June 1990

Recording ENGINEER/PRODUCER

The Applications Magazine for Audio Professionals

AN INTERTEC PUBLICATION

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TRACKING THE CHANGES: RE/P HEADS INTO THE '90s...

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It's the 1990s, and we're the first to admit that our 20-year-old title — Recording Engineer/Producer — doesn't begin to describe what today's working audio professional does on a daily basis. From this day on, we're R•E•P — the Pro Audio Applications Magazine for Recording, Engineering and Production.

It's too limiting to say that this magazine exists only for recording engineers and record producers. R•E•P also addresses audio pros involved in post-production; digital recording, assembly and editing; music creation; sound reinforcement, radio and TV broadcasting; commercial spot production; industrial multimedia; mastering and duplication; and studio design.

Although the name is updated, R•E•P will continue to present the applications-oriented material we've published for more than 20 years. R•E•P will continue to provide the information you need to work smarter and more profitably, from real, usable product reviews to business and production insights.

The audio world is changing, and R•E•P will help you face the challenges of that world, through the 1990s and beyond.

Dennis R. Milan
Publisher

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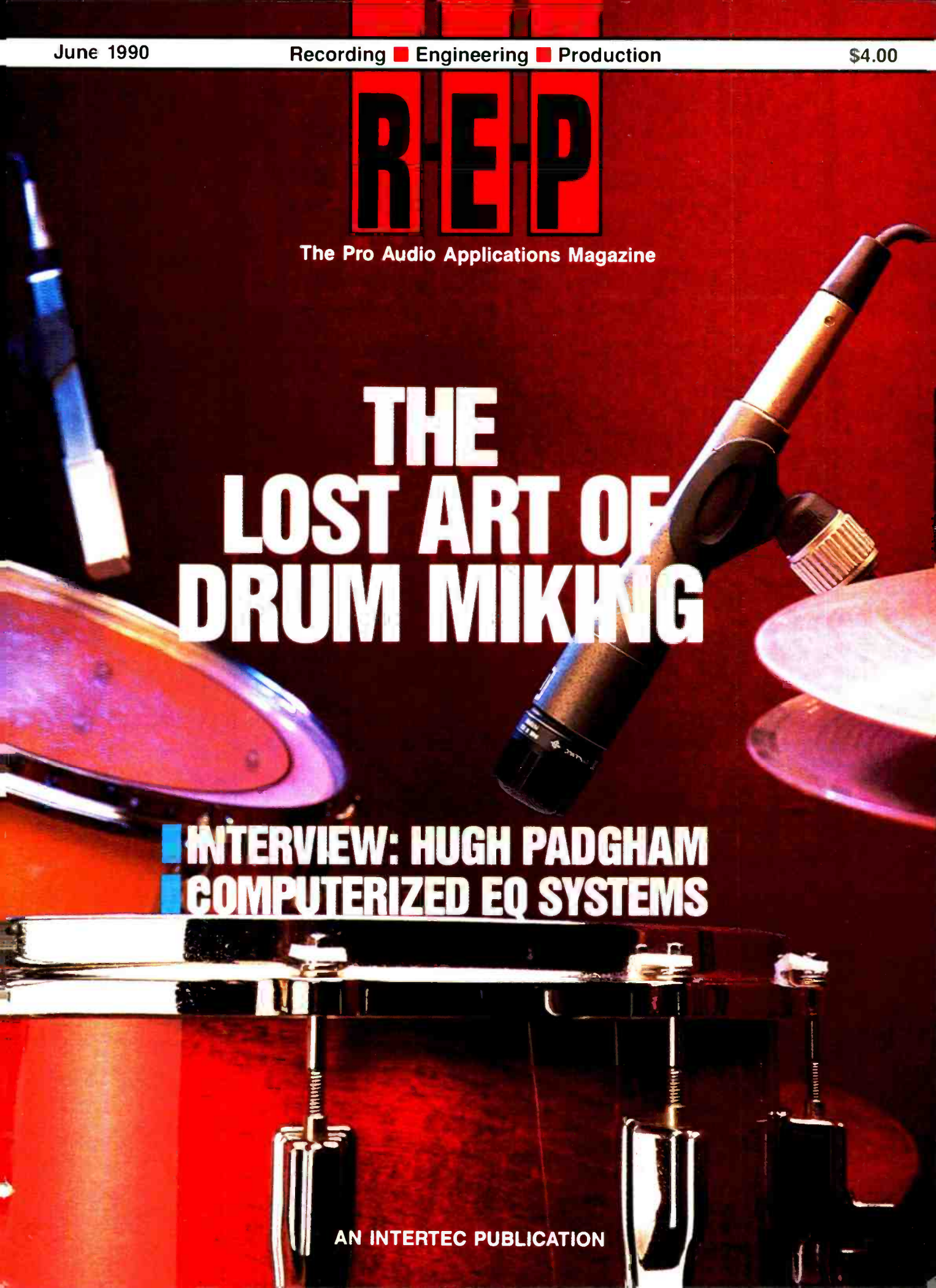
R-E-P

The Pro Audio Applications Magazine



THE LOST ART OF DRUM MIKING

INTERVIEW: HUGH PADGHAM

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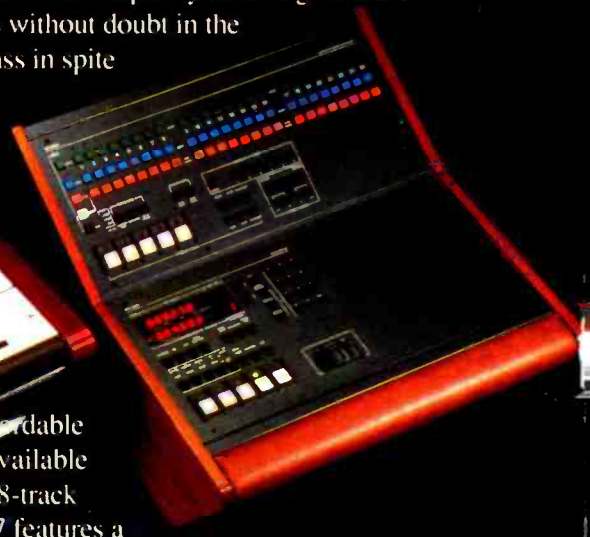

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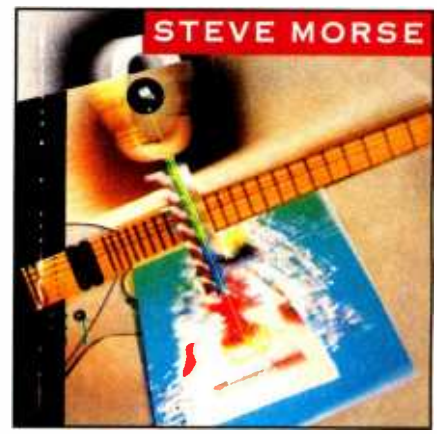

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Photography by Kevin Anderson
Art direction by Liz Veternick
Studio: Sound Recorders, Kansas City, MO.
Drums supplied by Big Dude's Music City, Kansas City, MO, and Bill Mack Jr.

R•E•P (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, P.O. Box 12960, Overland Park, KS 66212.

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R•E•P is an applications-based publication targeted at professional individuals and companies active in the commercial business of studio and field recording, audio for video, live sound production and related fields. Editorial content includes descriptions and demonstrations of audio production techniques, new products, equipment application, maintenance and audio environment design.

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From the Top

Future History

Once upon a time, say 20 years ago, things were more clear. People in the audio industry were usually musicians or broadcasters before they gravitated behind the mixing board. Others did PA, embryonically developing the sound reinforcement business somewhere in back alleys and garages.

Our magazine, created in 1970 and nicknamed RE/P in the first issue, fit perfectly in that neat, distinct world where studios did music, radio stations did voice-overs, and film houses did looping and transfers. Identifying a need, the magazine addressed all of the important issues pertinent to the job of manipulating technology for the creation of audio art, whether produced between four walls or out in a field.

RE/P magazine (past tense) continually broke new ground at higher elevations, originating articles that addressed the gamut of professional audio production, from studio work to field recording, from equipment design to post production, from interviews with chart-tracking producers to features on megawatt touring sound systems.

Over the years, the rapid appearance and development of various storage mediums, equipment platforms and production techniques redefined the industry again and again. The greatly downpriced availability of equipment from companies such as Tascam and Fostex, not to mention electronic desktop editing and sound manipulation, allowed expanded audio production without the capital investment that was once needed.

Albums, scores, demos, soundtracks and commercials could be generated in back offices, warehouses and bedrooms, in facilities fully equipped for the price of a luxury car. Professional, commercial audio production became the domain of musicians, marketing specialists, creative art types and media departments, in addition to the traditional industry job titles.

Video and computer hardware took root and bloomed in previously audio-only environments. Compact affordable video with expanded audio capabilities created an entire support industry. Sync-to-everything became more than a promise.

Today, out of the swirling fog of techno-uncertainty, solid images are starting to coalesce. The producer (small "p") of a project today has the capability to become a 1-man band, writing, directing, programming, performing, recording, mixing and marketing in multiple mediums.

Case in point: the guy who aligns the synced double 24-tracks at dawn, then directs and cuts voice-over talent to hard disc over imported digital tracks (spun off on DAT), assembles, edits and lays-back an agency Mac computer-generated commercial donut to D2, audio and video, still store/frame grabs a shot for the DTP'd PR piece, takes off his tie and completes basics for a heavy-chromium glam-band as engineer/producer in the afternoon and mixes his brother's neo-folk act at the downtown showcase club that night over his own rental PA system. Tomorrow he does the Lambada.

Question: What is this guy's job title? What does he do for a living? Answer: Audio production. Welcome to the Nineties.

We at R•E•P (present tense) recognize the traverses occurring today. In this post VH-1, sound byte, bigger-than-real world where it all eventually goes to video, and the marketability of production values is everything, we are updating to match the times.

With this issue, we are introducing a shortened title and a new tag line to more truly image the changes that our media industry is undergoing. From now on, the magazine is officially R•E•P — short, sweet, simple. The title no longer reflects a job description — the recording engineer/producer — but addresses what people in our industry do by vocation: audio *recording*, audio *engineering* and audio *production*. R•E•P.

We are also updating the department titles to more closely reflect subjects that are currently achieving critical mass: Random Access, an information hotline; Digital Domain, on digital hardware, software and disc-based recording; Sound Business, where SPARS does its usual exemplary job of explaining how to stay in business; and First Look, a timely peek at the latest product introductions. The titles may be new, but the material covered is exactly the type that made the magazine a prime source for useful and practical pro audio info.

We believe that positive change is good and regularly needed to keep from becoming dinosauric. With this in mind, we hope you enjoy the new, fresh writers we have recruited and the overall forward-leaning spin that is presented in these pages. Let us know what you think.

Mike Joseph
Technical Editor

Guest Editorial

What About Art?

By Piper Stevenson

Glancing through the pages of this magazine, you will quickly realize how exciting the music biz can be. We have it all: great equipment with astounding capabilities, proliferating software algorithms to suit even the wildest dreams, all on an ever-expanding technological horizon.

With so many great things going for our tight little industry, it is no wonder that so few of us sit back and take time to listen to the fruits that grow on the technological vine. If we did take more time to consider the art form, I think we would be ashamed of ourselves.

By placing such a premium on the value of the technology we use to create sound recordings, we have lessened the primary source of our existence: the musical experience.

Specifically, the greatest percentage of contemporary album-oriented music is technical masturbation — nothing more, nothing less. Studio projects are born from partially related electro-mechanical events, combined into preconceived, acceptable formats palatable to the casual radio listener.

Today's audio engineer has crafted a "manufactured" recording process that rarely challenges the listening audience. The root of this difficulty extends outwardly and involves two interactive branches: A large percentage of today's musical performances are sub-standard; and the technology used to record these performances is often utilized to correct the deficiencies of the primary art of creating the music.

In a nutshell, we have lost sight (or is it sense of hearing?) of what makes the art form interesting and viable. Our eyes glimmer at the latest mixing console, multitrack recorder or digital workstation. What we fail to notice is that while the technology has advanced, the talent who use the gear — and as important, those who perform — have not progressed accordingly. In the process of searching for that "perfect piece of gear," we have ended up cheating the listener by placing technology before art.

Engineers, producers and musicians have utilized their wares to only a fraction of their capabilities. Nevertheless, the musical compositions are often recorded for the sake of equipment — rather than for art.

If you need some proof, think back to your favorite pre-1970 recordings. Songs recorded on meager 4-track recorders are still enjoyed today, not because they are technically mystic. Rather, they exist as art forms, surpassing the standards that neither time nor technology can denigrate.

To further drive my point home, recall when stereo recordings were first introduced. Those particular recordings that exploited the capabilities of the stereo field (i.e.: discrete channel muting and/or the bombastic usage of panning) resulted in recordings that often lessened the quality of the complete work. Why? Because technology superseded the medium to which they were attached.

We've lessened the primary source of our existence: the musical experience.

Today, unfortunately, little has changed. I say this with some reservation, of course, because technology has advanced well beyond the imagination of the early stereo pioneers. As a self-acknowledged promoter of MIDI, sampling, digital recordings and workstations, I have many opportunities to use equipment, often to my own disadvantage — often more so to the disadvantage of the artist or listener. Perhaps you, too, have been in similar situations as you practice your craft. Because you can "save a take" using high-tech, you do. What about doing it right in the first place?

How often, for example, have you been told, "It's gonna be heard on a 4-inch TV speaker, why waste your time?" Or better still, "The guy who watches MTV doesn't monitor with Perraux Amps and Genelecs ... why should you?" Did you agree with your heckler and say, "Yeah, you're right — the music can stand on its own." Probably not. Instead, you likely spent several hours remixing and tightening the sound invoking every imaginable studio technique, technology and creative juice in your body.

Don't get me wrong — I am all for engineering that enhances the primary recording. However, when you start your sessions with poorly written compositions, there is little you can do as an engineer to make the songs more listenable or enjoyable. I am not downplaying the technical advances we have made, just our reliance on them. We are losing touch with the purpose of our actions.

Throughout all of the technical proliferation, the consumer has become educated and is now keenly aware of the advancements afforded in sound recordings. Unfortunately, many of us — including myself — have postured the equipment well ahead of the art form and, in doing so, have lessened the effectiveness of our recordings.

In an effort to produce recordings with the greatest fidelity, we have lost sight of the fundamental principal that enables the medium to exist — the music itself. While we have spent time endlessly searching for the greatest gear, perhaps we should stop and begin searching for greater talent.

So what can you to cultivate your *own* talent? Here are some steps:

1. Listen to recordings of music that you don't deal with in the studio. If you mainly do rock 'n' roll, listen to classical or folk. Get a feel for what your peers in these other disciplines are trying to accomplish.

2. Attend live performances in clubs or concert halls. It doesn't matter if you work with that type of music every day. The point is to be thoroughly familiar with how the performance occurs outside of the controlled environment of the recording studio.

3. Re-acquaint yourself with the basics of recording. Before you can break the rules, you have to know what they are. Know what the best technique is for the effect you are achieving. Don't merely use techniques because it is the latest and coolest.

The music industry needs to cultivate a stable of talented individuals comprised of creative musicians and engineers. We need people who realize that the artform existed long before the integrated circuit. Until we do this, our technologically overproduced recordings are worthless; they are an engineering experience gone haywire. ■

Piper Stevenson is a Chicago-based recording engineer.

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Bonnie Raitt's Grammy Album of the Year, Nick of Time, is more than just overdue recognition. It's a tribute to trust, faith and friends.

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Left to right: Don Was-Producer Bonnie Raitt-Artist Ed Cherney-Engineer

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CONSOLIDATION ...CONTINUED

Pro audio buyouts, acquisitions and mergers continued this spring. Two companies with active acquisition histories each picked up a company, and an audio pioneer decided to sell out a multinational conglomerate.

Dr. Willi Studer, the founder and sole shareholder of the Studer Revox Group, sold out to SAEG Refindus Holding Inc., a Swiss company. The sale was initially announced at the AES Montreux show, but was announced domestically at the NAB convention in Atlanta in April. Tore Nordahl, president of Studer Revox America, which acquired Dyaxis last fall, said he did not think the acquisition would affect American operations.

Mark IV Audio, which has been an acquisition trend the past couple of years, has acquired Dynacord, the West German manufacturer of music and commercial sound products. The company will continue to operate separately with its present management. An American company, Dynacord Electronics, has been formed and will be based in Los Alamitos, CA.

Robert Pabst, Mark IV Audio president, said that Dynacord's technology in digital electronics will be used to develop products in the other Mark IV companies. The fact that Dynacord has a strong European presence was undoubtedly a factor, as the European Economic Community becomes a reality in 1992.

The third acquisition was DOD Electronics, with product lines DOD, DigiTech and Audio Logic, purchased by Harmon International, the owner of JBL, UREI and Soundcraft. According to the agreement, DOD will retain control over its distributor network and will operate autonomously. ■

U.S. & BRITISH STUDIOS: What are the Differences?

Are there differences between American and British studios? Bruce Forest, an American re-mix engineer who has been working in Britain for the past few months, thinks so.

Like many re-mixers, Forest started as a club DJ in New York; he got his big break from Chris Blackwell of Island Records. He has re-mixed records from Steve Winwood, Madonna, Whitney Houston and Paul McCartney. When he went to London for a party and a couple of remixes, Forest stretched his week-long visit into months. He offers these thoughts on the differences between American and British studios:

"In the U.S., when I agree to do a mix, I first sort out the budget and see if the room I want is available. Then I scout around for a keyboard player and see if I can get ahold of the artist — that's almost unheard of. Then I get all the equipment together, turn up at the studio on the day of the mix and pounce around for half a day, trying to get it all working.

"Over here it's different. When I came to do the ABC track, I was thinking, 'Oh my God, who am I going to get for overdubs? Where am I going to get the equipment? Where am I going to find a good engineer?' When I showed up, Martin Fry of ABC was sitting there waiting for me. And they had hired a keyboard player — they felt it was their responsibility. Over here, a keyboard player brings his own gear, while in the States, the guys walk in with a little black briefcase expecting you to sort out the keyboards.

"In the U.S., most mixes come from the record company, while over here, most come from the artist's management. And I prefer it from the management for the simple reason that they know much better what they want. They want Bruce Forest to re-mix their artists' record. But when a record company calls and says they want you to do so-and-so, the chances are that they're just jumping on a bandwagon, not necessarily who's best suited to re-mix a particular track. "When it comes to management, they will always pick someone they feel is best for the job. In the U.S., it's rare to meet the artist, but here it's more common. They can set up a meeting and I can meet the guy and talk about the track. "I had a very nervous moment in Amsterdam. I was at a convention and a voice came over the public address: 'Would Bruce Forest please go to the organizer's office?' They said I had to call MPL [McCartney's management] immediately. And I thought, 'It's a Sunday, why else would he track me down in Amsterdam on a Sunday unless he hated it?' It turned out they were calling to say they needed a 7-inch right away. But I had a nervous 10 minutes!" ■

Bruce Forest

People

Charles Askanas has been named president and CEO of E-mu Systems . . . **Richard K. Wheeler** has been named president of Sony Operations and Technical Services. **Mark Gray** has been appointed president of Sony Communications Products. **Courtney Spencer** has been appointed vice president, sales and marketing, of Sony Pro Audio . . . JVC has appointed **Lisa Schraml** manager of marketing and sales . . . Akai has named **Ron Franklin** digital products specialist . . . **Hugh R. Heinsohn** has been named director of marketing for Gentner Electronics. **Elaine Jones** has been named director of corporate projects . . . Audio Kinetics has appointed **Nick Smith** to sales engineer . . . **Don Esters,** president of Harman International Industries, the parent company of JBL Professional, has been presented the 1990 Spirit of Life award, the highest volunteer honor given by the High Technology Industry for the City of Hope . . . **Dave Powell** has been appointed Solid State Logic's Eastern regional sales engineer . . . QSC Audio Products has named **Eric Mendenhall** design engineer . . . Renkus-Heinz has announced the following staff appointments: **Carl C. Dorwaldt,** national sales and marketing manager; **Mark Duncan,** product manager; and **Graeme Harrison,** European marketing manager . . . Pro Co has promoted **William Eaton** to Pro/Commercial Division sales coordinator . . . **Arthur Stoppe** has been promoted to production manager for Alpha International . . . **James Stoffo** has been named wireless marketing specialist for Vega . . . Lexicon has appointed **Daniel D. Roberts** vice president, sales and marketing. ■

THE GREENING of the Studio

A group of Los Angeles-based producers has sent a letter to Los Angeles studios asking them to help preserve the environment by not using styrofoam products, such as to-go containers and beverage cups, in their studios. The letter was signed by Rick Nowells, Jimmy Iovine, Shelly Yakus, Jellybean Benitez, Belinda Carlisle, Billy Steinberg, Desmond Child, Davitt Sigerson, Don Was and Maria Vidal, and it read:

"Dear Studio Manager:

Please join us in our efforts to save the environment! One way that you can help is to stop using styrofoam products in your recording studio. We hope that you will read the attached article, copy it and distribute it to your friends. Thank you for your help in this fight to save our world."

According to Laura Harding, Nowels' assistant, the response from Los Angeles studios has been very good. The group is also encouraging producers and other studio personnel in other cities to send a similar letter in their area.

For more information or a copy of the article mentioned in the letter, contact Nowels' office at 213-655-7990; fax 213-655-0926.

TrendWatch

Items of interest from outside the pro audio industry:

CD Reissues: Engineer Roy Halee, who remastered Simon & Garfunkle's "Collected Works" CD box, complained about the quality of the original CD issue of "Wednesday Morning, 3 A.M.," calling it a "hopeless mess." Quoted in the International CD Exchange, Halee said that his remastering of "Wednesday Morning" was an improvement but still contained a "horrendous amount" of distortion. Halee initially alleged that CBS lost the original masters and used third- and fourth-generation tapes. CBS denied that, saying that although they did have the master tapes, it wasn't worth the time or money to use them for remastering.

Lawsuits: A man who broke his kneecap at a Rod Stewart concert contended that the house system contributed to his accident, according to UPI. The lawsuit, which was filed against Stewart, the Cajundome, Lafayette, LA, and its insurance company, states that the music was "enhanced by sound amplifying devices so as to propel and propulse in all directions a highly intensified conglomerate musical sound typically identified as hard rock" This, with the lighting system and lyrics, led fans "into a boiling pot of ecstatic emotionalism." The man broke his knee when he slipped on liquid near the front of the auditorium.

Legislation: The DAT bill, which would require consumer DAT machines to incorporate the SCMS anti-copying system, is slowly making its way through Congress after an early March introduction. A hearing before the Senate Communications Subcommittee was scheduled for June 13. There has been no word on when the House Commerce, Consumer Protection and Competitiveness Subcommittee would hold its own hearing. On the censorship front, 13 states have withdrawn record-labeling legislation after the Recording Industry Association of America said it would standardize a label for its member companies. There are bills that are still active in about five states.

> **"Americans tend to walk into a studio as if it were a temple. They're reverent about the equipment there. The British walk in and all they see is potential; they'll see a piece of equipment that's supposed to be used for a vocal effect and use it on a guitar. I think it goes back to the European tradition of decadence. The British tend to be somewhat kinky. During the day, they walk around in bowler hats and umbrellas, and at night they go home and spank each other. It makes for interesting records."**
>
> — **Billy Joel, as quoted in the** *Chicago Tribune.*

Random Access

STUDIO UPDATE

Facility/Location	Details
NORTHEAST	
Apollo Theatre Recording Studios/ New York	New recording facility.
Black Entertainment Network/ Washington, DC	Steve V. Johnson named mixer, audio-for-video engineer.
Crystal Sound/New York	New equipment: Akai S950, Neumann U-47, 386 PC computer.
Editel NY/New York	Donald J. Cuminale named chief engineer.
Red Rock Recording/Saylorsburg, PA	Installed East Coast's first Amek Magnum console.
Selcer Sound/Brighton, MA	New studio venture with Brian Capouch — Soundworks.
Soundtrack/New York	Added Sony PCM-3348 DASH recorder.
Studio 4/Philadelphia	B Room update: SSI EG console, Westlake BBSM-15 monitors, variety of outboard gear.
SOUTHEAST	
Allied Film & Video/Orlando, FL	Relocated Florida operations to 4364 35th St., Orlando, FL 32811; 407-649-0008; fax 407-295-1840.
Atlantic Video/Alexandria, VA	William A. Winn named audio engineer.
Clifty Studios/Paris, TN	Upgraded to A-DAM 36-track
Soundscape Studios/Atlanta	New equipment: Genelec 1035A monitors, Studer Editech Dyaxis, Otari MTR 90.
MIDWEST	
Ajax Recording Team/Fort Wayne, IN	New outboard equipment: Eventide H3000B/SE, Drawmer 1960, DS-201 gates, Dolby SR, Neve 1089 mic/EQ modules.
Paisley Park Studios/Minneapolis	Tom Tucker named chief recording engineer.
Smith/Lee Productions/St. Louis	Steve Higdon named chief music engineer.
Sound Decisions/Bolingbrook, IL	New name of Body Electric Studios, reflecting new direction of audio for corporations.
SoundStage 1/Galesburg, MI	New recording facility.
MOUNTAIN	
TeleScene/Salt Lake City	Completed 24-track audio studio and 16-track MIDI studio.
SOUTHERN CALIFORNIA	
California Magnetics/San Diego	Will install Magnefax 7-slave bin-loop duplication system.
Group IV Recording/Hollywood	Opened new Pablo Room for SFX and electronic music.
Intersound/Los Angeles	Celebrated 10th anniversary.
Soundworks West/West Hollywood	Acquired Odyssey Filmakers assets and building adjacent to Soundworks West's facility.

News notes

Washington Professional Systems has opened a regional office in Mt. Laurel, NJ. The office is headed by Thomas Knauss, general manager, and will concentrate on the supply, installation and service of audio-visual systems. The office is located at 20000 Horizon Way, Suite 200, Mt. Laurel, NJ 08054; 609-273-8688; fax 609-273-8558.

Agfa presented its sales awards during a sales meeting in Breckenridge, CO. Bob Zamoscianyk, regional sales manager, Atlantic region, received the Vice President's Award. Jim Rouse, Pacific region, won first place in the sales contest. Second and third place went to Mike Caputo and Bill Greene, both from the Atlantic region. The Outstanding Performance Award was presented to Wayne Desmond, technical support engineer, Ridgefield Park.

Sam Ash has opened a store dedicated to sound reinforcement, DJ equipment and club lighting. Managed by Tom Dubas, the store is located at 166 W. 48th St. in New York.

During its 24th annual awards dinner dance, the **Cinema Audio Society** (CAS) honored mixers who were recipients of the Emmy Awards and Oscar nominations. The Man-of-the-Year award went to Bill Varney, vice president of sound at Universal Studios. Special awards of appreciation were given to Fred Ginsburg, Ed Somers and Phil Silvers for their successful efforts in producing the wireless mic symposium held last summer.

JBL has presented West L.A. Music with the first annual James B. Lansing Sound System of the Year award. The award is in recognition of a complete concert sound system delivered to Los Bukis in Mexico.

First Choice Marketing is a new marketing firm serving broadcast, commercial and pro audio manufacturers in the northwest United States. The firm is located at 7355 50th Ave. N.E., Seattle, WA 98115; 206-524-7344; fax 206-524-1015.

Nagra USA has added two new customer service options: product leasing and service contracts. Leases can run

from one to five years, with an option to buy at termination or to upgrade to newer Nagra technology. The service contract option covers the cost of labor for any equipment needing repair after the automatic 1-year warranty expires.

Distribution news

Alpha Audio's acoustics division is the new distributor for the Azonic line of acoustical foam products.

Klark-Teknik has been named the exclusive U.S. distributor of Milab's product line.

Neve North America and **Orion Research** have signed an exclusive agreement making Neve responsible for the manufacturing, worldwide sales and service of the Orion line of broadcast audio consoles.

Dealer news

Pyramid Audio (Chicago), **Martin Audio** (New York) and **Hy James** (Detroit) have been named dealers for the Digital Dynamics ProDisk-464 line of digital audio recording and editing systems.

Hybrid Arts has appointed **SG Audio** (Chicago) and **Milam Audio** (Pekin, IL) as authorized dealers of its ADAP II digital audio recording and editor.

Rep news

Twenty-two sales reps from the United States and Canada attended **Rane's** first training session, held March 9-10.

Tascam has presented New York-based **Marketration** with its Rep of the Year award.

Address changes

Hybrid Arts has relocated to 8522 National Blvd., Los Angeles, CA 90232; 213-841-0340; fax 213-841-0348.

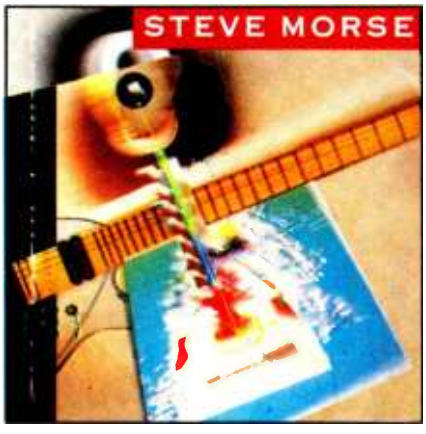
Neve North America has relocated its headquarters to 7 Parklawn Drive, Bethel, CT 06801. The phone and fax numbers remain the same. ■

STUDIO UPDATE

Facility/Location	Details
NORTHERN CALIFORNIA	
Davis Sound/Davis	New equipment: Dolby model 363 2-channel SR noise reduction unit for its Otari 1/2-track machine.
Mobius Music/San Francisco	Addition of Neve/Studer room: Neve 8068 console and Studer A820 2-track.
Music Annex/San Francisco	Completed its Studio III audio for video mixing suite with an AMEK 2500 console and Otari tape machines.
Sound Recording Organization (SRO)/ San Francisco	Joined Music Annex at the 69 Green St. facility in San Francisco.
Thumper Sound Studios/Oakland	New recording facility offering 16-track recording with automation. Box 520, 1001 Bridgeway, Sausalito, CA 94965; 415-547-3402.
NORTHWEST	
Klub Kev's/Seattle	Retrofitted Neve 8232 console for installation of Digital Creations Disc Mix moving fader automation system.
HAWAII	
Lahaina Sound/Maui	New equipment: Lexicon 480-L, TC Electronics TC 2290 delay-sampler, Yamaha SFX 1000, Digitech DSP 256 multi- FX, two Lexicon PCM 42 delay lines, two Lang PEQ-2 EQs, Yamaha C300 recorder and Sony PCM 2500 pro-DAT. Upgrade: Sony DASH chips for PCM 3324.
DEALERS	
Gand Pro Audio/Chicago	Named Meyer HD-1 dealer. Has installed Otari multitrack recorders at Solid Sound Studios, Joy Art and Chicago Rehearsal Studios; a Roland R-880 reverb to Nexxus Recording, Waukesha, WI; and a Tascam M208 console, two Otari 5050 BIIs, an Otari MX50 and dbx 263×, 163× and 463× units to Sound/Video Impressions, Des Plaines, IL.
Redwood Marketing/Nashville, Los Angeles	First sales of AMEK Classic mixing consoles: Turner Broadcasting, Atlanta; ABC, New York; NBC, Burbank.
MANUFACTURERS	
Neve	Installations: VR72 console, Chicago Recording Company; Flying Faders, Groundstar Studio; two V60 consoles and an 8128, Devonshire Audio & Video.
Soundcraft	Installation: two Delta consoles, Eel Pie Studios.
Sony Pro Audio	Sales: PCM-3402 DASH recorder, Jack's Tracks Recording Studios; PCM-3348 48-track DASH machine, Digital Recorders.
BrystonVermont	Sales: 13 3B amps, four 4B amps and three 10B electronic crossovers, Pacific Sound Services.

Fresh Tracks

Steve Morse: "High Tension Wires"



Label: MCA
Producer: Steve Morse
Recorded by: Steve Morse, Tom Wright, Rick Sandidge
Mixed by: Steve Morse, Rick Sandidge
Studios: MOR Studio, Atlanta; Chesire Sound, Atlanta; Mark V/Soundcastle, Greenville, SC
Mastered by: Glenn Meadows at Masterfonics, Nashville
SPARS Code: AAD

Comments: This is a truly excellent, tasty solo album. Instantly accessible, the music ranges from country funk romps to full-tilt electric fusion, from new age-inspired excursions to acoustic/electric folk pilgrimages.

Of special interest: Listen closely to "Highland Wedding," "The Road Home" and the direct-to-digital master "Tumeni Notes," the latter a direct stereo guitar cut. ■

Eric Johnson: "Ah Via Musicom"

Label: Capital
Producer: Eric Johnson
Recorded by: Richard Mullen
Assisted by: Eric Johnson, Chet Himes, Bob Lacivita, Walter New, Dave Parks, Stuart Sullivan
Recorded at: Riverside Sound; Saucer One Studio; Arlyn Studios; Studio Seven (all in Austin, TX)
Mixed by: Michael Frondelli, Richard Mullen
Mixed at: Soundcastle Studios, Los Angeles; Riverside Sound, Austin
Mastered by: Bernie Grundman at Bernie Grundman Mastering, Hollywood
SPARS Code: Not listed

Comments: Succinctly arranged and produced, this 3-piece (plus occasional synth) rock romp is an encyclopedia of guitar sounds, ranging from Hendrix and the best full-attack jazz-rock fusion of the Seventies to some of the sweetest, cleanest acoustic sounds ever.

Of special interest: Listen to "Desert Rose" for the digital effects, masterfully layered guitars, drum punch and imaging. This is a tune to calibrate your ears with. Also listen to the tones and mix of "Steve's Boogie," a country-flavored rocker, and "Trademark," a snapshot of Johnson's patented guitar virtuosity at its best. ■

Vonda Shepard: "Vonda Shepard"

Produced by: Vonda Shepard, James Newton Howard, Robert Kraft, Gardner Cole and Art Munson
Executive Producer: Felix Chamberlain
Studios: Oceanway, Kren, Leeds Le Mobile, Can Am Recorders, The Complex, Studio 55, Circle Seven, Sunset Sound, Art Munson Studios, Garden Rake Studios, Skyline Studios, Schnee Studios
Engineers: Ed Thacker, Greg Ladanyi, David Pack, Ross Pallone, Brian Malouf, Art Munson and Ian Eales
Mastered by: Stephen Marcussen at Precision Lacquer Mastering

Comments: Mainstream pop artists, who often draw from different styles, can present interesting challenges in recording and mixing. This album shows what a sympathetic engineering and production team can accomplish.

Of special interest: "Don't Cry Ilene" features mic and instrument selection not typically associated with today's production standards. Mix influences from Toto and the Yellowjackets result in an airy and sonically compelling sound. ■

Fresh Tracks is a monthly department spotlighting recent album releases from a technical and production viewpoint. R•E•P *is pleased to recommend these releases, both for quality referencing and listening enjoyment.*

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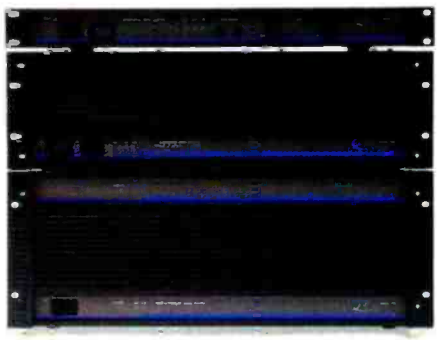

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Fresh Tracks

Luciano Pavarotti: "Tutto Pavarotti"

Engineer: Not listed
Producer: Not listed
SPARS CODE: ADD and DDD

Comments: This double-CD collection is noteworthy for the inclusion of opposing recording and production techniques: analog vs. digital recording, and a full orchestra vs. a MIDI one. Here is the perfect demonstration disk for analog purists and digital perfectionists alike.

Of special interest: "Caruso," by Lucia Dalla, featured in the movie "The Fortunate Pilgram," features a MIDI orchestral arrangement. The vocal processing, with artificial reverberation, dynamic expansion and digital delay, is most uncharacteristic for a classical artist of Pavarotti's stature. ■

Dick Hyman: "Dick Hyman Plays Fats Waller"

Label: Reference Recordings
Produced by: J. Tamblyn Henderson Jr.
Executive producer: Marcia Martin
Recorded by: Keith O. Johnson
Recorded at: Evan Williams Recording Studios, Santa Ana, CA
Mastered by: Robert Harley, assisted by Beck Rowel and Steve Rickmon
SPARS code: D

Comments: Touted as the world's first direct-to-CD recording, these performances were first encoded and edited on a Bosendorfer 225SE Reproducing Piano. Later, they were transmitted via microwave to the mastering house, where glass masters were created in real time. The session's participants cited the disk's superior sound quality as worth the expense and time.

Of special interest: Although the process may seem overly cumbersome, the recording's strength is in the clean presentation of Hyman's performances on such standards as "Ain't Misbehavin'" and "Honeysuckle Rose." Is there an audible improvement? You be the judge. ■

Zil: "Zil"

Label: Verve/Forecast/Polygram
Executive producer: Joao Mario Linhares
Produced by: Joao Batista, Ze Nogueira and Zil
Engineered by: Sergio Murillo, Mario Jorge, Zezinho Almeida, Marcio Menescal and Helcio Braga
Mixed by: Sergio Murillo
Mastered by: Dennis Bouch at Future Disc Systems, Hollywood
Studio: Synth Studios, Rio de Janeiro
SPARS Code: Not listed

Comments: Comprised of seven of Brazil's top musicians, Zil combines Brazilian, pop and jazz influences for an effective presentation. A straightforward production, the album's use of panning and effects are tasteful, yet effective.

Of special interest: "Song for the Rainforest" and "Zarabatana" both for their effective placement of vocals. ■

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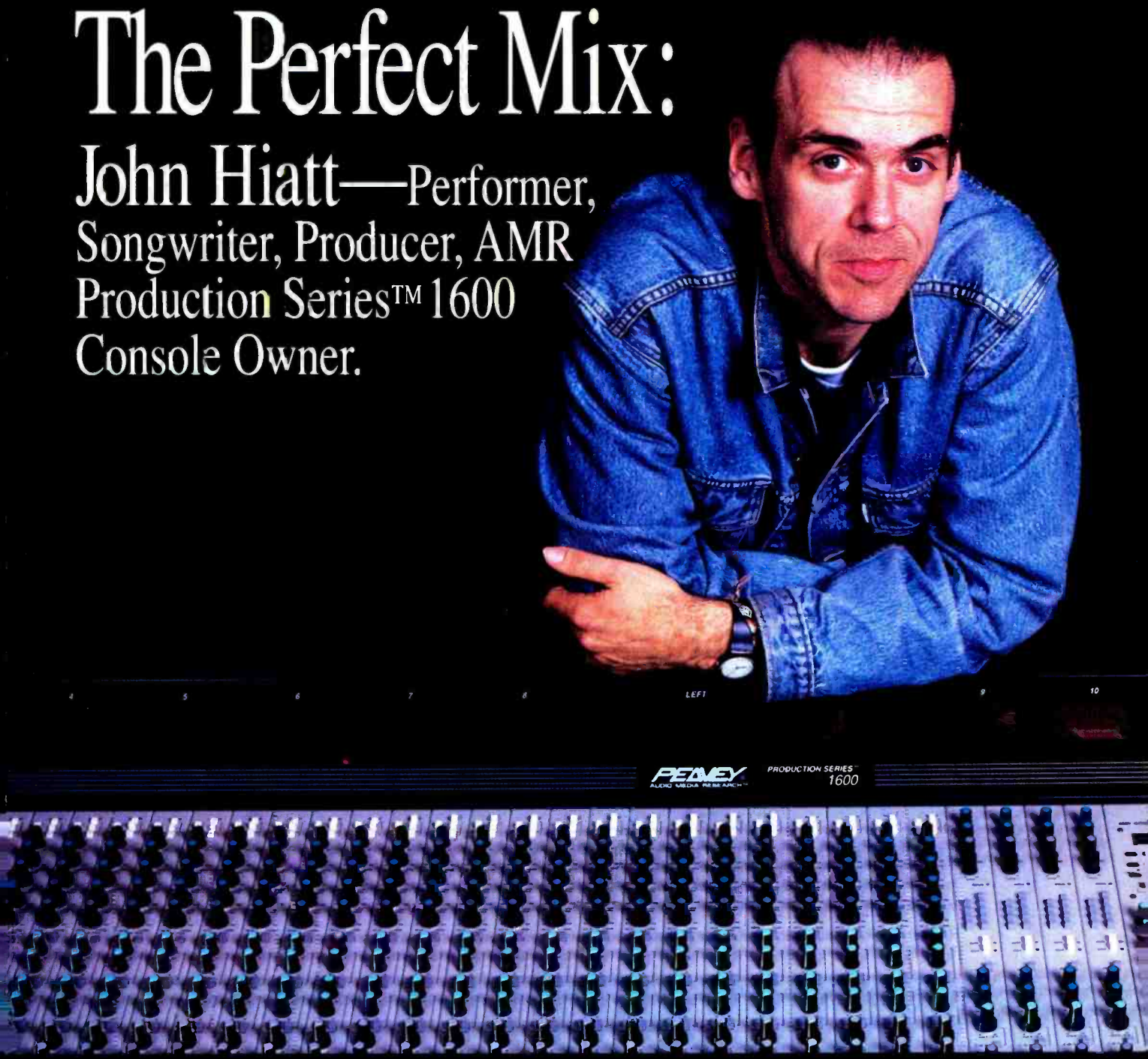

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Digital Domain

Technology for Today

By Rick Schwartz

Welcome to Digital Domain. Don't be misled by the high-tech title. The last thing you'll find here is speculation and buzz words like virtual and Hypermedia.

Although we could write about future technologies that may someday change our lives, most of us are more concerned with next week than next year. By necessity. After all, we need solutions to the problems facing us today. Problems like synchronization, interconnectivity and the lack of standardizations.

What we need is concise information about what is currently available and what will be available in the future. We also need to make educated decisions about the directions that technology is taking: Are optical disks cost effective, compared to regular old-fashioned magnetic hard disks? Does 18-bit really make a difference you can hear? Should I buy a workstation now or wait until later? Digital Domain is here to help you wade through the swelling waters of technology and answer these questions.

There are many exciting products and technologies available today that are not widely used. Satellite technology, for example. Did you know that your studio can transmit and receive real-time audio to studios all over the world at a reasonable cost? This "dial-up" capability is going to change the way many of us work.

Another exciting topic we will cover is the integration of technologies: the combination of computers, optical technology, MIDI and digital audio in creative new ways. Companies such as DigiDesign, Opcode, Lone Wolf and Studer Editech are developing products addressing these things even as we speak.

From time to time, I enjoy going back and looking through my old audio magazines. Some articles are still timely, others not, but my favorites are columns that made predictions about the future. Why? Because quite often they were wrong. So many new products that were expectantly heralded in those publications never made it to market.

Sometimes writers in audio magazines have a tendency to water down their columns so they do not offend anyone. After all, most publications are driven by revenue from advertisements. Even worse, these writers do not seem to spend much time with a product before the review goes to print. In extreme cases, I find myself wondering if the author even used the product. So many pieces seem as if the writer merely rewrote the owners manual, throwing in comments about how nice or useful he or she thinks a feature might be. Yes, but did it work? There is nothing more frustrating than purchasing a new piece of software or hardware that has received a glowing review and finding out it's buggier than a woodpile. With the subjects we cover and the products we review, that won't happen here. Promise.

So what kind of people should read this column? Anyone whose livelihood is determined by their awareness of modern production techniques and equipment. In fact, anyone who uses their ears to earn a living. This includes music mixers, audio for video mixers, mastering engineers, film sound editors, audio consultants and designers. Most of you own or use a computer. Many of you come in contact with MIDI on a regular basis. Most of you will be working with digital recording, whether it is a keyboard sampler, a piece of processing gear in a rack, a digital tape recorder or a hard-disk workstation.

Instead of sticking with rigid structures, Digital Domain will incorporate various formats, including product reviews, conversations with industry heavyweights, and, of course, we will emphasize leading edge technology.

Expect to learn about great and powerful undocumented features for the products that you own. Plan to discover helpful tips and assistance on subjects like SMPTE timecode manipulation, MIDI, the interface of audio equipment and computers. ■

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

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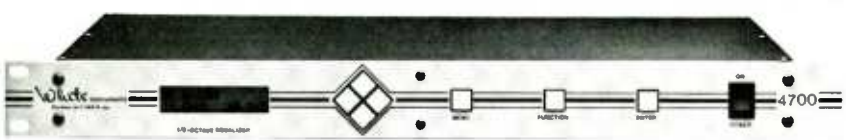

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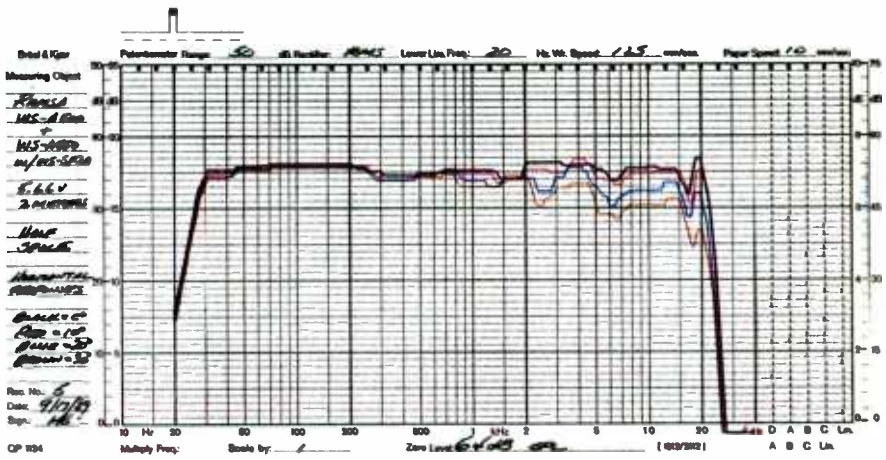

If you think this looks good, wait until you hear it.

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Of course, sonic performance isn't the only story behind our console. Flexibility is a necessity in the creative recording process, as well. Naturally, the MXP-3000 offers a host of flexible features at an unmatched value.

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L
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The Best of Both Worlds

By Pete Caldwell

Digital audio has been a major issue in this industry for awhile now, but what are its advantages? The obvious answer is that digital audio often sounds better than analog. Why? Because digital systems, by nature, are freed from much of the noise to which analog systems are inherently chained.

Additionally, digital recordings do not manifest distortion, wow, flutter, loss of frequency response and other anomalies found in analog recordings that have passed through many generations from original recording to final product.

This is fine as technology goes, but unfortunately, it is an oversimplification of life in the real world. To better appreciate life in the everyday trenches of the audio industry, let's consider three primary realities we must all face.

Reality No. 1: In a professional recording studio, first-generation analog recordings can be mighty good. (There are those who think that first generation analog sounds better than digital, which has its own unique anomalies such as aliasing and rounding-off.) At Doppler Studios, we once placed a $180,000 digital multitrack on one side of the control room and a $60,000 analog multitrack on the other side for a simultaneous recording comparison. We hired a rhythm section and recorded everything from heavy metal to Chopin. The results of subjective listening tests by many of Atlanta's best audio engineers were quite interesting.

Both recordings were very good. I felt that the digital was a bit quieter with a truer bass response, but the extreme high end seemed somewhat harsh. The analog high end seemed warmer and more pleasant, and the anomalies in the bass could be adjusted easily with equalization. The addition of noise reduction to the analog process placed the apparent noise levels of the two recordings in a similar range.

There are those who say that they can hear unpleasant artifacts from noise reduction systems, but in general, professional quality, state-of-the-art, first-generation analog recordings are pretty damned competitive with digital recordings. The fact remains that digital will hold up better than analog through successive generations. This brings us to the second reality in our real world scenario.

Reality No. 2: In the present world of sound recording for film and videotape, the end product is most often going to be analog. Programs and commercials will go to the TV broadcasters on 1-inch Type C tape, because most stations do not yet have D-2 digital VTRs. Audio will probably go to the film mixer on sprocketed analog mag film.

Unfortunately for digital, it is the end use playback that is most important. Your CDs at home sound great because you have a digital player. A $300 CD player can take advantage of all of the beauty of a digital recording, while a $300 audio cassette player can butcher the beauty of any recording. Digital is great if your final product is a CD.

Studios must make thoughtful, informed choices in order to get the most from analog and digital.

So why use digital if the advantages are going to be largely lost? Well, there are several reasons. If you have multiple layers or a very complex combination of components, and if you can keep your audio in the digital domain all the way to the last or next to the last step, then the results will be better: quieter, clearer and more faithful to the original, even if the end product is analog. But digital recording can be expensive, and in some cases it is difficult to manipulate easily in the production process.

It has become the responsibility of today's recording studio to help audio producers decide when the added cost is worth it. In short, audio producers must know in advance how much difference digital recording will make. With the help of the studio, they must then plan the complete audio process to avoid bouncing back and forth from digital to analog.

Reality No. 3: There is a lot of digital hardware in the real world right now. In many cases these various machines and formats will not easily interface with one another. They do not talk to each other without involving manipulations. Therefore, it is the further responsibility of today's recording studio to insure, at the beginning of a project, that all of the facilities involved are comfortable with the various digital formats to be used.

In sound recording for film and videotape, the end product is most often going to be analog.

For example, there are two entirely different digital multitrack formats. There are many different stereo digital formats. Different devices employ different sampling rates. Digital editing systems and workstations are notoriously unfriendly to each other.

Analog, on the other hand, has been around long enough to evolve standard formats and conventions. As we all know, there are always unforeseen traps. But compared to digital, analog is a calm and well-traveled sea upon which to sail. Digital interfaces can be tempestuous crossings.

Am I suggesting that we dispense with digital? Of course not. Digital is clearly the wave of the future. Digital is coming on strong, but some problems are coming with it. Analog, too, has a long and busy future. The studio of today must make thoughtful, informed choices to get the most from both real worlds. We must understand the present complexities and help guide our industry along safe, efficient, good-sounding paths.

The studio of the future will be all digital. The studio of the present must live with the best of both worlds. ■

Pete Caldwell is SPARS' first vice president and president of Doppler Studios, Atlanta.

The Society of Professional Audio Recording Services is your best source of pro audio 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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THE R·E·P INTERVIEW:

Hugh Padgham

By Richard Buskin

"I'd rather have a bad-sounding record that's got a good vibe and is a good song, than a bad song that sounds fantastic," asserts Hugh Padgham. "Sometimes you get demos that sound fantastic, and when you go into the studio and try to re-create them, everything's clean and nice, and it doesn't sound as good as the demo.

"There are times when dodgy equipment can be nice, and I use quite a lot of cheap equipment — even some semi-pro stuff — and people come in and say, 'Wow, do you use that? I've got one of those in my home studio!'"

The above statement notwithstanding, Padgham is not averse to employing state-of-the-art technology in order to create a sophisticated

Richard Buskin is a London-based free-lance writer.

The Grammy-winning engineer/producer talks about his work with Phil Collins, Genesis and Suzanne Vega.

sound on the records that he is producing, but whether he has been recording David Bowie's "Tonight," Paul McCartney's "Press to Play," the Police's "Ghost in the Machine" and Grammy award-winning "Synchronicity," Genesis' last two albums or each of the solo projects by Phil Collins, he has always essayed to keep the sound fresh and uncluttered, encouraging the listener to pay attention to the music rather than the machinery.

Hugh first met Collins while engineering Peter Gabriel's album, "The Third," at London's Townhouse Studios in 1979. He had started out a few years earlier as an assist engineer and tape-op at the nearby Advision and Lansdowne studios. Prior to embarking on a five-month tour of Europe with the Jim Capaldi Band, Padgham joined Townhouse as an engineer. Soon after, he helped wire in the first SSL desk to be installed in a commercial studio in the U.K.

Gaining experience with PiL, the Jam, XTC and Spandau Ballet, he moved on to production with Collins' "Face Value" album in 1981, went freelance, recruited the management services of Dennis Muirhead and has never looked back.

Aside from producing, he has mixed records by Brian Wilson, Genesis, Hall & Oates, Youssou N'Dour, Suzanne Vega and Sting. His track record places him in the top echelon of contemporary record producers and engineers. This has been duly acknowledged with a number of top awards, including the Grammy for Producer of the Year in 1985. He is scheduled to work on the new Sting album later this year.

In the interview, Padgham talked about Collins' latest album, "...But Seriously," the mix of Suzanne Vega's new record, "Days of Open Hand," and using new technology.

Working with Phil Collins

"Whereas Phil always comes into the studio on the first day with a pile of demos, the last two Genesis albums have started with absolutely nothing prepared. The band just jams in the studio for a couple of weeks. I record everything, ideas build and the songs come out of this.

"With Genesis, Phil sets up with a mic, sings 'la-dee-da-dee-da' or whatever comes into his head, and just uses drum machines. Drums only get recorded once a drum machine pattern and a framework of the song is on tape, and then the drums are just like any other overdub.

"With Phil's latest album, on the other hand, he came in with 8-track demos and did everything through his sequencer on the Emulator and drum machines, and used an SBX 80 sync box. In the old days, before sync boxes, in order not to lose the original feel of the demo, we actually dubbed the 8-track stuff onto 24-track and then carried on overdubbing from there, putting real drums on, real bass, real vocals. But the drum machine on records such as "In the Air Tonight" and the Prophet pad was all actually original 8-track material.

"I suppose I have more music input on the Phil record, because when it comes to guitars and bases, Phil hands the onus over to me. He admits he isn't expert in guitar parts and that sort of thing, so we get good musicians in and I help direct them. For instance, Phil hasn't necessarily written a bass line to the tune, so the bass player will come in and start playing along and I'll tape him and tell him the parts that I like and so on. Recording like that is great fun.

"For the first two weeks we'll put down the stuff from the demo or re-create the programs. We started the tracks with a variety of drum machines, but we mainly used the old [Roland] 808, which is MIDI-modified so that we can drive it off the SBX 80. We also plugged up the basic keyboard parts that would be in a sequence in an E3, hit 'play' and let that go. Then there would be other parts that he'd done manually that we would put down before going on to the next song.

"Then, before we had anyone else in, we'd put down a guide vocal and a track of real drums, before which all of the bass and guitar parts would be recorded and amendments made — where necessary — to keyboards or drums or whatever. One of the beauties of Phil's records, his keyboard parts and his tunes, is that they're so simple. It's really hard to write simple material, and in many cases, we try to keep the production pretty bare as well.

"About six or seven times out of ten, what we call the 'rough drums' will end up being the drum track, because I get his sound while he's running it through a couple of times and then he just plays it. So doing a drum track, especially because he's such a brilliant drummer, is a half-hour operation at most.

"We have created a drum sound by way of the fact that we used to do most of his recordings in Studio 2 at the Townhouse, which has a distinctive sound to it. When we originally built Genesis Farm 10 years ago, we built a stone room to reproduce the same kind of sound down there; they're stone rooms, not wood rooms or glass rooms, and that accounts largely for the live sound, but then there's the way Phil tunes his top toms very tight, and they're single-headed.

"We always call them the 'barking toms' because they bark when he hits them! I don't know many other drummers who have toms that sound like that. He also uses a smaller bass drum than other people use, while his last rack tom — the one nearest the floor toms — is bigger than other people's.

"I usually mic the bass drum with a Neumann U47 — I like the fatness, the low-end thud that those mics give — a good old [Shure SM-] 57 on the snare, 57s or [Sennheiser] 421s on the toms, condenser or ribbon mics on the cymbals, and usually a pair of [Neumann U-] 87s for room mics. Then, with Phil, I also like using the [AKG] 451 on the hi-hat, because he's got tom-toms and cymbals and stands everywhere, so sometimes you choose a mic because you can get it into where you want it to be! So basically I think careful placement of the mics on the drums and a good recording, and you can't go wrong.

"For recording voices, we generally use quite an unusual technique, which consists of singing through a dynamic mic — a regular Beyer M88, which he uses on stage — then going through this old Allen & Heath mini-limiter. It has got a few controls on it for fast attack and slow release and things like that, and I plug that over his voice and it's as noisy as hell! Dynamic mics are a bit noisier than condensers anyway, so you're dealing against the odds as far as noise is concerned, but it doesn't actually matter. I've got it down pat now.

"[The A&H] is a fantastic limiter, especially for me being co-producer with him, because when he's singing, I'm the only one in the control room talking to him about this performance, suggesting improvements and giving encouragement. You set a level for it and it's like the VU meter needle hits a brick wall, but it very rarely sounds over-limited. So when I'm doing vocals, I don't have to worry about the engineering side at all.

"The way we work is that Phil will usually rehearse his part twice, then we'll record him singing it four times. The first one we always call 'The Bridesmaid,' because nine times out of ten, it's compiled from takes two, three or four. He's good and sings pretty quickly. Although we sometimes drop-in, I try to avoid doing so, because if it's a song with a fairly gentle verse and a lot of shouting at the end, the voice will invariably sound different if he then has to go back to redo a line in the verse!

"On most of the other albums, there was usually a bit of [Eventide] Harmonizer —

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the same as Peter Gabriel, who would feel naked without it — but we didn't use any at all on this new record. I said, 'Phil, you've got a great voice, and although we've affected it a lot in the past, let's sing straight this time.' So, about the only treating we did to his voice on this record was tape-slap."

Choice of recording format

"On Phil's record, I recorded all the bass and drums on analog, using a Studer A800 with Dolby A. I did some A-B tests between a Sony 2500 DAT, a 1630, an ATR 100 with no noise reduction and an ATR 100 with Dolby SR. To me, the 1630 sounded like the most faithful reproduction. The analog without noise reduction also sounded good, in a punchy sort of way. I have mixed things that have been recorded SR that sounded very good, but I decided to steer clear of SR and go back to Dolby A.

"I did the drums and bass analog on Phil's record. For the rest, we started out using a Sony 3324. Then, by our good fortune, we were lent a 3348, so we converted 24 onto 48 and carried on from there. The 48-track is an absolutely brilliant machine to work on, if only for the fact that it has the most incredible transport.

"This 48-track was like a revelation, and I used it in an interesting way. I was determined, because of the size of the console, not to end up with more than I would have done if I'd been doing it normal 48 [2×24-track analog]. So I regarded the 48-track as two machines and I used channels 1-24 for information that I knew I was going to keep and use on the mix, and I used 25-48 as my drum and bass mix from the other tape as well as for stacking up vocals or keyboard parts; I used that as my slave reel, then bounced internally back over to 1-24 if needed. So I made sure I only ended up with, at most, 24 tracks of information on the mix."

Mixing Suzanne Vega's album

"I don't like the G-series EQ and I won't mix on one if I can possibly help it. I find it very annoying that I don't have the choice between bell and shelving on the top and low ends, and the two mid bands are absolutely vicious.

"When I was doing Suzanne's record, it was the first time I had worked at Skyline Studios [in New York] and I made sure that it was an E-Series desk. We booked the place and everything was fine. Then, after Christmas when I arrived there to start the work, I walked into the control room on the first day and sat down to write out the strip and I realized that most of the EQs on the desk were G-Series EQs! I freaked out — they had all been changed over to Gs — so we had to cannibalize whole channel strips out of an E-Series desk that SSL had sitting in their warehouse in New York and put them into the Skyline console! I had discovered the problem at around 10 o'clock in the morning and by 3 o'clock we started mixing with the E-Series modules.

"I mixed that down to a 1630 with Apogee filters and we went down to Technics DAT, as well. That sounded great. The backing tracks had all been recorded at Skyline and the overdubs were done on an MTR 90 at Suzanne's house with a Demeter mic amp. It was all very well recorded.

"I've never been a particularly valve [tube] person, but I am going to start using Demeter mic amps. They're made in California and they are valve, but the specs on them are absolutely unbelievable — really low noise, very good technical specifications. Demeter also makes a valve DI box that everybody is raving about, so I've ordered some of those as well."

Mixing philosophy

"I don't like to spend more than a day on a mix. I like to get a mix to a stage that when I go home, I take a DAT home with me that I'm pretty happy with ... one that, if I died during that night, I wouldn't mind if it were released!

"I then listen to it in the morning on my own system, reconvene at around 10:30, iron out my thoughts with the artist, then lay down the final thing. Hopefully, a mix only takes a day, but it goes through a night so that you have eight hours or more off.

"I find it a really good challenge to mix other people's stuff, as long as there are not too many horrors on it. It's probably the most important part of the process, the part where you can make or break a record, because how you mix it is how Mr. Man-in-the-Street ends up hearing it.

"I'm happy to do two or three recording/producing projects a year, and four or five mixing projects. I do tend to look at it as two different jobs in a way, so it's great for me, because I don't get bored with either one."

Working with new equipment

"At the present time, I like to use Sony 48-track — while putting bass and drums on analog whenever possible — together with valve [tube] mic amps and compressors. In other words, going through some sort of valve-warming gear as it goes onto digital.

"One piece of equipment that I've recently tried out and really liked was a new Canadian device called Q-Sound, which Jimmy Iovine and Shelley Yakus have been involved with. If you're sitting in front of the speakers in the studio, you can control the direction of the sounds by way of a '3-dimensional' joystick. When I heard the demo of it, the guitar solo came out and was sort of sitting on my ear!

"That was an extreme example, and while there is a danger that you can freak out on it, I hope I'm intelligent and aware enough to avoid doing so. When I use it, I aim to do so subtly and tastefully — there aren't going to be advertisements in the shop for this completely new recording medium — and I hope the music I record will just sound more interesting.

"For a live concert album, the Q-Sound would work great because it will give you clear imaging regarding the position of the musicians. But with a studio album, where do you put all of your overdubs if you're putting everything through it? So it's very interesting, and hopefully, I'll use it during the recording process as well, as opposed to just using it as a tool or toy during the mix."

Selected Discography

Produced and recorded:

- Phil Collins: "Face Value"; "Hello, I Must Be Going"; "No Jacket Required"; "...But Seriously."
- Genesis: "Genesis"; "Invisible Touch."
- The Police: "Synchronicity"; "Ghost In The Machine."
- David Bowie: "Tonight."
- Paul McCartney: "Press To Play."
- Paul Young: "Between Two Fires."
- XTC: "English Settlement."
- Human League: "Hysteria."
- The Fixx: "React."

Engineered and/or mixed:

- Genesis: "Abacab."
- Peter Gabriel: "The Third."
- XTC: "Drums And Wires"; "Black Sea."
- Brian Wilson: "Brian Wilson" (mixed 6 tracks).
- Sting: "...Nothing Like The Sun."
- Julia Fordham: "Julia Fordham."
- Suzanne Vega: "Days of Open Hand."

Awards

- Grammy Awards: Producer of the Year, Album of the Year (1985).
- Music Week Awards: Best British Producer (1985).
- BPI Awards: Best Producer nominations (1985 and 1986).
- Brit Awards: Best Single (1989) for "Another Day In Paradise."

■

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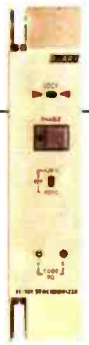

The MX-80 and MTR-90 were designed from the beginning to lock to external controllers, and therefore provide exceptional performance under these conditions. Pictured is the MTR-90's advanced EC-101 chase synchronizer.

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the making of...

"LAY YOUR HANDS ON ME"

The audio requirements for the Bon Jovi video required complex handling of several different sound sources.

By Tom Davis

"He's trying to break me, isn't he? He was only teasing me with the last two videos, wasn't he? Is this a trick question?"

That's what I said to Curt Mavis and Jeff Richter of The Company when they started laying out the basic premise video director Wayne Isham was formulating for the Bon Jovi video, "Lay Your Hands on Me." Wayne and I had done a number of music videos the last few years that were fairly involved on an audio level. But this was the first time he had come to me before the video was edited. Little did I know that they were deliberately easing the specifics of the job to me little by little to ensure my not taking my own life to get out of this one.

Tom Davis is an audio mixer at Post Logic, Hollywood.

The Company had been requested to create "the ultimate performance video" for Bon Jovi. But of course the label wanted to promote the pre-recorded version of the song, not a live performance. Nothing new here. I'm not the only one to take the record mix and add a little echo and crowd to match the picture.

But this was different. Wayne wanted to capture the entire gamut of a live concert. He wanted to condense the before-concert anticipation, the heat of a power-charged delivery, the audience participation and the finale, within the length of the song — about five minutes. When Curt and Wayne were discussing the approach to the clip with the band, he started playing with the idea of manipulating the front end of the song to better suit the video's needs.

For those of you not familiar with the song, it has an instrumental opening, basically 48 tracks and three minutes of craziness the band (and who knows who and what else) layed down when they were recording the album "New Jersey." The final version for the record was cut down quite a bit, but we had dubs of the original 48-track analog tapes, so anything was possible at this point.

My involvement began one evening at Post Logic studios in Hollywood, where I met with Curt and Jeff to evaluate the 24-track master and slave of the song intro. Wayne wanted to see what we had on the individual tracks to edit and remix into an

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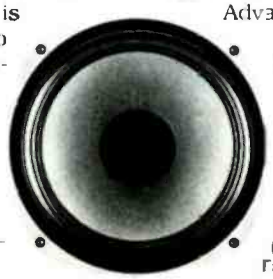

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original rendition for the video. We set up in Studio C, which is equipped with a 32-input Neotek Elite console and an Adams-Smith 2600AV editor.

We proceeded with listening to groups of tracks a few at a time, first the master and then the slave, and made notes of what we found. The whole time, we were spinning an audiocassette and identifying with the console slate what tracks were up and at what time code, so that Wayne could go away with something to play with in his off-line bay. This took about four hours.

A few days later, we met in Post Logic's Studio B, which has a 48-input Solid State Logic 6000 console, an AV editor and Otari MTR-90 24-tracks with Dolby XP SR packs. After spending time with the sections of the track we were focusing on, it started to become apparent to me that mixing this stuff down to two tracks and doing the edits afterward was going to be rather tough. Certain tracks carried over each other and there was the possibility of cutting off chambers ringing over.

I decided to create a second generation Dolby SR 24-track edited submaster by patching the machines together track-to-track and assembling the selected sections on a pre-striped time-coded reel using the Adams-Smith. (See Figure 1.) The beauty of this system is that you can do preview edits on any or all tracks of your record machine (by causing the MTR-90 to switch to input on record-selected tracks) and create a frame-accurate edit decision list, with full notes, to keep track of what is happening.

This was not just convenient, but necessary, because I had two 24-track playbacks (master and slave). While it was possible to synchronize four 24-tracks at Post Logic, it would get pretty unwieldy, not to mention expensive and confusing. So we pulled the pieces together, starting with the master, and edited it down to a fresh time-coded tape, sections at a time.

Editing track-to-track discretely like this enabled me to do the electronic version of a 24-track window edit, recording some tracks to one pass, delaying other tracks to accommodate parts ringing over, and to very easily slip individual tracks from one section to another section. It was like having an analog tape-based sequencer.

Once the master was cut to a length we liked, I put up another fresh tape to do the same thing with the slave reel. Using the edit list generated in the AV, I basically did an audio assemble, previewing each edit carefully and adjusting each edit for each specific track. The result was a new 48-track edited, unmixed submaster that had all the sections we wanted to time, ready

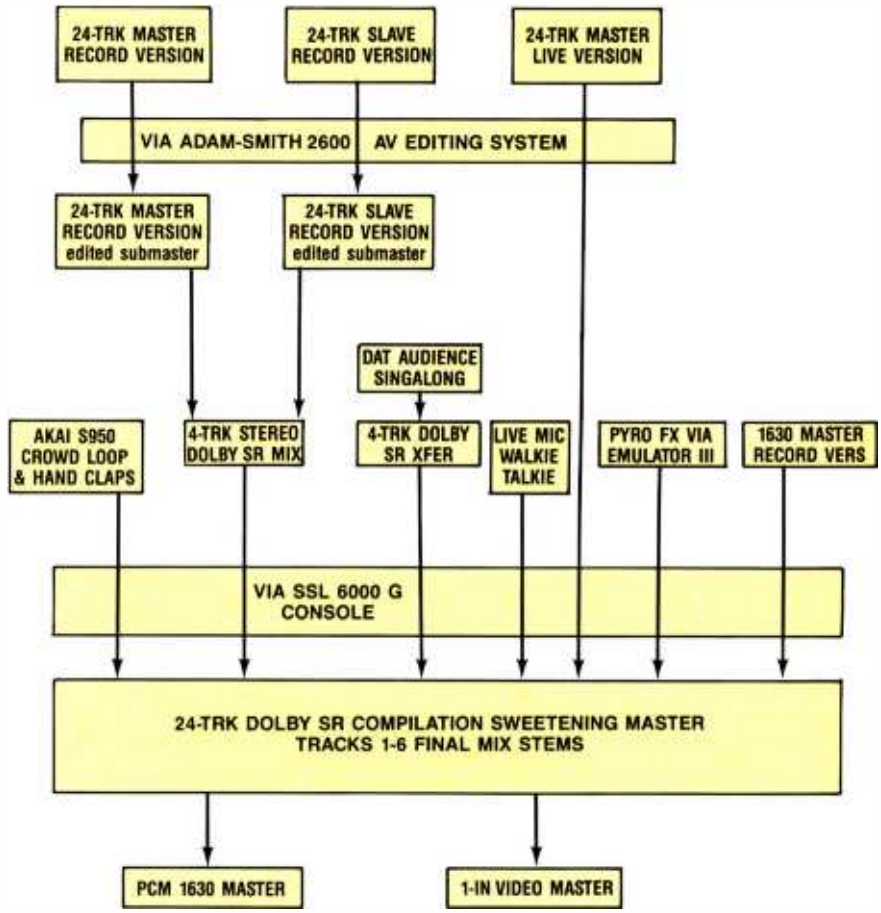

Figure 1. *Flow chart of the audio assembly for the "Lay Your Hands On Me" video.*

for an automated mix. After another 10 hours or so, we printed the mix down to a 30ips SR 4-track, taking the code across.

We now had the intro mixed, sans any crowd sweetening, for Wayne and Jeff to cut to. They took a 3/4-inch U-matic transfer of the final mix (which soon became a rough mix) and started a more defined edit using the punched-up parts in our mix to key off of, pulling the visual and the soundtrack together.

We then took a look at the middle section of the song, which was one of the little "specifics" they discretely waited for the right moment to surprise me with. The Company shot a live concert of Bon Jovi in Portland, OR, that had an a cappella singalong with Jon and the audience. Wayne wanted to open up the record mix and add the live tracks for the singalong. Well, not only did it sound *very* different, it was a whole step lower.

It was back to creating 24-track submasters again of the record version master and slave, and making mix moves to match the band breakdown to the way they do it live. We then added Jon's live vocal track, pitched up a whole step with an Eventide H-3000. To keep the whole thing moving along, we sampled the kick drum part into an Akai S-950 and played it in the a cappella part. At the climax of the singalong, the full song kicks in and plays out to the finale.

At this point, we had a 30-second intro, with no crowd sounds, no complete song, a middle band breakdown with an added kick drum and a live Jon vocal with no singalong, crowd cheering or audience handclaps. All of this was plainly seen in the rough cut. It sounded pretty strange.

In the next session, we decided to mix the intro again, now that we had a better picture cut to work with. We did a Total Recall on the SSL and reset all the patches and outboard from paper notes and tweaked the mix for a few more hours. Mark Biehl and Tony Freedman, my assistants on the project, are famous for keeping impeccable recall notes, so the mix came back perfectly. We then did a remix of the center section as well, again down to a 4-track SR master, and put these tracks to bed.

The next step was to put all of these pieces together. This required going to yet another 24-track master to do a final conform, add crowd, pyro blasts and walkie talkie voices. Using the 3/4-inch off-line for reference, we layed over the intro mix

from the 4-track to the new 24-track, stretching the Dolbys for minimum signal degradation. At the point the song kicks in full, we layed in the PCM 1630 master of the record mix on another pair of tracks. At the middle section, we layed up our pre-mixed section, which had the band mix, the sampled kick drum and Jon's ad lib vocal, all matching to picture. After the middle section, we went back to the 1630 and played it out to the end. The music was now all in place.

On to the crowd sweetening. I usually find that two or three crowd loops of different intensity are necessary to give the range of control needed to avoid the crowd sounding like it's just getting louder and softer. I've even added 10 or 15 people in the studio screaming and hollering on seven or eight tracks to put some random specific voices in a clip.

We didn't need to go that far on this one. Once the crowd loops were in place, we moved into the singalong. When Wayne and Curt filmed the performance for the video, they asked the 600 or so invited guests to sing, a half-dozen times, the chorus, which consists of "lay your hands on me" three times. This was recorded on a portable DAT and transferred to 4-track SR to edit with. It sounded quite nice, but each phrase had to be placed individually to keep time. Plus, 600 voices don't sound like 10,000, so I double-tracked the whole mess and added *lots* of delay and echo.

But wait; they were rhythm clapping, too. Time to break out the Akai clapping disk that I had Paul Robie, one of my engineers, build for me. We called it up, picked the keys on the keyboard that seemed to feel right and played them in manually. I have to say I was real nervous about this section working, but it really did come out totally believable in the end.

On yet another session, Johann Langlie, a sound designer I work with quite often, came in to lay pyro blasts to the fireworks in the picture to create the ultimate climax. He packs an Emulator rack and an Apple Macintosh running the Digidesign Q-Sheet software to fire his sounds to SMPTE. After these were in, we wanted to put in some walkie talkie chatter at the top. We brought in a pair of walkie talkies and put one out in the studio with a mic on it. The other one was in the control room with us; we just watched the picture and squawked a few orders over the intro section.

With all these pieces in place, we attacked the final mix, blending the crowd swells in, adding some echo and slap to the body of the 1630 master version, balancing the singalong crowd and hand claps, and, last but not least, going completely over the top with the impact of the pyro blasts. This mix was done twice on two different days to get it just right. The mix was automated down to a set of open tracks on the same 24-track, and layed up to a new 1630 master, as well as layed back to the 1-inch edited master in Dolby A.

I've done some pretty complex sessions in my 12 years of mixing for picture, but I think this was one of the most taxing on a purely logistical level. I'm not really sure how I would have gone about it had I not had systems like the Adams-Smith AV editor, an SSL desk and the excellent facilities at Post Logic. The audio portion of this video took about 90 hours, but it could have easily taken 150 hours or more without the technology I had at my disposal.

My only concern now is, what are Wayne Isham, Jeff Richter and Curt Marvis conjuring up for the next one? ■

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DEALING WITH DRUMS

Photography by Kevin Anderson.

By Mike Joseph

Rediscover the lost art of placing and miking acoustic drums.

In a world where an ever-growing percentage of professional, respected, working music creators can regularly chart tracks without seeing a real drum kit, it is imperative that we occasionally return to the roots of recording. Like a pendulum, the whims of music production techniques swing back and forth. Acoustic drums are making a comeback, and it is important that knowledge of the art of drum miking not be lost.

Some of the approaches and techniques may be obvious. Some may be new to you. Some may be merely refreshing, once known but long forgotten. None, however, are developed definitively: All pros need to add their own twists. There are no definitives.

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

The sound of the beat

With the possible exception of having to record a 60-piece orchestra under the apron of an opera house stage thrust, drums are probably the most interactive, affecting, least-controllable set of sources there may be. The ability to record drums properly separates the kids from the adults, the firsts from the seconds. The ability to capture the combination of sounds you want to capture, as separate from those you end up with, is even more a measure of success.

Drums, which are essentially devices using the oscillations of a stretched diaphragm over the mouth of a resonant tube to move air, are arguably the oldest musical instruments. From the concepts embodied in their development sprang the seeds of all other instruments. Sounding boards, vibrating surfaces, the pursuit of different pitches in different registers, and acoustic amplification can all be traced from drums.

Drums are classic 3-piece Helmholtz resonators. One end oscillates, its period determined by size, mass and tautness. The shell determines the length and column of air contained, creating a resonant cavity. The mouth at the other end couples the air column to the outside world, its diameter also determining tuning. Change one variable and the others change.

Above the skin on the outside, sound dissipates quickly, as the initial attack wavefront rapidly expands. Inside the shell, many pressure modes and nulls ex-

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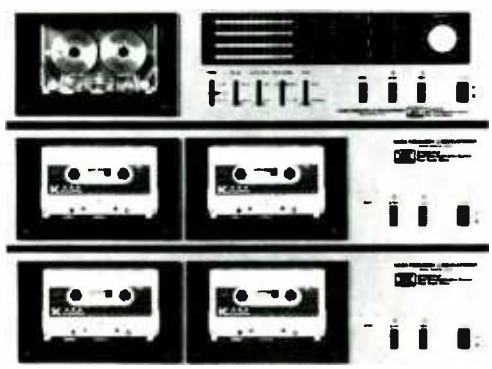

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ist. The excited, resonant air column generates the fundamental, which principally couples to the outside air through the mouth. The vibrating air mass inside the shell secondarily restimulates the head, causing sympathetic vibration and the creation of multiple harmonics, which radiate back through the skin.

The pureness of the tone and length of sustain is determined, among other things, by how closely the mechanical tuning of the skin matches the mechanical tuning of the shell system. A head set to one pitch on a shell that is tuned, by design, to another will decay rapidly and speak in several tongues. If the two are harmonically related, the tone will be pure and the sustain long.

Among the acoustic instrument family, it is percussion instruments alone which generate fundamental frequencies from 25Hz to 10kHz. The harmonics of a sizzle go measurably past 30kHz.

The act of effectively recording drums to tape is complex and convoluted, involving the original sound, multisource interaction, the effect of room boundaries, microphone diaphragm size/location/positioning/distance, room surface treatment, reflectivity, absorption and volume. Some recording engineers are intuitively connected to this formula and have no problem with it. Others never get it. Here is the once-over:

Drums in a room

Let's limit our discussion to basic drum kits: kick, snare, tom toms, cymbals, high hat. First, drums are loud — they move air. They rattle their own hardware. They wake up rooms, exciting them at seldom-excited frequencies. Due to their percussive nature (read: steep leading-edge attack of the waveform envelope), they show up room reflections and flutter where little else does. Their wide, harmonically rich bandwidth faithfully exposes room colorations: the combination of eigentones, room modes, standing wave harmonics, reflections, room volume resonance, absorptive coefficients in specific bands, etc. Drums are great this way — certainly better than a Marshall stack or two cellos.

The first order of business with drums is to place them in a location providing sound that is most like what you are looking for. Bright and reflectively snappy may be the trick in the morning, flat and dry later. Awareness of acoustic characteristics apply: The type of flooring, proximity to walls and room treatment, although this is complicated by the fact that the entire kit occupies a large footprint, interacts internally and covers a large frequency spectrum. Therein lies the interpretive art — use the ears.

The nature of microphones further color the picture. (See Close-Field Behavior of Drum Microphones" on page 42.) Each mic adds distinct characteristics and filters to the natural projected sound of the instrument. Multiply that by the infinite number of positions possible for locating the mic head and you can develop virtually any waveform you are looking for without touching the EQ.

Acoustic creation

An experienced engineer will quickly indicate the following: A good sounding instrument with any mic will always sound better in the control room than a so-so source with the best mic. Drums are the prime example of the rule — if it doesn't sound good, alter the source. Use another snare drum. Swap out the crash or ride. Change the heads on the toms. No amount of fiddling with the EQ will fix a dull, flat or resonant tub.

Work with the drummer to get the sound that you are looking for. Apologies to the players, but microphones do not hear what the drummers hear sitting on the throne. The fundamental of the sound projects away from the drummer, with the majority of the attack only in their face. The body, or fullness, develops at distance from the skin. The throne position is just not representative of the sound the mic hears. Also, a player gets a certain amount of tactile, vibratory feedback through the floor, seat and stick, filling in areas that the mic does not hear.

Diplomacy counts. Work with the drummer's sound because it is often good, or specific to the music at hand, and the session will go smoother. Obviously, you cannot substitute bigger sticks; ask the drummer to play differently or cut a 6-inch circle in his double-headed kick. You can, however, explain to him that you are trying to capture his sound, which means giving the mics what they want to interpret, which might be different than what is being heard on the hot seat. You know the drill.

But don't be afraid to suggest the necessary, such as swapping out for the studio snare, or taking off the front head of the kick or the bottom skins of the toms. Clearly, the program material will dictate the requirement. What works for acoustic swizzle jazz will not cut it on a dance record, and vice versa.

Here are some widely known and highly subjective consideration: Large kits don't sound bigger when they are recorded. The tastiest sounds often come from the smallest, tightest sets. Case in point — the biggest, fattest drums I ever cut were from Sheila E.'s tiny, red Yamaha starter kit. The worst, floppiest sound was from a much-touted name-brand concert set that sounded huge on stage but like spaghetti in the studio, no matter how tight the heads were.

Mics hear the sound looser than it is in the room. When tuning or damping the kit, make it right in the room, then go one notch deader, assuming you are close miking. Distance miking is another story, of course. Enough snare sizzle to the ear may be too much to a mic. Also, everything leaks. Work with it to make use of the good leakage.

The point is this: The sound on the other side of the glass, filtered by mics and 2-dimensional acoustics, is different than 3-dimensional hearing in the studio. You must put your face in front of the kit to hear where it is, with the understanding that the mics will subtly alter that reality.

A good arrangement is to place your well-versed second in the room under a set of cans while you sit in the CR. Leak a little program and a lot of talk-back, and direct the alterations by remote.

Tricks for treats

Tuning up a kit has always seemed more black art than not, even to many drummers. The variables are numerous: Hydraulic heads have a lower "Q" or peak resonance than others, so they do not find their exact pitch as easily or tune as high. Because of a greater head mass, they also seem to have fewer higher harmonics and need to be hit harder to bite. Double heads quadruple the difficulty — many believe that the top head's tuning determines the attack pitch, and the bottom determines the overhang resonance. Sometimes. Drum tuning drifts with temperature and humidity, of course, let alone the results of being stacked inside one another in a car trunk for two days.

A good technique for tuning seems to be the following: Find the range and key that the drums fall in and let the drummer tune to the partials he prefers. Use a piano if it helps. Then help tune to the purest, cleanest individual note on each drum, looking to diminish the secondary ring or partial unrelated harmonic as much as possible. Play all the pieces in the

kit to see if the other drums cause too much sympathetic resonance on other drums. This is often easier by muting or soloing on the board than damping out in the room.

If the toms or snare need damping, cut out a ring or circle of old drum head to the inside diameter of the head so that the width of the doughnut or ring section is only an inch or two, leaving a hole of six or eight inches in the center for the real head to show through. Lay this on the skin. Vary the amount of damping by how wide the ring is, whether it has a larger or smaller hole in the middle.

If you can, do not tape it down, because the tape will work loosely and will buzz. The ring effectively damps the wave as it travels to the rim, reflects and returns to the center. Knowing that the amplitude of skin travel is greater in the center than at the edges should be powerful ammunition when you apply variable damping to the skin, no matter how it is accomplished.

If a drum needs damping, place an old drum head with the center cut out on top of the head. This works better than duct tape or someone's wallet.

Putting tape on the head is sloppy tuning, because it unbalances the head, makes one-note tuning difficult, limits the room for the drummer to hit and gets in the way of the mic (duct tape doesn't "speak"). A wallet placed on the head works better, but it walks around and still gets in the way. Many heavy-forearm hitters get good results by laying a slice of old T-shirt, cotton cloth or towel over the head with tape on the shell to hold it in place. Whatever works. However, if the drum head needs two pounds of gaffer's tape and a thrice-folded tablecloth to get it in the ballpark, something else is dreadfully wrong. Save yourself the time and swap out the drum!

Kick drums are less troublesome, because a judicious application of pillow or blanket placed in the bottom usually works. Try to avoid tape on the actual skin — it will start buzzing two takes in. Because of the large size of the cavity, internal mic placement in relation to the beater, symmetrically or not, allows more flexibility than in smaller shells.

The pillow or teddy bear inside the shell primarily changes the cubic volume and

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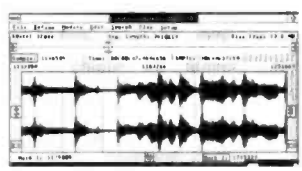

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high-frequency absorption inside the space, which changes the tuning frequency and "Q" of that frequency, as well as the balance of harmonics to fundamental. When in doubt, surprise yourself — get a little starter kick with one head and tune the head right. Everything else will happen magically.

Mic on drums

Short of writing the definitive encyclopedia on placement, it is enough to say that everything works sometimes. Most things work for the wrong reasons, and understanding the physics of small space acoustics always helps. Remember, when you mic a drum closely, you more or less only pick up the pressure wave from the attack of the stick and sympathetic internal resonance coming back through the skin.

You also pick up the reflections of the other drums mirrored off the head. Miking at distance allows the sound to develop or focus, becoming bigger or fatter. Miking at *great* distance allows the lower frequencies from the bottom of the shell to add to the attack from the head. It also picks up everything else in the damned room.

Assuming most readers are familiar with the common practices of placing a mic head above a skin, proper gain staging of the electronics and the ritualistic act called "the getting of the sounds," let's look at some of the more obtuse variants.

With a snare drum, the problem is usually one of practicality. Can you get the mic in close enough without getting in something else's way? Does the mic touch the high hat? Is there too much high hat? Is there too much, or not enough, snare in the sound?

Here are some suggestions: Try any new swivel-headed microphone, which lets you place the mic from an angle and away from the hat. Use a clamp-on bracket system, which has the additional advantage of locking-in the mic to drum head distance as the kit starts rockin'. Play with odd mics, such as a high SPL lav peeking over the edge or taped to a pencil, or an older ribbon at several inches off the rim, out of harm's way. Orienting the ribbon so that its dead 90° side is aimed at the hat is especially nice.

A great trick for fans of signal gating is to patch a lav or small mic, located directly above the snare head, into the trigger input on the gate, with the gating function that controls a snare program mic located 6 to 8 inches away. The gate response time is cheated by the closer trigger mic, allowing full open by the time the leading edge of the sound reaches the program mic. The distance placement that this allows on the program mic adds air and color, which a drum head needs for the sound to coalesce. It works well.

Try experimenting with different mics and positions for unusual sounds. For example, try a lavalier mic attached to a pencil, which is then taped to the snare drum. Does a No. 2 lead sound better than a No. 3? Try it and see what happens.

Try placing a second mic below the snare, strategically located to minimize kick pickup. Flip the polarity (don't call it phase!) on the board to realign the top and bottom mics, signal-wise. Then again, maybe out-of-polarity sounds better. Play with position for creative cancellation. Or put two similar mics on the same head, tight and parallel to the head, flip the polarity on one and move it back. Try everything once, preferably on billable time. (You're no dummy!)

Totally tom tom

Toms can experience everything mentioned above, with the addition of adding a microphone inside the shell on a single-skinned instrument. The location inside a shell is crucial, with a smaller mic element usually being more predictable and repeatable than a larger one. In this matter, clamp-on mic brackets keep the wandering to a minimum.

General rules: After you get a good sound on one tom, or between a single tom and the snare, always compare the sound of all the mics you will bring up, in and out of electrical polarity, in stereo panning placement and sum mono. Moving a microphone 1 inch sideways may not effect the sound of the miked drum, but may highly color a drum next door, one whose sound with which you are already satisfied. Don't assume anything. Some mics are wired pin 2 hot, others pin 3. Check the cancellation and addition of all signals, not just for correctitude, but for creative aesthetics as well.

On floor toms, try to make the drum mouth non-parallel to the floor. It is not surprising that reflection and standing waves between the floor and the skin greatly distract or contribute to the sound. Place a foam block or a packing blanket under the drum on the floor and see what happens.

Finally, try using one mic between drums to pick up both. It is obvious that the fewer mics that are on the kit, the less interaction there will be.

Kick it out

With kick drum, be aware that room leakage and other drums get into the shell chamber from the back or through the skin, exciting odd resonances. Playing with the working distance to the beater can overcome this (direct to indirect sound ratio), but a gobo or blanket outside the drum often kills leakage without altering the sound in a negative way. Where leakage is not a problem, try taping (with foam standoff) a lav mic to the stalk of the beater on the mechanism. WD-40 will kill squeaks.

A pressure zone-type mic placed slightly in front of the mouth opening will add a different quality to the sound, as will one inside the shell or a second mic on the skin in front, away from the beater, with flipped polarity. Moving the inside mic in or out will create cancellations, selectively altering the sound.

On high hat, try to get the majority of the sound from the snare mic, or use a separate mic, such as a small diaphragm condenser, above the bell and pointing away from a crash or ride, utilizing the hat

to shield the snare sound. Print the hat signal to the kick track, which allows you to independently filter each for separate control later, thereby saving a track channel. Say you read it here first. Also on high hat, put two mics up, flip one's polarity and play with distance, using cancellation as an acoustic EQ.

On overhead mics, don't settle for a spaced stereo pair. If you are not close-miking each cymbal directly, use an overhead stereo system, or try taping the edge of two pressure zone mics in a 45° V or wedge and hanging them above and ahead of the drummer's head. The sound is natural and balanced, although without a larger boundary plane, it is shy below 200Hz or so.

Try something different: Keeping left and right proper, use the other mics (snare, toms, kick) to fill in the missing frequencies, relying on the body of the sound and total imaging to be generated by the overhead pressure zone mics, which are prominent in the mix. The spatial coherence and time domain control is excellent. This works remarkably well for many styles of music and is the reverse from the normal approach of overheads as lower level afterthoughts. Even the snare and hat come across well, needing only subtle reinforcement if correctly completed.

Another approach to cymbals is to tape mics to the cymbals' stand stalks, letting the movement or the wash of the ride and crash alter the sound of the instrument pickup underneath. If the sound is too much alone, try subtly adding it to another mic above, either in or out of polarity.

Using EQ

Let me say a personal word on equalization. The less boost the better. Nowhere more than on the wide bandwidth noise-like character of percussion is it easier to hear phase shift than when boosting large amounts of one frequency. Don't ask yourself, "What would I like to hear more of?" Rather, ask, "What am I hearing too much of?" Almost always, taking out mids to expose the high sounds is better than boosting the highs, though the resultant curve may be identical. The gain staging, headroom and distortion that you improve may be your own.

Several obvious, well-proven EQ points deserve attention. A sharp cut at 600Hz is the quickest way to remove the "big rubber ball" sound on toms and kick. Be aware that radically boosting anything below 60Hz is dangerous these days, because rumble and junk faithfully translate to compact discs verbatim. Hi pass the bottom out of anything without a low fundamental and choose the one or two instruments in the mix that have real bottom to fill that space.

Finally, watch how much top is added to the hat and cymbals. When digital splatters, it goes to town. There are too many steps and stages after the master 2-track for someone to alter your mix; and top end that crashes into the ceiling is one of the first things to suffer.

A word to the wise

No matter how and where you do it, conventions in drum miking are merely a stepping-off point. There is always room to experiment and rediscover. Thankfully, the possibilities for new sounds, let alone new styles and feels of playing, are so limitless that acoustic drums will never be replaced. And as long as there are drums, there will be new ways to record them. ■

Circle (17) on Rapid Facts Card

CLOSE-FIELD BEHAVIOR OF DRUM MICROPHONES

By Tim Vear

Photography by Kevin Anderson.

How a mic responds when placed near a drum will determine the ultimate sound character.

The acoustics of the close-field of a drum are characterized by the sound of a very wide frequency range, the sound of a very wide dynamic range, the sound with extreme transients, and the sound generated by a large acoustic source (or sources).

These conditions may suggest the appropriate general type of microphone to be used, but it is the characteristics of a particular microphone under these conditions that determines the sound character that is ultimately reproduced. A look at some of these characteristics will help to understand the behavior of microphones in this environment.

Transducer type

Excluding the occasionally fragile ribbon device, the two basic transducer types that are typically used for drums — dynamics and condensers — have certain fundamental differences that become readily apparent in drum miking. These differences are in the moving parts of the elements and in the associated circuitry.

In both devices, the moving part consists of a diaphragm that vibrates in response to sound pressure. In a dynamic element, a small coil of wire glued to the rear of the diaphragm generates the output signal when moved through a magnetic field. The combination of voice coil, glue and the necessarily thicker diaphragm results in a moving mass up to 1,000 times greater than the typical condenser diaphragm, which is unencumbered.

The condenser microphone, however, requires additional active circuitry to generate a usable output signal level. This circuitry introduces certain limitations not found in dynamic microphones, which are passive devices and have no electronically generated noise of their own. These differences and others have a direct influence on the frequency response, dynamic range, transient response and directivity of each type.

Tim Vear is an applications engineer for Shure Brothers, Evanston, IL.

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Frequency response

Drums have a wide frequency response range, especially when cymbals and other percussion devices are included. Wide range microphones of dynamic and condenser design are available, although the condenser has an advantage at very high frequencies due to its low mass diaphragm.

The frequency response of a drum microphone is profoundly affected by its placement. The dominant effect is a pronounced increase in low-frequency response because the microphone is located closer to the drum. This is known as "proximity effect" and occurs only with directional microphones.

The increase may be as great as 30dB for frequencies below 50Hz within 1/4-inch of the drum head. The actual amount of increase is a function of the microphone's free-field response and its directional pattern: At a given frequency, a bi-directional type has 6dB more proximity effect than a cardioid, with supercardioid and hypercardioid types falling in between.

The off-axis frequency response of a microphone is equally important in determining the overall pickup because sound arrives at the microphone from many directions when it is positioned close to a large sound source, such as a drum. This is why microphones with similar on-axis response may sound quite different when used in a close-miked drum application.

Dynamic range

The dynamic range of a drum kit is the difference (in decibels) between the loudest and softest sounds that it can produce. At distances within 1 inch, the sound pressure level (SPL) from a snare drum (typically the loudest source) may approach 155dB, while the minimum level will be the background noise level of the room, perhaps 25dB SPL for an extremely quiet recording studio.

The dynamic range of a microphone is normally defined as the difference (in decibels) between the noise floor of the microphone and the maximum input SPL that it can handle without distortion. This is related to the sensitivity of the microphone and its signal-to-noise ratio: Sensitivity is the electrical output level for a standard SPL (usually 74dB or 94dB), while signal-to-noise ratio is the difference (in dB) between the sensitivity of the microphone and its noise floor.

For a dynamic microphone, the noise floor is only a function of its resistance (approximately the rated impedance) since it has no active (noise generating) circuitry. The maximum SPL for a dynamic, though not often stated, is typically above 155dB. This gives dynamic microphones a dynamic range that is suitable for high-level drum miking applications.

It is usually not possible to overload a dynamic microphone even with close miking. However, its sensitivity may not be sufficient (especially at high frequencies) to pick up low-level sounds with an adequate signal-to-noise ratio.

For a condenser microphone, the noise floor is primarily a function of the electronic noise generated in its active circuitry, though it is still low in high-quality designs. The maximum sound level for a condenser is generally not limited by the element, but by this active circuitry.

At some SPL (usually stated in the specifications), this circuitry will be limited by its voltage ceiling and distortion. It is possible to design condenser microphones capable of handling levels above 145dB, but only at the expense of a higher noise floor. However, a condenser microphone may be designed with higher sensitivity (especially at high frequencies) and greater signal-to-noise ratio than a comparable dynamic, thus making it more suitable for pickup of low-level sounds.

Transient response

The nature of sound produced by drums and other percussion instruments is transient — it consists of many short-duration, large-amplitude waveforms. To reproduce these sounds, a microphone element must respond quickly and accurately. The transient behavior of a microphone is related directly to its high-frequency response and to the nature of its mechanical and electrical resonances.

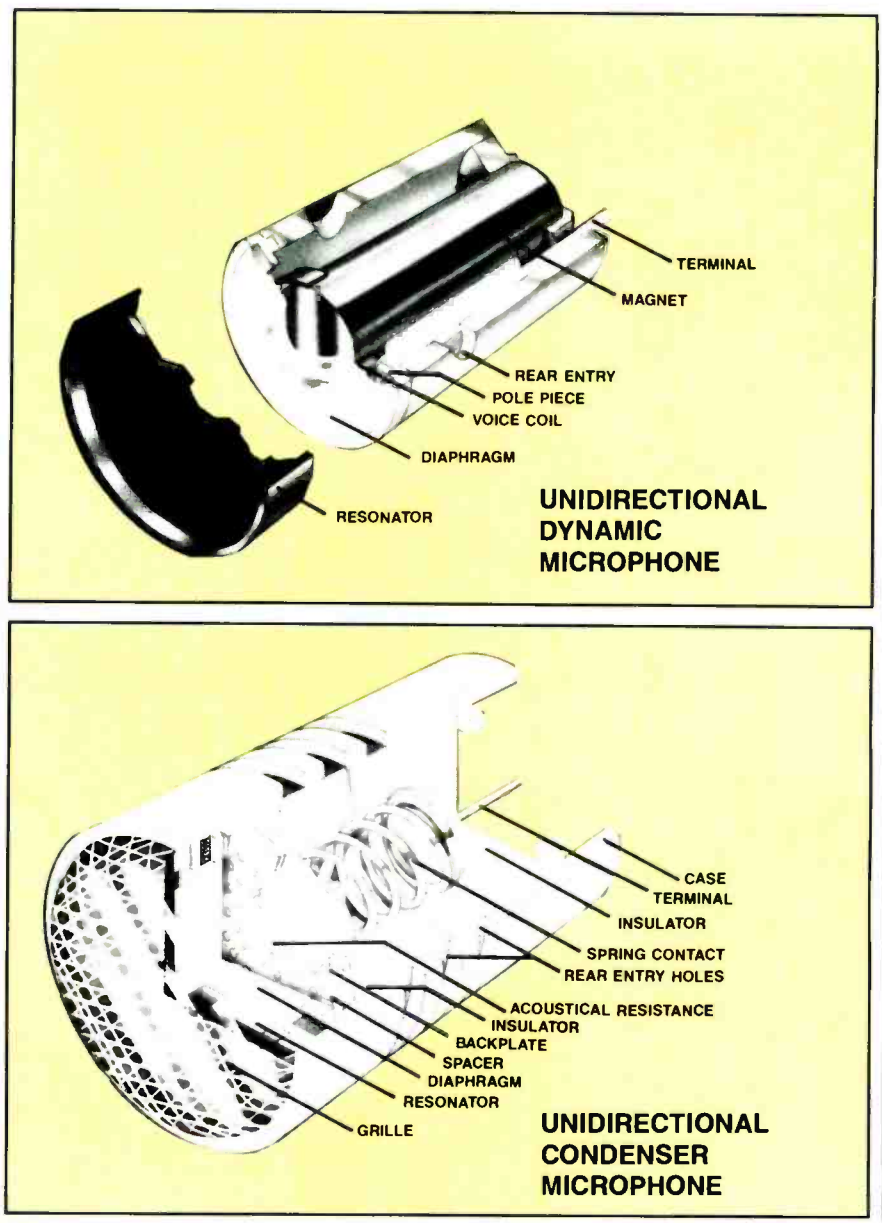

Figure 1. *Cutaway diagrams of a unidirectional dynamic mic (top) and a unidirectional condenser mic. The differences in each mic's construction have an influence on the frequency response, dynamic range, transient response and directivity.*

Extended frequency response in a dynamic microphone is usually obtained by the use of several acoustic resonators in addition to the basic mechanical system formed by the diaphragm and voice coil. In general, the higher moving mass and multiple resonators of dynamic microphones reduce the speed and accuracy of their transient response at high frequencies. However, the effect on low-frequency and mid-range sound is minimal.

With a much lower mass mechanical system and less reliance on acoustic resonators, the condenser microphone has the potential for better transient response than a comparable dynamic. It is necessary, however, that the active circuitry of the condenser also have excellent transient response within its dynamic range. This can usually be achieved in high-quality designs.

Acoustic source

The physical size and shape of percussion instruments have a marked effect on the sound picked up by a close-field microphone. The sound of a drum radiates not only from the head(s), but from the shell and rim as well. The head is not a uniform source of sound; it has many vibration modes that depend on where and how it is struck, how it is tensioned and how it is damped. In the snare drum, for example, the sound from the bottom of the drum is completely different from that of the top because of the snare mechanism on the lower head.

As mentioned earlier, the sound reproduced by a microphone is a composite of its on-axis and off-axis response. The on-axis sound source will be that portion of the drum that is immediately in front of the microphone, but the off-axis sound consists of other parts of the head and the drum plus the direct and reflected sounds from nearby drums or other sources.

The balance of on-axis to off-axis sound is determined primarily by the distance of the microphone to the sound source and by its directivity. Some off-axis sound will be heard and the fidelity of the off-axis pickup will determine whether this enhances or detracts from the overall sound.

Because most drums are not played in isolation from other instruments, directional microphones are often used to minimize leakage of sound from off-axis sources. However, the directivity of any microphone varies to some extent with frequency, especially for larger models. When the proximity effect of a directional microphone is added, distance and orientation strongly influence the final sound. Since condenser microphones may be made smaller than comparable dynamics, they may often be mounted more precisely.

A further consideration for a large sound source, such as a drum kit, is the use of multiple microphones. Interference effects may occur when the sound of one drum is picked up by more than one microphone. This can only be determined by listening to the combination of microphones, rather than to each individually.

Although we can characterize the sound of the close-field, its effect on different microphones varies considerably. It is not possible to predict the total "sound" of a microphone in a close-field application solely on the basis of published or theoretical specifications. Only actual use and experience can yield this information.

In addition, any attempt to capture the sound of a drum with a microphone at one, or even several, locations cannot reproduce the total sound of the instrument. A microphone samples one small point in a large, complex sound field. Placement may be critical and will vary with different kinds of drums and microphone models.

Selection of a particular microphone will be based not only upon its ability to deliver a desirable sound, but also on ease of use, flexibility, durability and cost. ■

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Most mic companies design and build many more microphones than they advertise, or that the average pro audio dealer stocks. Some mic companies (like Schoeps, Milab, Josephson, Beyer and Sanken) with traditionally smaller advertising budgets, build excellent though harder to find products. Others, like Crown with their PZMemo, provide good newsletter application notes, yours for the asking with a single phone call. Call your local dealer or the factories directly for the appropriate info.

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The performers and audience at the Grammy Awards have the most critical ears in professional audio. The last sounds this group of top artists, engineers and producers want to hear is phase shift or the pumping of a processor-based loudspeaker system.

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Model A-3x3 Single Channel, Permanent Version Processor

Optimized electronics = optimum signal qualit And Apogee systems are easy to install, easy to arra and quick to take on the road (ask about the full cor plement of rigging hardware).

Q. What alternatives do I have for mounting drum mics, other than regular stands and extension booms?

A. The following companies manufacture brackets and clamps to simplify your mic setup:

Atlas/Soundolier: 1859 Intertech Drive, Fenton, MO 63026; 314-349-3110.

AKG: 1525 Alvarado St., San Leandro, CA 94577; 415-351-3500.

Beyer Dynamic 5-05 Burns Ave., Hicksville, NY 11801; 516-935-8000.

Shure Bros.: 222 Hartrey Ave., Evanston, IL 60202-3696; 708-866-2200.

Black Audio Devices: Box 106, Ventura, CA 93002; 805-653-5557

Q. I have some great old microphones that don't sound quite right anymore. Where can I send them to have them refurbished or rebuilt?

A. All the major mic manufacturers and many independents offer refurbishing and factory servicing for their microphones. The following companies can be contacted at the addresses and numbers listed below:

AKG: Attn: Mic Repair, 1525 Alvarado St., San Leandro, CA 94577; 415-351-3500.

Audio-Technica: 1221 Commerce Dr., Stow, OH 44224; 216-686-2600.

Beyer Dynamic 5-05 Burns Ave., Hicksville, NY 11801; 516-935-8000.

Bruel & Kjaer: Attn: Service, 185 Forest St., Marlborough, MA 01752; 508-481-7000.

Electro-Voice: Attn: Repair Dept., 600 Cecil St., Buchanan, MI 49107; 616-695-6831.

Neumann: c/o Gotham Audio, Attn: Joe Leung, 1790 Broadway, 8th Floor, New York, NY 10019-1412; 212-765-3410.

Sanken: c/o Audio Intervisual Design, Attn: Andrew/Service, 1032 N. Sycamore Ave., Los Angeles, CA 90038; 213-469-4773.

Schoeps: c/o Posthorn Recordings, Attn: Jerry Bruck, 142 W. 26th St., New York, NY 10001; 212-242-3737.

Sennheiser: Six Vista Dr., Old Lyme, CT 06371; 203-434-9190.

Shure Bros.: 222 Hartrey Ave., Evanston, IL 60202-3696; 708-866-2200.

Sony: 1600 Queen Anne Road, Teaneck, NJ 07666; 201-833-5300.

Q. Is there a good book I can give to my second engineers to get them up to speed on mic technicques and applications?

A. R•E•P recommends the following books (note that several may be overly entry level or steeped in design explanations):

Sound Recording Handbook, by John Woram, Howard W. Sams & Co.

The Microphone Manual: Design and Application, by David Miles Huber, Howard W. Sams & Co.

Also, contact various microphone manufacturers that may have brochures available.

Q. Does super high-quality microphone cable make that much of a difference, or is it advertising hype?

A. If you haven't heard the comparison, you owe it to yourself to try the following: Get 100 feet of regular old off-the-shelf 2-conductor braided shield mic cable, and 100 feet of a high-quality low-capacitance/low-resistance mic cable (such as Mogami or Canare). Plug in a mic (any mic will do) to one of the lines, put on a good set of headphones and jangle some car keys. Swap cables.

If you can't hear the difference between the two cables, it's probably time to retire. The longer the cable run the more obvious the difference. In short, good low-capacitance cable makes a noticable improvement. ■

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Circle (20) on Rapid Facts Card

Automatic EQ: The Great Myth

By Mike Joseph

One of the big buzzes in the sound reinforcement industry is the heated discussion over automatic (or automated) house and monitor system equalization.

The entire issue is rife with complexity. Most practitioners agree that quality mics and real-time measuring devices alone can not provide the perfect room EQ. As for tuning by ear, no matter how good you are, your brain identifies peaks better than dips, correlates in stereo, is axially dependent, compensates for indirect sound in a reverberant sound field and lives inside your skull, which is connected to the rest of your body, which uses its fingers to adjust the EQ knobs, which all told do not let your ears get out into the room's sound field. Mics do not suffer these problems in the same way.

Conversely, anyone who has stuck a single microphone up in a room and plugged in a ⅓-octave analyzer knows the tentative nature of the act. "X" number of different speaker devices splayed in "X" number of zones in a typical large venue suggest that it is highly questionable to trust the effectiveness of a single stereo-strapped graphic EQ device.

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

Excluded is the issue of frequency resolution and phase integrity of the various equalizer designs: graphic, parametric, fixed Q sweep, graphametric, digital, digital control of analog, non-symmetric combining, etc., with their different slopes, Qs and band-to-band interactivity.

In theory, wouldn't it be nice if we could run some noise through the system, read the room response with a mic and have a "smart" EQ subtract the room effect from the original signal, adding in the appropriate ⅓-octave EQ? Systems like the 1128 from T.C. Electronics can do that. How smart are they? Well, what do you want to do? Do you want to have the system set itself up with noise before the show so the response is flat on a given speaker's main axis (plus or minus any aesthetic house curve you add)? That's easy.

Do you want to make it flat with noise in eight different measuring points in the house?

Do you want to measure the interaction between those zones? That is harder still. How does EQ/analyzer No. 3 know that the low end from speakers/zone No. 4 isn't part of its signal output, turning down, in effect, the low end to take care of what is really a side lobe from next door?

Do you want to elevate this all one level and have the system use program material during the show as the signal source instead of noise, while compensating for indirect versus direct sound, meaning time domain signal alignment? Look out! Your equipment jumps to the level of multichannel fast Fourier transform analyzers with full storage capabilities, delays, a computer to drive the package, multiple system sample points, inverse signal comparison and a level of setup complexity rivaling the main P.A. itself.

And it still does not know if the bass coming off the stage is from the musical instrument amps or the monitor fills. Do you really want it to turn down the house low end automatically because the sample mics in the room say "too much," even if there is no bass in the house mix? This sounds too much like dueling equalizers, pitting the house zones against the monitor mixes against the stage sound.

The human operator will and must be in the loop for the foreseeable future, even if only as a link between the "We have a problem/do you want me to fix it?" prompt on the screen and the button that says, "Push to engage EQ correction."

If this is even slightly intriguing to you, then read with special interest the short series beginning with this month's article from Apogee Sound on the reality of state-of-the-technology equalization systems.

Next month, following up Apogee's CORREQT article, we will run a piece on the Meyer SIM measurement and equalization system, currently enjoying considerable use around the world. We hope the presentation of the truth behind alternative approaches to improving sound system response via computerized FFT analysis and parametric equalization will be educational — and maybe even bust a myth or two.

Just don't call it automatic equalization. ■

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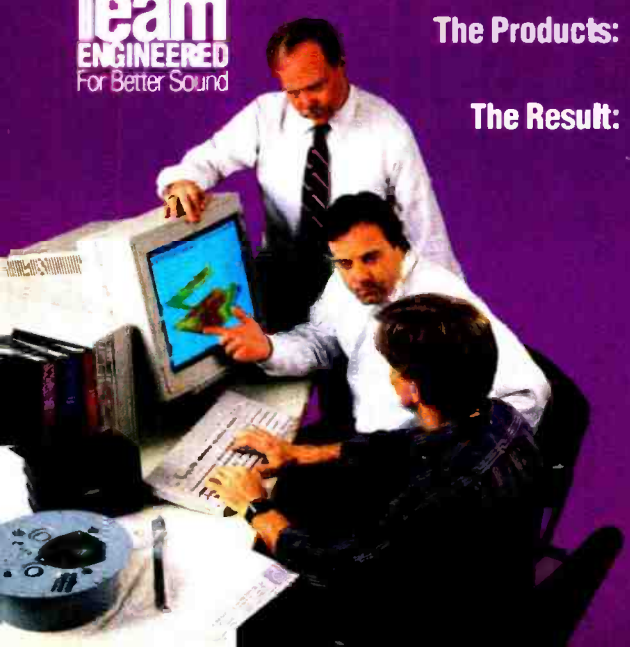

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PART ONE

Computerized EQ Systems

By Ken DeLoria

The CORREQT system is, at once, a philosophy of sound system design and practice, a technique and an evolving compilation of hardware and software.

Its mission is to enlarge, develop and extend the performance results of the Apogee loudspeaker line, particularly and especially when the loudspeakers are utilized in reflective acoustic environments. This utilization of the loudspeakers accounts for the majority of typical applications of the Apogee product base that is presently in distribution.

Ken DeLoria is the founder and CEO of Apogee Sound, Petaluma, CA.

Origin

CORREQT was developed during a 3-year period to answer the needs of sound designers and consultants who were using Apogee speaker products in demanding situations. These users were experiencing variable perceptions of speaker response performance characteristics as they changed venues, which is not unique in the sound reinforcement field.

A common concern emerged among the various users that there should be a way to minimize the contribution of the room's acoustics, thereby improving the consistency of the sonic results from location to location. Frequency response, projection pattern uniformity, signal arrival-time consistency and dynamic power handling were all factors to be considered.

The Apogee loudspeaker line had been engineered to minimize non-linearities in most configurations and operating levels. Because of the linear nature of these loudspeakers, it was relatively easy to identify the independent characteristics of the acoustic environment as the greatest variable and the largest contributor to overall system performance variables. (System is defined here as the microphone(s), mixer, processor(s), amplifier(s), loudspeaker(s) and acoustic response characteristics of the room.)

A method was developed to solve these non-linearities involving:

- The use of the transfer function measurement response of a 2-port FFT-based spectrum analyzer to identify the non-linearities.
- The deployment of precision parametric equalizers to correct response, thereby linearizing the system performance.

The dual-channel FFT, an essential piece of instrumentation, had become common-

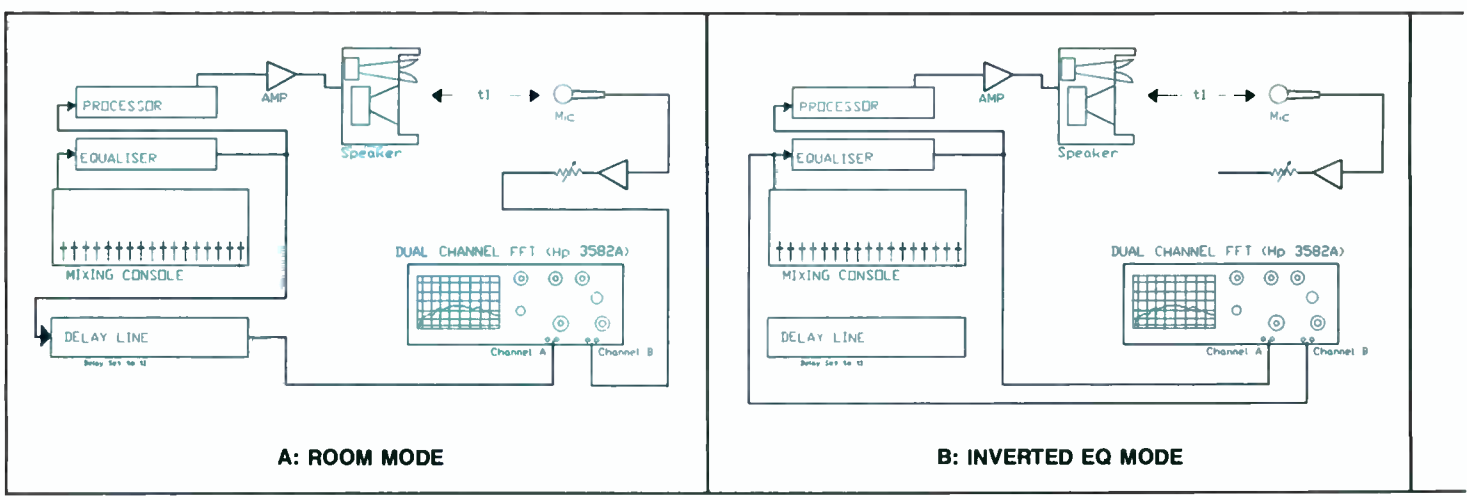


Figure 1. The typical process for using the CORREQT system is: A: Room Mode; B: Inverted EQ Mode; C: Result Mode; D: Normal EQ Mode.

A discussion of the Apogee CORREQT system, including its origin, philosophy and future development.

place at Apogee for research and development work and routine production testing. Research revealed that the dual-channel FFT, when used as a 2-port network analyzer, could effectively form the basis of a response correction system by measuring the transfer function of the system. (Transfer function is the result of dividing the spectrum that is present at the input to one channel of the analyzer by the spectrum that is present at the other channel.)

By using precision parametric equalizers, you can effectively null the acoustical environment's response irregularities and much of the resulting sonic coloration. You can also demonstrate a measure of control that was previously unavailable by simple 1/3-octave analysis or parametric equalizers alone.

Development

To develop the system, the acoustic characteristics of many sizes and shapes of rooms were analyzed. We found that the most significant deviations from flat linear response are attributable to the room character, rather than speaker placement or multiple speaker interaction. This coloration was usually in the low- to mid-frequency range, approximately 40Hz to 800Hz. Virtually all rooms that were measured displayed multiple narrow-band resonances. Peaks of 6dB to 10dB, which were only 1/10-octave to 1/3-octave wide, were common.

Using precision parametric equalizers to alter the electrical response by the precise inverses of the acoustic response anomalies yielded remarkable results. A typical subjective reaction to the corrected response was a reverberant field. Rooms were said to be "drier" and intelligibility factors, especially of podium and lavalier microphones, rose dramatically. Levels before feedback increased. RT60 measurements showed significantly less reverberation without the loss of full-range system response from the usual methods of restricting bandwidth via less specific equalization, such as 1/3-octave graphics.

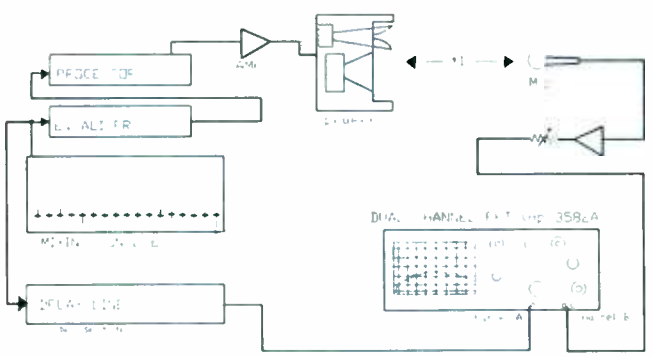
After the empirical data was collected and collated under a wide range of conditions, a basis was formed for the validity of the technique. The conclusion was that by attenuating the energy at those specific frequencies where the room had natural resonant modes, an operator could significantly and perceptibly decrease the overall resonance of the room without adversely limiting the frequency response of the system.

The effectiveness of the technique was a function of the following four factors:

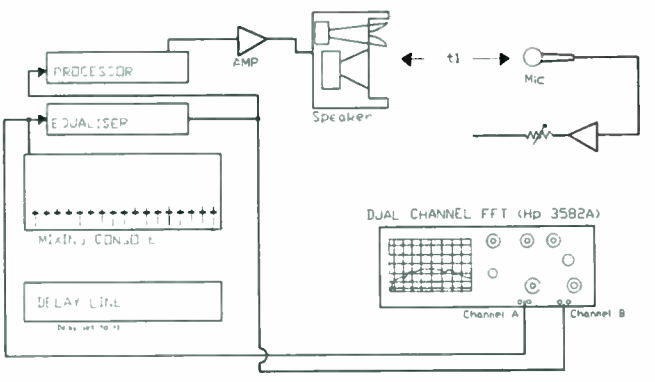
- *The characteristics of the reverberant field.* This affects the potential for altering the perceived reverberant characteristics of the room. If the reverberant field is reasonably flat with smooth high-frequency roll-off characteristics, the ability to alter the room sound by equalization of the system (without adversely affecting the direct sound characteristics) is not as great as in a room where the reverberant field exhibits significant peaks and dips in response.
- *The presence or absence of room resonance modes and their relative intensity.* Similar to above, rooms that exhibit strong low-frequency resonance modes that are narrow in Q, harmonically related and spaced apart by two to three times their Q factor, can be easily flattened without creating adverse side effects. Rooms which do not exhibit easily identifiable resonance modes, or where the modes are very wide, are more difficult to equalize to advantage.
- *The presence or absence of significant acoustical anomalies.* Severe acoustical problems, such as pronounced flutter echoes, discreet echoes, or radical response variations from one area of the room to another, are problematic and can be challenging to improve with equalization. Typically, some improvements are realized; however, a highly consistent sound field throughout the seating areas may be impossible to achieve.
- *The choice and placement of loudspeaker(s); i.e, the overall system design.* Just as a poorly designed room may be problematic in nature, a poorly designed loudspeaker or loudspeaker cluster may be difficult or impossible to improve with equalization. Also, the placement and focus of the loudspeakers will ultimately dictate the obtainable end results. The system design needs to be approached in a methodical and informed fashion to allow the CORREQT technique to achieve its full potential.

Methodology

A 2-port analyzer, in this case a Hewlett Packard 3582A FFT Analyzer, with its abil-



C: RESULT MODE



D: NORMAL EQ MODE

ity to compute transfer function, is used to measure the system response during initial system setup. This is accomplished by stimulating the system with the internal periodic noise source of the analyzer and displaying the signal from a measurement microphone placed in the room. This method yields rapid measurement response for quick setup because of the easily read nature of the stimulus noise signal. (Note: Periodic noise is white noise that contains timing information, allowing the analyzer to read time domain response in addition to frequency domain response.)

Typical room resonance modes can be narrow in bandwidth. Therefore, the extremely narrow, precise nature of many equalizer corrections indicated by the measurement results in raised concern about the stability of the system. Would such specific settings of the equalizers be valid as room conditions changed (such as temperature, humidity or volume of air in the room displaced by patrons)?

The 2-port analyzer again proved to be the answer. The system response is continually verifiable during actual performance, with the house full of patrons, by utilizing a transfer function computation to compare the electrical response of the program material on Channel A to that of the acoustic response (derived from measurement microphones) of the loudspeaker and room characteristics on Channel B. By averaging the data, a stable and interpretable trace is produced even with sporadic and dynamic program material as the system stimulus.

Any deviation from linear (flat) response is readily shown and can be manually corrected through the parametrics during the performance. The averaging shows the corrective curves developed during system setup, when the faster technique of using periodic noise as the stimulus was employed instead of the performance program signal.

It is important to note that the usefulness of the precise narrow band corrections that are typically employed with the CORREQT technique would be invalid, and possibly detrimental, if the results could not be monitored and subsequently altered throughout the show as conditions changed. This is because of the inevitable shifting in the room's acoustic characteristics. This happens because of the absorbency and displacement changes, along with changes in temperature and humidity conditions, when an empty room fills up.

As a practical example, during the 1990 Academy Awards ceremony at the Dorothy Chandler Pavilion in Los Angeles, a 14dB cut with a bandcenter of 70Hz, 1/6-octave wide (one of the primary resonant modes of that room identified during rehearsals) needed to be changed to a band center of 84Hz during actual performance, with a house full of patrons. Leaving this cut at 70Hz would not have helped attenuate the room resonance mode and would have created an acoustic "hole" at 70Hz.

However, by tracking the system's response and adjusting the filters accordingly, the valuable correction that has been established during rehearsal was retuned to produce the same result during performance. (Note: A typical CORREQT setup may employ as many as 50 to 60 filter points across all of the loudspeaker coverage zones.)

A validity check on the significance and usefulness of the data can be made by using the coherence function of the analyzer. This is important, because the process of acquiring valid data is a function of the coherence of the timing information between the signal arrival at both of the analyzer's input channels. One input channel is the direct line level from the board and one is from the microphones. The former must be accurately delayed to

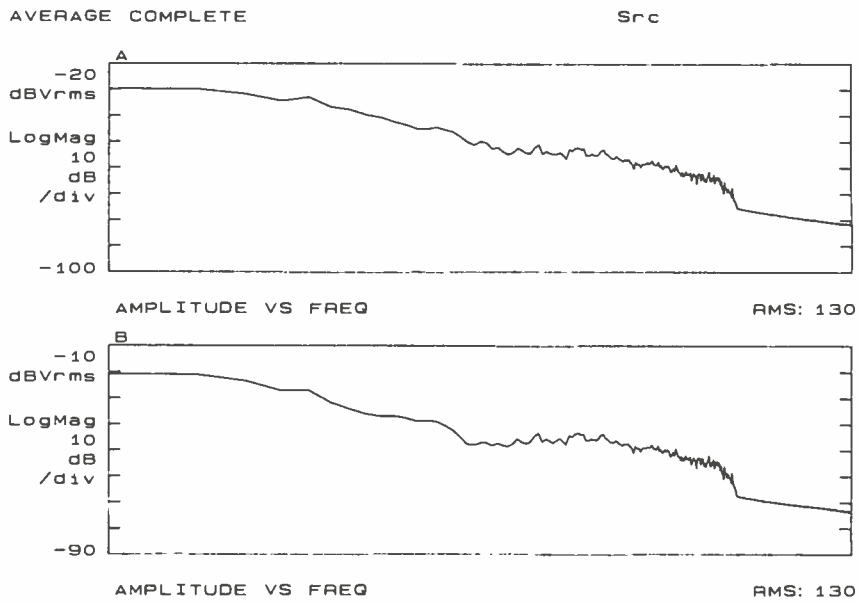


Figure 3. *Channels A and B amplitude vs. frequency response display, using program material as the source. Although an indication of the overall spectral content of the program material is displayed, the characteristic of the equalizer's setting is impossible to determine.*

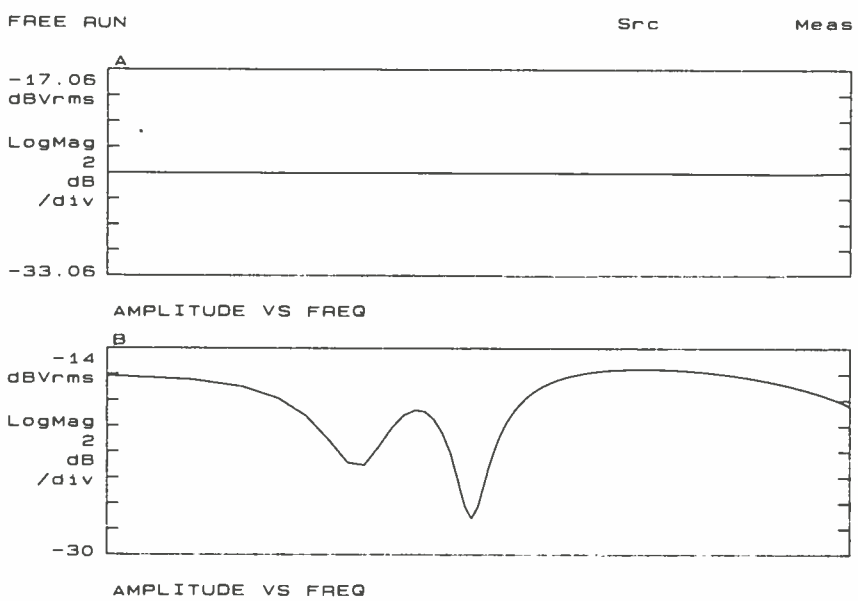


Figure 2. *Channels A and B amplitude vs. frequency response display, using a periodic noise source. Note the clean display with high resolution because of the uniformity of the test signal.*

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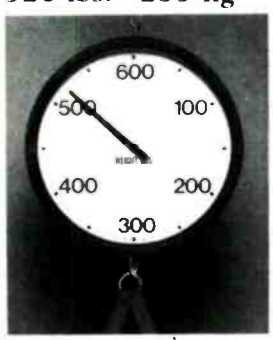

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match the transmission delay of the loudspeaker's acoustic energy, which is relative to the microphone positions.

Secondary systems

Once the main system's resonant modes have been defined and corrected, the addition of secondary or ancillary loudspeakers (side or front fills, center clusters) can re-excite, and to some extent undo, the careful work of correcting the primary system's response.

A technique was developed to deploy ancillary loudspeakers without adverse effects by locating the measurement microphone in the physical area that the secondary loudspeaker is intended to cover. A measurement is taken with this secondary loudspeaker switched off and the primary or main system on. After the response is viewed, the ancillary loudspeaker's response is shaped with the equalizer to fill in the loudspeaker's coverage zone with the frequencies not represented by the primary or main loudspeakers.

In this manner, the secondary loudspeaker system does not add additional energy to the room at frequencies not required in its coverage zone, if this energy is present by virtue of carry over or "spill."

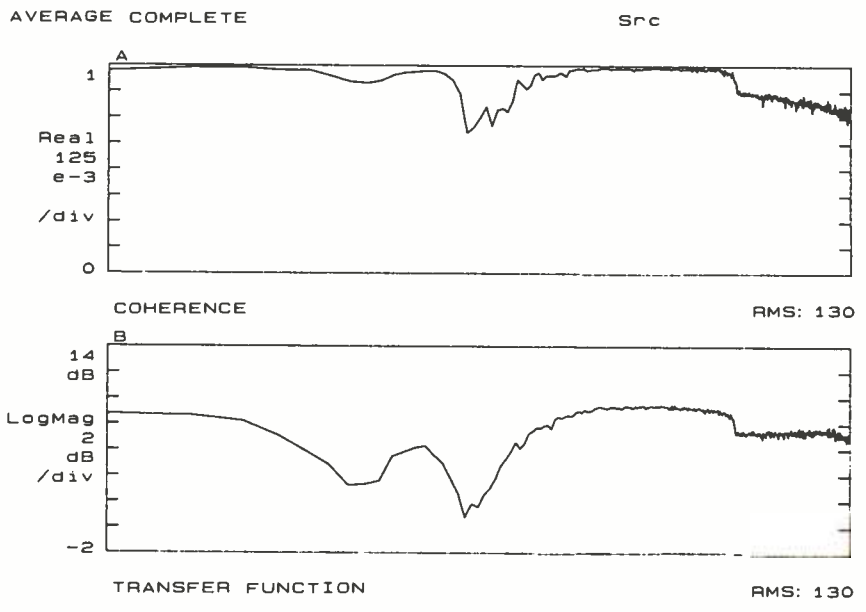


Figure 4. The coherence display (Trace A) and the transfer function display with Channel A referenced to Channel B (Trace B). The equalizer settings are easy to observe and they reasonably track the measurement made with the periodic noise source. Where the coherence is low (top trace), the accuracy of the transfer function response (bottom trace) is compromised.

System equipment

The equipment used for CORREQT consists of:

- A set of calibrated measurement grade microphones, typically one or more for each major loudspeaker coverage zone. B&K 4007 and 4011 types can be used with good results.
- A Hewlett Packard 3582A dual-channel FFT-based spectrum analyzer.
- A signal router, which accesses the inputs and outputs of the various equalizers that are patched into the system; accepts and selects the signal from the measurement microphones and routes selected signals to a digital delay unit and to the two input channels of the FFT analyzer.
- A high-quality digital delay for time/distance alignment of the source signal (typically line level at the EQ) and measurement mics.
- A computer controller that interfaces to the HP 3582A through the HPIB port. The computer allows indefinite storage and subsequent retrieval of response traces, and provides control functions for easy use.

Applying the system

A typical approach to apply the CORREQT technique to a room follows (see Figure 1):

- The normal system setup is stimulated with periodic noise or program material. The switcher is first selected to show the un-equalized room response at a given microphone location, which is usually covered predominantly by a single loudspeaker or stack covering a limited area. This is called a zone.

A mode is selected on the switcher that routes the output of the equalizer that is associated with this zone (delayed by the precise increment of the loudspeaker's transmission time to the measurement microphone), to the A channel of the FFT. The measurement microphone output is routed to the B channel input. The resultant amplitude vs. frequency trace is stored and displayed from the analyzer's memory. This trace represents the room response.

- A correction curve is manually set on the equalizer and displayed in inverted form by resetting the switcher to route the output of the equalizer to the FFT's Channel A input and the input of the equalizer to the Channel B input. The equalizer curve should be adjusted to overlay the stored room response curve. This trace is the inverted correction curve.
- The switcher is again reconfigured to display the results of the corrected system response. For this display, the input to the equalizer (again delayed by the transmission time) is routed to channel A of the FFT and the measurement microphone signal is routed to channel B. This is the corrected room response. Additional and ongoing adjustments are usually made in this mode.
- The normal, non-inverted equalizer response is then displayed as a check and to study storage purposes.

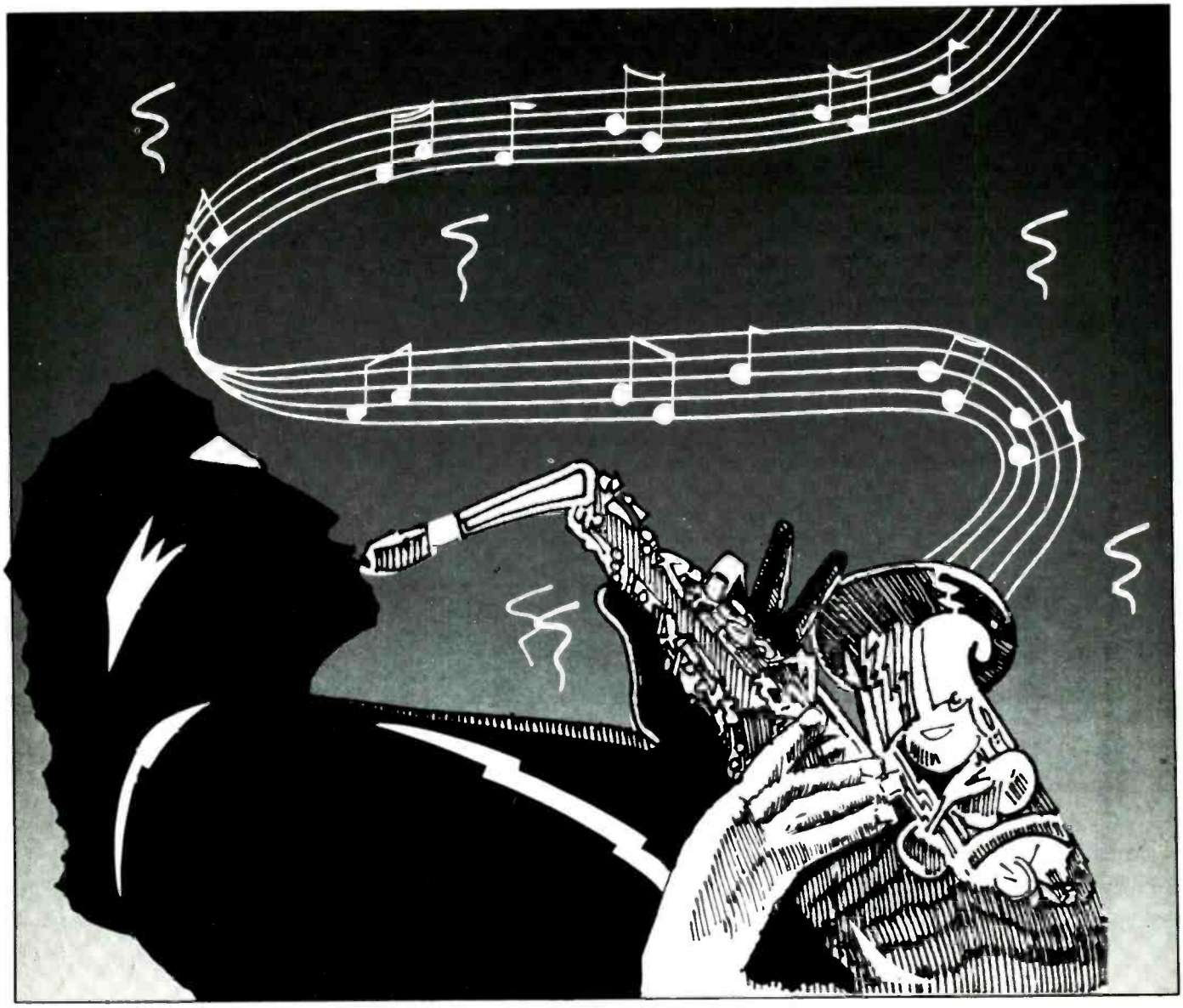
By repeating this process throughout a number of frequency spans and in the different loudspeaker coverage zones, a linearized system response is obtained. A major assumption is that there are no significant non-linearities in the loudspeaker arrays or other system components driving the speakers themselves, such as frequency, level compression, headroom limitations and pattern anomalies due to poor array combining.

The future

The power of advanced equalization techniques is starting to emerge as a star in its own right, rather than a walk-on extra. Highly visible shows, such as the internationally broadcast Grammy Awards and Academy Awards that have both used Apogee's CORREQT system for the past two years, have proven the value of having a full-time equalization operator on staff during system installation, rehearsals and the show.

The future development of sophisticated hardware and software will allow the process to be performed in a semi-automated manner, eliminating the requirement for the separate operator, lowering the labor costs and broadening the potential user base. Additional breakthroughs in hardware and software control systems will allow the process to be understood and mastered by operators who may not possess training of instrumentation usage. ■

Editor's note: Part 2 of this series, covering the Meyer SIM system, will appear in the July issue.



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HANDS ON:

Archie™

STUDIO MANAGEMENT SYSTEM

By Robert Missbach

A modern studio churns out pounds of paper everyday — everything from track sheets to cue sheets, stock orders to trouble reports, work orders to invoices. In larger studios, perhaps a dozen different people have to share data from these sources.

The studio manager may book a session by collecting data about a client (record company, independent artist or producer), scheduling a room, ordering the necessary equipment, assigning engineers and alerting them to the session requirements. The assistant engineer must log out tape from stock, keep a tracksheet for each song, keep a tape legend for each tape, fill in the daily work order with hours worked and materials used, and fill out repair requests for the maintenance engineers.

The engineers, in turn, must act on the reports, schedule and log maintenance, and order spare parts. The office manager must collate the daily work orders, prepare invoices for the time, material and equipment used, handle accounts payable and receivable, perform payroll duties and generate accounting reports.

Every studio has its own version of paper forms to carry this data, some of which have evolved over time, some adapted from other uses, others "appropriated" from another studio whose system has shown success. The end result of this paper moun-

Robert Missbach is a San Francisco-area independent recording engineer and producer whose credits include albums by Huey Lewis & the News, Santana, Journey and Michael Bolton.

tain must be toward consistent and efficient data flow, so that all parties who need the information are able to find, share, add to or delete from it.

Recently, some of these roles have been assisted by personal computers that run accounting software, databases for everything from clients to master tapes to parts and stock inventories, and other specialized applications. These are available for every computer platform: IBM and the clones, Macintosh, Atari, Amiga, you name it.

Often, the programs are manipulated by workers who were not originally hired for their computer skills, but for their administrative, technical or creative knowledge. They have, with varying degrees of success, learned to use these applications to assist in data management.

Archie is one of the first programs to attempt wrapping all of the various functions and requirements just mentioned into one piece of software. It achieves varying degrees of success.

Archie was created by John Alcock and Pete Johnson to bring all the data requirements of studio operation into one integrated computer datafile. Running only on the Macintosh platform, Archie combines the functions of every studio operation that requires a piece of paper.

Background

A musician, recording engineer, producer, film composer and studio designer who has relocated to Los Angeles, Alcock decided that the recording world needed a studio management program. Alcock's friend, Pete Johnson, who is a writer, programmer and die-hard rock music fan, introduced him to a Macintosh computer in 1984; work began on Archie in 1987. It was initially released in July 1988. There are currently more than 100 studios in Australia, Europe and the United States that have purchased Archie.

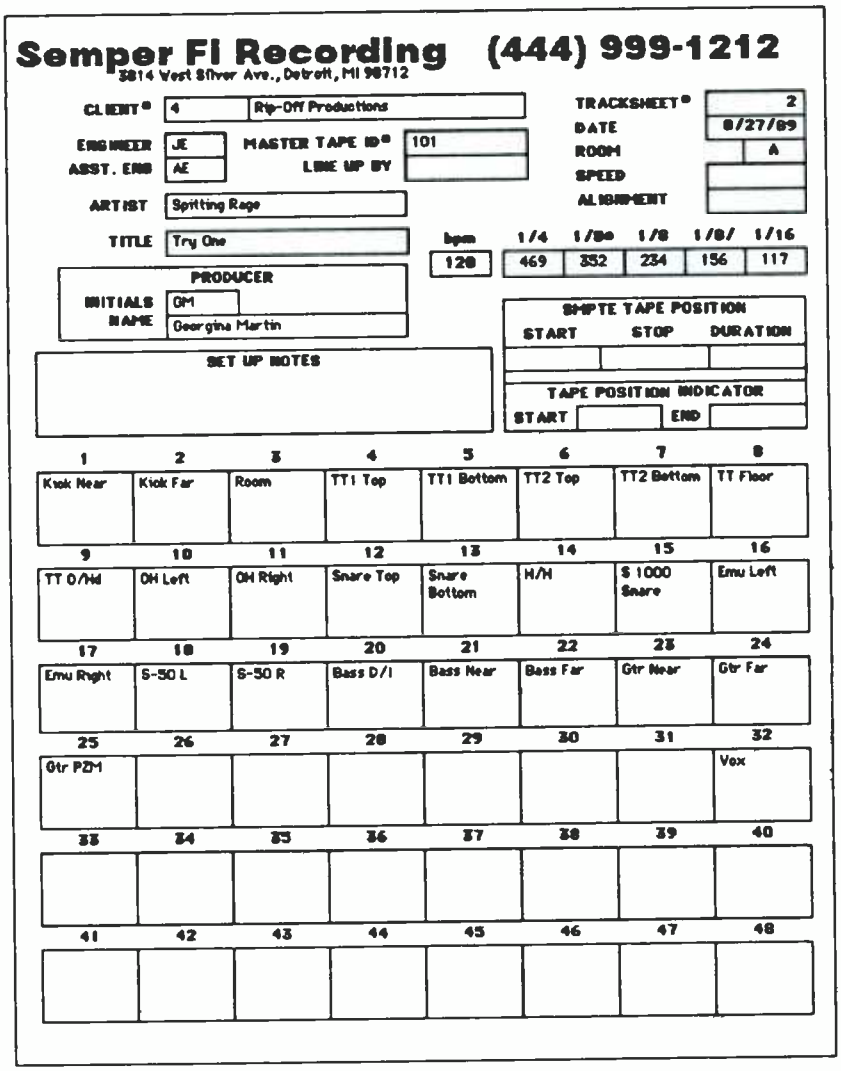
Archie is a relational database that uses the Double Helix Engine, a run-time version of a multi-user database program by Odesta. It includes 34 separate databases or relations, utilizing interconnective "hot links." Some of these relations are: Timesheets (work orders), Invoices, Stock for Resale, Master Tape Library, Equipment Inventory, Clients, Producers, Vendors, Engineers, and Accounts Receivable. These relations are used to produce more than 150 different forms, including tracksheets, song cue sheets, invoices, statements, mailing lists and various accounting reports. There are also search and warning capabilities for most of the relations.

Archie will run on a Macintosh Plus, SE, SE/30 or the II family, using System Software version 6.0.2 or later, with at least 2MB of RAM. It requires a hard disk with a minimum of 2MB free space. These platforms support either the single-user or multi-user versions of Archie and, with at least 2.5MB RAM, will also support MultiFinder. It is strongly suggested that the faster computer models or an accelerated Plus or SE be used, particularly on a multi-user installation. The program takes horsepower to run, and the faster the computer's crunch speed the better.

Archie was ambitious in its first release, incorporating most of the important pieces that are now in use. There have been nine upgrades, including a major rewrite resulting in the current version, 2.0. The most important enhancement in 2.0 is speed, which is reported to be four to 20 times faster than the original, depending on the operation. Other improvements include allowing studio staff to issue maintenance requests, establishing equipment inspection intervals, 48-track tracksheets with more fields, additional security options, refinements to report functions and a more reliable MultiFinder compatibility.

The program retails for $995 for the single-user version, and $1,325 for a multi-user package, which supports as many as four stations, with additional station copies for $150 each. This is expensive if you only want it for accounting and billing, but reasonable if you want to automize everything.

The manual is a 130-plus page binder with numerous screen-dump illustrations that details the myriad of menus and functions, interspersed with numerous "Archie Tips" and "Archie Notes." While the manual does not include a tutorial, it provides the new user with an overview of the different relations, offering suggestions for category names and numbering systems. The result is an adequate reference volume, though not especially deep in detail. Most of the text describes menu selections. However, more explanations on how to use them and how they relate to other functions would be helpful.



Sample Tracksheet. Users can put their facility names and logos at the top of the page, if desired.

Operational Observations

What Archie attempts is ambitious. In one package, it incorporates every reporting, tracking, scheduling and archiving function known to modern studio operations. Since all departments are relational, a change of data in one layout appears immediately in all reports using that data.

Most internal calculations are automatic, such as entering applicable sales taxes, totalling invoices or statements, and depleting inventories when an item is entered on a timesheet. A financial section tracks checks and deposits, reconciles statements, and produces journals and monthly reports. There are layouts for box and tape labels, mailing labels and check printing (using pre-printed check blanks).

It is probable that many studios will not employ all of the program's many features. There is a great amount of data that must be entered to make the system work, a chore that requires time and thought. To be effective, all of the studio data must be in the system.

Some glaring inadequacies are immediately evident. First, there is no way to change the layouts. Also, the number, size and placement of entry fields is not a user-definable option. While most of the forms are usable as is, the one form that is arguably the most used and most necessary in a commercial studio is the work order/timesheet. This is the point-of-sale document around which all other invoicing, inventory and scheduling must revolve.

Another fault is that Archie features only one line for entering session start and stop times. In most large, active studios, this does not reflect reality. A session usually starts and stops different activities several times throughout the day.

Archie provides three separate fields (and rate structures) for Tracking, Mixing, and Editing/Copying. These fields may be redefined as needed: Analog Tracking, Digital Editing, 48-track Mixing, Downtime, etc.; but there is only one entry line per timesheet for each of the three.

Semper Fi Recording (444) 999-1212
3814 West Silver Ave., Detroit, MI 98712

CLIENT # 1 PO# 1234567 TIMESHEET # 100

John Doe
Famous Record Company Inc.
6000 Sunset Boulevard
Los Angeles, CA 90028

(213) 555-1234
(213) 555-1190

DATE 8/28/89
C.O.D? No ROOM A
BOOKED TIME IN 10:00
BOOKED TIME OUT 22:00

PRODUCER
INITIALS GM
NAME Georgina Martin

SETUP
ENGINEER'S INITIALS JE
ASSISTANT'S INITIALS AE

PROJECT Slippery Pole

MISCELLANEOUS CHARGES
DESCRIPTION
Rental
TOTAL $100.00

STUDIO HOURS WORKED

	START	END	HOURS
RECORD	10:00	22:00	12.00
MIX			
COPY/EDIT			

SESSION MATERIALS USED

	#	DESCRIPTION	QTY
1	1	2" Analog Master Tape	1
2	5	1/4" Analog Tape	1
3	6	1/4" Digital Tape	1
4	8	C-30	8
5			
6			
7			
8			
9			
10			

SESSION NOTES

PRODUCER SIGNATURE: Georgina Martin
CLIENT SIGNATURE: Famous Record Company

Sample Timesheet, with room at the top for the facility name and logo.

Many record companies require an account of how much time was spent on a certain song. Often, producers need to track the time spent by individual performers (guitar overdubs, backing vocals, programming) for payment and credit purposes. Meal breaks and downtime should be listed for hourly clients.

There is a Miscellaneous Charges field with a single total, which can be used to gather some of these entries. However, this is a blank, unformatted field that does not self-total and is not an ideal way to log these activities. Miscellaneous Charges should be for catering, rentals and other services that are pertinent to the session. It should contain an itemized cost field and return a calculation field of these charges to appear on the timesheet and invoice for clear accounting. Archie provides no way to change this.

The use of the run-time version of Double Helix precludes user definability of layouts and fields. If users had the full developer's version of Double Helix (a costly acquisition) and were able to acquire the password from Archie's authors (an impossibility), they could change whatever they wished. But Archie was not intended to be a user-definable medium, so users must accept the existing layouts or pay a little extra to the publishers for customization. Mr. Alcock strongly resists customizing via their programmer, because it makes upgrades more difficult to distribute.

Features and Limitations:

Accounting: Archie allows only one account — a checking account. There is no petty cash fund, no additional checking accounts, or savings or credit accounts. All source and disbursement accounts are listed together; there is no separation between income, expenses, capital or credit categories. The journal report lists transactions individually, not totalled by category. There is a Monthly Subtotals by category, but it does not show totals to date, by quarter or for the year.

Statements print a list of invoices due, but not payments received. There is a feature that specifies that a payment be applied to a given invoice, but this merely removes that invoice from the list on the statement.

Lists: The databases for Clients, Vendors, Producers and Engineers produce lists, and one may "query" to extract a selective list based on criteria in the base. However, this reduced list cannot be printed nor viewed as a list, only flipped through like a stack.

Sessions: The tracksheets contain all of the expected fields, plus some helpful additions, such as a field for tempo that begets delay-in-millisecond conversions, and SMPTE start and stop times to calculate the elapsed time. However, starting a

tracksheet begins a series of forms that must be completed. A master tape log entry must be made, then a cue sheet, both resulting in a title list. These are useful documents, but very time-consuming for an assistant to perform during the session, when all he wanted was a tracksheet. There should be a way around this.

Printing forms: There is no choice of type fonts. This most sacred of Macintosh conventions is unsupported. The Double Helix Engine contains only a single font, Geneva 9, which is a screen font that works passably on the screen. However, when a studio is issuing an invoice for a few thousand dollars, users might want something with a bit more class. (Note that most Postscript laser printers would substitute a laser font like Helvetica.)

Highlights

- Relational database using the Double Helix Engine.
- Includes 34 separate databases or relations, including Timesheets, Invoices, Stock for Resale, Master Tape Library, Equipment Inventory, Clients, Producers, Vendors, Engineers and Accounts Receivable.
- System requirements: Macintosh Plus, SE, SE/30 or II; System Software version 6.0.2 or later with at least 2MB of RAM; hard disk with a minimum of 2MB free space.
- Price: $995, single-user version; $1,325, multi-user package (supports up to four stations); additional station copies at $150 each.

Circle (105) on Rapid Facts Card

There is a good explanation for this, however. Arbitrarily changing fonts would wreak havoc with most of the entry and display fields, which are carefully sized and positioned within the layouts. A menu choice of fonts for some printable forms, like the invoices, would be desirable, but this feature, again, is not supported within the Double Helix Engine.

The developer whom I spoke with works within the limitations of the runtime version, although he expresses an interest in seeing an intermediate version from Odesta that might allow some flexibility.

Speed: Archie is slow. This is a computer fact of life — the bigger the file, the slower it works. Since Archie is one large relational datafile, it carries a lot of weight. The idea really is to put everything that the studio does into it. With a IIcx, it is sluggish; with a Plus, it is painful.

Unfortunately, it is not possible to "cut loose" the relational interlinks to minimize re-figure time. Note that some CAD programs, which have a similar problem in that they refresh the entire screen every time you alter or add to them, manualize the redraw function — they only refresh when told.

Wrap up

Archie tries to accomplish a lot; perhaps it attempts too much. What choices does a studio have? If every business had a resident computer wiz to develop databases, applications and the links between them, and had an accounting department versed in the latest electronic bookkeeping techniques, they would not need Archie. Many smaller studios do not have these resources and, therefore, must rely on one man's idea of how to do it. Archie might be perfect for them.

With an installed base of over 100, chances are that some find Archie to be everything they need and more. Others have needs that Archie cannot address. For them, a better choice is to develop their own program from the many applications available. They may not get everything in one package, but the separate pieces will probably work faster, easier, and allow often-needed customization and stylizing.

By all means, if you are in the market and looking, do not pass up this all-encompassing program. Realize where the compromises live, and how they may or may not fit your case. ■

Do You Know these terms?

Monitor — a reference loudspeaker system for the mixing and mastering of recorded music.

Standard — a reference from which qualitative judgements can be made.

Tracks — (noun) channels on a multi-track recorder (verb) accurately reproduces the audio qualities of another transducer.

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First Look

By Laurel Cash-Jones

A new venue

The folks at Soundcraft have come up with what I think is this year's most appropriately named product — the Venue sound reinforcement console.

The Venue has eight buses and mute control, and has seven combinations of four frame sizes with an overbridge available for the larger frames. The overbridge has standard VU meters and integrated peak LEDs.

This new console also features full 8-bus routing and six independent auxiliary sends. The mono and stereo input modules have mute group capability, which allows each channel's status to be controlled by four master mute buses for rapid resting during a performance.

There are also four dual group/stereo FX return modules with insert points and a dual matrix module to use primarily where matrix speaker feeds are used.

Circle (101) on Rapid Facts Card

I want to take you higher

QSC is introducing one of the highest power-rated amplifiers ever. The MX 4000 is rated at 750W per channel at 8Ω, 1,125W per channel at 4Ω and a whopping 1,500W at 2Ω.

With all of this power, the MX 4000 takes up only three rack spaces and represents a new, enhanced design approach for QSC. It utilizes an "open architecture" via input connectors mounted on a removable module. This module allows for interface with control systems as they develop and will be compatible with a second generation of signal processing devices that QSC is currently developing.

These new circuit designs include a built-in limiter that prevents excess clipping and acts quickly and smoothly to reduce power if the amplifier's temperature becomes extreme (similar to an electronic aspirin). Another unique feature is its rear panel, which utilizes not only the traditional 5-way binding posts outputs and XLR/barrier strip inputs, but three Neutrik Speakon speaker jacks. Two Speakons provide channel 1- and 2-speaker interfaces. An additional Speakon can be used as a single stereo pair for long speaker runs, as a bridged mono speaker output or for bi-amping speakers with a crossover.

List price is expected to be $2,798 (a lot less than an MX missile, I might add) and the unit will be available for September delivery.

Circle (100) on Rapid Facts Card

Zounds — what sounds

Dynamic Range is the first volume of a new digitally recorded sound effects library called Sonic Boom. Each Sonic Boom volume will concentrate on one type of effect and its variations. This first volume consists entirely of gun sounds and related effects, including 873 sounds from more than 30 weapons. Each effect is categorized and easy to locate.

All of these effects were recorded on DAT, transferred to New England Digital's Synclavier and Direct-To-Disk for trimming, organization and processing, then digitally mastered.

The Sonic Boom series is now available as a 12-inch optical disk to use in the Synclavier and Direct-To-Disk, and on DAT and compact disc.

Circle (102) on Rapid Facts Card

Sound Ideas/LucasFilm library

Also notable in SFX land is the new co-production deal between Sound Ideas of Canada and LucasFilm Ltd. As part of the newest release from Sound Ideas, three CDs of the best stuff from Skywalker Ranch (LucasFilm's Academy Award-winning Marin County, CA, facility) are available. The sounds included in this collection have been heard in many favorite LucasFilm productions and fall into three categories: industry, jungle animals and the sounds of the earth's elements.

At the same time, Sound Ideas is releasing three CDs to enhance its already vast library of sounds. These new discs will feature aircraft, a U.S. Navy aircraft carrier and high-performance vehicle sound effects. (I wonder who got to keep the cars.)

Circle (103) on Rapid Facts Card ■

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

Cutting Edge

Roland SN-550 digital noise eliminator

The SN-550 digital noise eliminator employs a 5-band downward expander, which reduces noise in frequency bands that do not contain the original sound without any of the side effects, such as breathing, encountered on full-band expanders. A hum cancellation circuit efficiently removes ac line noise, display buzz, and noise from dimmers. Many of the unit's parameters are automatically set up to help obtain optimal noise elimination, such as 60Hz ac line noise.

Circle (106) on Rapid Facts Card

Audio Analysts CADD console

This 64-input house console, configured as 40 mic inputs, features a 4-band full parametric EQ section on each channel. Also provided are eight stereo inputs and eight line inputs, all feeding into eight stereo subgroups that feed two stereo mixing buses. These two buses can then be assigned to one or all of three main P.A. feeds. A companion monitor console is also scheduled for introduction this year.

Circle (109) on Rapid Facts Card

Numark SA3200 power amp

The SA3200 is rated at 510W RMS into 4Ω and 1.02kW into 8Ω (bridged mono mode). The amp incorporates advanced dc-coupled bipolar technology featuring ultra-speed components for a flat-out frequency response of 20Hz to 20kHz, +0, −1dB. Specs include a slew rating of 50V/ms, a THD of .035%, and a S/N ratio of 106dB. Other features include a forced air cooling system with a thermostatically controlled 2-speed fan, a current-limiting and fast-tripping circuit breaker power switch, two independent heat sink thermal signal cutoffs and self-resetting dual thermals inside the power transformer, a 5-way binding post to accommodate bare wire and banana plug connections, a bridging switch for mono applications, LED clipping indicators and removable air filters.

Circle (107) on Rapid Facts Card

Shape Mark 10 cassettes

The second generation of Shape's Mark 10 audio cassette incorporates design and production refinements that reduce the number of internal parts while boosting performance. The Generation II retains the clear plastic shell and the "1-piece bridge" assembly introduced as part of the original Mark 10 cassette.

Circle (108) on Rapid Facts Card

Why do Jensen Transformers have Clearer Midrange and Top End?

The high frequency rolloff of a *Jensen Transformer* is optimized, by computer analysis, to fit the *Bessel Low Pass Filter* response. This means *minimum overshoot and ringing* and *flat group delay* for best *time alignment* of all spectral components of the musical waveform.

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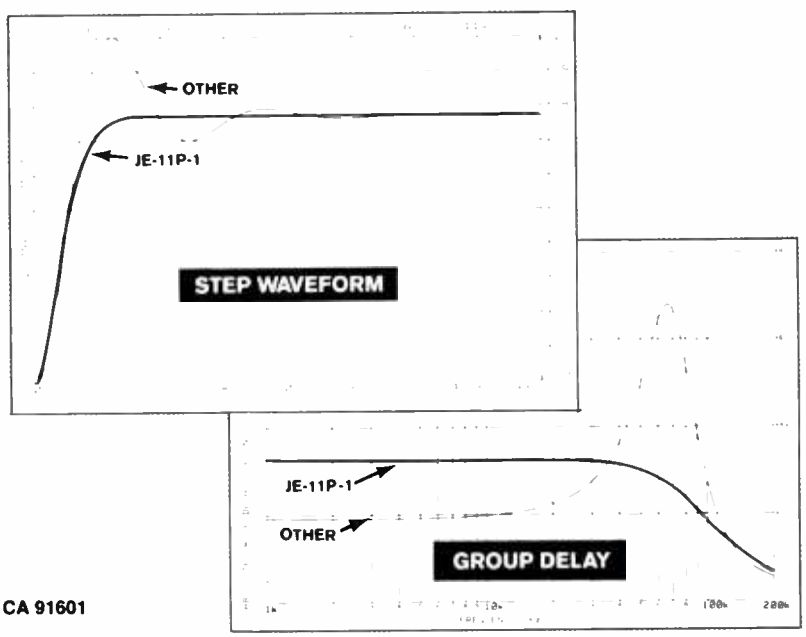

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Circle (27) on Rapid Facts Card

Cutting Edge

McManus Enterprises cable protector

The YellowJacket is a modular cable protector for location work made of Hiperthane, a patented super-resilient synthetic material. The YellowJacket's lightweight construction features a shallow-angled ramp that can be easily handled by wheelchairs, pedestrians and vehicles. Comprised of 3-foot-long interlocking sections, the protector is available in 4- or 5-channel versions, each capable of accepting a 1 1/2-inch diameter cable per groove. Larger models are available.

Circle (144) on Rapid Facts Card

Beyerdynamic MC 742 mic

The MC 742 stereo condenser microphone is designed for all stereo, MS and XY recording configurations, and includes two double diaphragm capsules arranged vertically. The upper capsule can be rotated 360° in relation to the lower capsule to accommodate a complete range of recording techniques. Five polar patterns can be manually adjusted. A 10dB attenuation switch and a built-in bass roll-off filter are included.

Circle (110) on Rapid Facts Card

Peavey SRC mixing consoles

The SRC 1600/2400 mixing consoles are equipped with six separate aux sends for easier signal routing. Two of the sends are pre-EQ and fader; two are post-fader and EQ; and two are switchable pre-EQ and post-fader. Features include XLR balanced inputs, 1/4-inch unbalanced inputs, 60dB input gain, 3-band EQ with sweepable mid, channel-limit LED and more. The console is available in 16- and 24-channel versions.

Circle (111) on Rapid Facts Card

Peavey PRM 225 monitor

The PRM 225 2-way phase-referenced studio monitor features a 4Ω impedance, two 5 1/2-inch woofers, one 1-inch tweeter, 3kHz crossover frequency, response linearity of 72Hz to 18kHz ±3dB, and sensitivity of 91dB SPL. Suggested list price is $249.

Circle (112) on Rapid Facts Card

Alan Gordon Enterprises audio power supplies

The company has introduced two power units. The Lavalier Power Supply, designed for use with the Sennheiser MKE-2 or TRAM TR-50 lavaliers, features a supply unit equipped with a Vega-compatible Lemo connector. The 12-120 Mini Inverter is designed as a means of powering ac mixing panels and other equipment from 12V batteries. The unit converts 11Vdc to 15Vdc to clean 115Vac, ±5%, and provides continuous power up to 100W.

Circle (113) on Rapid Facts Card

Hill rack mixers

The MINImix, the MULTImix II and the OMNImix are the newest additions to the Hill Audio series of rack-mount mixers. The MINImix, designed for sound reinforcement, features a large number of in-

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Circle (29) on Rapid Facts Card

puts and aux sends. Suggested list price is $1,699. The MULTImix II is the updated version of the original MULTImix, claimed to be the first 19-inch rackmount console to offer 16 inputs. The MULTImix II lists for $2,499. The OMNImix has 28 usable inputs, eight subgroups and features a 3-band EQ with mid sweep, four aux sends, four stereo inputs with 2-band E.Q., eight panable aux returns and 100mm alps faders. List price is $4,499.

Circle (115) on Rapid Facts Card

Polydax PR 11 HR 40 speaker

The PR 11 HR 40 features an exponential paper diaphragm that allows the driver to sustain a clean, smooth frequency throughout its operating range. This 4½-inch midrange, which is designed with a 2-layer copper voice coil based on a 1-inch aluminum former, produces a sensitivity level of 97dB 1W/1M.

Circle (116) on Rapid Facts Card

Soundtracs Quartz console

The Quartz console, previously introduced under the project code name PCX, is currently in production. Quartz is a 24-bus in-line console with computer mute automation of channels and auxiliaries. Because of the in-line design, it is narrower than traditional split consoles with comparable inputs. It features a stereo aux and 4-band all-sweepable EQ. Options include stereo inputs, additional effects return inputs, and frame sizes to accommodate 32 and 48 modules.

Circle (117) on Rapid Facts Card

Hollywood Edge FX library

The Hollywood Edge Premiere Edition is a 20-CD sound effects library featuring more than 1,500 wide-imaging sound effects. Recorded primarily on DAT and edited on the AMS AudioFile in full spectrum stereo, it is cross-referenced and indexed.

Circle (118) on Rapid Facts Card

Microsound direct-to-disk recording system

Jointly introduced by Eltekon Technologies and Micro Technology Unlimited, Microsound is a 2- or 4-track digital recording system for music recording, CD mastering, sound effects triggering and post-production. Features include digital sound storage; SCSI-based archiving to tape or optical disk; 2- or 4-channel stereo; 2-channel plus 2-channel AES-EBU; five crystal sample clocks, which provide 8kHz to 48kHz sampling in 15 sample rates; phase linear tracking filters; real-time DSP processing expandable to 2MByte memory; external sync to 12 channels or more; simultaneous 18-bit output, 16-bit input resolutions; and 64× A/D oversampling for undetectable distortion. The system is available for AT bus computers as an upgrade; a complete system is also available in a 5-space rack-mount with optional rack-mounted Eltekon hard drives and monitor.

Circle (124) on Rapid Facts Card

Intersonics Bass Technology Series

The Bass Technology Series subwoofers are based on the ServoDrive operating principle, which replaces the traditional magnet and fragile voice coil with a high-speed, extremely responsive rotary motor, drive shaft and active cooling system. The Bass Tech 7 subwoofer features more than twice the output of previous SDL (ServoDrive Loudspeaker) models from Intersonics.

Circle (114) on Rapid Facts Card

Electronic Media CD RackPack

Electronic Media International's CD RackPack is a CD package/rack made of recycled and recyclable rigid plastic. Featuring a double-sided viewing area, the package is designed to protect CDs during mailing.

Circle (143) on Rapid Facts Card

Apogee F1/EIAJ enhancement

The F1/EIAJ enhancement system is designed for Sony PCM F1s and other EIAJ-type digital audio processors. The system provides improved A/D conversion because of an analog input board that features the 924 series ultra-linear phase low-pass filters. A digital output board provides AES/EBU or S/PDIF outputs to an external D/A system. Modifications for the 501, 601 and 701 EIAJ processors, as well as the Sony 1000 and 2500 DAT recorders, are also available.

Circle (122) on Rapid Facts Card

Shure L2 transmitter

The L2 handheld transmitter, the most recent in the L series of wireless microphone products, is available in three versions. The L2/58 features Shure's SM58 microphone element. The LS/96 incorporates the condenser used in the SM96. The L2/Beta 58 features Shure's Beta 58 element. Any of the three elements can be used with the same L2 transmitter. Prices range from $532 to $748.

Circle (125) on Rapid Facts Card

T.C. Electronic delay lines

The TC 1280 stereo digital audio delay and the TC 1380 multitap digital audio delay use the same technology as the 2290 sampler. They operate with a processor time of 30ms and enable the operator to enter delay time in meters or feet. Both units have XLR-balanced input/output and relay bypass.

Circle (137) on Rapid Facts Card

Bruel & Kjaer CD

Recorded using the Series 4000 microphones, Bruel & Kjaer's limited edition CD showcases 69 minutes of music. The 18 selections cover a broad spectrum of musical styles, including pop, jazz, classical and folk.

Circle (140) on Rapid Facts Card

Digidesign Q-Sheet upgrade

Q-Sheet A/V 2.0 is the upgrade for the MIDI/SMPTE automation program that adds integration to the Sound Tools digital recording and editing system. Version 2.0 provides two independent tracks of digital audio that can be added to MIDI events, all synchronized to SMPTE. With 2.0, digital recordings can be much longer than sampled sound triggered from digital samplers, and it provides a method to add dialog or acoustic instruments to a MIDI/SMPTE system. List price is $995. Registered Q-Sheet A/V users can upgrade for $50. Sales of Q-Sheet, the predecessor to Q-Sheet A/V, is being discontinued, and registered Q-Sheet users can upgrade for $395.

Circle (141) on Rapid Facts Card

Cutting Edge

AKG Acoustics DSE 7000 workstation

The DSE 7000 includes an 8-track digital recorder, a 10-input mixer and a 2-track digital mixdown. The DSE 7000 employs 16 bit 4× oversampled D/A converters, sampling rates of 32kHz, 44.1kHz and 48 kHz, and a RAM card with 4.4 minutes of audio storage.

Circle (135) on Rapid Facts Card

Killer Tracks production library

A spinoff from the Hollywood facility HLC/Killer Music, Killer Tracks is a digitally recorded/mastered production music library available on CD or DAT. The initial library consists of 30 compact discs and contains more than 1,900 selections of music beds for jingles, promos, A/V and multimedia production.

Circle (119) on Rapid Facts Card

Beyer HM 560 mic

The HM 560, a dynamic vocal headset microphone, is designed for musicians who play an instrument while they sing. It features an adjustable boom for placement in relation to the performer's mouth. The microphone can be situated on the right or left side of the head, depending on the performer's preference.

Circle (123) on Rapid Facts Card

Lexicon 300 digital effects system

The 300 digital effects system incorporates new algorithms and proprietary digital signal processing circuits, as well as a time code reader, stereo pitch shifting and delay effects. A 5-entry event list includes a time code value and a set-up number. The 300 has universal connectivity through AES/EBU and EIAJ protocols.

Circle (133) on Rapid Facts Card

New England Digital PostPro SD

The PostPro SD workstation, a combination of Synclavier sound design capabilities and Direct-To-Disk recording and editing skills, is a 24-track recorder/editor that provides eight Synclavier outputs and up to 16 tracks of disk recording. It enables operators to make cuts, substitutions and changes in the final mix. Options for the PostPro SD include a 2Gbyte optical disk storage and retrieval system, 50% to 200% time compression and expansion, MIDInet, CMX Autoconform and EditView software, an enhanced Synclavier velocity/pressure keyboard and a DESC controller/editor/locator. The Postpro SD is priced under $130,000.

Circle (134) on Rapid Facts Card

Pearl Microphone TLC 90 mic

A cardioid condenser mic, the TLC 90, is designed for vocals and instruments. Requiring 30V to 48V of phantom power, the mic features an internal shock-mount of silicone rubber to reduce noise and vibration.

Circle (121) on Rapid Facts Card

NVision NV2000 multiplexer

The NV2000 is a digital audio multiplexer designed to support and simplify multichannel audio interconnection requirements. It provides 20-bit encoding and distribution capability for multiple channels of program audio with 110dB S/N in a studio environment. It can be upgraded to carry eight channels with analog or digital references. Prices for the NV2000 begin at $7,000.

Circle (146) on Rapid Facts Card

E-V high-frequency reproduction systems

Electro-Voice has released two broadband high-frequency acoustic summation systems for a pair of compression drivers. The N/DYM1/2MT and the DH1A/2MT are comprised of two drivers with an MTA-22 adapter, which offers a standard exit that mates to all E-V Hp-series horns. Both have a 1-piece titanium dome diaphragm and suspension and are protected from high-power damage.

Circle (126) on Rapid Facts Card

Soundtracs Sequel

The Sequel sound reinforcement console features input channels with a 4-band parametric EQ and high-pass filter, nine auxiliaries, four LEDs and four mute groups. Each output group has eight metric sends. All signal buses are electronically balanced to reduce crosstalk and provide noise specification.

Circle (127) on Rapid Facts Card

Tannoy close-field monitor

The NFM-8 (DMT) close-field monitor incorporates an 8-inch dual concentric driver in a ported, medite enclosure that offers solid bass reproduction. It features a roll-surround design that maximizes acoustic radiation from the cone's piston action while minimizing acoustic interference from the surround.

Circle (147) on Rapid Facts Card

Klark-Teknik delay units

Klark-Teknik has released two stereo delay units. The DN726 is a stereo delay line that accepts two inputs and provides stereo, in-phase outputs. The frequency response is 20Hz to 20kHz, and the delay range is 0 to 1.3 seconds in 20ms increments. The DN775 is a stereo mastering preview delay, which provides a 2×2 input/output configuration. It has a frequency response of 20Hz to 25kHz and a delay range of 0 to 5.55 seconds in 16ms increments.

Circle (130) on Rapid Facts Card

Carver power amplifiers

Carver has introduced six new professional power amplifiers. The PM-120 and PM-300 are 1-rack space designs with 60W and 150W per channel, respectively, into 4Ω. The PM-600 and PM-900 magnetic field amplifiers are rated at 300+300W and 450+450W into 4Ω. The PM-1200 and PT-1250 (the "PT" stands for professional touring) have 600W and 625W per channel into 4Ω.

Circle (136) on Rapid Facts Card

Vega Q-Plus update

The updated version of the Q-Plus wireless intercom system features an improved range and intelligent squelch circuits for its QX-6A base station; the QTR-2 wall-around units include improved receiver/transmitter RF performance and an enhanced limiter for an improved S/N ratio. A local sidetone is also available for direct QTR-to-QTR operation, and headsets feature increased volume capacity.

Circle (142) on Rapid Facts Card

Digidesign Sound Tools for Atari ST

Atari Sound Tools from Digidesign is a hard-disk based digital audio recording, editing and playback system for Atari Mega ST computers. Originally developed for the Apple Macintosh, there are more than 1,200 Sound Tools systems installed worldwide. Each Atari system includes a computer card for the Mega ST2 or ST4, an external A/D-D/A converter and the computer software. The system allows the user to record two tracks of high-fidelity sound directly to any Atari hard disk drive. Recording length is limited only by drive capacity. Editing features include fast non-

destructive playlist editing, time compression/expansion, digital EQ and mixing/merging, and cut/copy/paste style editing. Digital recording and editing are supported by Digidesign's optional DAT I/O bi-directional digital interface. SMPTE synchronization is also supported. List price is $2,995.

Circle (148) on Rapid Facts Card

Jensen/Hardy TSMP

The Jensen/Hardy Twin Servo Microphone Pre-amp (TSMP) is a re-engineering version of the Twin Servo Dual 990 Mic Pre-amp. This new unit features built-in LED metering with switchable VU or peak characteristics; compact 1¾-inch rack-mountable chassis with two or four channels; redesigned dc servo circuitry for lower distortion; improved input and output transformers; and improved, scratch-free pots.

Circle (128) on Rapid Facts Card

Eventide sampler for H3000 Ultra-Harmonizer

The HS322 internal sampling board adds 16-bit, 44.1kHz sampling to the H3000's list of audio processing tools. The base version of the HS322 stores 11.8 seconds of stereo or 23.7 seconds of mono samples in RAM. Expanded-memory versions of the internal sampling board are available with longer sampling times. The H3000's sampling software can address up to three minutes of mono sampling. The HS322 stores two samples in RAM and outputs two independent mono voices or one stereo voice.

Circle (145) on Rapid Facts Card

BSS DPR-504 noise gate

The DPR-504 4-channel noise gate is designed to clean up multimiked drums or percussion setups and eliminate spillover from backline instruments and monitors. It is also used in live sound mixing to highlight instruments, and in the studio to eliminate room reverberations. The operating controls include a key filter frequency, variable between 30Hz and 20kHz center. Key filter width is variable between 0.5 and 10 octaves, threshold is variable between +20dBV and −50dBV.

Circle (131) on Rapid Facts Card

Klark-Teknik signal processors

Klark-Teknik has introduced four signal processors. The DN500 dual compressor/expander/limiter is a 2-channel processor that can be used independently or linked for stereo operation. The DN504

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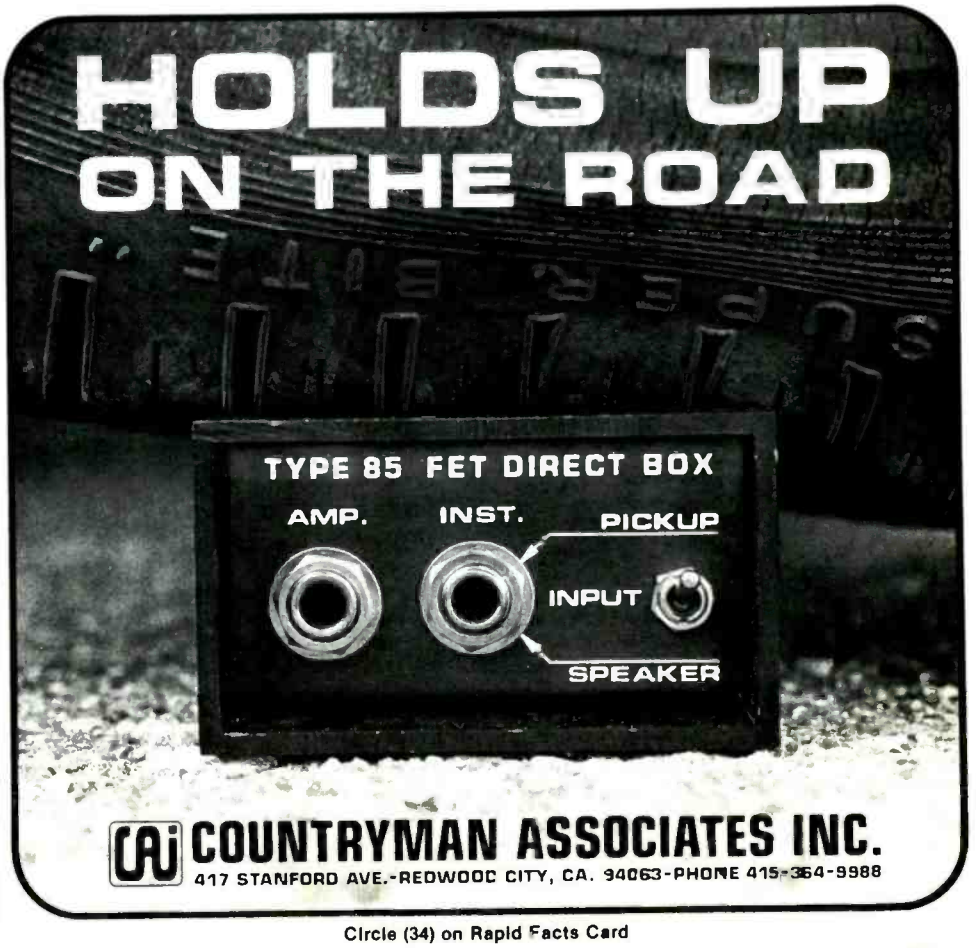

Circle (34) on Rapid Facts Card

Cutting Edge

quad compressor/limiter contains four compressor/limiters in a single rack space, each with complete function control. The DN510 advanced dual noisegate can be operated as a dual mono system or a stereo unit. The DN514 quad auto gate is a 4-channel noise gate in which each channel has two automatic attack settings for fast setup and attack time response.

Circle (132) on Rapid Facts Card

Eltekon mass storage systems

Eltekon Technologies has three new products in its line of mass storage systems for samplers, computers and direct-to-disk recording systems. The MX-2 is a rewritable optical disk with a capacity range of 650Mbytes to 1Gbyte on a removable 5¼ cartridge. The TX-2 is a tape back-up system with a storage capacity of 2.2Gbyte on one 8mm tape, with a data transfer rate at 246Kbytes per second. MicroSound is a direct-to-disk recording system for IBM 386 systems.

Circle (120) on Rapid Facts Card

Panasonic SV-3900 DAT recorder

The SV-3900 Pro-DAT recorder features a fully implemented serial control interface for external remote operation of transport and programming modes that require few front-panel controls. It also has a remote controller with keypad, a horizontal cassette tray, and balanced inputs and outputs.

Circle (129) on Rapid Facts Card

Lexicon MRC application notes

Continuing with the series, "Applications: Tips, Tricks, and Techniques," Lexicon has published four new documents designed to assist users in tapping the power of the Lexicon MIDI Remote Controller. The first addresses interactive improvisation and alternative performance techniques using the MRC, LXP-5 and a keyboard. The second deals with MIDI, mixing and the MRC. Both documents were written by Thomas Dimuzio. The third and fourth, written by Paul Lehrman, deal with MRC setups for the Kurzweil 1000 synths and Yamaha synths, respectively.

Circle (139) on Rapid Facts Card

Yamaha monitor loudspeaker system

The MS60S monitor speaker system is a compact powered 2-way loudspeaker with an 8-inch low-frequency speaker and a bullet-type high-frequency unit. It has three inputs and a built-in power amplifier. It features YST, which is designed to use a negative output impedance amplifier, yield extended low-frequency response and improve sound quality. Suggested price is $575.

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Publications

1990 Nashville Hotline Creative Sourcebook

The third edition of the *Nashville Hotline Creative Sourcebook* is now available for $30. The sourcebook is comprised of contact names, phone numbers and addresses for Nashville companies that provide services for the music, film/video and advertising industries.

Circle (152) on Rapid Facts Card

APRS UK recording guide

The *APRS Guide to Recording in the UK, 1990*, the APRS' annual members directory, presents comprehensive information on 113 professional sound recording facilities of various types located in the United Kingdom. Separate sections for post-production operations, mobiles, affiliates and full-member studios are included. Introductory articles, maps, photos, and a list of all APRS studio and manufacturing members are featured as well. The guide is available for $12.

Circle (153) on Rapid Facts Card

Fluke/Philips catalog

The *1990 Fluke and Philips Test & Measurement Catalog* is now available from Fluke. The 536-page catalog includes information for more than 650 products, accessories and software programs. Features include 20 new products, a new rack-mount selection guide, a glossary, and an abbreviations and symbols section. The catalog is free.

Circle (154) on Rapid Facts Card

Passport sequencing book

Craig Anderton's latest publication, *Power Sequencing with Master Tracks Pro/Pro 4*, is now available from Passport and Music Sales Corporation for $19.95. The book contains 122 "power tips" for those who use the MIDI sequencers to compose and play music. Also included is information Anderton has assembled from his experience in electronic music. Sections are included that describe the basics of using MIDI, synchronizing sequencers to tape, tips for using MIDI guitar and other alternate controllers, the creative use of continuous controllers and time shifting to free-sequenced music from a "computerized" sound, techniques for automated mixing, sequencer troubleshooting, and the potential hazards of hard disk storage.

Circle (155) on Rapid Facts Card

The Tapeless Directory

Sypha, an independent digital audio consultant firm, has released *The Tapeless Directory*, which provides information on 39 available tapeless digital audio recording/editing systems; 24 systems include detailed presentations. Background information on technology and terminology is included.

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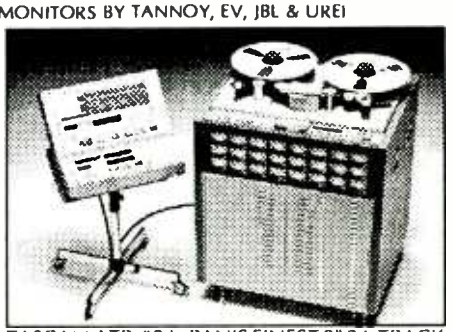

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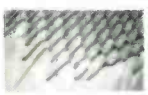

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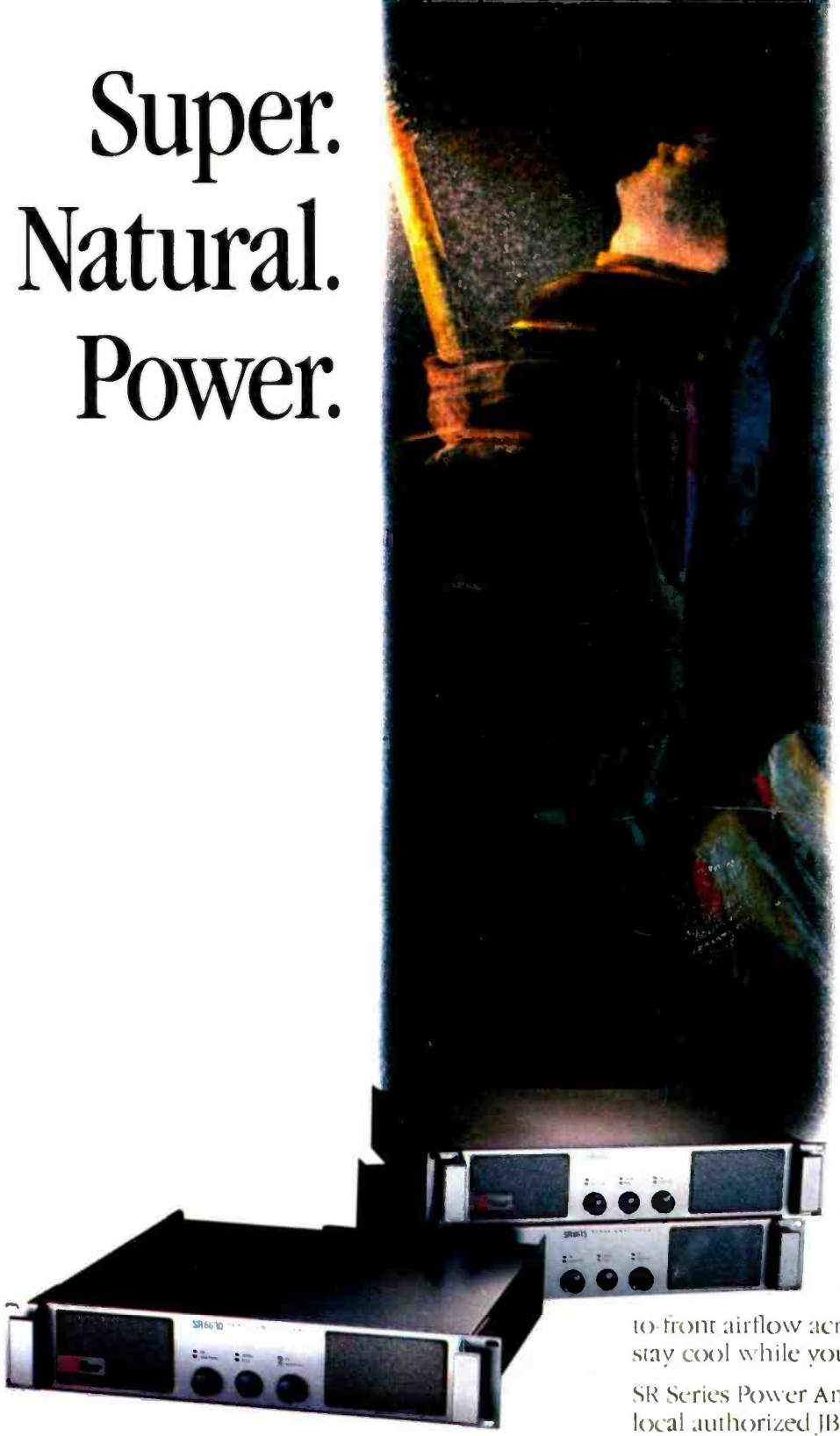

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