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The Pro Audio Applications Magazine

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■ INTERVIEW: ORRIN KEEPNEWS

■ SOUND REINFORCEMENT: "THE WALL"





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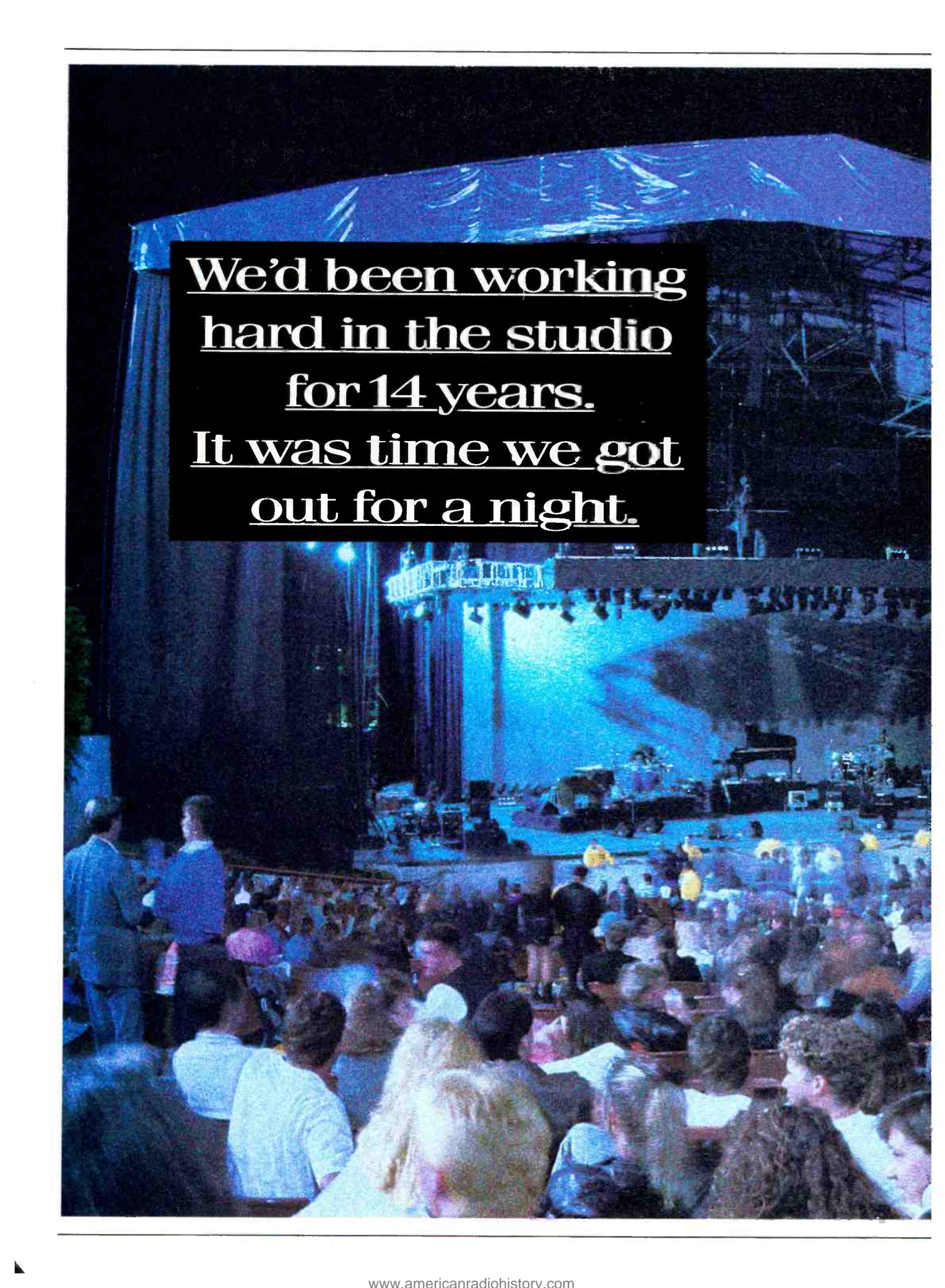
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Art direction by Liz Veternick.  
Photo by Bruce Bandle.  
Microphones supplied by Audio-Technica, Beyerdynamic, Bruel & Kjaer, Shure Bros. and Sony.

R•E•P: Recording•Engineering•Production (ISSN 0034-1673) is published monthly by Intertec Publishing Corporation, 9221 Quivira, Overland Park, KS 66215. Subscriptions rates are \$26 to qualified readers, \$30 to non-qualified readers per year in the United States, \$50 for qualified and \$60 for non-qualified per year outside the United States. Optional airmail for non-qualified readers outside the United States is also available for an additional \$55 per year. Foreign subscriptions are payable in U.S. funds only by bank check or money order. Adjustments necessitated by subscription termination at single copy rate. POSTMASTER: Send address changes to R•E•P: Recording•Engineering•Production P.O. Box 12960, Overland Park, KS 66212. Second-class postage paid at Shawnee Mission, KS 66202.

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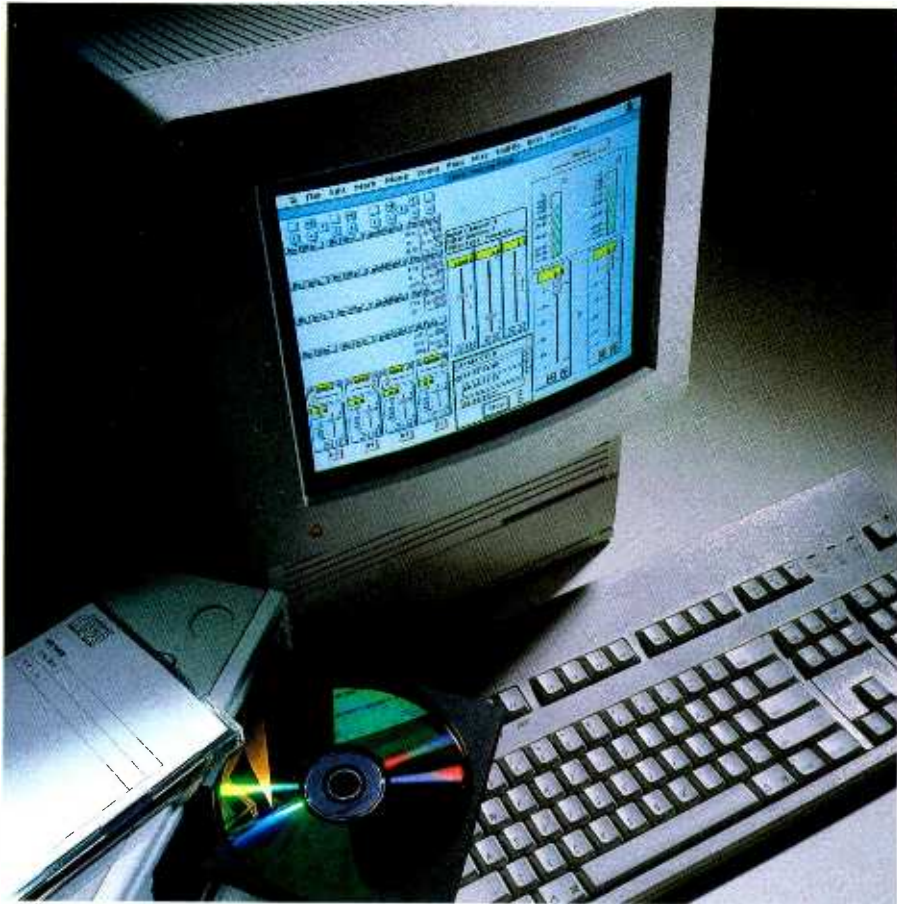
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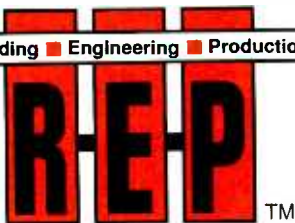
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# From the Top

## Economic Turmoil?

**Y**ou be the judge: What's wrong with this picture?

You're at the audio industry's major convention. As an audio journalist (I know, "audio journalist" is an oxymoron) you make the rounds of the industry's manufacturers.

"Well, Mr. Manufacturer, how has this year been?" you ask.

"Great year," he replies. "Sales have been really solid."

Always thinking of the tough questions (remember, you're an *audio journalist*), you ask, "What do you think about next year?"

"Man, I'm really worried," our friend says. "With the economy and this Middle East thing, it could be a bad year."

What's this? Bad feelings in the sunny audio industry? The aisles were full of it at September's AES Convention. In what has normally been thought of as a recession-proof industry, the feeling this time around is that we may not be as lucky.

There's no unified opinion, of course. It's hard to get people in the audio industry to agree on breakfast, let alone something as complicated as the economy. As Wynne Smith's story in this month's Random Access shows, a lot of people are apprehensive about the economy's future performance, but opinion varies about its effects.

For this industry, you have to look at the issue on two levels. On one level, you have the facilities, which are supplying audio services for the end-products of the entertainment business — records, movies, videos, TV shows, jingles, live performance. Sales of these items have traditionally been recession-proof.

However, consumer tastes have changed. During the last recession, in 1981-82, VCR penetration was not as deep as it is today, the compact disc was just being introduced, and such innovations as pay-per-view didn't exist.

Today, it's cheaper to rent a video at Blockbuster Video for \$3 than to spend the 40 or 50 bucks it would cost in some areas of the country to take a family of four to a movie (popcorn and drinks included).

Punch in an Eagles reunion concert on PPV for the price of one ticket, and you can have as many people over as you want. Plus, you don't have to wear one of those age verification bracelets to drink beer.

Your average yuppie couple is as likely to unwind to VH-1 or their CD copy of Fleetwood Mac's "Rumours," that quintessential 1970s album (on which they know and love every song). They're not as likely to shell out \$15 for a CD from a new act, which may only have a couple of decent songs.

Of course, any facility heavily into advertising work will be directly affected by the amount of time bought in the broadcast media. Advertising is always the first casualty in an economic downturn.

Bottom line: The business will be there, but in a different form. Some facilities are going to do well; others aren't.

The second part of the equation is the manufacturers. In this product-driven business, it takes sales to drive the engine of innovation. What happens to equipment sales if interest rates get closer to 20% rather than 10%? Who will be able to afford to buy new equipment?

Tapeless audio systems, both stand-alone systems or plug-in cards, are a great example of the problem before us. The number of companies making these systems has exploded; there are at least 40 companies now jumping into the business. That's about a fourfold increase from only a year ago.

Technology marches on without much regard to interest rates or GNP, and tapeless recording is clearly an area where there is great interest. But you can't ignore economic conditions. If the economy sours, it is likely that facilities will buy systems later rather than sooner, which would be bad news for companies that need sales sooner.

How many of those 40 companies could wait for conditions to improve?

So what's the answer? The same as when economic times are good. Find your niche. Provide the best service you can.

Acquire equipment wisely, to fill a specific need. Equipment purchases should not be made from the heart in any economic time, much less during a recession. Think smart; your business will thank you for it.

**Dan Torchia**  
Editor

## DCE Update

From: Jon Bosaw, sales manager, Valley International, Franklin, TN.

We were very pleased with the review of the Valley International DCE Digital Compressor/Expander that appeared in the July issue. Rick Schwartz did an excellent job of covering all the features that the unit has to offer. I would like to clarify a few points that may help your readers better understand the philosophy behind the DCE.

Like most equipment designers, we are torn between including many "extra" functions on a device, and the cost and complexity that these functions might add. One such extra that Rick mentioned, multiple-format capability, is indeed useful, but adds greatly to unit expense. We do not wish to make the user pay for functions that he might not need; multiple-format interface may be accomplished using an add-on box. However, we will be including AES/EBU interface capabilities on our next generation of DCEs.

Because we feel the DCE is unlike any other dynamics processor, it is expected that the new user will require some time to become acquainted with all of its features. A luxury such as dedicated "analog-style" knobs to control a digital device with many parameters is not cost-effective. Since the functions of the DCE are determined by software, the unit may be reconfigured for functions such as de-essing or frequency-sensitive gating. This programmable feature also makes possible the creation of new dynamics processing functions that are precise and repeatable.

On the topic of 16-bit performance, the processing algorithms utilized in the DCE retain the maximum available number of significant digits by incorporating pseudo-floating-point multiplication. This minimizes the amount of digital truncation (digital noise) added to the signal.

With the DCE, the user has the capability to create and tailor the type of compressor that is needed, instead of being offered conventional compression modes and effects.

Thanks for the opportunity to clarify these points.

## More Time Code

From: James Barber, director, Visionary Communications, Punta Gorda Isles, FL.

In reply to Eric Wenocur's letter "Drop

Frame Time Code" in the July issue: 30fps DF time code is a variant that was created specifically for the purpose of filming music videos with time-coded playback tapes, to be edited on videotape. Some clever sleight-of-hand is needed to compensate for the 1% slowdown of the film, which normally occurs when it is transferred to videotape on a Rank or Bosch telecine.

The 30fps DF capability was added to the Nagra IV-STC to permit "cross-resolving" standard DF time code. The playback tape, which is made from the studio master and carries the same master time code, is played back on location during filming. With the Nagra IV-STC set to resolve at the artificial rate of 30fps, the playback is speeded up by 1%. This results in a cancellation of the 1% slowdown from telecine transfer, and ensures that the resultant footage will sync with the prerecorded studio tracks, which of course are used as the soundtrack of the video.

Other techniques for playback, such as using a DAT machine, will result in transferred footage that gradually drifts out of sync with the studio master tracks. However, if there are a lot of quick cuts, this won't necessarily be a problem. At a drift rate of 1%, a shot that begins in sync will be one frame out of sync in about 33 seconds. In rock videos, individual shots are rarely held for more than a fraction of that.

Nonetheless, cross-resolving the playback tape with the Nagra IV-STC remains the preferred method.

## Lip Syncing

From: Jack Poley, Indianapolis.

I found David Scheirman's "Live & Direct" column in August to be interesting and informative, and I offer one viable reason why lip-syncing should be revealed when concerts are staged: In this (as he suggested) very gloss-over and impatient world, it would be relatively easy to have non-singers and non-players syncing/acting to the music with sufficient skill, but in fact have no connection with the making of the music they were interacting with.

This would seem to carry the notion of lip-syncing to a fraudulent level, and one can envision a scenario inspired by the movie "Capricorn 1," where people on a stage are lip-syncing and dancing to someone else's music. Or, like Santa Claus im-

postors at Yuletide, we have Band X appearing at 10 different venues simultaneously. Which one is the real Band X? Is the New York version, like Broadway plays, always *the* one to see?

So, it is also necessary to assure the crowd that the personnel they see on the stage are truly the personnel who created the music. Pretty soon, we'll have hologram concerts, with user-definable player substitutions. Maybe we'll be able to suppress the singer whose part we'd like to lip-sync to (including a lip-transpose feature, of course).

With tongue-in-cheek and lip-in-sync.

## Opining on Opinions

From: Les Brockmann, Les Brockmann Music Engineering, Reseda, CA.

I am writing with regard to your review of the new Pretenders album, "Packed!" in the August issue. I thought Mitchell Froom's comments were interesting, but I must take issue with a comment made in the sidebar review of the album: "The earlier Pretenders album 'Get Close,' (produced by Jimmy Iovine), was not a particularly likable record — too big and arena-sounding!"

I am not involved or acquainted with anyone related to either of these albums. I realize that if every person's opinions were a teaspoon of water, we could all go surfing, but I happen to think "Get Close" is a great sounding album!

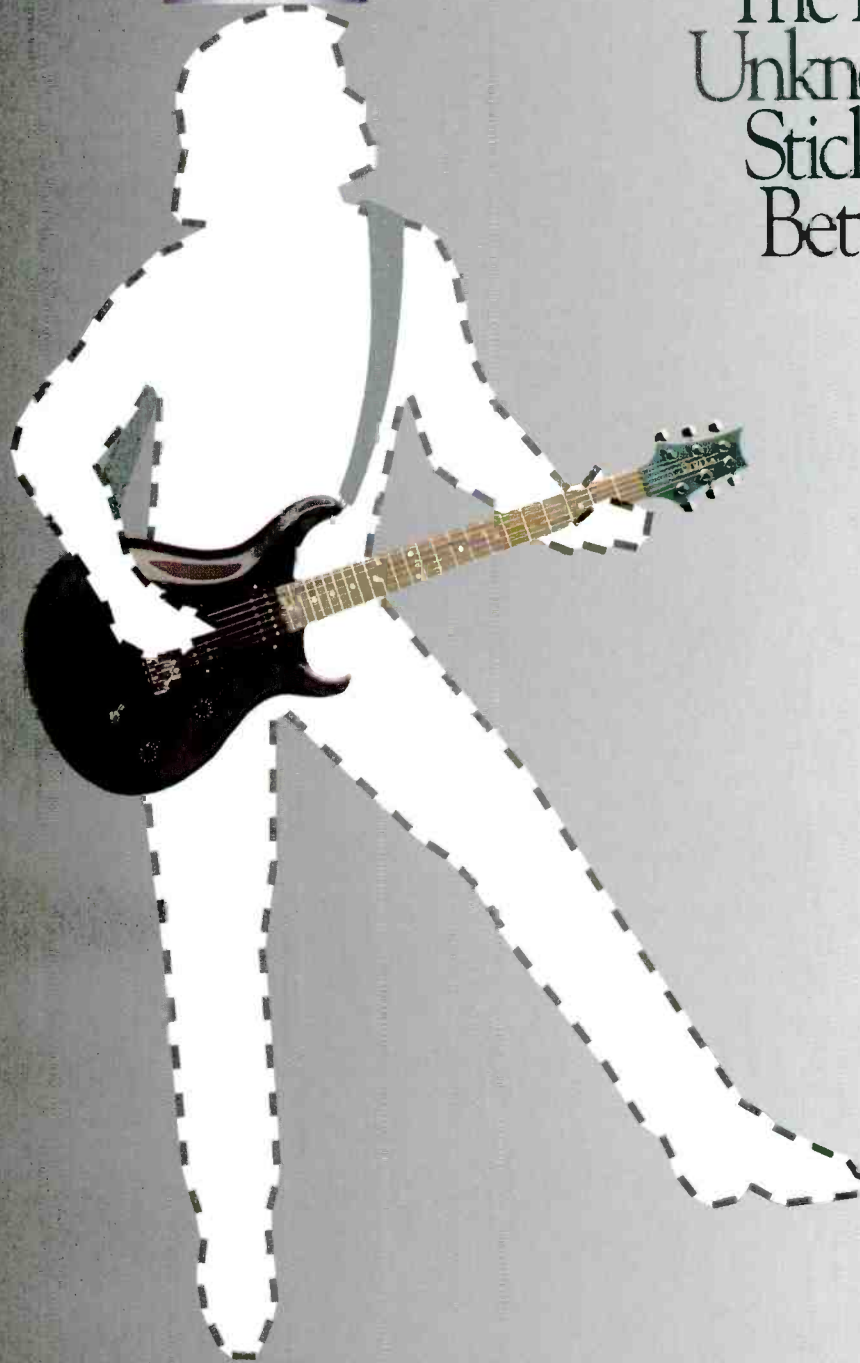
Its engineering is a good example of how to make studio tracks sound strong and loud, even at quiet listening levels, and how to keep the sometimes heavy textures from getting muddy (with Bob Clearmountain at the faders, exactly what I have come to expect). That CD lives in my permanent "listen again" pile. By contrast, "Packed!" sounds a bit small, dry and sleepy. After listening once, I put it in my pile of CDs to go to the used CD store.

I don't mean to insult anyone by my comments, but I would like to point out that you're making a mistake by putting down an artist's older project to praise a new one. I don't think that comment was made by Mitchell Froom, although it's not clear from the context. That brings me to my primary point: All of the "Fresh Tracks" reviews are obviously someone's opinion, and as such, this column should have an author's byline printed with it from now on.





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#### *The R•E•P staff replies:*

In stating our opinions, we aren't saying we're right; we're saying what we think, just as you did in your letter. Those who agree with us that "Get Close" was "too arena-sounding" will probably like "Packed!"; those who disagreed with us about "Get Close" are not likely to enjoy "Packed!" as we did. Again, these are just opinions.

In fact, we didn't need to go very far out on a limb to call "Get Close" too arena-sounding. We found this opinion to be shared by people associated with the band, people at the band's label and Pretenders fans in general. Jimmy Iovine stated near the time of the release of "Get Close" that he was trying to impart an arena quality to the recording to simulate the sound of the band's then-recent world tour.

When we started "Fresh Tracks," we debated whether reviews should be signed. "Fresh Tracks" is written by the R•E•P staff, by and large those people whose names appear on the masthead. Collectively, our backgrounds include being recording engineers, producers, journalists, musicians and record company executives. By remaining partially anonymous, we can review honestly and fairly, without any fear of jeopardizing any future relationships we may enter into.

What do you think, readers? Should "Fresh Tracks" reviews be signed?

#### *TEF or no TEF?*

*From: Alan Fierstein, Acoustilog, New York.*

I would like to add some info to Mike Joseph's article "Studio Design" in the July "Five Questions." First, readers should note that many acoustic materials are merely common building supplies that are customized, often inexpensively, by cutting and spacing them correctly. I recommend to customers that a consultant guide them in this.

Second, I fully agree that an acoustic consultant who had experience in the pre-TEF era "learned the hard way," and that a knowledge of TEF techniques is important. However, I would like to point out that the answer readers will get if they ask me if I use TEF measurements is a resounding "No!"

TEF measurements have almost no place in a control room. Their relevance is obvious when comparing the results from two locations even one inch apart. TEF is totally dependent upon precise

time arrivals of reflections, and if the measurement microphone is moved, the information is useless. Also, one, and only one, mic is used to measure. When you, an engineer, listen to music, your head is not locked in one position. You probably move your head. You probably have two ears. They are probably more than one inch apart.

TEF shares the spotlight these days with many other state-of-the-art computerized measurement systems, which dazzle the studio owner and make the consultant look like a genius. I've seen articles showing TEF results that, when interpreted properly, contradict the claims of the author! This leads me to the conclusion that there are charlatans out there. Anyone can buy a computer and use it to snow clients. I should know; I'm constantly being called in to fix their rooms. In addition to asking, "What rooms have they done?" studio owners should perhaps ask, "What rooms had to be re-done?"

#### *Transfer Room Clarifications*

*From: Vince Casper, system engineer, Saul Zaentz Film Co., Berkeley, CA.*

In my August article, "The Transfer Room," several typographical errors appeared in the printed article that were not present in the copy I submitted.

In the first paragraph, flat-bed dubber was substituted for the term dubber. Flat-bed dubbers are rarely used in post-production machine rooms. They are occasionally found in editorial suites for temporary mixing.

In the transfer room format list on page 34, line 5 of the section on open-reel formats, Stereo 7.5/15ips SMPTE Center-trk TC 1/2-inch, should read Center-trk TC 1/4-inch. To my knowledge, there is no 1/2-inch center-track time code format.

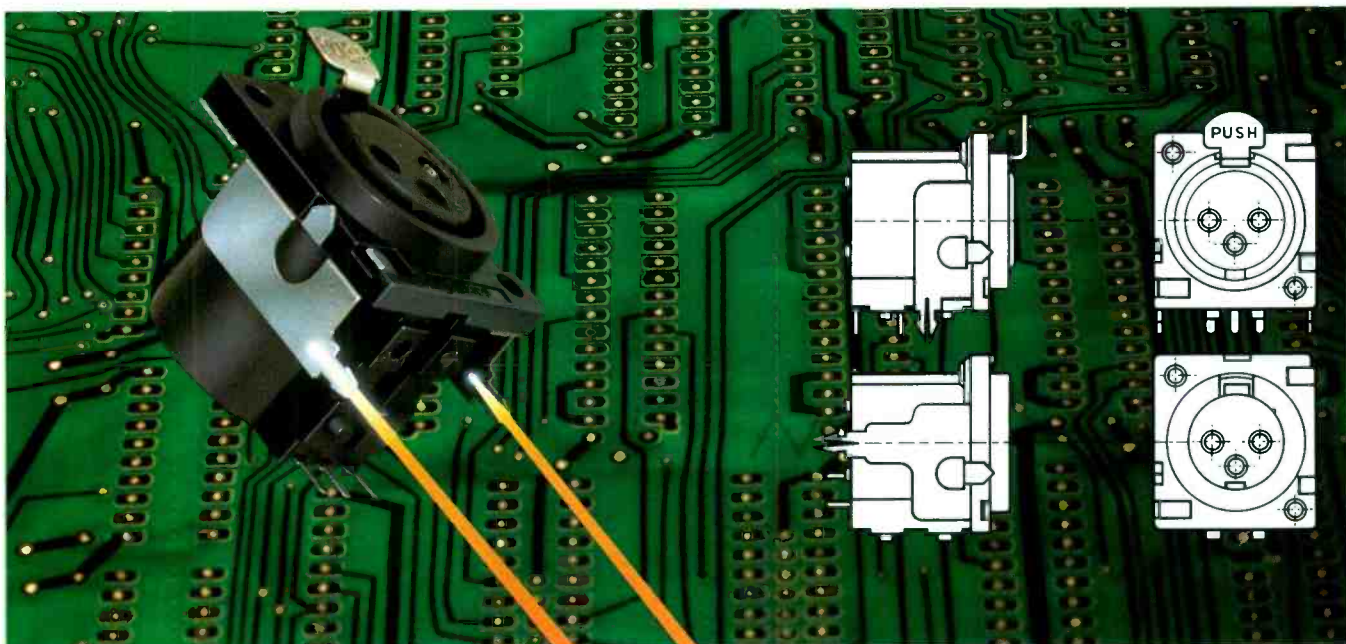
In the sprocket section of the chart; line 1, 16mm 7.2ips Sprocket should list 7.2ips under the speed heading and sprocket under the sync heading. On line 2, 25mm strip should read 35mm strip, 18ips sprocket.

*R•E•P regrets the errors.*

Send letters to R•E•P, 9221 Quivira, Overland Park, KS 66215. Letters may be edited for length and clarity.



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*Ampex Golden Reel Award for engineering a gold album exclusively on Ampex audio tape. In fact, of all the gold albums released last year—and the year before—most of them were laid down exclusively on Ampex tape. And it's a good bet that most of the others used Ampex for the majority of their tracks, too. • At Ampex, we appreciate the passion and precision demanded of audio engineers. It means pushing yourself to the wall so that every note, every beat, every bar will be perfect. It means taking music...and making magic happen. • We've made our own commitment to provide you with the highest quality, most consistent, most dependable audio tape in the world. A tape engineered with the same uncompromising attention to detail that you bring to your sound. • For all the details on what makes Ampex tape so technically advanced, just call or write for a copy of our new 456 Technical Brochure, and see why Grand Master® 456 is engineered like no other tape in the world.*



**AMPEX**  
A MASTER OF ENGINEERING

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## The Economy:

### Will It Affect Pro Audio?

There was a good deal of grousing about the economy on the floor at this past September's AES convention, which was ironic because many companies have reported good sales years.

While the pro audio industry traditionally has been somewhat recession-proof, the general feeling is that the industry will feel at least some effects from the economic downturn. A scatter-shot poll of opinion throughout the industry revealed the following:

John Carey, vice president of sales and marketing at Otari, was reticent about predicting the future. However, he did indicate that sales for the past 90 days have been "soft."

"Smaller companies are pulling in their belts right now and are taking a wait-and-see stance," he said. "Accordingly, I don't foresee this being a year with huge growth potential. We're aiming at our industrial, post-production and movie studio customers. Those customers will most probably spend as predicted."

Carey said that the crisis in the Middle East could have great consequences for the industry because a lot of the equipment sold is imported.

"If the crisis becomes a war, then obviously our economic priorities in this country will be shifted and that will affect the industry as well," he said.

Carla Campbell, the Eastern regional sales manager for Panasonic/Ramsa, has perceived greater caution in purchasing among the dealers on the Eastern Seaboard.

"I'm actually buoyed by the maturity and preparedness I see this time around," Campbell said. "During the last recession this industry went through, we saw dealers hit hard because they weren't as prepared. Although the Northeast seems to be feeling it more than some other areas, the dealers are responding overall to economic factors in their particular areas with an aptitude that has been a pleasure to work with."

One dealer in the Northeast saw the need to change priorities about a year and a half ago because of changes in the market.

"This area really got hit hard at the outset of the recession," said Craig Fennessey, president of CSE Audio in Rochester, NY. "Because the professional audio market has changed so much over the past 10 years, it became apparent to me that we were going to have to be more flexible in the ways we do business and the types of markets CSE services.

"Since my business philosophy has always been to strive for leadership, rather than just following along, we opted to branch out into areas we weren't previously known for."

CSE has become heavily involved in professional studio design and custom home installations in the past 18 months and plans to explore other avenues in order to continue their steady growth. Fennessey thinks the market is improving somewhat and should return to being healthy "in the not too distant future."

Mark Gander, vice president of marketing at JBL Professional, cited a recent *New York Times* article that pointed out that the true test of the economy is growth of 2% or more in any calendar year.

Those areas most affected by the current economic slump are the Northeast, Ohio, parts of Michigan and Texas; on the other hand, Florida, Pennsylvania, the Northwest and California are experiencing greater than 2% annual growth. This would indicate that the country as a whole is not in recession, just sections of it.

"Specifically, this industry continues to experience growth in visual/interactive areas of audio," he said. "There's stability in contracting, whereas traditional music and recording seem to be off and studio turnkey type of installations appear to be down," he said. "Everyone is concerned about the Middle East and the oil situation, and the general economy is not that strong, but you cannot heap the whole country together.

"Much of the economy of this industry is driven by discretionary expenditures, and (because of) the nature of that type of expenditure, it's unlikely that the professional audio industry as a whole will suffer as big a hit as other industries have."

— WYNNE SMITH ■

## Audio Pros Win Monitor Awards

The annual International Monitor Awards were presented recently in New York. Sponsored by the International Teleproduction Society, the awards honor excellence in all parts of teleproduction, including audio.

This year's audio winners were:

- Best Post-Production in an Entertainment Series: John Alberts and Joe Ferla, Howard Schwartz Recording, New York, for "Night Music #119."

- Best Audio Post-Production in Film-Originated Entertainment: Richard Fairbanks and Peter Roos, Transcom Digital, New York, for "Taken Away."

- Best Audio Post-Production in National Commercials: John Binder, Editel/Chicago, for Bud Light's "Dark Ages."

- Best Audio Post-Production in Local Commercials: Stephen Johnston and Lenny Rabinowitz, Limelite Video, Miami, for ATC Long Distance's "Joe Conklin — CPA."

- Best Audio Post-Production in Children's Programming: Peter Cole, Troy Smith, Chris Trent, Ken Dahlinger and John Walker, The Post Group, Los Angeles, and Matthew Knox, Frank Superstein and Steve Kirklys, Fun Amusements, Los Angeles, for "Pee Wee's Playhouse," "Fire in the Playhouse."

- Best Audio Post-Production in Documentaries: Michael David, Timothy Kerr and Skip SoRelle, Powerhouse Studios, Washington, DC, for "Black Friday."

- Best Audio Post-Production in Promotional Non-Broadcast: Rob Hill and Dorrie Batten, The Post Group at Disney/MGM Studios, Orlando, FL, for "Supercop." ■



## People

American Helix has named **Michael Dillingham** production control manager and **Al Thornburg** engineering manager; **Tracy Smith Files** has been promoted to sales coordinator ... New England Digital product specialist **Jim Bonevich** has moved from the home office in White River Junction, VT, to the NED sales office in Los Angeles; **Ted Pine** has been promoted to director of marketing; **Frank Sullivan** has resigned as vice president of marketing and product development ... Shure Brothers has promoted **Christopher Lyons** to product line manager, wired microphones ... Meyer Sound Laboratories has promoted **Scott Gledhill** to customer service manager and **George Douglas** to vice president of sales and marketing ... **Bob Ofenstein** has joined T.C. Electronic as technical sales director ... White Instruments has promoted **Jeff Van Ryswyk** to sales manager ... **John M. Spencer** has been appointed vice president of Applied Audio Marketing. ■

## Equipment Needed For Volunteer Studio

Here's one of the worthier causes we've come across lately: Bayview Recording Studio, located in San Francisco's historic Bayview Opera House, is a volunteer facility designed to provide local youth with a creative outlet for music and recording.

Tentatively scheduled to open this month, the studio needs mics, stands, monitors, outboard equipment and anything else that a fully equipped, professional studio needs. Grateful Dead drummer Mickey Hart has donated a console and 16-track recorder, and the studio is looking for Bay-area professionals to volunteer time in addition to equipment.

In an age where about the only access to entry-level recording experience is through schools that charge thousands of dollars, it is refreshing to see an effort such as this.

For more information, contact Gail Reid at 415-824-0386. ■

**Lawsuits:** Two suicide suits against Ozzy Osbourne over subliminal lyrics are moving through the federal court system in Georgia. No trial date has been set in either case. Judas Priest was relieved of liability in August in a similar case. See the October R•E•P for information on the civil trial and verdict.

**Obscenity:** The September issue of the newsletter *Entertainment Law & Finance* draws a parallel between 2 Live Crew's obscenity case and the controversy over Robert Mapplethorpe's photographs. In both cases, judges have focused on one part in each work — the seven sexually explicit photos in the Mapplethorpe exhibit and the rap lyrics in Crew's "As Nasty As They Wanna Be" — rather than the work as a whole. These cases point to a redefining of the Supreme Court's guidelines in determining what is obscene, according to the newsletter.

Meanwhile, in Broward County, FL, where "Nasty" was declared to be obscene, a record store clerk who sold a copy of the record to an undercover officer was convicted on obscenity charges and faces up to a year in jail.

**Computers:** Big news for this Mac-driven industry. At press time, Apple was scheduled to introduce several low-cost Macintoshes with various capabilities, including a model for less than \$1,000. ■

freemove

**Life is unreal. The host of 'Death Valley Days' became president. In light of that, why shouldn't I produce a record for Paula Abdul?**

— Don Was, quoted in *Newsweek*.

# Random Access

## STUDIO UPDATE

Facility/Location	Details
<b>NORTHEAST</b>	
Soundwave/Washington, DC	Chris Paul named director of marketing.
<b>SOUTHEAST</b>	
Flood Zone/Richmond, VA	New equipment: Dolby 361 SR/A.
<b>MIDWEST</b>	
Ajax Recording Team/Fort Wayne, IN	New equipment: Ampex ATR 102 mastering recorder.
<b>SOUTHERN CALIFORNIA</b>	
Soundworks West/Los Angeles	New equipment: Akai ADAM.
Westlake Audio/Los Angeles	New equipment: Neve VR72 with Flying Faders automation and Mitsubishi X-86HS digital 2-track.
<b>NORTHERN CALIFORNIA</b>	
Musical Infinities/San Francisco	New recording studio and music production company. James Harrington is president; located at 123 Townsend St., Suite 112, San Francisco, CA 94107; 415-896-6020.
Rocket Lab/San Francisco	John Acoca has joined the staff.
Hyde Street Studios/San Francisco	Susie Foot named studio manager. New equipment: custom recall system in Studio D; sampling update card for the Eventide H3000S Ultra Harmonizer; and Seymour Duncan 100W convertible amp.
<b>MANUFACTURERS</b>	
Amek	Mozart console sales: The Bakery Recording Studio (North Hollywood), Vineyard Ministries International (Anaheim, CA), Loomis Productions (Carrollton, TX), High Heels Studio (Baltimore) and Tim Stanton Audio (Austin, TX).
Gauss	Normandy Sound (Warren, RI) has purchased Gauss 3588 coaxials and 4583 15-inch woofers.
Mitsubishi	The Virgin Group has purchased a third X-880 32-track digital recorder.
Solid State Logic	Logic/FX compressor sales: producer/engineer Bob Rock (Vancouver) and Dick & Roger's Sound Studios (Vancouver). G Series console and ScreenSound to Sounds Interchange (Toronto).
Sony	APR-24 recorders sales: Toy Matinee; Beat Street Recording Studio; A to Z Studios; and Dimension Sound Recording Studio. Sales of PCM-3348 DASH machines: Sound Shop (Nashville), Digital Pursuit (Nashville), Tim Jordan Rentals and The Enterprise recording studio. Other sales: Waves (Hollywood), two MXP-3036 consoles; and Prime Ticket, MXP-3036VF.
Soundcraft	Installations of 200 Delta consoles: Location Recording, Microsoft, Boeing (Seattle), Film Counselors Associates (New York), Cinebar Productions (Newport News, VA), and Black Entertainment Television (Washington, DC). Other installations: MIRA Film and Video, 600 console; Nike, 200 B/VE console; NW Videoworks, TS12 automation system; and In-nervision Productions (St. Louis), 200 B/VE console.

## NEWS NOTES

**AKG Acoustics** has acquired two more companies. Just before the AES Convention, the company announced that it purchased a controlling interest in Edge Technology, which includes BSS Audio, Turbosound and Precision Devices. At the AES, it announced the acquisition of Qusted Monitoring Systems.

**Otari** acquired King Instrument, the audio cassette loader manufacturer, effective in late September. According to Otari, it is now the world's largest manufacturer of audiotape and videotape loading machinery.

**Linear Technology**, a Canadian high technology company, has acquired **Soundmaster International**. Soundmaster's principals and staff will continue with the company.

Techron's introduction of the TEF 20 means that used machines will be coming on the market. **Experienced Audio** has become a clearing house for Techron's used machines. Contact Bill Landow, Experienced Audio, 18582 U.S. Highway 20 E., Bristol, IN 46507; 219-534-4422; fax 219-533-8800.

**Neve**, the U.S. distributor of Mitsubishi products, has consolidated the Neve and Mitsubishi parts operations at the Bethel, CT, headquarters. Previously, the Mitsubishi inventory was located in Los Angeles.

**Cliff Electronic Components** of London has established a North American sales office located in Houston, offering jack sockets, connectors, cabinet hardware and other audio products for domestic audio product manufacturers, studio contractors and suppliers. The office is located at 9821 Whithorn Drive, Houston, TX 77095; 713-855-6685.

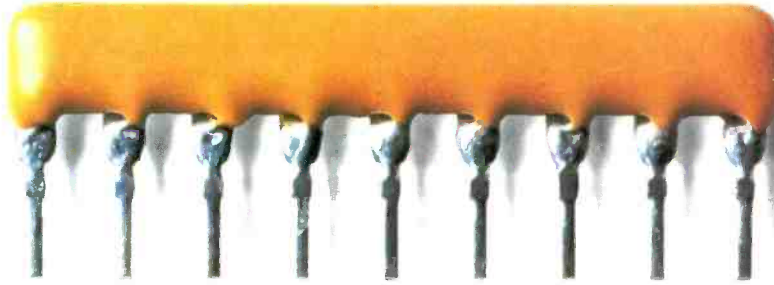
**Dolby Laboratories** has been celebrating its 25th anniversary throughout 1990. The company was founded by Ray Dolby in May 1965.

**FM Acoustics** has announced that 98% of all its individual spare parts will be available for shipment within 48 hours of placing an order. President Manuel Huber says more than 2,800 components are in stock in quantities of up to 10,000 units each.



# They make beautiful music together.

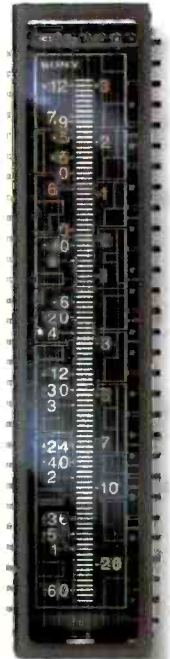
Laser-trimmed resistor packs and 18-turn trim-pots maintain precise circuit tolerances.



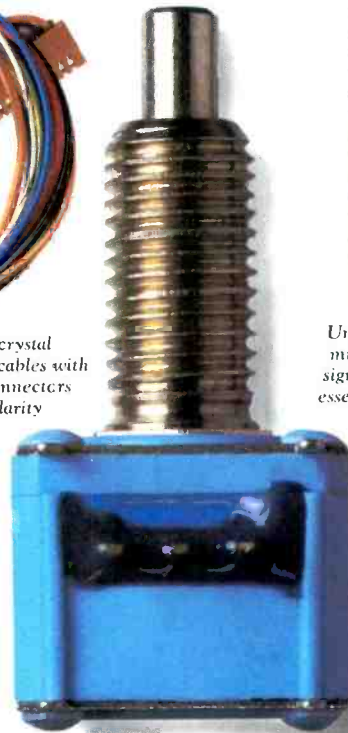
Audiophile-grade capacitors maximize sonic accuracy.



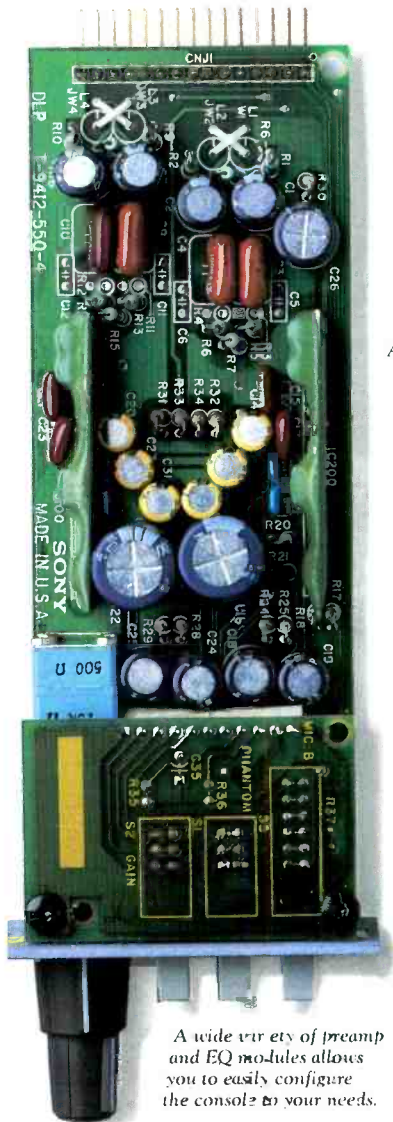
Large crystal oxygen-free cables with gold plated connectors ensure sonic clarity and detail.



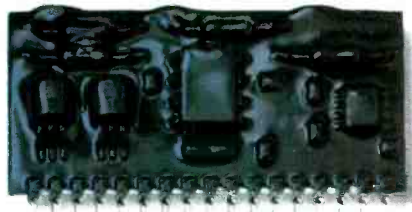
Unique vacuum-fluorescent multi-scale metering shows signal levels as low as -60dB, essential for digital recording.



Sealed, steel-shaft potentiometers deliver reliable performance for years.



A wide variety of preamp and EQ modules allows you to easily configure the console to your needs.



Sony's own hybrid circuitry makes these consoles among the quietest in the industry.

Sony marries superior components and intelligent engineering to create the MXP-3000 series consoles.

The result is consoles that offer the same high level of sonic excellence as our digital multitrack recorders, as well as unsurpassed reliability.

To achieve this, we selected only parts that meet the highest standards. Often, this required creating unique components.

This dedication to quality extends throughout the MXP-3000 series. From our "minimal signal path" architecture to our advanced metal frame

construction. It's why the MXP-3000 delivers performance that satisfies even the most critical users in hundreds of facilities worldwide.



Call us at 1-800-635-SONY, to learn how you and the MXP-3000 series can make beautiful music together.

## SONY

PROFESSIONAL AUDIO

# Random Access

## STUDIO UPDATE

Facility/Location	Details
<b>MANUFACTURERS (cont.)</b>	
Soundmaster	Sunset Post has installed the Integrated Audio Editing System.
Soundtracs	Retberg Music Productions (Ontario) has purchased an In Line 3632 Production console.
<b>DEALERS/DISTRIBUTORS</b>	
Audio Intervisual Design/Los Angeles	Facility sale: Scotland Yard Studios, DDA DMR12 console, KRK close-field monitors, Sony MUR-201 stereo reverb, BSS stereo dynamics quad gate and Audire power amps.
<b>DESIGNERS</b>	
Steve Durr/Nashville	Designed Windmark Recording studio (Virginia Beach, VA).
Russ Berger Design Group/Dallas	Construction completed at ABC-New York's newest post-production facilities and Bill Young Productions (Sugarland, TX). Designing a Music Technology and Resource Center for University of Northern Colorado Music School, an addition to General Television Network (Detroit), and additional edit suites and acoustical direction for television set design at NBC-Rockefeller Plaza and NBC's studio renovation in Brooklyn.

**Ampex** marked the 16th anniversary of the introduction of Grand Master 456 analog mastering tape at the AES Convention in Los Angeles.

**Everything Audio**, the Los Angeles pro audio dealer, has celebrated its 15th anniversary.

**Telarc** has released the first compact disc in Shure's Stereosurround format, on Spies' "By Way of the World."

**Digidesign** has organized the Third Party Developer Program, which consists of more than 150 developers working on a variety of projects, including image processing, speech research and audio/video editing. Andrew Calvo has been named director of developer relations.

**Manny's Music** was recently named Ashly Audio Dealer of the Year for 1989-90.

## NEW COMPANIES

**QMI** is a distributor of professional audio products, and has been appointed the exclusive U.S. distributor for Drawmer Distribution, FM Acoustics, Genelec, and SCV Audio. Scott Berdell is president; the address is 15 Strathmore Road, Natick, MA 01760; 508-650-9444; fax 508-650-9476.

## SALES NOTES

Worldwide sales for **Trident Audio's** Vector console have reached 32 one year after introduction. Recent orders include a 48-channel custom version, with full LCR panning and eight mix buses, and a 56-channel automated console. Additional orders have been placed from the major European markets, Japan and America.

**QSC Audio Products** has achieved record sales and profit levels for fiscal 1990, with about 20% growth over fiscal 1989. According to the company, it is its ninth consecutive year for sales and profit level increases.

**Avid Technology** has sold 60 Avid/1 Media Composer editing systems in the United States and Canada since its introduction last year.

**WaveFrame** says its fiscal 1990 sales increased 130% compared with 1989. A strong fourth quarter was capped by sales of \$1 million in June.

## ADDRESS CHANGES

**RCI Sound Systems** has relocated to 5615 Fishers Lane, Rockville, MD 20852; 301-984-1800.

**TimeLine** has relocated from the East

Coast to the West Coast. Its new address is 2401 Dogwood Way, Vista, CA 92083; 619-727-3300; fax 619-727-3620.

**Audio Animation** has moved to 6632 Central Ave. Pike, Knoxville, TN 37912; 615-689-2500; fax 615-689-7815.

**Dr. T's Music Software** has moved to Suite 1B, 100 Crescent Road, Needham, MA 02194; 617-455-1454.

**Digital Dynamics** has opened up a West Coast sales office located at 123 S. Victory Blvd., Burbank, CA 91502; 818-845-8426.

## REP NEWS

**Schmid Telecommunication** has appointed nine North American sales reps: Hemec Communications (Santa Barbara, CA); Jefferson Audio Video Systems (Louisville, KY); RKS Associates (Westglan Village, MO); Emmons Associates (Burnsville, MN); Omega Pacific (Kallua, HI); MSC Electronics (Richmond Hill, Ontario, Canada); Holzberg Inc. (New Jersey); Professional Audio Supply (Fort Worth, TX); and Electronic Marketing Associates (Laurel, MD). ABC Micros has been appointed Schmid's first rep in South America, with responsibility for Colombia. Glen Allen & Co. has been appointed to cover Puerto Rico, the Virgin Islands and the Dominican Republic.

**Shure Brothers** recently honored Pro Tech Marketing (Salt Lake City) with its Sales Representative of the Year award. ■



*"I've been sold on Beta's superiority since I first tried them. I use them on vocals, drums, amps, and brass because their sensitivity and resistance to feedback make them the perfect fit for the groups I work with. And the Beta 58 Wireless is the first system I've found that gives my artists the freedom of a radio mic without sacrificing sound quality."*

*Paul Dalen, Sound Engineer for David Sanborn and Lisa Stansfield.*



## Shure Beta Microphones. Buy Them On Word Of Mouth Alone.

Before you select a microphone, listen to the leading pros who use the Shure Beta Series on stage. They'll tell you about the benefits of Shure Beta's advanced transducer design, extraordinary gain-before-feedback, and true supercardioid polar pattern, as well as its outstanding sensitivity and low handling noise. But most important, they'll tell you that nothing beats a Beta for live performance. And that's not just talk. Try Shure Beta today and get the final word for yourself. Or call us for more information at 1-800-25-SHURE. The Sound Of The Professionals®...Worldwide. **SHURE BETA**

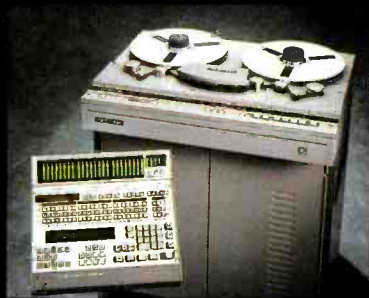
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[www.americanradiohistory.com](http://www.americanradiohistory.com)

It's time to buy a world-class console. But until now, the two or three that you'd consider all carried price tags that you wouldn't.

Catch the M700, the console with unbelievable sound at a price you'll find hard to believe: About \$70,000.\*

When you're looking for a world-class console, your first consideration is,



what does it sound like. And because the final instrument for testing sound quality is your own two ears, you've got to hear the M700. You'll then find out how well it compares to the consoles that defined "great sound."

Then get some hands-on experience. The M700 is designed around familiar industry standards with no

## NOW YOU CAN GET UNBELIEVABLE SOUND AT A PRICE THAT SOUNDS UNBELIEVABLE.





surprises to slow you down. Everything is where it should be, from full parametric EQ to its 12 auxiliary sends, which makes operating speed another of the M700's best features.

You'll get superb routing flexibility, with 40 in-line monitors, 80 inputs, 32 subgroupings and quad outputs.

When you decide to move up to digital, to accompany your console, one option to consider is the DASH format DA800 24-track digital recorder with award-winning ZD circuitry. Currently available for \$99,000\*.

it's destined to be the best-sounding 24-track around.

So before you invest in any console, you owe it to yourself to hear the M700. We think you'll agree that the only thing more unbelievable than the sound of the M700 & DA800 combination is its price tag.

\*Manufacturer's suggested retail price. Actual price may vary from dealer to dealer.

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# Fresh Tracks

## George Michael: "Listen Without Prejudice Vol. 1"



Label: Columbia  
Producer: George Michael  
Engineered by: Chris Porter, assisted by Noel Haris and Pete Frith  
Assistant Engineers: Noel Haris and Pete Frith  
Recorded at: Sarm West and Metropolis, London  
Mastered by: N/A  
SPARS Code: DDD

**Comments:** Creating a follow-up recording to the hugely successful "Faith" is no small feat, yet Michael's artistic and production approach in "Listen Without Prejudice" is dramatically different from its predecessor when compared to his outings in Wham!

**Of special interest:** Michael has given up the contemporary and often abused digi-technical stunts for a poignant wall of sound landscape that washes the listener in a formidable context. The recording's clarity, however, is not subordinate to the musical performance which, when stripped of hype, stands among some of the great popular lead and supporting vocals of recent years. ■

## Jack Teagarden: "That's A Serious Thing"

Label: RCA Bluebird  
Reissue producer: Orrin Keepnews  
Digital transfers and audio restoration: Paul Goodman  
SPARS Code: AAD

**Comments:** RCA is pursuing an aggressive program of old jazz reissues on its Bluebird label; this is representative of the program. Old in this case means that the original source material is from metal parts in all but three cases, dating back to 1929. [Keepnews and Goodman are the subjects of this month's interview — *Ed.*]



**Of special interest:** The results of Sonic Solutions' NoNoise system are amazing. Gone are the clicks, pops and others spurious noises (not to mention the whoosh noise of needle on vinyl) normally associated with 60-year-old recordings. Keepnews has assembled a nice package of Teagarden's work with several different groups. Paul Goodman has masterfully brought music which might otherwise be entirely unlistenable to a modern, discerning audience. Just one of many excellent titles from a valuable series. ■

## Soul Asylum: "And The Horse They Rode In On"



Label: A&M  
Produced by: Steve Jordan, assisted by Joe Blaney  
Recorded at: Chaplin Soundstage, Soundworks West and A&M Studios, Los Angeles, with the Record Plant Mobile Unit; Pachyderm Discs, Cannon Falls, MN; and Sunset Sound, Los Angeles  
Mixed at: Electric Lady and the Hit Factory, New York, and House of Music, West Orange, NJ  
Recorded by: Joe Blaney and Jonathan Akre  
Mastered by: Greg Calbi at Sterling Sound  
SPARS Code: AAD

**Comments:** Get grungy: this is down-in-the-dirt and raw music, with classic recording techniques that stretch and stress the medium with blistering guitars and thrashing drums. Forget everything you know about contemporary pop-record production techniques, forget about MIDI, forget about hours of rehash and refinement.

**Of special interest:** This record shows the effectiveness of the analog tape recorder as an enhancement and instrument, which is integrally linked to the recording process. That the majority of these tracks were recorded live with minimal dubs lends a spontaneity that seems terminally lacking in the present recording culture. ■



# The R-DAT With Features Others Ask You To Pay For

JVC's DS-DT900N R-DAT recorder includes professional features, as standard equipment, that are optional on other machines. Features like SMPTE time code capability, AES/EBU digital inputs and outputs, and parallel and serial remote control. The DS-DT900N meets the strict standards of the professional audio industry too. It's built on JVC's state-of-the-art conversion technology to deliver the highest level of digital audio performance.

With a manufacturer's suggested list price of less than \$4,500, no other professional R-DAT recorder gives you the features and performance of the DS-DT900N.

For more information, call 1-800-JVC-5825 or write JVC PROFESSIONAL PRODUCTS COMPANY, 41 Slater Drive, Elmwood Park, New Jersey 07407.

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# JVC<sup>®</sup>

## PROFESSIONAL



## Don Dokken: "Up From The Ashes"



Label: Geffen  
Produced by: Don Dokken and Wyn Davis  
Engineered by: Wyn Davis, Melissa Sewell and Eddie Ashworth  
Mixed by: Wyn Davis  
Recorded at: Total Access, Redondo Beach, CA  
Mastered by: George Marino, Sterling Sound, New York  
SPARS Code: ADD

**Comments:** This is a textbook example of heavy metal production: thundering, stereo Marshalls, wet toms, high-register vocals and ultra-compressed clean chorused guitars.

**Of special interest:** The guitars have all the power and crunch of early Van Halen but without the distant, far away sound that characterized Van Halen. We could do without the obligatory "serious rock ballads" but the power tunes more than make up for it. There is nothing surprising or new here, but the guitar, bass and drum tones are perfect examples of the genre, and what's wrong with that? ■

## FOCUS:

WYN DAVIS, MELISSA SEWELL: Engineers,  
"Up From The Ashes"

Wyn Davis mixed the first Dokken record and has produced Great White's "Shot in the Dark." Melissa Sewell is working on the new Great White record.

**R•E•P:** The credit on the album reads "engineered by Wyn Davis, recorded by Melissa Sewell." What were your roles?

**MS:** Wyn was responsible for getting all the sounds, the guitar tones, the drum sounds and so on, and I was responsible for getting it all on tape, and making sure the sounds remained consistent as they went to tape, as well as throughout the project. I had a fairly large contribution to the engineering. Wyn left the room once we got sounds so that he could keep his ears fresh as the producer.

**WD:** It got to the point actually where the guitar players were dependent on Melissa being there, and preferred her. A lot of that has to do with Melissa's temperament being so good. And from a creative standpoint, they didn't feel intimidated by her having some long history of working with great guitarists. It helped them to feel free to experiment and find their way through their work.

**R•E•P:** How were the guitars recorded?

**WD:** We used different configurations of 100W and 50W Marshall heads. The cabinets were vintage 1969-70 Straight Marshall Cabs, 4×12. For most of the solos, we used 25W Celestions through one cabinet, and for the rhythm parts, 85W Celestions from two cabinets.

**MS:** Each cab had two mics on it, either a Shure 57 and a Sennheiser 421 or a 57 and a Shure 58, depending on the guitarist.

**WD:** We moved the mics around a great deal to find the right spot, but basically they were direct axis, trying to split the cone and the paper evenly. Also, for the solos, we ran C12s as ambient mics in the room; the room is 21×30×14 — about 10,000 cubic feet.

**R•E•P:** What about guitar effects?

**WD:** Generally, I avoid recording any kind of reverb on the guitar, but depending on the situation, we recorded some effects that the guitar players had dialed in, certainly their EQ settings.

**R•E•P:** When the tom fills come in, they sound really clean and wet and big.

They don't sound gated but the drum track is so clean, it sounds like they would have had to be.

**WD:** That's a technique I've developed over the years because I'm frustrated with the sound of gates. The toms — and all the drums — are recorded wide open; they're never gated. During the mix, I'll slow the tape down to half speed, and figure out where all the tom fills are.

The automation in this console [Amek 2520] can read back data at half speed. Then we use a group fader to bring the toms in when they're being played, and then bring them back to a level where they're ambient but not obtrusive. In order for the toms to ring out and sound wet enough when they're playing, there has to be a lot of reverb on them; if you have that much reverb on those tom mics when they're not playing, the rest of the drum kit starts to sound pretty sloppy.

**R•E•P:** Any special equipment you used on the record?

**WD:** We had three 480Ls during mixdown. And I have to credit a lot of the sound of the record to three products which I love: Dean Jensen's mic pre-amps, the ATR 124 and Monster Cable. ■



# The best place to keep track of your valuables.



Your most valued possessions had been trusted to cocktail napkins. Biology notebooks. Worse yet, to memory.

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Circle (15) on Rapid Facts Card

**Zubin Mehta, Berliner Philharmoniker: Bartk, "Concerto for Orchestra"; "Suite from the Miraculous Mandarin"**

Label: Sony Classical

Produced by: David Mottley

Engineered by: Michael Sheady (Concerto); Mark Vigers (Suite)

Recorded at: Philharmonie, Berlin (Concerto); Jesus Christus Kirche, Dahlem (Suite)

SPARS Code: DDD



**Comments:** Bartok may be difficult for those unaccustomed to 20th Century classical music, but this is an excellent performance of two of the composer's important works. This recording is interesting: it is not pristine, and in fact there is a great deal of hiss on the concerto. The engineering stays out of the way of the performance and the venue, and this in itself is somewhat of a miracle in an age when engineers often try to inject as much of themselves as possible into their recordings, sometimes to the detriment of the music.

**Of special interest:** The mixes for both selections (live to 2-track) are tight and create a cohesion not often found on modern classical recordings: The orchestra really sounds like an orchestra, not a group of individual instruments. The ambiances, painstakingly captured acoustically, are rich and warm. ■

## FOCUS:

### MARK VIGARS: Engineer, "Suite from the Miraculous Mandarin"

**R•E•P:** How were the mics set up?

**MV:** I used a basic open setup, using three B&K 4006s in a left-center-right format, behind the conductor's head, about three or four feet apart from each other, pointing toward the second desk of violins and cellos. And I had two outriggers, Neumann KM84s or 86s, cardioid microphones, in line with the third or fourth desk and about three or four feet away from that. Then two KM86s on the woodwinds to focus the center of the orchestra.

That was particularly important because of the clarinet solos. I had a KM86 on the horns which I used a minimal amount of. There was no brass microphone, I had a couple of 84s for things like celeste, harp, and piano. I had a microphone on the timpani ...

**R•E•P:** The timpani sounds huge ...

**MV:** But I didn't use very much of it. In the acoustics of this church in Dahlem, in Berlin, the back of the orchestra comes through quite clearly. I remember I did need the mic on the piano to focus it through, because there was so much going on elsewhere in the orchestra that it wouldn't have been heard otherwise. I had two mics in the balcony in the back.

**R•E•P:** What about some of the "air" noise?

**MV:** In this day and age I know there are some purists who are concerned about such things, but my attitude is there is noise wherever you go, there is no such thing as a quiet room. It's difficult to find a recording venue where you don't have traffic noise or aircraft ... I don't worry about that. Some people do, but I feel sorry for them if that's the way they feel. The music's the most important thing.

**R•E•P:** One of the remarkable things is how similar your recording and Michael's sound. You really know that it's that orchestra with that conductor.

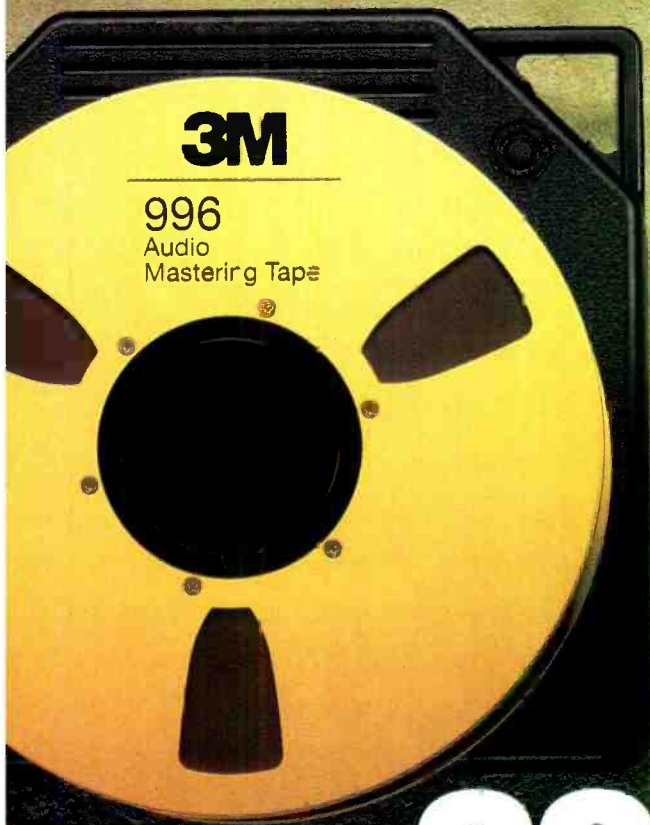
**MV:** Well that's the most important thing. As a recording engineer, we mustn't think above our station. We have to remember that our job is to be truthful and honest to the artist; that is all we are asked to do. Some engineers think otherwise. I disagree with that. My feelings are I have to do my job to the best of my ability, and to come up with what is asked by the conductor and the orchestra. Zubin Mehta was very involved in the recording process and he understands it very well. He knows when there's something that he's doing that's not right, or when it's something that I'm doing that's not right.

**R•E•P:** How many takes did you do?

**MV:** Two or three complete takes, and then little patches of things that hadn't quite worked out. ■



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## Little Fish, Big Ponds

By Lee Murphy

Since 1984, I have been operating what is known as a "boutique" audio sweetening facility in New York City. For years I had been a newscaster before deciding to concentrate on production and recording. The odd name for my organization, Brigg's Bakery, comes from an old neon sign I found on an abandoned storefront I remembered from my childhood in Manhattan.

Murphy is president of Brigg's Bakery, New York, and a member of the SPARS Board of Directors.

In just a few short years, I have seen many dramatic changes taking place in our industry. From the large, multi-room, music-based complexes of the 1960s and 1970s to the appearance of smaller, specialized facilities in the 1980s, there has been a great deal of upset and confusion. I can see a much different industry developing in the 1990s, which is settling down and stratifying.

I'd like to recount my first encounter with SPARS a few years ago. I was invited to a meeting just 36 blocks away from my studio. As the cab pulled up at Gallagher's restaurant at 52nd and Broadway, I wondered what I had in common with the midtown giants. That's the impression I had — studios with many rooms, big staffs and powerful clientele. Needless to say, I felt out of place.

I thought I recognized "what's-his-name" from Power Station and Bruce "something-or-other" from Clinton Recording. And Howard Schwartz. Of that I was certain. I met several more of these well-known

figures of upscale recording and my rookie head was spinning.

After I'd calmed down a bit, I thought to myself. "So, this is SPARS. And they don't seem to mind at all that my studio is as far away from midtown Manhattan as Vegas is from L.A."

Within a few months, I was proudly calling my operation a "boutique" and feeling a lot better about being so off-scale while vying for some of the same business being sought by the big guys. If my experience is any gauge of broader reality, there is a niche for small, specialized studios all over the country. If you've got the drive and the talent, now is almost certainly the time to dig in and go for it.

As a young man, I started off with a love of the "toys," but I soon realized that it was not a game I was playing. I persisted, because I truly loved the production environment. I started off recording radio commercials for regional clients of small advertising agencies.

One day, I heard about something called

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"audio-post-for-video" and made some equipment investments. Many of my existing customers greeted this expansion with a resounding, "Huh?" Time and again, I was told about 3-inch TV speakers and "Why bother?"

But eventually, they did begin to bother, and my business began to grow. The studio went from 8-track, to 16- to 24-track in three years. Before long, my work was being broadcast on national television and my sound design for the PBS series "Reading Rainbow" helped earn an Emmy.

A few years later, I was at Kennedy International, waiting to board a flight to California for the AES Convention. I was thinking about my career and all that I had gained from SPARS and the camaraderie I had shared with others trying to make it in this business.

I had that usual primordial gut anxiety I always felt prior to takeoff. It isn't unlike the feeling I get in the pit of my stomach when I am contemplating the purchase of another piece of major recording gear.

Once in the air, I reminisced, contemplating how quickly things change. One minute, you're on the ground. Next minute, you're thousands of feet in the air and soaring upward. One minute, you're analog and the next thing you know, you're digital. Linear seems to be state-of-the-art, and then comes random access.

Off-the-wall thoughts were tumbling around in my head. Why are we always so late in our realization of what is taking place in this industry? Of course, it's easy to analyze by hindsight, but by communicating and sharing ideas we can do a much better job of facing the facts. There are only so many pieces of the pie and a limited number of bakers. Are we the sun looking for someplace to shine upon? Or are we the clouds somehow obscuring our own potentials?

Crazy thoughts? I didn't know. I wasn't sure of anything, really. The only thing I knew for sure was that I had innocently seen an opportunity for myself and gone for it. Perhaps we should all be trying to

find our niche. Define the possibilities. Take stock of what's there, right there in front of us, and then determine how to make tomorrow's breakfast out of today's groceries. I started making a list of ingredients: computers, console, clients, cash ... and a good recipe, of course.

A bored voice squawked over the intercom that we were ready to land. I'd slept right over the Rockies, dreaming of new ways to make my business — my small boutique — pay for itself in an industry that was clearly becoming more stiffly competitive day by day.

I smiled to myself as the plane touched down at LAX. I knew it would be OK. No, on second thought, I knew I had a place in this business — if I could just keep finding it. ■

The Society of Professional Audio Recording Services is the audio industry's best source of business information. For information on membership and activities, contact SPARS at 4300 10th Ave. N., Lake Worth, FL 33461; 407-641-6648; fax 407-642-8263.

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## Multimedia & Other Myths

By Rick Schwartz

The first ever CyberArts conference was recently held in Los Angeles. You might ask, what is CyberArts? According to the show's program, "cyber" comes from cybernetics and is defined as machine augmentation of human beings. Combining the two words implies machine and computer enhancement of the arts, from music to the visual arts to literature.

Although the term CyberArts is about as useful as buzzwords like virtual, Hypermedia or artificial reality, I was looking forward to meeting the people who coined those terms and possibly even gain a better understanding of what they really mean.

Why was CyberArts important? The event itself was a technology show, of importance to our ever more technologically adept production facilities. Innovative studios are providing a wider mix of services than ever before. In addition to record projects, many sessions now involve other media like film or video.

Computer graphics and animation beg for good audio. Some studios are branching into new areas such as providing MIDI mix rooms and digital suites, or services like books on tape, forensic audio and others. In short, it's a whole new ball game out there.

### BRAVE NEW WORLD

CyberArts involves tools, techniques and technology. If the presentations were any indication, the tools and technology are not as refined (and easy-to-use) as the presenters would have everyone believe. One self-proclaimed computer visionary had to abandon most of his software demo because he was having a difficult time operating the Macintosh. Nothing seemed to work. Audio was poor (ironic, as live sound is one of our more "understood" technologies), making it hard, if not impossible, to comprehend the presenters.

Rick Schwartz is a sound designer/engineer and director of post-production for Music Animals, Los Angeles.

Many of the demonstrations that used computers did not work as planned. One keynote speaker had to yell out slide change commands. He also had to apologize for out-of-focus slides by saying, "What this slide would show, if we could see it, is . . ."

### MULTIMEDIA WAR STORIES

Multimedia is easily a candidate for the most overused word in the publishing world. Right now, multimedia products are getting a lot of interest. Some say that multimedia creators are doing a landslide business generating presentations for other multimedia companies. Where's the market of end users?

Peter Gotcher from Digidesign talked about the desktop obstacle course involved. One of his favorite multimedia war stories relates the difficulty in getting presentations to play at the same speed on different computers.

"There is no SMPTE time code equivalent yet in multimedia," Gotcher says. "It is very difficult to synchronize audio and video events because they run at different speeds, causing the audio to go out of sync." (Having different internal clock speeds, whether 8MHz in an SE or 40MHz in an fx, computers run graphics and video animation, as well as audio, at differing rates.) If you develop software using a Mac IIci, make sure to test it on a plain vanilla Mac to check for worst-case performance and speed compatibility.

Additionally, because of the difficulty in importing source material and producing animation in general, Peter recommends the use of simple graphics or slides that are punctuated with sound hits. He warns that there are no hardware requirement absolutes, although a hard disk with an access time of 28ms is generally considered fast enough to be used for digital audio applications.

Sometimes, however, a hard disk with an acceptable access time will not work because of poorly written disk driver software.

"People ask me what platform multimedia runs best on, and my answer has got to be videotape," Gotcher says. "Multimedia is more work than you think, much more." In short, don't believe the television commercial where some young executive sits down at his computer an hour before a board meeting and whips up a show-stealing presentation.

### WHAT'S NEW?

A number of new technologies were

shown at CyberArts. Allen Adkins of Optical Media International demonstrated how easy it was to make write-once CDs using the Macintosh. He wasn't the only one. James Moorer (of DroidWorks fame) created his demo material using similar techniques on a Sonic Solutions CD Maker System. [For more on CD-R, see September's Digital Domain — Ed.]

Several promising new musical instrument technologies were discussed. Adrian Freed demonstrated a very realistic sound modeling technique using resonance synthesis, made possible by eight 56000 DSP chips. The sounds, which included piano, upright bass and tubular bells, had incredibly long decay times with complex overtone structures and none of the side effects exhibited by today's digital samplers.

James Moorer demonstrated voice synthesis technology that could one day be used to synthesize background vocals in the voice of your choice. As he put it, "Imagine having Orson Welles' voice with Pavarotti's vibrato." Moorer also explained how multi-mode synthesis, using a combination of FM synthesis, resynthesis, and other hybrid techniques, would be applied more extensively in synthesizers of the future.

### THE WORLD LIBRARY

Brace yourself. If you thought the World Book was an encyclopedia, you're wrong. Ted Nelson, arguably the father and earliest major proponent of hyper interaction, insists, "We must have a universal library publishing system for the human race. Imagine it's the year 2020 and a billion people are sitting at screens around the planet. Each is able to draw documents to their screen from the common repository of humankind. Any document, or portion of a document, including text, graphics, music or photographs, in digital form, with an automatic royalty (issued) to the publisher" would be available.

According to Ted, we don't currently quote other literature in publishing because of the difficulty in obtaining permission. He says that "the notion of transclusion cleans up this copyright problem enormously."

What is transclusion? Transclusion embodies the idea of utilizing something from one document and applying it to another document without copying. The second document has a pointer to the first (a basic tenet behind Hypertext, commercially addressed in Apple's Hypercard program). Ted has also redefined other words





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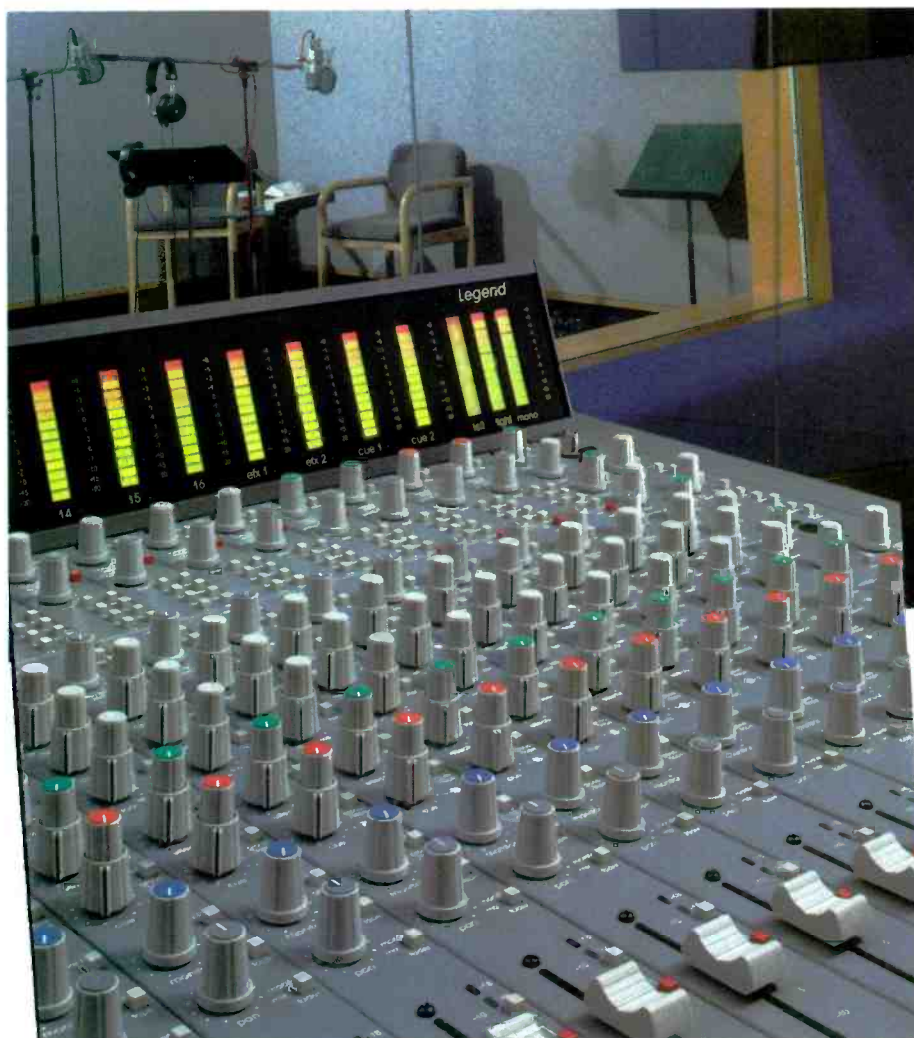
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in the English language: a *document* is an information packet that someone creates and *literature* is a system of interconnected documents. The *Xanadu Docuverse* concept consists of documents that have links and transclusion. Everyone can mark up the same material because of a special interrelated pointer system. Make sense?

Ted refers to himself as a hyperdreamer, but he is also a capitalist. Next year the Xanadu group (with funding from Autodesk) will come out with a new piece of software called the Xanadu Hypermedia Server. An information service, charges for access will appear on a monthly Xanadu bill.

### **FUN AND GAMES**

There was also an area set aside for CyberArts exhibits. The virtual reality section alone was worth the \$25 cost of exhibit admission. Participants were asked to wear the famed TV-screen goggles and sensor glove, which helped to transport users to an interactive 3-D computer generated environment. The Existential Funhouse (an experiment in interactive multimedia) was another exhibit, which consisted of a room containing sensors on the floor that controlled different things, including audio and graphics.

Some manufacturers like to believe that given the right tools, casual users can produce their own music videos and computer movies. Does the availability of low cost tools in the hands of untrained users yield results? If the presentations shown at CyberArts are any indication, George Lucas and Francis Ford Coppola have nothing to worry about.

People have grown to expect a certain level of quality from network television, if not from the television programming itself, at least from the on-screen computer generated graphics and flashy promos. Conversely, it is not hard to impress an audience with a slide show because they have such a low expectation of the medium. It's a little tougher to do MTV on a Macintosh.

Many attendees who I spoke with were limited to the small area set aside for exhibits, because they couldn't afford the steep \$495 price of seminar admission. I have never believed that knowledge should only be available to an elite few. Information should be available to the masses.

After all, isn't that what multimedia and computer inter-communication is really all about? ■



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and running a record label.**



**O**rrin Keepnews is one of the most prolific producers in history. Although he has never actually counted, he has produced more than 500 records in his 35-year career. (That works out to more than one record every four weeks.) He was the first to record legendary artists Bill Evans and Wes Montgomery, and has figured prominently in the careers of Cannonball Adderley, Thelonious Monk, McCoy Tyner, Sonny Rollins, Bobby Hutcherson and Flora Purim. He is currently national vice-chairman of NARAS and president of the Fantasy-distributed Landmark Records.

**R•E•P:** What is the deal that you have between Landmark Records and Fantasy?

**OK:** I wanted to start an independent label that would be truly mine. This is the third time I've started a label, but in the other cases there were other people and other connections involved.

**R•E•P:** The other two being Riverside and Milestone ...

**OK:** Right. Bill Grauer and I were partners in Riverside, and there were other people and other people's money at Milestone, and Dick Katz was closely associated with running it.

I had worked at Fantasy between 1972 and 1980 and during that period of living in the land of sunshine and relaxation, I had two heart attacks and a bypass operation. I wanted to work for myself this

---

Dan Levitin is a contributing editor to R•E•P and an engineer/producer based in Stanford, CA.



## THE R•E•P INTERVIEW:

time. I felt that I had reached a stage in my life — and my career — that I could have a label that would be quite self-indulgent, where I didn't do anything except what I wanted to do in the way that I wanted to do it.

I'll give you a totally petty example. Most of my life I have had running feuds with art directors about this one thing: I have always felt that the catalog number of an album is an important part of its identification in the world, so that number should be of noticeable size. For some reason, most record companies like to have those numbers the tiniest size possible.

One of the things I realized when I was putting Landmark together was, "Wow, I can have those catalog numbers as big as I feel like having them on the jacket." There were, of course, more important ways in which I wanted to express myself. For instance, if as a staff member or independent producer, I had gone to any of the record company heads, such as Ralph Kaffel of Fantasy, Bruce Lundvall at Blue Note, or whomever, and said, "I want to produce an album of the music of Thelonious Monk by this contemporary classical string quartet [Kronos Quartet] and I want you to pay for it," I think they would have figured I had flipped out entirely and tried to figure out how to get me out of their office quietly before I became violent or something.

The point is, it's not an idea I could have sold to anybody, but the two albums are excellent, pioneering albums, and they did a lot for Kronos' career and for my ego.

Now when I put this label together, I knew there were certain things that I am

# ORRIN KEEPNEWS

By Dan Levitin

good at, and other things I hate. The whole distribution thing is an example of the latter. Dealing with wholesale distributors as a very small label, dependent on getting your money from them, is the exact equivalent to committing suicide.

**R•E•P:** Because you don't have any leverage; if they don't pay you, you can't just say, "Well, I'm not going to ship Rolling Stones records, then."

**OK:** Right, and besides which, they are basically and rather consistently impossible people, with a few wonderful exceptions.

I didn't want to have to deal with them this time around, or for that matter with suppliers. So I set out in the beginning to do a P&D deal — a pressing and distribution deal — where the manufacturing and the selling of your product are done for a fee or a percentage by somebody else. And Fantasy has the kind of clout necessary to collect from independent distributors, because Fantasy is in many cases

their largest customer. The beauty of it is that no distributor can say, "Well I think I'll pay Fantasy this month but I won't pay Landmark," because Landmark only exists as an item on their total Fantasy bill.

I furnish Fantasy with finished masters and cover art, which Landmark pays for, and they manufacture it. One of the other benefits I get is that they can't refuse to work with an individual album. This deal has to be seen in the context of my long standing relationship with Fantasy; I was the head of their jazz division for eight years.

I'm well aware there are many ways for an independent label to get screwed on a P&D deal, and I wouldn't recommend it for everyone, but Fantasy and I came into this relationship with a history and background of reasons to trust each other's judgment.

**R•E•P:** What is a typical budget for one of your recordings?

**OK:** There really is no such thing as a "typical" budget because each record is unique. I'll tell you though, one thing I've always done with sidemen — it's just sound creative practice — is that you negotiate a single flat fee with a sideman, so you're not dealing with the clock. If we finish early, fine, the guy's ahead. If, for some reason, we end up spending twice as much time, I'm obviously not going to hold them to the fee.

But the advantage of this situation is you don't have to worry about the passage of time and "did it take me an extra half an hour to get that tune right?" I've done that for as many years as I can remember, and

I may have been the first jazz producer to do that.

In the Riverside days, my partner did an extensive amount of negotiating flat fee deals with studios for evening time, when they were lying fallow. If you get into a situation where the studio and the musicians are not a clock that is ticking on you, you have improved the creativity level immeasurably.

The problem about jazz, and music in general, as it functions in a capitalist system is that it has to be an art and a business at the same time, and that's one of the most anti-creative things imaginable. I believe it is the function of the producer to gain control of the environment so I spent as much of my time and ingenuity as I could working against all those ticking clock situations. Then all I have to worry about is getting product, good, creative, finished music, which of course is what it's all about anyway. The single most important ingredient in creating jazz records is to remove all of the unnecessary tensions, while being careful not to remove any of the necessary tensions, and there is a distinction.

**R•E•P:** You said in your book ["The View from Within," Oxford University Press, 1988] that you've tried to maintain the attitude, the perspective, that it's the artists' album and not yours ...

**OK:** Oh, God, yes ...

**R•E•P:** But at the same time, it's your job to manage the recording session, so there's potential conflict there, with who's in charge, and whose view is going to carry ...

**OK:** Yeah, but it's the kind of thing that tends to be more potential than actual.

**R•E•P:** Well, on the one hand you're suggesting that you need to be subservient, and on the other you're suggesting that you really need to be the boss.

**OK:** Well, I would quarrel with both of your choices of language there. "Subservient" is a dreadful word and I have never been subservient in my life, and being the boss is not at all a function of the producer. To say that the album is the artist's album and not mine does not mean that I am subservient. And to say that I am in charge of the situation in the studio does not mean that I am the boss.

What you need to accomplish more than anything else, is there has to be a very real working partnership between the artist and the producer, which means a recognition on both sides, sometimes implicit and sometimes explicit, that each has his areas of being the decision-maker.

I am never going to say to an artist, "That was the take, I'm not going to let

you lift your horn on that tune again," but I'm not going to let somebody say to me, "Yeah, that was good enough, let's go on," if I don't believe it was.

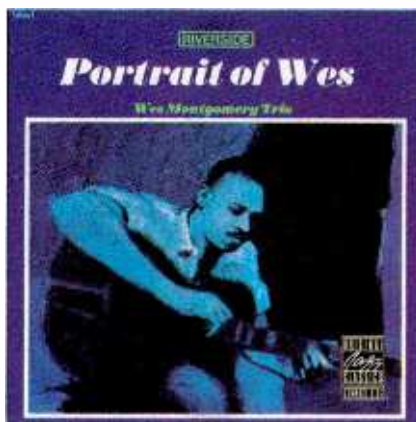
If you are able to establish a workable, creative relationship with the artist, you're going to come out pretty good or better. If you're not able to establish this, then neither of you belong in the studio.

**R•E•P:** How do you relate to the technology of recording? How involved do you get with sounds, for instance?

**OK:** First of all, you have to realize that in my production work, I go back to 1-track; professionally, I'm a little older than stereo, so I've been through a lot of technological change, and I'm a passionate believer in using technology rather than letting technology use you.

**R•E•P:** Could you give me an example of that?

**OK:** I think there are instances in which



I will believe in the validity of overdubbing and layering, but I also believe that it can be drastically overused to undercut and do away with the spontaneity that's a very important part of jazz. A lot of that comes out now that so many people are recording live to 2-track again with digital because multitrack digital still remains incredibly expensive.

It gives me great pleasure to be able to tell a bass player, "No, you can't repair that part, it's there. Everybody else was playing great, you got a bad note or two, that's tough. We're going with this." Because a lot of musicians, particularly musicians who are playing instruments that can just be plugged in and taken direct, are aware of the fact that they don't really have a sound in the room — musicians get aware of these things very fast — so there are a lot of piano players, and guitarists and bass players who for years have relied on being able to punch in and fix notes. And this sometimes has a very negative effect on performance. But on the whole, prog-

ress is a wonderful thing.

In terms of the actual engineering, I've always been a great believer in professionalism. I'm not an engineer, and I'm not a musician. I would no more play the date for the musician than I would for the engineer. What I vastly prefer to do is to work with an engineer with some regularity, to where I am familiar with the man. I value the engineer far more than the room.

It is my feeling that, give or take some exceptions for rooms that you fall in love with, the chances are most professional studios are going to be roughly comparable or adequate. Particularly with an engineer who's good, he can make this room sound as good as that room. I consider the nature of the engineer far more valuable than the nature of the room.

**R•E•P:** There is a remarkable consistency of engineering in your albums in that the balances and the sounds are all very true. The drums always sound like drums, the piano like a piano ... there are only a few cases where this is not true in your work.

**OK:** Well, I must confess at being a bit surprised about that. I know I've had a consistency of attitude; I didn't know I had a consistency of sound as well. I'm not denying it, I just didn't know it. I was doing an RCA reissue with a fabulous veteran engineer named Ray Hall a couple of years ago, and he was trying to remember if he had ever done a session with me back in the old days, in the 1950s.

He was remembering one particular session which was a possibility, and he said, "All I remember about that session is that the producer wanted no echo." And I said, "If the producer wanted no echo, it must have been me." I have a feeling about natural sounds. If anything, I can be accused of being too dry. You talk about advantages of multitrack — for me, one of them is certainly being able to not use echo. When I record multitrack, I record dry; I think echo belongs to the mix and doesn't belong anywhere else. And if the musicians insist that they want to hear echo as they often do now, put it in the phone mix, but don't put it on my tape.

The most significant thing to realize in a relationship with an engineer is that he's a professional. He should know his job. A good engineer will give you choices: "Do you want the bass drum like this or like this?"

My philosophy of sound with jazz is that the sound is only a means to deliver the performance. If you talk about a consistency in my recordings, it is probably as a result of my wanting to be middle of the road with sound. I don't want extremes of sound. The sound should be as unobtru-



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sive as possible. I don't want a kick drum that calls attention to itself.

**R•E•P:** You say in your book that club owners are the last to know talent.

**OK:** Yes, although I might want to revise that and say that although they are the last, they may still be a little bit ahead of the critics. I've always been very suspicious of record reviewers and critics. As a producer I consider most reviewers my natural enemy. I'm aware that it's much more attention-getting to be negative; people remember bad reviews a hell of a lot more than they remember good reviews. And a good review is just saying an artist and the producer were effective, whereas in a bad review, [the reviewer] is saying "I am more discerning and I am more clever than either the artist or the producer." ■

## Selected Discography

- "Classic Jazz Piano," various artists.
- "The Cannonball Adderley Quintet in San Francisco," Cannonball Adderley Quintet.
- "Cleanhead and Cannonball," Eddie "Cleanhead" Vinson with the Cannonball Adderley Quintet.
- "Early Ellington (1927-1934)," Duke Ellington and his Orchestra.
- "New Jazz Conceptions" and "The Complete Riverside Recordings," Bill Evans.
- "Monk Suite," Kronos Quartet.
- "Wingspan," Mulgrew Miller.
- "The Complete Riverside Recordings," Thelonious Monk.
- "Portrait of Wes," Wes Montgomery Trio.

## Paul Goodman: Audio Restorer

In addition to working with Orrin Keepnews on some newly recorded records, Paul Goodman has been at the controls as "audio restoration engineer" for a number of reissues Keepnews has produced. In many cases, the source material for these reissues is pre-tape.

Throughout his career, Goodman has also engineered a large number of classical recordings for RCA Red Seal, including performances by the Philadelphia, Cleveland and Chicago symphonies. He has been nominated for Grammys 22 times, and has received three for best engineered classical recordings.

**R•E•P:** What do you use as source material for the reissues, for example, the recent Jack Teagarden package?

**PG:** The material for the reissues usually comes from metal — we dug down to get all the metal that was in the vaults. Do you know what I mean by metal?

**R•E•P:** You're talking about the metal parts used to create 78s ...

**PG:** That's correct. Initially the recording was done on hot wax — this was before tape — which was cooled and shipped out to the plant, where it was electroplated and metal parts were struck from that. And those are the parts that BMG Records still have on file.

The original part is the master. Then you have a mother, which is a playable part, and then you have a stamper, which is the one that was used for the actual pressing. Orrin and I want what is as close as possible to the original pull, whatever we can find. Most of the time I'll use the master, which is the inverted one. We have these styli that are specially made for us by Stanton, and they can play an inverted metal master.

**R•E•P:** So you have what amounts to a negative stylus?

**PG:** Exactly. It's actually two styli put together by Stanton; it forms a V. We get them in bulk because they don't wear too well. And I have several different sizes, a 5 mil, 4 mil, 3 mil, 3½ mil ... you have to experi-

ment to get these things to play right.

**R•E•P:** Have you done any recordings where you go farther back than wax?

**PG:** That's as far back as you can go.

**R•E•P:** I was thinking of Edison cylinders.

**PG:** Who has those?

**R•E•P:** It's funny you ask. Just the other day I was at a place called the Archive of Recorded Sound at Stanford and they're working on documenting all the recording sessions of RCA — known then as the Victor Talking Machine Company — from 1900 to 1950. They have some Edison cylinders.

**PG:** That's interesting. We haven't been using any material from back that far. The Edison wire stuff goes back to where there wouldn't be enough material for a commercial CD. I know there are some people working with that, but we're not.

**R•E•P:** Could you walk me through some of the process by which you clean stuff up.

**PG:** The first thing we do is get in as much of the metal as we can on any one selection, and we'll play them to find the best one. Whatever isn't bent too badly, from shipping or handling, we'll try to straighten and then we'll play it. I have to recenter many of the things. And we have to determine the speed, because a lot of them weren't recorded exactly at 78 rpm. We have several equalization curves to give us an approximation of what the cutting curve was in those days, and that varied rather considerably.

**R•E•P:** By curves, do you mean you dial up EQ for each individual selection?

**PG:** Not with an equalizer. Our maintenance people built three different equalization curves into our turntables, they're predetermined, the three best average curves, and we just choose the appropriate one. Because the stuff is so old, it would be impossible to find out exactly what the curves they originally used were; nobody knows. So at this stage, there's no equalization, just the playback curve, and we then transfer it.

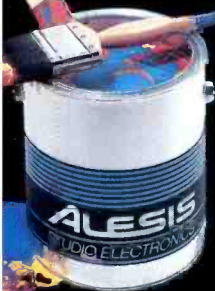


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**R•E•P:** What brand of tape do you like using for 1630?

**PG:** It changes constantly. We keep in house whatever brand of tape is giving us the least amount of trouble at a given time. We keep three brands in house, and if one starts giving a problem with more than one or two engineers we'll shift to another main brand and see how that is, and ship the other stuff back to the manufacturer. The three we're using at the moment are Am

pex, Sony and 3M. Actually they're serving us very well. Lately.

Then we send the 1630 out to Sonic Solutions for de-ticking and de-noising. I've gone out there a few times and they know our parameters. If the music is touched, they stop. I will take it with some noise left rather than have the music touched.

When it comes back, I'll do a spot check comparison with a 1630 that I kept here in New York, and if I find

that the music has been touched for any reason, I send it back out for them to redo. But they've been astonishingly good, I haven't had to do that at all lately.

**R•E•P:** So basically, to use their phrase, you're using them as a "dry cleaners." You don't have your own machine yet.

**PG:** That's right, although we will be getting a machine shortly. The Teagarden piece still has some clicks and noise, but it is far better than what it was, and well within what I would call acceptable limits.

After the tape comes back from NoNoise, we do a little EQ as necessary, but I try to avoid it whenever possible. My whole approach is very classical. I try not to interfere with the sound or change it in any way, but rather to represent it as accurately as possible. When that tape comes back cleaned, and you hear what was beneath the noise, it is amazing what is really there.

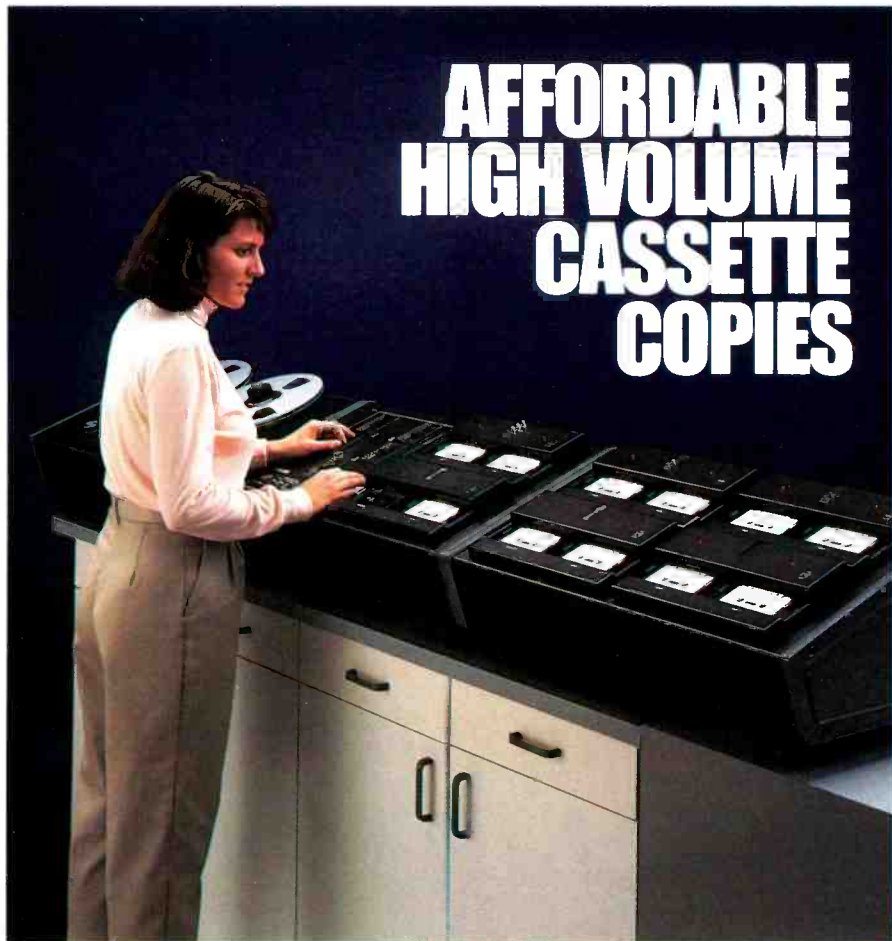
If there is a piano solo, for instance, that is too far back, I'll try to bring it up in level using EQ or limiting if I can do so without touching any of the rest of the music. The object is to try and not change the sound of what is there, but to just enhance it if possible. Some of those old recordings sound pretty good if you just leave them alone.

**R•E•P:** How involved do you get in the mastering?

**PG:** What I send out is the actual CD master. From me it goes to the plant, and they have no control over equalization or sound or level.

**R•E•P:** You've been working with Orrin on new recordings as well. What's your producer/engineer relationship like?

**PG:** It's very good. When you first start out with a producer like Orrin, you tend to step very lightly, to see if you're hearing things the same way he is. And we found that we pretty much hear and feel things alike. I stay out of the performance area and he has just minor comments as far as sound or pickup or whatever. And what we're doing in the studio seems to work. Usually we'll have sounds or balances up in the first 15 or 20 minutes, and then we're running. ■



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# OUTBOARD MIC PRE-AMPS:

## WHAT'S THE DEAL?

By John Hardy

**Y**ou would think that spending half a million dollars on an audio console would guarantee that you are getting the best mic pre-amps that money can buy. You might also think that the newest DAT recorders would have a pair of equally incredible mic pre-amps built in. Not necessarily.

True, not everyone is looking for the most accurate reproduction. Many pros deliberately want a not-so-perfect sound quality that happens to be perfect for the occasion. Like a "warm" sound for a vocalist, or just a touch of distortion for an instrumental overdub. A blues harp player might go to the extreme of using a tube-type guitar amp for his mic pre-amp. *Lots* of distortion. Perfect! Yet the engineer recording it might use the most accurate microphone he can get, to capture the sound coming from the guitar amp as clearly as possible.

And there at the end of the studio's mic cable is a console pre-amp that may not be doing its job accurately. Certainly some console pre-amps are better than others, but generally speaking, there is room for

improvement at most price levels.

Engineers often begin their careers with the misconception that all mic pre-amps are pretty much equal, and pretty much perfect. If you don't like the sound quality, blame it on the microphone (or the source), but never on the mic pre-amp.

Some magazines perpetuate this misconception by asking famous engineers which microphones they used for a particular hit record, but neglecting to ask which mic pre-amps they used. Most know, but few remember it's a package deal. The total sound is the result of both devices.

You can listen to a Neumann U87 through 10 different brands of mic pre-amps and get 10 different sound qualities. Just as engineers choose different microphones for different situations, they should also be aware of the fidelity options available from different pre-amps.

### THE LOST ART?

There is so much emphasis on digital circuitry these days that analog design is getting lost in the shuffle. An analog circuit that looks great on paper can be seriously compromised by improper grounding techniques, whether it is part of the PCB design, or part of discrete hand-wiring design. All parts to be grounded must have their own independent path to a central grounding point, logically called star grounding.

Even with massive copper ground areas on the PCB, or heavy bus bars within a console (or within a module of a console), there will still be a small, but measurable, resistance from one point to another in a grounding system. If two or more parts

share a common ground return path, they can interact, as the current from one part of the circuit flows through the resistance of the ground bus to the other.

Yet for ideal performance, each part of the grounded circuit needs to see absolutely 0V. If an audio signal is nominally 1V, and there is 1mV of error being induced due to shared grounds, there will be some kind of distortion or noise a mere 60dB below the signal.

I recall a digital voltmeter circuit I prototyped long ago using one of those plug-in proto-board things, complete with two long ground buses with many parts grounded randomly along the buses. When I shorted the input to ground, the display should have read 0.0000. Instead, it read anywhere from 0.0000 to 0.0014, depending on which point along the ground buses I chose to ground the input.

The 0.0014 represented 1.4mV of error caused by shared grounds. The digital circuitry was working flawlessly because it is generally immune to such errors. It was no longer my digital voltmeter experiment; it became my grounding technique demonstrator.

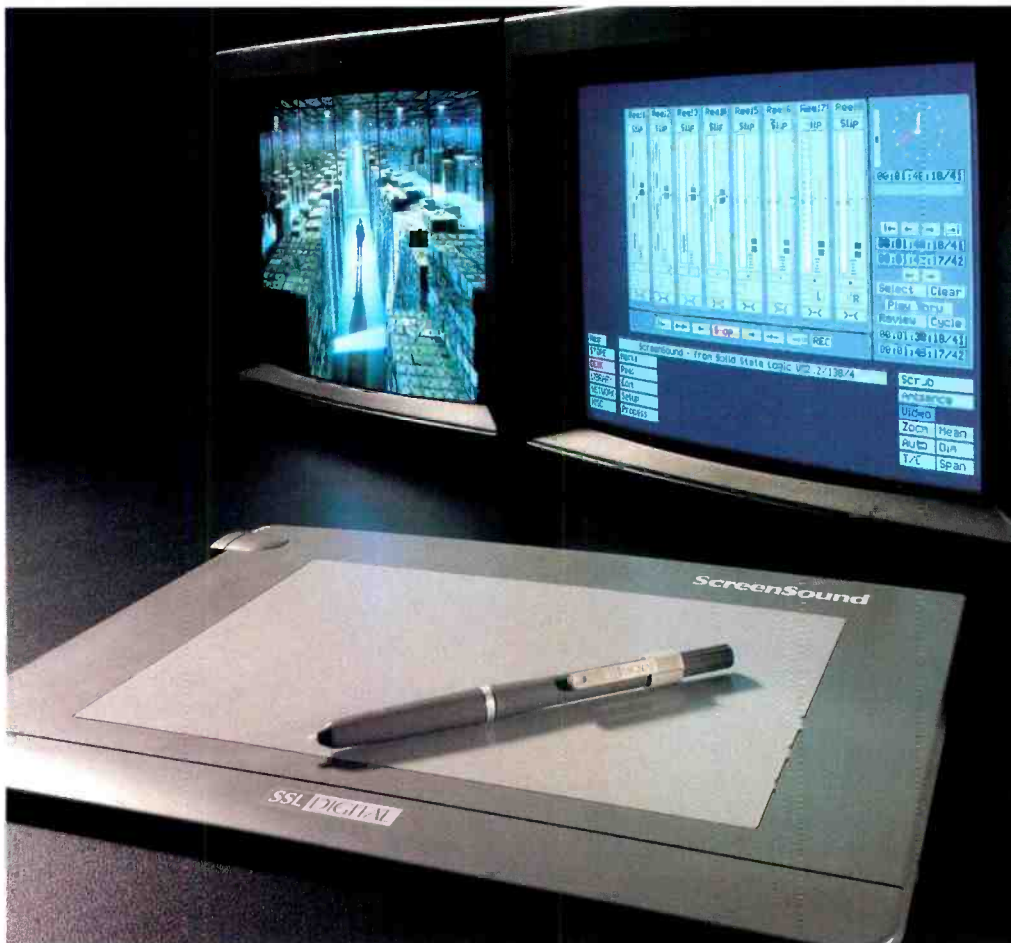
### CHOICES AND OPTIONS

Because stand-alone outboard pre-amps can be ideally designed, they seldom suffer from the design compromises and limitations found in many console pre-amps. Additionally, outboard pre-amps come in many technologies, shapes and sizes: with and without input transformers, and having monolithic op-amps, discrete op-amps or vacuum tubes for amplification. They may be rack-mounted or direct plug-in replacement into existing console slots.

John Hardy is the president of the John Hardy Co., Evanston, IL.



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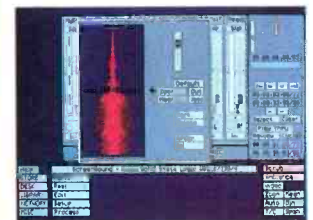
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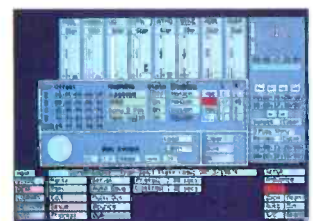
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There are those designed to be extremely accurate, while others are designed to add a certain desirable inaccuracy. They can cost hundreds of dollars or thousands of dollars for a pair of channels.

Some outboard pre-amps offer continuously variable gain controls, others offer stepped-gain switches with values of 5dB-per-step or so. A variable pot allows gain riding at the pre-amp, while a switch selectable gain control allows exact resetability, so alternate channels can be closely matched. Everyone has their preferences, and with outboard pre-amps you have choices.

Listing other attributes, some outboard pre-amps can handle higher input and provide higher output levels without distortion than stock pre-amps. Many have a higher slew rate and track high frequencies and transients better. Power-wise, there are many condenser microphones that require relatively high current from the phantom supply, and not all stock supplies can provide enough power. Outboard supplies with phantom power capabilities usually satisfy this requirement.

#### PERFORMANCE CONSIDERATIONS

Stepping back a moment, it's fair to ask why mic outboard pre-amps differ so

much from stock units and each other, performance-wise. Electrically, there are many ways that a pre-amp can alter the signal coming from a microphone. One basic issue is improper matching of the microphone's output impedance to the mic pre-amp's input impedance. If all microphones had an output impedance of exactly 150Ω at all frequencies, and all mic pre-amps had an input impedance of 1,500Ω at all frequencies (including frequencies far above and below the basic 20Hz-20kHz range), this critical interface between microphone and mic pre-amp would not cause any error in frequency response.

The problem is that many microphones have an output impedance that varies with frequencies, and many mic pre-amps have an input impedance equally variable. This affects performance in any of several ways, including a possible rise in high frequency response, a roll-off of high frequencies, or a roll-off of low frequencies. There could be a resonant peak in the high frequencies, higher distortion, reduced maximum output level, or even some microphone instability in extreme cases. Sometimes the effect is helpful, but more often it is not.

These impedance variations can be

caused by a poorly designed output transformer in a microphone, or a poorly designed input transformer in a mic pre-amp. Perhaps each of those transformers is superb, but not the appropriate impedance for each other. The same thing can happen with transformerless microphones and transformerless pre-amps.

Regardless of whether a microphone or mic pre-amp is transformer-coupled or transformerless, there will unavoidably be residual capacitances, inductances and resistances present that create these impedance variations. Recall that these are the basic components used in equalizers and crossovers to deliberately create variations in frequency response. The best mics and pre-amps will be designed so that these variations occur well beyond the audio bandwidth, but the errors can start to creep in before you know it. When you add the capacitance of a long mic cable to the equation, the errors are even more pronounced.

#### TRANSFORMER INSIGHT

Which begs the question: which is better — a mic pre-amp with a transformer-coupled input, or one that is transformerless? Much of that depends on the char-

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acteristics of the transformer.

All transformers have a maximum signal level they can handle before distortion becomes excessive and the core material begins to saturate. All else being equal, a small transformer will saturate before a big one will, and the lowest frequencies will be affected first. Sometimes the distortion caused by core saturation can be used to creative advantage, depending on the type of sound one is looking for.

All things considered, a transformer with a low impedance ratio will be more linear in total performance than one with a high ratio. A low impedance ratio transformer (typically 150Ω:600Ω) will have flatter frequency response, flatter input impedance and more linear phase response than one with a high impedance ratio (typically 150Ω:15Ω or higher). The impedance ratio is generally dictated by the requirements of the amplifier that follows the transformer.

Steel-core transformers are less expensive than nickel-core transformers, but the best nickel-core transformers will clearly outperform the best steel-core ones, assuming you are looking for the highest accuracy.

There are even differences between the nickel-core materials. The two most com-

mon nickel materials are the "50% nickel" material, and the "80% nickel" material (often called Mu metal, which is actually a trade name used by one core supplier). The 80% nickel material is best for audio, but there are many sources for the material, and substantial variations exist in performance, depending on the source.

To get further insight into transformers, let's look at three popular Jensen models, the JE-115-KE, the JE-13K7-A and the JE-16-B. The JE-115-KE has a high impedance ratio (150Ω:15kΩ), the JE-13K7-A has a medium impedance ratio (150Ω:3,750Ω) and the JE-16-B has a low impedance ratio (150Ω:600Ω). All three use a proprietary 80% nickel-core material. The one that is commonly used in high-end recording consoles is the JE-115-KE.

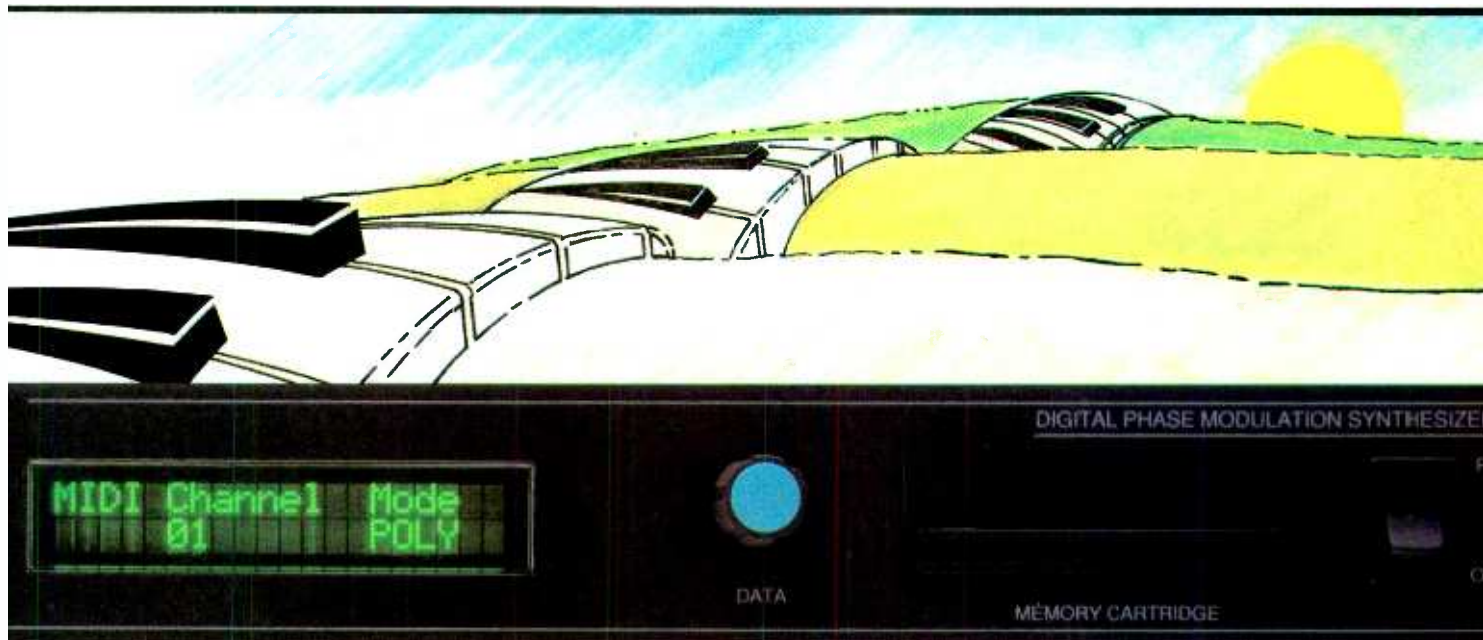
An interesting point is that the JE-13K7-A is an even better transformer than the latter because of its lower impedance ratio, yet it is generally not used in consoles due to numerous circuit design and cost considerations. Even more interesting (or disappointing) is that the JE-16-B is superior to both the JE-115-KE and the JE-13K7-A because it has the lowest impedance ratio of them all, yet the JE-16-B is not used in consoles either! The JE-16-B is availa-

ble in a variety of outboard pre-amps and retrofit cards, however.

#### ELECTRONIC ANSWERS

Transformerless mic pre-amps are popular at least in part because they are much cheaper to make than a mic pre-amp with a transformer-coupled input. They are also smaller and lighter. Instead of costing anywhere from \$35 to more than \$100 for a premium input transformer, a few inexpensive transistors can provide the balanced input capability, while a pair of 10-cent capacitors can be used as input coupling capacitors to keep the 48V phantom voltage from damaging the transistors. You can see the temptation of some designers (or accountants) to go for the transformerless design, since it can offer performance that in many ways rivals that of the better transformer-coupled designs, at a fraction of the expense.

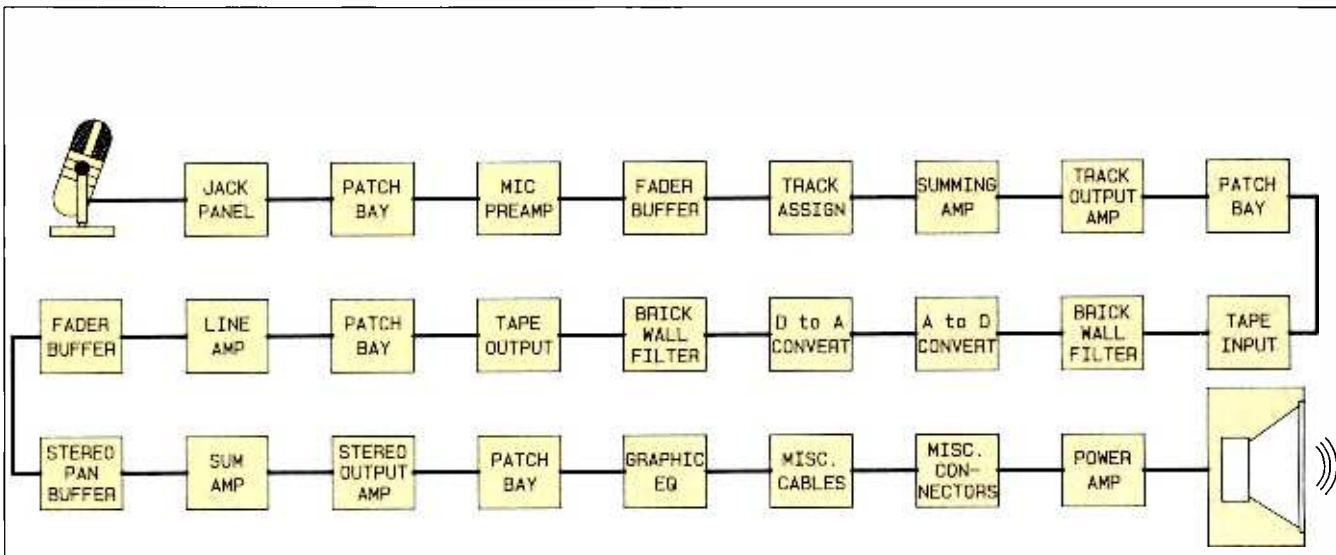
As with most things, there are excellent transformerless pre-amps and there are marginal ones. One limiting factor will be the type of capacitor that is used for the input coupling capacitors. An input transformer will naturally block the phantom supply voltage and keep it from reaching and damaging the amplifier circuit, but the capacitors must do that job in a transfor-



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**Figure 1.** A tortuous path: by the time audio passes through a typical signal chain, the result may not be pleasing to your ears.

merless circuit.

Unfortunately, the entire audio signal must pass through the capacitors in transformerless designs, and the problem of dielectric absorption in the capacitors will tend to smear the sound. Capacitors with a Teflon, polypropylene, polystyrene or polycarbonate dielectric are preferred since they have much lower dielectric absorption properties than others.

A clear disadvantage of transformerless inputs is that although good low voltage common-mode rejection ratios can be achieved, common-mode voltage *range* is extremely limited. A transformer might have a common-mode voltage range of typically 1,000V, which is the basic breakdown voltage of the windings. But transformerless inputs are limited by the voltage rating of the input coupling capacitors, as well as the voltage limits of the op-amp that they are protecting.

If the electrical noise or interference that is picked up by the mic cable exceeds the power supply voltages of the op-amp (typically bipolar 18V), you no longer have your rejection of common-mode voltages. Radio frequency interference and interference from solid state light dimmers can create induced noise voltages that approach or exceed the supply rails of the amplifier.

### GAIN STAGES

In the early days, vacuum tubes provided amplification. Thereafter came the solid state transistor. Discrete op-amps were constructed using individual, or "discrete", transistors and other parts. Then came the "miracle in a can," the monolithic op-amp, where a complete op-amp circuit could be fabricated on a single 1/16-inch square "monolithic" chip of silicon.

Occasionally, discrete transistors are added in front of the inputs of a monolithic op-amp to provide lower noise than the op-amp is capable of on its own. Discrete transistors are sometimes added after the output of a monolithic op-amp to increase the output power of the op-amp. These are called semi-discrete circuits (or sometimes semi-monolithic or hybrid circuits).

Some people prefer the sound quality of a tube pre-amp, claiming it has a warmer and smoother character than solid state pre-amps. Tubes have the advantage of going into distortion gradually at higher signal levels, and this distortion can be pleasing in controlled amounts. On the other hand, solid state pre-amps have very little distortion until they reach their maximum output level, where distortion rises rapidly. This is not as pleasing.

Solid state pre-amps are sometimes thought to be cold and harsh-sounding, but it is important to realize that only *some* solid state pre-amps are cold and harsh. Don't condemn them all; it depends on the individual design of the solid state circuit. It's the same story for op-amps, although many feel the discrete op-amp has the highest potential among the solid states for the best possible sound quality compared to monolithic op-amps. This is true specifically because each transistor, diode, resistor and capacitor in a discrete design can be carefully and individually chosen and optimized for its specific function within the circuit.

In a monolithic op-amp, substantial compromises must be made because there are process limitations inherent in monolithic construction. For example, it is difficult if not impossible to fabricate the best possible input transistors with their unique requirements, *and* the best possible output

transistors with their radically different requirements, on the same tiny silicon chip.

Another disadvantage of monolithic op-amps is their size. In the case of our Hardy 990 discrete op-amp, each output transistor is fabricated with a silicon chip that is larger than an entire monolithic op-amp. This allows the 990 to have higher output power, which makes it possible to use lower impedance parts in the feedback loop, all providing lower noise. The higher power also makes the 990 a better line driver than typical common monolithic op-amps.

Additionally, there are voltage limitations to monolithic op-amps, putting a ceiling on total dynamic range. Most operate on a bi-polar 18V power supply rail, while a discrete design can operate with 24V supplies or higher, providing greater headroom.

### DIRECT TO STORAGE

Many engineers use outboard mic pre-amps so they can completely avoid the recording console and the potential degradation of sound quality it may cause from the sheer quantity of amplification stages: fader buffer amps, eq amps, summing amps, channel output amps, switches, connectors and more cable.

Whenever possible, most users of outboard pre-amps go straight to the tape deck or disc drive. If needed, a limiter can be patched between the pre-amp and the storage medium. The rule is: Keep It Simple.

Additional improvement to the sound quality can be had by putting the pre-amps as close as possible to the microphone, allowing the use of a very short mic cable. Low microphone voltages are very sensitive to the effects of cable capacitance. The longer the cable, the higher the ca-



capacitance, and the greater the deterioration of sound quality.

In a typical studio the mic cable length could easily reach 100 feet by the time it gets to the console's mic pre-amps. In a remote recording situation or PA system, a mic cable could reach at least several hundred feet in length. Instead of traveling hundreds of feet at mic level, it is better to use a 10-foot low capacitance mic cable to an outboard mic pre-amp, with the signal then traveling the remaining distance at line level. The higher voltage, lower impedance line output of a pre-amp is usually much better equipped to drive long cables than a microphone is.

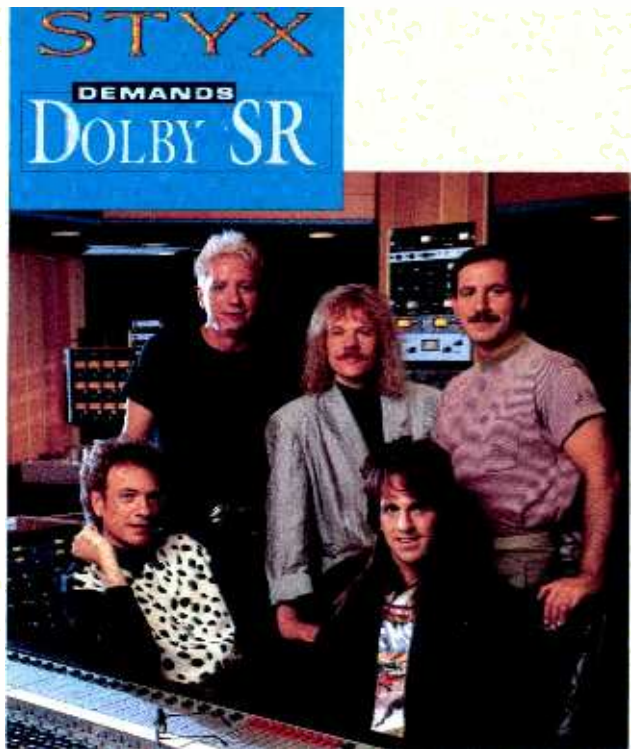
Another advantage to traveling long distances at line-level rather than at mic level is that you can achieve a much better signal-to-noise ratio. If your microphone signal travels a long distance at -50dBV, and there is noise being picked up by the long cable at a -80dBV level, you have an S/N of only 30dB. If you first amplify the signal with a local outboard pre-amp, you can send the signal the entire distance at line level, typically 50dB or so higher. This increases your S/N in the above case to 80dB. Not bad!

#### PERSONAL RACK

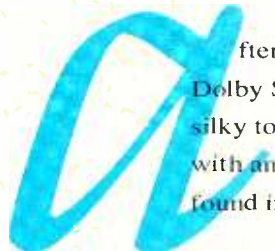
Many engineers are assembling their own personal rack of mic pre-amps and other goodies such as limiters, digital delays, etc. That way they can offer not just their superior talent, but also a superior rack of specialized equipment. They realize that no single mic pre-amp is right for all occasions, so they bring a variety of pre-amps with them. We know of several people who bring a rack of 12 or more channels of pre-amps with them wherever they work.

Bottom line: Understand the benefits and limitations of your console pre-amps. Then try every outboard pre-amp you can get your hands on. Get to know each one intimately. Try every microphone in every pre-amp, under as many diverse situations as possible. But be certain that your evaluations are done under the best possible conditions, and make sure you know what the rest of the audio chain sounds like. Please refer to the article "Proper Mic Pre-amp Evaluation Methodology" [R+E+P, November 1988, page 30] for more information.

I promise you, if the only pre-amps you have ever used are stock console pre-amps, you may be surprised, even shocked, at how different a particular microphone will sound through some of the various outboard pre-amps. Whether it's an abused SM-57, or a brand new large diaphragm ultra condenser microphone, you *will* be surprised. Find new combinations and special applications. Learn. You won't know until you try. ■



Alan Sillman



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A short treatise on miking speaker cabinets.

# RECORDING INSTRUMENT AMPLIFIERS

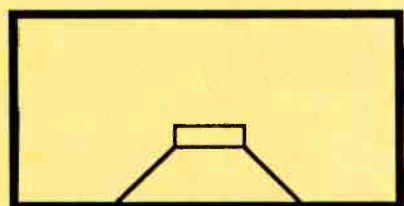
By Mike Joseph

**T**here's more than one way to mic up a speaker cabinet, although few people have the inclination, the desire to pursue the unknown, or even the time. In the crush of a session, the easiest and most efficient act an engineer can do is stick a 57 or 421 on a desk stand and aim it right down the throat of an amplified 12-inch. Whether guitar, bass, miked mouth harp, Rhodes or synth, the sound will be a fairly close approximation of what the amp is doing.

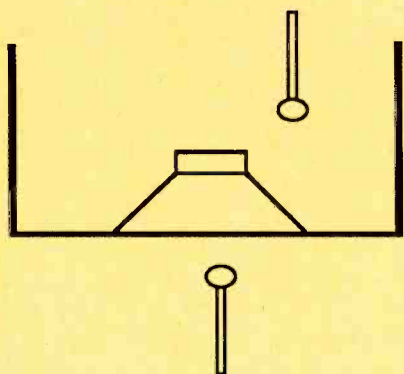
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Mike Joseph is technical editor of R•E•P.

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*Figure 1. Playing the polarity and phase differences of two mics against each other.*



*Figure 2. Miking an open cabinet on both sides provides infinite tonal variations.*

But what if you're looking for something a little different, say a fat, deep sound, bigger than the one amplifier cabinet alone? Or how about achieving tonality shifts without relying on external processors? Or maybe discovering a sharp way to get the sound of a multi-cabinet stack onto one track? What then?

Here are some tried and true ideas collected over years of sessions, with no little input from other studio warriors. We hope they contribute to the general pool of shared technique. As always, rules and regulations need not apply.

As background, remember that all the traditional tonal tricks apply — cabinets placed flat on the floor sound fuller because of coupling to the ground plane (half space loading); or on a chair or up on a road case, slightly thinner (closer to free air response or full space). A second mic or two in the room provides air, ambience and room sound, pending distance and balance between direct and indirect sound fields. Closer miking provides bite and mic proximity effect, and distance adds blend or roundness. And, of course, stereo gives perspective, depth, air and the all-important phase difference information.

#### BASIC INSTRUMENT AMPLIFIERS

On open or closed backed cabinets, put the first mic in front of the speaker as you normally would. Position it for a fuller or warmer sound, often just off axis. For tonal variation, take a similar model microphone and place it about a foot in back of the first, also aiming it straight at the speaker (see Figure 1). Moving the second mic further away (up to several feet) will vary the depth of the sound, playing with the perceived fullness or spread of the signal.

For an acoustic phase shift (not unlike the sound of a phase shifter or flanger stuck in mid-sweep), flip the polarity (the misnamed "phase reverse switch") on one mic and place it beside and slightly in back of the first. Slide it back and forth, up to several feet. This usually provides more tonal variation than any combination of on-amp tone controls.

On an open-backed cabinet, place the primary mic as you normally would, but place the second mic in back of the cabinet (see Figure 2). Find a position that provides a satisfactory sound, taking into consideration the myriad cabinet resonances and colorations inside the box. Start out with the polarity switch reversed on the second mic's input channel. By moving the front microphone back and forth, multiple tonal variations can be created. The balance between the two can be manipulated on the board to arrive at a sound much larger than one mic alone.

In addition to the obvious stacking of cabinets or multiple mics in front of mul-

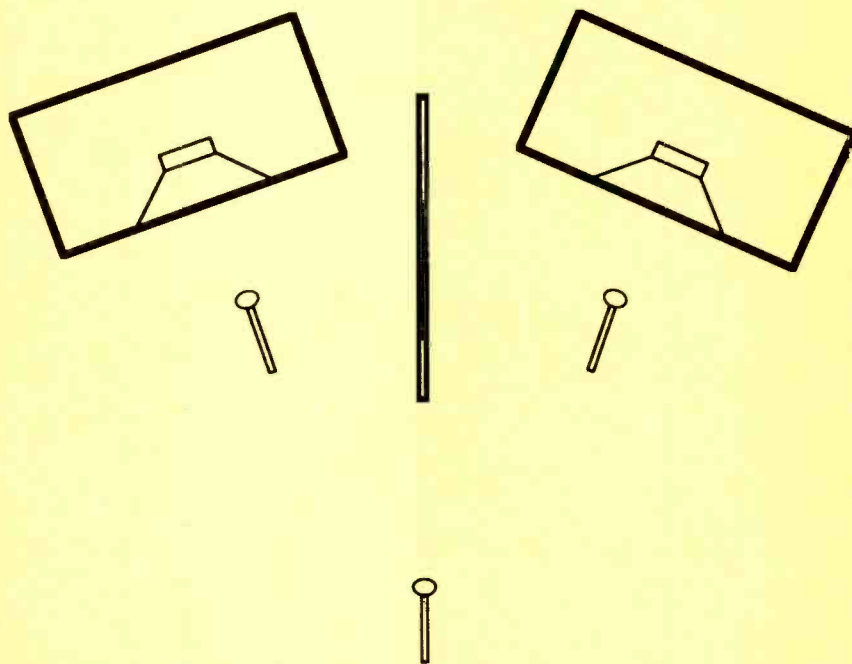


Figure 3. Two speaker cabinets, angled together, allow great variation in perceived size, width and depth.

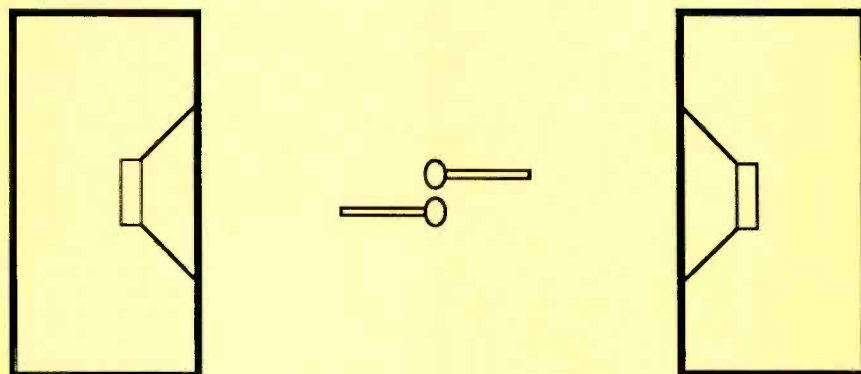


Figure 4. Placing the mic in the middle, using two cardioids, an omni or a bidirectional.



multiple speakers, a greater fullness and depth from one instrument can be added by using two speaker cabinets off one amp, or conversely "Y"-cording the one instrument into two amplifiers (assuming a mono source). Separate the two cabinets by six or eight feet and angle them in slightly, aiming both at a point 10 feet or so away (see Figure 3). Room size will determine the exact dimensions.

Place a close microphone in front of each speaker cabinet, varying mic brand or distance to attain the size and depth you are looking for. Anything from touching the grill cloth to six feet away works. Try different positions for each cabinet. Place a third mic at the point where the cabinets intersect.

By varying the physical placement of the microphones, sliding one cabinet forward or back, and/or altering the mic channel polarity, an infinite number of tonal variations and acoustic space sizes can be approximated. As an added variation, try placing a gobo between the two amps to maximize separation and control leakage into the primary mics.

A twist on this trick has two cabinets aiming directly at each other, with two cardioids in the middle, back-to-back, or an omni or figure-of-eight (bidirectional) mic in the middle (see Figure 4).

#### ACOUSTIC IMAGING

A number of useful sounds can be created by placing the microphones and cabinets in unusual environments. A small, tight box created out of gobos, cushions or packing blankets can add a deep deadness that is ideal for source placement into an artificial digital environment. Alternately, placing a cabinet at one end of a long hall and a mic at the other end will add delay, space and openness far more complex than any program patch.

Positioning hard reflective planes around a speaker cabinet, whether glass plate, mirrors, or shellacked plywood, can create a highly dense sound filled with numerous short standing waves and reflections. Aiming the mic or mics at the surfaces themselves, as opposed to the speakers, adds a midrange quality very unlike that found in the direct field.

Aiming the speaker cabinet directly at the control room window, with a pressure zone boundary layer mic taped to the surface, creates a whole different flavor. Of course, there's nothing to stop you from folding back any sound already on tape to a studio instrument amp.

Re-miking a pre-cut track using any of the above techniques adds a whole new level of organic unnatural effects. Occasionally something as simple as original dry sound panned right and re-miked amplified sound panned left, or maybe dry center and digitally affected, re-amplified

signal delayed hard left/right, adds a quality that rack boxes just can't provide.

#### OVERALL PERSPECTIVES

Try any of the suggestions mentioned, or add your own variations. One may just satisfy the timbral need for that unique instrumental sound on your next track. Just remember that in the final call, the larger the bag of tricks you have in your experiential possession, the more you'll have to contribute to the project at hand. However, just in case you need overall perspec-

tive on the meaning and importance of all this, I submit the following:

There is an anecdote about Frank Zappa from many years ago. When asked how he got that gigantic Marshall stack sound on one of his tracks, Frank reported that it had been very difficult. He had placed a battery-operated Pignose portable on its back pointing straight up, hung a cheap dynamic over it pointing straight down, and plugged right in. The sound was huge and airy, with no board tweaking necessary. Which just goes to show . . . ■

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# Master

## OF THE MICROPHONE

By Dan Levitin



**Read and learn from one of the best: Bruce Swedien talks about how he chooses and uses microphones.**

**B**ruce Swedien is one of this industry's masters of microphone technique. Just listen to anything in his vast body of work — artists such as Michael Jackson, Duke Ellington, the Chicago Symphony, several movie soundtracks and many commercials — and it's readily apparent that his mic technique is artistic.

Because he is such a widely acknowledged mic master, **R•E•P** decided to interview Swedien on a single topic — how he uses mics. His "sixth sense" to using mics is the result of more than 30 years of experience.

Swedien shows no signs of slowing down. In addition to building a home studio, he's recording most of the new Michael Jackson record and is producing three songs on it.

**R•E•P:** How do you mic drums?

**BS:** I've always treated drums as more of a series of instruments, rather than as a single instrument. Over the years I've developed a few favorite mics. For overheads, I'll either use the B&K 4006s [omnis] or a pair of Neumann U67s [cardioid]. I usually go for some kind of an X-Y configuration. The type of music dictates how close to the sound source I might be: If it's more rock and roll type drums, I'll move the mics farther back, farther away from the kit.

On the snare drum, I'll use anything from a Shure SM57 to a Sennheiser 451 or 452. I usually go for a single microphone. I've tried miking both the top and the bottom but I run into phasing problems, so I don't do that much.

For the hat I usually go with a 452, but if it's jazz or be-bop, I might even go for a ribbon mic like an RCA 77, because it's so smooth.

**R•E•P:** Do you mic the hat at the crack or from up above?

Dan Levitin is a contributing editor to R•E•P and an engineer/producer based in Stanford, CA.



**BS:** Above, but quite close, usually three to four inches.

**R•E•P:** Do you have a preference for a particular brand of cymbal?

**BS:** No. Again, that really depends on the type of music being played more than anything else. There's no one type that's good for everything. I built a little 12-inch square baffle made of plywood and lead, and it goes in between the snare and the hat. With that I can usually create an acoustic shadow over the snare drum to keep some separation between the hat and the snare. Of course, you have to be careful to stay out of the drummer's way.

**R•E•P:** How about the kick?

**BS:** My favorite is a 421, but I'll end up using anything from a Neumann 47 FET to an Electro-Voice RE-20, depending on the type of music or the type of sound I'm after.

**R•E•P:** How far in do you place the mic?

**BS:** Usually, not very far in. But for those situations that demand it farther in, I had a special kick drum cover made with a zippered hole in it, so the kick mic can sit real close, and the cover reduces the sound of the other drums leaking in. If you listen to [Michael Jackson's] "Billie Jean," and listen to the sound of that drum set, you'll hear the first time I used that device.

**R•E•P:** And you usually record with the rear head off the drum?

**BS:** Yes, but when I use my cover, it's almost as though there were a rear head.

**R•E•P:** Do you mic any differently when you're recording a sample?

**BS:** Nope, exactly the same. I'm a frustrated drummer and bass player, so I spend a lot of time playing and sampling myself. I don't like the idea of stealing someone else's sounds. As a result, a lot of my drum sounds are new and fresh, because I know how to mic the drum, and I know how to hit 'em to produce certain sounds, and certainly to record them.

**R•E•P:** How do you try out a new mic?

**BS:** Well, I get new mics all the time. I just try them out with different sound sources. I got one a few weeks ago made from some company back east — I forget which one — and it sounded terrible. To me, microphone technology, and the art of making high-quality condenser mics, matured about 30 years ago. One mic that is new that has impressed me is the Milab VIP-50. To my ear that's one of the best new condenser mics to come along in at least 10 years.

**R•E•P:** The last one being the TLM 170?

**BS:** Right. The TLM is an OK mic, a pretty decent mic.

**R•E•P:** But it's still pretty noisy ...

**BS:** Yes, it is. I said it was a decent mic, not a wonderful mic.

**R•E•P:** What about the B&Ks? Are they the quietest mics you've used?

**BS:** Yes, I'd have to say so.

**R•E•P:** I wonder why more people don't use them.

**BS:** You're right, I've never understood why. I use them a lot. They're absolutely



*Pieces from the Swedien Collection (clockwise from top): Telefunken 251; Neumann U47; Shure SM7; and an RCA BK44.*

one of my favorite microphones. I have a pair of the omnis that they matched at their factory for me, and they also made me a special stand for X-Y technique that's calibrated with numbers so I can recreate a position easily.

**R•E•P:** You must have some outboard mic pre-amps that you carry with you.

**BS:** I have several. I have a GML, Neve, Studio Technologies. My all-time favorite is the Neve, but each pre-amp sounds quite different. The control room that I'm using now, which Ocean Way built for me, has a gigantic Neve 8078 console in it, and those mic pre-amps are pretty impressive just stock. But I have a Neve of my own, and the module in that is the 1064, which is a 3-band EQ with Class A electronics, and to my ear that's the best sounding mic pre of all. There are two of those that are actually in the same class: the 1064 and

the 1073 module, and sonically, those two blow everything right out of the water.

**R•E•P:** You're famous for having brought less-expensive mics into expensive recording with the Shure SM7 and Michael Jackson.

**BS:** A lot of people talk about that, but really, that's only one of many microphones that I've used on Michael, and I did that for a specific purpose. It was the color of that mic that I was looking for. For certain pieces of his music, I'll use my Telefunken 251, which is anything but a cheap microphone.

**R•E•P:** The story I heard through the engineer grapevine is that for "Off The Wall," you went out and bought 10 SM7s and lined them all up and picked out the best one.

**BS:** That's almost right; I picked out the best three. And then in addition to that, I have recently bought another one. They all sound a little bit different, but overall they're fairly consistent. The song I used it on first was the song with all that bottle percussion, "Don't Stop 'Till You Get Enough." But then on "She's Out of My Life," that's my 251.

You can't use one specific microphone for everything. There's no such thing as *the* vocal mic; I've never believed in that. On "Thriller," there are probably five different microphones in use on his solo vocals. Between the leads and the backgrounds I definitely change microphones.

Michael's rhythm and concept is so wonderful. When I record Michael doing vocals I put him on my drum platform, which is an 8-foot square platform of unfinished plywood. The reason I do that is that Michael dances and he snaps his fingers and he claps and he moves all the time during the recordings, and I try to keep as much of that in the vocal recording as I can. I think it takes the overall image of our work past being a pristine studio recording and makes it feel more human.

**R•E•P:** Don't you get all kinds of shoe-on-plywood noises and things like that?

**BS:** Absolutely, and I love it! Also, the reflective sound of his voice off the plywood back to the microphone is a big part of the sound that way. I'll move the mic and angle it down a bit sometimes toward the wood to get even more of that. I've got a special mix of "The Way You Make Me Feel" that I play at seminars I give, with just the vocals in it so that people can hear how much of that stuff I leave in; they're always amazed.

**R•E•P:** What part of the mic do you like to have people sing into?

**BS:** Straight on, right into the diaphragm.

And I hate those damn pop screens and wind screens, because they change the sound of the vocals.

**R•E•P:** Do you have any special techniques for avoiding sibilance?

**BS:** I can't say I've encountered sibilance very often. Usually by the time I get to work with someone they've achieved a little bit of success, and as a result, they're pretty well aware of, and conditioned to, the recording process. With Michael, or Patti Austin or Michael McDonald, they're so used to the recording process and so professional, they'll take care of the essences and pops for you if you make them aware of it. I guess I've been fortunate.

**R•E•P:** Do you have any advice for engineers who might be less fortunate and are encountering sibilance?

**BS:** I guess you would have to rely on a windscreen. Also, of course, you want to stay away from the mics that would aggravate that. For instance, a Tube 47 is the last mic you'd want to use. You develop a sixth sense with microphone technique. It takes years and years to do it, but you'll be able to hear someone speak and know instinctively what mic to put up.

**R•E•P:** Do Neumanns really sound different upside-down?

**BS:** I think they do. Especially the older ones, like the U47s. I really don't know why that is. I do know that the finish on the capsule makes a big difference in the sound of the mic, so maybe if you have it up one way or hanging the other way the reflected sound off the screen may change. I usually use them upside-down. My Telefunken 251 that I bought new in 1961 is the most incredible-sounding 251 I've ever heard.

**R•E•P:** How do you deal with proximity effect and vocalists who are moving around a lot during their performance?

**BS:** I try to use proximity effect as a tool. The effect is more noticeable with certain mics, say on ribbon mics with a large ribbon element. Large capsule condenser mics have a great deal of proximity effect. If you have a thin voice, by moving the sound source closer to the mic, you can use proximity effect to emphasize the low end without having to use EQ.

**R•E•P:** When you first go out into the room to record something, what do you listen for before you put up a mic?

**BS:** Spectrum, meaning the balance of high end to low end and so on, and whatever the voice or instrument sounds like, I try to re-create. Depending on the quality of the performer, I would feel it's my responsibility to re-create that quality if it's unique.

But then, you run into other situations where you want to help a little. I might use a microphone then that I know would create a certain effect and maybe improve an area of the voice that may be a little weak. For instance, using proximity effect and a ribbon microphone as I said, to give a voice some low end that it may not have naturally.

**R•E•P:** Have you done much symphony recording?

**BS:** My start in the industry was in classical music in Minneapolis, and then I worked for RCA Red Seal for a year recording the Chicago Symphony and the Chicago Strings. [Swedien recorded the now-classic version of "Also Sprach Zarathustra" by Fritz Reiner and the Chicago Symphony — Ed.]

**R•E•P:** Do you still do classical dates?

**BS:** Nobody asks me. I'd love to, but no one asks me anymore. I guess I have a different reputation now.

**R•E•P:** What's your microphone philosophy there?

**BS:** Classical music requires a totally different approach. You would almost always rely on a single pair that would be in an X-Y pattern above the conductor. Then depending on the music, if there are a lot of woodwind solos, for example, you'd want "sweetener" mics to mix in. To tell you the truth, it's actually a little boring.

**R•E•P:** Why is that?

**BS:** Because the most that you can do in classical, or even jazz, I'd say, is to recreate the original sound field. After a while it makes me feel like I'm taking dictation, and I start yawning and looking around the studio for something to do. For the past few years I've felt it's my responsibility to take the sound field past reality and to put it in terms of my own imagination; to try to create something that couldn't appear in nature. Of course, you're not supposed to do that with classical. The conductor would get all bent out of shape.

I've always viewed myself as an artist. As such, I don't think a real artist even tries to paint the true reality of a vision. What I try to do is paint my concept of reality, mixing it in with my imagination. Do you understand what I mean?

**R•E•P:** You're describing the difference between the Renaissance painters trying to capture reality perfectly, and the impressionists who had no desire to do that: Cezanne, van Gogh, Monet ...

**BS:** Right, who would capture his own interpretation of reality and put that on canvas. To me that's where my work falls — to try to make the sonic sound field have

a life of its own as something that's completely different and, as I said, couldn't possibly occur in nature. The idea of that is so exciting to me I get excited just telling you about it — that's really what's kept me going. And for a guy who's 56 years old to be waking up in the middle of the night with new ideas for building a new studio, I think that's pretty incredible. I'm as excited about that as I was when I was 19 and built my first studio in Minneapolis. [See the sidebar, "Bruce Swedien's Home Studio."]

**R•E•P:** What would you use on a horn section for a pop album?

**BS:** A lot of times, I'll use ribbon mics. I have a bunch of RCA ribbons that I bought new. I love the sound of them on brass. My inclination is usually to go with as few mics as possible, miking the section as a whole, if possible.

Generally, I try to avoid anything that's going to introduce potential phase problems, whether it's from too many mics, or too much EQ.

***"For the past few years, I've felt that it's my responsibility to take the sound field past reality and to put it in terms of my own imagination, to try and create something that couldn't appear in nature."***

**R•E•P:** Do you use Monster Cable?

**BS:** Absolutely. I'm a believer in Monster Cable. There are some applications where its effect is really dramatic. They brought a harness down for me to go from the output of the console to the input of my 2-track. I could've sworn when they hooked that up that someone threw an equalizer in there. It added so much top and bottom and clarity that I can't live without it now.

We were talking about mic pre-amps and there's something I should add to what I said earlier. When I use an outboard mic pre-amp, I'll usually put it out there in the studio with the singer, and I'll use Monster wire from the mic to the pre-amp, and then run line level into the control room.

**R•E•P:** So your shortest run is from the mic to the pre-amp.





A man and his mics: Swedien has more than 85 in his collection, dating to the 1950s.

**BS:** Yes, exactly. I think mic pre-amps all sound different, and so there's no best mic pre-amp. Each application is different. If I want the pre-amp to be absolutely invisible, I'll get out my GML. But you don't always want that.

**R•E•P:** How do you get some of the 3-D and spatial effects you've been experimenting with?

**BS:** I've been playing around with binaural for many years ...

**R•E•P:** Binaural being where you take a dummy head and put microphones where its ears are ...

**BS:** Yeah, and you reproduce the space between the human ears. As far as 3-dimensional sound, that's the most startling and the most effective.

**R•E•P:** Do you use ordinary mics for that?

**BS:** No, usually a couple of miniature condensers. But to really reproduce that effect, it has to be heard back on headphones, which is a socially impossible situation. It's pretty hard for a bunch of people to be at a party and sit around sipping martinis with earphones on.

**R•E•P:** And yet you do have some spatial stuff on "The Dude."

**BS:** Yeah, I tried to. It's funny that you say that — very few people noticed. But the Walkman had just come out, and I thought, "Oh, boy, I've got a captive audience plugged into earphones, ready to experience binaural sound," and I thought, "Man, I'm gonna kill 'em." But very few people noticed. I did almost all the percussion in binaural, and if you listen in earphones you can hear the percussion instruments coming from all over.

**R•E•P:** The frustration, though, is that no matter where I sat with my head between my speakers, I couldn't replicate that.

**BS:** That's right, you can't, the reason be-

ing that you lose the polar response of the sound source the minute you put it on speakers. That's another reason that very few people go into or understand stereophonic microphone technique.

The polar response of a sound source is so fragile that if you're not careful you can lose the whole effect. And most people don't truly understand stereo to begin with. They think that by having something come from the left speaker and something different come from the right speaker that's stereo, and that's the furthest thing from the truth. That's what I call "2-channel mono" — it doesn't sound anything like the original music.

**R•E•P:** Roger Nichols says the whole point of stereo is to try to re-create —

**BS:** — the original sound field. Roger is right on the money. ■

Photos by Elizabeth J. Annas.

## Bruce Swedien's Home Studio

"I built my first studio in Minneapolis when I was 19. We bought an old movie theater and converted it into a studio, and it's still a world class recording facility. This new studio I'm building is a dream I've had for 35 years.

"My wife and I have a horse ranch outside of Thousand Oaks, CA. There was a tennis court there when we bought it, but in the 11 years we've lived there, we haven't once played tennis! So I took the tennis court out and I'm building a small studio.

"The studio will be really just one room, a control room, of about 1,500 square feet. It's a combination studio and screening room. I was the designer and the architect. I've hired a contractor who has worked with me on a number of projects around the ranch. I had quite a bit of training in acoustics at the University of Minnesota when I was young — I lifted the dimensions of this room right from the textbook. There are no two parallel surfaces, it has a coffered ceiling, so the ceiling isn't parallel to the floor. The dimensions are 21' x 35' x 14'.

"I'm also building a garage adjacent to the studio. If it turns out I want to do vocals in the studio, I can just back my Bronco out of the garage and put a vocalist in there. After Michael's album, I'm co-

*Continued on page 56*

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Continued from page 55  
producing a Danish singer named Sanne for Virgin Records, and I'll be able to do that here. She's a wonderful singer with a lot of European success.

"I'm putting in a Cinemascope screen, 9' x12' and I have a Barco-Vision video projection system with subwoofers and the whole shot. I'll be able to accommodate every format possible, from videodisc to 1-

inch, ¼-inch, VHS, Beta, you name it. I have a big project planned for next year with Michael Jackson doing a motion picture, so I'll be able to do a lot of that here.

"The console is a 32-input Neve 8032. That's the 3-band EQ, totally Class A and there's not an IC in the console. It has 32 inputs, 8 echo returns, and 17 effects returns. I'm doing some mods to it because I'm setting the control room up so I can

do film work in it as well. It has a quad monitor system, which is left, center, right in front and surround. It'll even be set up so I can do stereo surround, so I can use the new Cinema Digital Sound if I want.

"I got real lucky — when I bought this console I got the skeleton of a console exactly like it, so if I want to expand it later it will be quite simple. One might ask if 32 channels is going to be big enough for me. I might just be building a big hi-fi here, I don't know. Obviously, I can't do the sort of thing on that desk that I can do at Record One, which is the biggest Neve in the world. I'm doing it with the idea that it doesn't have to pay its way — I'll be able to do a certain amount of my work there.

"In addition, it's my home; I'm not planning to be bringing in a bunch of people there. I'm looking to do more producing/engineering, not just engineering, and this will basically be for my own projects. Record One will still be my main base of operations.

"For tape machines I have a Mitsubishi X850 with Apogee filters that I've had for some time. I've heard all the other digital machines, and I haven't heard anything else that interests me. I also have a 16-track MCI JH16 with the older electronics, which sounds marvelous. I'm still thinking about what I would get in a 24-track. My favorite is the Studer A800 Mark III, but the Studer people were over here for dinner the other night and they're going to be sending me one of the new ones to listen to, the 827.

"For 2-track, I have a Mitsubishi X86 HS with the 96k sampling rate, a regular X86 with 48k sampling and two X80s. And an Ampex ATR 102. I've been going back and forth between the HS and the ATR, and on the ATR I use Dolby SR. I have the Panasonic 3500 DAT machine.

"For monitors, Alan Sides is installing the Ocean Way system and they're driven with MacIntosh 2500 amps, 500W per channel.

"For effects, I have a stereo Echo-plate, 8x4, custom-built for me by Jim Cunningham; an EMT 250, four Yamaha REV5s, two REV 7s, an SPX1000, all the usual things.

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## FIVE QUESTIONS:

By Mike Joseph

# ASSORTED MICROPHONIUM

**Q:** Why do certain microphone designs have specific sound qualities, such as warmth or brightness?

**A:** The reasons are many. All microphones have a diaphragm of some type, whether it is driving a coil of wire through a magnetic field, having electricity induced into itself directly (as in a ribbon inside a magnetic field), or being electrically charged and changing a voltage through capacitive effect over varying distance.

All other things being equal, lighter diaphragms, such as those found in condenser mics, will respond more readily to transients and potentially track them more accurately to higher frequencies. Additionally, their lighter mass is more sensitive to subtle variations in sound. Larger diaphragms, with their higher mass, are less sensitive to subtlety — they move slower and tend to “smear” higher frequencies. It takes more to get that greater mass in motion (regards to Newton).

Excluding the naturally bi-directional characteristics of a ribbon mic, most microphones get their directional characteristics one of two ways: plumbing or air paths, which route sound to the back of the diaphragm, selectively canceling signal at certain angles via phase interaction; or twin matching diaphragms, which have their phase response or polarity electrically manipulated to create selective cancellation at certain angles.

Close working distances to directional microphones additionally create a build-up of low frequencies, called proximity effect. All of these qualities alter the perceived and measured performance of microphones, giving them characteristics we like to label as warmth, brightness, mellowness or bit.

**Q:** Who manufactures stand-alone microphone pre-amps?

**A:** The following companies provide pre-amps-only in a chassis:

- GML: 7821 Burnet Ave., Van Nuys, CA 91405; 818-781-1022; fax 818-781-3828.
- John Hardy Co.: Box AA631, Evanston, IL 60204; 708-864-8060; fax 708-864-8076.
- Jensen Transformers: 10735 Burbank Blvd., North Hollywood, CA 91601; 213-876-0059; fax 818-763-4574.
- Neve: 7 Parklawn Drive, Bershire Industrial Park, Bethel, CT 06801; 203-744-6230; fax 203-792-7863.

**Q:** For location recording, who makes phantom power supplies, both battery-operated and ac-driven? Our condenser microphones will need to be powered and plugged directly into a DAT recorder.

**A:** Before you purchase a phantom power supply, be sure to check on what your microphones need for current. Their current draw is usually listed in the specifications. Modern electrets are fractional compared to older condensers. Companies supplying power supplies include:

- AKG: 1525 Alvarado St., San Leandro, CA 94577; 415-351-3500; fax 415-351-0500.
- Audio Technica: 1221 Commerce Drive, Stow, OH 44224; 216-686-2600; fax 216-688-3752.
- Neumann: c/o Gotham Audio, 1790 Broadway, New York, NY 10019-1412; 212-765-3410; fax 212-265-8459.
- Shure Brothers: 222 Hartrey Ave., Evanston, IL 60202-3696; 708-866-2527; fax 708-866-2279.

**Q:** Is there one stereo microphone recording technique that outshines the others?

**A:** All of the popular stereo microphone techniques have their proponents. No technique works for every situation — it's a matter of what you're looking for and what you are recording.

We know of a very interesting project recently completed at Cal Tech by graduate students in the audio lab, soon to be released as a CD on the Performance Recording label by James Boyk, instructor at the lab and owner of Performance. They set up an interesting test jig of small speakers in a line array, to present a source of rim shot clicks in uniform predictable progression from center to left to right to center, in front of a number of different stereo microphone arrays.

The results, to say the least, are ear-opening. We suggest you contact Boyk at the address below and pick up a copy of the CD. It is the most definitive statement on the subject we have heard.

- Performance Recordings No. PR-6-CD, available through Harmonia Mundi USA; 213-559-0802.

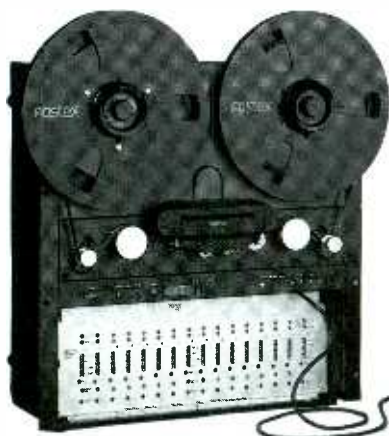
**Q:** Who can supply high-quality, low-capacitance mic cable? We are interested in putting our pre-amps in the studio on short cable runs for our digital sampling.

**A:** The following companies are well-known for their low cap cable. Please contact them to get the specifics of their designs and philosophies.

- Belden Wire & Cable: Box 1980, Richmond, IN 47375; 317-983-5200; fax 317-983-5294.
- Kimber Kable: 2675 Industrial Drive, Ogden, UT 84401; 801-621-5530; fax 801-627-6980.
- Mogami: c/o Marshall Electronics, Box 2027, Culver City, CA 90230; 213-390-6608; fax 213-391-8926.
- Monster Cable Products: 274 Wattis Way, S. San Francisco, CA 94080-6761; 415-871-6000; fax 415-871-6555.
- Pro-Co Sound: 135 E. Kalamazoo Ave., Kalamazoo, MI 49007; 800-253-7360; fax 616-388-9681.
- Whirlwind: 100 Boxart St., Rochester, NY 14612; 716-663-8820; fax 716-865-8930.



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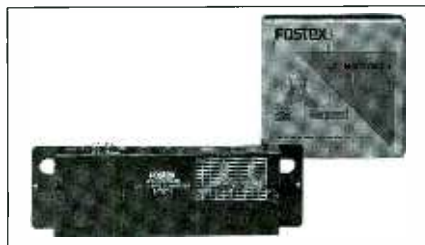
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\* The 280/MTC-1 interface does not offer all of the functions available with the open reel interface. • Atari and Macintosh are registered trademarks.

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The Macintosh software works with Performer and Master Tracks Pro. The Atari software works with Master Tracks Pro and Dr. T's KCS.

Steinberg's Cuebase sequencer has a device driver for the MTC-1 and 8330 built-in, so you don't need MidiRemote software with it.

As with all computer interfacing certain restrictions apply. So check the details at your local Fostex Dealer or call Fostex.

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## Random Notes On Concert Sound

By David Scheirman

### AUDIO EDUCATION

**D**uring a recent nationwide concert tour, I chanced to do some shows on some college campuses, where our stagehands were students. This can be the case when schools host live music concert productions. Per the show contract, the local labor force may be composed of men and women aged 19 to 24, many of whom are specifically interested in the entertainment production business. Some may be part of a special class or degree program that is preparing them for a career that will require a strong knowledge of theater crafts or event management.

In several instances, I noticed individuals who were intensely interested in all aspects of the concert sound system. This included the various components, how they are put together, the people on the sound crew and how they approach their job, and the overall result of the day's efforts: the sound of the show. These highly motivated individuals would usually attempt to spend some time asking some basic questions: Where does one learn about working with sound as a career? What schools or programs offer preparation in this field? How does a student know whether an advertised learning program is a scam or the "right stuff"? And, perhaps most important, how does an entry-level person find a job?

The whole process of considering and answering such questions on the spur of the moment made me think more deeply about the issue. Perhaps today's young people have been given the notion that the concert production business is glamorous. Perhaps it is; whether you work with sound, lights, staging, band gear, transportation, wardrobe, projection and special effects, being involved with successful live productions can be a lot of fun.

However, it takes a combination of extremely hard work and luck to actually succeed when approaching this business

David Scheirman is R•E•P's live performance consulting editor and president of Concert Sound Consultants, Julian, CA.

in an entry-level position. It may take a lot of time cleaning dirty duct tape from old snake cables, or fixing broken wheels on touring cases, before a new person is given a chance in a professional situation. This is regardless of what college course has been taken or which books have been read.

However, it is true that new opportunities are frequently opening up. Entry-level people are needed. So where does a serious young learner go to absorb the best that the industry can offer, in preparation for a job search?

Several directories provide information about public and private learning institutions that offer courses or degree programs related to sound. Although most programs are still related almost exclusively to the recording industry, there are some notable courses that should offer good, realistic preparation.

In Nashville this fall, I was pleasantly surprised when Rich Carpenter of Carlo Sound brought a dozen or so graduate-level students to the Starwood Amphitheatre, where our show was setting up. Enrolled in a course that teaches basic sound principles at Belmont College, these eager and intensely focused young people were on a field trip to observe a contemporary concert sound system being set up and operated.

Another practical program that comes to mind is taught by Dana Roun at the Full Sail Center for the Recording Arts in Florida. A former touring production person who has worked with such artists as Bon Jovi and Boston, Roun has worked diligently for several years to set up a live sound course module, four to six times a year, that allows students to actually learn about and use contemporary concert sound gear. Occasional visits from outside manufacturers' representatives (such as Michael MacDonald from Yamaha Pro Audio and John Meyer of Meyer Sound Laboratories) enhance the learning opportunities.

And I'm pleased to note that Al Grundy's Institute for Audio Research in New York set up an ongoing live sound course program this fall. The schedule includes basic system design theory, along with practical learning situations in local music nightclubs and theaters.

There are many more practical learning programs out there. If you are an instructor or educator working with this type of material, write a letter to the editor of this publication advising students about what your program has to offer.

### HARDWARE JUNKIES VS. TRUE TECHNICIANS

I recently had to take a VCR unit to a shop to be fixed. I looked at the ads in the Yellow Pages, and stopped in at a couple of places while doing some errands one day. In one shop, I encountered a cocky fellow who almost sneered at my battered unit, and was miffed that I had not yet upgraded to the more trendy, nationally advertised brand that his shop happened to sell. I went elsewhere.

At the next place, another fellow correctly appraised this rugged, 4-head unit as being "better than most of what's on the market today at any price." I left the unit with him for inspection and repair.

The experience led to my thinking about how this relates to professional audio gear. We all probably have certain favorite workhouse audio tools that are getting old and battered, but always work and give us a good, consistent reference point from which to do our job. Whether stereo headphones, vocal microphones, equalizers, a mixing console or test gear, a working professional will have and hold onto things that work—those items of equipment that do what they ought to and keep on doing it.

We are all susceptible, to some extent, to modern advertising's insidious message that what we have now isn't "quite good enough," and that what they have just introduced will somehow "make things better." This has been true for some time, whether you examine marketing techniques for new automobiles, home hi-fi gear, or even clothing and cosmetics.

However, when a single compact plywood loudspeaker system enclosure housing two or three components with some nice connectors and fittings can run \$4,000, it's best to stand back and be very clear about your reasons for purchasing such an item.

We can be "hardware junkies," becoming addicted to new products that have a polished marketing image. Or, we can be true technicians, learning how to gain and use the basic audio and sound system skills that enable us to do the best job we can in a variety of situations, regardless of what specific equipment resources are available.

### WHICH BOX TO BUY (WHICH ARRAY TO CREATE)?

The owner of a young, aggressive concert sound rental company called me re-

*continued on page 80*



# Bose® ProFiles

*"Sound quality and ease of use were 'no-compromise' requirements.*

*We had to satisfy a broad range of applications for both speech and music.*

*With Bose equipment, it was never a gamble."*

— James G. Ritz  
Peirce-Phelps, Incorporated  
Audio/Video Systems Division



**The Site:** TropWorld Casino and Entertainment Resort  
Atlantic City, New Jersey

**The Challenge:** Provide quality sound installation for casinos, public areas, shopping arcades, and restaurants while assuring an easily heard and understood paging capability for security needs.

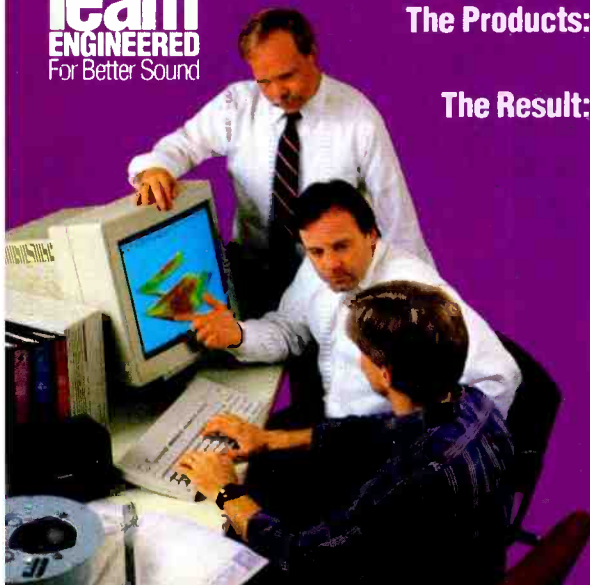
**The Contractor:** James G. Ritz, Peirce-Phelps, Incorporated

**The Products:** 120C Bose 102™ 7.2 flush-mount loudspeakers  
32 Bose 1C2C system controllers

**The Result:** *"I never had to compromise. Using Bose products, I was able to overcome the variety of acoustical and environmental roadblocks I faced in an installation of this magnitude. We provided a sound system flexible enough to sound as good in an open casino as it does in an intimate meeting room. The Bose 102 loudspeakers were versatile enough to handle many different requirements while providing a simple and uniform installation. We came up a winner, and so did our client."*

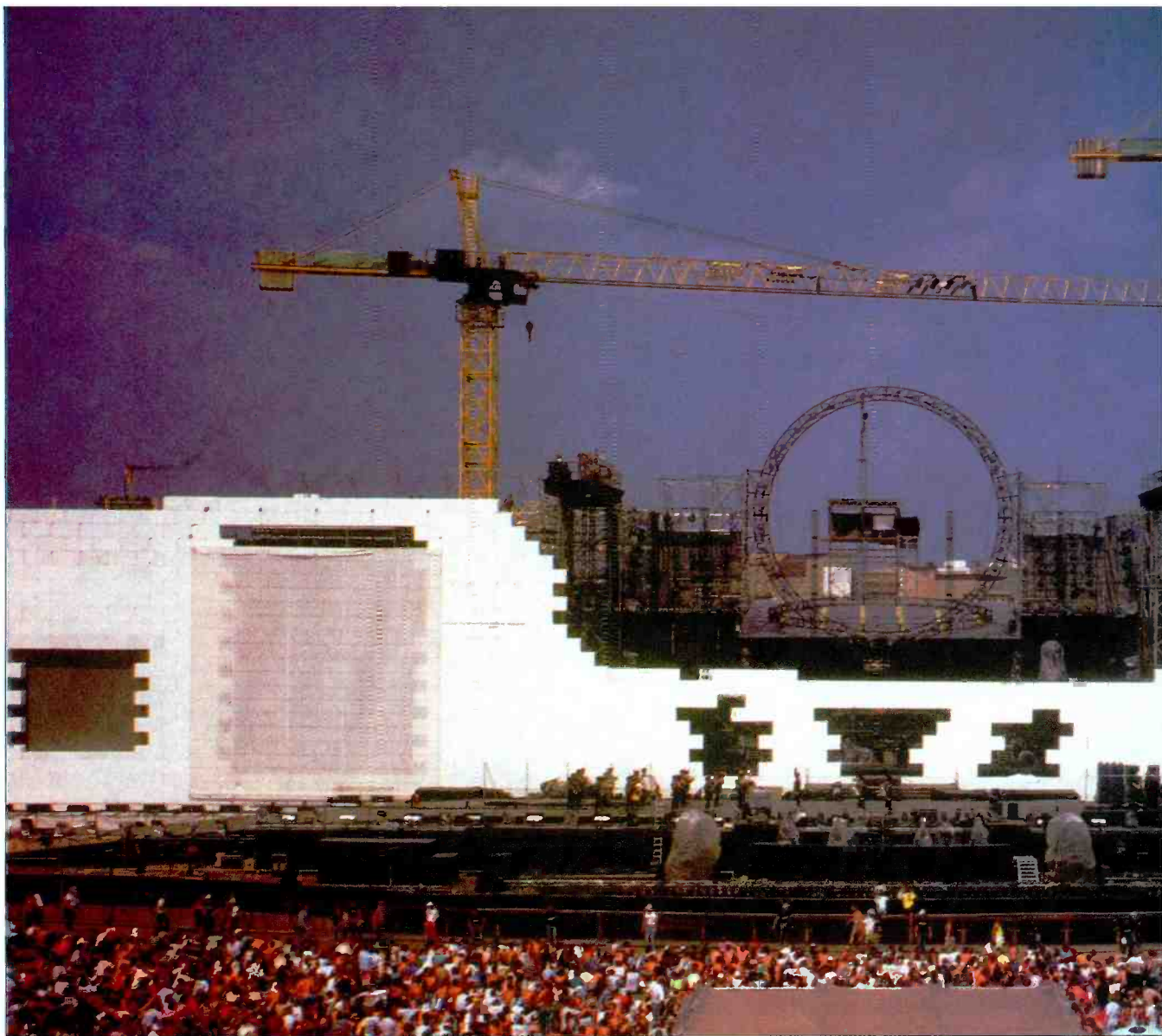
For more information on Bose products, call 1-508-879-7330, or write Bose Corp., Dept REP, The Mountain, Framingham, MA 01701-9168

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Circle (33) on Rapid Facts Card



**W**andering from West Berlin through the Brandenburg Gate and entering the Potsdamer Platz would have proved a little problematical last year, for the simple reason that even if you'd been able to climb the intervening Berlin Wall, you'd have ended up in the middle of a mine field and been shot at by East German border guards.

However, this was just what half the population of West Berlin decided to do in July. Instead of the guard posts and machine guns, the only sign that this had once been one of the most densely defended pieces of territory in the Western Hemisphere was the set for Roger Waters' monumental production of "The Wall." The massive structure of polystyrene blocks straddled the site of the old

concrete construction, and the audience and stage crew were packed onto the site recently occupied by the aforementioned mine field. Whatever music would be played, the historical implications of the site were enough to ensure that this would be a memorable event.

The site itself did nothing to endear itself to the assembled crew. Dubbed "the dust bowl of doom," the unseasonably high temperatures and the East German's lavish use of chemical defoliants conspired to create an omnipresent red-brown dust that liberally coated the 250,000 people who turned up to watch the fun.

The cast for the show would have done justice to a Cecille B. DeMille production. As well as Waters himself, Van Morrison, Bryan Adams, Jerry Hall, Sinéad O'Connor and Albert Finney were just a few of the assorted celebrities who turned out to lend a hand. Part of the Red Army provided the required marching military types

and several trucks. All this and a huge choir had to be crammed onto the massive stage set. (Waters requested a World War II bomber and tanks, but was turned down by the relevant authorities.)

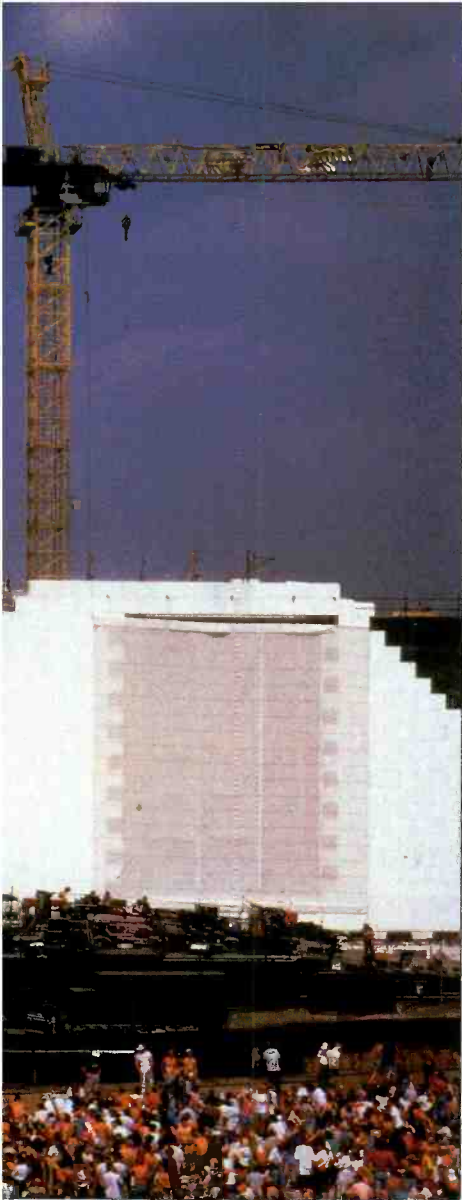
The sound for the occasion was provided by Pink Floyd's old hire company, Britannia Row, which chose the new Turbosound UHQ enclosures as the basis for the main PA.

"The Wall" was only the third appearance for the UHQ enclosures — the boxes having first seen the light of day at the Glastonbury Festival — which were officially launched at September's Los Angeles AES convention.

The UHQ system consists of a top and a bottom box, with the crossover point between the two situated at 150Hz. The bottom box consists of a 21-inch driver with a 6-inch voice coil operating within a 12-inch magnet; it is housed in the same sized cabinet as the 3-way top box.

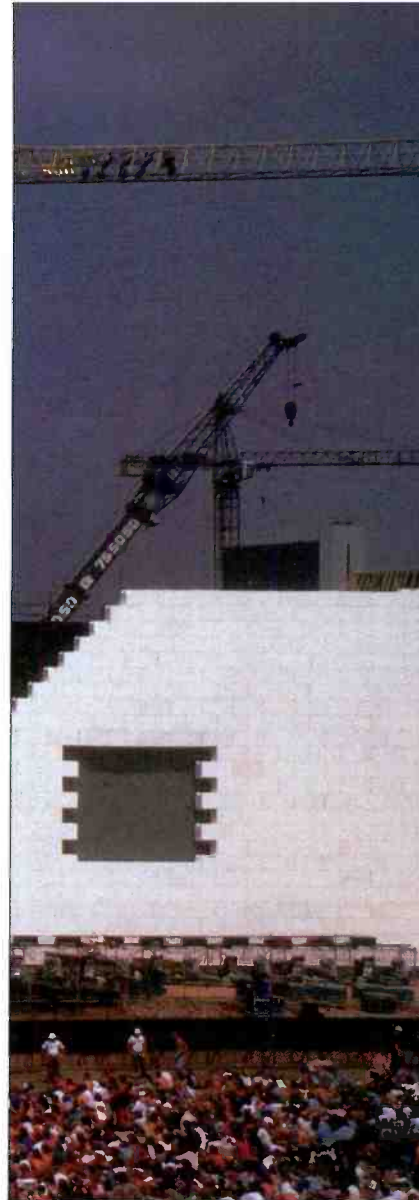
Andy Benham is a London-based free-lance technical writer.





THE WALL  
AT THE WALL

By Andy Benham



The top box itself contains 12-inch and 6-inch Turbo devices, and a high-frequency compression driver that cuts in at 8kHz.

These cabinets were positioned on either side of the stage, with an array of 24 top boxes on each side, flown above the sub-bass units on the ground below. However, because of the gargantuan dimensions of the stage, 32 cabinets were used in front of the Bailey Bridge that formed the front of the stage. These additional cabs were a mixture of the older TMS3 design and conventional sub-bass units.

The positioning of this in-fill cluster on the ground proved to be the only placement option, according to Britannia Row's Chris Hey.

"Obviously, we had to have speakers in the middle of the stage because the main towers were such a long way apart and we had to fill in the dead area," he says. "We weren't able to put the speakers on the

**A complex multimedia system at a historical performance: Despite the artistic success, performing "The Wall" at the Berlin Wall was not without its technical problems.**

bridge itself for a couple of reasons. Firstly, live mics were used on the stage, and secondly, it wouldn't have been very desirable to have the sound bouncing off the flat metal surface of the bridge."

#### DELAY TOWERS

The sheer size of the site, some 35 acres in all, meant that delay towers were a must. Brit Row installed 200 Turbosound TMS3s, along with 50 24-inch bass bins on 11 towers distributed around the site. The delays used were the new BSS TCS-804s and 803s, the former being used on the main system, while the latter were used for the delay towers.

Indeed, it was the 803s that contributed, through no fault of their own, to one of the more dramatic mishaps that occurred during the concert.

The previous night, the band ran through the entire show, which was filmed for use in the event of an emergency dur-

ing the live show. The PA, including the delay towers, behaved perfectly, as indeed they did during the sound check on the morning of the show.

The problem occurred during the afternoon when the East Germans and the TV station decided they wanted more lighting for the crowd. This lighting, they decided, was best positioned on the delay towers out in the audience. So in the afternoon, before the show, they went to the delay towers, turned the power off, installed the extra lighting and turned the power back on. All this was done without *anyone* bothering to inform Britannia Row.

The problem was that the BSS crossovers have an auto-mute facility to prevent damage to the speakers in the event of power interruption. When the power went back on, the delays automatically muted and stayed mute. In the intervening period some 250,000 people had packed out the Potsdamer Platz, making it almost impossible to get around all of the delay towers and turn everything back on.

It took nearly three and a half hours for the delays to be turned back on. Although the sound was excellent at the front, where the crowd was covered by the UHQ system, the sound at the back left a little to be desired, at least until the towers were turned back on.

The FOH system was the province of Gary Bradshaw, who used a pair of Yamaha PM3000 boards to control the vast array of feeds. Yamaha SPX90 and SPX900 processors were used for the effects along with Lexicon PCM70s, and an impressive number of compressor/limiters, with some 14 dbx 160Xs and an additional 11 BSS DPR402s being required to look after the sound.

The stage monitoring was under the control of monitor engineer Robin Fox, who insisted on his favorite Ramsa 40/18 monitor boards, a pair of them being bused together at the heart of the system.

#### TV TIE-IN

The show was also intended for live TV broadcast to Europe and the rest of the world, with coverage to the United States being recorded for broadcast at a later date. Because the whole point of the event was to raise money for Group Captain Leonard Cheshire's Memorial Fund, and the TV rights were estimated to be \$3 million, the TV production had to be right.

To ensure that this happened, the idea was to record a dry run of the show the previous evening, transfer it to Betacam, role the Betacams in sync with the live

show and then switch over to the recorded footage in the event of a major disaster. The most commonly mentioned was the so-called "burning truck scenario": one of the trucks that raced back and forth across the Bailey Bridge catching fire and blocking off the stage front.

Ensuring that this emergency backup system was in place fell to Multitrack Hire's Nigel Taylor, who spent the entire concert locked up behind the stage in a cramped caravan with the proud title of sync control.

Seeing as Taylor has worked for Floyd



*Turbosound UHQ enclosures comprised the main house system.*

for 10 years, overseeing the electronic control side of things from "Dark Side of the Moon" onward, and also being involved with the synchronization of the film version of "The Wall," it was only natural that Waters should call him in when the idea of doing "The Wall" on the site of the Wall was first suggested.



#### COMMON TIME

Because everything had to be tied into the TV, everything started with the sync pulse generator in the ZDF mobile TV facility. This was then fed both to the TV network and to the main mix position, where it was used to speed-resolve a pair of 24-

track tape machines, which carried the effects tracks and the musicians' click tracks. Two machines were used for safeties, each having a separate sync line in case one machine failed. Both machines were started together and then ran throughout the show locked to the video sync.

Meanwhile, in the TV trucks, there were four Betacam machines, time-resolved to the live show and carrying the recording made the night before, as well as extra video material required for the live broadcast. Syncing up the Betacam material with the 24 tracks at the mix position proved to

be a relatively simple undertaking. First, the 24-track tape was copied off onto a Fostex D20 DAT machine, and then, using a Fostex synchronizer to drive the DAT machine, the audio was then transferred onto the Betacam version of the previous night's performance and matched together frame by frame.

The time code was also used to control the impressive array of lighting that was assembled for the show, and particularly the projectors used for displaying images on the huge polystyrene wall. Three projectors were used, the time code being fed to an Adams-Smith, which then controlled the projectors via an interface box, which dropped the output signal from the Adams-Smith down to the required low impedance signal. The projectors were then locked into the time code and stopped and started as required.

The projectors' dowers were controlled by Fostex 4020 event controllers, although there were

some problems with this system because of a combination of the excessive ambient temperature and the massive amounts of heat generated by the projectors' 700kW zeon lamps. In the end the dowers proved capable of holding back the lamps for a mere 45 seconds before the heat threatened to melt the equipment, so the projectors had to be turned off when not required.

Another problem on the projection front was the sheer size of the circular back projection screen behind the stage. The 70mm projector that served this screen needed a special lens because of the extreme projection angle needed to cover the 16m screen from the projection position a mere 26m behind the screen. This screen was used to carry some of the animated footage for which Waters has become famous. The whole thing was tied together with time code, with a lot of the work being done in Waters' home studio with the help of a DAT copy of the 24-track master.





House engineer Gary Fox used Yamaha PM3000 consoles with signal processors from Yamaha, Lexicon, dbx and BSS.

On the afternoon before the show, Nigel Taylor explained how the Betacam back-up system was supposed to operate or, hopefully, not operate.

"If we lose the show, they will switch to yesterday's show, clear the stage, and if we have lost sync they will continue with yesterday's show," he says. "If the 24 tracks have lost power, but we haven't lost the time code, they can be driven back in lock from the TV time code. Then the band will start to play again and everything will go back live.

"Everything in the show is hanging on time code. 'Run Like Hell' and 'Young Lust' are the only wild tracks in the show. At the end of 'Young Lust,' there is a ringing phone that can just ring and ring and is then answered at exactly the right moment to bring the show back into time code. Counts tell everybody when they are to play."

Getting these counts to the musicians on stage proved to be something of a major event in itself. Allocating radio frequencies in the middle of Berlin was something of a nightmare, but in the end three were found, with a fourth available as a back-up if required. The radio headphones used for the click tracks functioned well during rehearsals, but problems occurred just before the show, presumably because yet another mobile radio had been brought on site and was operating on the same frequency. This necessitated a very rapid change of crystals before the show, but in the end the system worked admirably.

#### MAIN SYSTEM PROBLEMS

However, there were problems with the main system, of such a magnitude that all of the pre-planning with the Betacam recordings was time well-spent.

Everything came to a grinding halt at the end of the second number, with an embarrassingly long 3-minute gap before the TV company realized what had gone wrong and switched over to the pre-

recorded footage. After the show, monitor engineer Robin Fox explained what happened.

"Everything was going fine after the first number but then the monitor power kicked out in the second number," he says. "It was a 63A circuit breaker which kicked out and took out all the monitors."

"We were quite well-lit; at least you could see all the knobs and faders, and we had just gone into the second number and had the big change from fore stage to rear stage. Everyone relaxed into show mode and then it went very dark.

"All I could do was to wait for it to come on. I also had to do a quick bit of sign language to the band because they didn't know it had stopped because their back line was still on. I couldn't run onto the stage and tell everyone what had happened because the whole thing was being filmed.

"Roger came over at the end of the first half, and I made the motion of cutting my hands off, saying, 'They'll never work again.' Roger just pointed to the desk and laughed. I apologized, but he said, 'At least it came back on,' and that is all we said on the matter."

American TV viewers missed the gap. At the end of the show, when the audience had gone home, the band ran through the offending 20 or so minutes, and this is the footage that will be seen on American TV, as well as forming the start of the video that will be released in due course.

There also was an album release, and making provisions for this complicated the back-stage setup even further. BSS mic splitters were used to split the signals into two paths, one for the live sound mix, and the other for the recording, and on to the TV network. The mics themselves were a veritable cornucopia of designs, although Shure SM57s and SM58s were the most prevalent.

The split mic lines, as well as another 80 or so transformer-buffered channels, were fed back to the Manor Mobile where the album was mixed down onto a Sony 3348 DASH machine. Another feed was provided by means of Calrec Soundfield mics positioned on the mixing tower so that there was a backup in case anything went wrong with the more direct route.

The Manor Mobile was also used to provide the raw feed back to an SSL 4000G used to mix the sound down for the live TV soundtrack.

Both the American TV show and the video of the event have had extensive post-production work done on them, to the extent that various contributors have been rumored to have gone back and laid down extra vocals or whatever, so the version that was seen in the states was slightly different from the version shown to the European audience and didn't feature that embarrassing 3-minute gap.

All in all, "The Wall" was not without its problems, and the failure of the delay towers undoubtedly accounts for some of the more negative comments that have been made about the show in the media. Those who came early or were lucky enough to be able to get close to the stage got excellent sound, courtesy of the UHQs, but those at the back were perhaps not quite as well-served.

However, judging by the reaction of the Berlin audience, there can be no doubt that the show was a resounding success. More than 250,000 people chanting "tear down the wall" at the end of the show was a very poignant moment, and the patterns made in the sky by Theatre Projects' massive array of SkyArts and SkyTrackers was so close to what the city must have looked like when the sky was crisscrossed by searchlights seeking allied bombers that there wasn't a single person in the crowd who could have failed to grasp the significance of what was going on.

Considering the technical complexity of the show, it is more surprising that it worked at all, forgive the couple of relatively minor failures that occurred.

As for "The Wall," what can Waters do to follow Berlin? After the show, the rumor floating around was that there are two possible sites for the next performance: the Golden Gate Bridge and the Grand Canyon. Given Waters' preoccupation for the epic scale, who knows? ■

Photos by Nik Milner.

**Hands On:**

# RADIAN MS-8 LOUDSPEAKER

By Mike Joseph

**C**ontrol room monitoring is a subject fraught with contradictions, inconsistencies and incompatible conflicts. The relationship between acoustic environment, transducer and listener seldom allows seating in more than one tightly defined pocket of balanced fidelity.

It is the rare design that delivers an effective interplay of monitor speaker and room, designed to provide a transparent, high-resolution environment where the total system works as one. The ideal is hard to come by, usually short of major ground-up architectural creation involving a larger control room and a tasty expenditure of dollars.

Mike Joseph is technical editor of R•E•P.

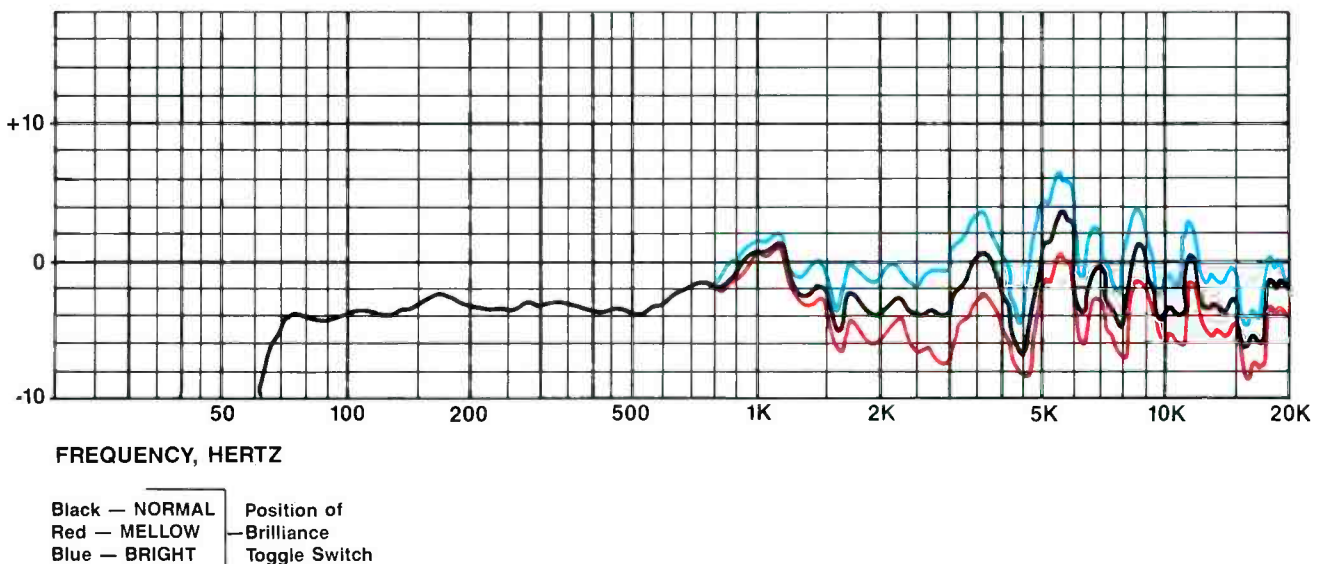


Figure 1. Radian MS-8 frequency response, on-axis, 0=80dB at 1m, brilliance pot set flat.



# Specs and Description

Manufacturer: Radian Audio Engineering  
 Model: MS-8  
 Price: \$498 each  
 Version as tested: Satin Black Lacquer  
 Options available: Satin Red Oak finish  
 Size: 19"×12"×9.75"  
 Weight: 35 pounds shipping  
 Power Handling: 150W recommended; up to 250W broadband tested  
 Sensitivity: 89.5dB stated; 86dB 1W/1m broadband noise tested  
 Impedance: Nominal 8Ω  
 Circle (100) on Rapid Facts Card

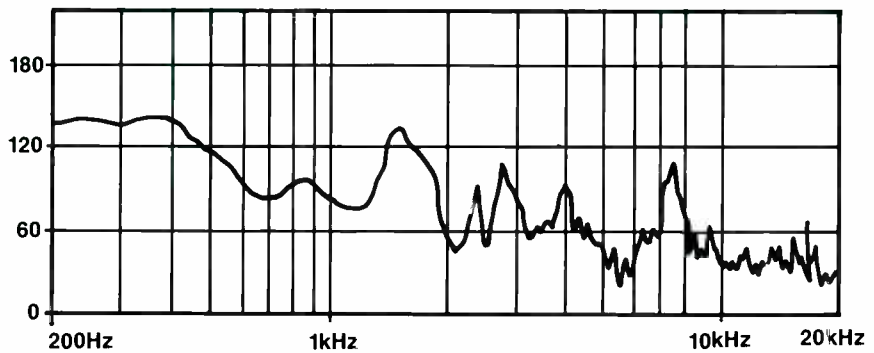


Figure 2. Coverage angle vs. frequency response at 3dB down-point.

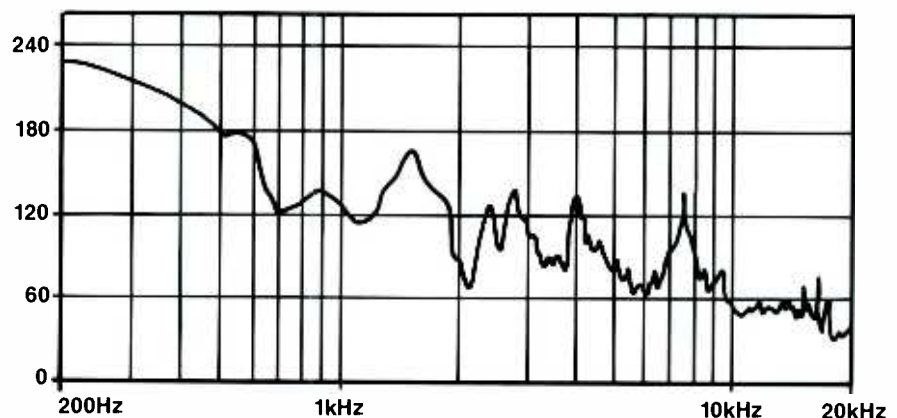


Figure 3. Coverage angle vs. frequency response at 6dB down-point.

What is the ideal? In a perfect world, the monitoring sweet spot would be wide and deep. All locations in the mixing area would be afforded the same balanced coverage and frequency response, with imaging, aural perspective and tonal consistency. Secondary listening locations, whether for producers or artists, if not identical, would at least be congruous.

Off-axis locations would interpolate smoothly. Acoustical power output at any audible (and possibly a good octave sub-audible) frequency would be limited by the dynamic range of our hearing, not by distortion caused by electronic power limitations or mechanical excursion limits of the paper, plastic or metal alloy diaphragms.

But alas, it is not a perfect world. Even daring to imagine the unlimited performance of a theoretically perfect electro-acoustic device, rooms with walls and ceilings impose strict limitations on performance. Reflections cause colorations. Acoustic noise and power handling limit dynamic range. Standing waves exist, no matter to what degree damped, absorbed or trapped. It's simply physics — minimizable, modifiable, sometimes even controllable, but ever-present. What's a mixer to do?

Many solutions have recommended

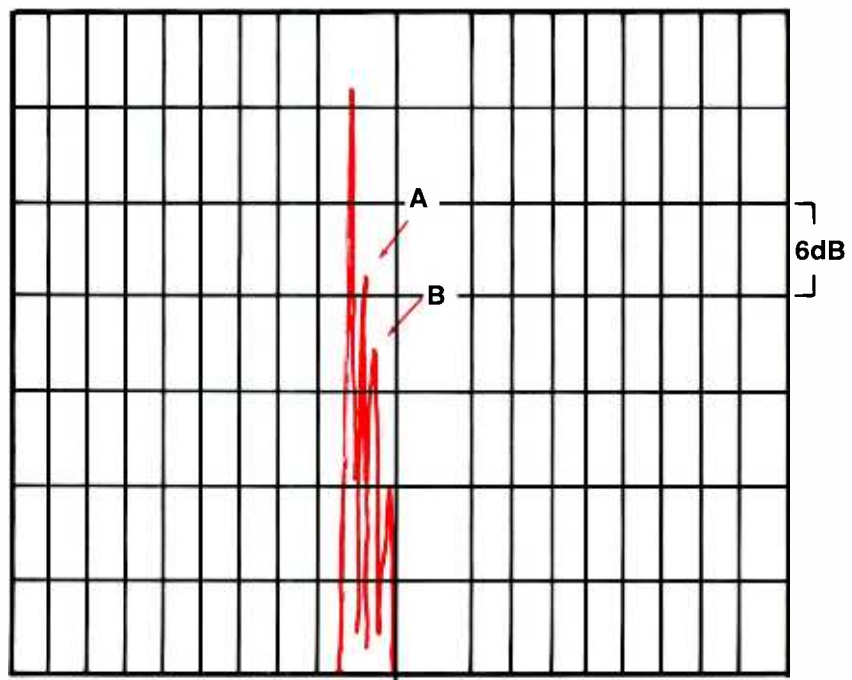


Figure 4. TEF ETC measurement shows high-frequency reflections from woofer edge (A) and cabinet (B).

themselves to the engineer searching for ever-greater listening accuracy in the workplace. Every flavor of speaker — big, small and indifferent — has claimed the title of ideal solution. Lately, bookshelf speakers have again sprung to the forefront. This time they carry the mantle of close-field monitor, yet truthfully they are larger than most meter bridges can handle.

**Perspective:** The appearance of close-field monitors originally sprang from the need to emulate or approximate actual consumer end-use applications (cars, portable hi-fi's and TVs). They began with home-built car stereo speakers in a shoe box, growing through Auratones, Radio Shack Minimus speakers and finally settled on the all-pervasive Yamaha NS-10s. As consumer tastes grew up to better home stereo and TV fidelity, so, too, did (mixing) desktop monitoring improve in its selection of speakers.

Ever-curious engineers introduced esoteric home stereo devices into the control room. Much British Bextrene product appeared, as well as other Euro and East Coast brands, among them KEF, IMF, Rogers, ADS, Braun and Visonik. Most sounded great, but barely reached SPLs capable of satisfying general playback requirements.

Reliability stank at tracking levels. Burnt coils were common. Acoustically, it was a 1-person game. Generally, the sweet spot was tiny, the imaging was limited to one location and the small diaphragms didn't move much air. In short, the consumer meter bridge solution wasn't effective for higher power, wider coverage applications.

Pro board-top monitors fair better, but not greatly, especially in competitive price ranges. What this might suggest is the need for a speaker with all the advantages of an on-the-wall behemoth — power output, excursion, efficiency, frequency range, coverage — in the package of a meter bridge top-sized (or slightly larger) device, with its improved imaging, freedom from room reflection-caused coloration, improved transparency and low price. Enter the Radian Monitor Standards.

### PRODUCT DESCRIPTION

Although many major manufacturers provide small boxes with big performance, few seem to do so as effectively as Radian has in such an economical price range. The model MS-8, based on the Radian-designed and -built 5008-8 coaxial driver, lists at \$498 per unit.

A baby brother version, designated the MM-8, uses the same driver in a smaller cabinet, with minor compromises in low end response. The latter is clearly designed to compete head-to-head with the NS-10s, while the larger MS-8 fills an in-

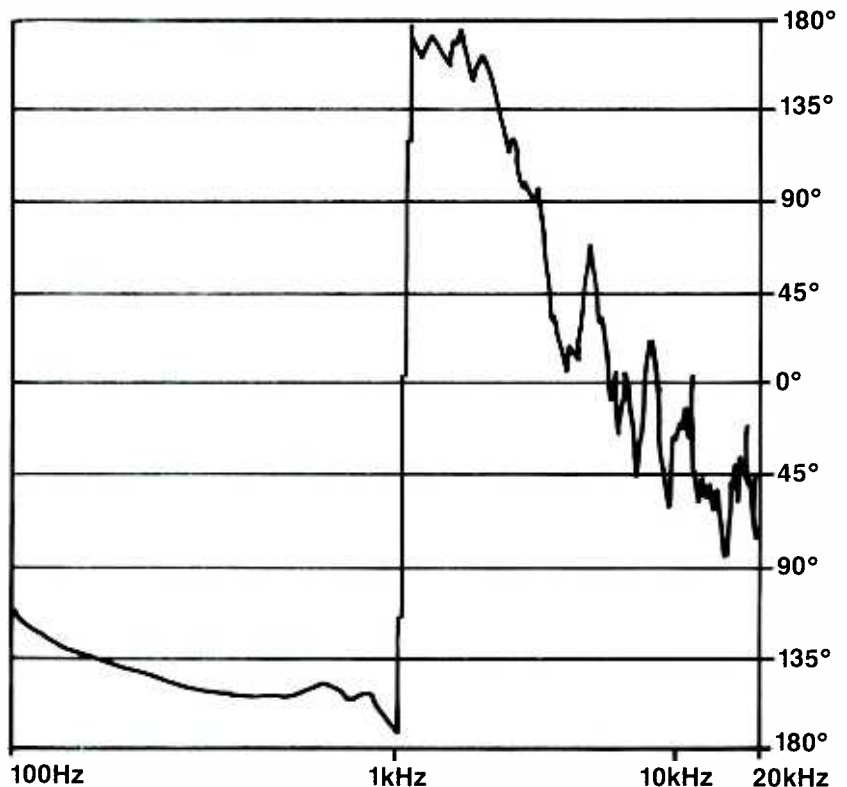


Figure 5. Phase vs. frequency response curve. Vertical line is "restart" at top of the graph.

teresting slot between the Yamahas and larger bookshelf-sized 2- or 3-way, 12-inch, woofer-based enclosures.

The speakers delivered to R•E•P and tested at our affiliated technical engineering facility were enclosed in a black lacquer finish (stained oak is optional) and constructed of solid oak and high-density pressboard, identified by Radian as Flakecore. The 1-piece driver unit consists of a 1.75-inch diameter HF compression driver mounted piggyback on an 8-inch cast aluminum frame woofer.

The high frequency exit is milled out of the center-pole piece of the low frequency device, without benefit of an external horn, like the Altec 604 might have. Because the 8-inch woofer extends to a 1,800Hz crossover frequency, the lack of a longer horn to extend the lower range of the high frequency device is not much of an issue. What is lost to a greater extent is directional pattern control at its lower extreme (shown clearly in coverage angle response curves we shot).

The high driver's aluminum diaphragm

is suspended using a Mylar surround, somewhat unusual in a world of crinkle-formed and diamond-shaped 1-material diaphragm/edge surrounds. The woofer cone is equally unusual in its choice of graphite-filled polypropylene, which is stiffer and lighter but more expensive than paper. The hefty woofer magnet weighs 28.5 ounces, and the entire enclosure with transducer weighs 35 pounds.

The rear connection panel consists of two typical 5-way binding posts and two crossover equalization controls. One EQ switch allows 3-position presence/brilliance shelving,  $\pm 3$ dB starting at 1.5kHz and rising. The second is a brilliance or sizzle pot, providing a peaking adjustment of 16dB total centered at 15kHz. Nominal flat is at the middle of the pot's travel range.

The 3-position switch is cryptically labeled "normal," "mellow" and "bright," although "mellow" sounded normal and "bright" melted glass. "Normal" provided a forward and prominent midrange sound, something we might describe as bright.



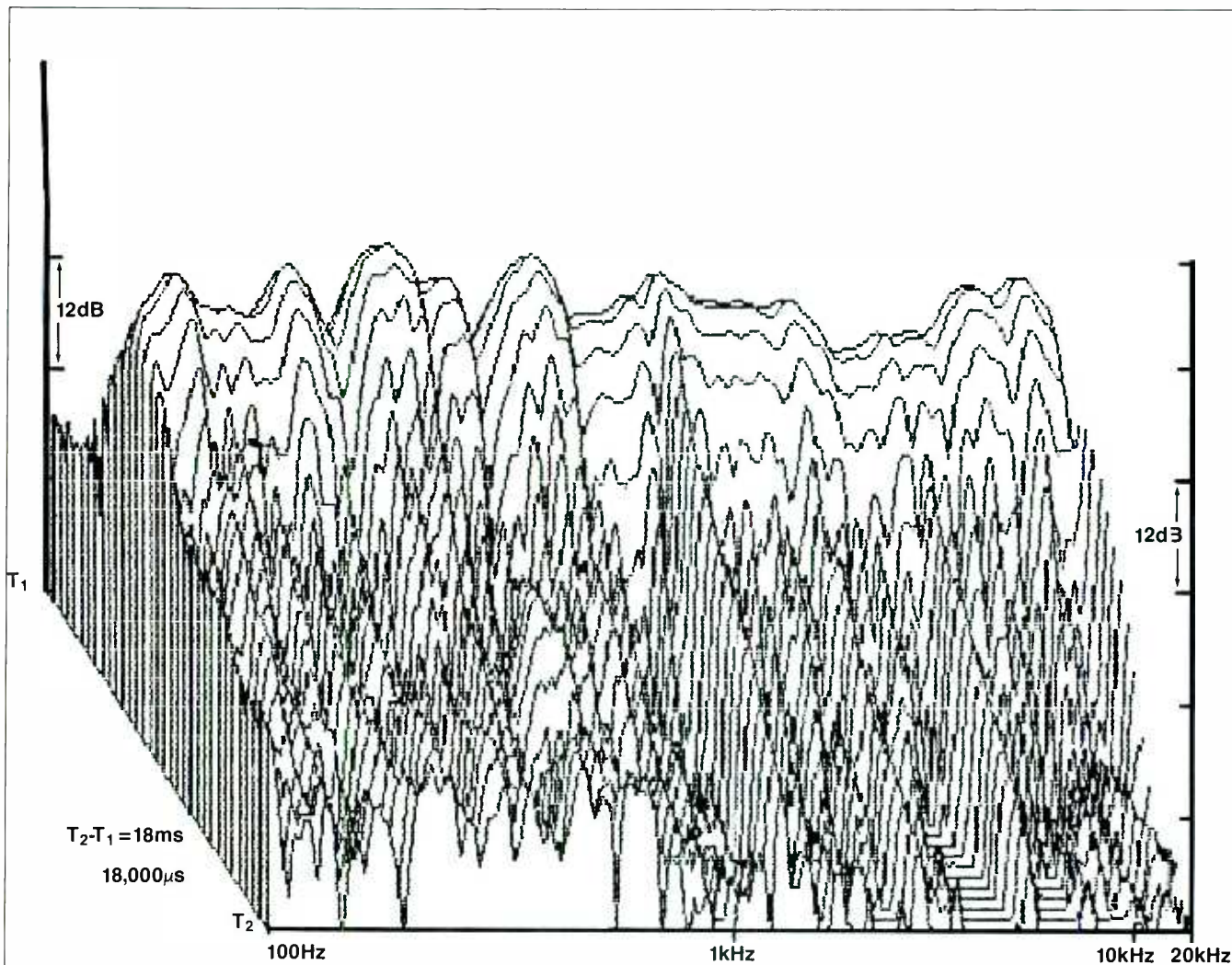


Figure 6. Full bandwidth sweep, comparing signal decay over time.

Got it? The purported purpose of these settings as stated in the literature is to "permit operation in a wide range of acoustic environments, and for variations in personal taste."

#### HOW THEY DO IT

Thanks to an innovative passive crossover approach, the high frequency range is more extended than is typical for a compression driver's relatively large aluminum diaphragm. As is known, large diaphragms lose the highs in a natural rolloff, or 6dB/octave (the Newman Criteria). Instead of pulling down the total level to the compression driver to match the lower efficiency of the woofer, Radian manipulates the crossover to equalize the midrange out of the high section smoothly, exactly complementing the rolloff slope of the driver itself.

The net result is an extended frequency response, matching the level of the 8-inch low frequency driver at crossover. This design has an added advantage: You will never have to worry about overdriving the high section, because decades of headroom exist. No more burnt tweeter

coils. In fact, Radian claims no returned drivers to date for coil burnout.

A long, tuned L-shaped PVC pipe provides porting. (It's literally shoehorned into the box with a 90° angle joint, contributing quite extended low frequencies from the relatively compact 19"x12"x9.75" box.) The devices themselves incorporate every small trick that current speaker design allows, including milled backplates for longer excursion before bottoming, the aforementioned Mylar surround on the compression driver diaphragm, and graphite impregnation in a polyprop cone for stiffness, lightness and freedom from humidity.

#### MEASUREMENTS

The speaker/mic separation was three meters (10 feet) far-field on-axis, in a true anechoic environment good to below 100Hz. Numbers stated were normalized to one meter mathematically. We measured energy frequency curves (EFC) at several different coverage angles, energy time curves (ETC), 3-D decays (waterfalls), as well as phase response. Very low frequency speaker output was measured

close-field (because of wavelength limitations in the measuring environment) and spliced in below 150.

Measuring equipment included a 1/2-inch diaphragm B&K 4133 mic driving a Techtron TEF System 12 with TEF 2.0B software. Additional equipment included a B&K 4135 1/4-inch mic, a Hewlett-Packard 3325A function generator, a UREI model 200 analog chart recorder, a B&K 2610 instrument grade measuring amplifier and an HP 5300B frequency counter.

The sensitivity of the MS-8 measured 86dB 1W/1m, or 2.83V into the rated impedance, with a broadband noise source. The EFC shows the compiled frequency response, with the 0 line calibrated to 80dB at 1kHz (see Figure 1). The effects of the presence/brilliance switch can be seen, accurately offsetting 3dB, with the greatest effect occurring in the 2kHz to 4kHz range.

Other than the rise at 1kHz (because of the wavelength-related narrowing or beaming of the 8-inch driver), the response is extremely smooth and extended from the mid-band down to 65Hz, the 6dB down-point. Not bad for a box less

STATEMENT OF OWNERSHIP

Statement of Ownership, Management and Circulation (Act of August 12, 1970; Section 3685, Title 39, United States Code).

1. Title of publication: R•E•P: Recording, Engineering, Production.

- 1A. 341-673.
- 2. Date of filing: Sept. 20, 1990.
- 3. Frequency of issue: Monthly.
- 3A. Number of issues published annually: 12.
- 3B. Annual subscription price: \$26 & free to qualified.
- 4. Location of known office of publication (street, city, county, state, zip code): P.O. Box 12901, Overland Park, Johnson County, Kansas 66212.

5. Location of the headquarters or general business offices of the publishers (not printers): 9221 Quivira Road, Overland Park, Johnson County, Kansas 66215.

6. Names and addresses of publisher, editor, and managing editor. Publisher: Dennis Milan, 9221 Quivira Road, Overland Park, Kansas 66215. Editor: Dan Torchia, 9221 Quivira Road, Overland Park, Kansas 66215. Managing Editor: Tom Cook, 9221 Quivira Road, Overland Park, Kansas 66215.

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	Average No.	
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A. Total No. Copies Printed (Net Press Run) . . . . .	24,266	27,000
B. Paid and/or Requested Circulation		
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2. Mail subscriptions . . . . .	20,198	20,112
C. Total Paid and/or Requested Circulation	20,198	20,112
D. Free Distribution (including samples) by mail, carrier delivery or other means . . . . .	1,710	1,599
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Douglas A. Wilding,  
Circulation Manager

than 1.3 cubic feet in volume.

The higher frequencies measured more erratically, with woofer beaming and crossover transition to the short horn resulting in the 1,500Hz to 1,800Hz dip. Horn or phase plug anomalies, or coupling problems to the "soft" wall of the extended horn that the woofer cone represents (remember, it's constantly moving), caused measurable deviations in the 3kHz to 10kHz band.

Although not out of line for a larger diaphragm compression driver and horn combo, the steepness of the slope in the 4.5kHz trough, and the 6kHz and 9kHz ranges, guarantees some audible artifacts. Note that the largest swing is  $\pm 5$ dB over a 1kHz band area. Not great, but not out of line with other "professional" horn loaded compression drivers, either.

The noticeable hole from 15kHz to 18kHz is probably response falloff because of the relatively large diaphragm (for the wavelength) and horn flare rate. The response is back up at 20kHz, extending roughly on to 30kHz, although the latter range consists mostly of higher distortion from modal diaphragm breakup.

Figures 2 and 3 represent coverage angle vs. frequency response for the 3dB and 6dB down points, respectively. This should provide a good idea of how smooth the response is, with coverage angle off-axis indicated on the vertical scale, and frequency range from 200Hz through 20kHz indicated on the horizontal. A straight diagonal line from the top left corner to the lower right would indicate a smoothly collapsing pattern as you go up in frequency.

A flat horizontal line would be perfect, indicating uniform frequency response at the given angle off-axis. Note that Figure 2 shows an average and fairly uniform 3dB down-point around 60° off-axis, or 120° coverage throughout the midrange.

Figure 3's midband average is approximately 90° off-axis, or 180° coverage. Also note in both cases that problems exist around the 1,800Hz crossover frequency, probably because of the previously mentioned short pole-piece horn losing pattern control, as well as wavelength-related beaming or narrowing of the woofer. The passive crossover/equalizer and its phase-related delays are also suspect.

The ETC measurements (see Figure 4) show reflections of 0.3ms delay emanating from the front of the baffle. This represents the equivalent of about four inches, suggesting high frequency reflection/refraction at the edge of the 8-inch woofer. The signal here is approximately 10dB down. At 15dB down, a second reflection is indicated by a third ETC arrival time. This may well be the cabinet edge.

All in all, curves similar to this are normal for a 2-way coaxial system, and in

most cases better than multiple driver systems. Because of the equal energy per frequency nature of ETCs, it was difficult to gauge device space offset clearly. Generally, however, no glaring problems should exist for a coaxial design.

Figure 5 shows the phase response of the entire system, linearly indicated. Note that 0° offset is the middle horizontal line, where the phase curve crosses at 6kHz, 8kHz and 9.5kHz. Also note that the vertical line in the center merely represents the "starting over" of the curve from the top, or at 180° offset. The "confusion" in the very high frequencies occurs because of signal wavelengths approaching or becoming smaller than the phase plug slot size.

Finally, Figure 6 represents the 3-dimensional waterfall, comparing signal decay of a full bandwidth sweep over time, to frequency response. Of interest here is the relatively fast decay (read: tight damping) of the low frequency section, compared to the ringing or overhang of several noticeable points in the high frequency section. The worst occurs in the crossover region. Secondary harmonically related resonances occur at 4kHz and 8kHz, contributing to audible effects as noted below.

LISTENING TESTS

In pre-recorded playback tests and during sessions, the speakers generally performed admirably. They are not shy about using or presenting power. In a long conversation with Radian's personnel in marketing and engineering, they indicated that the small size of the speaker should not fool you. A total of 250W per channel represents a fine, if not slightly conservative, power match to these devices. A Crown D-75 won't do it.

Although they aren't the most efficient speakers around, they need a large power supply with lots of current to sound the best and provide the tightest damping factor. The dynamic capabilities of these speakers put all but the largest soffit-mounted monsters to shame. Clearly few small speakers can provide the fullness, clarity and projection of these speakers.

Their weak point is clearly in the area of response smoothness. Although the extreme high range didn't suffer from the brittle or harsh qualities not uncommon in metallic diaphragms, the midrange was less than perfect in smoothness. As noted in the frequency response and time decay measurements, the upper range suffers from raggedness, adding a forward edge to voices, strings and sibilant program material that isn't present in original sources.

Surprisingly enough, the effect is minimized even slightly off-axis, and even at its worst, is not heavily audible as a negative characteristic. Good ears will



hear the roughness in response as exactly that — a slight harshness or bite, keying off sibilance or distortion. Some vocal program material may suggest a nasal quality, although subtly so. This is, no doubt, fallout from the 3kHz to 7kHz region's roller coaster response.

For perspective, note that NS-10s are equally mountainous, as are many other pro speakers we have learned to live with.

That said, although the roughness is noticeable, it is not totally objectionable. Drums, guitars, electric bass and synthesizers sound big and powerful, up front and present.

The very worst that can be said is that these speakers sound like a very good compression driver on a properly designed horn. They don't have the smoothness of a soft dome, but then soft domes can't hit 110dB SPLs in your face and hold it there. Soft domes don't let drums sound like drums, or vocal shouts cut the air. Sometimes these things are good.

In the realm of total fidelity, the imaging is great, something most coaxial designs are noted for. The perspective is pinpoint accurate, and off-axis listening is true and smoother. Tonal balance changes only slightly and maintains uniformity as you listen progressively at angles. The speakers are not as "open window" transparent as some flatter home stereo speakers (which have had studio popularity from time to time), but few, if any, consumer speakers excel at power handling, extended diaphragm excursion and dynamics the way these do.

To cut to the chase, you won't believe you're listening to an 8-inch speaker. Put 250W behind these, prop them on the (large) meter bridge, or use an Ultimate Support Stand right in front of the board, and serious acoustic power will walk right up and kiss you on the cheek. They'll do it without hitting the excursion limits. Leave the room for a plumbing break and the speakers will still be cooking along happily, not burning to a crisp. Generally we're talking real bass and effortless highs from a small box and a large diaphragm high-power compression driver, and you shouldn't take that lightly.

### REAL USE

In the process of recording and mixing a live 24-track soundstage recording of a high-power 5-piece R&B band this past summer, these little speakers provided the R•E•P staff with all of the primary monitoring functions required. In two of the mixdown and sweetening facilities involved later on in the project, the MS-8's were compared to and chosen over the permanent, soffit-mounted, equalized main monitors by everyone involved. The Radians were more transparent, more predictable and easier to live with for extend-

ed periods at higher levels than the high-priced spread. The resulting mixes translated more predictably. And that's what it's all about.

The slightly elevated midrange noted earlier was audible in the sessions, but considered a plus, providing a final tape with smoother (but not muted) mids and a seemingly extended high and low end when played on a range of consumer speakers. Playing with the various mid and high equalization switch settings allowed flexibility enough to fit into any placement scheme, whether free-standing in the air,

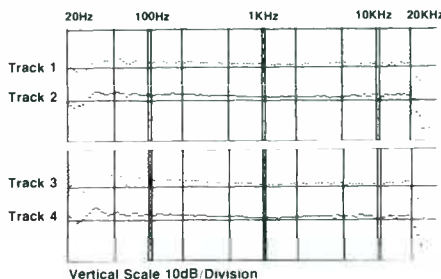
on a meter bridge, or boxed into a corner.

Only the low bass wandered because of coupling variations. In short, when noting the characteristics of the speakers, they translated very well into real-world music product creation. That's as close to an endorsement as we'll get. ■

Editor's note: The manufacturer has notified us that by the time this review hits the press, updated versions exhibiting smoother total frequency responses will have replaced the units we tested, addressing the one reservation we have about these speakers.

## EXCEPTIONAL FREQUENCY RESPONSE

AT 1 7/8 IPS (REAL TIME)



**TEST METHOD** A 40KHz to 20Hz sweep at -20dB from a Sound Technology 1510-A was recorded at 1 7/8 ips in a KABA slave deck on TDK SA tape. The tape was played back at 1 7/8 ips in the KABA master control deck and the output displayed on the Sound Technology. The curves represent the **SUM** of the record and playback response of the KABA system at 1 7/8 ips.

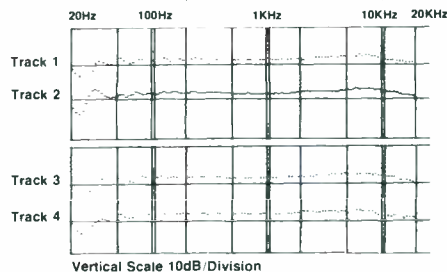
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## EXCEPTIONAL FREQUENCY RESPONSE

AT 3 3/4 IPS (DOUBLE TIME)



**TEST METHOD** Same as above except the sweep was recorded at 3 3/4 ips on the KABA slave deck and played back at 1 7/8 ips on the master control deck. Highest frequency on playback was 20KHz so there is no response beyond 20KHz.



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## Show Recap

By Laurel Cash-Jones

**N**ow that the curtain has closed on the AES for yet another year, it leaves us to savor all the new and exciting(?) products that were introduced (or re-introduced in new packages) during this show. Despite promises to the contrary, there were not many "earth-shaking" new concepts at this show. However, there were some clever advancements in existing products.

An interesting side note: Most of the manufacturers showing innovative products have been primarily involved in the musical instrument business.

Laurel Cash-Jones is R+E•P's editorial consultant and a Los Angeles-based free-lance writer.

### SAMPLE THE FUTURE

One of the things that impressed me was the very quiet introduction of the Akai S1100 stereo digital sampler. While it is based on the popular S1000, it goes well beyond it in some very significant ways.

How? First, aside from being a great-sounding sampler (44.1kHz or 22.05kHz selectable sampling rate) with 16-bit true phase-locked stereo sampling (internal processing is 24-bit), it has an on-board digital signal processor with various reverbs, echo, chorus/flanger, and pitch shifter.

Add to this a built-in SMPTE reader/generator with cue list programming, a SCSI port for storing data to a hard disk or magneto optical drive, a digital output (XLR/EBU type II) and a standard memory of 2Mbytes (23.76 seconds of stereo sampling time at 44.1kHz) and the capability to expand the memory up to 32Mbytes, which gives you more than

three minutes of stereo sampling time at 44.1kHz on-board.

Promised shortly (isn't it always?), the upcoming optional version 2.0 software release will even allow the S1100 to record direct-to-optical disk in conjunction with a 650 magneto optical disk drive. I am told that S1000, S950 and S900 discs will play back just fine on the S1100.

If this is true, I must heartily congratulate Akai, especially because obsolescence is so rampant in this industry. (However, I am surprised someone hasn't called this a "Complete Digital Audio Workstation"!)

**Circle (101) on Rapid Facts Card**

### SPEAKING OF WORKSTATIONS

A new catch-phrase was coined at the show: the "Personal Workstation." Watch for it. This one will be more overused than "Digital Audio Workstation" ever was. Trust me. I hope whoever coined it gets a royalty.

### WHAT'S ALL THE NOISE ABOUT?

Coming to quiet all the nasty noises in the world is the CEDAR Sound Restoration System from Cedar Audio Ltd., Cambridge, U.K. An acronym for Computer Enhanced Digital Audio Restoration, CEDAR was designed to work on various types of signal degradation, such as broadband noise, scratches, pops, thumps, buzzes and hums.

CEDAR is said to be an easy-to-use system that extracts only the signal from the program material and allows extremely accurate control at each stage of the noise reduction process and all in real time. Don't you wish they made something to quiet down the neighbor's lousy stereo system?

**Circle (102) on Rapid Facts Card**

### NOW YOU CAN MASTER TIME AND SPACE

Roland became a master of the space-time continuum with the debut of its Three-D Sound Localization System. I have to say that this one really wowed the crowd at the show.

Scheduled for a Spring 1991 release, the Roland Sound Space (RSS) system is composed of two processors — binaural and transaural. (If you need an explanation of these terms, do some research; it is an important and impressive type of recording.) The binaural processor converts the input signal into signals resembling the L/R signals of typical binaural recording.

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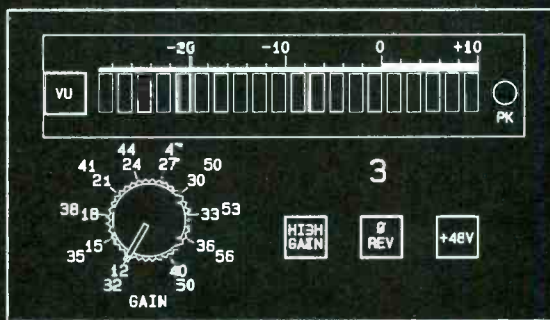
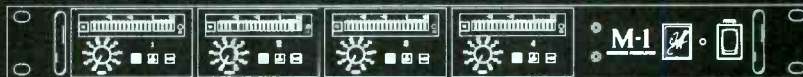
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This allows the RSS to manipulate the sound source in a 3-D fashion as desired by the engineer. However, when binaurally recorded sound is reproduced through a regular 2-speaker stereo system, the right-channel sound, which should only be heard by the right ear, will reach the left ear as well; the left-channel sound will also reach the right ear.

This is known as L/R aural crosstalk. (This is why headphones are the most common form of playback of binaural recordings.) In order to eliminate this L/R crosstalk, Roland included a separate transaural processor in the RSS unit.

The basic components of the Roland Sound Space Processing System include the controller, the processor and two A/D/A converters. This system incorporates four 24-bit internal processing circuits in order for it to process up to four sound sources simultaneously. The A/D converter offers selectable sampling rates of either 44.1kHz or 48kHz, and has selectable emphasis. It also features the use of optical input/output terminals using the AES/EBU (CP-340 Type 2) data format, thus allowing connection to other signal processing gear using this format.

The controller has two rotary knobs on each of its four inputs. Most important, they are used *together* to place the position of the sound source where you want it to go. The first knob (called azimuth) allows you to move the sound from left to right, and from front to rear. The second knob (called elevation) allows you to move the sound from front to rear, and from top to bottom.

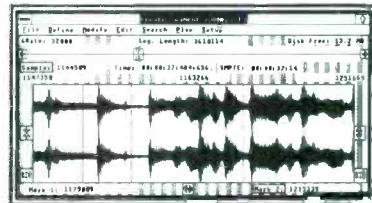
This is a truly remarkable system. You must hear it to understand what it can do for a standard 2-channel system, without adding a surround sound decoder and more speakers and amplifiers. It may become as common on CDs as Dolby processing has for film.

Or it may become the Edsel of the sound business. No one ever said that life was fair or that the best technology wins. If it were true, we would all be using Beta instead of VHS to tape "Monday Night Football" while we slave away in the studio. ■

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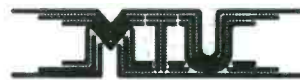
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## Harrison SeriesTen B console

The fully automated SeriesTen B can store and retrieve all console settings in less than two seconds, including the complete reconfiguration of all operational parameters. The console interfaces with a Macintosh II-based hard disk automation system, which offers save and recall, snapshot and dynamic automation of all major functions, including headphone and monitor mixes. A new mix editor features improved mix-merge utilities. The graphics system displays a 20Hz-20kHz graphic EQ curve, fader levels, compressor and gate curve, panning and all bus assignments. Functions can be updated dynamically with a trackball or mouse.

Circle (104) on Rapid Facts Card

## Martin America F1 Series speakers

The F1 Series compact 2-box system is a smaller version of the F2 and is suitable for venues that do not require the interchangeable rackmount facility of the F2 top box. The F1 top box features a potent mid horn with a proprietary 12-inch driver. High frequencies are reproduced by a 1.4-inch exit titanium diagram compression driver, which combines low distortion with enhanced high frequency clarity; the combination has a nominal 65° horizontal coverage pattern. The dual driver low end is housed in a ported enclosure the same size as the top box to provide a compact system.

Circle (105) on Rapid Facts Card

## Sennheiser MKH 60 P48 condenser mic



The MKH 60 P48's symmetrical push-pull transducer with optimum resistive loading results in an ultralinear frequency response. The capsule's low impedance allows it to drive a low-noise, Class A transformerless output amp, which delivers a 1.3V balanced audio signal. The mic also features frequency tailoring switches to roll off low frequencies for eliminating rumble and wind noise or to boost high

frequencies for accurate sound pickup at a distance from the sound source. The humidity-resistant mic is made of lightweight metal alloy construction and features 48V phantom powering.

Circle (107) on Rapid Facts Card

## Analog Devices SSM-2125 decoder

The Dolby Pro-Logic Surround Sound Decoder fully integrates an auto-balance function, which provides dynamic correction of left-right input signal-level imbalances. The decoder combines all of the core functions of a complete Pro-Logic system on a single chip, including active decoding matrix, center mode control, noise generator and auto-balance. The SSM-2125 integrates up to 30 op-amps, 10 VCAs, a proprietary operational conveyor amp, two dual-output rectifiers, two log-difference amps, comparators, random logic and a digital noise source. The decoder features a dynamic range of more than 100dB and 0.015% total harmonic distortion.

Circle (106) on Rapid Facts Card

## Bec Technologies Audioplex Elite

The 2-way fiber optic snake system features 128 full bandwidth audio channels each way, transformerless direct active inputs and outputs, high level oversampling A/D and D/A converters, unlimited splits and unlimited run lengths with no signal degradation. Outputs can drive 10 volts into a 600Ω load. The fiber optic snake can be run in sections, with armored cable required only in areas where crush protection is needed. Its modular design allows it to be expanded in blocks of eight channels, up to 128 on a single fiber.

Circle (108) on Rapid Facts Card

## BSS DPR-901 EQ

The DPR-901 integrates parametric equalization with dynamic expansion and compression to provide four fully parametric bands of frequency-selective expansion and compression. A below-threshold control allows low-level expansion and low-level compression with downward expansion. Features include level-dependent equalization, dynamic loudness contouring, mix enhancement, noise reduction and broadcast limiting. Other capabilities include transfer sweetening, souring, softening and hardening, de-essing and de-essing. List price is \$1,350.

Circle (111) on Rapid Facts Card

## Neve DTC-2 console

Designed for CD master tape prep, the DTC-2 Digital Transfer Console offers flexible and musical EQ and filtering sections. A comprehensive automation system allows storage of all console settings so a master can be remade with new settings at any time. High and low pass filters offer a range of Q values, while the A/B store allows comparisons between two settings. The D/A and A/D section with matched anti-aliasing, anti-imaging filters, allows remastering of analog tapes with high resolution.

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## WaveFrame CyberFrame-M editing system



An economical version of the CyberFrame-E, the M-version is an expandable multitrack disk recorder designed for music, radio and audio for video markets. Features include an edit controller, EGA Monitor/Graphics adapter and modular disk recorder. If slaved to a VTR, it provides internal digital ping-ponging, intuitive scrub, locate and mark editing, visual waveform display and synchronized virtual track management. Options include software packages for machine control and CMX-compatible list management, printing of cue sheets, editorial tools and a digital module with 10×6-channel mixing, signal processing and multi-format I/O.

Circle (110) on Rapid Facts Card

## API 550S EQ

Based on the original API 440 EQ circuit, the 550S features an extra band and 11 new frequencies, extending 28 over four bands. All filter circuits feature a filter that is wider at minimum boost or cut and then narrows to one octave at full boost or cut to allow subtle tone adjustments over 30Hz to 20kHz. The LF and HF bands can be switched from peaking to shelving; the two mid bands are peaking only. The 550S uses two API 2510 discrete op amps for input and output

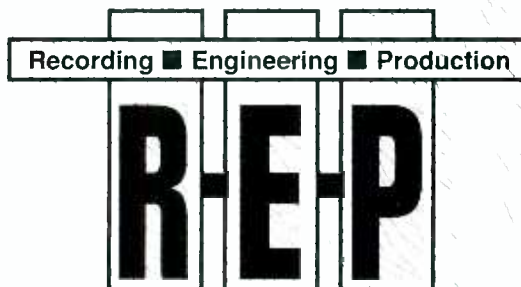


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devices, allowing output levels in excess of +27dBm.

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### 3M 996 mastering tape

The 996 tape records at operating level +9 with little distortion and features a S/N ratio of 79.5dB. It also offers higher MOL and improved signal-to-print characteristics. The 996 is 100% laser-scanned for consistent end-to-end quality and is packaged in a new TapeCare Library Box, which seals out dust and humidity. Available in all standard widths, the tape is bias-compatible with 3M 226 and other industry products.

Circle (114) on Rapid Facts Card

### Genelec 1033A studio monitor

The 1033A active monitor is designed for use in small- and medium-sized control rooms. A Directivity Control Waveguide decreases the system's overall directivity while optimizing its free field and reverberant characteristics. Driver protection is included. Peak SPLs of 124dB/pair at 2m can be produced. The 1033A uses 2x10-inch long-throw woofers, a 120mm mid-range high-sensitivity cone driver and a 25mm metal dome tweeter. Overall frequency response extends from 37Hz to 22kHz,  $\pm 2$ dB in half space. Modules consist of two speaker enclosures and an amp unit.

Circle (115) on Rapid Facts Card

### Otari MTR 90 Series III

An update of the MTR 90 II multitrack, the Series III can shuttle tape at speeds of up to 2,400 feet in 82 seconds and is available in 24- and 16-channel/2-inch versions. An automatic shut-off function detects tape load errors and an automatic sensing function prevents tape damage at the end of reels. The Series III electronically conforms its tensioning and ballistics to reel sizes from 14-inch metal to 7-inch plastic reels. The EC-101 internal chase synchronizer allows the system to servo-lock to a master source in forward and reverse at playspeeds from 0.2-times to 2.5-times normal playback.

Circle (116) on Rapid Facts Card

### Sennheiser WM1 wireless mixer

The WM1 wireless mixer system consists of a compact, battery-operated unit that features one conventional hard-wired input for a dynamic or phantom-powered condenser mic and four wireless UHF receivers. Each channel includes a volume control, bass and treble adjustments, bass

roll-off switch, pre-fader listening button and full metering. Monitoring is achieved through headphones or a headphone/mic combination. Mixed output can be hard-wired to a recorder and/or transmitted wireless to the EM 2003-TV or EK 2012-TV RF receivers. Body pacs or handheld transmitters are available.

Circle (119) on Rapid Facts Card

### Community RS220 loudspeaker system



The RS220 Series system consists of the 3-way RS220 loudspeaker, VBS210 subwoofer and 220 System Controller. The trapezoid-shaped loudspeaker enclosure is 14 $\frac{1}{4}$  x 26 $\frac{3}{4}$  x 14 $\frac{1}{4}$  inches. Each speaker weighs 77 pounds and is outfitted with steel edges to accommodate flying attachments using cables or bolts. The RS220 operates from 100Hz to 18kHz and posts power handling figures of 200W pink noise/500W program; maximum output is greater than 127dB at 1m. The subwoofer contains a pair of 10-inch dual-spider drivers that operate between 60Hz and 150Hz when used with the 220 System Controller.

Circle (120) on Rapid Facts Card

### Otari MTR-15 2-track recorder

The MTR-15 has extensive microprocessor computer control and automatic alignment of the record and reproduce parameters. As an updated version of the MTR-10, the MTR-15 is faster, more streamlined and comes with 12.5-inch reels. A  $\frac{1}{4}$ -inch center track time code version of the MTR-15 records and reproduces

SMPTE/EBU time code. A plug-in assembly allows conversion between  $\frac{1}{2}$ -inch 2-track and  $\frac{1}{4}$ -inch 2-track formats. The compact design is suitable for rack mounting or floor stand console configuration with meter bridge. An optional chase synchronizer is available.

Circle (117) on Rapid Facts Card

### Harrison ARS-9 routing switcher

The ARS-9 Audio Routing Switcher is a transformerless, differential unit on inputs and outputs. It may be fitted with up to 256 inputs and 256 outputs, which allows a maximum of 65,536 switches; these crosspoints are addressed using an 80C31 microcontroller running at 12MHz. Input, output and switch cards plug into a 16-slot card cage with internal motherboard and system power supply support for two input, four output and eight switch cards. The card cage is fitted with standard 19-inch rack-mount ears. The ARS-9 is suitable for stand-alone applications or integration as a subsystem with the Harrison SeriesTen B Console.

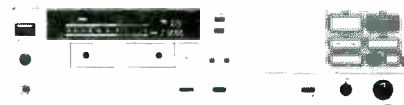
Circle (118) on Rapid Facts Card

### SSL SoundNet

The SoundNet Digital Audio Network system works in conjunction with Solid State Logic's ScreenSound system to allow up to seven operators to share and copy work on multiple working disks, without the need to download and upload projects. SoundNet also provides central mass storage of audio and a database of all sound clips, including those on optical discs not currently in the drives. All operators have immediate access to the central database of clips using key word searches. All backup and restoration is performed as an off-line function. Other features include 48 hours of hard disk storage and 56 channels of digital or analog audio playback.

Circle (126) on Rapid Facts Card

### Panasonic SV-3900 DAT recorder



The SV-3900 features a fully implemented serial control interface for external remote



operation of all transport and programming modes that require few front-panel controls. The standard 9-pin serial port can be switched to follow ES-Bus or P2 protocols. The recorder comes with a full-function remote control, which features a standard keypad for entering PNO and Start IDs, all transport controls and a shuttle wheel with a speed range from half-time to 15-times play speed. Other features include program, absolute and time-remaining displays and selectable 44.1kHz/48kHz sampling rates.

Circle (113) on Rapid Facts Card

### New England Digital DSP Option

The DSP Option, designed as an add-on mixing and digital signal processing module for PostPro and PostPro SD digital audio workstations, incorporates NED's MultiArc technology, which provides a pathway for future multitasking and multiuser capabilities. The option offers on-board mixing capabilities, including 5-

band parametric EQ with high pass, low pass, shelving and automated level control; 32-bit data path with 24-bit audio resolution; multi-channel digital I/Os and sample rate conversion.

Circle (121) on Rapid Facts Card

### DAR DASS 10



Digital Audio Research's DASS 100 Digital Audio Synchronizing System is a multi-function digital audio synchronizer, interface and processor. It performs sampling frequency and digital audio format conversions, digital audio sample synchronization, DC removal, gain adjustment, digital audio mixing, time delay and digital

test-signal generation. The 100 also provides digital audio sample clock generation using video, AES/EBU, WSYNC or LTC signal sources. Up to eight system configurations can be held in non-volatile memory. A removable control panel permits system changes or remote operation.

Circle (122) on Rapid Facts Card

### Sonic Solutions Version 1.0

Version 1.0 of the Sonic CD PreMastering System combines 24-bit recording, editing and mixing into a single workstation. The system uses a Macintosh II computer, Sonic Solutions' proprietary signal processing hardware and magnetic computer disk drives. Features include recording, processing and playback of digital audio at any word size between 16 and 24 bits, the ability to record up to two channels and play back up to four channels from an optional erasable optical hard disk drive with removable media, a vari-speed function that permits time and pitch changes in real time as sound is loaded

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onto the hard disk and an archiving program that allows for backup of work in progress to 3/4-inch cassette, DAT tape or recordable CD.

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## Neumann TLM 50 pressure mic



An update of the classic M 50 mic, the TLM 50 uses transformerless electronic circuitry that provides directional properties in the upper frequency range that are comparable to a pressure gradient mic. In the lower frequency range it operates as a pressure transducer with a linear response. The aluminum diaphragm is 12mm in diameter and is mounted on a 40mm diameter Lucite sphere, which provides smooth transition into the pressure buildup region for frequencies above 1000Hz and an even rise in the directional index as the frequency increases. Addressed from the side, the TLM 50 features a -10dB switch and a switchable filter for damping frequencies below 100Hz.

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## Crown macro-Reference amp

The macro-Reference amp incorporates a 20-bit digital range, multiple plug-in input configuration, protection circuitry, LED displays for input/output and a Signal Process Indicator. Other features are front-panel level controls and settings for two input sensitivities. Operable in bridged/mono or parallel/mono modes, its bandwidth lies between 3Hz and 100kHz; ultimate damping capabilities are rated in excess of 20,000 at 8Ω. Convection cooling is assisted by on-demand proportional-speed forced air. Suggested retail price is \$3,500.

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## Hardware and Software Updates

### NED EditView update

New England Digital's Macintosh-based EditView audio editing software now features direct lock machine control and new display options such as the ability to view program material on either side of the head or tail of a cue, and cue in-and-out points that can be adjusted on the fly. Precise cut/copy/paste edits can be performed from the EditView window. Editing on the NED PostPro workstations now uses a point-and-click process.

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### Otari Diskmix update

The new Diskmix 3 Film Moving Fader Automation System displays cinematic increments of feet and frames, which allows a sound mixer to work directly from a film cue sheet or edit decision list. A conforming mode allows the mixer to adjust entrance/exit points on audio sources/tape machines while making additions or deletions to the film during the post production process. The system provides the speed of SMPTE-based tape transports while preserving the system's ability to perform in terms of full coat mag.

Circle (131) on Rapid Facts Card

### 3M archive package

The new TapeCard Library Box is designed to store the new 996 Analog Mastering Tape, 3M's 275 digital audio tape, 800 series mastering tapes and logging tapes. The box features a blow-molded, impact-resistant, double-wall, lightweight plastic construction that seals out dust and humidity. Four raised interlocking stacking buttons prevent slipping and a built-in compact carrying handle enables easy transportation. A hub support system allows upright storage and eliminates cinches by letting the reel rotate freely in the case. Twin latches prevent accidental opening and a large spine label area provides space for identification.

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### QSC UL listings

QSC's model 1200 and 1400 power amps have received UL listing. According to the company, UL approvals will be a routine part of new product design.

Circle (136) on Rapid Facts Card

### TAC consoles expansions

The Bullet recording version is now available in a 24/8/2 + 16 format; the ES8 serial interface works with the Bullet 10/4/2 AFV. The Magnum 24-bus in-line recording console includes a 4-band EQ that may be split for simultaneous operation on channel and monitor signal paths, an in-place solo with solo/Pfl operation that is controlled by Master Status switching, fader reverse and discrete tape monitor input trim. The Scorpion II now features 35 standard configurations available in four chassis sizes ranging from 16/8/2 to 32/16/2. The Scorpion II has an improved EQ section, including the addition of switched midrange "Q's," a high pass filter and a 15-segment LED meter.

Circle (133) on Rapid Facts Card

### Hybrid Arts ADAP II Portable

The ADAP II Portable digital audio recorder/editor is coupled with a 4Mbyte laptop computer that includes a backlit LCD display. Disk storage capacities of 210Mbytes or 420Mbytes are available, allowing about 12 and 24 minutes of stereo recording time, respectively. The system supports AES/EBU and S/PDIF interfaces and has SMPTE read/write capabilities. Optional software packages include MIDI Performer and TimePage, an audio time-scaling tool.

Circle (135) on Rapid Facts Card

### Audio Processing Technology apt-X 100 update

Enhancements to the apt-X 100 Music Coding System include the Auto-Sync Mode, which now locks encoder and decoder units in a satellite or transmission link within an inaudible 50ms, without the need for a dedicated Word Sync signal; an automatic decoder that detects auxiliary data within the digital information; and an eight-channel De-multiplexer Mode, which allows up to eight coder channels to be multiplexed together for transmission over a satellite, microwave or hardware link.

Circle (138) on Rapid Facts Card

### SSL G Series options

The G Series console can now be fit with either the classic Bell EQ or the G Series EQ. According to the company, some console users had been requesting a combination of both EQs, most notably Hugh Padgham and Fran Filipetti. [See the August Letters for more information on this issue — Ed.]

Circle (134) on Rapid Facts Card



### Bruel & Kjaer portable R-DAT system



The portable R-DAT recording/archiving system, which comes in a lightweight Zero/Halliburton flightcase, is built upon two Bruel & Kjaer Type 4006 omnidirectional mics and the Panasonic SV-255 portable R-DAT recorder. Accessories include stereo mount, 2-channel P-48 power supply, UA-0777 nosecones, battery and battery charger. The system meets FAA airline size regulations for carry-on luggage. List price is \$6,200.

Circle (124) on Rapid Facts Card

### Agfa R-DAT cassettes

R-DAT Digital Audio Tape is designed for archiving studio and field applications. A dark gray carrier features non-slip bubbling and a retractable hook for storage. Two cassettes fit into the tension-grip casing inside the carrier. The smooth base foil has been coated with pure metal particle pigments to provide high packing density. Tapes are available in 60-, 90-, and 120-minute lengths.

Circle (125) on Rapid Facts Card

### Turtle Beach Systems mastering system



The 56K Digital Recording System consists of the 56K-PC Digital Signal Processor card, which provides access to the computer's hard disk for recording and playback; the 56-D Digital Audio Interface, which provides connections to AES/EBU

and S/PDIF digital audio interfaces, SMPTE time code and MIDI connectors for synchronization and control capabilities; and the SoundStage 2 track editing software, which has an onboard 4-band parametric equalizer with assignable bandwidths and center frequencies. Other features include a realtime level meter and spectral analysis for recording, a varispeed playback function for scrubbing and SMPTE and MIDI triggering. Retail price is \$2,689.

Circle (129) on Rapid Facts Card

### QSC EX 4000 power amp

Previously known as the MX 4000, the EX 4000 is a 3-rack space amp that features input connectors mounted on a removable module, which allows for interface with control systems as they develop. The rear panel features 5-way binding posts outputs, XLR/barrier strip inputs and three Neutrik Speakon jacks. List price is \$1,998.

Circle (137) on Rapid Facts Card

## Publications

### Lexicon newsletter

Lexicon has just published the first issue of *Digital Domain Digest*, a four-page newsletter covering a variety of topics on digital audio technology. The newsletter will include application articles, technical discussions and current news about recent developments at Lexicon. The newsletter is published quarterly and is mailed free upon request.

Circle (140) on Rapid Facts Card

### Digidesign textbook

"Random Access Audio," by Dave Huber, is a textbook covering the basics of digital audio recording. It is available directly from Digidesign for \$4.95.

Circle (139) on Rapid Facts Card

### Lexicon application notes

Lexicon is offering eight, free application notes for owners of Lexicon PCM-70 and LXP-5 digital effects systems and the MRC MIDI Remote Controller. The notes feature discussions about technique and step-by-step procedures to explain how Lexicon systems can be used more effectively.

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# MOVING?

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Continued from page 60

cently to solicit my opinions regarding modular, boxed loudspeaker systems. He was reticent to spend his capital on research and development time besides the cost of plywood and transducers. He was hoping to be able to buy multiples of a full-range speaker system from a manufacturer, have instant gratification and somehow know his decision was right.

"It's hard to decide," he noted. "There are nearly half a dozen options for boxes that fit my needs ... that are trapezoidal, have hanging hardware, are pre-fitted with multipin connectors and offer roughly the same coverage pattern. How can I tell which is the best value for the dollar?"

Personally, I think that the development of a variety of speaker system products from such manufacturers as Apogee, Eastern Acoustic Works, Electro-Voice, JBL, Martin, Meyer, Renkus-Heinz and others is fantastic. These companies are offering pre-built products, ready to be used off-the-

shelf, that the concert sound business could only dream about 10 years ago. The modular, roadworthy enclosures can provide a certain level of sound quality and ease of transportation that is very important.

However, perhaps the most overlooked aspect of purchasing and using multiple full-range speaker system enclosures has to do with the arraying aspects of the boxes when combined. How do the lows, mids and highs in each smaller box combine as a larger array to present a coherent whole-system wavefront? What sort of coverage pattern control exists as the identical boxes are combined in different numbers and arrangements?

Most of us audition speaker systems singly or in pairs. Sometimes, we have a chance to compare Brand A and B to Brand C in the same place at the same time. But rarely do we get a chance to compare arrays of one type of enclosure with another. The logistics and schedul-

ing difficulties make this type of learning experience all too rare.

To their credit, some speaker system manufacturers have undertaken extensive measurement and testing projects in an attempt to provide meaningful data for their end-users. Apogee has made a 3-ring binder available to designers and consultants, which gives actual 2- and 3-box interactive array data on the company's modular speaker enclosures. Both JBL and Meyer presented AES papers last year on array measurement projects. Renkus-Heinz offers proprietary software that will predict coverage patterns of its boxes when used in combination.

The system assembler or purchaser who is considering using multiples of today's modular full-range speaker enclosures will want to take full advantage of any such resources, and learn to interpret them, if the overall performance and efficiency of a large system is of concern. ■

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- 9-track 20,000 note sequencer with independent track looping
- Four 16-instrument multi-timbral locations
- MIDI controller features including multi-channel send and receive
- MIDI sample dump send and receive
- On-board 3.5" floppy disk drive

And with the addition of an affordably priced sample interface, the DPM 3 SE becomes a high performance 16-bit sampler. It's New and it's Hot! The DPM 3 SE—Everything you want in a keyboard and much more.

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DPM<sup>®</sup>3  
OWNERS

REMEMBER...YOUR DPM 3 WILL NEVER BE OBSOLETE! UPDATE YOUR DPM 3 TO THE NEW DPM 3 SE FOR ONLY \$49.95. CONTACT YOUR LOCAL AUTHORIZED PEAVEY DEALER FOR DETAILS OR CALL 601-483-5365



# It Takes Real Guts To Face A Crowd Like This.



## Concert Series

They want it all. They expect it. They deserve it. And, frankly, you wouldn't have made it this far if you had delivered anything but your absolute best. Night after night, show after show.

At JBL we share your dedication

and desire to take your music to the top. That's precisely why we invested the time and energy we did into the development of Concert Series loudspeaker systems. Just as every note and word must work together in perfect harmony, every

component in a professional sound system must integrate and function perfectly with each other.

Concert Series has the "guts" to face the most demanding audiences. This fact is underscored by the major tours and concert venues that have selected Concert

Series. From reggae and rock to solo and symphonic performances, Concert Series is helping artists the world over to give their fans the calibre of performance they demand and deserve, night after night, show after show.

We encourage you to audition Concert Series. Do it for your fans. Do it for yourself. Visit your JBL Professional dealer and discover for yourself why Concert Series is hanging around with some of the biggest names in the music business.

The JBL logo, consisting of the letters "JBL" in white, bold, sans-serif font, set against a red square background.

JBL Professional  
8500 Balboa Boulevard, Northridge, CA 91329

**H** A Harman International Company

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