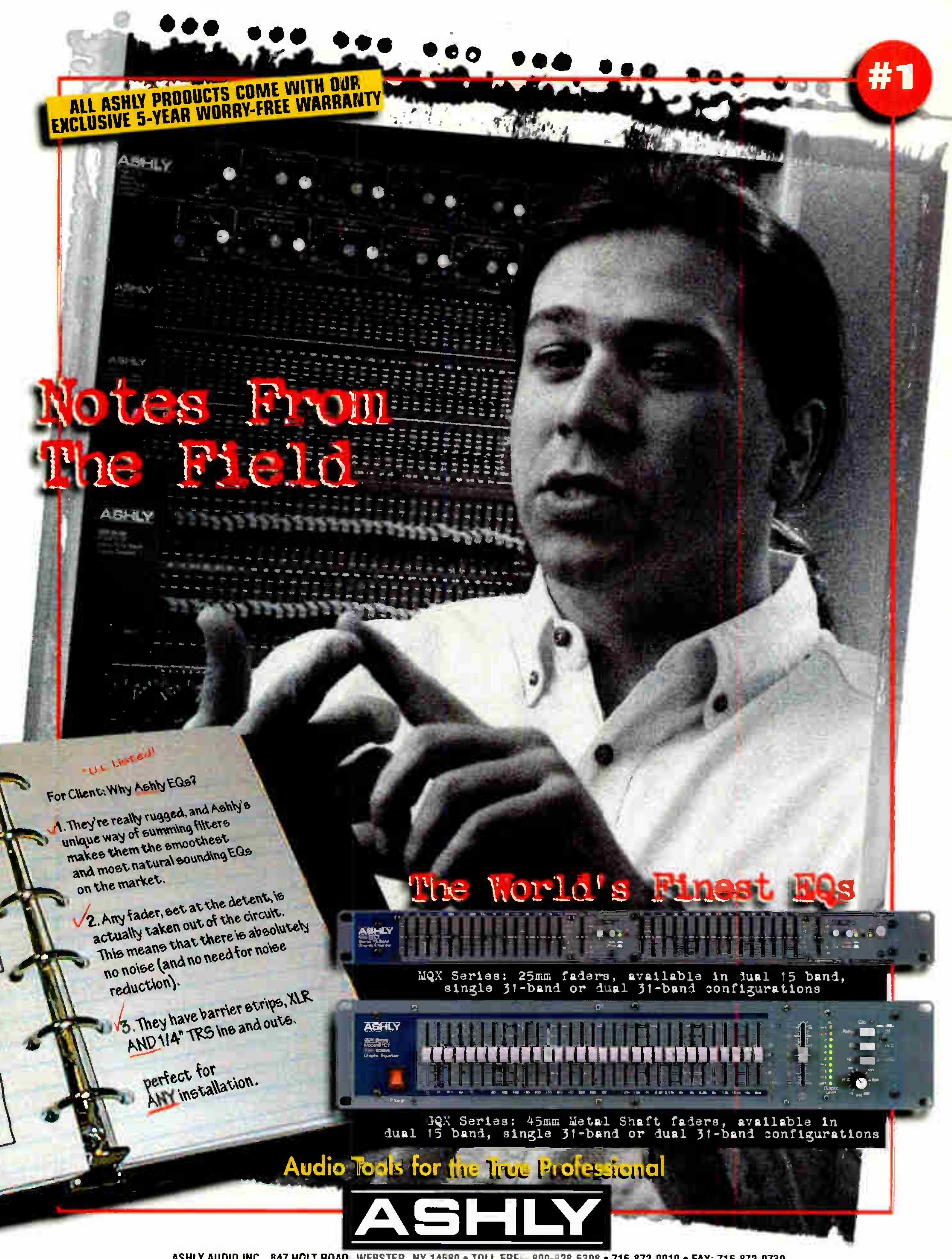
Nineteen eighty-four was also a year that saw plenty of buzz about new digital gear: Yamaha showed its high-end REV1 reverb; Lexicon's PCM 60 was the first pro-quality digital reverb priced under $1,500; and although it wouldn't ship until 1986, AMS previewed its AudioFile workstation. It's still in production today, which must be some kind of record in a world where the half-lives of digital products seem to be measured in nanoseconds.

1984

▸ Milestones
- Apple Macintosh arrives
- First U.S. CD plant: DADC, Terre Haute, IN

▸ Beginnings
- Akai M.I. Division
- Alesis
- ART
- Carver (Phoenix Gold)
- MMA
- Velodyne Acoustics

World Radio History



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World Radio History

1985: Dave Harrison (with arms folded) debuts the Series 10.

1985

Enter SoundDroid

Atari launched its $600 520 ST computer. With a half-meg of RAM, color graphics and mouse, it was the first serious computer from a company known mostly for games. But its built-in MIDI ports made the 520 ST attractive to software developers in the emerging MIDI music software market and with their customers—especially in Europe, where Macintosh computers were *very* expensive. With the arrival of the 1040 ST (1MB RAM), a new platform was born.

A group of Tektronix engineers formed Audio Precision, and the new company showed its System One, a PC-based audio test system, three- to ten-times faster than other systems on the market. System One soon became an industry standard.

Lucasfilm and Convergence Corp. formed The Droid Works and, under the design leadership of Andy Moorer, unveiled the SoundDroid™ workstation at the 1985 NAB show. Offering picture interlock, multitrack recording, sound synthesis, editing, mixing dynamics control, reverb and effects from a slick interface of touch-sensitive graphics screens, soft-keys, assignable knobs, moving faders and shuttle wheel, it was a spellbinding technological achievement. A year later, commercial systems were offered to the public, but The Droid Works' true workstation approach to sonic manipulation was years before its time, and none were ever delivered outside of Lucasfilm. The company folded a few years later.

Alesis and ART showed the first under-$1,000 digital reverbs: The ART DR2 was based on the MXR 01a, had seven room types and was priced at an attractive $995; months later, Alesis unveiled the XT Reverb ($795) with two programs. The days of affordable DSP had finally arrived...

Digidesign introduced Sound Designer, a program that allowed editing and manipulating of samples from an E-mu Emulator II using a Macintosh computer. The program also offered FFT analysis, digital EQ/mixing/compression, FM and waveshaping synthesis, and waveform redrawing using a mouse. Years later, Digidesign would bundle Sound Designer software with

1985: Droid Works SoundDroid

Congratulations, Mix, from Group One Ltd., and all of our manufacturers!!!

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1985

▶ **Milestones**
Atari ST launched
First under-$1,000 digital reverbs

▶ **Beginnings**
Apogee Electronics
Audio Precision
Cooper Sound Services (Cooper Sound Systems)
Droid Works
Korg USA
Manhattan Production Music
Music Industries Corp.
Opcode Systems

▶ **Anniversaries**
50th—BASF/AEG Magnetophon (first tape recorder)
25th—Sony's first U.S. operations
25th—Cetec Vega (Vega)
25th—Korg Inc.

its hardware for the Mac II family of computers and call it Sound Tools.

Ten thousand audio pros packed the New York Hilton for the fall 1985 AES show, and it was a whopper! To counter the growing DASH recorder market, Mitsubishi, Otari and AEG joined forces and announced the PD (ProDigi) standard for 32- and 2-track recorders. Otari's DTR-900 came out a year later.

Calling it "the world's first totally automated console," Harrison unveiled the Series 10, a digitally controlled analog mixer with SMPTE-driven moving fader automation and instant reconfiguration of all levels, pans, EQ, dynamics and signal routing. Over the years, it would be refined into the Series 12, still in production today.

On a slightly less grand scale, another major console debut at AES was Yamaha's PM3000; both it and the later PM4000 would become standards in live and concert sound work for years to come. Another perennial workhorse to come out of AES was Lexicon's PCM 70 digital effects processor, which offered the most extensive MIDI manipulation possibilities of any outboard device available at the time.

1986

Digital or SR?

In January Apple debuted the Mac Plus, a 1MB computer with SCSI support and a 9-inch screen. Retail? $2,600!

At AES Montreux in March, Mitsubishi showed the X-86 2-track and began delivering the second-generation X-850 digital 32-tracks. However, Dolby stole the show by announcing Dolby Spectral Recording (SR), a process designed to improve the quality of analog recording. The SR hardware was pricey ($750/channel), but it suppressed modulation noise and provided a dynamic range exceeding that of 16-bit digital systems, giving analog fans something to smile about. Studer later showed its A820 top-of-the-line analog 24-track, which included onboard slots for Dolby A or SR cards.

Yamaha hit a home run with its SPX90, a programmable effects processor with 30 preset sounds and 60 user slots. At $745, it became standard in touring and studio racks for years to come.

After years of development, AMS delivered AudioFile, a disk-based recording/editing system. Built into its front panel control surface was a monochrome CRT, 13 user-definable soft keys, dual thumb wheels and a QWERTY keyboard. Retail was in the $40-50k range, depending on options and storage needs.

1986: Lexicon CEO Ron Noonan introduces the Opus.

In June, Intel shipped its 386 processor, finally putting some punch under the hoods of PCs.

Trident showed the Di-An digitally controlled analog console. Its assignable design included features such as storage for four EQ settings per channel and a slick "auto gain" function that automatically set preamp gain during run-throughs. Sales were dismal; Di-An never became the success it should have been.

Akai's S900 sampler was 12-bit, but its affordable price ($3,295), quality audio and great library (which later grew to mammoth proportions) appealed to the musician/studio market, while the post-production community loved it for effects triggering.

Rupert Neve founded Focusrite to develop high-performance circuits, beginning with the ISA range equalizer and mic preamp modules. Focusrite eventually developed large consoles based on the modules and continued with its acclaimed Blue and Red Range outboard processors.

Otari's MX-80 is a 2-inch analog recorder, designed for the smaller facility or home/project studio market. It was available as a 24-track, but the 2-inch, 32-track version spawned a new format.

Founded by engineer Bruce Jackson and former Soundcraft U.S. president Betty Bennett, Apogee Electronics debuted at AES with its 944-G and 944-S filters, which improved the performance of digital recorders. Within a year, Sony approved the use of Apogee filters in its PCM-3324. Otari followed, and Mitsubishi offered the filters as a factory option. Apogee later offered a Low-Jitter Clock module and a popular line of outboard converters.

Lexicon unveiled Opus, a disk-based, 16-bit, digital 8-track recorder/editor with a hardware mixer and, no surprise, extensive signal processing capabilities. It was a stunning achievement, but the staggering development costs of the system eventually put an enormous financial strain on the company. Years later, after focusing its efforts solely on signal processing, Lexicon recovered and prospered.

Soundtracs' PC-MIDI console was the first mixer to feature MIDI-based mute automation. More upscale (a *lot* more upscale) was Neve's first V Series board, a 48-bus console featuring Neve's Formant Spectrum EQ, Master Status controls for input/output/fader setups, split or in-line operation, eight mono/four stereo aux sends and optional Necam 96 moving fader automation. The V Series was enormously successful and became the cornerstone of Neve's high-end analog designs for years to come.

1986

▶ **Milestones**
Dolby SR introduced
R-DAT spec announced

▶ **Beginnings**
AKG acquires Ursa Major
AudioControl Industrial
JBL acquires Soundcraft
Mackie Designs Inc.
Focusrite
Sabine
Sonic Solutions

▶ **Anniversaries**
50th—Telex
25th—Gold Line

World Radio History

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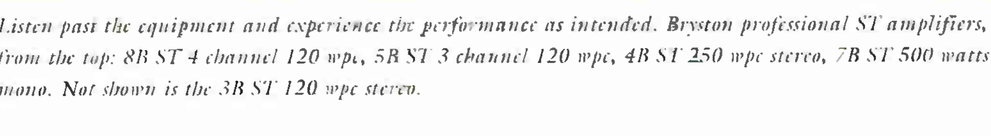

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World Radio History

Optical Media International's "The Universe of Sounds" was the first CD-ROM for pro audio use. Touted as "having the capacity of 1,000 floppy disks," it was a $1,200 single-CD collection of samples for the Emulator II. The Sony CD-ROM drive that went with it was $2,000. Overall, it was an expensive proposition, but as with all revolutions, you gotta start somewhere. OMI later went on to create TOPiX, its seminal CD authoring system.

1987

The Mac Gets Serious

Apple announced the Macintosh II, featuring a 16MHz, 68020 processor. It was $5,500 with 1MB RAM and a 40MB hard drive, but its open architecture with NuBus slots opened the way for a new era in audio.

At NAMM, Alesis issued a new challenge with its 16-bit, 16-preset MicroVerb at $249. Ten years later, the NanoVerb would drop to $179.

Founded in mid-'86 by former Droid Works execs Bob Doris, Jeffrey Borish and Mary Sauer, Sonic Solutions opened its San Francisco offices in early 1987 and began offering NoNoise®, a Mac-based system for removing hiss, noise, clicks and pops from recordings. The company's initial plans included licensing the technology, with an emphasis on remastering analog recordings for reissue on CD. Later Sonic Solutions would expand into 2-channel and multichannel workstation development. Four years later, they unveiled the first 24-track editing/mixing workstation and subsequently developed the first DVD premastering system.

After years of squabbling over whether the new home digital audio tape format would be based on stationary (S-DAT) or rotary (R-DAT) head technology, the latter won out. *[As S-DAT machines never went into production, there was no need to refer to DAT decks as R-DATs, but even today the "R-DAT" term lingers on.]* The first R-DAT recorders started arriving in America as gray-market goods, but the first professional DAT deck—Sony's PCM-2500—was still months away.

At the fall AES, SSL showed its SL4000-G console, with expanded power, better sound and improved functionality, including mix automation storage to removable 20MB cartridges. It was an impressive accomplishment, but what I liked about it most was the full-size QWERTY keyboard that replaced those horrible little round keys found on earlier SSLs.

WaveFrame unveiled the AudioFrame, providing editing, recording, music synthesis, signal processing and mixing. Based on the IBM PS/2 platform, it offered some radical new

1987

► **Milestones**
Apple intros MacII
First consumer DAT decks

► **Beginnings**
Aurasound Pro Audio
Digitec France
Pelonis Sound & Acoustics
Spectral
Systems Development Group
Tech 21
Viking Audio

► **Anniversaries**
100th—Nippon Gakki (Yamaha)
25th—Bryston Ltd.

From one twentysomething to another...

Furman offers its sincere congratulations to *Mix* on its "coming of age". And *Mix's* anniversary reminds us that we were a young company, too, in the mid-Seventies. Like *Mix* we've come a long way since then—from the introduction of our first product, the now-legendary PQ-3 Parametric Equalizer/Preamp with the green front panel and red knobs, one of the very first rackmount, studio-quality products aimed at the MI market.

A decade later we introduced the first of our pioneering AC power handling products, the PL-8 Power Conditioner and Light Module. Our first TEC Award nominee, the PL-8 and its many successors went on to become ubiquitous in rack protection and illumination, just about everywhere.

Two decades later our IT-1220 Balanced Power Isolation Transformer is another TEC nominee, and our company makes over 50 other Audio Signal Processing and AC Power products, and is the recognized leader in power conditioning and distribution for the pro audio industry. We invite you to contact us or visit our web site for the full Furman story.

the original PQ-3, 1975

the IT-1220, 1997

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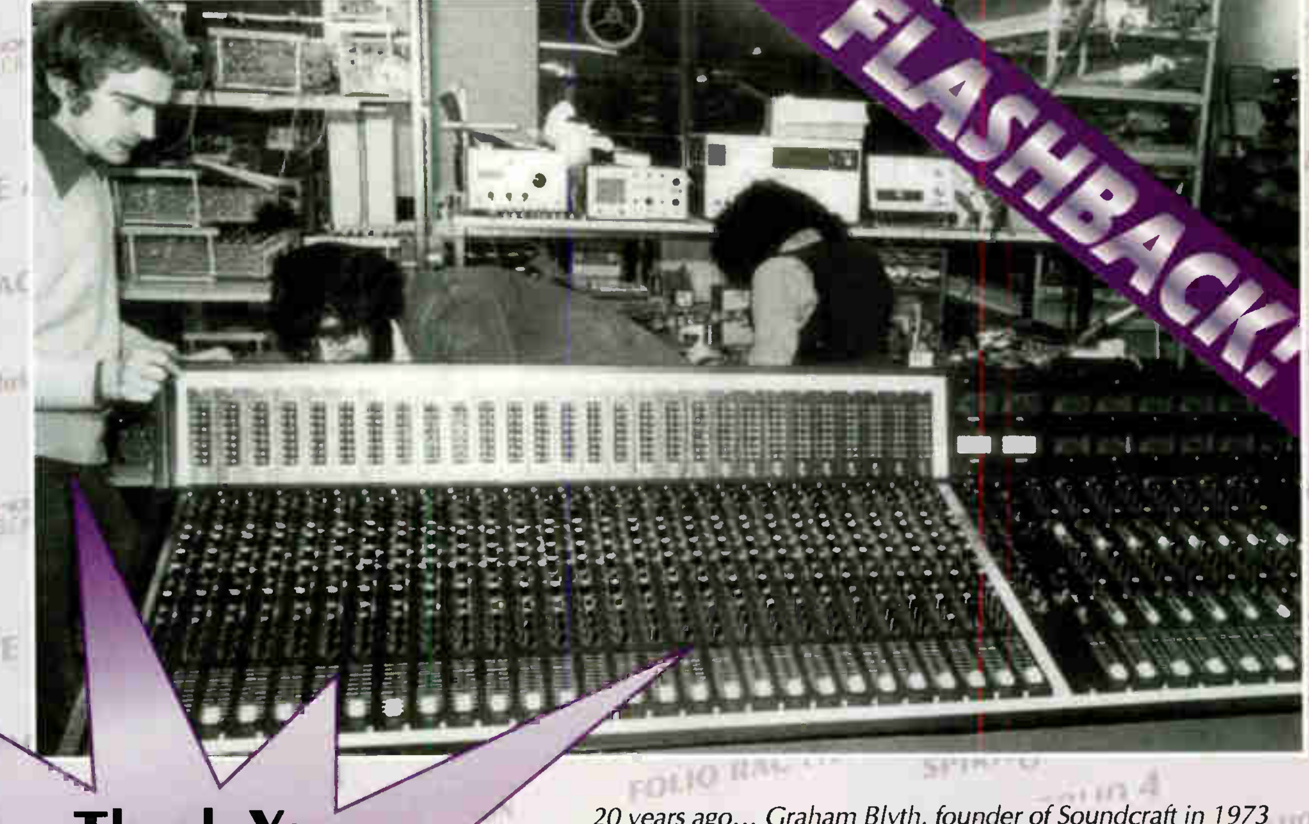

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20 years ago... Graham Blyth, founder of Soundcraft in 1973 and now Spirit's chief Guru, is shown here snooping behind the meterbridge of his latest creation!

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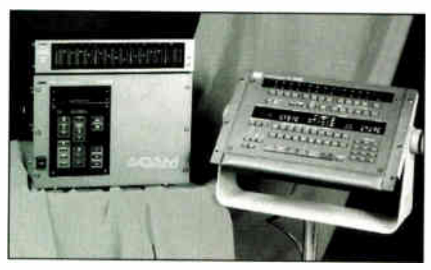
approaches, such as a fixed sampling rate architecture, which permits pitch changing of sounds without affecting the sampling rate.

1988: The Euphonix Crescendo arrives.

1988

DAT Settles In

No consumer DATs were officially delivered Stateside, due to the RIAA's attempts to legislate requirements for copy-code circuits in DATs to prevent the duplication of copyrighted material (i.e., CDs). However, DATs that were deemed "professional" were allowed into the country. CBS later encouraged the adoption of a copy-protection system based on a deep (but narrow-band) notch in the upper midrange—effectively a "slice" out of the music—but a National Bureau of Standards study found it audibly unacceptable.



1988: A-DAM, the first MDM.

At Paris AES, Akai unveiled its A-DAM (Akai-Digital Audio Multitrack), which stored 12 tracks on 8mm videotape in an 80-pound, rackmount chassis. A-DAM was the first machine to use the modular digital multitrack approach, whereby multiple A-DAM transports could be slaved for 24- or 36-track operation. It was priced at $30,000+, but compared to the $100,000+ prices on reel-to-reel digital machines, A-DAM was an affordable alternative.

A new standard was launched: the MADI digital transfer protocol for carrying up to 56 channels of digital audio between two devices. The amazing thing about MADI was that rivals such as Neve/SSL and Sony/Mitsubishi took the initiative upon themselves for the good of the industry. It doesn't happen often enough.

Yamaha's DMP7D ($5,995) was a digital I/O version of the popular DMP7 mixer, with optional outboard converters for transferring from/to DASH/PD/AES/S-PDIF. Upon its release in 1988, *Mix* asked the question: "So when will Yamaha release the 56-input version of the DMP?" Seven years later, Yamaha responded with the 02R.

Panasonic debuted its SV-250 (portable) and SV-3500 (rackmount) DAT machines for the pro market. Both were essentially modified consumer decks but went on to become best-sellers. A few years later, the SV-3500 was replaced by the SV-3700—Panasonic's first "real" pro deck—which became one of the most common DAT models in studios.

Tandy announced the THOR erasable CD system, with the promise of under-$500 CD recorders and $25 media. It was absolute vaporware, impossible to do based on 1988 technology, and never went anywhere, but lots of press about THOR caused CD player sales to plummet as millions of consumers postponed buying systems until the "recordable" ones came out.

Digital was THE buzz word at the fall AES show: AMS launched its digital mixer series with the Logic 1, which could be used alone or incorporated with an AudioFile for a complete digital domain workstation. Integrated Media Systems debuted Digital Dyaxis, a hardware-software system that combined with a Macintosh to form a 2-track recorder/editor. Eventually, Dyaxis took a sizable share of the stereo workstation market and then expanded into full-blown multitrack system with disk-based video.

Sony began shipping PCM-3348 48-track recorders, employing thin-film heads to put 48 tracks on the same ½-inch tape used on 3324s. As the 48-track machine could play back tapes made on 24-track DASH recorders, projects could be started on a 24-track machine and finished on a 48-track system for access to tracks 25-48. The machine was $240,000, but sales took off like a rocket.

Euphonix, a young start-up company, showed up at AES with its first Crescendo console. The prototypes were rough, offering Macintosh, Atari(!) and PC-AT interfaces for viewing, editing and storing automation data. However, the approach of combining a digitally controlled analog mixer with a central control area—where equalization, panning and aux sends could be manipulated without leaving the sweet spot—and onscreen displays of EQ curves was right on the money. In years to come, Euphonix rose from obscurity to become a major player in the console market.

1988

▸ Milestones
Akai A-DAM: First MDM
MADI standard proposed

▸ Beginnings
Audio Technology (Audio Toys Inc.)
CAD Professional Microphones
Cedar Audio Ltd.
Doremi Labs
Euphonix
THAT Corporation

▸ Anniversaries
25th—Yorkville Sound

1989: Mackie CR-1604

1989

Digidesign, Meet Mackie

January 20, 1989: Nobody knew just how significant this day would turn out to be, as Digidesign unveiled Sound Tools, a Mac-based (SE or Mac II) system for digital recording and editing. Sound Tools combined hardware boxes (outboard converters and DSP) with its Sound Designer II software, and at $3,995, was just the ticket for editing tracks on those DAT machines that were showing up in studios everywhere. Eventually, Sound Tools was replaced by Digi's Audio-

World Radio History

media series of plug-in cards (still in production); the SD II file format became a worldwide standard, and Digidesign became the leading provider of workstations.

Bring on the low-cost mixers: Alesis previewed its Model 1622, a 16-channel unit that used "Monolithic Integrated Surface Technology" to achieve a breakthrough $799 price. Six months later, Mackie Designs—a new company formed by the founder of Tapco—responded with the CR-1604, another 16-channel design but in an all-metal chassis with an internal power supply and seven aux sends per channel. Deliveries didn't begin until much later, but the 1604 created a buzz that continues to this day.

Seeing the growth of the project studio as a threat to established businesses, a group of commercial facilities in Los Angeles formed HARP. The association lobbied for tougher enforcement of zoning regulations in order to hobble what they saw as unfair competition from unlicensed studios.

SSL unveiled ScreenSound, a multitrack disk recorder/editor and mixer designed for post-production, with onboard machine control of ATRs, VTRs, dubbers, laserdiscs and Quantel Harry systems. Functions were accessed via a pen/tablet interface.

With the introduction of the AT4031 and AT4051 studio condenser microphones, Audio-Technica began its move out of the *milieu* of garage band mics and into the realm of serious professional tools.

Thanks to the PC, acoustical tools became more affordable: DRA Labs MLSSA provided loudspeaker assessment, reverb time/decay, intelligibility analysis, energy-time curves and more—all from a $2,500 system (not including required 640K PC XT/AT).

Yamaha showed its DMR8, which combined a digital 8-track (expandable to 24-tracks) recorder and digital mixer with onboard signal processing. Its $30,000 price and proprietary stationary-head digital cassette formats prevented the unit from widespread acceptance, but its sparkling 20-bit reproduction was years before its time.

1990

Analog Rebirth

The talk of Winter NAMM was Opcode's Studio Vision, a digital audio sequencer that combined the MIDI sequencing of Vision with the digital audio capability of Digidesign's Sound Tools.

After many delays, Studer finally unveiled its D820-48 digital 48-track, expanding the growing dominance of the DASH format.

The hottest demo at AES was hearing the CEDAR (Computer Enhanced

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1990: High-output tapes and Dolby SR bring analog to the cutting edge.

Digital Audio Restoration) process perform real-time de-clicking, and scratch and crackle removal from a beat-up Paul Robeson 78.

Digital may have grabbed the headlines, but analog kept on improving. A new format was born: 1-inch, 24-track recorders incorporating Dolby S noise reduction were shown by Fostex (G-24) and Tascam (MSR-24S).

3M demonstrated its high-output 996 tape formulation, capable of +9dB operating levels with a S/N ratio of 79.5 dB. With the availability of better noise reduction—such as Dolby SR—and high-output tape formulations from 3M (followed by Ampex and BASF), producers and engineers began to re-examine the benefits of analog recording.

1990

- **Milestones**
  - Sony introduces writable CD
  - Philips announces DCC
- **Beginnings**
  - Aardvark
  - Digital Audio Labs
  - Digital Domain
  - Harman purchases DOD/DigiTech
  - WhisperRoom
- **Anniversaries**
  - 10th—Crown PZM mics

1991

Bring on the MDMs

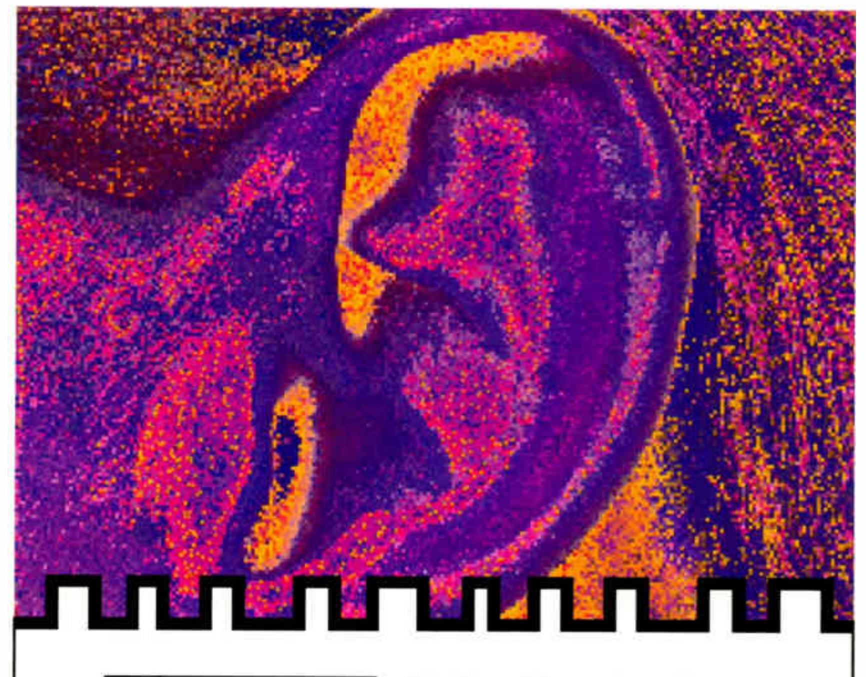
January 18, 1991: A surprise unveiling at winter NAMM would forever change the course of pro and semipro recording. The product was the Alesis ADAT: Capable of recording eight tracks of digital audio on inexpensive S-VHS tapes, it could be interlocked with other ADAT units to provide up to 128 tracks. Even more impressive was the original $3,995 price tag.

Although ADAT was still 14 months away from delivery, it had the effect of immediately bringing analog 8-track recorder sales to a halt. Affected most by the advent of ADAT, Tascam and Fostex began their own MDM development projects. No one could have predicted that Alesis would eventually sell 100,000 ADATs, but digital multitracking was no longer the realm of the rich and famous.

1991: Alesis ADAT

In April, Skywalker Sound began using Dolby AC-2 coding to transmit audio over T1 lines between its Northern and Southern California facilities, 450 miles apart. ADR would never be the same.

Spatial expansion and 3-D audio systems began catching on. The BASE (Bedini Audio Spacial Environment) had been in use for over a year; Roland was shipping its RSS system; QSound (offered on a royalty basis) had been used on projects from



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1991: Digidesign's Pro Tools

Madonna and Sting. Eventually the craze wore off, and spatial effects such as QSound software and Spatializer (which debuted later) became tools for occasional use, rather than abuse outlets for those in the "let's use this on *everything*" camp.

In exchange for ending digital manufacturers' opposition to the RIAA's proposed home taping royalties on digital gear, hardware manufacturers were mandated to include SCMS (Serial Copy Management System) on all consumer DAT decks. Professional gear was exempted, yet SCMS was included on some pro recorders, as some manufacturers feared litigation if consumers bought pro machines to avoid SCMS. Ironically, by this time, DAT was considered a failure as a home format, and the net effect of SCMS was to make it difficult for bands working on home digital equipment to create backup copies.

Responding to the growing project studio market, interest in near-field speakers took off. Tannoy enjoyed steady sales of its entry-level PBM-6.5 and PBM-8 models, and an influx of new monitors hit the streets, including the Audix MM5, Bag End ELF, Dynaudio PPM1, Electro-Voice S-40, JBL 4200, KRK Model 9000 and Peavey PRM-308. Perhaps prompted by the success of the 1991 Meyer HD-1s, a growing number of compact, high-performance powered monitors appeared, including the Genelec 1031, Quested 108 and Westlake BBPM-4. Today, there are dozens of powered reference monitors available.

Meyer Sound debuted its SIM® (Source-Independent Measurement) System, a revolutionary acoustical measurement technology. The result of an eight-year R&D effort, SIM took advantage of emerging low-cost, 32-bit floating-point DSP and 486 PC processing to analyze acoustic spaces during live performances with an audience present, using either music or voice as the test signal. It was unlike anything else on the market.

Digidesign made a giant step with Pro Tools, a Mac-based system that integrated multitrack digital audio recording/editing, DSP, MIDI sequencing and onscreen digital mixing. The platform supported 4 to 16 independent I/O channels, analog and digital I/O and SMPTE sync. Systems were

1991

▶ **Milestones**
- Sony develops MiniDisc
- Alesis ADAT introduced
- 3M intros high-output analog tape

▶ **Beginnings**
- Acoustical Solutions
- Level Control Systems
- Millennia Media
- SADiE
- Sonic Foundry

▶ **Anniversaries**
- 20th—Lexicon/Gotham Delta T-101: first commercial digital audio product

—CONTINUED ON PAGE 118

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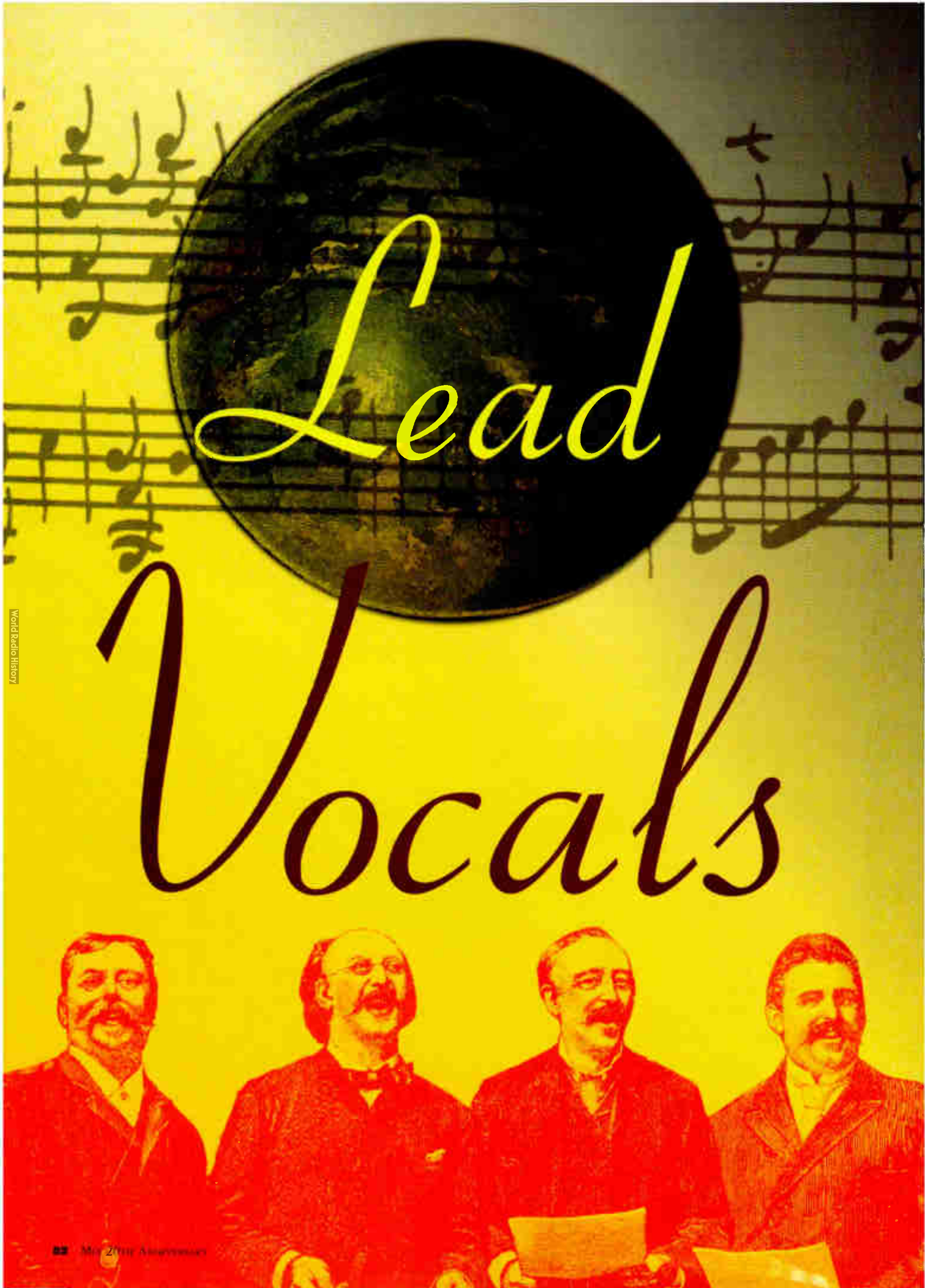

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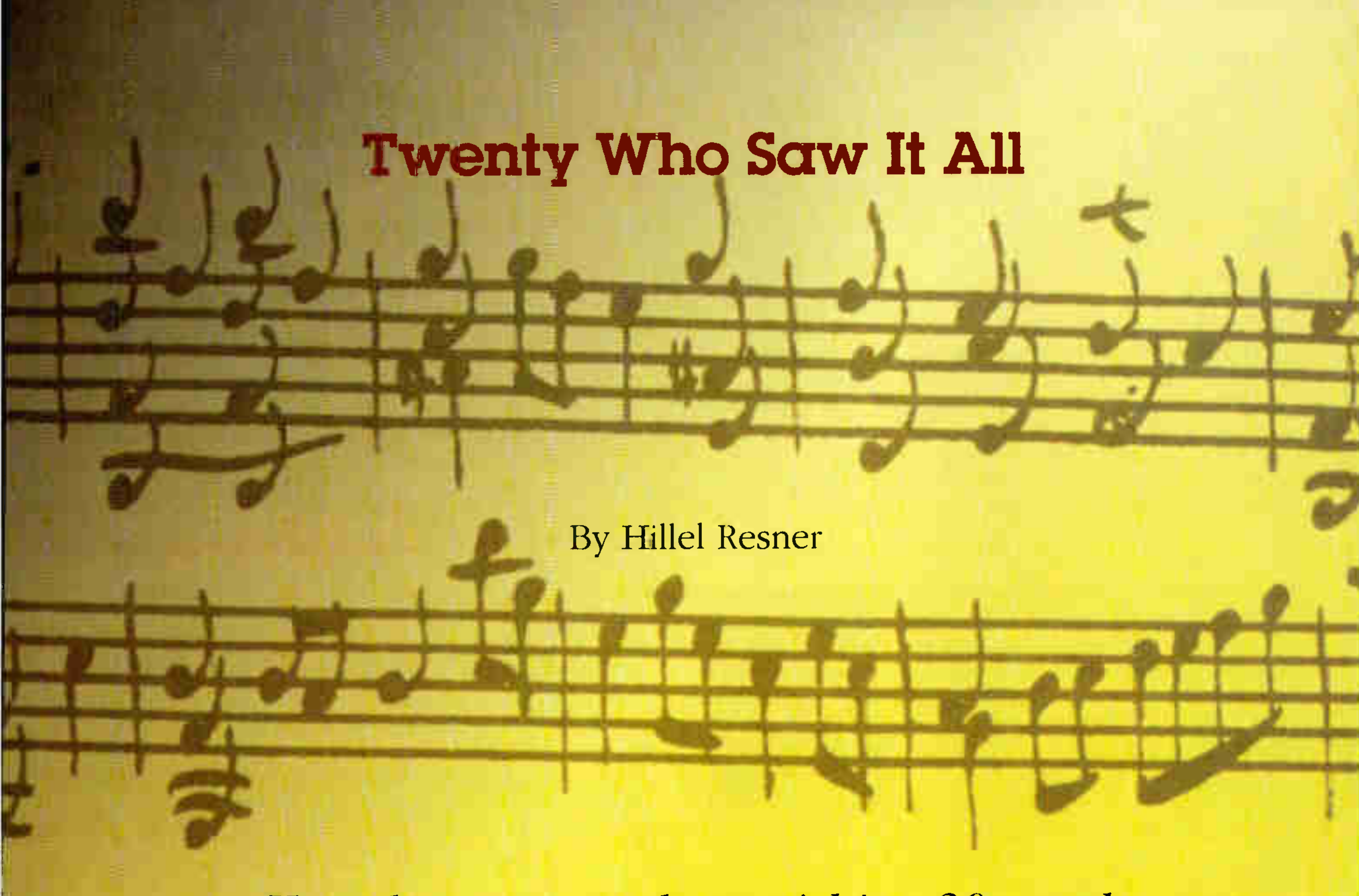
Twenty Who Saw It All

By Hillel Resner



How does one go about picking 20 people to represent the voices of change and progress in the recording industry over the past 20 years? Our industry has such a wealth of experience that you could probably pick 20 people for each *year* without too much difficulty. So we established some criteria to select our 20 subjects: First, they had to have strong opinions about things, and not be shy about expressing them. Second, they had to have had a special relationship with *Mix*, preferably dating back to early in the magazine's history—like Chris Stone, whom we first interviewed in our fourth issue, or Phil Ramone (issue 15), or Dave Angress, who was an audio retailer in San Francisco when *Mix* was a tabloid. Beyond that, they only had to have the time and willingness to answer a couple of questions.

We asked our subjects what changes in the audio industry during this time have had the greatest effect on their work, and in what way. We also asked them to tell us about a memorable experience they've had during the past 20 years. For reasons of space, we couldn't use everyone's answers to both our questions, but what we present here are pretty good snapshots from some eyes that have seen a lot!

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David Angress

Dave Angress goes way, way back with Mix. *As manager of Sound Genesis in San Francisco, one of the first successful pro audio retailers, Angress needed to get the word out. When* The Mix *came along, he immediately saw its value, and gave the magazine support when it needed it—in encouragement as well as advertising. Since then, Angress has built a successful career in sales and marketing with a number of leading audio companies, including AKG, Harman Pro Audio and Guitar Center, where he currently serves as vice president driving its pro audio, keyboard and computer business.*

"In those days it was a bunch of really small businesses, and the products came out of engineering solutions to very specific customer needs. It really wasn't built on any kind of business model, and it wasn't built on any kind of sound financial model, either. It was just a bunch of regional guys in a small community, making things happen together. And then it began to grow, with significant growing pains, into a real industry, and all the pressures you would have in any industry came to bear: financial issues, technology issues, how can you manufacture it better to get the cost down—all that stuff. And we're at a point now where obviously, it's a global industry. It's got real business underpinnings to it, and it's subject to all the same influences—positive and negative—that our entire global economy is subject to.

Angress sans specs

"Unfortunately, we do end up with some of the big business financial pressures slowing down product introductions and innovations, because big companies tend to start doing what's 'safe.' Happily, we still have those people who remember why we got into it in the first place and are still designing great products that support the music."

Betty Bennett

Betty Bennett first joined the audio industry in 1980 as receptionist/bookkeeper at the original offices of Soundcraft Electronics in Kalamazoo, Mich.

By 1984, Bennett had become president of Soundcraft U.S., overseeing the growth and acceptance of the British console manufacturer's products in the American market. In 1986, following Soundcraft's sale to Harman, Bennett, with Bruce Jackson and Christopher Heidelberger, founded Apogee Electronics, which has since become the premier manufacturer of A/D and D/A converters.

"Some of the biggest changes affecting my work have been the ways in which we communicate. We've gone from letters and telexes to fax and e-mail!

"In our industry, over the past 20 years, we've seen large, analog-based manufacturers caught out because they didn't have a digital division. Now digital has hit, and hit hard. Digital requires a whole new thought process. You can't just pull a group out of the blue; it has to be a mature team.

"Equally, companies that got into digital early ran into difficulties. The projects were so large, the time to market was so long and the technology moves so fast, that the resulting products were superseded virtually as soon as they were released. They were often too expensive and outdated."

Betty Bennett

Hal Blaine

Known with justification as "the world's most recorded musician," veteran drummer Hal Blaine has logged more studio hours than most tape recorders. His 50-year career has spanned every rock era and included sessions with everyone from Elvis Presley and the Beach Boys to John Denver and Frank Sinatra. Today, Blaine is still on the road and in the studio, most recently touring with mandolinist David Grisman, recording with a new band, Pink Noise Test, and others. His biography, Hal Blaine and the Wrecking Crew, *was published by MixBooks in 1990.*

"Twenty years ago was just about the time electronics were coming in—electronic drums—and a lot of guys started going to electronic music. And what happened was that a lot of people, to this day, are strictly using computers. They've got all the MIDI stuff and, and the CD-ROMs with all the drums and all the guitars and all the instruments—and that's how they're

Hal Blaine on the stand

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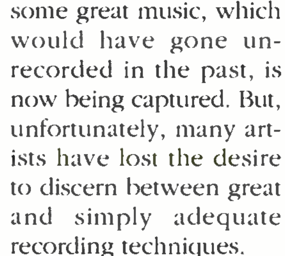
doing an awful lot of commercials today. And commercials were probably my favorite thing to do, because you went in and worked for an hour and got paid for several years after that! We used to do three, four, five commercials a day with Don Piestrup—and fortunately, whenever they do anything major or big band stuff, where they bring in live bands, he's still calling me. And from the time Herb Alpert and Jerry Moss started Alamo Sounds, about three years ago, they had a certain number of people who they signed that had electronic records, and they brought me in to put live drums on the electronic records."

Randy Ezratty

A "road warrior" since the early '70s, Randy Ezratty started his career in Los Angeles as an assistant to the legendary Paul Buff, then moved to Nashville as part of the original Allison Research team. After working for several years as a roadie and/or live sound mixer, in 1980 he started Effanel Music with the (then novel) concept of portable 24-track remote recording. Since then, he has recorded Peter Gabriel, Paul Simon, Bruce Springsteen, Sting, Tina Turner, U2 and countless other artists. His "crowning achievement" is L7, Effanel's new, expandable Neve Capricorn mobile recording studio.

"The biggest change in our industry has been the increased availability and economic viability of technology to the masses. You no longer need to be a seasoned professional to make decent recordings. This has been a mixed blessing. It pleases me that



some great music, which would have gone unrecorded in the past, is now being captured. But, unfortunately, many artists have lost the desire to discern between great and simply adequate recording techniques.

"My favorite project was Paul Simon's *Graceland Live*, recorded in Harrare, Zimbabwe in 1987. The combination of musical, cultural and social treasures that came together in one place and on one project reminded me why I chose to make live recordings."

Mark Gander at the bench

Mark Gander

JBL Professional has seen a lot of changes over the years since Mix *was founded, but one thing has stayed the same: the genial and thoughtful presence of Mark Gander. An electrical engineer by training and a sound reinforcement mixer in his own right, Gander has brought both creative imagination and soul to the world's leading loudspeaker manufacturer. Starting out as a transducer engineer, Gander served as VP of both engineering and marketing before assuming his current post as VP/strategic development. Along the way, he has given a lot of helpful advice and support to both* Mix *and the TEC Awards. Thanks, Mark.*

"In the '60s and '70s, technologies such as multitrack recording and synthesizers were exceedingly expensive and complicated. Only skilled engineers and the highest levels of creative artists could afford access to, and were able to take advantage of these tools. Technological developments, together with manufacturers both responding to and creating market demand, have greatly broadened access to these technologies.

Randy Ezratty with Mick Fleetwood

"In my specific field of loudspeakers, there really haven't been any revolutions, only evolutions of the basic concepts developed back in the '20s and '30s. We sometimes break up the audible spectrum into a few more ranges than we used to, and we take advantage of newer materials to reduce distortion and weight, but the basic physics and acoustic principles haven't changed. We've yet to find a radical new way to generate sound fields that doesn't also come with an unacceptable penalty in distortion or fidelity.

"The greatest potential for the future is in digital electronic control. The advent of analog processed systems in the 1980s indicated the improvements possible by more closely integrating the complete electro-acoustical transduction system. As sophisticated digital signal processing inevitably becomes more affordable, innovations such as wavefield synthesis, beam steering and flexible directivity control will become broadly available."

Herbie Hancock

One of the most accomplished and inventive musicians of his generation, keyboardist Herbie Hancock's career is a virtual chronicle of the developments in music technology over the past 25 years. Already firmly established as a jazz giant, his electronic explorations of the 1970s and '80s achieved a vast audience and helped legitimize synthesizers and sequencers as instruments of creative expression. At the 1994 TEC Awards, Hancock received the Mix Foundation's Les Paul Award for the creative application of technology.

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Herbie Hancock

"The obvious change is digital technology. That changed everything. As far as instruments are concerned, what made the switchover was the Yamaha DX-1. That was the first real digital instrument...The first digital instrument I had was a plug-in to the Macintosh, called the Alpha Centauri. As a matter of fact, I and Steve Wozniak were on the board of directors. Then, when the DX-7 came out, they folded the company. Then, little by little, all the other instruments started to become digital—even the Fender Rhodes became digital eventually.

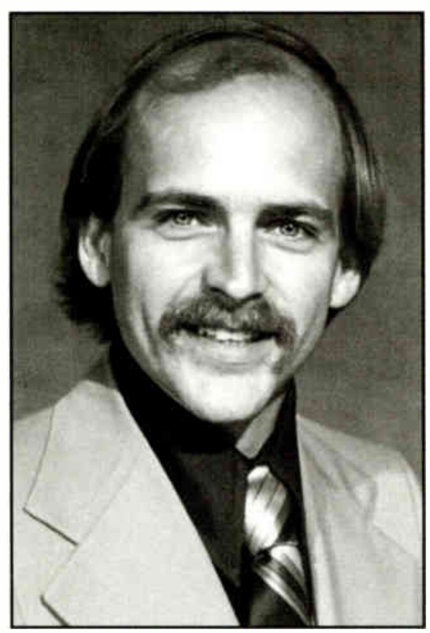
"Before MIDI came in, Brian Bell and I had a lot of stuff built to be able to have analog instruments talk to each other. And we were also involved in making sequencers, before MIDI came in. I remember actually using some of the stuff that we worked out, with the help of E-mu, so that I could do sequences on this keyboard, which had memory. On one of my records, called *Monster*, there's one tune that Santana played on, called "Saturday Night." In the middle of it there's this kind of Latin brass ensemble thing, and I had programmed this sequence in there to play all these instruments...I'd start a sequence by hitting the key command, and once that started I'd hit the key command for the next sequence, and they would follow seamlessly—and that was a new thing. I had done all that in my [home] studio, and when it came time to record I took all my instruments to this recording studio, and when it was time for this thing to come on, I pushed this command and sat back and watched it play. And the engineer, Fred Catero, his eyes bugged open—he couldn't believe it."

Christian Haseleu

Chris Haseleu is associate chair of the Recording Industry Department at Middle Tennessee State University, one of the oldest and most respected programs of its kind in the country. Before joining MTSU in 1978, he worked as a mastering engineer at GRT Records. In the late '70s and early '80s, Haseleu also co-wrote (with Dennis Buss), a column on studio operations for an obscure West Coast magazine called The Mix.

"Without a doubt, the change that has had the biggest effect on my work has been the acceptance by the industry of the need for education in audio. Twenty years ago, there was only a handful of programs that covered the recording industry; the first *Mix* education listings, in 1981, showed less than 80 educational opportunities. Now, the *Mix Master Directory* has over 350 listings in its education section. In my case, the program I joined in 1978 with 60 students now has over 1,100!

"Over the past 20 years, I have been involved in the design and construction of four different recording studios. My favorite was the second project, which was a small mixing control room. Because it was a fairly small project, and because it was being paid for by funds from a center of which I was the director, I had the opportunity to get very involved in every aspect of the design and construction. I worked closely with Bob Todrank, the designer, and together we built a really fine-sounding room. This room, completed in 1987, has been used to train hundreds of students, many of whom are working in the industry."



Christian Haseleu

Leslie Ann Jones at the board

Leslie Ann Jones

A recording and mixing engineer for over 20 years, Leslie Ann Jones began her career in Los Angeles, and in 1975 moved to San Francisco to join the staff of The Automatt. There she worked with such artists as Herbie Hancock, Bobby McFerrin, Holly Near and Narada Michael Walden, and on the film score of Apocalypse Now. *From 1987 to 1997, Jones was a staff engineer at Capitol Studios, where she worked with a wide range of top artists and on numerous films and television shows. Back in Northern California, she is now manager and mixer at Skywalker Sound's scoring stage.*

"Digital audio has had the greatest effect on my work, both good and bad. *Bad* because of the proliferation of inexpensive digital formats that make recorded music sound, shall we say, not so good? And *good* because those formats seem to drive people to invent really good formats and converters! *Bad* because the inexpensive cost of technology has made it possible for the marketplace to be deluged with more music than it can support, and *good* because it's so flexible.

"It's hard to pick just one favorite project, but a more recent one was the first time I worked with Peter Matz, the

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A compressor with a brain. A little twisted? Maybe.

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great arranger and orchestrator. I had been a big fan of his work since I was first introduced to it as a child by my mother. When I got a call at Capitol to engineer a new TV pilot, and the composer and arranger was Peter Matz, I was thrilled and a bit nervous. After recording one cue, Peter came in to listen, conferred with the director and walked out without a word to me. Later, after we were finished, I commented about this and he said, 'Why should I say anything? It sounded like it was supposed to.'"

Al Kooper

From his classic riffs on Dylan's "Like a Rolling Stone," to his ground-breaking work with the Blues Project and Blood, Sweat & Tears, as well as the Platinum hit Super Session, *Al Kooper has helped to forge the history of progressive rock. Kooper has also made a name as a producer, with artists like Lynyrd Skynyrd, Was (Not Was), Nils Lofgren and B.B. King, and scored soundtracks for film and television. A recent resident of Nashville, Kooper is moving to Cambridge, Mass., to teach at Berklee College of Music.*

Al Kooper

"I would say that the most important change that's taken place has to be digital mastering. It has helped me to realize my original vision all the way through to the consumer, unhampered by sonic roadblocks. Anyone who continues with analog mastering in this day and age has got to be misinformed or nuts!

"The most rewarding project for me in the last 20 years was the recording of my last album, *Soul of a Man.* Ostensibly a fiftieth birthday party staged at the Bottom Line in New York City, it turned into a re-creation of the three bands in my life—Blues Project, Blood Sweat & Tears and The ReKooperators—with a total of 27 musicians participating. Like a musical autobiography spread out over two CDs, it tells my whole story in words and music, captured forever in the digital domain. The record company, in an unthinking moment, has condensed it down to one disc for re-release, but even that can't destroy the satisfaction of those original three nights in 1994."

Steve Krampf

A true industry visionary and a supporter of Mix *from its earliest days, Steve Krampf, as the first Tascam representative appointed in the U.S. (1974), was responsible for evangelizing cost-effective 8-track recording for musicians. From 1978 to 1986, Krampf was vice president of sales and marketing at Otari, where he introduced the popular MTR-90 24-track recorder. Since 1991 he has held the same position at Lexicon, where he has worked to expand the company's DSP base with the PCM 80. Articulate and soft-spoken, Krampf is also one of the best-dressed people in pro audio.*

"First, the Tascam revolution, pioneered by Yoshiharu Abe, provided access and control of production equipment to a logarithmically broader base of people than in millennia before. While the high-end studios and suppliers initially 'freaked,' they later saw that the strong survived better than ever. After that came MIDI and the overall education effort; one needed the other for critical mass. The result was a generation of multitalented, multidisciplined artist/producers that ended any delusions I had of a triumphant return to the studio as a music producer!

"The project or job that gave me the greatest personal satisfaction was working for Otari, doing something that most everyone said we did not have a chance to do, with the likes of Ampex, MCI, Studer and 3M in the marketplace. I enjoyed working with a company that was committed to supporting an insurgency into a market niche, as well as a high degree of customer satisfaction. And discovering my

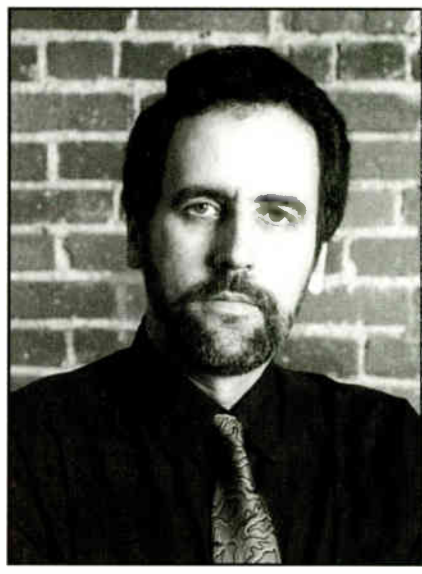
Steve Krampf, 1982

art—identifying and leading both engineering and salespeople who wanted to make a significant contribution to the industry."

Mel Lambert

A pioneer of the audio industry trade press, writer and consultant Mel Lambert's 22-year career has included an eight-year stint as editor of Recording Engineer/Producer, *as well as a lengthy association with* Mix *and other magazines as a writer and contributing editor. Currently, in addition to writing, Lambert operates Media&Marketing, a consultancy service for the pro audio and multimedia industries.*

"Dramatically improved means of communication, including desktop publishing and the Internet, have enabled people in our industry to become better informed about new tech-



Mel Lambert circa RE/P

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nical developments, thereby increasing their profitability and efficiency.

"For recording and production facilities, the biggest thing is the democracy of the technology that we have available now. It's both more affordable and higher-quality. And what we have are people who have the skill sets and can now use different tools to offer a wider range of audio production services to a wider range of clients. But it's all audio, it's all about getting the product finished, whether it's a wedding video with good sound quality or a full 5.1 DVD. People have to be more clever, but the tools are also there to make them clever.

"Joining the crew at *RE/P* in 1980 is an experience I will always treasure. I had visited the U.S. on several occasions during the late '70s, but I wanted to experience the culture up front and personal. At that time, Marty Gallay's book was the leading pro audio bimonthly magazine, and I was honored to be asked to come to California to edit the magazine."

Rose Mann booking time

Rose Mann

If you say "Rose" in the recording industry, you must mean Rose at the Record Plant. For 20 years, with only a couple of brief stints elsewhere, Rose Mann has held things together at L.A.'s most famous studio, keeping the studios booked and the clients happy. Rose's photo, a picture of her at the console, graced the Plant's first listing in The Mix *in February, 1978.*

"There've been monster changes. First of all, the cost of equipment has gone through the roof, and every year we have to upgrade something. And every year it's what we call an extraordinary expense. If it's not a new board, it's new patchbays or new monitors or new amplifiers. I just spent $25,000 for new carpeting. A place like Record Plant, it has to be run like a five-star hotel. I've got to keep it nice.

"The other thing is, records are made differently now. It used to be that there was one producer on an album, and there was one mixer. Now, you've got up to six or seven producers on an album, and that means six or seven engineers. And six or seven engineers usually means it gets recorded at six or seven studios—so the album's spread out all over town and you don't get the whole project.

"Also, engineers have got so much equipment that they come with now, and with all this technology it's gone from a one-hour setup for a mix date to a three-hour setup. A guy will come in with a bunch of stuff and it's not in

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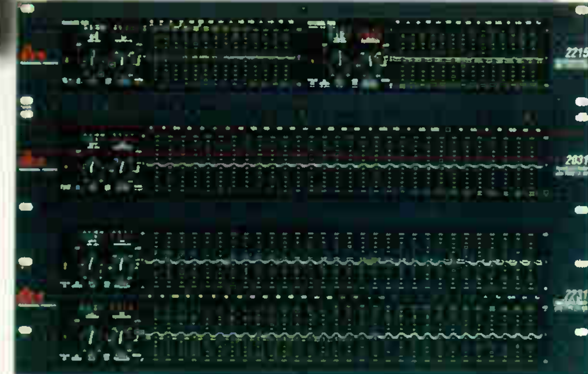

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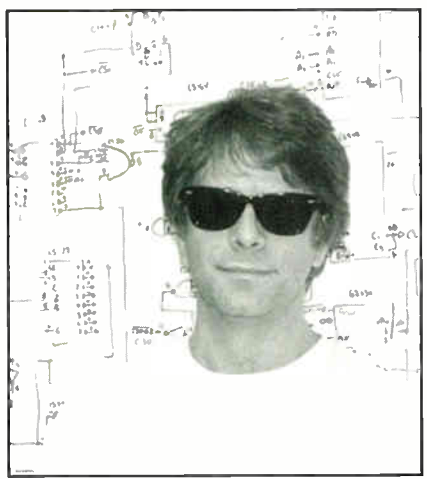
a rack, and he wants the studio to set it up. So do you swallow those three hours or do you bill it? I bill it!"

George Massenburg

Professional audio's Renaissance man, George Massenburg's 30-year career has encompassed nearly every aspect of the industry—from engineering and producing for records, film and television and designing and operating studios, to breakthrough electronic developments as the founder of GML Inc. A Grammy-winning engineer and a 1990 inductee to the TEC Awards Hall of Fame, he is as passionate about music as he is about technology.

"I think audio has sunk to a great low with the takeover of the CD, in the sense that we came from a great, warm and safe medium that made us want to go home and put on a record, and I don't love to put on CDs—I can't relax and listen to a CD...With the CD, another style of recording has emerged. It's extremely clear and dimensionless, but it doesn't have any depth, because CDs don't hold depth and detail. What I'm looking for is a step forward in resolution.

"I've gone back to recording analog, and I like it a lot better. What I'm trying to do is have some material that I can remix at 96 kHz—because right now, with 44.1, it's a brick wall; I can't come back and rework that in a couple of years when I want to remix a multichannel 96k master. That's one of the reasons I'm going back to analog—to have something that's wide-band and feels good.



George Massenburg

"Technology is moving ahead very quickly, things are evolving very fast. But looking at history is a much bigger picture, and looking at the role of the artist in the 17th, 18th and 19th centuries, I don't see things being much different than today—that the artist is there to connect life to what is bubbling beneath the surface in all of us. These little voices in all of us take flight, they're illuminated by the artist who can really tell the truth. It's that connection with the sense of art beyond commerce that I think is important to get back to."

Hank Neuberger

The executive vice president and general manager of Chicago Recording Co., Hank Neuberger began engineering at CRC in 1976. He has worked with "every great artist in Chicago" and won a Grammy for Tribute to Steve Goodman *in 1987. A past national chairman of NARAS, Neuberger has supervised the Grammy telecast sound for the past seven years. A great communicator, he speaks as deftly as he engineers.*

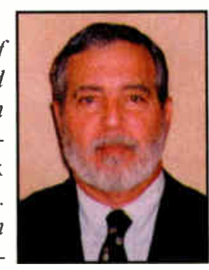
"MIDI and modular digital multitracks (ADAT, DA-88) have transformed the music and the business of recording it. On the plus side, more people in more places are recording more music than ever before. On the down side...don't get me started; at least we're still here!

"In 1980, Steve Goodman was producing his good friend John Prine for the first time. After recording and mixing the entire *Bruised Orange* album, I've always felt I was just lucky to be there for this indisputably great songwriter's (to me) greatest album. Being around two master songwriters taught me how writers treat their songs much like children, nurturing them carefully and fretting over letting them out into the world—a good lesson for every engineer."

Hank Neuberger—EQ this!

David Oren

A sage observer of both technology and people, David Oren has been an unofficial guru to Mix *since the early '80s. A 30-year veteran of the audio industry, Oren served as sales and marketing manager for multitrack products at TEAC, introducing such innovations as the 3340 4-track recorder to the U.S. As product development manager at Tascam, Oren worked on the development of the first Portastudio, the 80-8, the first 1-inch 16-track, and multichannel mixer design and development. He has also worked in product development for both Fostex and Alesis. Doubtless, he has influenced your life as he has ours.*



"Over the past 20 years, we've seen the development of new manufacturing processes and technologies that allow manufacturers to offer products at a fraction of their original cost in today's dollars. At the same time, the typical audio production system has progressed from microphones, a mixer and a recorder to one requiring provisions for MIDI and timecode synchronization, plus a mixer capable of handling the increasing number of electronic voices and other media sources.

David Oren

"This evolution has made the job of product development and marketing more difficult, because companies now have to develop a broader range of products to suit the needs and sophistication of a broader spectrum of customers. While I want to add all the features and functions that the user

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needs, the primary design goal is to develop products and technologies that enhance the creative process, with intuitive operation—that is, for technology to support art, not get in the way of art.

"I would have to say that it was more fun at the beginning of the 'multitrack revolution,' in a quieter and gentler time when companies and product concepts were developing. The personal rewards are just as great today, but in a 100-million-dollar company or a startup today, you can't do the things we did in a startup 20 years ago—like picking the color for the brand logo from a Sambo's menu!"

Alan Parsons

From his earliest days as an assistant engineer to George Martin on The Beatles' Abbey Road, *Alan Parsons has lived on the cutting edge of recording technology. Catalpulted to fame for his engineering of Pink Floyd's* Dark Side of the Moon, *Parsons went on to record numerous best-selling records for Al Stewart and others. In 1976, he founded the Alan Parsons Project, achieving a new level of renown as an artist. Since then, he has continued to break new ground as both an engineer and artist and has recently been touring in support of his latest album,* On Air. *In 1995, Parsons received the Mix Foundation's Les Paul Award for the creative application of technology.*

Alan Parsons (right) with Eric Woolfson

"The most obvious change was the introduction of black boxes. Even when I was doing *Dark Side of the Moon* back in '72, there were no effects to speak of, other than echo chambers and tape machines. Every effect that you wanted to achieve was essentially created with a combination of tape machines and room acoustics. Then, suddenly, "bucket brigades" came along—that's what they called delay circuits back in those days. Suddenly we were able to delay sound without tape. And no sooner had that happened than somebody figured out how to create a Doppler effect. Then we had chorusing, and then pitch-shifting. And I remember distinctly people saying, they'll never be able to achieve that—you'll never be able shift pitch in real time, that it could only be done by recording it first and playing it back at a different speed.

"Actually, at Abbey Road I worked with the very box that was used on *2001: A Space Odyssey*—the thing that slowed down HAL's voice when it was singing "Daisy," and I remember thinking, 'God, if this could only be a real-time process!' And a couple of years afterwards, it was."

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Phil Ramone

For recording professionals, and most music listeners as well, the name says it all. Since first exploding on the pop scene in 1963, Phil Ramone has worked his producer's magic on the greatest performers of our time—from Billy Joel, Paul Simon and Gloria Estefan to Barbra Streisand, Frank Sinatra and Paul McCartney. Ramone has always embraced technological change and has been a pioneer in digital recording, Dolby film sound formats and EDNet, among other milestones. He was inducted into the TEC Awards Hall of Fame in 1992.

"I think what people didn't understand, back when we were making analog multitrack recordings, and we went from tubes to transistors, what a major change that was. We lost warmth, we lost a lot of things. But on the other hand, we gained a different phase of technology, and I think one of the keys to changes in technology is to make it work for you, rather than you work for it. Good mic technique has to be brought back into the 16-bit situation. And utilizing the room to make things happen for you, using proper reverbs, carefully attaching your EQ to what the final product is going to be. It's up to you to make it warm.

"I'm very much a believer in the fact that the next phase of engineer that I want to see is the more adventurous engineer. When the hard-edged bands came in, the ones that came in with the grunge sounds, they ignored everything—and interestingly enough, some of their ignoring taught me a lesson. They were after the spirit of the record and not necessarily the technology. It goes back to a very strong point, which is that it's the music we're supposed to be worrying about."

Ramone at the console

Courtney Spencer

Currently the vice president of Sony Pro Audio, Courtney Spencer is a veteran of the audio wars. Originally an engineer and a producer of commercial music, Spencer cut his teeth in sales and marketing at Manhattan's venerable Martin Pro Audio, where he served as a VP/general manager for eight years. He later became VP of sales for Waveframe Corp., before joining Sony in 1990. There, he has helped to lead the company during a period of exceptional growth and technological development.

"On a broad level, a key change has been the introduction and the ultimate market acceptance of the CD as the industry-standard music carrier, leading to a gradual, and still ongoing, conversion to a digital audio production infrastructure.

"At the same time, the role of software/computer-based products and systems continues to grow in very exciting ways, as computer power increases and software offerings become more sophisticated. The demise of dedicated hardware-based products, which some people predicted, has not occurred—and I don't think too many people are holding their breath any more.

"For me—and many others, I'm sure—the effect of these changes, as well as new ones coming into play now, such as DTV, DVD, etc., has been

Courtney Spencer, 1982

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to keep our industry very dynamic, continuously challenging, and above all, a lot of fun to be involved with.

"Pro audio is a very competitive business, where we—like most of our competitors—have a true passion for what we do. I think the challenge here for me has been to create the feel of a small company, while building on Sony's unique strengths."

Chris Stone

A true studio pioneer, Chris Stone co-founded the Record Plant in 1967 with the late Gary Kellgren, recording many of the world's top artists (Rolling Stones, John Lennon, The Eagles, Bruce Springsteen, etc.) before selling the studio in 1989. In 1979, he co-founded SPARS and served as both president and chairman of the board. Today, Stone is the globe-trotting CEO of the World Studio Group, a privately held affiliation of world-class recording studios, which he launched in 1992.

"The biggest change has been the evolution of recording flexibility, from 4 to 48 tracks, and then to unlimited hard disk space, thanks to the power of computers. This, coupled with the advent of digital technology, which is only now coming to fruition (Record Plant had 3M 32-track digital machines in 1979), is most exciting. In addition, the advent of global recording through communications technology (ISDN, satellites, the Internet) has allowed the fantastic growth and worldwide synergy our industry is now experiencing.

"My most gratifying experience during this period had to be supervising the recording of Woodstock '94. The record, which went Platinum, turned out magnificently; it was everything the first Woodstock wasn't, in terms of quality. A&M gave us whatever we needed, including 14 48-track digital machines. We had four trucks with two machines each, and another six recorders in three studios at Bearsville. The excitement of being part of the live recording of an historic music event is unbeatable."

Chris Stone in Record Plant days

John Storyk

One of the first studio designers to be interviewed in Mix *(October 1979), John Storyk has been plying his craft since 1969, when he worked on Jimi Hendrix's Electric Lady Studios. Since then, he has been responsible for more than 600 recording studios, video facilities and radio stations, as well as small clubs and theaters. Storyk's projects have ranged in size and complexity from personal studios for Whitney Houston and Shaquille O'Neal and screening rooms for New York's Planet Hollywood to a multistudio complex for L.A.'s Margarita Mix and a 15,000-square-foot, ten-room complex for SynchroSound in Kuala Lumpur.*

John Storyk at the table

"I would cast my votes for the obvious changes in the past 20 years: digital, desktop audio, multimedia awareness, etc. The number of studios has grown tenfold—possibly more—as the equipment and technology have become accessible to so many. Interesting enough, people still want and need environments; in fact, the environments have become even more important. There is certainly no shortage of opportunities to design.

"Auralization and testing have exploded. DSP technology has given more analysis and prediction tools to more people. Yes, the computer should not be forgotten—it's the Holy Grail of our industry (after a great melody, of course). If there was ever an industry that enjoyed being wired and connected, it's ours. In a given day, I am in California, New York City, Buenos Aires or Bombay. I don't remember this happening 20 years ago!" ■

—FROM PAGE 38, 20 YEARS IN MIX

how cool the arrangement and the recording of this 33-year old nugget is.
—Blair Jackson, "Classic Tracks: 'The Lion Sleeps Tonight,'" Dec. 1994

1995

Bass-ics: For the well-known Chris Squire [of Yes] bass sound, we put the bass through more of a guitar amp setup, which I think was a Sunn amp with either 10-inch or 12-inch speakers. I took it direct, at the same time. On the amp, we went for lots of treble and distortion. I would just roll the bass end off of the amp, so it was all click and presence. I used the direct for the low end. I mixed those two signals together, while making sure they were inphase. By balancing the two, I could bring out the lows or focus on the treble side. I would usually bring out the upper midrange, about four or five thousand, to bring out that gritty, trebly sound. By itself, the amp sounded like a piece of shit, but when you mix it in with the direct, it sounded great.
—Eddy Offord, "Bass Applications...Basically," by Rick Clark, Jan. 1995

1) XLR: Pin 2 or Pin 3 Hot?: I know it's hip to be a rebel in rock 'n' roll, but the IEC, AES, EBU, SMPTE, ANSI and NASA all say Pin 2! (IEC 268.12, AES DRAFT AES14-299X). And this is not new, this is old news. Okay, so I don't really know about NASA, but I bet they would say Pin 2...We use NTSC for television, 44.1 for CDs, red means stop, and green means go. Why can't we all just get along with Pin 2?
—Stephen Anderson, "Insider Audio: Top Ten Technical Complaints," Feb. 1995

Insider Intro: Talk to many people in the industry, and you'll get the same

—CONTINUED ON PAGE 113

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The Best of Bonzai

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I see images of a Pink's Chili Dog served on fine china at Leonard Cohen's L.A. garret. David Lindley and some boiled soybeans with a flask of fine Shochu. A bottle of Beaujolais in Van Dyke Parks' garden. Cheese and cucumber wrapped in seaweed out on the patio at Hitsville with Walter Becker. A bowl of chicken soup on a streetcorner with Don Was.

Here's just a sample smorgasbord, a few memorable bites, some spicy moments. Table talk and saucy wisdom from those who have faced the music.

ROBERT MOOG, 1984

What is the basic contribution you have made to electronic music?

I guess the single thing that accounts for the success is that I pointed the development toward the use of keyboards and the making of sounds that turned out to be popular. The Mini-Moog was just a distillation of the early modular synthesizers, with convenience and a sound that became a standard. We started using the word "synthesizer" three years after we began in 1967.

LES PAUL, 1985

Which of your inventions paid off the most?

The Les Paul guitar—but it took years to get it really going. Mr. Berlin, who was the head of Gibson, asked me shortly before his death, "When you came to me with that broomstick with the pickup in 1941, did you ever believe in your wildest dreams that it was actually hockable?" Of course I did. I was the only one who believed it at the time, but I never got discouraged.

FRANK ZAPPA, 1985

How would you like to be remembered in the distant future?

I would rather not. I think that people who build an aspect of remembrance into their work habits—like, "If I don't do this, then how will I be remembered?"—that's really bad. You should just plan for *The Big Blotch.*

ROGER LAGADEC, 1985

How will the new technology improve human experience?

The way I see it, there will be a weird mixture of things. We must have people who have an impeccable knowledge of technology, absolutely flawless—but there must also be people who do strange things. There will be no progress unless there are people with strange ideas. Digital audio started that way, when the very idea of transmitting sounds with pulses was thought to be ludicrous. But films had been expressed with a series of still pictures. The digital sample and the still picture are the same thing.

STEVIE WONDER, 1986

What fulfills your heart the most?

I love people. I love meeting people and bringing a smile, a positive feeling. I have been fortunate to do many things in this profession, which is something that I cherish very highly. And yet, as much as I love it, I want others with talent to have the opportunities. It's just not enough for me alone—I want it for other people, as well.

STEPHEN "DR. MICROPHONE" PAUL, 1987

Do you believe in magic?

Oh, yes. It's an essential part of the formula. We live in a vibratory universe. Our complete sensory experience is a vibration-based one. From the ditherings of quanta-packets which compose substance to the touch, to the force of the atmosphere—which, although invisible, is capable of lifting 600 tons of airplane off the ground—the phenomena of acoustics is so complex that no math can truly do it justice.

LEONARD COHEN, 1988

Any business advice for musicians?

Well, I remember when I went down to New York with the intention of establishing myself in the music business. I was not a boy. I was in my early 30s, and my mother said to me, "Leonard, be careful—those people aren't like us." I was very resentful of my mother suggesting that she could tell me anything about things. But you know, she was right. They aren't like us. So, that's a good thing to remember. Whatever you think it's going to be, it's not going to be like that. However crooked you might have heard it is, it's going to be a lot more crooked than that.

ANDY SUMMERS, 1988

What makes a great producer?

What I want from a producer is a safety net, in a way, so I can be free to flap around in the studio and know that someone is there keeping things defined, holding the show together.

GEORGE MARTIN, 1988

What is the role of the producer?

The role of producer has changed. There are more engineer/producers now. I'm the old-fashioned type, a producer who is a musician and likes to work with an engineer who's an engineer. I think that the two roles are very difficult to combine.

I think the role of producer has become a bit too important. Because of that, people say, "I want to produce. I want to do this myself. Look at my album—I produced it myself!" It's a boast, and I don't think it should be. I think they should say, "Let's get a good producer to help us."

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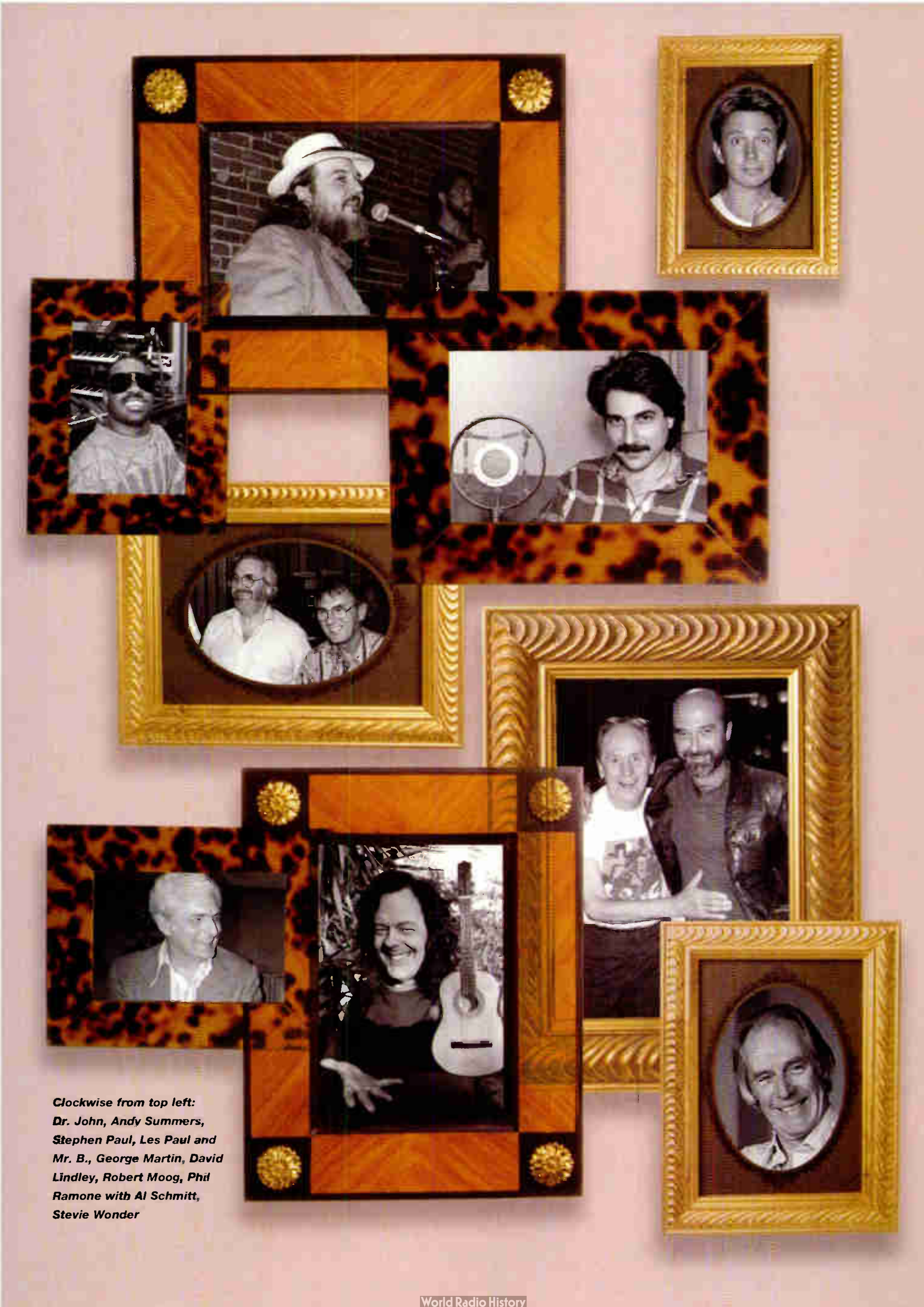

Clockwise from top left: Dr. John, Andy Summers, Stephen Paul, Les Paul and Mr. B., George Martin, David Lindley, Robert Moog, Phil Ramone with Al Schmitt, Stevie Wonder

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BOB CLEARMOUNTAIN, 1989

Is it getting harder and harder to get into the business because of the technical leaps? Any words to the wise?

Yeah, forget it. [Laughs] First of all, you should have a bit of musical background. You should know about time signatures and keys, some basic stuff in music. Music is what you are dealing with, and that is more important than the technology. They really make it easy for you nowadays. It's just a matter of pushing buttons, and you turn the knobs until it sounds right. Don't get hung up on the technology. There is no wrong way to make records. If you use a mic that I wouldn't use for hammering nails and it works, then that's great.

DR. JOHN, 1989

How do you feel about getting older?

I've always believed that age is a state of mind. We age ourselves only in the ways that our spirit is aged. The meat may decay, but the spirit never will. As long as we keep some focus on the spirit, we're doin' alright. The spiritual side makes it all immortal.

What do you have in mind for yourself when they carry that big box down the streets of New Orleans?

I was hoping they would have a large fiery ceremony—maybe they can set me on fire and let whatever is still burning go adrift down the Mississippi River.

HERB ALPERT, 1989

Why did you pick the trumpet?

I liked the sound. And you could probably do a psychological study on trumpet players. I don't know if it's a need to be the center of attention, but I think we need to be heard. [Laughs] The trumpet is not one of those instruments that you can hide behind. You hit a couple of clams on the horn when you're playing in a section or a small group—it's really heard. Before the electric guitar was cranked up, the trumpet player was the guitar player of yesteryear.

DON WAS, 1990

What can computers do better than humans, musically?

I don't think that computers are musical. What they do is remember 10,000 DX-7 settings better than humans.

ALLEN SIDES, 1990

What was it like working with Sinatra?

Frank came in, walked up to Quincy and said, "Let's take it." He goes over to the mic, and I haven't even heard him yet. No chance to set levels, no chance to set anything. And with Frank, it has to be right.

DAVID LINDLEY, 1990

Any words of caution for those kids whose hearts are in the music?

There is a tradition in the music industry that is perpetuated by certain people who say, "You just play the music, and we'll take care of everything else." And they try to convince musicians that if you go into the business area, and publishing, it will take away from your music. It does *not* take away from your music—it makes it better, because it stretches your mind in an area that is musical, too.

PHIL WOODS, 1991

What do you think of the music business?

I prefer to be a thorn in the side of the whole music establishment. I think they're a bunch of assholes.

ARTIE SHAW, 1992

What advice would you give to young musicians?

Do what you love, and everything will follow from that. And remember, no advice is any good until you follow it. Do the best you can. Follow your deepest impulses, and if they are mistaken, you will make mistakes. If you don't make mistakes, you'll never learn anything. Nobody ever learns from success; you learn from failure. And don't follow me—you'll just make the same mistakes I did.

RICKIE LEE JONES, 1992

Any advice for newcomers to this music business?

Keep your publishing. Don't sell your publishing, because that's how you'll live when things aren't going well. And remember, the record company is not basically your enemy. They are there to work with and to help promote your career. Don't regard them as an enemy, until they are.

BRUCE SWEDIEN, 1992

What's the hardest part of being an engineer?

The hardest part is to be willing to give of yourself to the project—to commit totally to what you are doing. And there *are* things you have to give up—like free time.

GEOFF EMERICK, 1992

Of all the sounds you came up with for The Beatles, is there any one that you are especially proud of?

I guess it would be on "A Day in the Life." The gradual long fade, done manually, was monumental. To make that end crescendo loud—it wasn't written, the orchestra was told to go from A to E in 37 bars and do the best they could. I was playing the faders as the song progressed and realizing that what I wanted was another 6 dB by the time I got to the end. I pulled the whole thing way up. I'm proud of doing that—how else could you have done it?

TOM PETTY, 1993

What keeps you good?

What'll keep you good is to enjoy what you're doing. You can't fool the audience—if you're not enjoying it, it really won't sound good. What I've learned is the most simple lesson—the real secret is to get in there and have a good time, and that somehow gets on the tape. I just enjoy music, and I only do it when I'm enjoying it. And that seems to have paid off, for a long time.

PHIL RAMONE, 1993

Can you recall the first session where you flew solo as an engineer?

Yes, and afterwards there were stains on my pants. It was a Neil Sedaka record. I was about 17, and I had never balanced a whole rhythm section before. It was like the first time that your dad says, "Okay, son, now you take the wheel." It was incredibly exciting, and I still get that feeling.

TAJ MAHAL, 1994

What would you tell a kid who came up to you and wanted to follow in your footsteps?

If you have any way to clearly get back to an ethnic background that you have, go back and take the best from it, bring it forward and meld it with good music from the time in which you exist.

ED CHERNEY, 1994

Is there a magic moment when you know you've found the mix?

Yes. And once you get that moment, you have to try to stay the course. Don't try to change things too much from that moment, although the tendency is to keep chasing.

RICHARD THOMPSON, 1994

Any inspirational words for those thinking of entering the music business?

Be honest. Tell the truth. Trust your instincts. And never eat at a restaurant called "Mom's." ■

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Over the past 13 years, the TEC Awards have honored hundreds of the brightest stars in the recording industry. And while many of the names have changed annually, there have been a select few that have consistently been nominated and/or won TEC Awards for their contributions to the audio industry.

The great Les Paul and singer/guitarist John Sebastian played a lively duet at the 1993 TEC Awards in New York.

The one and only Phil Spector accepts the TEC Hall of Fame Award in 1995.

Legendary producer George Martin accepts the TEC Hall of Fame Award in 1989 from Hillel Resner (L) and David Schwartz (R).

The 1989 lineup of presenters and nominees (Top, L-R): Hillel Resner, Bill Porter, Stephen St.Croix, Bob Moog, Hal Blaine, John Woram, Roger Nichols, Neil Dorfsman, Rupert Neve, Bruce Merley; (Bottom, L-R): Les Paul, David Schwartz and Mr. Bonzai.

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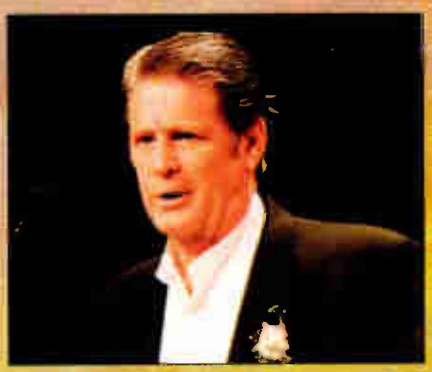

Brian Wilson received the Les Paul Award at the 1996 TEC Awards in Los Angeles.

Ray Dolby, who revolutionized both studio recording and film sound, received the 1991 Hall of Fame Award.

Boz Scaggs and Ray Benson jammed with Don Was and Booker T. Jones at the 1994 TEC Awards in San Francisco.

Bob Ludwig picked up two TEC Awards in 1996—one for Mastering Engineer and another for Mastering Facility.

Captured at the 1991 TEC Awards in New York (L-R): Bassist Will Lee, emcee Weird Al Yankovic, Les Paul, Art Garfunkel.

Herbie Hancock shows off his 1994 Hall of Fame Award with Charlie Lahaie of the House Ear Institute and musician Nathan East.

The heavies: Phil Ramone, Herbie Hancock, Alan Parsons, George Martin and Father Guido Sarducci at 1994 ceremony.

George Massenburg (center) was the 1990 Hall of Fame inductee, while Bob Clearmountain and Don Was received TEC awards for engineer and producer, respectively.

Veteran musician and producer Al Kooper emceed the 1995 TEC Awards in New York and performed as well.

Roy Clair received one of Clair Brothers' numerous TEC Awards from Don Was in 1994.

World Radio History

by Blair Jackson

Seven Views of Where We Are And Where We're Going

Everyone loves to make and hear predictions. Remember in the late '50s when we were all told that everyone would be driving flying cars by the year 1985? Didn't quite work out that way, did it? Or that a steak dinner at a restaurant would cost more than $25 by the year 2000? No *way*, we said. Hmm.

The audio industry has always been filled with creative souls who have one eye firmly fixed on the future and who are completely dedicated to taking technology to the next step—whatever that may be. This is why the "state of the art" changes every five minutes, and why that prototype you've been beta testing is going to become yesterday's news when this *other* cool thing comes out tomorrow.

We asked seven of the audio industry's brightest thinkers (and longtime friends of *Mix*) to tell us whether where the industry is today is what they predicted ten years ago, and what they see in that crystal ball that every self-respecting futurist keeps in the closet next to their collection of Quadraphonic LPs. Our distinguished panel: **Ken Pohlmann**, head of the University of Miami's prestigious recording program, digital recording guru and for many years a *Mix* columnist; **Paul Lehrman**, professor at the University of Massachusetts Lowell and now author of *Mix*'s monthly "Insider Audio" column; **Russ Berger**, president of the Dallas-based, TEC Award-winning studio design company Russ Berger Design Group; **Murray Allen**, former dean of the Chicago recording scene as owner of Universal Recording, now audio director for the multimedia company Electronic Arts; **Craig Anderton**, former *Mix* columnist and editor of *Electronic Musician*, whose many books and articles have made him one of the most respected voices in audio; **Toby Mountain**, a thought-provoking writer and a talented mastering engineer at his own company, Northeastern Digital; and **Stephen St. Croix**, the brains behind Marshall Electronic and an irrepressible industry gadfly in his monthly *Mix* column, "The Fast Lane." These seven fine individuals have our personal assurance that we will not mock their predictions ten years from now—unless, of course, we can get a cheap laugh out of it.

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Ken Pohlmann: In 1987, I figured that digital audio would be a great force of technology democratization, and that really has happened. The low-cost, widely available, high-quality digital audio stuff has transformed the business. It's actually gotten to be low cost faster than I thought it would, but that was always my hope. Back in the old days, you needed something the size of a Winnebago with about two or three good engineers tweaking around it all the time to make it work. And with digital, of course, you don't need any of that. Therefore, since it becomes real user-friendly and very low-maintenance, and it all becomes reduced down to silicon, all these trends come into place. The real big news, of course, is that in the old days you had big mechanical transports and other sorts of high-cost, hand-built, low-volume items. But once the world gets digital, it goes onto silicon chips, and once you go silicon chips, it's just a question of volume, and as the volume increases, everything gets cheap.

The next step is for the democratization trend to go even faster. There's no reason why you couldn't expect to see the same quality or even better-quality equipment for even lower prices and widely available to everybody and anybody who wants to use it. There are actually two trend lines. On one, the prices sort of stay about the same. A PC costs about the same as it always has. But the processing power probably doubles every year or so. So that's what we'll see in digital audio. The actual prices might stay relatively similar, but they're going to get more and more comprehensive, and there's no reason, for example, why we can't expect to see desktop systems that handle audio and video simultaneously, so you could do all your own online recording of both audio and video editing and post-production in your spare bedroom. So the same thing that's happened to audio studios will probably happen to video studios.

What's lagging out there is creativity. Frankly, I think that electrical engineers and other audio gurus have made great advances in terms of what the machines can do, and what really hasn't changed a lot in the past couple of decades is the creative output. The music itself is evolving, but the way it's recorded and the way it's presented to the consumer really hasn't budged since the 1950s. Stereo's been around since then as a consumer format. One minor step forward will be the advent of 5.1 playback for the consumer—that's already happening in a big way. And I think probably the next big leap for the industry is to figure out how to use 5.1 mixing in a very creative way. We have to avoid all the pitfalls and problems and poor taste that we saw when Quad was introduced in the '70s, and figure out a better way to spread music around throughout a space in an intelligent fashion. I think that perhaps what we really need is another Steven Spielberg or Bill Gates or Les Paul or some individual to step forward and do it and demonstrate what can be done creatively—how to use all this great technology in a more creative, artistic way. And once he or she does that, then we're off on a whole new era.

Paul Lehrman: What's happened is pretty similar to what I predicted ten years ago. The idea that everything would be digital and everything could be brought inside of one platform was pretty clear—the digital audio workstation being the be-all and end-all. So in that regard, I think we all nailed it. I think what we *didn't* nail was the modular digital multitrack, the low-cost digital. I think everyone thought that low-end studios would still be working with ¼-inch, 8-tracks at this point. So that one we probably missed. The other thing that I predicted a long time ago was that the differentiation between the MIDI studio and the professional audio studio was going to disappear, and that has certainly come true.

You could say that in some ways the democratization has backfired and it's going to lead, in the next few years, to a stratification of the audio world all over again. It's going to have to do as much with delivery systems as it is with the actual production. There are going to be two types of audiences. There are going to be audiences who expect a lot, and there are going to be audiences who expect very little in terms of audio. There are going to be audiences that have home theaters, 5.1 setups, who go to the movies all the time, who expect real high-quality stuff. And then there's

—CONTINUED ON PAGE 125

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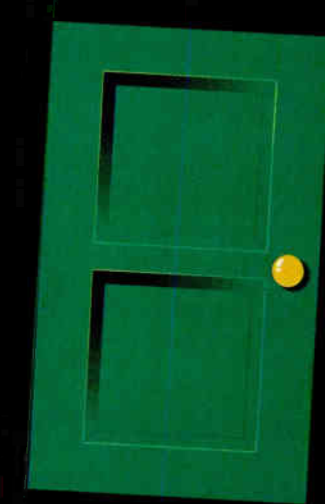

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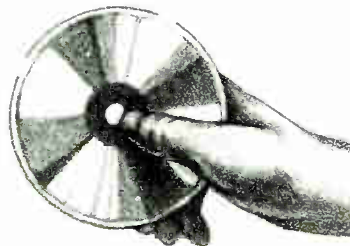

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- 18. ☐ Sales & Administration—Sales rep, account executive, etc.
- 19. ☐ Artist/Performer—Recording artist, musician, composer, other creative
- 20. ☐ Other ______________

3 Your role in purchasing equipment, supplies and services (check ONE):
- 21. ☐ Recommend the purchasing of a product or service
- 22. ☐ Make the final decision or give approval for purchase
- 23. ☐ Have no involvement in purchasing decisions

4 Your company's annual budget for equipment, supplies and services:
- 24. ☐ Less than $50,000
- 25. ☐ $50,000 to $149,999
- 26. ☐ $150,000 to $249,999
- 27. ☐ $250,000 to $499,999
- 28. ☐ $500,000 or more

5 Purpose of inquiry:
- 29. ☐ Immediate purchase
- 30. ☐ Files/future purchases

6 Where your audio-related work takes place (check all that apply):
- 31. ☐ Commercial (public) production facility
- 32. ☐ Private (personal) production facility
- 33. ☐ Corporate or institutional facility
- 34. ☐ Remote or variable locations

001	045	089	133	177	221	265	309
002	046	090	134	178	222	266	310
003	047	091	135	179	223	267	311
004	048	092	136	180	224	268	312
005	049	093	137	181	225	269	313
006	050	094	138	182	226	270	314
007	051	095	139	183	227	271	315
008	052	096	140	184	228	272	316
009	053	097	141	185	229	273	317
010	054	098	142	186	230	274	318
011	055	099	143	187	231	275	319
012	056	100	144	188	232	276	320
013	057	101	145	189	233	277	321
014	058	102	146	190	234	278	322
015	059	103	147	191	235	279	323
016	060	104	148	192	236	280	324
017	061	105	149	193	237	281	325
018	062	106	150	194	238	282	326
019	063	107	151	195	239	283	327
020	064	108	152	196	240	284	328
021	065	109	153	197	241	285	329
022	066	110	154	198	242	286	330
023	067	111	155	199	243	287	331
024	068	112	156	200	244	288	332
025	069	113	157	201	245	289	333
026	070	114	158	202	246	290	334
027	071	115	159	203	247	291	335
028	072	116	160	204	248	292	336
029	073	117	161	205	249	293	337
030	074	118	162	206	250	294	338
031	075	119	163	207	251	295	339
032	076	120	164	208	252	296	340
033	077	121	165	209	253	297	341
034	078	122	166	210	254	298	342
035	079	123	167	211	255	299	343
036	080	124	168	212	256	300	344
037	081	125	169	213	257	301	345
038	082	126	170	214	258	302	346
039	083	127	171	215	259	303	347
040	084	128	172	216	260	304	348
041	085	129	173	217	261	305	349
042	086	130	174	218	262	306	350
043	087	131	175	219	263	307	↑
044	088	132	176	220	264	308	↑

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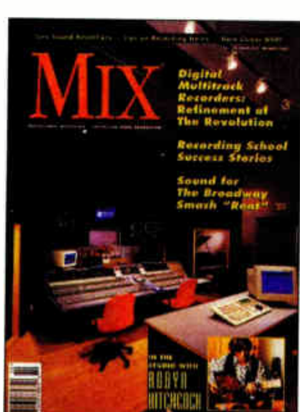
—FROM PAGE 97, 20 YEARS IN MIX

story: Down time in their studios has increased, while those intervals in which they can actually do work are getting briefer and further apart. It's ironic. Years ago, many of us who struggled with primitive software and hardware were telling anyone who would listen that computers would someday save all of us time and money, allowing us to realize all of our audio dreams. Now that the entire music industry is totally dependent on computers to accomplish even the slightest task, those very computers are in danger of making it impossible to produce anything at all.

—Paul D. Lehrman, "Insider Audio: Fear of Frying (My Studio)—Let's Stop Progress Before It Stops Us," Sept. 1995

Gone but Not Forgotten: We live in a disposable age, and nothing is more disposable in our industry than recording media. I don't know about you, but I have DATs strewn everywhere—in the studio, in my briefcase, even a few at home in the kitchen. We take it for granted nowadays that our recordings are replaceable. If the ref from last week's session goes awry, it's a simple matter to roll off another copy from the digital workstation...In the recording studios of 70 years ago, there were no tape masters, nor were there the ubiquitous safeties and work copies. Back when recording was new, there was only one way to preserve a recorded performance: a transcription disc.

—Gabe Wiener, "In the Acetate Groove: The World of Transcription Disc Restoration," Dec. 1995



1996

Safe Sounds: In 1987, an article in the *Los Angeles Times* told the world of Pete Townshend's battle with tinnitus and his hearing loss. Townshend said that the saddest circumstance of his hearing loss was not being able to hear his children speak to him. The high frequencies, where children's voices are pitched, are usually the first to be affected by noise-induced hearing loss...The article helped bring into the open a problem that had been widespread but largely ignored in the industry since the advent of amplified music: noise-induced hearing loss.

—Charlie Ennis Labaie, "Protecting Your Hearing," Jan. 1996

Dow Jones Audio: When Sonic Solutions went to market, its CEO saw 27 financial institutions in a week-and-a-half. It's a lot like touring, except the stakes are much higher...It's at this point that a professional audio company becomes just another specimen to be analyzed from the clinical, green-eyeshade point of view. It doesn't matter to professional investors whether you make workstations or widgets, they're looking for profitability and growth.

—Dan Daley, "The Pro Audio Industry Takes Stock, Literally," Feb. 1996

The Future Upon Us: The Internet may well be a unique and wonderful vehicle for information exchange, but getting at this information, and saving it to one's own machine for later reference, often feels more like swimming in molasses than "surfing." This is particularly true if the saved information is not merely text but graphics, audio or video...Delivering those files over the existing infrastructure—regular phone lines and modem—is akin to trying to suck icebergs through a straw...During the last year or so, however, a number of enterprising companies have figured out ways to "stream" audio over the World Wide Web, meaning that users can listen to audio directly as it comes over the network to their computers without the wait.

—Philip De Lancie, "Web Audio Goes Real Time," April 1996

The Right Place, The Right Time: I just did a song on the new Melissa Etheridge album called "I Could've Been You" that had a real laid-back, bluesy feel. I used two snare drums. I played on a very small 4-inch wood drum very lightly in the verses. Hugh Padgham made that drum sound so deep and big. Then when the chorus came in, it was more aggressive-sounding, like Soundgarden. That was a 6½ metal drum, and that drum sounded higher than the other one...I said, "Hugh, what in the world are you doing to get that sound?" He said, "Nothing, just mic placement."

—Kenny Aronoff, "Getting That Great Drum Sound," by Rick Clark, June 1996

I Love the Sound of Breaking...: The whole recording process interferes a great deal with the sound of a live orchestra anyway, and if you attempt to maintain total control of the music with a large quantity of close directional mics, it will sound the least natural from an audiophile point of view. For instance, take 30 bass-shy cardioid microphones, put them through a nice, bright modern op-amp mixer, take that through a typically hard analog-to-digital converter and send the master to some uncaring factory. Next, play the CD in your typically bright home CD player, through a thin solid-state power amp and a pair of nice, bright speakers. What you get at the end sounds like breaking glass!

—Tony Faulkner, "Recording the Symphony Orchestra," by John La Grou, Sept. 1996

1997

Web Site Under Construction (But Here's a Couple): Sound companies now face escalating demands within a pricing structure that may appear to have remained constant, but in real, inflation-adjusted dollars has actually declined. Artists' engineers clamor for more equipment, while accelerated obsolescence shortens the useful life of the most expensive components. Year after year, promoters budget the same round, slim numbers for sound, regardless of the show's technical requirements, confident that they can play several vendors against each other should push come to shove. Sound companies are required to provide More for Less because that's what the market will bear.

—Mark Frink, "Touring Loudspeakers: More for Less," March 1997

And a Beauty From Chet: One day I went to work and looked down and realized my shoes didn't match. So I said, "To heck with this. I've got to get out of this business." I don't produce anymore.

—Chet Atkins, "The Mix Interview," by Rick Clark, July 1997 ■

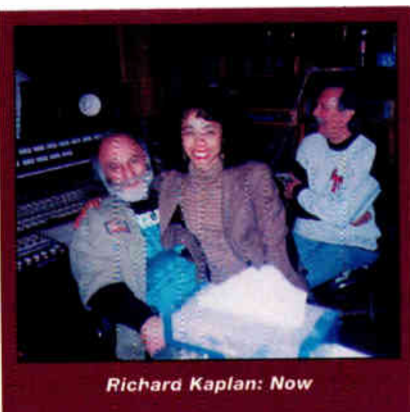
World Radio History

—FROM PAGE 56, STUDIO SURVIVORS
ence or have experienced the same problems that you run into, and you can share solutions."

Preservation on the Reservation: Richard Kaplan's Indigo Ranch

Sometimes survival is an outgrowth of preservation. Nowhere is this more dramatic than at Indigo Ranch in the Malibu Mountains along the Southern California coast. The studio was constructed in 1974 on sacred Chumash Indian meeting grounds, which had been used historically for summer and winter solstice ceremonies, and particularly for music celebrations. In the early part of this century, the land also served as a health retreat for John Barrymore and his family.

Michael Pinder, keyboardist of the Moody Blues, and Richard Kaplan, the group's lighting and sound specialist, found the site the day it came on the market, and they knew from the start it was going to be something special. Under their guidance, the spirit of the location was reflected in the design of the studio and, most impressively, on


Richard Kaplan: Now

the vintage electronics that are the heart and soul of this analog-to-the-max studio.

"We're not the run-of-the-mill studio," says Kaplan. "I think if we were, we'd be dying. We have 100 tube mics, 30 tube limiters, dozens of Pultecs and tube equalizers, and 42 mic preamps, in addition to the regular stuff. And we have several walls of boxed equipment ready to run of every vintage.

"We're booked year round with major album projects—we've been busy since we opened the door in '74. We're analog at its finest, and we attract artists from all over the world to do major album projects here. Our vintage equipment is so well-built and maintained that the quality dazzles people."

A good deal of the credit for Indigo's sonic/electronic integrity must go to the late Deane Jensen, an audio scientist whose legend and respect are boundless in the minds of many true audiophiles. "This is definitely a Deane Jensen studio—he lived here for a while, he helped us build it," Kaplan says. "He was a friend and confidante up till the end. Putting together a bunch of old tube equipment, especially with new equipment, is asking for disaster because everything has to be systematized. Things match up in this studio, and they work. We owe how well it all works to Deane."

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Even in 1997, Kaplan and Indigo Ranch feel no need to rush off into the world of digital equipment, although many of their clients bring in digital gear, and just as often discard it when they compare it to Indigo's analog arsenal. "If technology ever catches up with the old stuff—someday it might—we'll be there. But to this day I still like George Massenburg's analogy that digital audio is like listening to music through a screen door."

Richard Kaplan: Then

Ship of Tools: Skip Saylor Recording

Another studio survivor sticking to tradition is Skip Saylor, captain of his eponymous Hollywood mixing facility. "I look at my job as a historian. Anything I can do to capture that history better is what I'm looking to do. I want to preserve what we've had up to this point, as opposed to how I can change it."

Saylor's outlook leads to a reverence for analog and traditional recording techniques, not unlike Indigo Ranch's Kaplan. "I'm an old warhorse, a throwback from a different era. Record-quality recording is my primary goal. Not every recording studio would necessarily do what I do, like add a 16-channel vintage Neve sidecar to an SSL with Ultimation. My thing is putting two different kinds of consoles together, to give my clients different sound options."

Despite his adherence to analog and record projects, the challenges of operating a mid-level studio have forced Saylor to adjust to market realities, particularly the home studios. "The midline, mid-priced studio is becoming a dying breed. I used to have a room like that, and I've converted it into a 48-track, all discrete mix room because of home recording and because there are just too many studios out there, especially the $50 to $65-an-hour bargain studios. They all took a dent out of the overdub business that a lot of studios were involved in at one point."

Saylor sees the evolution of the home studio phenomenon as the end

Skip Saylor: Then

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of a cycle. "We went through a craze where everybody thought they could make a record at home, and I think now they're figuring out the sound quality is not as good at home. There's a lot of aggravation to having a home

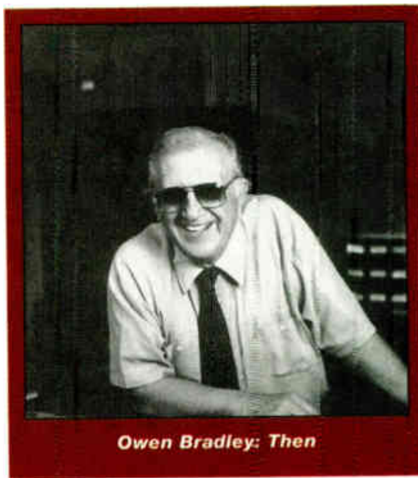
Skip Saylor: Now

recording studio, and I don't think everyone with a home studio really wants to be a studio owner and deal with the issues that come with it. I believe home recording will settle into a place where it is an extension of doing your homework before you come into the main studio, and then continue working on some parts at home on the ADAT or DA-88, doing overdubs, etc., while finishing the job in the professional room.

"Surviving in this business, for me, means doing my best possible work and believing that if I can maintain one of L.A.'s best studios, and offer my clients unique options for creating their sounds, then I will continue to prosper."

Owen Bradley: Making Hay in the Barn

Few of Nashville's studio survivors have been at it as long as Owen Bradley, owner of Bradley's Barn. Built in 1964 in Mt. Juliet, Tenn., about 20 miles east of Nashville, the original studio burned down in 1980 and was rebuilt in 1982. Its main tracking room is 50x65 feet and attaches to a 30x20-foot room with a relatively small control room recently equipped with an Otari Concept One console. "I was mixing 60-some tracks last week," says Bradley. "It's a far cry from the way we used to work with one track, or three


Owen Bradley: Then

tracks. Some of the best records we ever did were recorded on one track."

A veteran of dozens of smash hits (on at least one occasion during the '60s, he had produced both the *Billboard* Number One hit on the pop chart and Number One on the country chart). Bradley has been in the music business since he was 15 years old,

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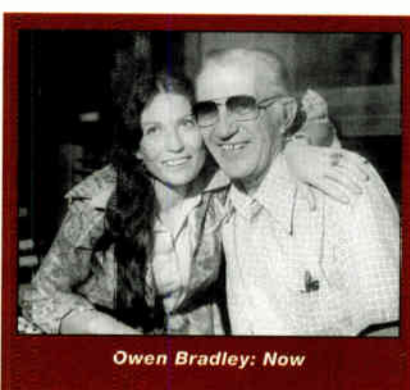
beginning as a multi-instrumentalist in a roadhouse band. He joined the staff of Nashville's WSM Radio in 1935 and moved up the ranks to become musical director by the time he was 32. Simultaneous session work for Decca Records artists led to the label offering him the job of producing records, which he did for about 30 years.

As a prolific producer, Bradley chose to have his own studio early on. He and his brother Harold owned Quonset Hut, built in 1955 on Music Square East in downtown Nashville. Most of the major artists in Nashville at that time were either recording there or at the RCA studios. "The Quonset Hut was where we did all of Marty Robbins' records, we did Johnny Cash, all of Brenda Lee's records, Patsy Cline, Loretta Lynn, Kitty Wells, Ernest Tubbs..."

In 1962, the Bradley brothers sold their studio to Columbia Records, and Owen continued to produce his artists there for a while. But he found that he missed having his own studio. "I started thinking about another studio because my son was just getting out of the service and he had a desire to get into the music business. Plus, I sort of missed all those big speakers and the fact that I could play back a record loud, which my wife didn't like at home.

"I had a lake house in Mt. Juliet, and every time I went there I passed this big barn. I saw a sign on it one



Owen Bradley: Now

day that it was going to be auctioned off, so I stopped and bought it. In the back of my mind, I thought I could put some equipment in it and my son could make a little demo studio out of it. So that's what we did. We had very sparse equipment at first. It just had a tin roof, so we couldn't work there when it rained.

"But then Columbia closed the Quonset Hut to outside business, and next thing I knew people were coming up wanting to record at the barn. So I bought some state-of-the-art equipment, fixed the roof and we started really going at it pretty full-time. I was still working for Decca, and they gave me their blessing to work up here with their artists."

For the 81-year-old Bradley, surviving in the studio business continues to be less of a challenge than a way of life. "I enjoy having a studio. I still do a little record production, but I'm really not out looking for projects. We just play it as it comes down the road one day at a time. We are not in the mainstream because we're out in the country. I have a little farm around this place. The main thing is that we still have a lot of fun doing what we like to do. It's sort of a hobby, and a business too."

As far as Bradley's survival tips for others? "Get into the publishing business. Copyrights don't talk back, and once you get them, they're yours for 50 or 60 years. But I never really liked to do that, so I tried the studio business." ■

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World Radio History

—FROM PAGE 81, EVOLUTION OR REVOLUTION?
priced from $5,995. Today it's the leading workstation platform, with over 15,000 systems in use worldwide.

Yamaha's DMC1000 was the first in a line of serious, small digital consoles. It offered 22 inputs, 10 buses, 4-band parametric EQ, total snapshot automation, moving faders—all at a reasonable $34,000. Eventually, the DMC1000 found a niche as an outboard mixer for workstations, but its role in the development of Yamaha's 02R digital console in 1996 was more significant.

1992: Tascam debuts the DA-88

1992

Prices Down, Quality Up

The first "affordable" CD recorder arrived at Winter NAMM. The Marantz CDR-600 was a stand-alone, rack-mount unit with digital and analog I/O. Price was "only" $7,500. Three years previously, Gotham's CDR-90 unit had been priced at $70,000; in another five years, stand-alone CD recorders would cost less than $3,000 and CD-R drives for computer use would drop below $500.

Also at NAMM, low-priced consoles were everywhere. Among the 15 new consoles shown, Mackie's 8-bus line included a 24-channel, 8-bus mixer priced at less than $4,000.

Activity in the trenches of digital film sound began heating up. Optical Radian Corp./Kodak abandoned its proposed CDS (Cinema Digital Sound) format. Sony announced its SDDS Sony Dynamic Digital Sound. And *Batman Returns*—the first film using the rival Dolby SR•D format—was released in June. But they were both dwarfed initially by Digital Theater Systems (DTS), which shipped more than 2,000 CD-ROM players (the 6-channel audio was locked to timecode on the film) to theaters with the prints of *Jurassic Park*. Meanwhile, in anticipation of the new era of digital cinema sound, Nagra unveiled its Nagra-D, a 4-channel, 24-bit-capable portable sync recorder. With the eventual demise of sprocketed film dubbers in the not-too-distant future, Magna-Tech and WaveFrame teamed up to show a prototype of the first disk-based film dubber. It never made it to market, but eventually digital film dubbers would be announced by Akai, Sony, Dolby, TimeLine, SoundStar and Fairlight, with the latter producing the first 24-track units.

SSL broke ground with Scenaria, which had 24 tracks of disk-based audio, 38-channel automated digital console and extensive transport/sync control. SSL's pairing of this system with integrated random-access video signified a revolution in the making.

Bring on the BIG digital boards! Neve's Capricorn made its first public appearance at APRS—just in time, as the first MADI-equipped digital multitracks were unveiled three months earlier at AES Vienna.

On October 1, 1992, Tascam's DA-88—an expandable 8- to 128-track system offering affordable digital recording on Hi-8mm tape—debuted at AES San Francisco.

Low-cost disk recording came of age. Digital Audio Labs (DAL) showed its CardD, which transformed an IBM 286/386 into a digital audio workstation. Innovative Quality Software's SAW was a fast, efficient program that offered an alternative to DAL's software but used the DAL hardware. In the years to come, DAL—especially with its V8 package—became a major supplier of multichannel I/O hardware for PCs and was supported by numerous software companies.

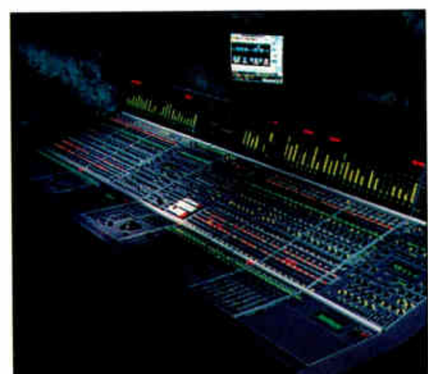
Unfortunately, great ideas aren't always successful. Joined by Gotham Audio and George Massenburg Labs, AT&T entered pro audio with the unveiling of DISQ, a system based on a central "mixer core" controlled by a conventional analog console (Neve VR or Solid State Logic 4000/6000/8000). While the user operated a familiar work surface, all digital mixing, routing, signal processing (including EQ and dynamics) was carried out in the background—entirely in the digital domain. The concept was fantastic, but expensive, and DISQ never got beyond a few installs.

1992

▸ **Milestones**
- RIAA abandons CD longbox
- Sony announces multimedia CD-ROM
- Tascam intros DA-88

▸ **Beginnings**
- Emagic
- Garwood
- Macromedia
- Power Technology
- Spirit by Soundcraft
- World Studio Group

▸ **Anniversaries**
- 25th—Audio + Design
- 25th—Penny & Giles (audio)



1993: Neve Capricorn

1993

The Year of the Console

Audio products generally run in cycles, and 1993 was the year of the console.

Amek's Recall by Langley live sound console brought recall automation that memorizes the positions of all critical controls, along with snapshot automation and virtual dynamics.

A new company, Tactile Technologies, showed the M4000, a digitally controlled analog console with 48-channel controller and remotely located outboard electronics racks. It could be expanded (up to 240 channels) by adding more rack modules. The M4000 began shipping two years later but never gained a foothold in the market.

Once found only on big-ticket mixers, moving fader automation was incorporated into Allen & Heath's affordable analog Saber V; it was followed by debuts of the Soundtracs Solitaire and Soundcraft DC-2000, two under-$30,000 entries.

Speaking of the BIG Board, Japan's Over Quality console made its Stateside debut with an 80-channel version at $780,000. Harrison updated its breakthrough Series 10 with the Series 12, offering remote-control mic preamps, extensive switching and a Macintosh system controlling console functions. Neve began deliveries of its

World Radio History

long-awaited Capricorn all-digital console. SSL showed OmniMix, a larger version of its Scenaria system but with a configurable bus structure to accommodate the new surround sound release formats.

JBL previewed the future of studio monitoring in what would become its DMS-1 system, based on an outboard DSP engine that provided crossover, phase correction and transducer alignment. And they just *happen* to fit into UREI 813 soffits...

1993
- **Milestones**
  - Sony Super Bit Mapping debuts
  - Peavey MediaMatrix intros
- **Beginnings**
  - LinearX Systems Inc.
  - Night Technologies Intl. (Nightpro)
  - Soundscape Digital Technology
  - TVL (Manley Laboratories)
- **Anniversaries**
  - 25th—QSC Audio Products
  - 25th—BGW
  - 25th—Community Light & Sound
  - 20th—Soundcraft
  - 20th—Speck Electronics

With the advent of Sony's Super Bit Mapping and Apogee's UV-22 methods of encoding 20-bit signals for release on standard 16-bit CDs, there was a growing interest in mixing to higher-bit resolution, but few options in storage media. Sony's PCM-9000 2-track recorder could store up to 80 minutes of 20-bit (or 60 minutes of 24-bit) on erasable 1.3GB optical disks. Offering random access and ease of editing, it moved up in line as the eventual replacement for the tape-based PCM-1630 system.

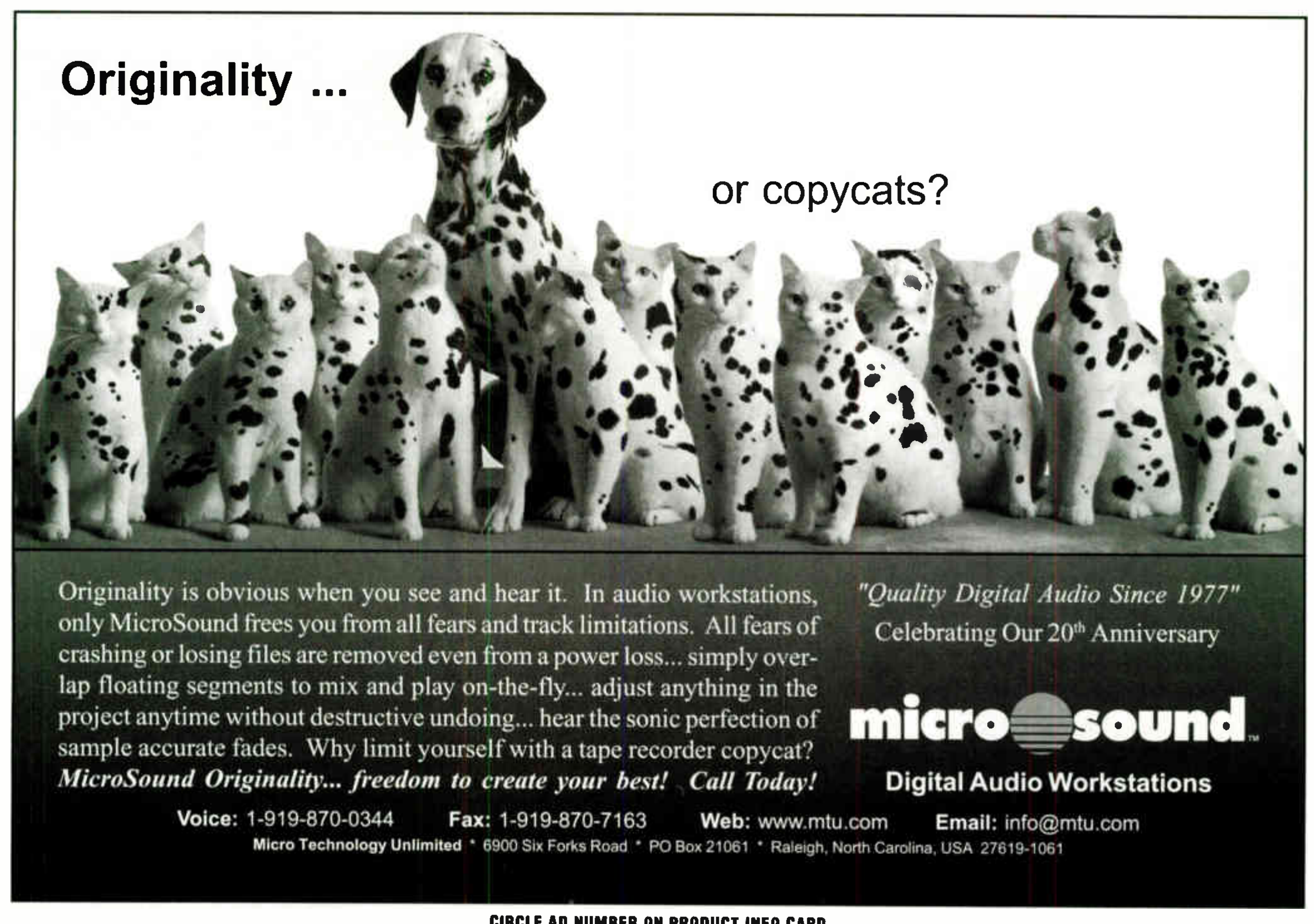
Described as an "audio Erector Set," a joint venture between Peavey Electronics and Peak Audio was unveiled. Known today as MediaMatrix, the system combined an I/O connection box with an IBM PC and plug-in cards providing DSP horsepower for mixing, gating, EQ, compression, crossovers and delay. Users could design a system simply by dragging icons of various components (gates, preamps, etc.) into the desired configuration and drawing lines using a mouse. Although intended for contracting applications, MediaMatrix provided a glimpse into the studio environment of the future.

1994

The Old and the New

The concept of third-party software "plug-ins"—bringing new functions and features to existing programs—caught on with non-audio software, such as PhotoShop and Quark Express. With the rising number of Digidesign systems worldwide, software developers expanded the market with audio plug-ins for Sound Designer II and Pro Tools applications, and companies such as Waves, Jupiter Systems and Arboretum Systems jump-started this new industry. Later in the year, Digidesign shipped its TDM system—the open-architecture, 256-channel, 24-bit digital audio bus for Pro Tools—opening even more opportunities for plug-in developers.

Yamaha created a stir with its ProMix 01, an under-$2,000 automated digital mixer with moving faders and recall automation. Meanwhile, Britain's Tony Larking (TL Audio) began offering tube consoles: The Valve 8:2 was a rackmount model; the 1000 Series was a configurable split/in-line design, with 24 buses and up to 72 input modules.



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Pioneer unveiled a pro 96kHz DAT machine, the D-9601, which recorded at 96/88.2/48/44.1/32 kHz.

MDM activity heated up: Sony's PCM-800 adopted the DTRS (Tascam DA-88) format. Panasonic announced its ADAT-format recorder.

Twelve years before, the PCM-F1 brought digital recording to the masses, storing a stereo 16-bit audio signal on videotape. Just announced was Rane's PaqRat, storing a stereo 18/20/24-bit AES/EBU signal on an ADAT or DA-88 recorder. PrismSound's MR-2024T stored six channels of 20-bit or four channels of 24-bit audio on a DA-88.

Despite the MDM hoopla, the high end continued unabated: Studer and Sony reported steady sales of DASH 48-tracks. AT&T and Harrison announced the development of an integrated digital console, based on AT&T's DISQ Digital Mixer Core engine and Harrison's Series Twelve and MPC consoles. SSL unveiled Axiom, its first large (48- to 96-channel) digital console, with internal signal processing and LCRSS busing. Axiom's DiskTrack™ was a disk-based recording/editing system with up to 95 simultaneous channels.

New surround formats? Otari's PicMix added film mix monitoring to any studio console. Six joystick panners could be set for LCRS, LRS, LCRSS or custom panning. Bring on the revolution!

CIRCLE AD NUMBER ON PRODUCT INFO CARD

1995: RSP Project X

1995

The Big Buzz

RSP Technologies debuted Project X, a $40,000 large-format digital console with ADAT or DA-88 interfacing. A desktop surface controlled audio and DSP functions in a separate rack. Features include recall of all console settings, dynamic, SMPTE-based automation, and onboard DSP. Amek entered the digital mixer milieu with its Digital Mixing System, based around a hardware surface that controls a rackmount DSP core, audio I/O section and optional matrix routing.

Sony demod the OXF-R3 console, its all-digital, 24-bit wonder. More than just another megabuck console, the OXF-R3—combined with other Sony innovations, such as the PCM-9000 optical disk mastering recorder—provided a glimpse into the 20- and 24-bit re-

World Radio History

1995: Yamaha 02R: the affordable digital console.

ality that is on its way.

Yamaha showed its under-$10,000 02R 20-bit 8-bus console, offering 24 analog inputs and 16 digital tape returns for a total of 40 inputs, with four card slots accommodating ADAT, DA-88, DAT and AES/EBU signals. Standard were moving faders, instantaneous reset of all console parameters; limiter/compressor/gate on every channel and output bus; and two internal effects processors. Pair it up with a couple of MDMs, and the notion of the all-digital studio was no longer a fantasy.

The changing face of recorders arrived with the second-generation Alesis ADAT XT (along with the similar Fostex CX-8 and Panasonic MDA-1), offering improved transport control and lockup, assembly editing and an alphanumeric fluorescent display with running time accurate to 1/100 second. Akai's successful DR4 and DR8 disk recorders were followed up by its 16-track DR16 ($4,995), which added a built-in digital mixer, with control of levels, panning, master outputs, two effects sends and the L/R bus—all controllable via MIDI or held in one of 99 snapshots. Nagra previewed a compact portable deck that records on solid-state PCMCIA cards.

Digital dubbers? TimeLine's MMR-8 was the first modular digital 8-track recorder based on magneto-optical technology. Fairlight celebrated its 20th anniversary by announcing a disk-based film dubber system, targeted at $1,500 per track, recording to hard disks or removable MO media. Akai was also showing its dubber, based on the DR8 technology. And SoundStar announced its version, the Digital Machine System, based on Spectral's PRISMA digital audio engine.

Neumann unveiled the M149, a large-diaphragm tube mic, the first to offer a transformerless output combined with vacuum tube electronics.

And tubes kept getting hotter: At AES 1995, more than 25 companies dis-

1995

▸ Milestones

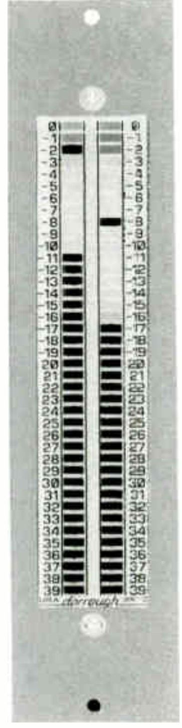
DVD introduced

▸ Beginnings

Earthworks
PreSonus Audio Electronics
Quantegy
Ultimate Ear

▸ Anniversaries

70th—Shure
50th—JBL
50th—Sennheiser
25th—Allen & Heath
25th—Burlington Recording Media
25th—Cal Switch
25th—Calrec Audio Ltd.
20th—Aphex
20th—Fairlight
20th—Harrison Systems
20th—Neutrik



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played equipment using vacuum tube technology: AKG, Anthony De Maria Labs, Aphex, ART, Blue, Bruel & Kjaer, Curtis Technology, dbx, Demeter, DigiTech, DOD, Drawmer, G-Prime/Micro-Tech Gefell, Groove Tubes, Inward Connections, Manley, Neumann, Peavey, Retrospec, Rolls/Bellari, RSP/Rocktron, Sony, Studer, Summit, TL Audio, Tube-Tech and Voce.

Ironically, the biggest buzz of the year wasn't products at all, but the number of companies announcing home pages and Web sites on the Internet.

1996

A Whole New World

With the popularity of MIDI, MDMs and low-cost digital, the once-clear lines between the worlds of pro and semipro recording were thoroughly blurred, especially when companies that don't cater to the music-store crowd—such as Amek, Focusrite, HHB, Manley, Meyer, Otari and TC Electronic—exhibited at NAMM.

Affordable digital is here to stay. Roland's VS-880 Digital Studio combined a disk-based 8-track recorder/editor with a 14-channel digital mixer and two optional effects processors. It's offered with the soon-to-be-a-standard Iomega Jaz 1GB removable drive at $2,795. Compatible with its DA-88, Tascam's DA-38 is a $3,499 DTRS-format MDM recorder.

1996: Roland VS-880

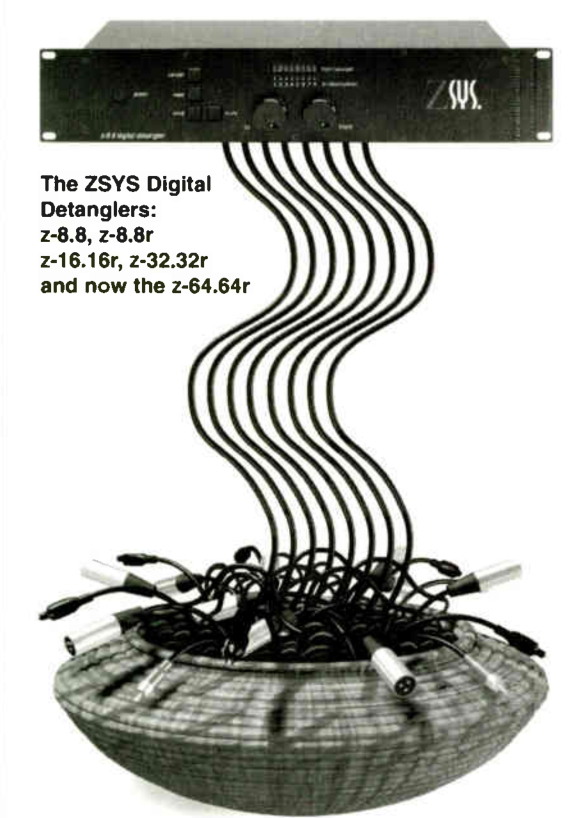
Once labeled Digital Video Disc, DVD becomes the Digital *Versatile* Disc, but two years in the future, there still is no DVD-Audio standard. Ready for the eventuality of high-bit-rate audio, Sony unveiled its PCM-3348HR 24-bit/48-track DASH-format recorder.

Old wine in new bottles: Southern California-based Martin Sound purchases Neotek and Anatech (a British company with a remarkable in-line console in development).

Affordable disk-based video for audio post arrived with Doremi Labs' V1 ($5,995) video recorder offering tape recorder-style front panel controls, a variety of compression ratios, removable media and compact rackmount packaging.

MiniDisc found a niche as a format in inexpensive ($1,200-1,500) 4-track digital recorder/mixers such as the Yamaha MD4, Sony MDM-X4 and Tascam Digital PortaStudio 564. All feature 37 minutes of recording, MIDI sync, cut/paste editing and a write-after-read mode for bouncing four tracks onto two of its own tracks.

The digital mixers kept rolling out: Korg's SoundLink DRS 168RC ($3,500) is a 16x8x2 digital console with ADAT and S/PDIF I/O. Priced in the $30-40k range was Soundtracs Virtua, a fully digital 64-channel mixer with dynamic automation, snapshot recall and LCRS panning. Tascam showed an "under-$10,000" digital mixer prototype, offer-



If digital was supposed to make things easier, why do you have a snakepit behind your rack of digital gear?

Tired of battling the constant tangle of cables every time you need to configure and reconfigure your set-up? Wondering how you're going to make *this* AES/EBU device talk to *that* S/PDIF device? Let a **ZSYS Digital Detangler** take care of your digital audio interface problems so you can get on with more important things. Whether you need **8**, **16**, **32** or even **64** ins and outs.... manual, remote, or software control........even format conversion and custom configurations .... one of our **Detanglers** is perfect for you.

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1996

- **Milestones**
  First MiniDisc multitracks
- **Beginnings**
  City Music Fixtures
  Diamond Audio
  Euphonix acquires Spectral
  EVI Audio
  Liquid Audio
  Special Projects
  Uncut Audio Corp
  Wave Distribution
- **Anniversaries**
  50th—Klipsch Professional
  50th—Switchcraft
  50th—Tektronix
  25th—American Data Services (Lexicon)
  25th—DAS Audio
  25th—dbx
  20th—AMS
  20th—Bag End/Modular Sound
  20th—Hafler
  20th—HHB Communications
  20th—Nady Systems
  20th—Symetrix
  20th—TC Electronic

ing two 24-channel strips for a maximum of 40 TDIF (DA-88/DA-38) inputs on mixdown, with 16 analog mic/line inputs. Yamaha's 03D ($4,000) was shown as a scaled-down version of the 02R, with 24 inputs, four buses and two internal effects processors.

And anyone who thought 16 (or 20 or 24) bits were sufficient needed to hear dbx's Blue Series A/D converter. Based on a 27-bit process, it offered a choice of onboard noise-shaping approaches, including the ability to create NS curves using a graphic EQ-style interface.

Numerous companies were offering audio on demand on the Internet, but Liquid Audio did it right. The audio is excellent, based on a software version of Dolby Digital AC-3 compression. At AES Los Angeles, Liquid Audio showed a mastering/file prep package and server software, which delivers high-quality audio over the net for transactions, and automatic royalty tracking/reporting via e-mail. Systems such as Liquid Audio could create new distribution avenues for low-volume, special interest or specialty releases—or, provide the instant-access record store of the future.

1997

The Shape of Things to Come

So, having looked at where we've been, what's in store for the years ahead? The answer, perhaps, lies in the product introductions we've already seen so far this year.

This year will see more new digital consoles—in all price ranges—than came out in the 15 years between 1977 and 1992. Digital console introductions in 1997 so far have included the 48x8x2 Mackie Digital 8•Bus ($8,000); Soundtracs Digital Production Console, with 64 or 96 moving faders and multiple touchscreen interfaces; and Solid State Logic's high-performance Altimix, providing mixing, networking, disk-recording/editing and random-access video. All provide onboard DSP, integral dynamics on all channels, moving faders, automation of *everything*, extensive transport control via MMC or Sony 9-pin, multiformat output buses (5.1, LCRS, etc.)—all as standard equipment.

Six months ago, the workstation

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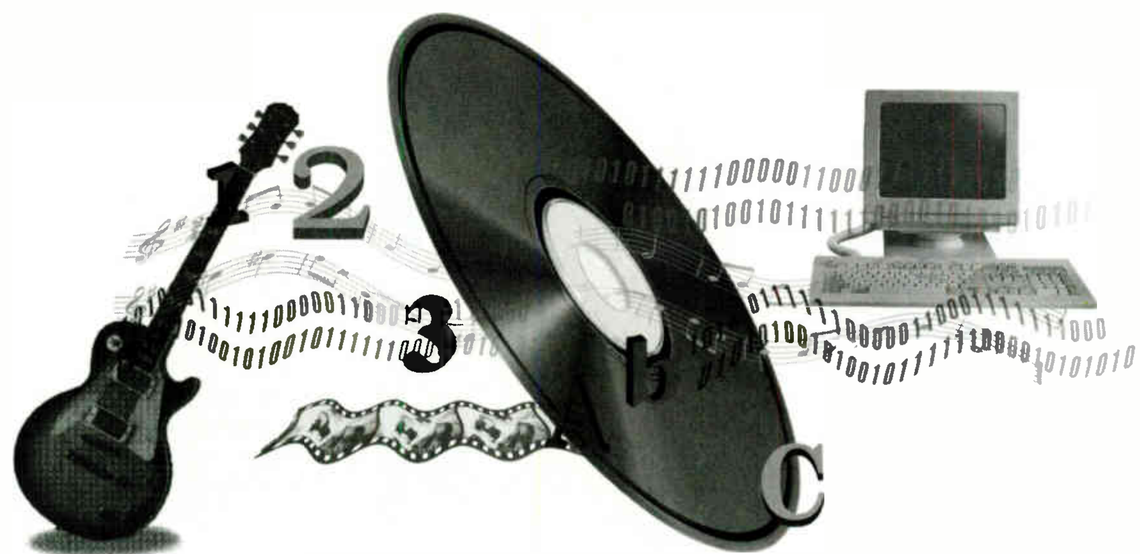

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market had seemingly leveled out. Now, with new players offering systems and numerous I/O cards available, the workstation world will be more interesting in the years to come, especially as the PCI bus enables a new cross-platform (Mac/PC) hardware standard. So far, products such as the Event Layla, Digital Audio Labs V8, Lucid Technology's PCI24, Ensoniq Paris, Korg 1212, Digidesign Audiomedia III and Emagic's Audiowerk8 all point to more affordable solutions for studios.

MDMs will continue their meteoric rise in sales, fueled by new designs, such as the Alesis Meridian, Studer V-Eight and Tascam's DA-98. And disk-based 8-tracks, such as the MO units from Genex and Augan, are showing the form that tomorrow's recorders will take. Once rewritable 10GB MO disks are $10 and available at Walgreen's, we'll see the *real* revolution, where digital tape recorders join the Elcaset decks and underdash 8-track players found at garage sales.

Outboard gear doesn't have to look like outboard gear anymore: Power Technology's DSP/FX effects processing system turns a PC into a digital multi-effects box with 32-bit resolution and screen-based control of all parameters via a hardware card and PC/Windows-based software. Lexicon's new Lexicon Studio™ is a hardware/software system offering I/O, DSP, routing, sync and control hardware for leading software packages based on PC or Mac. And for those who want access to the power of software plug-ins in real-time situations, the Galim Signal Processing System from Waves offers modular, computer-based multi-effects and real-time audio processing in a four-rackspace unit integrating Pentium or Power PC hardware.

The recording industry now faces challenges in how the present studio environment will handle the needs of 88.2/96kHz, 20/24-bit consumer systems. That issue can be addressed by using some of the available present-

1997

- **Milestones**
  DVD-Audio standard develops
- **Beginnings**
  Emtec Magnetics (BASF)
- **Anniversaries:**
  50th—AKG
  25th—Automatic Inspection Devices (Integral Vision)
  25th—CAE/Littlite
  25th—D&R
  25th—Dorrough
  25th—E-mu Systems
  25th—Eventide
  25th—Sound Out Laboratories (Soundtracs)
  25th—Tapco

day tools and eventually upgrading for the future.

A more interesting aesthetics issue is how we, as enginners and producers, plan now for (and adapt to) the coming of 5.1-channel surround sound. Will our first releases be like the roller-coaster stereo demonstration records of the 1950s? Are the surround channels merely a place to dump the rear room ambience to provide the "concert hall" experience? Do we mix so the listener is sitting in the center of the band? How do we deal with our surround mixes' mono (or stereo) compatibility? And if monitoring decisions are difficult enough today in stereo, then how do we deal with the guesswork of wondering what kinds of system our audiences have at home or in the car? We may not have all the answers yet, but I have a feeling we're in for a fun ride. Bet on it. ■

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—FROM PAGE 110

going to be a much, much larger audience whose expectations are going to be lower and lower. People are going to accept less and less because the dynamic range on radio is getting smaller as radio stations try to compete more. There already isn't any real dynamic range on television. And the dynamic range and frequency range on the Internet, no matter what we end up with, is always going to be dreadful.

There's going to be a tremendous push to make this acceptable to people, and I think people will begin to accept it because they will be spending so much time listening to it that they'll absorb it—"Okay, this is the way it is." I think people don't even have the time to sit down and listen to CDs much anymore. I think most people are listening to audio in conjunction with something else, whether it's watching television or fooling around on their computers or driving their car. And all three of those things are not conducive to high-quality audio, especially driving in the car. What's your available dynamic range in the car? Maybe 15 dB? I think that as people become more and more multitasking-oriented, audio will be a more back-seat kind of thing. I think the lower-end studios with the lower-end production markets are going to be geared toward that, and they're going to be geared toward turning out stuff in which the quality doesn't really matter that much—what matters is the punch and the fact that it gets the message across. Whereas there are going to be a few studios that are going to be very high-end that will be mixing sound for movies and for surround sound, and there's always going to be that core audience that wants that.

Craig Anderton: Obviously, digital's here to stay, and the higher sampling rates and the larger word lengths are foregone conclusions, which will make it a lot better. But to me, the really interesting thing about digital audio is that it allows for analysis of music and sound in a way that's never been possible before. What I think and hope we're going to see is more studies that deal with the *qualitative* nature of sound, rather than quantitative. We have plenty of quantitative data on the subject but very little on what makes sound magical or what makes it trigger memories in people, or even why it supposedly has healing powers in some instances—things like that. Now we have the tools to analyze it in ways that never existed before—different tunings on keyboards; sophisticated spectral analysis that was never possible before; there's filtering and things where you can really isolate individual components, screw around with the sound and determine different things about the sound in a controlled setting. Obviously, it's now possible to synthesize a whole lot more sounds digitally than it was 20 years ago. Additive synthesis is something that's now feasible thanks to digital technology. So all these things that have been sort of dormant in the wings are now possible. FM synthesis started the whole thing off when it made it out of the universities and into the bar down the street, so to speak. We're going to see more of that esoteric stuff filtering down. It used to be that no one had a spectrum analyzer unless you could

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afford a big Hewlett-Packard box that cost like ten grand. Now you buy a $200 software wave-editing program and it has a spectrum analyzer in it.

So I think in a lot of ways, the interest and excitement is going to be involving sound rather than audio, per se. And applications of sound. One good example is quantization. When quantization first appeared on sequencers, people thought, "Oh great, now we can have perfect rhythm," only to find out that perfect rhythm is not what we want. It's the same thing with pitch correction. I'm starting to think that tuning is a much more plastic medium than we thought. Look at blues guitarists who, when they bend up to the octave from the seventh, never quite make it all the way. These are things we've taken for granted until now partly because, until recently, you couldn't measure to see, for instance, how much [drummer] Steve Gadd was advancing the hi-hat compared to the rest of the beats, or that kind of thing. As we have these tools, we're going to be learning a ton of stuff; some really fundamentally important things about music—like, tempo is a suggestion, not an order; pitch is a suggestion, not an order; and microtonal tunings may have a real basis. So that's what I think is going to be interesting to watch. And, of course, a lot of it is software/computer-driven. The processing power in computers these days is just so astonishing that it makes all this possible.

Murray Allen: Ten years ago, the germ of the whole move to home studios was well under way, so we knew that ultimately the home studio would expand and the so-called project studio would become a major player. We also knew that because of what was happening with computers even back then, the quality and the ability for more people to get involved in creating final product was on the drawing board. The thing that surprised me a little bit was that the quality people would accept as okay would drop as much as it did. In other words, we always knew that professional composers and engineers created a certain quality of product. As it became easier for more people to get into the act, so to speak, the people who are the purchasers, who in some cases don't have the taste or understanding of what really good is, sometimes bought materials that were less than great. I had already seen that take place in the video world, when video-assist was developed and there was a deterioration in what was happening with video because people who weren't schooled from start to finish and never put in apprenticeships were getting involved. At the same time, for the people who were knowledgeable and had paid their dues and had talent, it gave them a greater ability to be creative.

Equipment is going to keep getting less expensive. Those of us who are quality nuts—who have devoted our whole lives to creating the Rolls Royces of audio—are facing people who are talking about Internet audio, which I'm involved with, too, and where everything is compressed and people are getting used to even lesser-quality audio. It's very much like when people would take a cassette and copy it three or four times and give it to their friends. It was like, "Why are we spending all this time making great records, when it's being copied on inexpensive home machines and being passed around?" I guess what that goes to prove, and we've always known this, is that content is what counts to the consumer. If it's a good song and the artist performs it well, people don't really care if there's a little noise on it or the top end is gone or if there's a little bit of wow on it.

The other thing I believe, and I've talked to record companies about this, is that in a couple of years every audio record will also have some picture involved with it. In other words, the marriage of audio and video—"multimedia"—is going to be the mainstream. It will probably be on DVD. There will be stand-alone DVD records for the purists, where we have great 6-channel sound or whatever—pure audio at 96k sampling rate, things of that sort. But I think the mainstream will be more involved with multimedia, one way or the other. And when that happens, we know the audio will probably be compressed a little bit more.

Toby Mountain: I think most of what I believed about the importance of computers has come true. I came into digital mastering with the computer age from an academic background, so I saw what computers were capable of, and I saw that coming. By 1987, too, there were enough initial start-ups that it was clear that was the way it was going. In terms of DVD, I don't think anybody could have prophesied that. I think some people thought, "Well, now we've got the CD. The next step will be some credit card-size music carrier in 15 or 20 years." People were talking about bubble technology and other things, but I'm not sure many people specifically foresaw DVD. As far as mastering itself goes, I don't think people really envisioned the amount of power that we would have and breadth and scope and the ability to change things—things like NoNoise and digital processing and getting into the high-resolution stuff, like 24-bit. I don't think people thought we would revise the CD standard, per se, even though there was some dissatisfaction with 16-bit. I think some people were willing to discard digital altogether and forge on with analog—and some people did do that. Others have learned to live with it and use it how they want to their own advantage, mixing it with analog and so on. In mastering, digital pretty much reigns now because most of the equipment mastering engineers are using now is digital, at least at some point, because obviously they have to send it off in a digital format.

Whether DVD is successful or not, I think the next big change will be that the music-only album is pretty much dead, and what we'll see change in the next five years will be that most things will come out on some music-plus format; in other words, music with multimedia, music with graphics, music with video. Even though the enhanced CD has not been particularly successful, that's just the beginning. It was a poor start, but there's much more to come, and if DVD takes hold you're going to see a lot more movement in the direction of presenting music in a different context. It's going to be awhile for the record industry to adopt DVD as a format, but I think it eventually will. DVD will be kick-started by the DVD-ROM industry, and the computer industry in a way is kick-starting everything else.

Russ Berger: The quest for ever-quieter spaces for production, free from background noise, will continue. More powerful and sophisticated DSP technology tools will allow us to reduce HVAC and mechanical noise through Active Noise Control systems. This is a practical use of phase cancellation that can help control unwanted HVAC sys-

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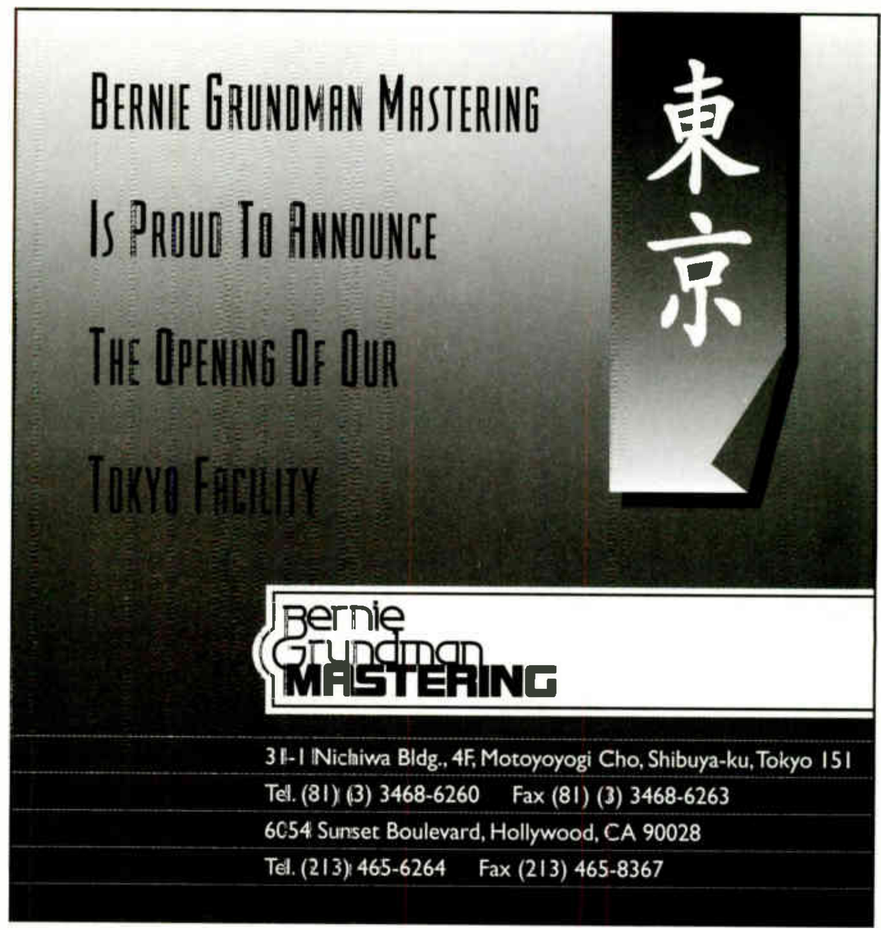
tem noise, and a system consists of three primary components. The first component is a series of acoustical sensors, which could be accelerometers, to measure the vibration, microphones to measure airborne sound, or a combination of both. The second component is an electronics package to analyze the noise and produce an out-of-phase canceling signal. The third component is a delivery system that comprises amplifiers and loudspeakers or vibration shaker transducers. The system senses the disturbing noise spectra and produces an "out-of-phase" canceling signal.

For us architects and designers, improved communications will enable better integration among the design trades and promote the exchange of ideas. The ability to centrally control design and construction efforts will allow more abbreviated project schedules and tighter budget control. Today, we are distributing drawing files electronically via the Internet, which gets drawing files and information there immediately. Tomorrow, the ability to simultaneously share and co-author drawings over great distances will make design coordination efforts more effective. In the future, much of the construction coordination and field verification of construction will be handled by live video feed from the site.

Stephen St.Croix: Anybody who's been in the public eye and done predictions, and I've done both for some time, would be tempted to say, "Of course I knew all this was going to happen. I knew it was going to be 16-bit, and I knew it was going to suck. And I knew it was then going to be 24-bit and I knew we were going to go 96kHz." The truth is, when I first heard digital, I was in L.A. with Stevie Wonder. I think we were working on *Songs in the Key of Life*, and what we had was a Sony 1610, and around the same time I'd gotten a Sony 2000 Beta deck with a Sony 601 PCM interface, and then the Nakamichi DMP-100. These were the first 16-bit linears, and those were the days when 16 bits of audio were 16 levels of pain. They really were—you were actually hoping the next bit wasn't going to come along because it was probably just going to hurt some more. And even then, as horrible as everything sounded—it was like BBs in a broken glass—I turned to Stevie and said, "This is all there's gonna be." And Stevie said that wonderful thing he al-



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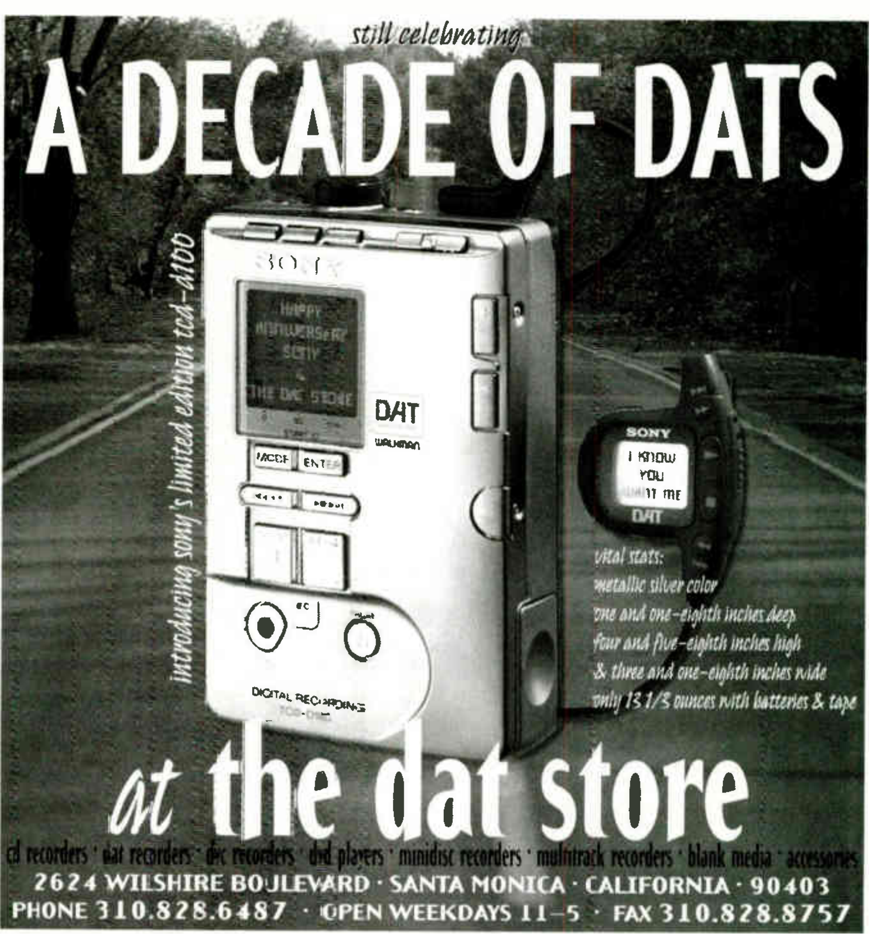

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ways says: "Uh-huh!"

And even when I got my Delta T delay from Lexicon that Chris Moore designed—8-bit linear—and it sounded really bad. I listened to that and said, "Oh this is it! This is the only way it's going to go. All they have to do is make it sound good. There have to be some breakthroughs in removing the edges in conversion."

So, yeah, I saw digital as the future. What I didn't see, what I never would have guessed, is that the state of video quality would stay so suppressed for so long. I am astounded we live in a world of 400 theoretical scan lines, and you get half of them on your doorstep if you're really lucky. This is an embarrassment. There's no technical reason for this, of course. It's all economic and political. But the fact is, we don't have TV that doesn't give you a headache. We now have digital audio that is beginning to work. I can actually go out and buy a CD and listen to it without throwing up. I can't do that with video. DVD is really the first step toward abandoning archaic analog TV. We just have to give it up. DVD, even with its crappy compression, as long as you're not trying to overcompress, blows the doors off of even videodisc because it's not analog.

We're in a time when huge, roll-off-your-chair-and-roll-around-on-the-ground-laughing-with-milk-squirting-out-your-nose mistakes are being made. Look at MiniDisc. Look at digital cassette. C'mon. These things kind of make you forget that wonderful all-time joke that we played on ourselves—8-track. That doesn't seem quite so bad in the light of these more recent mistakes. But the buying public, your readers, are not dumb. The public is educated now, and you can't slip these mistakes in like you used to. Companies try these things out, and the people say, "Oh no, no. This sounds terrible. This is a move backwards." And I'm proud of the industry for starting to stand up for their rights and saying, "Wait a minute. Just because Monster Company Number One has come out with product doesn't automatically make it sound good." They don't buy it, and the product goes away. This is what I've been fighting for in *Mix* since I joined. The buyers are taking control, and that's how it should be.

The future is clear; it's simple. I cannot see how we can deviate from this prediction. I see it to be an inescapable necessity simply because it will be driven by everything that drives capitalistic future—profitability, reliability, simplicity and sex appeal. And the prediction is this: nothing, nothing, *nothing* will move. There will be no moving parts in the audio industry. All storage will absolutely be on some form of holographic crystal—a chunk of doped glass that will support quantum jumping or do an opacity or a chemical change when exposed to laser. So you scan 'em and write and scan 'em to nondestructively read. No power supplies, no refresh. It's just like the science fiction shows—like in *Star Trek* and *Deep Space Nine*, when somebody hands someone a crystal and says, "Here's the data you wanted." Terabytes in a sugar cube. When I started writing about this years ago, it was a dream, but now it exists. Two companies are actually making prototype interference solid-state memory now. So that's where we're going to go. We will be recording directly to this removable media! And that's the short-term—five years. Long-term, it's going to come to a fork—biological or inert memory, and I can't predict which way it's going to go.

Also, the audio industry as a business will eventually realize it can't go on stealing market share from itself indefinitely, and it's going to want to grab share from the real world, so it's going to move down-market using technology's greatest special effect: making insane amounts of power for embarrassingly low sums of money. I truly see a minimum-physical-interface recording studio. I think we are going to be sitting in an air-conditioned room with goggles and data gloves on, grabbing a chunk of audio floating above us with our right hands and another piece with our left hands, and sticking them together and instantly hearing the splice. I am betting my future involvement in this industry on it going that way; I believe in it that strongly. I'm actively researching true virtual environments. I think we could be working in fully virtual environments in about seven years, with it becoming really competitive in 12—when it's reliable and not just another technology freak show. ■

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Once in a great while, an idea comes along that can be considered truly revolutionary. Well, it's once-in-a-great-while-time again. Introducing the HLA Series and its centerpiece, the 4895 Three-Way -- a metamorphosis in tour sound technology from JBL Professional.

At the heart of the series are two DCD drivers, a 10" and a 14", which offer the ultimate in performance at as little as 7 lbs. per driver. This is accomplished with a new Neodymium magnet design and new voice coil topology which vastly reduce the need for steel. Dual Coil Drive was chosen because it has two magnetic gaps and two voice coils in each driver. This doubles their power-handling capabilities.

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4895 Three-Way

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Digital Production in Live Sound ⊙ Wireless and HDTV
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2000
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JANUARY 19
The Future of Audio
Developers Reveal Their R&D Plans
⊙ ⊙ ⊙
Music Delivery On the Web
What's Legal, What's Next
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Technology Free-for-All
Mix columnists Stephen St.Croix and Paul D. Lehrman Go Head to Head
A Supplement to
MIX
World Radio History

5.1 Surround Sound...

It's a jungle out there

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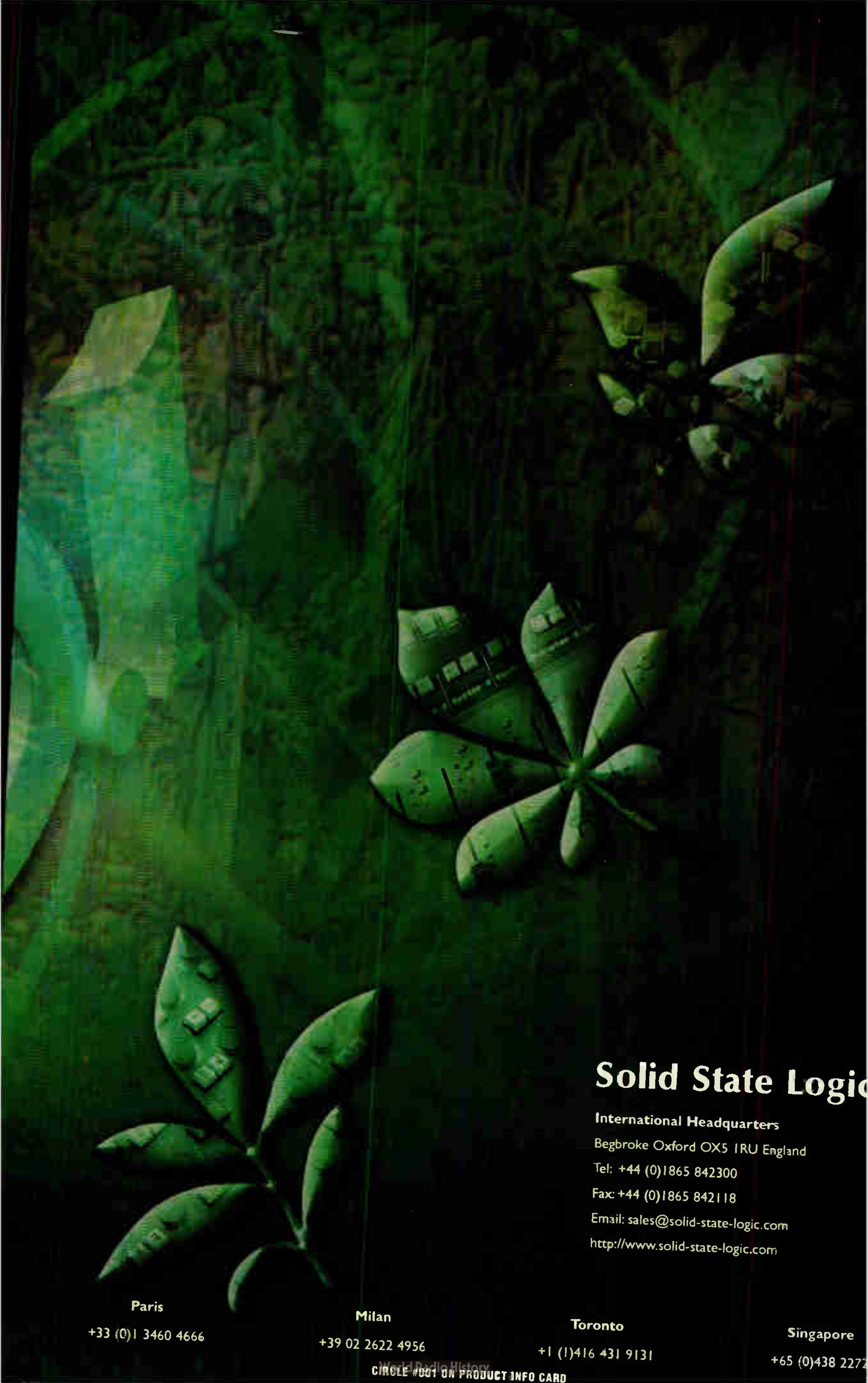

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CIRCLE #001 ON PRODUCT INFO CARD

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So if the road to the future of audio is confusing, let us offer directions— The Studer D950. Built for the road unexpected. The one you travel every day.

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Please contact TGI North America for more information.

CIRCLE #003 ON PRODUCT INFO CARD

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Brad Fiedel

Credits: *Terminator II • True Lies • Striking Distance • The Accused • Tom Hanks "Earth to the Moon" • Blue Steel*

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Frank Serafine

Credits: *Orgazmo • Field of Dreams • Hunt for Red October • Flight of the Navigator*

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Greg Mackie, Founder

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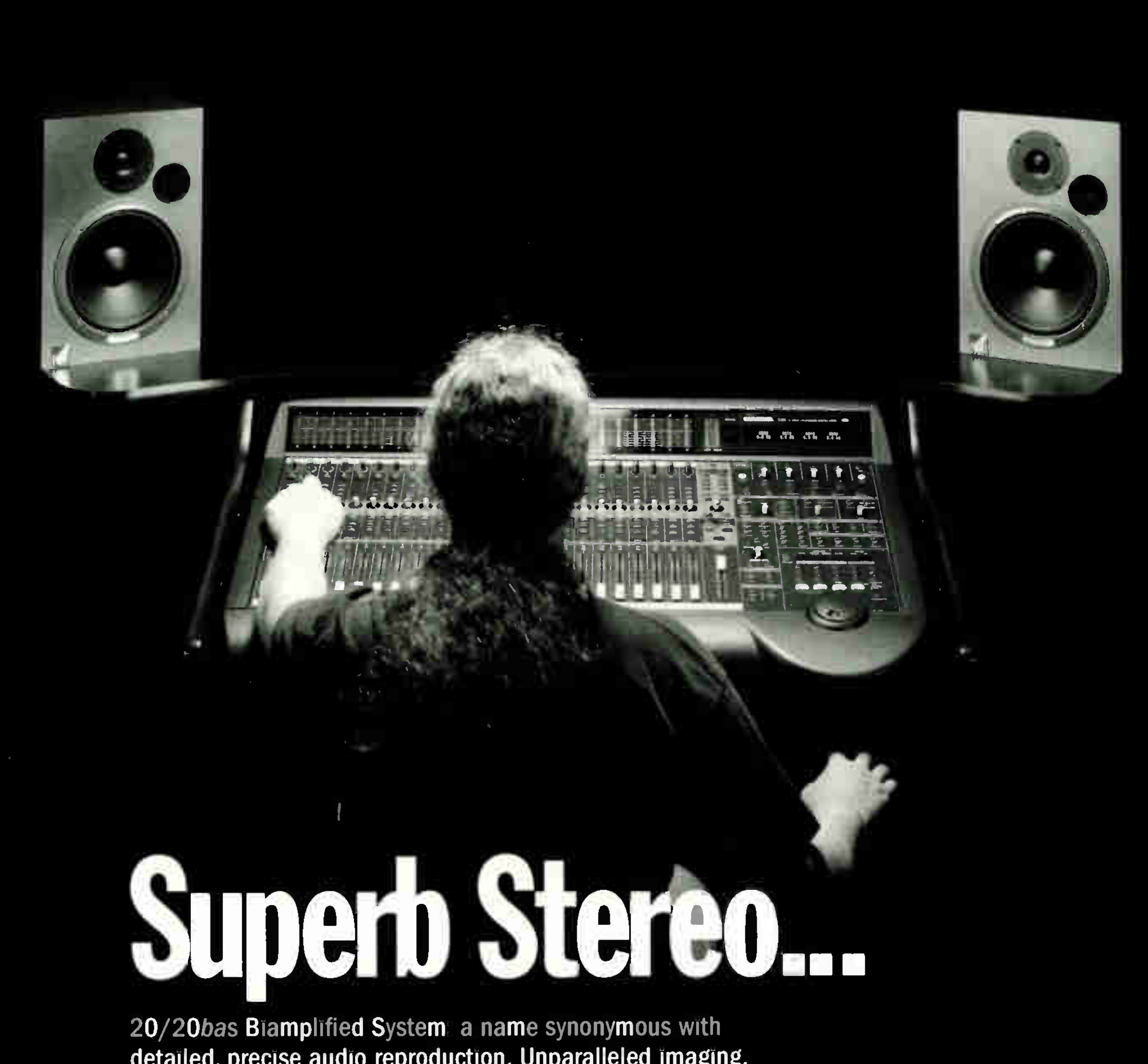

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CIRCLE #005 ON PRODUCT INFO CARD

10 From the Editor

12 The Fast Lane Meets Insider Audio

In Which Mix's Columnists Take Stock and Debate What's Coming for Our Changing Industry

Learn a bit more about Stephen St.Croix and Paul D. Lehrman, longtime *Mix* columnists and audio industry raconteurs, as they go *mano a mano* in a wide-ranging debate about the past, present and future of recording and technology. Love 'em or hate 'em, their opinions are always provocative.

36 Electronic Music Delivery

Major Players Look Ahead to the Future of Internet Audio *by Philip De Lancie*

Mix media and mastering editor Phil De Lancie delves into the myths and technical realities of downloadable music—as it stands today and what it promises for the future. Hear from those at the forefront, including Gerry Kearby, CEO of Liquid Audio; Howie Singer, CTO of a2bmusic; Tom McPartland, CEO of TCI Music; and Ted Hooban, director of digital products for online record retailer CDnow.

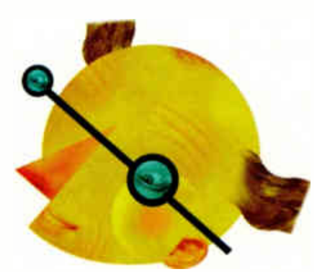
50 The Music Industry and the Internet

In the Online World, Piracy and Protection Are the Hot Topics *by Sarah Jones*

The labels are scrambling to protect artists, while breaking bands search for ways to get their songs to the masses. The RIAA is suing manufacturers that don't copy-protect their systems. And companies are feverishly trying to figure out ways to watermark original material. The brave new world of electronic music delivery is not as simple as uploading/downloading a song—there are basic artist rights to consider.

58 Audio in the Year 2000

A Behind-the-Scenes Glimpse at Technologies for the New Millennium *by George Petersen*



How does the manufacturing community plan for a future that may or may not be obsolete? Who can predict what technologies will make their way into daily use five years down the road? When will terabyte storage make its way into facilities, and why are they already talking beyond 5.1? *Mix* editor George Petersen talks to industry technologists and finds out where we are all headed.

84 2001, A Live Sound Odyssey

The Future Is Digital *by Mark Frink*

It doesn't take a rocket scientist to figure out that the future of audio lies with digital technology, but in the sound reinforcement industry, it's been a piece-by-piece transition. *Mix* sound reinforcement editor Mark Frink takes a look at the signal chain and predicts how the live sound systems of the future might shape up. Hint: It's more than just computer control!

96 Ad Index/Product Information Card

98 Wireless in the Age of Digital TV

Mic Makers Respond to Spectrum Changes *by Ty Ford*

The arrival of digital television in major markets this past fall has ramifications far beyond new sets in the home. It has created a jungle in the airwaves, and FCC guidelines regarding the broadcast spectrum affect everything from emergency response systems to wireless mic frequencies on tour. Learn what's going on in the UHF and VHF bands, and what you can do to make life easier the next time you pull into Atlanta...or Chicago...or Los Angeles.

Cover illustration: Tim Gleason

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Checklist for the New Millennium

THERE ARE ONLY 365 DAYS TO GO UNTIL THE BIG BLOWOUT, BUT BEFORE YOU START buying party hats and stocking up on magnums of '88 Louis Roederer Cristal Rose for the celebration, here are a few suggestions for the audio industry. And if we can pull together and accomplish half of these before our chronometers read 00:00/01:01:00, this audio world might just be a more beautiful place. Ready? Here we go!

1. Hardware manufacturers: Start *really* using the Web! Forget the cute animated gifs and give us specs, data sheets, schematics and service information on both the gear you build now and what you once built. And don't use the old excuse that publishing schematics gives your competition inside info: They're *already* building knockoffs of your gear, so what's the point?

2. Software companies have to improve tech support. But beyond merely adding phone lines, this could also involve placing troubleshooting menus for common complaints on Web sites, or maybe just making the darned thing easier to use in the first place.

3. Congress could improve the quality of product tech support by passing legislation requiring users to actually consult manuals before calling tech support. Now again, if the manuals were a little better...

4. Sooner isn't better! Manufacturers: Don't ship us your half-finished products. Take the heat for being late, but get the bugs out first. Thanks!

5. Also, let's make 2000 a goal for looking at real standards for issues such as plug-in architecture and file format exchange.

6. Engineers: Whether you're in the control room or packed arena, turn it down! You might not need it now, but once you retire, you'll need your hearing to detect errant drivers who might run you down (maybe they've heard your mixes).

7. Speaking of mixing, go easy on the joysticks when making surround panning decisions! If a solo sounds great, it'll sound even better when it stays in one place for 20 seconds or so.

8. Take the simple approach once in a while. Rather than placing 17 mics on a drum kit, try a pair of overheads and a kick mic. *Hear* the difference!

9. Get a life! Instead of spending hours on Internet newsgroups ranting that the lack of spare parts for Scully recorders is some kind of government plot to force us to buy digital gear, forget technology for a while: Take a walk. Watch a sunset. Attend a symphony. Read...

10. And most importantly, don't let all this millennium hype get out of hand. Consider the fact that due to errors in the Gregorian calendar, we're about four years out of sync, so all this new millennium nonsense actually took place in 1996 and you missed it! In any case, 1999 may still be a good time to reflect on where we're at, where we're going and when we should start thinking about the Y10K problem...

Let's keep looking forward.

George Petersen
Editor

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Mix was founded in 1977 by David Schwartz and Penny Riker Jacob

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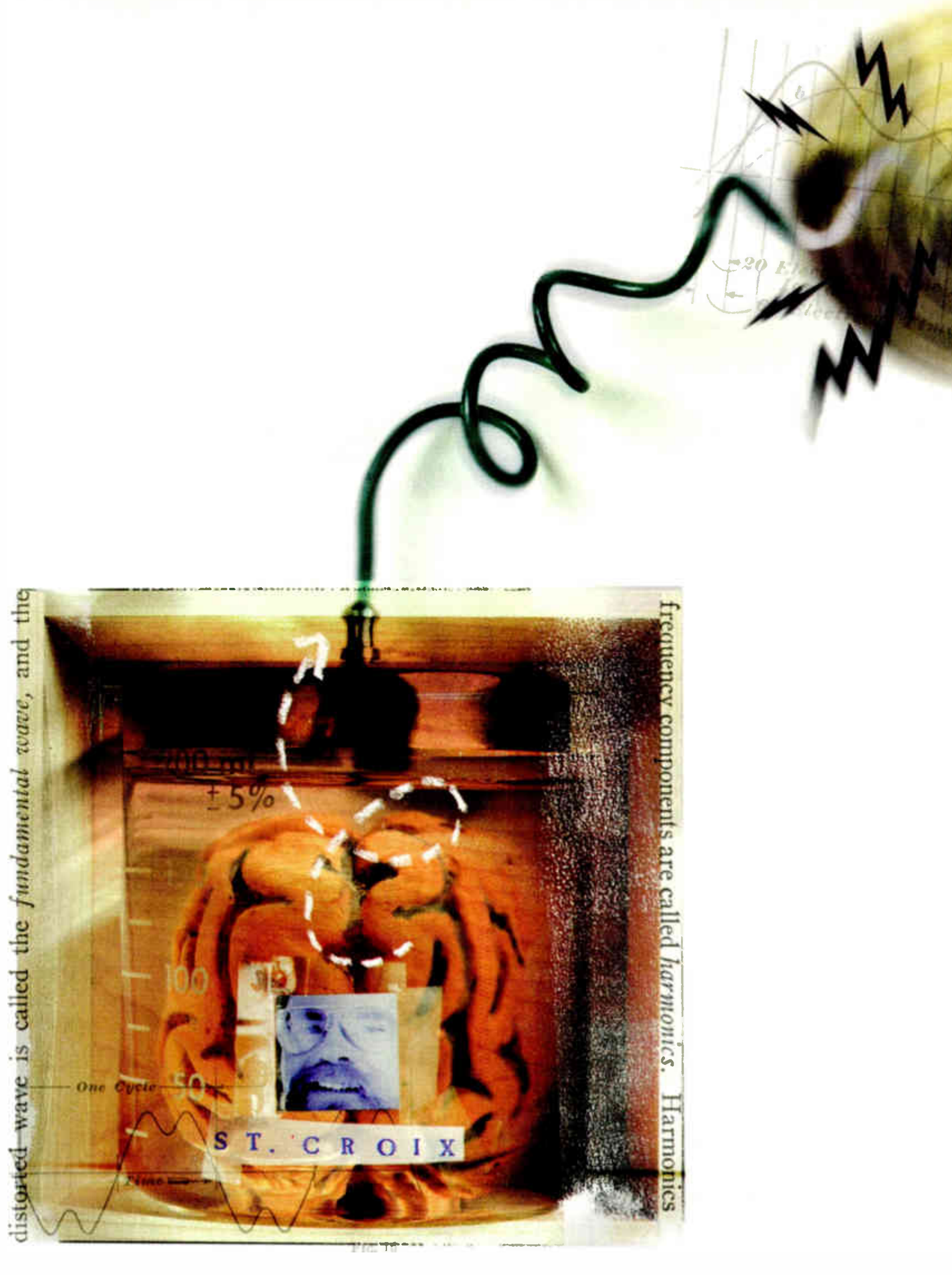

The Fast Lane Meets Insider Audio

For more than ten years, Stephen St.Croix has occupied *Mix* magazine's pole position, the "Fast Lane," right there on page 20, putting forth irreverent monthly commentary on the audio industry in his inimitable style. Half our readers love him; half our readers—well, let's just say they don't always agree with what he has to say. Paul Lehrman moved into the "Insider Audio" spot about three years ago, taking over for Ken Pohlmann and exceeding our wildest

World Radio History

ILLUSTRATION: STUART BRADFORD

In Which Mix's Columnists Take Stock, and Debate What's Coming For Our Changing Industry

expectations about what a columnist could deliver. His wit and his depth of knowledge are unequaled in the audio press, except perhaps by Stephen.

Paul was born 46 years ago on Long Island, N.Y., to "a proto-typical New York Jewish overeducated family." His father is a doctor, and his mother resides in academia, making use of her two master's degrees. His brother is a composer, and his sister is a professional storyteller and children's theater director. He

World Radio History

spent two years at Columbia University, majoring in electronic music composition while trying to find a way to minor in recreational pharmacology, but he left when he realized electronic musicians were only playing for other electronic musicians. He dropped out and went to a hippie commune in Virginia, where he hooked up with a country-rock collection of locals. Then it was back to New York and a conservatory degree, and a brief career in radio engineering and production that brought him to Boston. Today, he lives in the Boston area with his wife, Sharon Kennedy. He teaches recording at UMass Lowell, directs the editorial for Mix Online and is currently putting together a revival of the heretofore-never-performed first (1925) version of George Antheil's "Ballet Mecanique," which calls for, among other things, 16 synchronized player pianos and three airplane propellors.

Stephen recently celebrated the angst of turning 50 in print. He was born in Maryland, but was removed from his home at nine to be raised on a series of Air Force bases throughout the West, then on an Pima Indian reservation in Arizona, where he grew his hair long. To make money, he raced dragsters ("I was 6-foot-2 and 110 pounds, so I won a lot."), but after crashing and ending up in the hospital a few times, he opted for the quieter life of rock 'n' roll. First drums, then guitars and keys. Later he entered Carnegie for a degree in Fine Arts and Commercial Design, but he left after the first year when his teacher said, "Everybody who thinks they're going to get rich in art, raise your hand. Now all of you with your hands up drop out." Everything he learned in audio, electronics and design came from the street. Today he lives in Maryland, with his cats.

Both Stephen and Paul remain active performers and/or musical creators. They are working professionals, and each, in his own way, is an educator—Paul in the more formal sense, Stephen more in the street sense. And while they share a nerd's-eye view of technology developments, each recognizes the glory of true art. Other than that, they couldn't be more different personalities. When we set out to create *Audio 2000*, we thought it would be a good idea to let our readers know a bit more about these two and their views of the future, so through the miracle of modern technology (a conference call), *Mix* moderated a dialog between two of audio's dedicated muckrakers. Love 'em or hate 'em, they always make you think.

The Formative Years

Lehrman: I gave up composing as a career choice at age 20, because there was no way I could own my own electronic music studio. So, after I blew my health and my bank account in Virginia, I ended up in a place called SUNY at Purchase, which had just opened and had implemented a really intense, traditional conservatory-style music curriculum, but they had no composition program. So I decided to try out being a bassoon player. I had played the bassoon since high school, and so at Purchase I really concentrated on it for two years and actually got quite good at it. I was told when I graduated that I could probably be a professional bassoon player if I really wanted to. But I didn't want to. So I put it away and never really played it again. And while I was at Purchase, I taught myself a lot about radio. I had been a ham radio operator when I was a kid, but I taught myself a lot more. I built the campus radio station, built the sound system and recording system for the campus concerts—simply because it was such a small school and it was brand-new. I knew a little bit about this stuff, and nobody else knew anything. And that was great fun. The radio station I built had a couple of Revoxes and a Low Power Broadcast board. And everything I did was unbalanced. But it was AM carrier current, so nobody cared. You couldn't hear it anyway.

St.Croix: I'm sorry to interrupt. I just like that statement: "Everything I did was unbalanced."

Lehrman: Well, it certainly was. [Laughs] I learned a lot about carrier-current radio and why you shouldn't do it. Because it just doesn't work. I made a tremendous amount of mistakes but learned my way around. And I also learned classical recording because I found myself being the resident student recordist for the music department, and I got a very fast education in how to record classical ensembles in less-than-ideal spaces, because two-thirds of the school hadn't been built yet. So we were performing in these very weird spaces, and we were trying to get good recordings of recitals and concerts. I learned how to do that, just from microphone placement. We didn't have any fancy equipment, and that was really quite a wonderful education. After school, I spent a couple of years in radio, recording classical concerts, which was good because the equipment was much better, but I was also doing things like transmitter maintenance and rebuilding cart machines, which didn't interest me in the least.

St.Croix: Well, I went to way too many schools—none of them too impressive, so I ended up doing sort of a street-level education. I had to work to learn, and that may not have been so bad. I had taken German in high school in the desert, and it was pretty easy. When I eventually moved to Europe and settled in Switzerland, my school classes were taught in Italian, French and German—

We were performing in these very weird spaces, and we were trying to get good recordings of recitals and concerts. I learned how to do that, just from microphone placement. We didn't have any fancy equipment, and that was really quite a wonderful education. —PAUL LEHRMAN

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not in English. I was pretty comfortable there, and for some forgotten reason I decided, well, I'd be an EEC translator. I mean, earphones were already in my life anyway.

Before that, when I was living on the reservation, I raced dragsters on a forged license to buy my way out. It was a natural for me because at 14 I was 6 foot 2, weighed 110 pounds, and I would ride a top-fuel dragster without the required 200 pound flywheel scatter shield. I was light, and I was crazed—so I would win. I would also crash. However, I met girls. And this was very cool. When I turned 15 I had won enough money to get off the reservation and build a house.

Once, while I was in the hospital after violently losing a race, a friend came to me and said, "Why do you do this?" I answered, "Well, I get paid, and I meet girls." And he said, "I'm going to share a big secret with you. There is another way to meet women where you'd probably bleed less. Music." So I got into music only to get laid. I was working nights at a place called the Peppermint Lounge—not the New York one, but in Phoenix. I was sweeping up and cleaning after hours, and I talked the manager into letting me bang on the band gear because these guys owed the club money. You had to be a live player in those days to understand how you can be a working band, a popular band, yet owe the place you work money. So they owed, they left their gear there 'cause he wouldn't let them take it home 'cause they might skip. So I went for the instrument I thought I could get onstage the soonest with—drums. I practiced at night until one day I thought I was better than the band's drummer. I challenged him in front of everybody and said, "Look, I can play better than you." And the band, being a typical dysfunctional family, said, "Well, get up here and try." There's only 200 people in the audience. I did and I got the drummer's gig. The guy was right. Women went home with me, and I didn't have anywhere near as many splints or bandages as I did when drag racing. So I thought, "Oh man, this is great." And then as I continued to play drums, I began to notice the guy standing in front of me with the guitar...

So I decided I needed to be a lead guitarist, and so it took several more months until I became their lead guitarist. And that is how I started. And an amazing thing happened. About that time, I suddenly woke up and realized, "Oh—I actually like music." It had never occurred to me. I was in it strictly to get laid and get off the track. I didn't start as a tech at all. I didn't start fumbling things together until I lived in London and designed and built little fuzz boxes and amps in Piccadilly Square. But that came much later. I was playing big time before then. Not big time financially, but all the time. All day and all night.

> My first studio, I used to go in at night and lock the doors and just sit there and look at all the gear and the lights, and I realized that my whole life I wanted a rocket ship and this was as close as I was going to get. I swear, I'd pick limiters for the number of lights on the front panel.
>
> —STEPHEN ST.CROIX

Lehrman: Let me also say that, so you don't think I'm strictly this classical guy, I was also into jazz, folk and theater music. I was all over the map. At one point, I considered myself fluent on something like 12 different instruments. But the one thing that I discovered—because my family was very culture-oriented and we were listening to music all the time—which was my own, which nobody else was interested in, was, of course, rock 'n' roll. And so I had a little band at the age of 9. And there were three of us who dressed up in sort of Dave Clark Five outfits. And turtlenecks and leather jackets as much as we could get away with. We ran around the school playground pretending to take pictures of each other for our next movie. Worked out "She Loves You" for two acoustic guitars and snare drum. But when I was in high school, I started playing some real music, and I was in a lot of bands that were very seriously into Jefferson Airplane and the Grateful Dead and Hendrix, and the Blues Project.

St.Croix: That was the recreational pharmacology thing.

Lehrman: Absolutely. You can't sit and do a four-hour jam on "Dark Star" without some kind of chemical influence. And I started playing in clubs as soon as I was old enough to do so.

The Technology Bug

St.Croix: When I started doing electronic development, it wasn't because I wanted to provide electronics to the world, or even that I was curious. In fact, it was the same backhanded type of reasoning that got me into music: I got into electronics strictly because I couldn't get my guitar loud enough to be the only thing the audience could hear without my band yelling at me. So I thought the answer would be in electronics, and I developed a particularly nasty fuzz box. I was actually working part time at Vox in the UK at the time, a day job. I developed electronics experimentally, strictly for my own use, to give myself a different sound than anyone else. I had no real interest in designing, but you couldn't go buy this stuff, and I needed to cut. I really needed to cut. And I needed sustain. I needed all the things everybody thinks they need. And you couldn't just go to the store and buy it. So I got these germanium transistors and hacked them together and got what I wanted. And then guys with money would ask if I would build them one, too. And I would say, "Sure," for a price that I thought was insane, and they'd go, "No problem." And I saw the light. So that's how I got in. The interest

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only developed slowly over the next years as I realized I could cut out a position in the market for my own taste in design. But I never intended to. It was definitely out of necessity—not curiosity. As soon as I got the sound I wanted, as soon as I got the thing to work, I'd wrap the circuit in masking tape, shove it in my pocket, and walk back out on stage. I wouldn't even draw out a schematic. I didn't care.

Lehrman: I don't play out very much anymore. And the reason I stopped is that I got into the one-man band-in-the-studio bit. You know, '83, '84, the computer-based synthesizers and the dawn of MIDI. I got into electronic music in the first place because I wanted to create music by myself without depending on other musicians. But I couldn't do that for ten years or so. Then in the '80s we had all this desktop music production stuff come out, and I just glommed onto that. And that became my medium of expression. So, do I play out? Except for jam sessions on the back porch with some great players who happen to live in my neighborhood, no. But do I still compose? Absolutely. So, in fact, I'm playing all the time, but it's in my own studio for my own purposes. The bulk of my work these days has to do with film soundtracks and music for live performance backing up other types of performers, not musicians.

The more technical side wasn't born out of frustration, but out of necessity. And also out of curiosity. I liked the idea of mixing sound for live bands. And so I learned how to do that. And I was always interested in the technical stuff. As I said before, I was into ham radio when I was a little kid. I just loved the technology. I just loved the idea that this stuff could be used for creative purposes. So I never really felt like there was a dichotomy, and I never felt much frustration. It was just, "Wow, let's try this new toy and see what it can do." As I got older and had more access to cash, I could get bigger and louder toys. The technology became my expressive medium. I've always been more of a user and a consumer than a designer, although I've done a little bit of design work. Not nearly as much as Stephen. It's always been, "Wow, how can I take this and turn it to my creative ends and make whatever it is I'm doing cooler?" What I've got now—and what I've had really for about ten years—is everything I've always wanted. [Laughs] Except, of course, the time to sit down and be able to use this stuff.

> There will still be professional, expensive places, but they'll be tiny. They'll be boutiques—the types of places where you've got a little office building on 27th Street with six Pro Tools rooms, each of which is run by a guy with a different color earring because he's got a different specialty. —PAUL LEHRMAN

Mix: That's interesting. Larry Blake's column this month [Sound for Film, in "Post Script] is about the fact that he doesn't really have a Christmas wish list because he basically has everything he needs. Have either of you reached that point?

St.Croix: That's when you change industries.

Lehrman: I think I reached it when I got my Kurzweil 2000 because that was everything I'd always wanted. It's not the perfect machine, but it's a great machine. Everything I'd always wanted in a synthesizer was right there. And what I needed was a stack of those and a lot of alternative controllers to play it with, and then a lot of time to just explore what was in there, and to figure out what I could get from there. That was about seven years ago, believe it or not.

St.Croix: If you get to the point where you've got all the toys that you want and everything's set, and now you're sitting there looking at them—and I don't mean this against Paul—I think you already might have lost touch with why you got all those things. So far I haven't reached that point. In the beginning I started to amass an arsenal, as we all try to do. We go into studios, we rent a little time, we see how it works, and we think, "I could do this. I could do this better. I just need this toy and this toy and this toy." And then there's a new toy, and—discounting the race to get the model XR1000 replaced by the model XR1000B and then model XR1200—getting a workable system together was a goal at one point in my life. But luckily, I started getting a lot of work: a lot of production work, a lot of studio work, a lot of engineering work, a lot of tracking work and a lot of playing work. As I got more and more work, this need for the newest gear, and the need to amass the ultimate arsenal, dissipated.

I've found my purchases becoming more immediate to solve the problem at hand: "Well, we're doing drums today, and I need to gate this 'cause the cymbals are bleeding, so today I gotta buy gates. And now we're doing synths and we hit eight notes and we can't do any more chords, and so I guess I need a more polyphonic synth." And when my purchases became track-driven—I mean, specifically to solve the problem at hand on that track—two things happened: The concept of the dream arsenal disappeared, and with that disappeared the anxiety and the economic strain involved in that. My first studio, I used to go in at night and lock the doors and just sit there and look at all the gear and the lights, and I realized that my whole life I wanted a rocket ship and this was as close as I was going to get. I swear, I'd pick limiters for the number of lights on the front panel.

Lehrman: [Laughs] I'm with you on that. I understand that completely.

St.Croix: And it was wonderful. You'd sit in there at night and think, "Damn. This is cool." But then as work became more project-oriented, that went away. I would only buy the gear that the project would

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pay for. And at the end of the project, if I liked the gear I would keep it, and if not, it would go away. And I started ending up with very different equipment than when I was building my dream arsenal. But the whole angst of keeping up, of being leading-edge...At first I was actually buying gear in anticipation of needing it in the future, to chase technological advancement, but that's like buying bread thinking you might need it in three weeks. Finally I only bought what I needed, and I only designed what I couldn't buy.

Breakthrough Technologies

Lehrman: The most important technological advancement to me and my work, far and away, is MIDI. Not that I like it so much—although I do, but I do recognize its limitations—but it has made what I do possible, period.

As for the industry, I think the most important thing that's happened in the last 50 years has been multitracking. And that's a very wide field. Do I mean multitrack sequencing or multitrack tape or multitrack hard disk? The answer is yes, all of those. I think that multitracking has simply made it possible for music to be created in a totally different way than it used to be. And that's all there is. The live music session no longer exists; music is just not created that way any more because of multitracking technology. Secondarily is probably hard disk recording and the freedom that gives to the entire editing and production scene; I think that's probably the second most important thing that's happened in the last 50 years for the industry in general.

Now, all these things have dark sides. As things get easier, people get lazier. And that's a very nasty side of all these developments. As the technologies become more accessible, people decide to do less with them. And people jump in and do what can be done easily. When I teach sequencing, I don't let my students quantize for a while. When I teach sampling, I don't let them loop until I know that they know what they're doing, because those things are so easy to do, and it's so easy to create stuff that sort of sounds okay but is basically mediocre. And I think that what we hear in large part on the radio is a result of that, and I think it sucks. On the other hand, the technologies have their wonderful sides.

St.Croix: The biggest breakthrough for me personally is what we're getting into right now—the successful transition to digital audio. It terminated my analog design career and forced me to phoenix. I was Mr. Analog. I had the Time Modulator, which was one of the most successful pro analog delay products on Earth. I was king. I had technology that I owned, I had patents that I owned. I was set. I understood the analog world. My design chops in analog were quite good. If I thought of something, I could hear it in my head. I could make that happen in design. I knew the bullshit tricks. The games with different types of capacitors. How to push parts in totally illegal ways to get results no one else would even go for. I had no formal education, so my designs were totally maverick and extremely difficult for someone to copy and reverse-engineer. So I had built-in protection in my unorthodox approach to analog design.

But one day I saw the writing on the wall—specifically ones and zeroes. The transition to usable digital—not necessarily acceptable-sounding, but usable—was so fast that I found myself faced with, "Do I leave the industry or do I relearn?" Well, I decided to relearn, and that phoenix process opened an amazing, amazing world where every time I finish a design, I know that the next design won't share a single concept because the technology will have moved ahead that much. And if I tried to do a design that was too complex back in the real world days, I either had to give it up or hang in and spend years on it. Now, I just wait six months, computers become four times as powerful, and my original complex design runs easily. So it's like surfing. I'm being pushed along by the wave, the swell of technological advancement. Now I even enter into product designs, whether it be hardware,

> Surround mixing, right now, is very similar to cocaine in 1970, in that you've gotta go into a lot of studios to find somebody grown-up enough to say, "I just need a little."
>
> —STEPHEN ST.CROIX

firmware or software, that I know cannot be completed. The world just isn't technically ready. But at the end of say, four months, when the dev cycle is done, there'll be enough horsepower out there to run the design. I've done that twice and have not been caught. It's an incredible feeling to have the world of technology pushing you, so you go on the ride and just concentrate on steering.

As far as the whole industry, I'm right there with Paul. Multitrack recording changed the fundamental rule: If you want it done, you have to do it. You don't have to anymore. If you want a brass section, it doesn't have to exist. You can have one horn player do ten overdubs. You can play with it, you can copy it, you can sample it. Nothing has to be real. You no longer have to play by the rules. You no longer have to play straight through without mistakes. You no longer have to play with anybody. You no longer have to play at all, actually. Anything you can think of, you can do. That's a pretty fundamental change—the concept that you can actually record without playing live. This is a huge, huge jump, to be able to think this way. When I hear a song in my head now, I don't even hear all the pieces at the same time. I even create, I conceptualize in out-of-real-time multitrack. And so does the world, to some extent.

24/96

Lehrman: Years ago, when 16/44.1 first came out, I was working with a fellow on an article for the late, lamented *RE/P*, in which we were talking about doing a 24-bit system. CDs, we argued, were not going to be enough, and we had some

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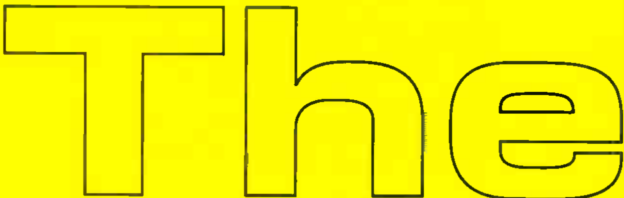

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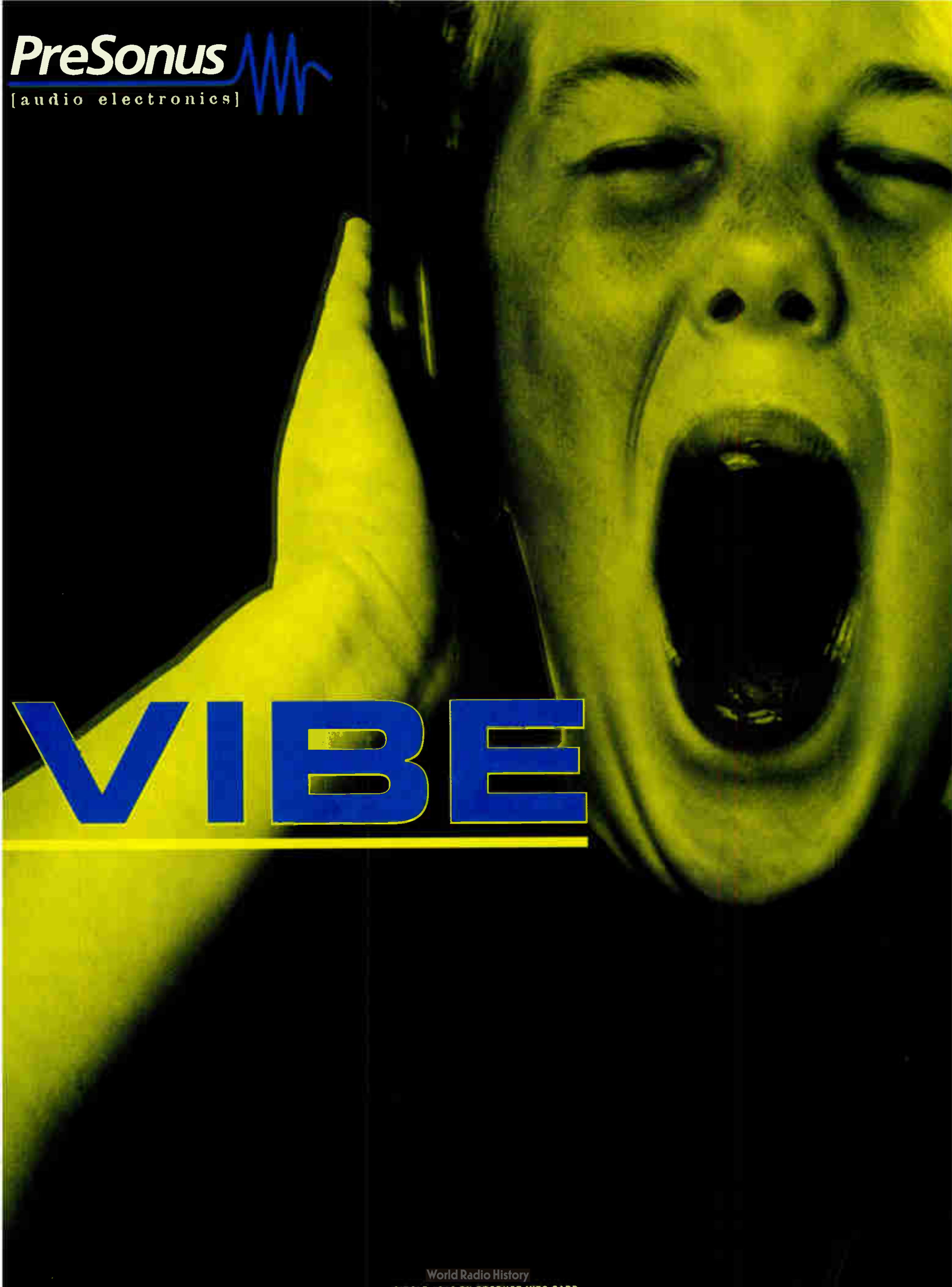

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demonstrations of how reverb tails were going to disappear and things like that. So this is something I've been thinking about for about a dozen years or more. I think that 20-, 24-bit systems do make sense as production systems. I don't think 96k makes any sense at all because of the enormous waste of resources that's involved. On the other hand, I also don't mind CDs. There are certainly some CDs that sound like shit, but for the most part, I like the way CDs sound. I think there are obvious situations where people are cutting corners and are doing bad jobs with them. But I think for 99.99 percent of the consumers who are listening to music, which includes me, that 16/44.1 is perfectly adequate. On the other hand, just as TV-makers like working in film better than they like working in video because of the increased resolution and various other aspects of it, we want our production facilities to be better than our delivery systems. And I think that that's why it makes sense to go 20-bit, 24-bit.

St.Croix: I agree with Paul. CDs sound great. I buy CDs, I stick them in the little slot, they spin around, I hear music. "Damn!" When I hear bad music from bad production houses, bad studios or bad mastering houses, I'm not hearing a bad CD. The technology works. The early broken-glass CDs are generally gone. If the CD sounds bad today, you really have to look for the problem elsewhere than the design and the spec and the technology. For most things, 16/44.1—if the 16 is really there—is quite acceptable.

However, there's no question that 24-bit yields truly audible improvements. True 24 doesn't happen yet, but 24-bit converters that are trimmed out properly to do 20 and not latch the last couple bits, so that they really move independently, sound beautiful. They're really getting good. But 96? I guess the people who mine iron want us to use 96 so that we need more magnetic media. What the hell is this 96 stuff? I don't get it. Bit depth, going to 24, counts in the frequency domain. Certain types of processing really benefit from this. However, higher resolution in the time domain?

> I think the biggest boon to my growth, the biggest tool, the biggest advancement in technology is the button "undo."
> —STEPHEN ST.CROIX

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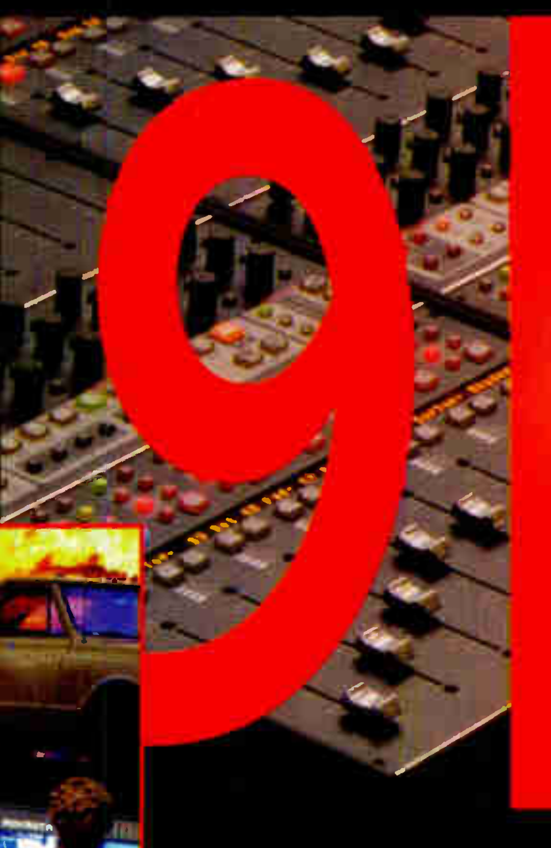

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World Radio History

The Fast Lane Meets Insider Audio

are the people who do mathematical design behind the silicon design of coming chips. They are serious. These are people I do not want to have dinner with, or even ride a Harley with. I listen to them, but I'm not inviting them over to swim. What they're talking about is logical, and it's real theoretical, but I think there are other issues at hand that far overshadow what we could possibly get out of 96. Look at what it's going to cost, in data bus loading, in transmission time, in what's going to happen when the real world needs to market this stuff and compresses it. And why 96? Why not 88.2? Look at what's going to have to happen in the advancement of gearboxing technology to make 96 sound as good as 44.1—our present consumer format. Because nobody gearboxes and gets away with it. Nobody. I think somebody's let go of the helm here and we've gone astray. This is wrong.

Lehrman: Well, there's a couple of forces at work. Probably one of the biggest is the fact that the manufacturers have to keep coming up with reasons to keep selling us things.

St.Croix: Right.

Lehrman: And that means that what we have has to be pictured as being inadequate to whatever it is that we really need. At a certain point, there's a point of diminishing returns at which that's no longer true, but we just don't know where that is. As long as the hype machine is continually pushing us to feel as if what we have is obsolete and inadequate and needs to be replaced and will not do the job that people are demanding of us... at a certain point we have to turn around and say, "No, that's bullshit. I don't need to do that anymore." But we don't know where that point is, and unfortunately, because the audio press is a commercial entity and is dependent on advertisers for their income, it's hard to get a really objective debate or objective discussion going, in which we can look at this stuff and say, "Do we really need this?"

St.Croix: I disagree with Paul on one thing and that is we don't know where that point is. I know where that point is. That point is 16/44.1. [Laughter] We're past that point.

Remember what started this: Filters sucked. They sounded horrible. Conversion was a disaster because we were operating at 44.1, and in trying to use a sampling frequency this close to the usable band, the filters had to be brick walls. They were analog filters and they all had these horrible time-domain problems. We needed to somehow move the filters out of the way. Oversampling finally came along and allowed filters to be moved out of the way so there can be, even in the analog domain, a milder slope. Butterworths with a pleasant amount of phase shift. And then somebody else said, "Look, now we can noise-shape. We can move the noise out of the way too—way out at the extreme high end of the passband, where humans tend to miss it." And all this meant that there was more breathing room, less conversion artifact, and a more stable, predictable system that would even be easier to manufacture once technology allowed clocking in and out higher rates.

Who uses linears now? Everybody uses delta-sigmas. Everybody's oversampling. But the freight train was already moving—the clocking race continues. I think the number one reason for these higher sample rates has already been dealt with, so that reason's gone. But the marketers still tell us, "Higher is better. More is better." And it's carrying us on into the absurd. The first time I ever heard all 16-bits A-to-D convert correctly, which was very recently, I was stunned at what 16-bit could do, because nobody had been delivering true, accurate16 bits in their 16-bit converters. And it'll be a long time till we see a 24th bit move by itself. But 20 and 21 moving by themselves sounds...

Lehrman: What is the sound of the 24th bit moving?

St.Croix: Right, unknown. But I know it borders on criminal, the 96. I just don't get it. These people who were telling me about how wonderful this time resolution is for certain time domain things like digital compressors and limiters, they're forgetting the point. And the point is that they want a consumer final format of 96. And until that happens, all this is bogus. They're still going to be converting to 44.1. They're still going to be gearboxing. Compression is here to stay—sadly. Look at DVD, how compressed it is. I for one hope desperately...never have I wanted a concept or format to succeed as much as I want DVD. But, in the same breath, I must say that you could go out into the world and spend years looking and not find anybody as violently against lossy compression as I am. However, I am going to lose that battle. And I would rather have a very high-quality lossy compressor squeeze my 44.1 to whatever than I would have it squeeze my 90-plus bullshit down to the same end result. I want the actual human engineers to be in control of every track at every bit rate. Since compression is going to take place, I'm a believer in staying at the target sample rate whenever possible, for as many stages of generation of material and processing as possible. Of course, maximum possible word length for DSP headroom is another story. Always use the biggest word you can get.

> I think for 99.99% of the consumers who are listening to music, which includes me, that 16/44.1 is perfectly adequate. On the other hand...we want our production facilities to be better than our delivery systems. And I think that that's why it makes sense to go 20-bit, 24-bit. —PAUL LEHRMAN

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St.Croix: Surround mixing, right now, is very similar to cocaine in 1970, in that you've gotta go into a lot of studios before you'll find somebody grown-up enough to say, "I just need a little." When everybody else is saying, "Look what I can do! Let's do it all!" Sure enough, it's nauseating. I'm sure there's as many deaths today from overuse of 5.1 as there were back then from overuse of cocaine hydrochloride. However, in the right hands, I'm sure cocaine can be a beautiful thing. [Laughter]

Mix: Thanks, Stephen, we just lost three readers from Salt Lake City.

St.Croix: And so can 5.1. I believe in surround. When you hear a score and effects done for film by sane people, it is thrilling. So I like it. But unfortunately I can go out and buy the new DVD releases that came out this month, all four of them, play them all, then do it another month, then another month, and maybe one out of those dozen is not a freak show.

Lehrman: I agree with Stephen to a certain degree, that when it's done well, it's fantastic. When you can hear it in a theater, in a well-designed theater where they're not using Frazier black boxes in the back, but real speakers, it's amazing. On the other hand, I think that the number of people who are actually going to be able to benefit from this is so extremely small, and it's smaller than they think they are. I mean, how many millions of people have stereo systems set up in which there's no stereo image, because of the way the speakers and the room are set up? Now, they're ostensibly going to be a little bit more careful with their 5.1 system, but are they really? Where's the couch going to go? Where are the curtains going to go? How many of them are going to actually be able to present a decent listening environment for themselves? I think that we're sort of kidding ourselves if we really consider this to be a mass-market item.

St.Croix: But don't we have to design for best-case?

Lehrman: No. Because there's a point of diminishing returns at which point you're throwing lots of money after very little. I don't think that most CDs on the market are designed for best-case. I don't think they're designed for people with astounding stereo systems. I think they need to hold up under those conditions, and you don't want to hear garbage coming out of your speakers under those conditions.

But I think that for the most part, you're mixing for a middle ground. Why the hell do people use NS-10s all the time? You're mixing for a middle ground. And I think in 5.1, there sort of is no middle ground. Either people do it right or they do it wrong, and I don't think there's much in the middle that says, "Well, this is sort of okay. And it's sort of worth doing."

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I may be wrong on this. There are people who tell me that the hottest items at the stereo stores are now surround-sound systems for home theater. And I can believe that. On the other hand, I can't believe that people are setting them up correctly, I can't believe that people are going to have them set up correctly for more than a few months before somebody else moves the furniture around and screws up the whole thing. Even more important for me, and this takes it into a larger arena, is when the hell are people going to have time to listen to this stuff? Nobody I know has time to listen to any music anyway.

St.Croix: I disagree. I think it is, of course, the new responsibility, as the technology grows, to mix, as Paul says, for what is projected to be the median market. Obviously. Who's going to fund you if you don't? But I also think you should produce a mix designed so that when a guy breaks up with his wife and then sits around listening to music for two months, until he finally decides, "I'm going to set this system up right," and he moves all his stereo shit around and listens, that he gets a reward. That the mix on the product does yield noticeable, better results when played with a noticeably better system setup. I think we owe it to ourselves and to the market to have that audio Easter-egg hidden in there. Although, Paul's right. It's hiding for the one percent. But I want a reward in that media. I do mix for that. I will do tricks like, putting a bass track down, then doubling that bass track with a synth, and the synth will be full, easy to listen to, no real low information, lots of even harmonic stuff so that on a mediocre or average system, it's got a solid bass line the victim can relate to and understand. And it's 10 dB down from the real bass line, which he never hears. But when you play it on something real, suddenly it wakes up with a nice Alembic bass, very full and organic. When the listener drops it into the system he hawked his house for, he hears it—he feels it. I feel very strongly that we should do that for him.

Recording Studios of the Future

Lehrman: I think the high end is going to shrink even more. I think we're going to find ourselves with far fewer really large studios, which will exist for specific purposes only, like film scoring, soundstage stuff. There will still be professional, expensive places, but they'll be tiny. They'll be boutiques—the types of places where you've got a little office building on 27th Street with six Pro Tools rooms, each of which is run by a guy with a different color earring because he's got a different specialty. Doing advertising work, dance remixes and that kind of thing. The home studio, obviously, is going to continue to burgeon because people want to be able to work at home. But I think that the larger studios are really going to become even rarer, and for very, very specific purposes where that kind of physical space is needed.

St.Croix: What he said, with one exception. I think that there will be a couple mega-studios, but they won't be directly available to the world. CBS, Disney and Sony will have vertical production centers that have huge, internally staffed facilities for every step from tracking to mixing, mastering, and distribution, including alternate-language. Other than that, it's going to have to go boutique—no middle.

All techno-industries seem to follow classic sociological city models. A city center starts, the city grows around it, it ages, suburbs appear, then the original core eventually burns out, so that there's no longer a living center. Everything centrifuges. The middle of everything goes away. So you'll have incredibly competent home studios, very powerful ones, because computer technology doubles in power and halves in price every six months. Home studio options are becoming very serious. And the boutiques, as Paul pointed out, will exist.

There'll always be some name that's hot enough that he can sell himself. And he'll have that, "Well, let's get that Bob Clearmountain's kid to do this in his new place." These very high-dollar places will exist. But the middle, the upper-middle pro, will go away completely. It always does, in all technologies. It's going to be a loss in one way. The experience of those who used to run those facilities will be lost. There will be a lot of lost art here. But as far as capabilities, technically, the new baby DAW systems outperform the majority of 16-track studios of a decade ago, and half the 24s of today. It's already happened.

> I got into electronics strictly because I couldn't get my guitar loud enough to be the only thing the audience could hear without my band yelling at me. So I thought the answer would be in electronics, and I developed a fuzz box.
> —Stephen St.Croix

Manufacturing

St.Croix: Because the Marshall Time Modulator falls into the historic category, I get people who come up at conventions and say, "I want to start designing products. What would you recommend?" What I recommend is very simple, one word: Don't. I'm not sure it's possible to do a boutique design in hardware, or hardware/firmware, today and get the dev cycle short enough so it can properly hit the market that is perceived to exist when it started. Nor do I believe that, with as dynamic and complicated a growth pattern as we have now, that you can accurately project the market far enough ahead to do a long dev cycle for a really solid product.

Lehrman: What about software?

St.Croix: Well, there you go. Another world has come to be. At Intelligent Devices, I am surrounded with young

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CIRCLE #018 ON PRODUCT INFO CARD

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guns that kick ass in areas where I can't even find the asses to kick. But my design concepts—what I want it to sound like, how I want it to act— are translatable, so I have now totally, completely forsaken hardware. I don't touch it. All I do is software. Right now I'm doing the Time Modulator in software. One month ago, we finally succeeded in creating the sound. I got it to sound like the original physical Time Modulator—warm and distorted and screwed up, just the way I wanted. And that was a real milestone, because I now believe that DSP—on-the-street, cheap DSP—is big enough, powerful enough and architecturally sound enough that I can do pretty much anything I want, if not everything I want.

So I've switched to software, and I cannot see that ever changing. Right now, boutique software houses are doing well. There's always some new weird-ass little plug-in coming out. This is wonderful, because the guy that once had to come up with ten grand to do a physical boutique stomp box can do a software version for the price of packaging and distribution, if he can afford to feed himself while he develops. And if he doesn't want to do that, he can start off slower but safer on the Web with no packaging, as a challenge-response download. So I think it's a wonderful change, and there's more opportunity for boutique development than ever before. But only in straight software. And by that I mean not even DSP-specific. Host software. Stuff that runs on Pentiums and Power PCs, not Motorola chips.

Lehrman: I'm pretty much in agreement. I think that there has been, for the last year or two, a niche market in terms of small, high-powered, tube-oriented recording channel thingies. You know, the Manleys and the Joemeeks and stuff like that. And I think that those are great, but I don't think that that's going to expand. And I think that anybody looking to get into that area is kidding themselves, because that's just not going to be a growth segment. I think that the way to do it is with software. Not meaning to brag, but I was doing this 15 years ago. Of course, I failed, but we had a good time.

St.Croix: Everybody failed who was doing it 15 years ago.

Lehrman: That's not true. Opcode and MOTU are still around. And the companies that have a really solid base in hardware are getting into software, like Lexicon and TC Electronic. And I think this is definitely the way to go. There are livings to be made, not fortunes, but livings. Just don't buy Version 1.

St.Croix: Any new technology sucks at first. Each new audio technology sounds like broken glass when it initially appears. This is no different. He's right. What he said is THE standing joke. Don't buy V-1. Nobody who actually tries to record a song with a buggy plug-in uses that plug-in again. But the alternative is painfully slow growth, with nobody publishing experimental plug-ins. I like it the way it is now—everybody gives it a try, and their ideas get out there. And even if a good idea comes on the market as a buggy plug-in, it still does the world good because somebody else will immediately steal the idea and make a plug-in that does work.

Lehrman: Actually, the problems are not in the plug-ins. The problems are in the systems themselves. We're reliant on an industry that not only weren't we relying on before, but really couldn't give a flying f— about us.

St.Croix: Yes, we are dependent. But, when you look at what you get for your money, when you look at the fact that there's a platform that is a commodity, the dependence is a necessary evil. Look what we get for it. Look what you can do in your home for 3,000 bucks today. I'm okay with it. At least right now there's two competing forces keeping everybody honest. I don't know how much longer the Macintosh will be able to survive, but right now I like the fact that there's two systems that are so fundamentally different.

Lehrman: I think it's crucial. I think if we ever get to a point where there's only one, we're going to be in real trouble.

St.Croix: Any galaxy or world or city or even automobile run by Billy Gates alone scares the hell out of me. I don't care what the second system is, I'd bring back CPM if I had to keep Little Bill from being alone out there.

Lehrman: I understand they're working now on the Amiga again. [Laughter]. But seriously, the model becomes no longer purchasing the product; it's purchasing a subscription to a product. Manufacturers are going to have to figure out how to get a revenue stream out of that, because how do you make money by signing somebody up and then giving them a free subscription for life? On the other hand, how do you convince people to spend money on upgrading something when they spent a lot of money, or what they think is a lot of money, to begin with? I don't know the answer to that. Bill Gates had this brilliant idea about six or seven years ago of telling everybody who had an illegal copy of Word to register it. And he wasn't chasing after pirates, he was trying to sell them subscriptions, and it worked. And then everybody became legal owners of Word and then would spend, instead of $300 on the program, would spend $65 on an upgrade every year. And I think that's a model that other manufacturers are going to have to look at and say, "Well, how can we do that? And how can we do that without pissing off the customers?"

The Future-Future

Mix: Stephen, a lot of your columns deal with concepts like crystal memory and acoustical heterodyning speakers, stuff that would make many of our readers say, "He's crazy. Not in my lifetime." Paul, do you think Stephen's crazy?

Lehrman: I ain't gonna touch that one. [Laughter] Do I think Steven's crazy? No, I love this stuff that Stephen writes about that may or may not exist. And 20 years ago, I was writing about laser turntables, which seemed to be an awfully good idea at the time. Why not? Why don't we write about these things that people are trying to make happen and that may or may not happen?

St.Croix: I'm the first person in my family to not be a doctor. My father's past connections with the government, Bell Labs,

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and other spookier places have gotten me in some very interesting situations. One of my companies does forensic law enforcement—extreme spy shit, big tech. That also puts me in interesting places. I have spent time at NASA and Bell Labs, where people are really doing a lot of "blue sky." This crystal memory thing is absolutely going to happen. These things...I like to break them early, and I sometimes break them early enough that my credibility is flexed at best.

Mix: You knew about the ban on CD players in aircraft before the FAA.

St.Croix: Yeah. I do actually research these things. And whenever possible, go there to touch them and play with them. I actually do a lot of traveling to check out these bozo things I write about. Whether or not they're aborted later—like the crystal thing was aborted after I first wrote about it, but another company picked it up later. And it is now, due to higher-frequency lasers, coming back, it will exist. There'll probably be an xyz three-point, converging laser array—giving you 150 terabytes in a little less than one cubic inch. And access time should be unbelievable. It's a doped crystal lattice that retains quantum orbit shifts, and doesn't require power to remember. It's true static memory. No refreshes. This is happening. I don't think up this shit. Somebody shows it to me, and I go, "Oh, cool. I'm going to tell my readers." When it comes, that's the question. But I guarantee you the stuff I write about is stuff that I've either seen or read the white papers on, or the patents on, or talked to the designers about.

Lehrman: You're right, this is stuff that comes out of industries where tons and tons of money is being spent, and of course it's going to have spinoffs into the consumer industries. And that's the way things have been going since they invented mechanized warfare. So why not?

Keeping It Fun

St.Croix: The fun for me is not what it was in the beginning—now it's creating the product I dreamed of. I think the biggest boon to my growth, the biggest tool, the biggest advancement in technology is the button Undo. [Laughter] I paint digitally. I do a lot of oil and watercolors, a lot of painting. And I sell my work. Of course I used to do it all on canvas. With oil colors, my biggest challenge was, "When do I stop? When is it done?" My teachers always said, "You'll know when it's done." They were wrong. You never know. I was always afraid to try the green lipstick because I was afraid it might mess my painting up, and I would never be able to get the tint right again. On a computer I try anything I want. If only real life had a big Undo button! To me, the fun is in accomplishing my goal: the piece of art, the painting, the song. When I stick a CD in the dash of the car and turn it too far up and listen on the way to dinner and go, "Damn! That's what I wanted to hear." That's fun. Especially if the car is real fast.

> The model becomes no longer purchasing the product; it's purchasing a subscription to a product. Manufacturers are going to have to figure out how to get a revenue stream out of that because how do you make money by giving somebody a free subscription for life?
> —PAUL LEHRMAN

Lehrman: What keeps it fun for me? Finding something that someone has done that really makes sense, in terms of a new tool. Finding that plug-in, that piece of software, that piece of hardware that I go, "Yeah, I can grab onto this, and I can use this, and I can make this my own really easily." That's the fun. It's also in the final product, listening to it, sitting back and saying, "This is what I wanted to say. Here it is." But not just the final product; it's the journey, too. If the journey is a good one, if it's filled with little points along the way where I look at what I'm doing and say, "Yeah, this is what I should be doing. This is the right piece I'm working on. This is the right approach I've taken to working on this particular project." If I can sit back every once in a while and look at it and say, "Yeah, this is right," that's where the fun is.

And sometimes that becomes a question of being one with the tool, and being happy with the tool that I've got, whether or not it's a new one. You know, I put a new version of a sequencer in and I say, "Oh my God, they fixed that, isn't that wonderful?" And all of a sudden my entire chain, my entire methodology of doing a particular task changes because I now have a better way of doing it which I like better. And that's incredibly exhilarating, and gets the endorphins really kicking.

St.Croix: I have sacrificed a great deal of money, and certainly other unknown theoretical desirables, to build a lifestyle where no two days are the same. I don't want a pattern. I'll do design for several days, or a week or a month, and then I'll do a Harley engine mod design, or a turbine design, and then I'll paint, or I'll plant a tree or I'll play with a boat. Delta. That's it. Delta, delta, delta. Change, change, change. No matter how good anything is, it's never good enough to be immune to eventual modification. Or maybe it just gets to be time to do something new. Almost all the things I do make me happy, and I can't point to one and say, "That's my escape."

Lehrman: Well, my life sounds actually very similar to Stephen's, although I do have things I do to differentiate between work and play. Right now, because of a couple of projects I'm involved with, I know what I'm doing for the next 15 to 18 months, which is the first time since about 1977 that I knew that. And in 1977 I was wrong. I'm actually working on five completely different projects simultaneously, and bouncing from one to the next. That's my work life. I have another life which is that I have a wife, whom I do

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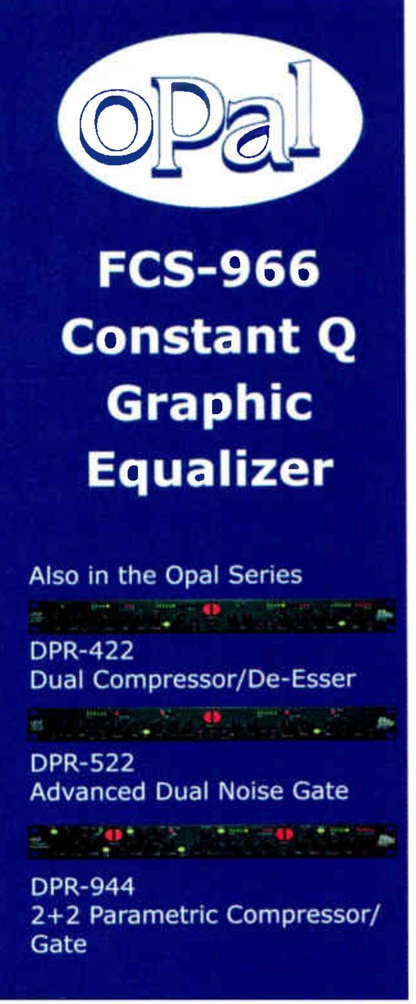
projects with, and whom I live in a house with. And the house is my project. I have a garden which is my project. I live in proximity to 8,000 acres of woods, and I have a mountain bike that I use extensively when I can. And I do a lot of hiking. And that takes me out of the studio, God knows, and puts me into a totally different kind of environment.

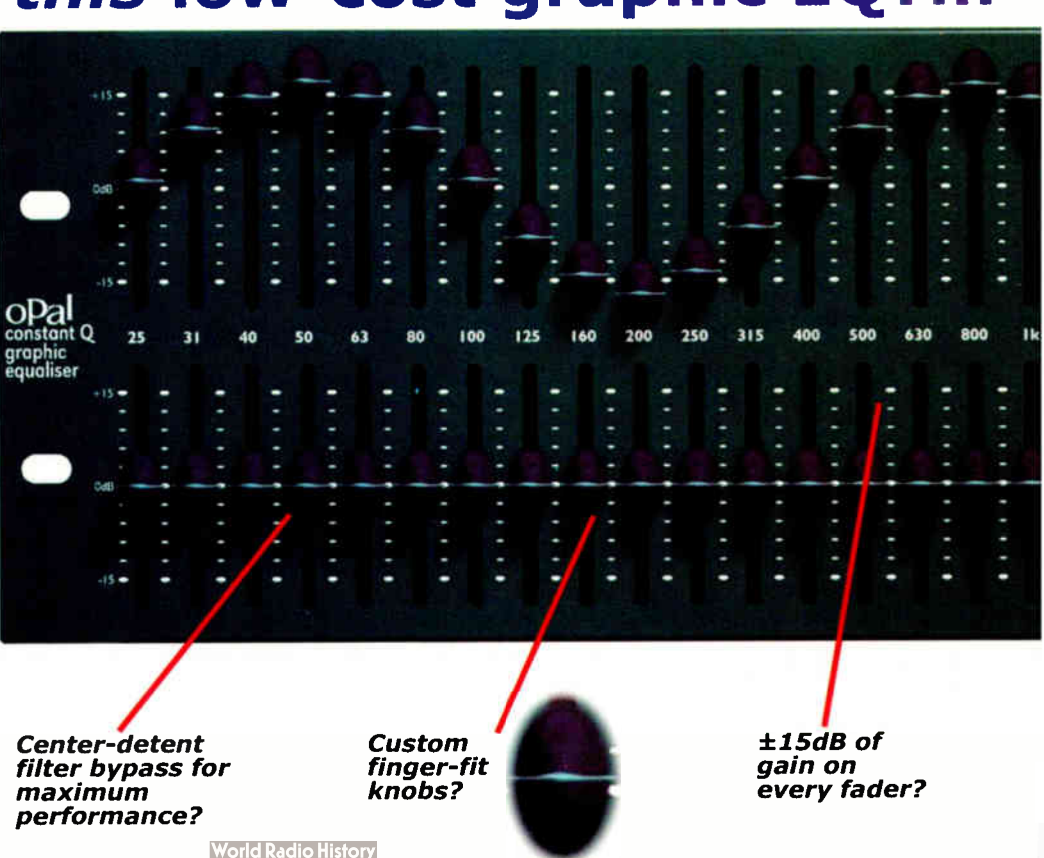
My wife is a storyteller, and exists in an environment which is so utterly completely opposite to mine. She actually bought her first computer last fall, a ten-year-old Mac, so she could do word processing. Up until that point, as we used to tell our friends, I'm working with all this high-tech stuff, and she's still drawing on the walls of her cave. She is very much steeped in ancient lore and the oral tradition. And yet, we do a lot of projects together. We just published a book together and we've done a couple of records that I've contributed to. And she's done some stage shows that I've done the sound design and music for. So that also keeps me in the studio, but it also takes me out of the studio. A lot of different things, a lot of balance, a lot of no two days the same. If I were ever to be in a job where I was doing the same things five days a week I would probably shrivel up and die.

St.Croix: You know, now that I listen to what he says, I have to be a little more conscientious of my answer and actually tell you a couple of things, non-audio things that I do. He did, and I realize that I too should be responsible. [Laughter] These items will in no way be, nor are they meant to compete with, the classiness and sheer solidity and comprehensiveness of Paul's. I like making land-based vehicles go as fast as possible. The Harley I ride is a radical alcohol burner. It's severe. I like petting cats. I like surfing. And I'm big-time into competitive body building. So these are really down and dirty simple-ass things, but that's when I do my thinking. All of those things are real physical, and you know why I like them? They resolve. Bodybuilding resolves when you take first place. That's resolved. I like that. Bikes? Easy, they resolve when everything red-shifts. There you go. Okay, I went fast enough. And the cats resolve when you pet them and they purr. And you feel it, "I've reached my goal. This living creature is happier because I'm playing with it." It's very simple. I rarely actually create when I'm working. Working is usually translating the creative thoughts I've had into something tangible.

Mix: What's in your CD changer? Right now.

St.Croix: Stevie Ray Vaughn, Stevie Ray Vaughn again *Diva*—believe it or not, Annie Lennox—Kentucky Headhunters, Dire Straits, and some weird-ass stuff you





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wouldn't believe. The Mermen, and something else, I think it once had a title on it, but it came off.

Lehrman: I actually don't have a CD changer.

St.Croix: Ooh, I'm impressed. [Laughter] The man who wants to control his immediate destiny! Put them in one at a time.

Lehrman: Of the last five I put in, three of them were different recordings of Antheil's "Ballet Mecanique" because I'm working on it. So I don't know if that counts. The Mobile Fidelity pressing of *Who Are You?*, Enya's *Watermark*, the Incredible String Band's *The Hangman's Beautiful Daughter*, Joni Mitchell's *Misses* and the new Firesign Theater.

Mix: Favorite movie?

St.Croix: *Forbidden Planet*. The first movie that scared me, the first movie with special effects, and the first event in my life that showed me that man could create artificial realities. And the first movie ever made with a totally electronic sound track!

Lehrman: *The President's Analyst*. I was very into Cold War comedy. It was right after *Dr. Strangelove* and *The Russians Are Coming*. *The President's Analyst* was about everybody lying to you. And the ones who were the most dangerous were the ones with the best network.

Mix: If you could push rewind, where would you go?

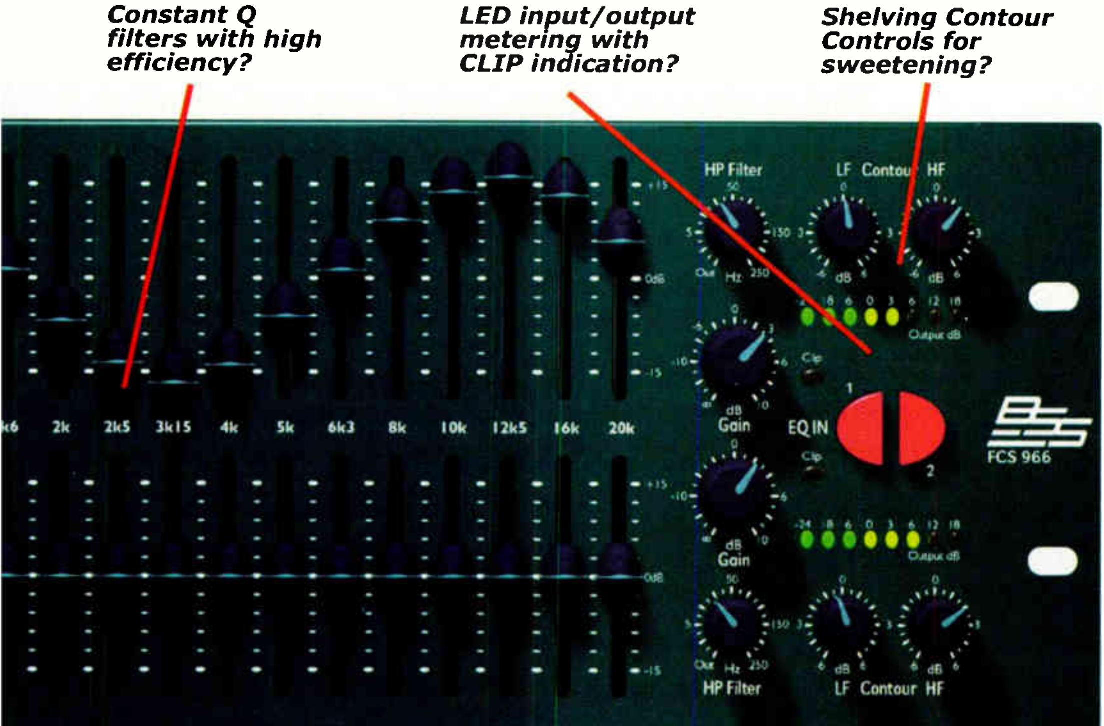
St.Croix: 1955. Things were little enough then that you could open your front door, walk down your sidewalk to the street, do a 360, and understand everything you saw.

Lehrman: 1968. A great year for crisis, as they said. A year in which there were tremendous possibilities, tremendous forward-looking, artistic and political action going on in which it really looked like the world was going to change. As Paul Kantner said on that wonderful PBS rock 'n' roll series, talking about 1967, he said, "But for a week there, everything was perfect." And in 1968, for a little while, for a couple of months, everything was really exciting.

Mix: Fast forward? Where do you want to go? How far into the future?

St.Croix: Two hundred years. If you're going to take a chance, take a big one. Everybody I know now has gotta be out of the way. [Laughter] I don't want to see any bogus life-support shit on my old friends. No *Brazil* face lifts. If you're going to do it, do it. If you're going to take a chance and roll the dice, why not roll for a big prize or a big loss?

Lehrman: That's pretty persuasive. I was thinking more like 25 years when my mortgage runs out. But yeah, probably about 100, 150 years, when they've either solved the problems of whether we're going to die or not, or they've realized they can't solve them. ■



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World Radio History

Electronic Music Delivery

Major Players Look Ahead

by Philip De Lancie *Illustration by Jeff Foster*

Four years ago, the multimedia CD-ROM was riding high, while the Internet was all but unknown outside of government and academia. It's instructive to keep that in mind as we squint toward the future, trying to guess what form music delivery to consumers might take in the years to come.

On the one hand, we know that in general people like to own things and that collecting physical carriers such as records, tapes or CDs is a source of great satisfaction to music fans. On the other hand, the World Wide Web, though still in its infancy as a commercial medium, opens up the possibility of selling entertainment data without selling a physical object. As anyone with pay-per-view cable and a VCR will tell you, this isn't a new concept, but the interactive flexibility of the Web makes it possible to move from a broadcast model to an individually customized shopping experience.

Will electronic distribution—the selling of a music recording electronically, as opposed to selling a physical embodiment of that recording, such as a CD (even if the CD is ordered online)—make the traditional "brick and mortar" record retailer obsolete? Few expect that to happen anytime soon, if ever. In fact, research released this past summer by Jupiter Communications suggests that by the year 2002, digital downloads will account for a mere 2.2% of online music commerce, which in turn is expected to represent a growing but still modest portion of overall record industry revenues.

That said, companies such as Liquid Audio and a2bmusic have developed systems that address many of the technical, copy-protection and royalty issues that would have to be in place for a direct download system to work. And the concept is at least on the table at various major labels, partly in response to the rampant piracy evident at sites that post music in the MP3 format, giving away recorded music without compensation to those who created it. The portable

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Electronic Music Delivery

MP3 players coming to market from companies such as Diamond Multimedia should force the labels to act not only defensively—as they have by suing through their trade group, the Recording Industry Association of America (RIAA)—but also proactively, assessing how best to exploit this newly developing market profitably while protecting their intellectual property rights.

For a look at how these factors might shake out down the road, we enlisted the aid of four active forces in the online and cable worlds. In addition to Gerry Kearby, CEO of Liquid Audio, and Howie Singer, CTO of a2bmusic, we spoke with Tom McPartland, CEO of TCI Music (a subsidiary of cable TV giant TCI), and Ted Hooban, director of digital products for online record retailer CDnow, which recently completed a merger deal with rival N2K.

What are the most important elements (i.e., copy protection, royalty tracking, audio fidelity, portability, etc.) that need to be in place for all interested parties (rights holders, distribution and sales entities, consumers, etc.) to be well-served by electronic distribution?

Hooban: A lot of the software needed to make this possible already exists. And I think those systems are pretty well proven to work effectively. However, it may not yet be to a level where record industry executives are comfortable, and they may not be comfortable with the fact that there are a couple of different incompatible formats around, and there is not one single standard that allows interchange. So I think that the technical and business model has not really shaken out to a sufficient degree to make all the labels jump onboard. Also, there is really not a compelling enough market there yet for a record company to go in and commit the resources to making their titles available for digital download.

Kearby: A commercially viable system for digital distribution of music over the Internet must address all of these elements. The Liquid Music System we have developed has components to address each of these areas, but we are particularly sensitive to the issue of security. Piracy costs the industry in excess of $5 billion a year, and we employ a multilayered approach to security that makes music delivered in Liquid Audio format actually safer than on traditional CDs.

McPartland: To get the major intellectual property rights holders to utilize non-physical distribution platforms will require a solid end-to-end system that ensures fidelity, data encryption, a portfolio of compression tools, downstream copy protection and, perhaps most importantly, a business model that essentially preserves the economic food chain that currently prevails in favor of the major labels. This last will be the most difficult to get all parties comfortable with, even more than all the technical components, many of which are already sufficient. Specifically, it would be less economically threatening for the major labels to wait until their own informal consortiums develop industry standards to facilitate this process. That would minimize or obviate any need for a Liquid Audio or a2bmusic to participate in the sale. It's analogous to how the banking industry ensured that their own cooperative developed the whole wire transfer process, thereby ensuring that Microsoft or IBM didn't wind up having the ability to levy a toll or tax on the banking industry because of their computer or software prowess.

Singer: For consumers, we believe the key items are audio quality, broad music selection, the right price, portability away from the PC and overall user experience. The protection mechanisms we put in place must not hinder the user's enjoyment. In some sense, the acceptance of MP3 among a certain community of users gives the industry a baseline that they must exceed, at least in some dimensions.

For the rights holders, the key issues are integrating downloading into the rest of their business, audio quality—artists may be pickier than the fans on that one—copy protection and royalty tracking. As far as protection goes, many rights holders will choose to give away their content for free, but that should be at their discretion and not easily circumvented by individuals who simply choose to make use of that valuable content without the appropriate payments. A successful system must support both alternatives, as a2bmusic does.

> Even with the rapid adoption of digital distribution, the majority of music will still be sold the "old-fashioned" way: selling shiny physical objects that spin. Therefore, it is essential to make digital distribution a part of the overall campaign to sell music.—*Howie Singer, a2bmusic*

Even with the rapid adoption of digital distribution, the majority of music will still be sold the "old-fashioned" way: selling shiny physical objects that spin. Therefore, it is essential to make digital distribution a part of the overall campaign to sell music. That is why a2bmusic has put so much effort into including retailers in all our promotional efforts. As for distributors, they have to see a role for themselves in digital distribution rather than something that eliminates their role.

What are the primary obstacles or hurdles to electronic distribution?

Hooban: There are a number of issues on the consumer side. It's not really convenient to download anything at this point. And it is absolutely imperative that you make it portable, but there is no easy way to do that. It's do-able and affordable, but the technology is just not convenient. And instant gratification is not really there. It will take you less time to drive down to a record store and buy the product than to download it on a typical con-

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sumer PC. People talk about broadband, and all that stuff will happen—people will have a fatter pipe to the home—but at this point, most people are on 28.8 modems, and it takes too long to download an entire album's worth of material, even in its compressed form.

Another issue is the selection: There really isn't much right now. It's kind of a chicken and egg problem. Labels haven't really stepped into this area wholeheartedly, because they don't feel there is a strong demand on the part of the consumer. Consumers haven't been demanding it because there hasn't really been much to choose from.

Then there is the customization issue: Can you co-mingle tracks, or buy a single track? You have to work out the economics of selling singles, breaking apart an album. That is an issue the record companies are dealing with, and who knows how they may ultimately resolve it?

Also, there is not really a very good pricing story there. After you pay for the CD-R and pay for your tracks, it's not much cheaper to download. The cost advantages are not really enough to overcome the inconvenience and the other issues.

Kearby: Bandwidth into the homes has certainly been one of the gating factors for widespread consumer adoption of the Internet as a shopping alternative for music. Let's face it, with current technology the listening experience online via a 28.8 modem is just barely in the range of being tolerable to most audio professionals. Sluggish download times have also been a problem. But the good news is that now we are seeing the beginnings of a significant push to increase bandwidth to consumers. The increasing availability of cable modems, DSL services, satellite distribution and other initiatives are a very positive sign for audio on the Internet.

McPartland: The hurdles are security, bandwidth and critical consumer mass through the distribution platforms that will have the capability of offering the service.

Singer: Without lots of content legitimately available, the early adopter consumers will continue to get the music they want, as they do today, from sites with unlicensed music. The MP3 phenomenon demonstrates the importance of bandwidth to making this a mass market offering. The industry must become convinced that legitimate digital distribution represents incremental business for them, both in terms of selling the digital goods and in encouraging the sales of physical goods. As that happens, more content will be released and the momentum can build.

How important do you expect electronic distribution to be to overall music indus-

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try revenues in five years?

Hooban: I think a lot of the issues will be worked out and the infrastructure will be there. The record companies are taking baby steps, but they are getting there, so the content will be there. I think it will be a substantial business.

Kearby: A number of different analyst reports are readily available, and their projections vary. Clearly, it will be an evolutionary process where the sales of downloadable music will begin slowly and grow. But the consensus among all the analysts is that record labels, both large and small, should leverage the Internet now to their best advantage. Whether it is used purely for promotion or as a sale and delivery vehicle, the informed label executive recognizes the exposure and efficiency potential of the Internet.

McPartland: Total U.S. sales by record clubs—basically Columbia House and BMG Direct—are approaching $2 billion annually. That is in the face of flat-to-declining total industry sales, using a print-based mail order business with intentionally delayed new releases and a sales methodology that does not permit the consumer to interact with the product in any way that would facilitate purchase. It is the central tenant of TCI Music's core strategy that electronic distribution will fundamentally change every element of the music business, from the way artists interact with labels to the level of economic participation that occurs at each link in the distribution chain.

Singer: The consensus seems to be that in five years, digital distribution will be a noticeable, but not very large, portion of retail revenues—still smaller than the record clubs' 10 to 15 percent.

To the extent that there is electronic distribution in the future, is the Internet the most likely vehicle, or do you foresee other approaches as well?

Hooban: I think the Internet will be a big vehicle, but there will also be alternatives, such as wireless satellite. But the Internet will be one of the strongest areas, because that's where people want to be. It's got the mindshare right now.

Kearby: Liquid Audio has traditionally developed software solutions in an open architecture environment, enabling us to quickly implement and integrate technological developments. If new, viable delivery options become available that have the promise to enhance the online musical shopping experience and develop significant penetration in the consumer market, you can trust that we will be among the first to deploy them.

McPartland: The Internet will certainly be one key avenue of electronic commerce. However, notwithstanding the efficiency of compression innovations, broadband avenues will also play a major role. This will especially be true should interactive cable set tops debut on time and at the scale currently anticipated. We believe that the cable box will allow consumers and record companies to download music products and services in a secure high-speed/high-fidelity environment. This will allow a large consumer base to experiment with the convenience and functionality of direct downloading of songs as well as whole albums or concert performances.

Singer: Internet protocols will certainly be used, but there will be networks used other than the Internet to get the goods to consumers. This is already true in a University where a server sits behind the firewall and students listen to music over the campus Ethernet.

To the extent that there is a role for electronic distribution in the future, will it be equally applicable to all types of music product—including new album releases—or mainly used for promotional singles, back catalog, obscure artists/genres and other niche applications?

Hooban: I think it will definitely be used for singles, back catalog and obscure artists or genres. For new album release, it depends how big a market it turns out to be. If a quarter of music industry sales were by download, then new releases would be sold that way. But I don't know if anybody knows the answer to that yet.

Kearby: All the options you mention are

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> —*Gerry Kearby, Liquid Audio*

valuable marketing tools that the record industry has at its disposal when using Liquid Audio products. Our system is extremely flexible. The major labels can use it as an ideal promotional vehicle to drive traffic to their brick and mortar retailers and to online retailers. The Indies, who lack the same degree of physical distribution as the majors, are in the forefront of making their artists available on a track-by-track basis for purchase and download directly to consumers.

McPartland: Seventy-five percent of all online/nontraditional sales are currently directed to catalog releases. This is due to both the online demographic as well as the difficulty associated with getting deep catalog through traditional retail. In the future, I believe new artist releases will also be greatly facilitated by electronic commerce. However, we will also see the concept of music rental proliferating. Specifically, if the system through which you would download music is so efficient and dependable, why store it on your hard drive at all? Why not just call

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up a portfolio of selections as needed for a nominal rental fee? I believe nonphysical delivery also means nonphysical storage and more of a play-on-demand relationship.

Singer: There are two segments that seem to be emerging as worthy of attention as electronic distribution begins to become a real business. For active music purchasers in high school or college—clearly a "hit driven" market—you can use it to help promote new releases. The back catalog and other material is probably of greater appeal to those who are somewhat older and less comfortable shopping in most traditional music retailers, which is why sales of jazz and classical as a percent of the total is much higher at online retailers than through traditional outlets. It is too soon to say whether digital distribution will apply equally to both these segments.

Do you expect the major labels to adopt electronic distribution only through their own sites, or will retailers (online) still have a role in the distribution chain?

Hooban: I think record companies are trying to figure out where they fit into the value chain, and what part of it they are going to assume. Do they act as the retailer and go directly to consumers, or do they work with online retailers to do that? That is an issue that is just being batted around. The real strengths of labels are their marketing and promotional muscle: They know how to break an act and take them big. But why don't record companies get into retailing, owning their own record stores? I think it depends on what the companies view as their core competencies. And running a successful online commerce site is not an easy thing. Maybe a couple major labels will get into it, and maybe the rest won't. It's hard to say.

Kearby: It's unclear to what degree the major labels will make any of their content available directly to consumers over the Internet. Undoubtedly, traditional retail will continue to retain their very important role in the distribution chain in the foreseeable future. What's important to remember is that the Internet is not an inherent enemy to the traditional retailer. For example, Liquid Audio was involved this past July in a promotion involving Tower Records and the Intel New York Music Festival. We recorded a live performance of one of the bands during the festival, encoded and published it to the Net and made it available at the Tower Records store in Manhattan the following morning. Anyone who bought a copy of the band's latest CD at that Tower location could then go to an in-store station where they could download the Liquid Track from the night before and burn their own CD, a very cool commemorative of the event. We expect to do more of these types of events in the future.

McPartland: I believe the labels will

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probably employ multiple channels of distribution and multiple site access, but through proprietary non-third-party technology processes.

Singer: As large, traditional retailers such as Tower or Best Buy grow their online presence, the labels must provide these important distributors with goods to sell. If most goods are still sold physically, then they must keep those entities in the picture, though the labels will sell directly from their own sites too.

Would you expect to see music electronic distribution in an "open" format such as MP3, or in one of the competing proprietary formats?

Hooban: I don't think the open MP3 format will work, because it does not have the required security features. It already has a negative image in the music business; it will always be associated with piracy. If anything is going to happen, it will be with the proprietary formats: a2bmusic or Liquid Audio. But they may need to come together on some kind of standardization so they are able to play each others' files while still addressing the security issues.

Kearby: Unfortunately, MP3 is so "open" that it has become the technology of choice for music pirates. MP3 is great news if you want your music for free; there is an abundance of free music being distributed illegally all over the Internet in MP3 format, much to the dismay of the RIAA and others. If you make your living from making or producing music it's very bad news. Apart from the audio, which is noticeably inferior, there is virtually none of the standard info you get with a conventional CD. On the other hand, the Liquid Music Player, also a free app, provides superior audio quality and provides all the info you get with a standard CD like album art, liner notes, credits, lyrics and more. Plus it includes the ability to allow consumers to burn their own CDs using a very simple, friendly interface. So it provides a great experience for consumers and implements safeguards that ensure complete accountability and payment for rights organizations, labels and artists.

McPartland: Distribution will be in a proprietary format to preserve the major label food chain but also to ensure to the consumer that buying into one "major label standard" will allow them to embrace the totality of electronic commerce.

Singer: We will continue to see both types of formats, and we can expect the majors to support the systems that respect their copyrights. That is what is important, not whether it is open or closed. Formats that allow individual consumers to decide whether or not they wish to put an artist's music up on the Net without permission are unlikely to be supported by the artist or the majors any time soon, if ever.

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Electronic Music Delivery

tion of portable MP3 players to have on the outlook for electronic distribution?
Hooban: MP3 players will accelerate the music industry's adoption of one of the proprietary formats that have the security and protection that the record industry needs. If hundreds of millions of dollars are being lost because people have MP3 files and portable MP3 players, then the record industry is going to have to address that issue rapidly to combat that piracy. Otherwise, people who download hot new releases are not going to place any financial value anymore on music, and may never go into a record store and pay for CDs.
Kearby: We believe open standards like MPEG-3, or the more advanced MPEG AAC [advanced audio coding], which we have just integrated into our Liquifier Pro V.4.0 encoder, can be correctly implemented in a way the record industry will embrace. We have been working closely with several manufacturers of these devices and other new consumer technologies. As they increase their penetration into the market, we have laid the groundwork to support them as delivery platforms for music in Liquid Audio format.
McPartland: The most direct impact of MP3 portables will be to further delay major label acceptance of nonphysical delivery, due to the industry's fear of lack of control and the large number of bootleg sites. What the industry should learn, however, is that MP3 shows consumer acceptance of digital delivery, albeit in an unauthorized mode at the moment.
Singer: Portable players are essential to consumer adoption. The music industry will not support such players until they are part of a system that protects the interests of the rights holders.

Do you have any concerns about the degree of data reduction used in current electronic distribution schemes? Are standards of audio fidelity being compromised in order to enable electronic distribution?
Hooban: I don't think that fidelity is a big issue. I don't think the typical consumer will be able to detect a difference in fidelity between the downloading formats, or between any of those formats and CDs. I listen to files compressed 11:1, just enough compression to make it go through the pipe fairly quickly, but not enough to where you start to hear sound degradation.
Kearby: Liquid Audio offers artists and labels the ability to deliver CD-quality music directly to fans over the Internet today, and we are constantly striving to raise the bar on the listening experience. Given the bandwidth available today, compression is required to complete delivery in a practical time frame. But our roots are in pro audio, so while we deal with the reality of the existing infrastructure, we also have a vision of what increased bandwidth will make possible in the coming months and years, and we are committed to being at the vanguard of implementing new technologies that make the Internet musical experience the best it can be.
McPartland: Fidelity and technology are no longer hurdles at this point. The hurdle is the business model, the preservation of the food chain.
Singer: We are using AT&T's version of the new MPEG-AAC standard. Independent test results, some published in the *Journal of the AES*, show that this compression scheme provides the best combination of sound quality and file size available anywhere. Furthermore, in blind comparisons the quality is in almost every case indistinguishable from the original CD. The quality we are shipping today provides better fidelity than other alternatives used by millions of consumers every day, namely audio cassettes and FM radio.

What is your company's current and planned role (if any) in the delivery of music to consumers in electronic rather than physical form?
Hooban: We will be in the direct download business one way or the other. It's just a matter of when is the right time to do that. We see digital download as being an additional product line, just another music product that we would sell. And our goal is to offer the broadest range of music products that we can.
Kearby: Liquid Audio has developed a secure, end-to-end Internet music delivery system. We provide the industry with a software-based infrastructure that provides the potential of instant global distribution combined with unsurpassed intellectual property protection.
McPartland: TCI Music seeks to be the quintessential delivery platform of digital music entertainment services and related products through multiple distribution channels. We believe music is one of the most likely entertainment forms to be able to take advantage of this new arena. Therefore, we have engineered our entire company around building the capability for our consumers to select audio, video and related information services in a totally self-directed manner through interactive digital distribution platforms of a quality second to none.
Singer: a2bmusic provides the record industry an approach and technology that meets the requirements that they have spelled out for participating in electronic music distribution. We have an approach that helps them sell records through various promotional efforts, our security is excellent, and the sound quality is great. We're talking to key partners to enable the creation of portable players that support the rights holders. We expect to continue to play the role that we have already established as one of the leaders in digital distribution. ■

Fidelity and technology are no longer hurdles at this point. The hurdle is the business model, the preservation of the food chain.
—Tom McPartland, TCI Music

Philip De Lancie is Mix's Media & Mastering Editor.

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The Music Industry Meets The Internet

It's a simple fact: The Internet is changing the whole structure of the music industry. The people who have traditonally held power over how music is sold and distributed have had to smash their business models, as more and more music is sold on the Web. In fact, according to market research firm Jupiter Communications, music has become one of the biggest Internet retail markets: $81 million dollars in sales were forecast in 1998, and that number is expected to rise to $1.15 billion by 2002. After text, music is the second most popular content in Web commerce.

Like all Web content, audio needs a technical infrastructure to support programming and delivery. The music industry has been slow to embrace Internet technology as a means of promoting and delivering music, however, because of all of the complex associated issues, such as the international scope of the marketplace, ease of transferring content and the common, and dangerous, misconception that all content on the Web is free...

Piracy Online

Perhaps the biggest threat the Internet brings to the recording industry is opportunity for piracy. "If something is worth stealing, then there are unscrupulous people who will do that," says Bruce Colfin, an entertainment attorney and a 30-year veteran of the music industry. "And if something is easy to make copies of, and you can do it surreptitiously, and it's less dangerous than drug dealing and things like that, you can make a fortune in it." Colfin believes pirates are most dangerous to large corporations: "I don't think the pirates really care about something from the little guy unless it's really worth a lot of money; they are more concerned with the mass-market stuff, the stuff they know is a bazillion-seller," he says. "Pirates don't want to rip off somebody who's not well-known, because they're not in the business of marketing and publicizing. They want [a customer] who'll say, '*Titanic* for two bucks? I want that!'"

There are those who believe that consumers won't pirate if the alternative—a legitimate purchase—is acceptable to them. GoodNoise Corp., a record company using the Internet as a platform for selling and delivering music, operates on that philosophy. "The point that we're making [at GoodNoise] is that if you make it easy for people to buy, and you give them a good price, then 80 percent of people are going to do it the right way," says Steve Grady, a spokesman for the company. "There's no expectation that the music is free—most people want the artist to get paid for what they do,

Illustrations by Dave Ember

World Radio History

In the online world, piracy and protection are the hot topics.

by Sarah Jones

World Radio History

The Music Industry MEETS The Internet

for their intellectual property, and they will do it the right way."

Of course, the record industry has always dealt with copyright infringement and recognizes that piracy is not going away; however, the opportunity for illegal distribution is much greater in cyberspace. "The leakage that occurs in the ordinary course is not what we're talking about when the entire world is interconnected using converged technologies on global networks," says Cary Sherman, Recording Industry Association of America (RIAA) senior executive vice president and general counsel. "There, leakage of one recording can suddenly be accessed by millions of people around the world. It's the aggregate impact: It's not what any one person does in his or her home, it's when one person can become a worldwide publisher of somebody else's music that we've got a serious problem."

MP3: Opportunity for Promotion or Piracy?

"I have seen the death of the recording industry. It's name is MP3," wrote columnist Joshua Quittner in a recent online edition of *Time* magazine. An ominous statement, to be sure, but one that echoes the fears of more than a few record company executives. MP3, short for MPEG 1 Layer 3, is a popular format for audio delivery on the Web. An open standard, MP3 compresses digital audio files at a rate of about 11:1—meaning a typical pop song can be shrunk down from 40 to 50 MB to about 3 or 4 Megs, a manageable size for delivery across the Internet. But more than its ease of use, the aspect of MP3 that is seen as a threat to the music industry is the fact that the format does not incorporate a copyright protection scheme. At Music Tech East, an ASCAP-sponsored conference held in New York last October to explore ways to use new technology to promote and protect music on the Web, Jason Calacanis of the *Silicon Alley Reporter* declared MP3 "the music industry's Vietnam," citing high-speed access, affordability of CD burners, the fact that point-to-point communication has been easier to carry out and harder to track, and the music industry's hesitancy in responding to it as the main reasons the format poses a considerable threat to the record business.

The technology itself is not the problem, say opponents of free MP3 use; what is troubling is the illegal use of MP3 as a vehicle to proliferate the pirating of copyrighted material. Indeed, an estimated 3 million people have already downloaded free MP3 players, and thousands of Web sites promote and distribute illegal MP3s.

And the MP3 format is just beginning to take off. A growing number of manufacturers are introducing systems that enable MP3 files to be taken off a PC and downloaded into portable, Walkman-type devices. (Even a car system is in development.) At press time, the RIAA was denied a preliminary injunction to prevent distribution of the Rio, one such MP3 playback device, claiming the unit is in violation of the 1992 Audio Home Recording Act, which prohibits the manufacture of home digital audio recording devices (remember consumer DAT?) without a Serial Copy Management System to prevent additional generations of copied material. Diamond Multimedia, maker of Rio, counters that the pager-sized Rio, which retails for about $199 and can store about an hour of MP3-format audio, is a playback-only device; therefore, SCMS requirements do not apply. Not true, says the RIAA, because in order for MP3 files to be played back in Rio, they have to be copied from another source, whether that source material comes from the owner's personal CD or is downloaded from the Internet.

Not everybody agrees with the RIAA's contention that distribution of unprotected music poses a major threat to the record industry, however. The Internet is growing as a viable marketplace, offering new distribution and promotional opportunities for small record labels and other independent groups. Critics of the RIAA feel that the group is acting with only interests of its major members, the "Big Five" record labels, in mind. These Big Five companies—Warner, BMG, Sony, MCA/PolyGram and EMI—account for 80% of the $38 billion global music market. But this share is down 10% from five years ago, and the Internet is greatly responsible for that shift, according to GoodNoise, which uses its Web site

The music industry has been slow to embrace Internet technology as a means of promoting and delivering music, because of all of the complex associated issues, such as the international scope of the marketplace, ease of transferring content and the common, and dangerous, misconception that all content on the Web is free...

I think the principles of the old law make perfect sense, even though technology changes. If something is protected by copyright and somebody finds a new way to make a copy or a derivative work—an unauthorized copy is an unauthorized copy.

Bruce Colfin, entertainment attorney

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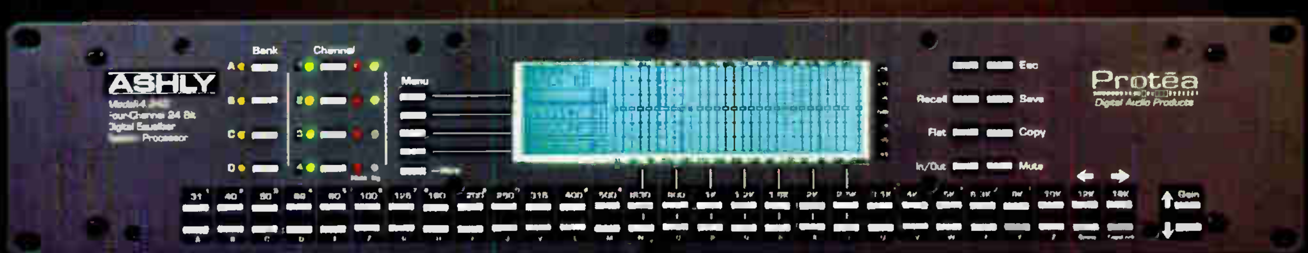

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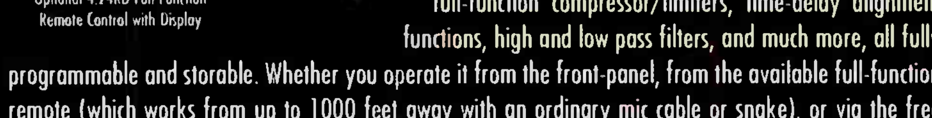

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The Music Industry MEETS The Internet

(www.goodnoise.com) to publish music in MP3 form and bases its business on the theory that most MP3 traffic is legal and that the majority of MP3 users are fans, not pirates. "We feel that the whole argument that the RIAA and the major record companies are making about piracy is really a smoke screen," says Steve Grady. "What they're really afraid of more than piracy is digitally distributed music. [The major record labels] have a chokehold over the industry as far as distribution goes—they have controlled it for a very long time. [MP3] changes the whole fundamental structure of the music business and opens up new doors

The major record labels have a chokehold over the industry as far as distribution goes—they have controlled it for a very long time. MP3 changes the whole fundamental structure of the music business and opens up new doors for artists who aren't established with major record labels to have an outlet to distribute their music.
Steve Grady, GoodNoise

for artists who aren't established with major record labels to have an outlet to distribute their music." That poses a threat to the labels from a cost perspective, says Grady, because physical goods are no longer part of the equation.

The RIAA defends its position, insisting that those allegations are "absolutely wrong. It isn't the technology itself, it's the fact the technology is being abused to take other people's music and disseminate it worldwide for free," says the RIAA's Cary Sherman. "People shouldn't be surprised that companies that try to make a living at making music and people that try to make a living making music have a problem with that. We didn't think a product should be put on the market that was going to exacerbate the already terrible problem of illegal MP3 files by encouraging more people to download them, because if that market took hold, and you were able to offer the consumers portability with respect to MP3 in the form of a device like the Rio, how can a legitimate marketplace compete?"

Rather, Sherman says, the RIAA is in favor of an industry effort to create an open, multi-industry security standard: "When you do that, you have opened up—far from closing—the distribution channel. Because that means any company, large or small, can get into distribution, because their artists' works will be protected. That means that the distribution channels will be broader, not narrower. And we wouldn't be doing that if the majors were doing what they've been criticized of doing."

Sherman adds that those who criticize copyright as an obsolete concept "really ought to go back to their roots and think about why it is that we've got the most vibrant mass culture in the world. It's in part because by giving people that statutory monopoly we are able to disseminate the largest number of products at the lowest prices. Otherwise we're going back to Mozart and having patrons who can afford to pay an artist to create, and the other people get the crumbs for free."

The RIAA's lawsuit against Diamond probably will set a precedent for MP3 and its role in online music delivery. In any case, it represents one of the first steps toward defining a new music business structure in cyberspace. Whatever the outcome, the solution will be based on the rules in place today. "I think the principles of the old law, and by analogy

Technology is being abused to take other people's music and disseminate it worldwide for free. People shouldn't be surprised that companies that try to make a living at making music and people that try to make a living making music have a problem with that.
Cary Sherman, Recording Industry Association of America

a lot of the stuff that is written down there, makes perfect sense, even though technology changes," says Colfin. "If you make copies, does it really matter what you make the copies on? If something—let's say a sound recording—is protected by copyright in the normal course of business and somebody comes along and finds a new way to make a copy or a derivative work—an unauthorized copy is an unauthorized copy."

Web Earnings for Composers

"Basically, my background is as a composer, someone as an owner of copyright, so the whole issue has been a concern to me, even before the Internet," says Joyce Imbesi, a Los Angeles-based musician, composer, producer and founder of TuttoMedia, a company providing music and sound production for film, TV and new media. "It's been a big concern, how I am compensated when my music is performed, whether that be on broadcast medium, through television, cable, the radio, overseas, records sold, any of the typical copyright outlets. It's been very interesting to see how that's changed, because in my mind

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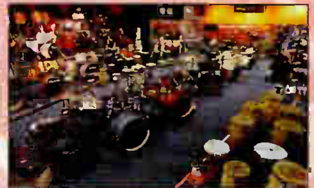

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there were already some problems in tracking all of these works before we even had the Internet."

There are many ways for these royalties to be earned on the Internet, based on the legal framework currently in place: For example, streaming audio is defined by copyright law as public performance; many downloads earn mechanical royalties. Licensing and tracking have been a challenge, however. Several companies, such as Liquid Audio, AR IS and others (IBM is said to have a system in the works), already provide software solutions for protecting copyright and distributing royalties earned on music downloads. In addition to these embedded watermarking and tracking systems, another advance is ASCAP's EZ-Seeker tracking system, which identifies specific song titles performed on the Internet and will locate Internet sites using commonly available audio and video file formats. It then qualifies potential licensees, automatically issues license forms to appropriate sites and later tracks compliance with license requirements. EZ-Seeker can also decode various watermarks that may be employed by record labels, music producers and distributors to identify their works. BMI offers BMIMusicBot, a Web search and database application for identifying music and linking information with songwriter and publisher information.

Imbesi believes that education—of the composers as well as content providers and consumers—is needed for these tracking systems to work."There are a lot of Web site owners who have music on their sites—whether it's background music or they're selling music—and don't have any knowledge of the fact that they are supposed to be paying, that this is something that is owned by someone and needs to be licensed," she says. "On the other side, since the technology has changed so much and anyone can sort of be a composer in the garage with a few boxes, a lot of young composers who are doing music for video games and that kind of thing really aren't educated as to what their rights are, that their compositions have a value beyond maybe what they are being paid to create them."

And although Internet technology seems to be outpacing legislation, steps are being taken to manage intellectual property across international lines, as well. One recent victory for the recording industry was the passing of the Digital Millennium Copyright Act, which allows for the implementation of the World Intellectual Protection Organization treaty, designed to protect copyrighted works over the Internet. The treaty represents an international copyright protection effort, making it illegal to manufacture or import any devices that circumvent Internet copyright protection technologies. In addition, the agreement raises the global level of copyright protection on the Web to U.S. standards, which are the highest worldwide.

Finding a Long-Term Solution

Just as the industry was not prepared years ago for the feasibility of home CD-burning, nobody can predict a timetable for the inevitable faster, better-sounding music delivery technology of the future. What should be done now to ensure a system is in place to address future mass-market systems? The answer varies, depending on perspective, but everyone agrees the solution begins with a heightened awareness level.

"The solution is marketing, not technology," says Steve Grady. "You have to market in the right way to the consumer base, make it easier to buy than to steal, and you have to give them an advantage for buying, to re-create that relationship with the customer."

Joyce Imbesi suggests a blanket license as a possible way to provide compensation to composers and artists; service providers could pass on their license costs as a small increase in rates."And that would kind of make it invisible at the same time," she explains. "Because when people put the radio on, if they had to put a quarter in every time they would think twice about it. But it's being paid for: When you pay your cable bill, you're paying for all the services that you get

There are a lot of Web site owners who have music on their sites—whether it's background music or they're selling music—and don't have any knowledge of the fact that they are supposed to be paying, that this is something that is owned by someone and needs to be licensed.

Joyce Imbesi, composer

through that cable line; when you go into a restaurant, part of your meal ticket is paying for the ASCAP or BMI license that's being piped in while you're eating your meal. We are paying for music in a lot of other ways, but they're made more invisible—which is part of the problem why the general public doesn't realize that this is property that needs to be paid for."

The RIAA advocates the idea of a long-term strategy for content protection, based on a consensus among the consumer electronics, computer and music industries. "We can't be addressing these issues on a product-by-product, technology-by-technology basis," says Cary Sherman, who adds that a coherent and comprehensive solution will require the consensus of all the affected industries and that it's time to come up with some mechanism to ensure that the content is protected, or that content won't be created."And this is not a question of just copyright, this is a question of what is going to enable people to earn a living making music when they don't have the ability to control it anymore, or the ability to be paid for it," says Sherman. "And if they don't make money doing it, then they have to spend their time doing something else, and we're all worse off." ■

Sarah Jones is a technical editor at Mix.

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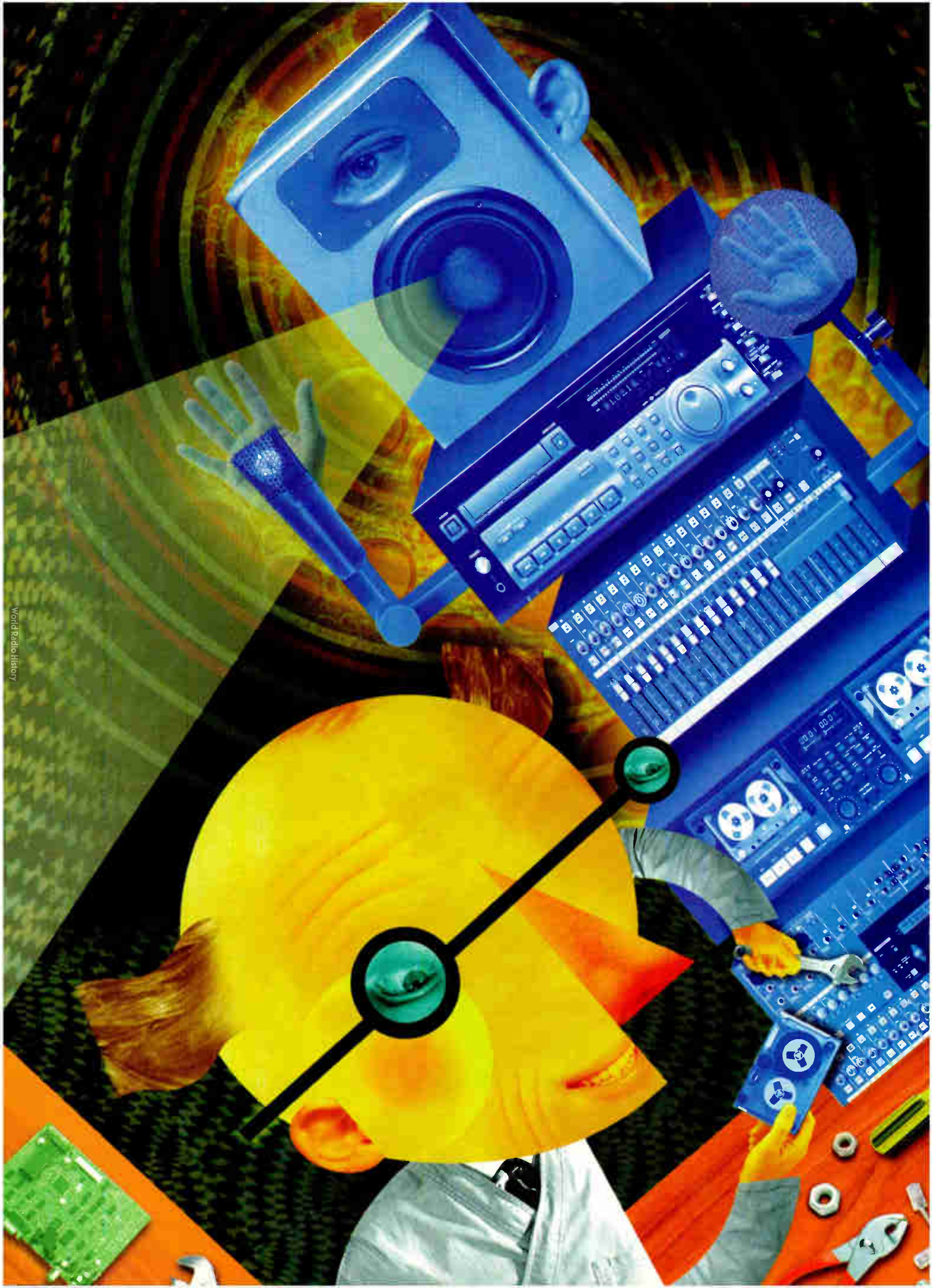

World Radio History

A Behind-the-Scenes Glimpse at Technologies for the New Millennium

BY GEORGE PETERSEN ILLUSTRATION BY GORDON STUDER

Predictions can be dangerous, farfetched, vague or merely silly.

When futurespeak turns to *audio* developments, the results typically are filled with crystal ball views of biocube storage, coin-sized terabyte datacarts, gigaHertz sampling rates, 400-channel pocket multitracks, antigravity handles for effortlessly stacking bass bins, and for good measure, a couple E-ticket passes to the private collection of holosuite programs stashed in the back of Quark's bar on Deep Space Nine. It's all fun and entertaining, but a sneak peak into what kinds of audio products we'll be seeing in the next few years—based on technologies emerging today—would ultimately be a lot more useful.

So with this goal in mind, we spoke to a number of leading technologists representing divergent fields of audio. The participants included: Yukiharu Akase of Yamaha, Keith Barr of Alesis, Mark Gander of JBL, John Meyer of Meyer Sound Labs, Andy Moorer of Sonic Solutions, Dr. Jörg Sennheiser of Sennheiser Electronics and Richard Zwiebel of Peak Audio. When you poll seven audio experts, chances are you'll get at least nine outlooks, and as expected, their responses were lively and informative. So, as the countdown to the 21st century begins, buckle your shoulder harness, disengage the gantry links, stow your tray table in its upright position and prepare for liftoff. Next stop: Audio 2000!

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EmagicVISION

Emagic believes the integrated "front end" application will play a dominant role in the coming millennium. Existing production tools will evolve into programs that can blend all media formats—such as digital audio, DSP, MIDI, scoring, synthesis, sampling, digital video, graphics, interactive multimedia authoring and mastering—into single affordable and easy-to-use applications for various skill and price levels.

Standardization will become paramount. These emerging standards will have to be user-friendly to guarantee the seamless integration of all the different media formats. Modular, reusable code structures will also be instrumental in providing more efficient production solutions in a shorter time span.

The inevitable accelerated increase of CPU performance and storage media capacity, coupled with standardization and affordability, will enable all media developers to create integrated applications. Naturally, the Internet, especially when equipped with much broader bandwidth, will play a vital role in exchanging media of all types and working on projects from many places in the world simultaneously. It will also serve as a stage where artists will find a new audience. Basically, the distribution cost for multimedia content will decrease significantly and offer access to more. In this respect, the entire world is an emerging market.

—Sven Kindel, President and CEO of Emagic

enormously more acute than what you would expect knowing the ear's frequency response. I think everyone can agree that nobody hears higher than 26 kHz, which is the highest recorded and confirmed pitch that somebody somewhere has been able to hear," which more likely refers to the aural acuity of a young girl living in the Peruvian Andes than it does to a working musician in Manhattan.

"So the question," Moorer says, " is what good does it do us to have audio response out to 40 or 80 kHz? In terms of steady-state tones, it doesn't do us any good at all. But it does help preserve the time accuracy.

"Try the following experiment: Put a very short pulse—a microsecond-long pulse—into each ear. If you vary the delay between the left ear and the right ear of this pulse, anyone off the street can hear a 15-microsecond difference. I mean anybody. And that's already shorter than the time between two samples at 48 kHz. And some people can hear down to a five-microsecond difference between the two ears, and that's shorter than the distance between two samples at 96 kHz. And this five microseconds corresponds roughly to the distance between two samples at 192 kHz. So there's some fairly good reasons that suggest that 192 kHz is probably enough."

5.1...Done?

As DVD-Audio discs/and or Sony Super CD 5.1 releases begin rolling onto retailers' shelves in the months to come, 1999 may mark the year of the surround bonanza. Of course, if consumers don't embrace this new technology, then surround audio-only releases may merely be relegated to sit next to the Quad decoders, Elcasets and 8-track tape players in our attics. But either way, the debate continues, ultimately to be settled by the consumers who use their wallets, pocketbooks and Platinum Visa cards to cast their votes to accept or decline this new format.

"Going from stereo to surround in home listening is probably as great as the revolution when we went from mono to stereo," foretells Moorer. "There is some precedent in that the five-speaker system, LCRSS, happens to be used by the film industry. So people will have home theater systems with five speakers in them, possibly with a subwoofer enhancement. So at least initially, music will have to take advantage of that. That is, it would be a relatively difficult sell to convince consumers to go to five speakers just on the grounds of more interesting music. But the difference between a five-speaker presentation and two-speaker is absolutely breathtaking. It's not subtle. It's in your face. This is going to be a time of great creativity."

But are five channels enough? What's the next step? "We're doing some work with the University of California with 8-channel sound," explains John Meyer, from Meyer Sound Labs, a pioneer who brought electronic control into the milieu of sound reinforcement speakers; refined the concept of active, powered studio monitors; and, more recently, has pressed the development of powered enclosures for P.A. applications. "And using full-range discrete sound makes it pretty easy to do new things, such as room simulations to make a room bigger or other kinds of stuff. We found 5.1 hard to pan, although 5.1 is commercially viable, but video is the most important aspect of that. In an 8-channel system, you put one channel in the ceiling so you have LRC, then two on the sides and two on the back and one on the top, like the SDDS idea of it. The DVD could hold that much information—it might take both sides of the DVD to do this, or two layers. Maybe that'll come in the future, but that would be kind of interesting."

According to Moorer, multichannel sound could be taken even further: "As far as I'm concerned, the next stop after 5.1 should be twenties—you know, 20, 30, or more speakers. Anything in between doesn't make a whole lot of sense. As we cross into the next century, one of the things that we will probably see in our lifetime is sound-field reconstruction. Although we can make a fairly good case for there being a limit to the sampling rate and a limit to the number of bits required, it's harder to make a case for the number of speakers. And to reconstruct a waveform that had come from, let's say, a string quartet on a certain stage requires a holographic approach, which would be thousands and thousands of speakers.

"But talking about hundreds or thousands or tens of thousands of transducers or speakers, is really more a question of when we can expect this, rather than if it's going to come. I think it'll be more like

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wallpaper, you know, and embedded in the wallpaper will be zillions and zillions of speakers that as soon as you put the wallpaper up, will figure out where they are and they'll communicate with each other and tell your hi-fi set where they are."

Of course, more channels means increased storage requirements, but the answer to such requirements may go back to Moorer's comments about the needs always outpacing the storage requirements: "Now, if you think for one second about what that implies as to the amount of bandwidth and the amount of data that's going to be transmitted on our DVD format," Moorer says, "we've gone up in capacity by a factor of anywhere between four and ten, depending on how you look at it. The CD came out in '84, about 14 or 15 years ago. So, in the next 15 years, there'll be another factor of two-to-ten increase in the capacity of storage media, which will be manifested as more channels and higher sampling rates."

Moorer feels that all of this technology could lead to some pretty interesting, highly interactive times. "Music traditionally has been stage up-front. That is, there's no interactivity in a symphony concert, except that listeners can stand up and walk out if they feel like it. But the music just happens. Even in a jazz concert, there may be interactivity among

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However, large, well-equipped studios will still offer an abundance of solutions, as well as a service-oriented, controlled environment for the artist. Because of this, they will continue to thrive and actually be more profitable as their equipment investments cost less.

From a retail perspective, I think there is going to be a tremendous backlash to the current MI "superstore" mentality of the large chain retailers. The smaller retailer will make a comeback in a big way, bringing back value-added, service and knowledge-based salesmanship, developing a true relationship with customers.

—Phil Celia, Director of Sales, Fostex Corporation of America

the musicians, and there's some amount of synergy with the audience, but it's not direct. I don't think we'll see a lot of interactivity as far as what notes are performed, but I do think we'll see interactivity in spatialization. If you want to hear that oboe part up close, you might want to walk right into the middle of the symphony and listen to it. Or, with a jazz musician, if you wanted to really hear what the trumpet was playing, you might want to walk over there. Or you might want to pan it around so that the drums are coming from the back right now."

But beyond deciding where to sit within the multichannel (or *very*-multichannel) listening environment, could the consumer have creative choices in how they experience the project? "Absolutely," Moorer feels. "Rather than the engineer deciding where to pan it, I think we're going to see more and more of these decisions deferred to the listening environment. So the idea would be, you may only have five or six or 12 speakers, but there might still be a point in sending 30 channels of audio and panning them in the home, or in the home theater, right then and there, simply because that allows you the ability to walk through it or change the spatialization."

Additionally, the producer could supply several preset mixes on the disk, stored as some sort of level/panning audio EDLs, perhaps giving consumers presets, in effect saying, "Here are six suggested presets, now there's 10,000 more of your own you could make." Or, "Do you want to sit in the middle of the band, in front of the band or behind the band." Moorer adds that another possibility is that with the producer's preset supplied on the disk—sort of in the form of the director's cut in film—users could call up the producer's preset to study how the mix was done.

Such a process could make a fundamental and revolutionary change in the way we mix, Moorer says: "One of the interesting results might be that we might start mixing things dry or mixing things more dry. In this case, the eight channels that are allowed on the DVD-Audio spec, might not just be speaker feeds; they might be unmatrixed feeds that would then be matrixed and processed in a set-top box via instructions that are sent along with the disk that could be changed or modified on-the-fly. This gets a little bit closer to what we were talking about, like being able to walk into the orchestra, although we're limited now by the number of channels and the bandwidth. There may be some amount of experimentation in releasing completely dry mixes this way, and allowing the set-top units to do the processing."

Meanwhile, stark changes are in store for the home listening environment, where consumers often spend tens of thousands dollars on playback systems, yet completely ignore even the most basic tenets of acoustics or loudspeaker placement.

"We're going to see more processing available in the home environment," Moorer notes. "Some of the problems in the home, of course, have to do with speaker mismatches and difficult listening environments, where speaker placement is often limited by the shape of the room, the location of the furniture—this kind of thing. Simply because the processing power is becoming so inexpensive, we're going to start to see self-calibrating and self-optimizing stereo systems in the home. There have been some past attempts to do this in the home with mixed results. But with five speakers, it's enormously easier to do, and you have some tremendous advantages by using more and more speakers to help get rid of room coloration. Or, certainly, if you wanted to change the acoustical nature of your room and make it sound like you're sitting in a concert hall, being able to assign delays to the different speakers. As far as the consumer goes, this is one area that hasn't been explored fully, yet we're going to see more experimentation."

Microphones: The Chain Begins

Yet not all breakthoughs require new technologies. For example, for some years, the industry has had access to quality analog microphones with dynamic range performance that exceeds 125 dB. Perhaps here, the analog side of the signal chain is merely waiting for digital to catch up.

"There are limitations at every step along the chain," Moorer says. "Microphone preamps get better and better, but in some ways, the microphone preamp is the limiting factor. We know that by running A-to-D converters faster and faster—that is, with higher and higher oversampling—there's relatively little theoretical limitation to how much signal-to-noise ratio you can get. So we're limited by the input stage to the A-to-D

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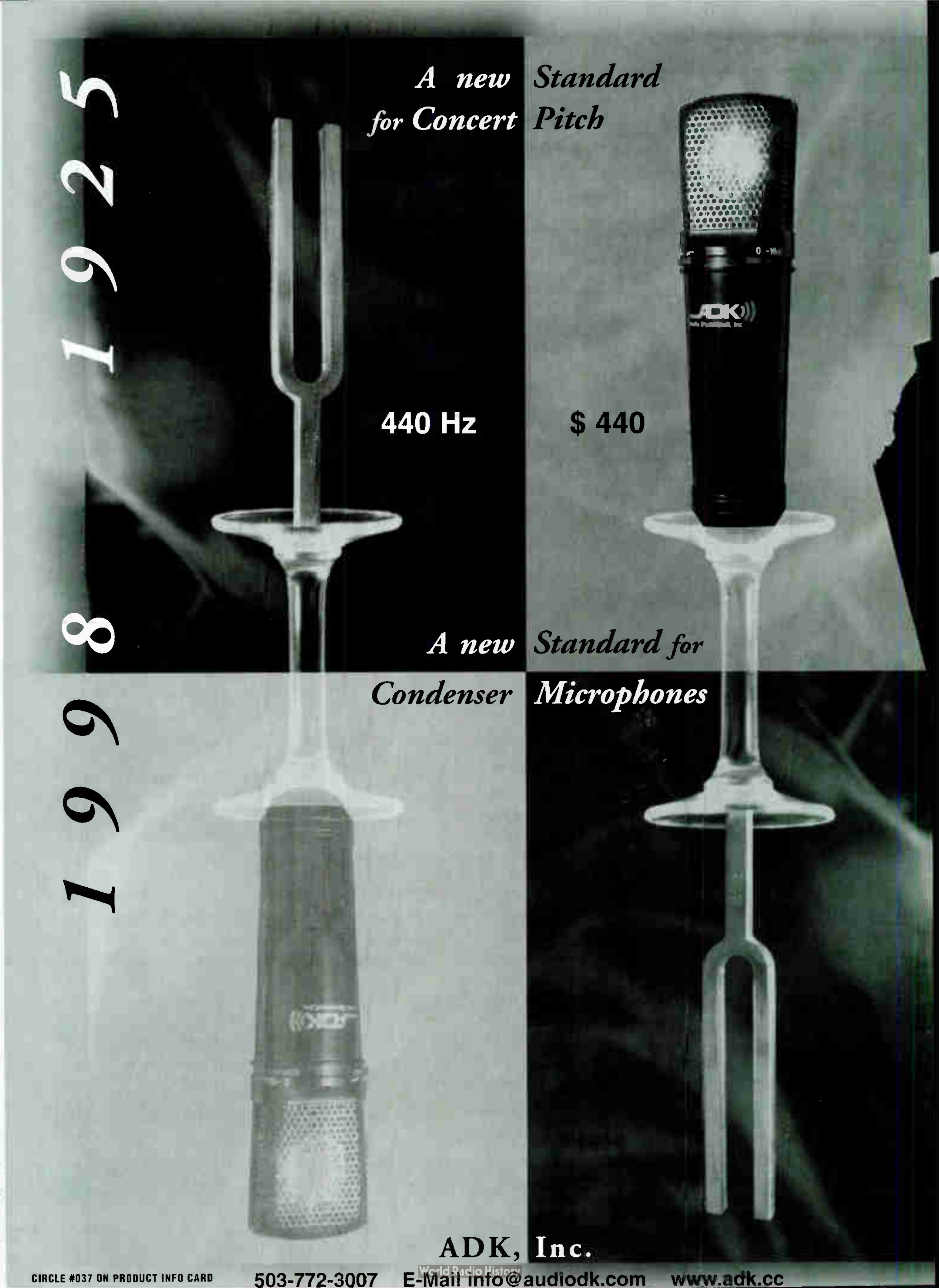
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—Doug Perkins, mSoft

converter and also by the microphone preamp. This is going to sound odd, but to go to the next step both may require cryogenic amplifiers. We may very well have to cool them with liquid nitrogen to reduce thermal noise, which is really in some ways the final barrier toward getting under the 140/160dB signal-to-noise ratio that we might like."

...et microphones continue to improve. ...raditional microphones, the trend of ...ing toward smaller solutions without ...promising quality will continue," ...esees Dr. Jörg Sennheiser, owner of ...oth Sennheiser Electronic and the Georg Neumann company, and professor of acoustics at the University of Hannover, Germany. "Using these small, cost-effective transducers, we can pack many of them together to form lines or two-dimensional arrays. If we do them, for instance, with condenser microphones in silicon, we can add some intelligence to it, to steer the beam or whatever.

"Rather than inventing new things in most cases, we're back to the basics—reading old papers or patents—and seeing what technology makes things possible today," Sennheiser continues. "We did this in the past using the RF principle for condenser microphones, which

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As for software, the current model of a "DAW platform" as the central piece and "plug-ins" as the outboard gear seems to be neatly replacing the real analog studio with its virtual counterpart. The next big thing that's about to happen is total networking, where the concept of tape is gone in favor of sending music down the wire to the next studio where you are going to work.

—Michal Jurewicz, designer, Mytek

was a real oldie from the 1920s, I think. Now we have done the same thing with optical microphones, which was described many years ago. There is also the possibility of building a microphone without using any metal. There are some applications where metal is critical, for instance in a CAT scan, where metal distorts the high magnetic field. Patients need to have some way of communicating from inside that washing machine [laughs], so there is a need for microphones without any metal."

However, Sennheiser also looks at such developments in terms of the day-to-day needs of the audio community: "The same principle holds true onstage. Having a microphone without any electricity in it—just light being bounced off a diaphragm—we can make it absolutely sweat-proof, which is a problem today in live theater, and there are many more applications of the optical principle." And these are not merely lofty predictions. At last year's AES convention in Amsterdam, Sennheiser demonstrated a working prototype of an optical microphone that used fiber-optic lines to transmit and receive light pulses reflected off the back surface of a microphone diaphragm. "There could also be a revival of planar dynamic microphones, or transducers, such as small loudspeakers," Sennheiser predicts, "because modern magnetic technology makes it possible to shape magnets—at least in the future—at our will. Then we can create structures where we can make use of printed coils on the diaphragm."

Materials and Methods

Audio technologists often need to look into other industries to provide new avenues, particularly in the availability of raw materials. "Piezo-electric foil renders so many possibilities, but the problem is in the material itself," says Sennheiser. "We are not from the chemical industry. We know what kind of foil to take and how to stretch it in what direction to make it piezo-electric. But this requires large investments, so we would like to see the chemical industry provide a material that's properly stretched with high piezo-electric constants, because then we can make transducers out of it. Almost 20 years ago, we built many transducers for telephone use using that approach. They have some remarkable properties, and this material could also be used as loudspeakers, just as a tapestry on the wall. Then you can have square meters of loudspeakers—even with low-frequency reproduction—so that's a possibility. We're just waiting for the material."

Alternate materials and the availability of new materials are a major concern to speaker designers, emphasizes Mark Gander, vice president of strategic development at JBL Professional. In terms of the future of transducers, "the two phrases that come to mind are 'material science' and 'digital electronics integration,'" Gander says, "and those two areas will accelerate their pace over the next few years and determine how loudspeakers or sound systems that employ loudspeakers will be different in the future. Material science is actually the area of greatest advances that loudspeakers have continued to see since their popular commercialization in the 1920s and '30s, when the compression driver was essentially invented.

"Since then, changes in materials that are available to make diaphragms, changes in the material to create the magnetic field, are the areas that have advanced and created the greatest improvements in loudspeakers—whether that's changing from aluminum to titanium or beryllium or some composites for the domes on tweeters and compression drivers, or going from plain paper to carbon fiber, Teflon, Fiberglas, Kevlar or mixtures of all those materials with paper to make speaker cones. We've also seen progress from original field coil magnet assemblies—which are essentially electromagnets—to alnico magnet material, to the lower-cost ferrite magnet material to the more modern samarium cobalt and neodymium magnet materials. Technology advances in materials allow speakers to play with more efficiency, or go deeper in bass, or of particular importance—to have lower distortion than the generations before them.

"Recently, we're also seeing the possibilities of material science leading to other ways to make speakers, rather than the traditional compression driver or moving-coil cone or dome diaphragm, like some of the flat-panel speaker technologies from NXT and other people, Gander explains. "Modern materials technology has allowed these speakers to start to work at an acceptable level, while the flat-panel things that were done out of Styrofoam and other more primitive

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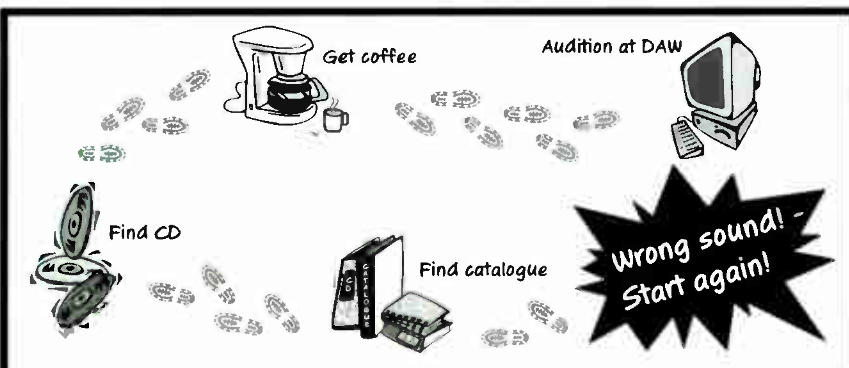
materials in the 1960s and '70s could barely produce speech-range intelligibility, much less high fidelity. Newer materials can actually allow these things to at least be intelligible, and are starting to border on relatively low distortion for high-fidelity applications—or at least medium-fidelity applications like laptop computer speakers and display-panel speakers for trade shows, retail establishments and educational institutions."

As a real-world example, Gander refers to a technology most of us are familiar with: "The perfection of the piezo-electric methodology for tweeters [in the mid-'70s] generated huge numbers of low-cost musician speakers," Gander says. "Now, we take piezo-electric tweeters for granted. They're considered at least inexpensive, if not cheap, and not particularly high-quality. But they are a very cost-effective way that a new material science technology allowed something to be commercialized and come into everyday use.

"More modern examples are the Mylar material that was developed for the space program and used in wire insulation. Mylar is now a common material for dome tweeters and for some of the flat-panel loudspeakers like the Infinity EMIT tweeter used in hi-fi. And there are some professional ribbon tweeters and ribbon devices using that material for the diaphragm. Once you have a material that can be both lightweight and still stiff, and handle a certain amount of mechanical and thermal stresses, you then have a capability of not only improving older designs, but creating new designs that weren't possible beforehand."

In spite of all the breakthroughs and advancements in technology, audio speakers are essentially still constructed around speaker cones, and voice coils. So



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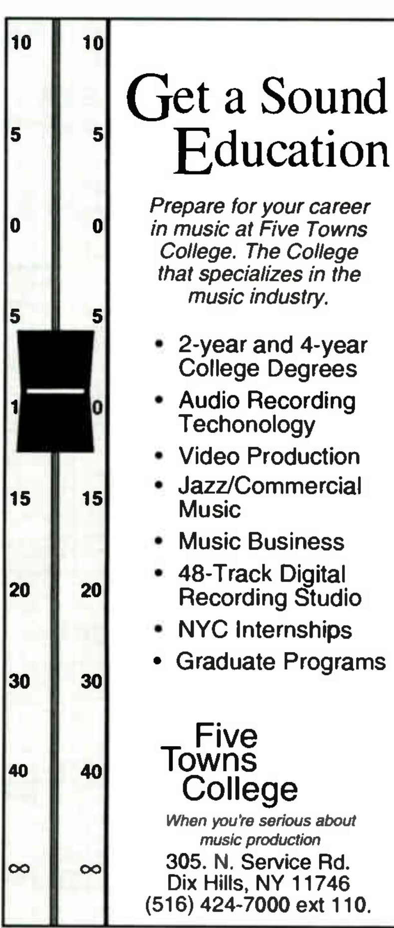

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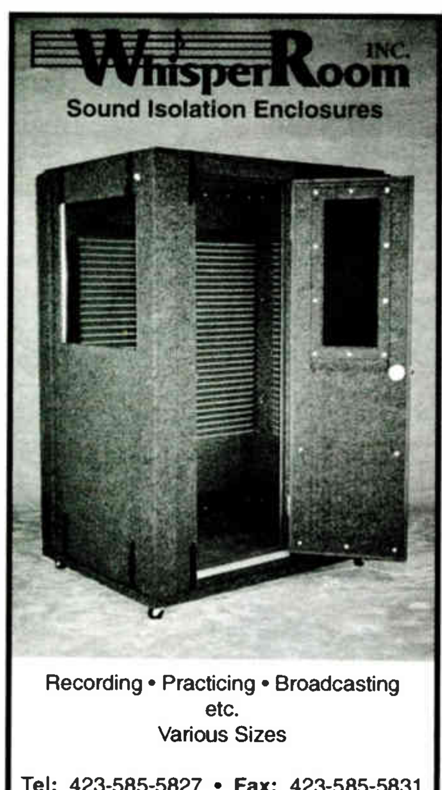

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why in 1999, are we still stuck with cones? "We're still stuck with cones because they work really well, and they're still very, very cost-effective," Gander explains. "The bottom line in acoustics is that you must move air—vibrate air molecules that are butted up against the diaphragm. There are some modern, exotic methodologies of directly vibrating the air. There are a number of research papers and one company that's trying to commercialize this distortion modulation of the air, where you actually put very high ultrasonic frequencies into the air at very high decibel levels.

"The harsh reality is, the air that we breathe and the air that we listen to sound in isn't particularly linear and doesn't accurately reproduce the vibrations that it gets. So over distance, you actually create distortion just from the fact that the air—which is nonlinear—is the propagation medium," states Gander. "And as you increase the sound pressure levels, you can generate quite high levels of distortion, just because of the air. Yet with that nonlinearity, there's actually a way to put in very high frequencies, say 50 kHz, and then also put in 51 kHz at 140, 150 or maybe 160 decibels. And that 51 and 50 kHz beat together and give you a difference frequency of 1 kHz, and you can actually perceive that as a 1kHz tone. The problem is you get all the beat frequencies and harmonics that build up above and below that 1kHz tone, and dealing with those is a limitation of that technology now."

Networking and All That

There's no question that digital has made a major impact on the recording community. In live sound, it's been brewing in the background, ready to take center stage. "These days, the 'digitalization' of products is accelerating at warp speed," states Yamaha's Akase. "Examples, such as DVD, digital broadcasting and the Internet, are trends that are having a tremendous influence and will continue to bring changes to the pro audio industry. Their influence is already apparent in the significant digitalization of music production, studios and sites. The need for digital P.A. systems and acoustic systems for concert halls is emerging."

Obviously, a key part of that digital future is networking, and Yamaha has been intensively involved in developing its mLan spec, which will provide the capability to send sample-accurate AES digital audio, MIDI and other control

StorykVISION

Equipment in the rooms will grow continually smaller as hardware, consoles, tape machines, etc. is replaced with virtual (software) components. The importance of acoustics, environment (room) comfort, lighting, ergonomics, etc. will increase substantially. (I loved a recent article by a well-known producer who said his favorite piece of equipment was his chair!) The economy of surface-applied acoustic treatments will continue. Prices should continue to drop. This will fuel the affordability of studio construction.

Digital sound has just about arrived (finally) to the point where consumer delivery systems are equal to or better than the best analog. This is fantastic. Millions of people will be demanding better environments in which to enjoy multimedia.

Surround sound will continue to drive the mastering and audio production community and be an enormous influence on how production environments are designed and constructed. We hope one thing will not change: Music will continue to be the reason for paying attention to all these changes!

—John Storyk, Walters-Storyk Design Group

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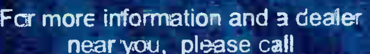

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In the 50 years Studer has been a supplier to pro audio and broadcast, there have been times when the future of products was obvious to the manufacturers, which allowed us to precisely anticipate the tools our customers would need in the future. Today this is no longer true as the various forces change the face of consumer and professional audio, but there are trends and technologies we are confident will be a part of the future audio landscape.

As consumers we will be listening to audio with higher resolution than 44.1/16. It will be multichannel and integrated with pictures and graphics. Audio will be streaming to us from multiple sources including the Web, direct satellite and cable systems. We will have physical copies on optical discs, hard disks and even good old 12-inch platters of analog vinyl (remember them?). We will be listening on playback appliances, computer systems, home theater systems, multichannel auto systems, virtual surround systems (more point sources than speakers) and multichannel headphones.

We at Studer can foresee that we will be producing high-resolution, digital, multichannel audio tools that integrate sound with picture in an efficient, reliable and cost-effective manner.

—John Carey, President, Studer North America

information over IEEE 1394 (Firewire). "The new generation of networking technology should be developed to connect digital products in a flexible manner, able to handle any audio and control signals in an efficient system operation," adds Akase.

A major player in networked audio is Richard Zwiebel of Peak Audio (Boulder, Colo.), which has developed products such as Peavey's breakthrough Media Matrix system, as well as created the Cobranet protocol adopted by numerous manufacturers. From a technology standpoint, the future for networking is bright, according to Zwiebel. "With 100-megabit Ethernet hubs, there was a finite bandwidth. But now we're working on the next generation of things using switched Ethernet. What we're doing is gigabit Ethernet between the switch, and from the switches out, using 100-megabit. Basically, once you get to that place, there's no limitation on the size of the network.

"Gigabit Ethernet allows us to put thousands of channels of audio around a place such as a theme park," he continues. "The technology that we base our technologies on comes from the computer industry—we could never afford to do that in our little old audio industry. The fact that Ethernet computer networks are going to switched, and the cost

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of the switches are now dropping to where they'll be like hubs pretty soon, means we can do a lot of things that a year ago were just impossible.

"Right now, I'm a consultant on a huge project for the U.S. Congress," Zwiebel continues. "It's the House of Representatives chamber, and also upwards of 100 hearing rooms, and every one of those has its own audio system. We're developing a big network to tie the whole place together, so from one centralized location, a computer will be constantly polling every system, whether it's in use or not. We're using Media Matrix and amps that have control systems. But, regardless of whose product you use, you'll be able to centrally monitor all the pieces, see if there's anything going bad or any fault or anything, all the way out to actually measuring the impedance as such on the speaker lines to see if there's any speaker failures. Then it would alert somebody who's centrally located, monitoring systems over an area of miles. And using an audio network, if there is a problem, you'll be able to take control of it and actually listen to what's going on in the room, without leaving the central location. We'll also have one spare system there online, with all the presets for every room loaded into it. So if something should go bad, you can just automatically substitute the one you have right there centrally for any other system in the whole facility. That's the direction where technology's going."

At the same time, we need to be aware of the dangers of becoming overtechnologized, where we begin spec'ing systems based on their coolness, rather than for practical considera-

XwireVISION

In the future we see local and remote production facilities of all sizes using wireless audio transmission for a host of applications, including the distribution of multiple channels of audio for production applications. A digital wireless snake is something engineers dream of today, and we see it becoming a reality in the near future. Some day, consultants will have the option to spec digital wireless in situations that formerly required cable, materials and labor, thus cutting costs and time for themselves and their clients. There's going to be some incredible digital wireless products in the future, especially with components and power sources becoming smaller and more powerful.

—Jamie Scott, VP of marketing and sales, Xwire

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NEW AUDIO FORMATS

Top: Renowned producers at StudioPro98 (L-R): Ed Cherney, George Massenburg, moderator David Schwartz, Nile Rodgers, Tommy LiPuma, Barry Beckett. Above: Mel Lambert introduces the panel on modular digital multitracks, moderated by *Mix* editor George Petersen.

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tions. Does a typical elementary school auditorium really need a network-switched, modem-controlled system with 40 channels of wireless mics and six delay towers, when two hard-wired mics, a P.A. head and a couple two-way speakers would do?

This trend is definitely of concern to John Meyer: "In the last 20 years, the industry has gained some professionality in the audio trade," Meyer warns, "and this is one of the things I really worry about. When I started in the 1970s, there was about a 50 percent chance of finishing the show with problems and things blowing up, and everybody was used to that. We are more respected now. We put on more consistent, better shows. Networking and DSPs can bring us back to when we first got involved with transistor amplifiers, when shows didn't finish and we were making excuses. No one in the audience is going to forgive us if we say we didn't understand how complicated networking was. What is our goal? We're not trying to put an Ethernet together, we're here to put on shows."

One of the problems with networked audio control is the learning curve involved in using products from different manufacturers. Under the auspices of simpler-is-better, Zwiebel has begun developing a solution that would appeal to all audio users. "We're working now with a number of companies in developing a Web-based interface to all these various products," Zwiebel says. "They'll all be using a standard protocol like SNMP or something, so if you're familiar with using a Web browser, you'll be able to just go look at a link and click on 'I need to go to QSC control, or a Peavey this, or a Crown that,' or whatever. It'll open up just like a Web page, but you'll be able to have the controls and stuff inside that page. So if you know how to use a Web browser, you'll be able to get around your system. It's a whole new trend in technology we're going to see."

EuphonixVISION

In predicting the future, "What is technologically possible?" is usually less meaningful than "What tools are needed to push the sonic envelope of music, film, television, computers and the Internet?". Artists with creative drive and consumer appetites for newer/bigger/better sound guarantee another decade of innovation. Just read through a Mix back issue from 1989 for a perspective on how fast it's evolving.

Our customers cry out for more channels, more tracks, more bits, more samples, more integration between picture and audio, and more integration between recording, editing and mixing. They want this to come in a form that is simple to understand and operate. Our future vision is focused on keeping the technology out of the way of the creative process. Too often, we've seen great technologies that weren't adopted because they didn't help make the production process better.

Sound is purest in its analog form, but digital audio lets you do things that analog can't. However, the path from microphone to recorder will be optimum in the analog domain for many more years. The tools that provide great sound with the minimum effort will be the ones we find on the pages of Mix in 2009.

—Scott Silvfast, President, Euphonix

DSP Integration

But no matter what system, from a simple car-trunk P.A. for a wedding band to a huge, megabuck touring system, the integration of DSP into the sound reinforcement chain offers numerous advantages, but so far we've only touched on the possibilities.

"Now that we have tremendous electronics processing capability with DSP, and with more reliable electronic circuitry that can handle the abuses of portable applications and harsh environments, we have the chance to integrate much more fully what's going on with the transducers," says JBL's Gander. "This includes fully developing the capabilities of modern materials, whether it's carbon-fiber enclosures, exotic diaphragm materials, or new types of flat panel or ribbon transducers. And through the digital control and digital modification, we can extract the maximum performance from those devices—and actually overcome even more fundamental limitations than materials limitations, such as the fundamental nonlinearity of air."

Such developments would certainly have to go far beyond the delay and filtering capabilities typically associated with DSP use today, so are we really just on the cusp of intensive DSP control in loudspeaker systems? "Absolutely," Gander says. "In fact, most of the digital products on the market right now in terms of electronics products are really just simulating the previous analog models in terms of duplicating the classic Butterworth or Linkwitz-Riley crossover slopes, and just doing the delay. The real future is to change over into FIR [Finite Impulse Response] filtering. The classic IIR [Infinite Impulse Response] filtering is part of the mathematics of how we do digital filtering, digital crossovers and implement digital circuitry. But FIR filtering allows you to manipulate the amplitude completely separate from the phase, so we could have infinite slope crossovers that have no phase distortion, for instance. So we're just now at the point where the digital processing is cheap enough to be able to implement those type of filters, which require more processing power.

"Even with systems that right now seem very sophisticated, like the Peavey Media Matrix or the BSS Sound Web," Gander predicts, "the next generation will be able to compensate for distortions and reduce distortions not necessarily that are left over in the speakers—though they can be reduced as well—but will handle problems like combinations of many sources coming to an individual listener or air nonlinearity. Then the next step is beam steering and control of the directivity from multi-

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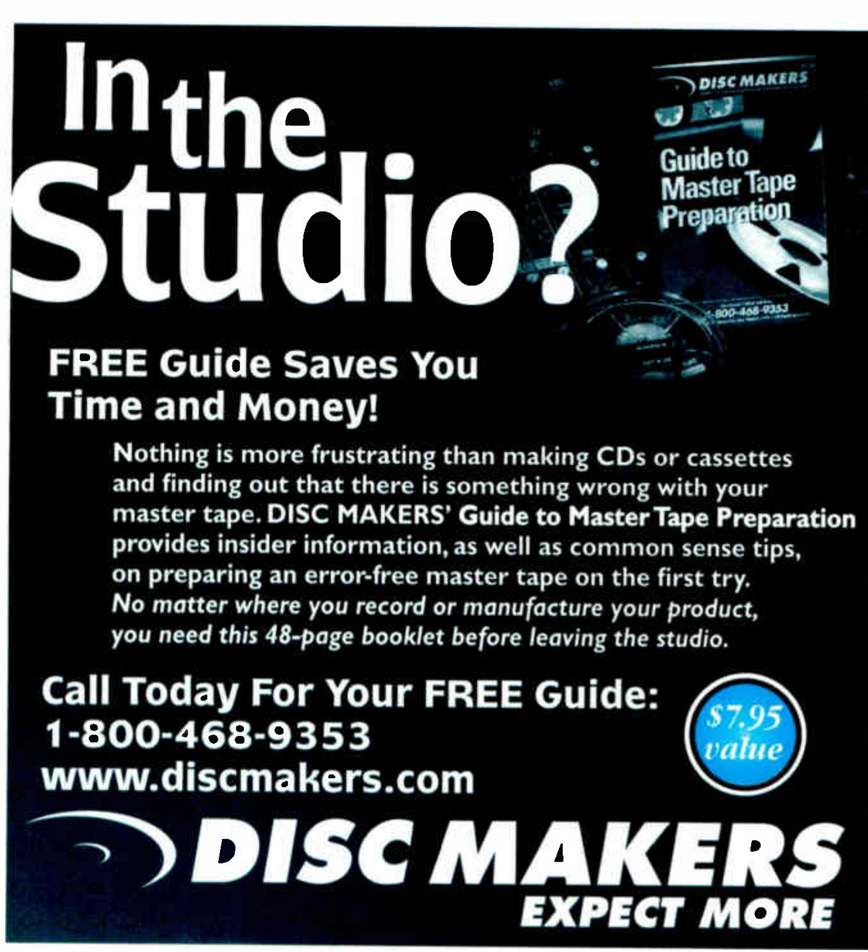

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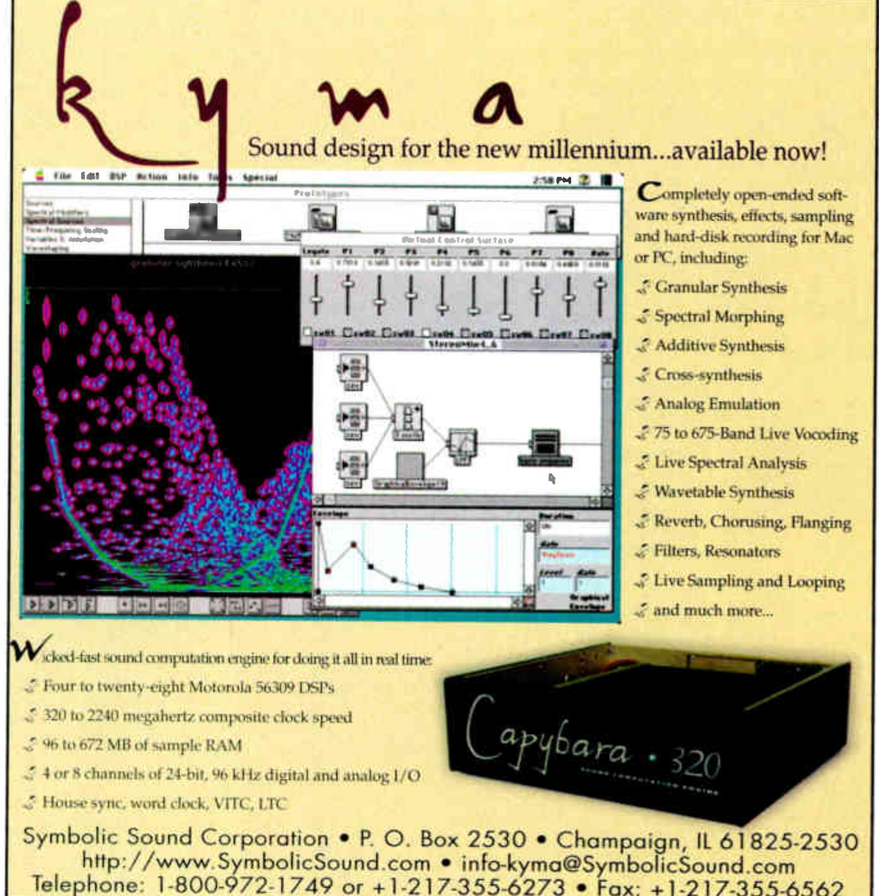

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ple loudspeaker sources. It could send the sound only to where the people are sitting—not up to the ceiling or bouncing around the room and causing time-delay problems and difficulties in intelligibility and quality."

On the other hand, providing too much control—especially of previously hidden DSP parameters, can have an adverse effect. "I look at the whole DSP thing like a car, where you have the controls that run the car, and then you have all the stuff that's inside the engine, the carburetor, etc.," Meyer says. "The audio world, seeing DSP coming along, suddenly thinks all these controls that were once hidden should be on the dashboard. Now, an FOH engineer doesn't generally need to know how to disassemble a console, and someone who drives a car doesn't need to be involved with all the aspects of how the engine is run. Most of the time they can drive a car without knowing how the carburetor works or without knowing how the timing works. I think it's a mistake that just because we're going to DSP that suddenly all these parameters should just appear on your laptop along with everything else—crossovers, all this kind of stuff. You want to have operators operate the system and technical people to go inside to work on the system. It's two completely different functions.

"The whole audio trade is getting dazzled by the technology, and we forget our goal," Meyer laments. "Fiber optics and DSP are not the goal—just a method of trying to achieve the goal. We only have one thing to do and that's try to get a sound into the audience so it can be heard, clear as possible." ■

Mix editor George Petersen lives with his wife and an interactive rottweiler in a 114-year old Victorian house on an island in San Francisco Bay.

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2001: A LIVE SOUND ODYSSEY

by Mark Frink

I stood in line outside *Mix* editor George Petersen's inner sanctum to wait my turn to use the latest in prediction technology. Code-named Crystal Ball, the device leased from a private Redmond, Wash., consortium uses a small warp-field generator to create a time-flux around *Mix*'s editorial server, allowing us to look at future issues of the magazine before they are written. As I waited, I thought back on the development of our young sound reinforcement industry, homegrown from a patchwork of

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Photograph by Steve Jennings

devices borrowed from movie theaters, radio stations and recording studios: The live entertainment industry we know was created by musicians, inventors and tinkerers who adapted the necessary technology from bordering disciplines.

With the end of the century upon us, it's time to gaze into that Crystal Ball to try to see how new technologies are going to change the tools we've developed for live sound. One thought immediately occurs to me: Although digital audio production has arrived in recording, cinema and broadcast facilities, it is not taking over live sound. Not yet, anyway. But I'm going to walk out on that tongue-in-cheek limb and say that digital is coming.

THE FUTURE IS DIGITAL.

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Actually, digital technology has been seeping into the industry for years by way of application-specific products. First came digital delays, then reverbs, speaker processors, snakes and small-format mixers. Each application area has seen digital products dominate, once they've proven themselves, by offering better functionality than comparable analog products. However, to justify the costs associated with changing over to all-digital systems, the gear will eventually have to pay for itself. A new product, in any industry, can establish itself only by demonstrating a clear price-performance advantage, and the use of technology for its own sake is something only a handful of projects can afford (and something most live engineers avoid like the plague because they know that low serial numbers carry extra risks). Most engineers choose equipment because it fits their needs, regardless of whether a unit is analog or digital.

So, there are issues and there are obstacles, but the all-digital system is coming bit by bit, and in *Audio 2000* we have a chance to guess what that system might look like.

CONSOLES AND CONTROL SURFACES

Cruising the floor of the 1998 AES convention, it was obvious that digital consoles are now established in non-live applications. In addition to offering the ability to instantly recall the configuration and settings of a particular project, the development of these boards acknowledges that the final product will be digital information, and by working in that domain, attempts to maintain the integrity of the music. Though they are not often used for live sound outside of remote recording and broadcast applications, there are many large-format digital consoles now available. With six-figure price tags, these must replace several other desks or an entire remote truck to pay for themselves (which they can do on very large projects). They must also be accepted by the engineers who operate them.

An engineer's expectations about sound system operation for live shows is based largely on experience, the tried-and-true. The layout of large-format sound reinforcement consoles did not suddenly appear, but evolved into the popular topologies currently in use, and so mixing with a mouse is neither intuitive nor familiar to many live sound professionals. Designers of new consoles must accept the built-in bias for intuitive control surface layouts that are comfortable and easy to use. We expect a one-for-one representation of a fader for each input, with dedicated knobs and switches above each for all possible functions. Typically, we only make adjustments one at a time, but the comfort we get from being able to put a hand on a particular control instantly because it is in a fixed location on the control surface is important, and one of the positives that analog consoles have in common.

Designers of new consoles must accept live sound engineers' built-in bias for control surface layouts that are intuitive and easy to use. Possible future digital consoles might have a flat-panel touch-screen (or a number of them tiled together), depicting familiar rows of faders and knobs.

Possible future digital consoles that are easy to imagine have a flat-panel touchscreen (or a number of them tiled together), depicting familiar rows of faders and knobs that are operated by simply touching them. We have already seen that the first step is a control surface with mechanical faders, knobs and switches behaving much as their analog counterparts. By re-mapping the controls of a short console, an almost unlimited number of channels can be accommodated on a relatively small control surface. Think vertically, in layers, rather than horizontally.

Now that the Nintendo generation has graduated from college, it won't be long before they'll be mixing on PC-based systems using hand appliances that resemble game controllers, discarding rows of physical controls in favor of graphic displays on monitors that can be customized for particular users and specific tasks. Designers of successful digital mixers for live sound might incorporate the same dual-control approach employed in other product categories for live sound, using a physical panel with familiar controls to put operators at ease, plus a PC-based controller for editing the entire range of parameters from a computer screen. A familiar control panel's row of faders and knobs becomes the bridge between an analog console's control surface and a software-based control interface.

A digital control surface offers the flexibility of paged or windowed instrumentation layouts, with handles and switches mapped to control parameters specific to various tasks. But object-oriented control is only the beginning.

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The use of technology for its own sake is something only a handful of projects can afford, and something most live engineers avoid like the plague because they know that low serial numbers carry extra risks.

2001 A LIVE SOUND ODYSSEY

Beyond this is the potential for digital consoles to incorporate expert systems that can take over the more mundane tasks of mixing, freeing us to listen to the music and watch the stage—all from a choice seat because the controls have been shrunken and fitted into a small cockpit that can be situated anywhere there's an open seat, after the large slab of faders and knobs is left behind.

THE DIGITAL INFRASTRUCTURE

But talking about digital consoles and control for FOH and monitor mixing is jumping the gun a bit. The first step in all-digital production for live sound is the obvious marriage of remote mic pre's and digital converters in multichannel formats. More benefits can be realized when signals are converted from analog as early as possible and then manipulated as a stream of ones and zeros all the way through to delivery at the speakers. There's a parallel in that we have seen a proliferation of mic preamps taking residence at the stage, as well as active splitter systems. This acknowledges the advantage of taking relatively weak input signals and raising their levels near the source before splitting and sending them over long snake lines.

Remote-control microphone preamps that can be monitored and adjusted from the mix position provide a front-end solution to systems with a digital backbone. Like MDMs and high-quality A-to-D converters (and everything else audio), these are available in 8-channel formats. The industry has already seen the marriage of preamps and digital converters in multichannel products that live in the head end of fiber-optic snakes. It's also easy to imagine A-to-D converters purpose-designed for amp racks to have presets to pick up and onboard-process groups of eight channels from the digital return snake.

But, once the signal is sent, there is a burning need for a format of multichannel transmission of digital signals from one manufacturer's box to another's. This digital cross-manufacturer interoperability is a Holy Grail that has seemingly eluded our corner of the industry. Though groups of manufacturers agree on recommended practices, there is no MIDI counterpart in the live sound world.

We are also in need of an inexpensive digital infrastructure—copper cable to use in place of fiber optics, along with a common multichannel format that can be shared by manufacturers to ship digital audio around. We have several candidates for each right now, using copper and high data speeds to accommodate more than 50 channels on one wire.

While fiber-optic technology has revolutionized large-scale distribution of digital audio, shorter distances can be managed using the inexpensive Category Five (cat5) cabling used in present-day computer networks. In layman's terms, cat5 wire is simply a 4-pair Unshielded Twisted Pair (UTP) cable, seen in modern offices cabled to each desk's computer. The terminations are RJ-45 connectors,

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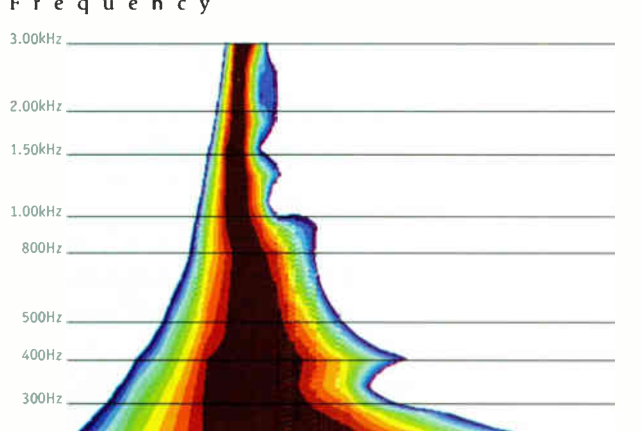

This wavelet image indicates amplitude in color (brown represents 0 dB, violet represents -12 dB) over time (horizontal axis) by frequency (vertical axis). The smooth, steep, tightly-packed slope through the upper midrange clearly shows the unified arrivals of critical vocal intelligibility information.

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similar to telephone jacks but with twice as many wires. The plastic connectors cost only pennies, and 1,000 feet of wire costs well under $100. Another type in use with large-format digital systems can ship 56 channels over 75-ohm coaxial cable for up to 100 meters. Independent of specific technology loyalties, it's easy to see how cabling a P.A. using relatively inexpensive computer network hardware and copper wire is attractive. Money saved could be used to pay for high-quality converters that are the on-ramps to the digital freeway.

The first step in all-digital production for live sound is the obvious marriage of remote mic pre's and digital converters in multichannel formats.

POSSIBILITIES—FROM MICS TO ARRAYS

What are the full benefits of a digital system? The potential for analyzing and processing signals—digital data—offers opportunities we can only begin to imagine. With the advent of inexpensive PC-based FFT analysis, powerful tools have been placed in the hands of live sound engineers who before had to rely on analog RTA tools. When all signals are digitized, we can further refine our ability to optimize the performance of the transducers at either end of the signal chain, "where the rubber meets the road."

For instance, individual microphones could be preprocessed to make them behave more like ideal input sources. All similar mics could be pre-EQ'd to target curves so that soundcheck would start by realizing the grand assumption that matching models of mics sound identical. The same mic might be used like a 57 one moment and like a 451 the next. Another example would be microphones that could double as inputs and analysis points, where a vocal mic could also be processed to identify frequencies that are about to feed back.

On the speaker side, individual components could be QC'd to an ideal spec. Arrays constructed from individual enclosures could be steered, tuned and tweaked driver by driver to provide optimal coverage. Distributed systems could be automatically synchronized once their distribution is digitally based.

And mixing itself will change radically, far beyond the simple pleasures of automation. How about delay-based as opposed to level-based panning? Inserts and outboard processing will become plug-ins and onboard DSP engines. You may even see the day when a mix engineer could telecommute and phone it in from home.

Where will this all lead? When word processors first began to replace typewriters, they were cumbersome, expensive and did little more than an IBM Selectric. PCs, however, offered really expanded functionality. Copying and pasting were some of the first time-savers. How often have you copied graphic or parametric EQ settings from one channel to another? How about the ability to open a copy of a previous gig with the same band, or a similar band in the same room? The point is, the range of operations in any digital environment exceeds what was previously possible with analog, as processing becomes more powerful and software develops.

Manual procedures that are repeated can be stored as automated routines or "macros." Eventually, processing power

What About the Sound?

While we're envisioning all the benefits to the user of an all-digital live sound system, we can't forget the sound. There's been much justified criticism of "CD-quality sound," that marketing catch-phrase that has invaded the consumer electronics industry. The dynamic range and frequency response of digital are widely considered inferior for live music (though many engineers probably haven't heard digital sound using high-quality converters).

Can we live with the limitations of digital sound? The fact is, in most larger systems we already do, in a processor between the mixer and the amps. Time-based processing requires A-to-D conversion, and most large live systems already have digital processors at some point in the signal chain, whether there's a simple alignment delay or more extensive DSP for further speaker control.

There are a lot of misconceptions about digital, too. One assumption is that digital equipment has inherent distortions that increase edginess and harshness. In fact, harsh digital sound can usually be traced to sharp filters, poor conversion, low resolution, truncated word-length, poor analog stages, jitter, improper dithering, clock leakage in analog stages and all manner of poor circuit design. And not all products sound the same, of course. Somewhere between the consumer's 16/44.1 and the mastering engineer's 24/96 is a compromise of word length and sampling rate that, when used with well-designed digital products, is good enough for live sound.

Even though we see continually improving speed and resolution, as well as falling prices, in digital technology, there are few shortcuts to quality. If the move to digital systems forces us to examine sound quality, we may wind up ahead. —*Mark Frink*

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can include intelligent agents that can automate mundane decisions based on information about the operator's preferences. It's hard to imagine the range of functionality of future digital consoles. Who'd ever have thought you'd be able to dictate to a word processor? We can similarly expect audio diagnostics to be incorporated into future generations of digital products for live sound.

SPECIALIZATION ENGINEERING—REINVENTING THE POT

Hey, it's not easy designing a flexible yet intuitive control surface for an emerging technology. Many current products were developed by teams of specialists. At one extreme, we have consoles that attempt digital approximations of analog desks, while at the other end there are creations that barely even make the analog analogy. Declining prices for flat-screen displays and other PC peripherals will offer designers of digital consoles new possibilities.

Pro audio equipment manufacturers have always borrowed technology from adjacent industries to provide affordable solutions to the relatively small live sound market. Now, there is a growing sense that all of us in audio will eventually be working in the computer industry.

Software engineers will no doubt determine the course, even the structure, of PC-based digital live sound systems. In the computer world, hardware quickly takes form after just a few sales, with scarce revisions, but new operating systems can be downloaded over a modem. The ability of design teams to refine software in subsequent versions means that input from end-users is incorporated into products in ways that weren't possible when audio instrumentation was all hardware-based. So, the physical look and feel of instrumentation will no longer be fixed in the first release of a console. The ability to customize controls and operation will also mean job security for software engineers, and the lessons learned by developers of PC-based mixing systems for other markets will translate into powerful new live sound products.

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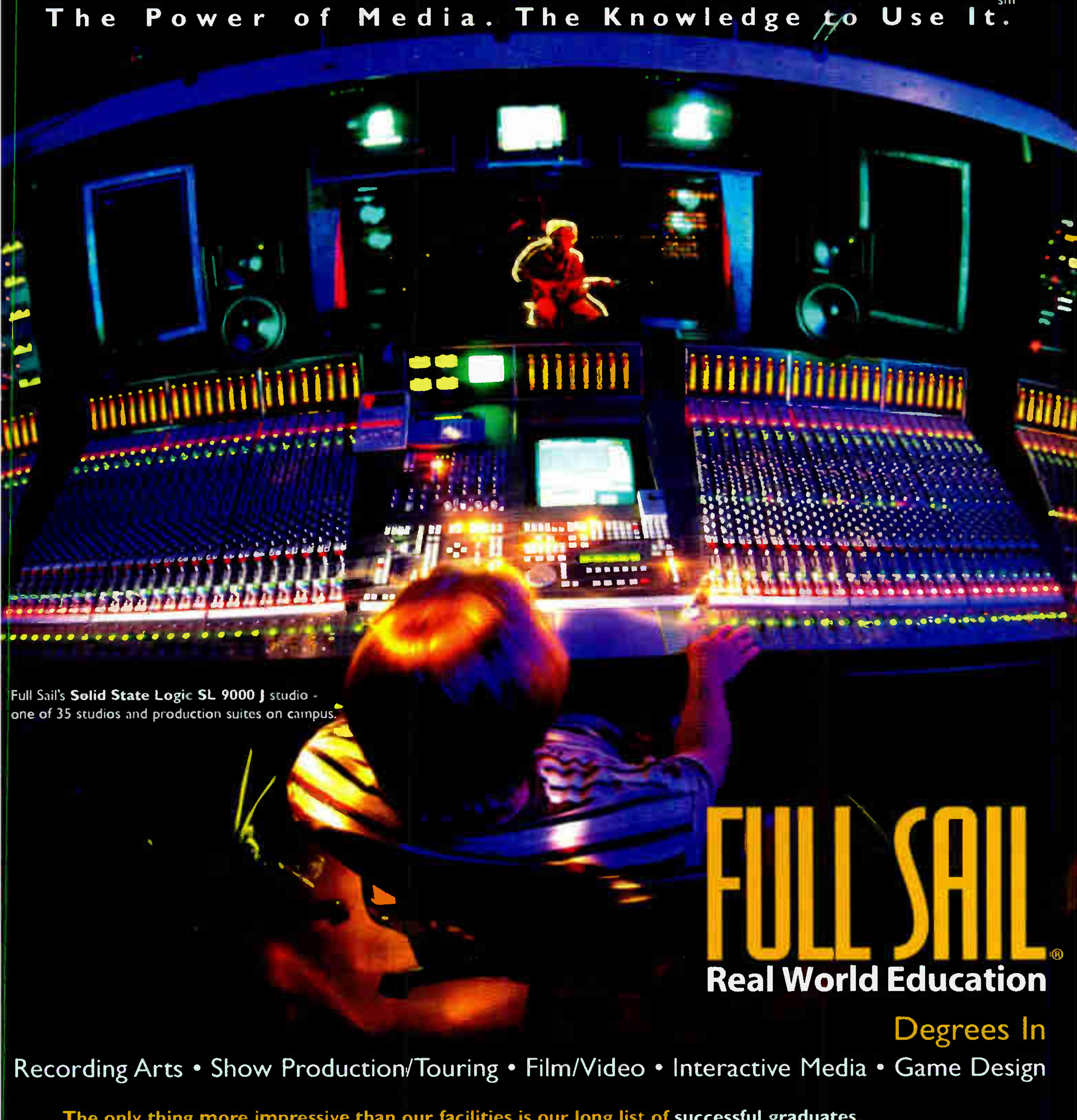

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2001 A LIVE SOUND ODYSSEY

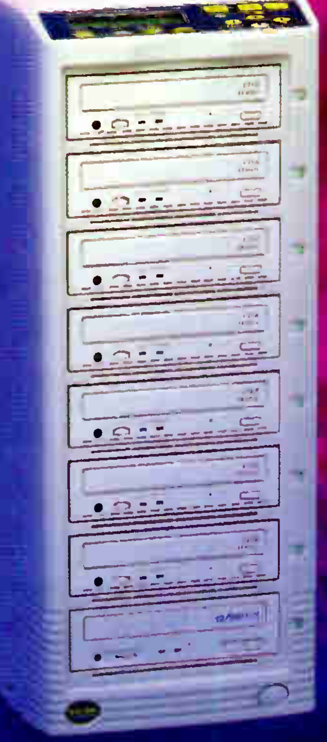
All the little extras on our computers that we take for granted can eventually be incorporated into our digital audio work environment. Colors, fonts, icons, objects and windows will be adjustable, allowing us each to customize a portable work environment. Would we like pastel Star Trek touchscreen displays, or are we biased toward our old mechanical pots and faders? I'm guessing that early successes can be expected of digital consoles that replicate analog desks with fairly fully mapped controls and onboard converters; these are the products that will gain acceptance more easily from users and rental clients replacing analog desks in the first round. Further on, the separation of processing and control will create a slab of moving faders with a few virtual strips remotely located from a powerful digital audio computer. One future live sound mixer might be a processor rack that sits under the stage that is connected by a network to workstations onstage and in the audience; it would look like a notebook computer with a few appliances attached.

For now, no one's turning down analog large-format consoles, but you shouldn't let that keep you from getting to know your portable computer better. Once the conversion and processing start living in the amp rack and the stage-box, it won't be long before you find the new kids mixing on their laptops. Ready or not, you're likely to find yourself mixing on a digital live sound system sooner than you think.

We have already glimpsed the future and it looks like Star Trek. Think about it. The most coherent vision of a possible future is already in nightly syndication. It's no surprise that the control rooms of successful studios have begun to resemble the bridge of the Enterprise. Anyone who has seen the Star Trek Experience at the Las Vegas Hilton understands that a design bias for the control surfaces of future instrumentation already exists. "Engage!" ■

Mark Frink is Mix's Sound Reinforcement editor.

World Radio History



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With Mark of the Unicorn's 2408, you get up to 24 simultaneous digital inputs and outputs, 8 channels of analog I/O and as many tracks as your computer allows, 16-bit recording (expandable to 24-bit), digital I/O to connect with ADAT, DA-88 and S/PDIF and much more, all for under $1,000! It even works as a stand alone translator between ADAT, TDIF and analog. Connect up to three 2408s for 72 inputs and outputs! Works with your choice of Mac or Windows computers and a wide variety of music software including MOTU's award winning Digital Performer sequencing/recording package. Cut, copy and paste any portion of your performance for unsurpassed editing ease. Just add the 2408 and your home computer rocks! It becomes a professional digital audio workstation with power far beyond limited tape-based or stand-alone systems.

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but because they haven't registered their mics, the FCC doesn't see them as a force to have to deal with. Also, unlike the other industries, there is no united lobbying front for the wireless mic industry."

Problems associated with unregistered wireless mics are greater with touring sound and production companies. Licenses need to be modified for every location. For many, that's just not practical. Users who stay in one geographical area know the drill: Fill out FCC form 600, check with a local frequency coordinator and wait for the FCC to grant your application.

Nady says what happens in the next five years will take place in an indeterminate rate, depending on variables that are not yet fully known. "The FCC has a very thorough Web page. If you're on the road, you can download the frequencies for the next city and plan ahead to deal with the issue. That means backup systems on other bands will be necessary to ensure uncompromised interference-free operation in all locales. Some of the spectrum around 800 MHz will be increasingly less usable. Shure, Samson and Nady among others are still supplying units around 800 MHz. Even our NADY 802, one of the lowest-cost units, has two frequencies available, in eight groups of two frequencies each between 794 and 806 MHz. Those units at 794 to 806 MHz may have five or six years of shelf life, but in certain locations, there will be problems, which is why we'll soon be introducing added frequencies in the 700 to 760MHz range. Even with the new frequencies taken by DTV, many of the channels between channels 50 and 60 [490MHz to 746MHz] will be available."

The complex greater San Francisco Bay Area, including San Jose and Santa Rosa, offers, possibly, a worst-case scenario. According to Nady, if each of San Francisco's 23 TV stations (eight VHF and 15 UHF) gets a DTV license, 46 stations will be on the air, leaving only 15 channels open between 174 and 746 MHz. However, Nady points out that the 950MHz band is still viable for analog UHF wireless. And, despite the widescale abandonment of the VHF band for UHF over the last few years, Nady says VHF wireless may not have been as bad as reported.

"Part of the switch to UHF was market-driven. There was nothing really wrong with VHF. The UHF spectrum was more open, but VHF wireless from most

DTV Table of Allotments for Ten Major U.S. Cities

CITY	NTSC	DTV	MHz
Atlanta	2	39	620-626
	5	27	548-554
	11	10	192-198
	17	20	506-512
	30	21	512-518
	36	25	536-542
	46	19	500-506
	57	38	614-620
	69	43	644-650
Boston	2	19	500-506
	4	30	566-572
	5	20	506-512
	7	42	638-644
	25	31	572-578
	38	39	620-626
	44	43	644-650
	68	32	578-584
Chicago	2	3	60-66
	5	29	560-566
	7	52	698-704
	9	19	500-506
	11	47	668-674
	20	21	512-518
	26	27	548-554
	32	31	572-578
	38	43	644-650
	44	45	656-662
Dallas	4	35	596-602
	8	9	186-192
	13	14	470-476
	27	36	602-608
	33	32	578-584
	39	40	626-632
	58	45	656-662
Detroit	2	58	734-740
	4	45	656-662
	7	41	632-638
	20	21	512-518
	50	14	470-476
	56	43	644-650
	62	44	650-656
Los Angeles	2	60	746-752
	4	36	602-608
	5	68	794-800
	7	8	180-186
	9	43	644-650
	11	65	776-782
	13	66	782-788
	22	42	638-644
	28	59	740-746
	34	35	596-602
	58	41	632-638
New York City	2	56	722-728
	4	28	554-560
	5	44	650-656
	7	45	656-662
	11	33	584-590
	25	24	530-536
	31	30	566-572
Philadelphia	3	26	542-548
	6	64	770-776
	10	67	788-794
	17	54	710-716
	26	42	638-644
	35	34	590-596
	57	32	578-584
San Francisco	4	57	728-734
	5	28	554-560
	7	24	530-536
	9	34	590-596
	14	29	560-566
	20	19	500-506
	26	27	548-554
	32	33	584-590
	38	39	620-626
	44	45	656-662
Washington	4	48	674-682
	5	6	82-88
	7	39	620-626
	9	34	590-596
	20	35	596-602
	26	27	548-554
	32	33	584-590
	50	51	692-698

A complete listing of NTSC and DTV frequency allotments for every U.S. city may be found in the FCC document 6th Report and Order on MM Docket No. 87-268; FCC 97-115, which is downloadable from the FCC Web page at www.fcc.gov/dtv. Note: all information is subject to change.

*Most wireless mic manufacturers have developed resources, charts or tables for dealing with their products in specific locations. Sennheiser USA (www.sennheiserusa.com) has created a comprehensive table of products and frequencies, searchable by city and by international destination. So, if your tour or production brings you to Dallas, for instance, you can head off potential problems by typing in "Dallas" and outputting the frequencies in use. *Mix* recommends that you call your mic manufacturer for specific details.

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DVD Location Disk Recorder (optionol)

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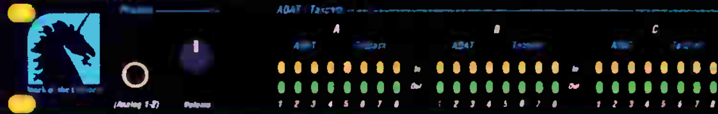
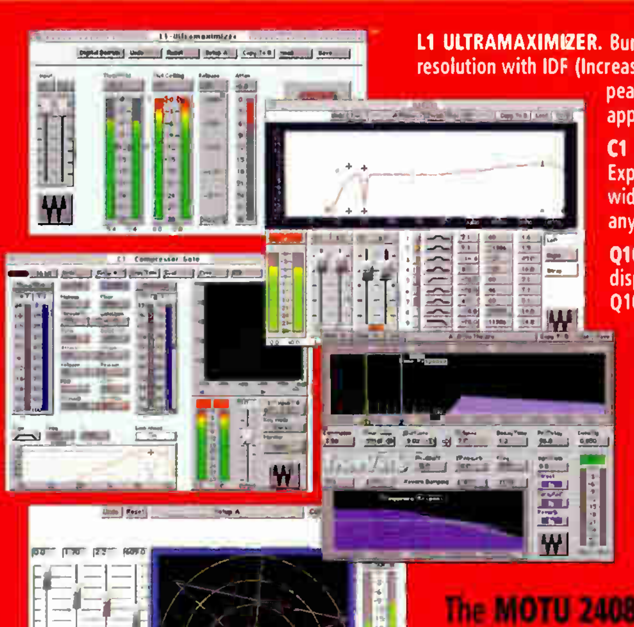
Start with a **Power Macintosh** or **G3** computer — more affordable and powerful than ever before, and still the world's best computer for professional MIDI and audio recording . Next, turn your Power Mac in to a true, pro quality audio workstation with the amazing new **2408 Hard Disk Recording System**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



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

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



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

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

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

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

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

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

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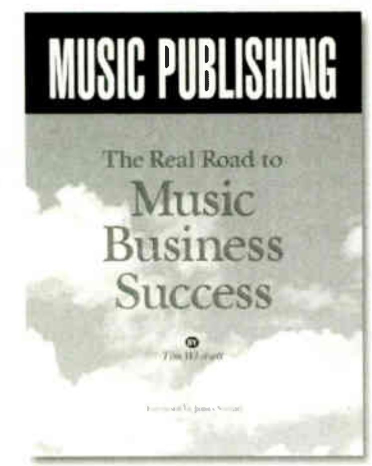
MUSIC PUBLISHING
The Real Road to Music Business Success

by Tim Whitsett



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Wireless

manufacturers is still superior to their UHF systems for signal to noise—maybe by as much as 10 to 15 dB. VHF also has less transmitter battery drain."

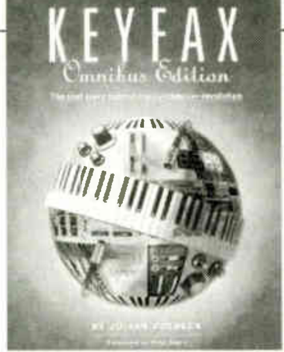
Short of coming together as an industry and pooling enough resources to win a bid in the upcoming spectrum auction, the only solution seems to be to do more with less and wait for more parts of the spectrum to be opened. Like many others, Nady is looking at solutions for the future. "We're working on a digital wireless in the 2.4GHz band. It's ISM (Industrial Scientific Medical); that means anybody can use it. 800MHz is available in Japan, so several competitors, including Samson, which is made in Japan, jumped into those first."

54 MHz has been assigned to Public Safety Radio service. It may come down to a $25,000 fine by the FCC for the local church if their sound system interferes with the local fire company.
—Bill Mayhew

With 20 TV stations already on the air in New York and L.A. (not counting any peripheral signals that get into those markets) and 20 DTV stations planned for each market, touring companies that have become reliant on a large number of wireless mics are going to have to ask themselves one question: "Do ya feel lucky? Well do ya, punk?" ■

Ty Ford's commercial and narration demos are available at http://www.jaguNET.com/~tford. He has also just uploaded an upgraded list of copyrighted mic/mic preamp reviews and a new list of production music and SFX libraries.

THE KEYFAX OMNIBUS EDITION IS A BUYERS GUIDE LIKE NO OTHER!



FOREWORD BY PETE SEARS

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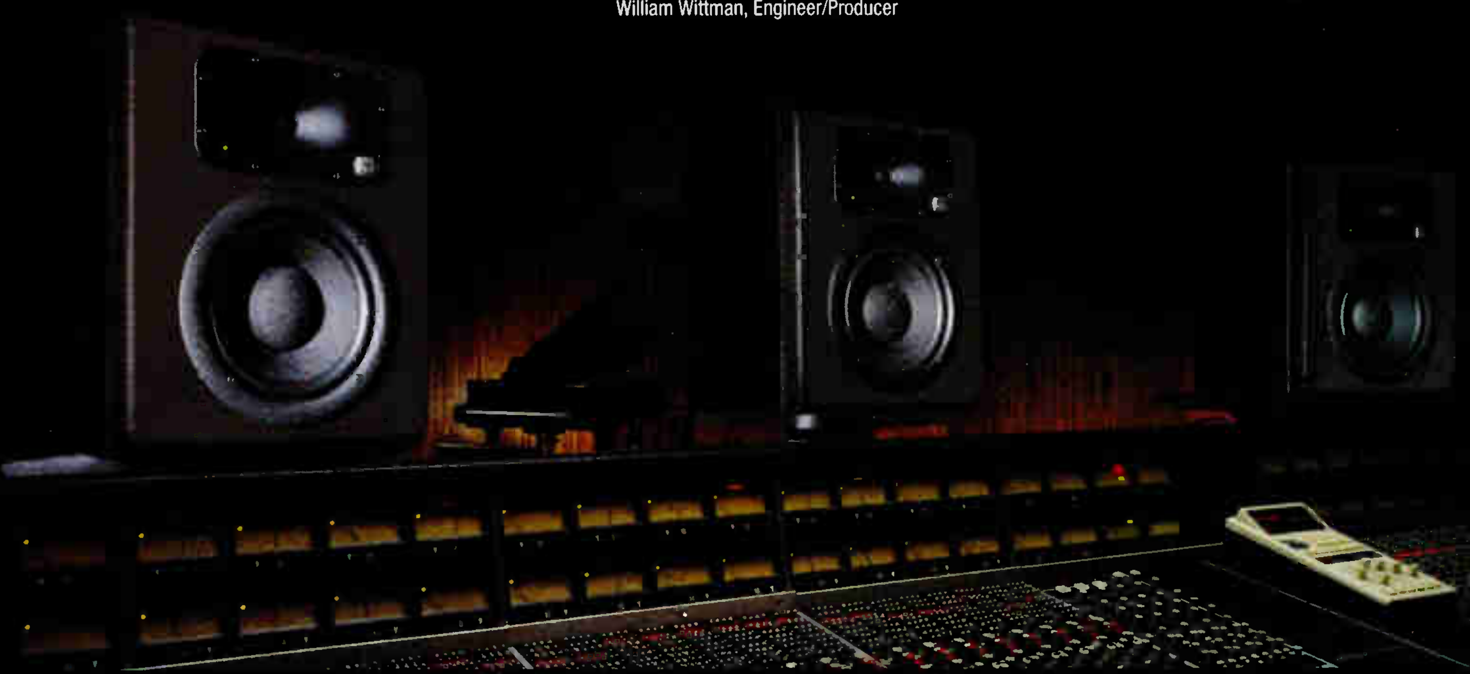
"When A $2,000 System Sounds As Good As A $50,000 System, I'd Say They Got It Right."

William Wittman, Engineer/Producer



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Revolutionary transducer designs, optimized network topologies and innovative materials are some of the reasons why the LSR line is being hailed as 'the world's most advanced monitor'. JBL's all-new ***Differential Drive***® woofer permanently dispels the notion that better linearity, higher power handling and greater dynamic accuracy are somehow an unobtainable, evil triangle. ***Dynamic braking*** produces truly accurate bass at higher SPL's with maximum reliability. Composite materials, including ***Carbon Fiber*** in the woofer as well as ***Titanium*** and ***Kevlar***® in the high and mid frequency components, insures performance that is always optimally maintained.

Not Just A Better Spec... A Better Monitoring System

While all companies boast about their specifications, JBL went one step further. To guarantee that every component of the LSR family worked together for optimal performance, LSR development employed JBL's unique 'system-engineered' design philosophy. Simply put: the entire line was researched and refined as one, with an overall performance goal in sight. What this means to you is a monitor and subwoofer that work together as a system; delivering stunningly uniform and accurate performance in both stereo and multi-channel applications.

LSR 32
12" 3-way mid-field monitor with rotatable Mid/High Elements.

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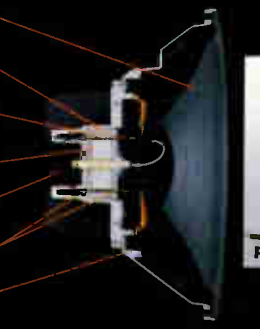

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