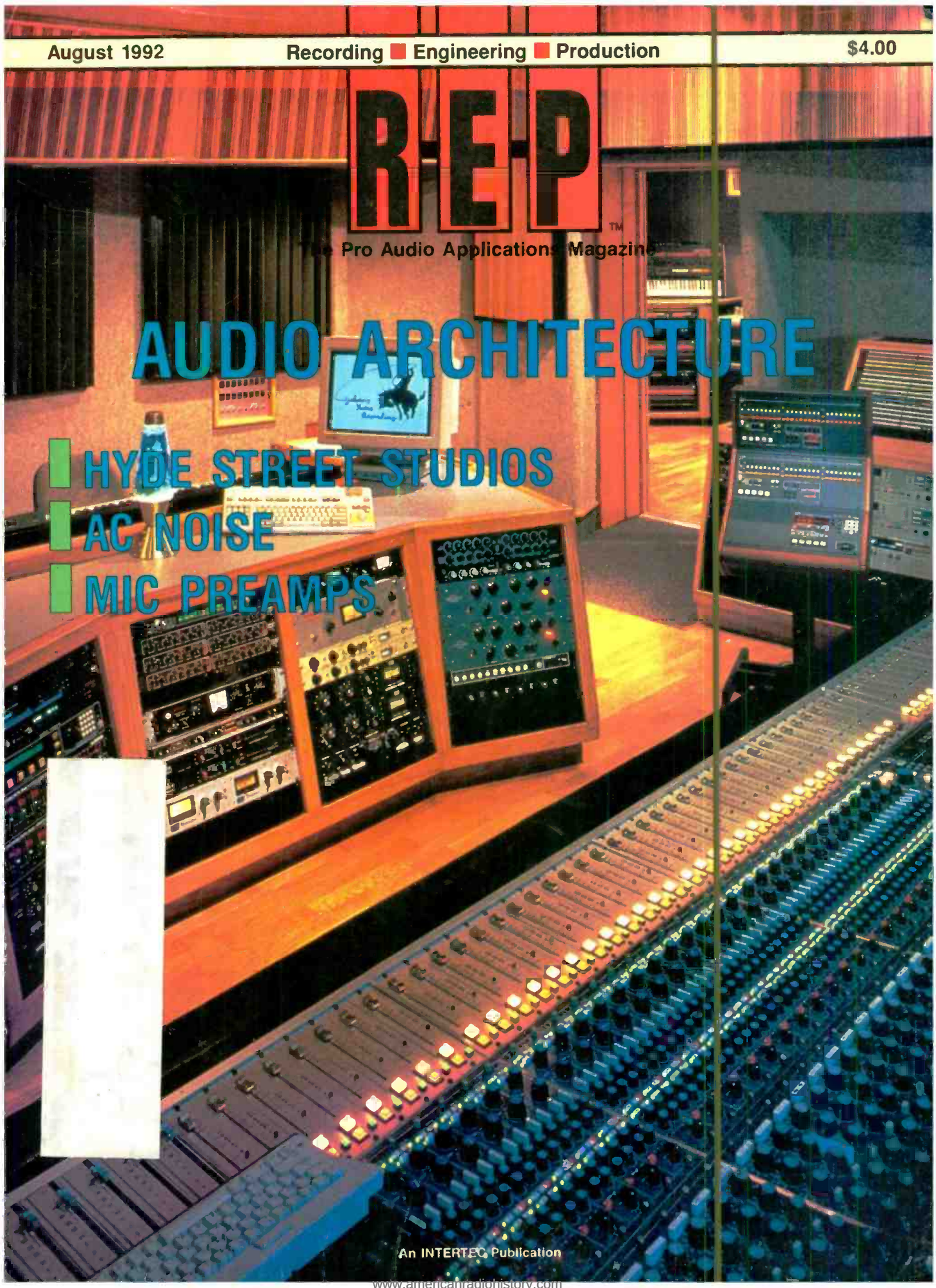
August 1992 Recording ■ Engineering ■ Production $4.00

R-E-P™

The Pro Audio Applications Magazine

AUDIO ARCHITECTURE

- HYDE STREET STUDIOS
- AC NOISE
- MIC PREAMPS



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On the Cover

Johnny Yuma Studios in Burbank, CA. Design by John Storyk and Ted Rothstein.

Audio Production

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May 1992 Issue

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EQ Magazine
February 1992 Issue

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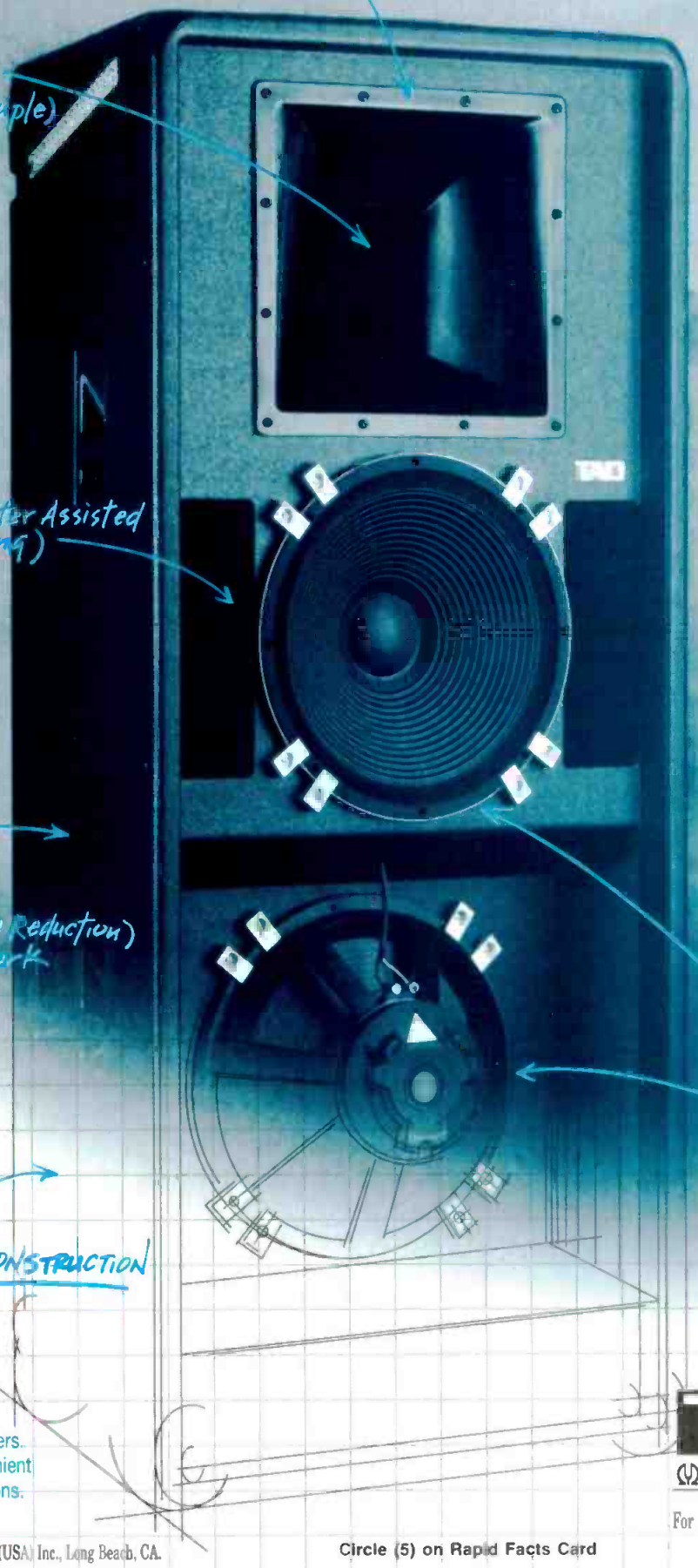

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Recording ■ Engineering ■ Production

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From The Top

What We've Learned

Audio architecture: the art and science of designing a room so that its acoustic qualities are not only aesthetically pleasing, but easily managed. Whether bright, mellow, tight or big, a studio (read: recording production space) and the associated monitoring control room should be comfortable and please all of the senses.

There are many types of production spaces and monitoring environments these days, made possible by recording technology and our better understanding of how to make rooms function more efficiently. (See this month's "Sound Business" on page 48 for a clear and concise commentary from designer Francis Daniel on that subject.) The black art aspect today has been minimized, thanks to a strong dose of science administered via TEF, MLSSA, Audio Precision and a handful of other measuring tools.

It's not unusual to see facilities that are virtually all control room, with only an iso room for the acoustic part of the recording. Thanks to near-fields and more rational mixing levels, lighter basic acoustic treatment often works fine here. No, ½-inch wallboard won't stop an SVT bottom, but not everyone cuts speed-metal grunge bands in high-rise office buildings, either.

Let's not forget that in a recording environment, there's more than acoustics involved in what makes a room work. As Francis points out, quite a few good sounds have come out of "acoustically questionable spaces."

Part of the so-called "project studio" allure lies in the innate comfort offered by living room/bedroom environments. The rugs are thick, the couches plush, and the windows are plentiful. The acoustics may not derive from Heaven, but it's what's coming through the speakers on playback that counts!

Is traffic getting in, or are the guitar blats getting out? What's bothering the little, old lady next door? Is the bottom end limited by your EQ or the rattling light fixture? Are you really hearing the comb filtering introduced by the two mics on the acoustic guitar, or by the side wall two feet from your right ear?

Every studio suffers some of these things to a degree, but with the right location, some knowledge of physics (or the presence of a good consultant), and a little bit of cash flow, these irritations be addressed — noticed, measured and fixed.

And let's not forget the most important measuring tool of all: our ears. Along with the other senses, our ears tell us, via ambient influence, that we're in a normal, comfortable environment; that things are sounding good or bad in general. They provide the "all's fine" reference point, against which we judge other sensory inputs, along with the specific sounds we hear.

With synthetic sampled sources, or upon signal playback, it's the speakers and their acoustic interaction with the space that defines our world. Fortunately — and this is a major point to make — monitoring loudspeakers have improved multifold in the past several years. If you're still cutting on the big monoliths in the wall and mixing on the little black hifi boxes on the bridge, wake up and smell the morning! Most of the small, (albeit somewhat pricey) powered 2-way monitors are simply amazing, much better than anything from five years past. Phase linearity, wave front alignment, frequency flatness, bass extension, freedom from crossover coloration, lack of high-end weirdness — all are well under control and not the weak link in the chain that they used to be. And you never thought 1920s technology could be tweaked-out so well!

Put all of these elements together in a package — the technology, the control elements, the better understanding of acoustics — and what do you have? The average audio production practitioner in 1992 has a much easier time than ever before. Where before we had the ability to get a good vs. bad sound out of an instrument in a purpose-built room, today we have the ability to get dozens of different good sounds, or the artistically bad sound, too, if we want it.

Today, we're not fighting the room, the neighbors, the monitors, and the listening environment, or we shouldn't be if we're doing it right — with our eyes (and ears) open. We have the devices and experience to get what we want. No matter if we're doing it "legally" in a commercial space, or for ourselves in a so-called project space, ain't life grand? ■

Mike Joseph
Editor

Guest Editorial

Truth and Audio

From: Mark Parsons, Parsons Audio, Wellesley Hills, MA

It was a pleasure to read Wynne Smith's recent interview with Rupert Neve (**R•E•P**, *February 1992*). Ms. Smith goes with some depth into Mr. Neve's experiences and into the principles and philosophy that guide his work. His ideas are worth noting on their merits; more so given his accomplishments through the heyday of Neve consoles, with Focusrite, and now with Amek. More than instructive, he addresses issues that underlie the work of everyone in our profession: What is perfection in audio design and reproduction? What does truth have to do with it? What do people perceive when listening? What ought to be our aspirations when developing and using equipment? With what amalgam of objective and subjective processes should we go about achieving those aspirations?

It would be nice to read further discussion of such matters in your pages. They are relevant to your readers' work: how to look and listen; how to judge; how to understand the forces that affect our choices; how best to apply the lessons of our experience; how to know and achieve what is possible; how to know what is most appropriate. Answers to such questions determine our decisions as buyers, product designers, equipment manufacturers, producers, engineers, salespeople, etc. They help determine what devices our artists use when creating and performing. They affect the quality of the sound and artistry that we help bring to listeners' ears, minds and souls. They help determine people's well-being, including our own. They are issues for us as individuals, and they are issues for audio people as a community—as people who work together.

At my company we spend our working hours helping people to buy professional audio wares—hard, soft and firm. We witness how people choose those wares. We see that the equipment evaluation processes of buyers and sellers can be less than adequate. Both may suffer from limited awareness of what choices are available. Objective evaluation processes — especially when applied to new technologies—may suffer for lack of knowledge and understanding of equipment operation, applications, specs, features, or design and construction considerations. They may depend too much upon imperfectly understood information, often as a result of inadequate education in audio fundamentals. They rely upon information that we all know tells us less than the whole story. Among other difficulties, which Mr. Neve alludes to, is that people can always perceive more than they can measure. We always suffer for want of new standards of measurement that need to be devised. Now, as at all stages of human history, the work of science is never done. Objective processes are forever in need of refinement. They are never enough.

Many of us fare no better with our subjective criteria, which can be crude at best, even irrelevant. They give too much voice to our weaknesses, to the more facile lessons of our experience: our vanities, habits, biases and attitudes; errant intuitions; intellectual laziness; comfort with outmoded technology. They give too little voice to our strengths: willingness to learn, to imagine, to seek inspiration, to explore new possibilities, to improve, especially to question our entrenched opinions. Even among experienced professionals, especially when (as now) technologies are changing dramatically, we sometimes find unnerving confusion when choosing tools — especially when assessing items like DAWs, sophisticated consoles and console automation, machine control systems, monitor speakers, converters, etc. It often seems to us that, when faced with a difficult buying decision, an honest customer is almost always a groping one (and for that reason among others — an honest salesperson is the only kind to have).

The pressure is on us all to keep learning both what is measurable and what is not. Your magazine helps, especially regarding what is measurable. But it could help more by occasionally looking deeper. To be sure, our work is more about applying ideas than questioning them. Who among us doesn't benefit from an occasional intellectual degaussing, head cleaning, search for the cold solder joints in our minds, etc.? Could R•E•P occasionally be a forum for such? Mightn't it be valuable to your readers? ■

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THE NEW H3500 *Dynamic* ULTRA-HARMONIZER®: IT PUTS DIGITAL EFFECTS IN A VERY DIFFERENT LIGHT.

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The H3500 has 22 effects algorithms: Many have set industry standards for quality and versatility in areas like pitch shifting, reverb, delay effects and sampling. Now we're setting a dramatically different course for audio processing by adding two mod factory *DFX* algorithms. Each one includes a full set of independent processing modules, from delays and filters or pitch shifters to envelopes, modulators and mixers. The modules can be patched together in any combination. Factory presets range from "ducked" delays (echoes that only appear between vocal or instrumental phrases) to choruses, flanges, even reverbs that respond instantly to a musician's touch. The H3500's *DFX* processing takes a dramatic new step beyond static effects, one that can bring tracks, performances and mixes to brilliant life.

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For looping rhythms, flying in backup vocals or replacing snares, nothing's faster, cleaner or easier than an Ultra-Harmonizer: Ask the leading engineers and producers who use one every day. The H3500 gives you all the power of Ultra-Sampling right out of the box: It has an internal sampling board, our most advanced sampling software, and either 23.8 seconds mono (11.7 seconds stereo) or 95 seconds mono (47.5 seconds stereo) of memory. Eventide's world-renowned pitch change technology gives you freedom no other sampler can match. Change playback time on the fly—without changing pitch. Or retune the sample from the front panel or MIDI, without changing playback length. Even access sample memory from mod factory algorithms for long delay loops with beat-per-minute timing. Of course, you can also use the H3500 as an ordinary sampler.

LIMITED AVAILABILITY

Clearly, not everyone can handle this much Ultra-Harmonizer power. That's why the new H3500 *Dynamic* Ultra-Harmonizer will only be available from a select group of Eventide dealers. Before you can explore the new direction in world-class multi-effects, you may have to do some traveling. But we assure you, it's worth the trip.

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Letters

HEY THERE, NEW WORLD ORDER GUY

From: Jeffrey St. Laurence, Northampton, MA

Dear President Bush and Vice President Quayle,

I am writing to you again asking for your help to make my SAFE-SOUND SPEAKER a materialized reality. It is a terrible shame when something that is needed so badly is able to be suppressed for so many years, but it is the same power that GM had over poor Mr. Tucker, and that is the same thing *they* are doing to me. (The Tucker car from Ypsilanti, MI – Mr. Tucker made it in his garage.)

Please let's make the United States of America "first" with the SAFE-SOUND SPEAKER for concerts and nightclubs, before I have to sell it off to some other country.

I have had considerable background in audio, having been resident technical advisor for the Hanley Sound Company of Boston (Medford), MA, the company that did sound for Woodstock, The Beatles, The Rolling Stones and a list too long to mention.

The fact is that I was ready to mass-produce this SAFE-SOUND SPEAKER five years ago, and that makes me sorry for young people who could have been saved hearing trouble if the funding had been located back then.

My solution to the problem involves secret, proprietary information, but concerns isolated, contamination noise that bends over the auditory hairs within the cochlea, (which) causes permanent deafness.

Please let's make the United States of America "first" with the SAFE-SOUND SPEAKER for concerts and nightclubs, before I have to sell it off to some other country.

(Isn't there anybody in America with a shred of decency left to help this man, this crusader, this erstwhile hero? - Ed.)

HONORS RECEIVED

From: Pete Welding, Cema Special Markets, Los Angeles

Thank you very much for honoring EMI Records' "T-Bone Walker: the Complete Imperial Recordings" CD set with one of the **R•E•P** Focus Awards.

I have forwarded the plaque you sent to EMI Records Group, since they were responsible for overseeing this particular repackaging series. I know I speak for them in thanking you for your kindness and generosity in acknowledging the release of this historically important material by one of the undisputed masters of black American vernacular music.

This means a great deal to me, and I wanted to drop a line of thanks to you. This is something I am quite proud of, and it's nice to know it's appreciated by others.

Thanks again for the recognition.

From: Larry Cohn, Sony Music, Los Angeles

I received your (my) Focus Award and cannot tell you what a joy and pleasure your measure of appreciation has brought to me. I sincerely hope that we can continue much in the same manner vis-a-vis forthcoming projects.

Once again, many thanks from an appreciative producer!

HUMBLE BEGINNINGS

From: Theo Mayer, CompuServe Address #73707,3342

(Digital workstations are a) Hot subject! Probably the best thing to do for the user world out there is to keep an eye out for people who have had "bad" experiences in this new recording genre. All my experiences are positive, with the simple frustration of the time it takes to load a project onto and off of the disc record systems.

Large format removable media (MagOpto) becomes a necessity if you are a shop moving quickly between client projects. We are lucky — our audio facility supports our in-house, on-line video facility so we move from project to project rather slowly. We don't have a 2 p.m. booking followed by a 4 p.m. booking.

I was part of the original team that developed TASCAM in 1973 - '76, and I helped launch Fostex in 1980. What a delightful place we have all come to!

MEASURE, DON'T GUESS

From: Jeff Pennington, CompuServe Address # 72557,3430

I've been a systems engineer/maintenance engineer for the L.A. recording industry going back to United Western Studios when Bill Putnam used to run the place. I went independent for a year and serviced quite a cross-section of studios, from garage to hi-tech. Some eight years ago, I got absorbed by channel 11 KTTV/Metro-Media, now the Fox Television Center. I continue to support Studer, SSL, NEVE and Otari post production facilities by putting out fires and fixing broken stuff when there is time.

In the recording industry we have seen the use of differential line drivers and inputs for some 10 to 15 years. These outputs, generally having a 60Ω source, pass down your audio cable into a differential input having an impedance of 10kΩ or more.

In the broadcast industry, there is a strange but common notion that 600Ω is the only way to go when sending audio down a wire pair. Any good R.F. man will tell you that you've got to match the characteristic impedance of the line, which is said to be 600Ω. In reality, most audio cable commonly in use today has a characteristic impedance of 60Ω to 100Ω.

While at first I got into a rather lively debate about what was a better methodology to transmit audio, I turned to experimentation and data compilation to arm myself with the facts. I, after all, had to convince a lot of R.F. guys who think they are blessed with a handle on physics. In addition, anybody seeing the facts then had the opportunity to present me with the data that could prove my facts wrong.

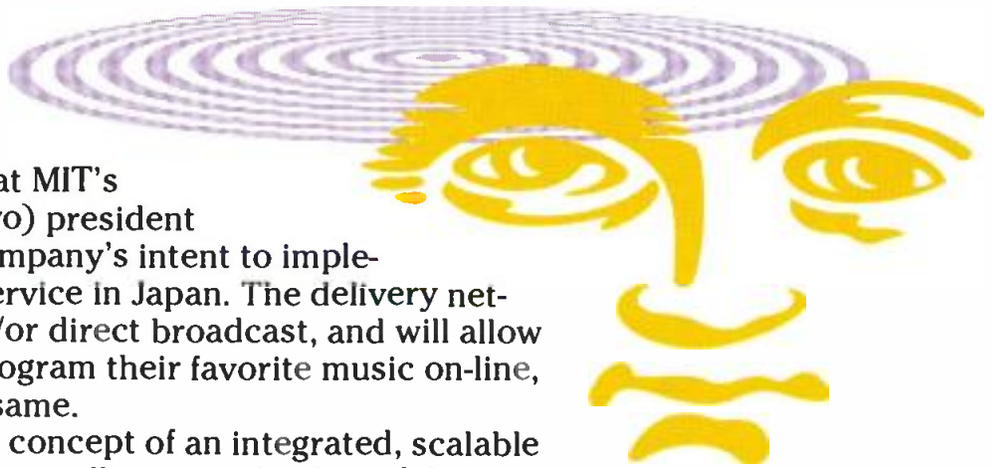
Thus, to the best of my knowledge, are these facts as true and as unbiased as I could make them. This compilation of facts has, through the wonder and curse of DTP, become a technical paper. And while the subject is definitely not new, there are still a lot of misconceptions about audio line driving even among the most knowledgable of engineers. ■

Circle (8) on Rapid Facts Card

Random Access

THE HIGH FRONTIER...

Since the early days of the digital revolution, the hope has existed that audio, video, computers, libraries, museums–pretty much the total body of human kind's creative work–could eventually be digitized and transmittable, like sensor data on the bridge of the Starship Enterprise.



To that end, a system appears around the corner for personalized radio (audio). Addressing North American media executives at MIT's Media Lab, ASCII Corp.(Tokyo) president Kazuhiko Nishi stated his company's intent to implement a personalized radio service in Japan. The delivery network may be fiber optic and/or direct broadcast, and will allow subscribers to personally program their favorite music on-line, and presumably record the same.

Nishi is also promoting the concept of an integrated, scalable digital system that encompasses all communications delivery including broadcast, CIS, telecommunications and consumer electronics devices. With personalized TV already projected for the year 2001 and the integrated realities of ultra-definition TV, photography and electronic publishing expected to follow, nearly everything we can see, hear and record is fair game.

And just think, it was only last year that your in-laws learned to program their VCR.

IS ONLY A FEW FIBERS AWAY.

On July 16, 1992 the FCC finally granted permission for every phone company to provide video signal into homes. The anticipated short-term impact of this video dial tone de-regulation will be deceleration of consumer cable fees, which have risen over 50% in the past five years.

But the mega profit potential for our phone companies is the opportunity to become the ultimate delivery system for the information revolution. Obviously such changes are not possible over night. And the system's full economic potential can only be realized after completed installation of billions of dollars worth of fiber optics switching, routing and on-line storage hardware. But mondo profits are welded to the yet-to-be-granted permission to create progamming for these on-line networks. As such, maximum impact will only occur when the phone companies are allowed to go vertical and begin programming AND delivering signal.

Destined to be an urban-first phenomena, some consumer activists anticipate the video dial tone to be a $400 billion, ten-year investment which will inevitably result in a $60 annual increase in everyone's phone bill. Unmentioned in the FCCs decison was the issue of master billing records, and the reality of a central computer tracking everything you watch, buy, plus who you talk and listen to, and what you read.

Orwell anyone?

PEOPLE

Symetrix has added **Walt Lowery** to it's customer service and information staff...**Gerald Fritz** has been appointed public relations and customer service manager at Neutrik...**Pat Maloney** has been promoted to director of Operations at Apogee Sound; Apogee also announced the appointment of **Nick McGeachin** as Director of Export Sales. McGeachin was formerly director of international sales and marketing for Intertec Publishing Corp., publishers of *R•E•P* and *S&VC;* and Apogee UK, a newly formed company designed to sell and distribute Apogee loudspeaker systems throughout the UK, has announced the appointment of **Darryl Vaughan** to the position of managing director...**Jan Hebel** was recently appointed as a field sales representative at AFA/Martin Pro Audio Group...**Prodromos Constantinou** has been named general manager for Studer Revox Canada, Ltd. in Toronto...**Roy Howell** and **Joe Ogburn** have rejoined Pyramid Teleproductions as director of engineering and chief engineer respectively. ■

TREND WATCH

TIES OFFER HOPE FOR JERRY'S KIDS

Many audio pros dislike traditional business attire, especially the constricting necktie. But now there's hope from the most unlikely source-Jerry Garcia. For about $30, even the most conservative banker can sport neckware based on fine art from the Grateful Dead's legendary guitarist. During the 1992 Democratic convention Bloomingdale's in Manhattan launched a ties-by-Jerry sales campaign–selling 853 ties the first day.

What's next – Mr. Natural cologne?

Decline of the acoustic piano

According to the Piano Manufacturers Association, fewer than 300,000 pianos were sold in the United States in 1978. Last year, only 110,000 were sold.

"Digital is completely wrong. It's a farce."
-Neil Young

From a guest editorial in *Guitar Player* May 1992:

"There's a certain emptiness in the air these days. You think that it might be today's music, because it just isn't as heartfelt as yesterday's. Everybody says, 'Well, business came in and took over and ruined music,' but that's just an excuse. The real reason is technical. It's not that people don't have souls anymore. All these bands have huge souls and can't wait to play; they just can't figure out why their albums don't sound as good as some of the things they used to hear."

Random Access

STUDIO UPDATE

Facility/Location	Details
NORTHEAST	
Effanel Music/New York City	Recently took delivery of a 52-channel SSL G series console with Ultimation for its mobile recording studio.
Kamen Recording Studios/ New York City	Upgraded three existing workstation platforms into 8-track Digidesign Pro Tools systems.
Sear Sound/New York City	Ordered a Studer Dyaxis II for studio "B".
SOUTHEAST	
Soundshine Productions/ Fort Lauderdale, FL.	Reopened under new management.
Producers Video/Baltimore	Purchased the Korg SoundLink digital audio workstation.
SOUTHWEST	
The Hit Shack, Austin, TX	Recently added a 36-input Soundcraft TS-12 console and an Otari MX-80 24-track multitrack deck.
SOUTHERN CALIFORNIA	
The Bakery/North Hollywood	Installed Yorkville YSM-1 studio monitors and Audiopro 1200 power amplifiers.
NORTHERN CALIFORNIA	
Music Annex Post Production/San Francisco	Completed upgrades with two consoles. A modified Amek Hendrix has been installed in Studio IV, and an Amek 2500 has been added to the NED-equipped Studio III.
NORTHWEST	
Bad Animals/Seattle	Opened Studio X featuring a SSL4064 G with Ultimation, two Studer A827s, a Sony 3324-A digital deck and TAD custom monitors.
CANADA	
Pizazzudio Recording Studio/Weston, Ontario	Recently acquired a Studer A827 multitrack recorder, a D&R Avalon Console with Optifile Automation and Genelec 1031A studio monitors.
GREAT BRITAIN	
Abbey Road/London	Took delivery of a 48-fader/120-path Neve Capricorn digital console for the Penthouse studio.
EUROPE	
Radio Uptown/Copenhagen, Denmark	Took possession of a DAR SoundStation II digital audio production system.
Finnish Broadcasting/Helsinki, Finland	Has added a DAR SoundStation Sigma to the new Radioioatelier production studio.
JAPAN	
Sunfield Crescent Studio/Tokyo	Purchased a 72-input Focusrite console with GML automation.

NEWS NOTES

Meyer Sound Labs announced the appointment of Group One Ltd. as the exclusive national representative for its full line of professional loudspeakers, recording studio products and SIM System II acoustical measurement system.

The **DAR Sound Effects Library** is an extensive collection of digitally recorded sound effects and atmospheres for TV and film soundtracks on SoundStation digital audio production systems. Specially commissioned by DAR, the library is a set of three magneto optical disks containing more than 600 individual sounds, which can be instantly auditioned and automatically "spotted" to picture, without searching through alphabetical lists or changing CDs. Users also have the flexibility to rename, re-group, re-order or add effects to suit their particular way of working.

CONFERENCES

The **Audio Engineering Society** will hold its 93rd convention at San Francisco's Moscone Center October 1-4, 1992.

A Digital Audio Conference will take place at Parsons Audio in Wellesley, MA from Sept. 14-16. It is intended for New Englanders who are not traveling to San Francisco for AES. The conference will consist of three days of exhibits, seminars, workshops and open discussions. Participating manufacturers include Sony, Digidesign, Sonic Solutions, Yamaha Digital, Roland, Amek, Lexicon, Apogee, Dolby, Neumann, Opcode, Panasonic, Genelec, Meyer Sound, KRK, Bryston, Fostex, Timeline, Siglech, RPG and others. For a schedule of events, call 617-431-8708.

The **1992 International Electronics Manufacturing Technology Symposium** will be held September 28-30, 1992 at the Hyatt Regency-Inner Harbor in Baltimore. For further information call (202) 457-4900.

The **"Musician's Home Recording Handbook,"** by Ted Greenwald is a how-to recording manual created for the home/project studio environment. The book includes step-by-step descriptions of advanced techniques, emphasizing concepts that apply to most recording situations while focusing on the in-home environment. The handbook is available from Miller Freeman, Inc.; 415-905-2470; fax 415-905-2239. ■

Fresh Tracks

By Dan Levitin

Ali Ryerson: "Blue Flute"
Label: Red Baron/Sony Music
Produced by: Bob Thiele
Engineered and Mixed by: Harvey Goldberg
Mastered by: Chris Herles at Sony Studios (New York)

Comments: The apparent renaissance enjoyed by straight- ahead jazz and traditional small jazz combos in recent years has spawned a great deal of good and important new talent. Ali's sense of timing is witty, her tone and improvisations outstanding. The stellar lineup includes Red Rodney on flugelhorn and Kenny Barron on piano.

Of special interest: The tones on all the instruments are mellow and smooth. There is not the slightest trace of brittleness in Ryerson's flute or Rodney's flugelhorn. The piano is panned very wide so that during Barron's solos, the left hand comps come out of the left speaker and his soloing out of the right — a nice engineering touch.

The flute/flugel unison during the head of "Asterie" creates some very interesting textures, almost as though another instrument is joining them. ■

Sarah McLachlan: "Solace"
Label: Arista
Produced by: Pierre Marchand
Engineered by: Pierre Marchand
Recorded at: Lans Westwind's house (Marin Heights); Mushroom Studio, Venture Studios (Vancouver); Karen's House (New Orleans)
Mixed by: Pierre Marchand

Comments: Members of the music press who have been widely touting Tor Amos as "the best new female singer/songwriter of the '90s" have obviously never heard Sarah McLachlan. This is not to take anything away from Amos, who is indeed a great new voice. But the depth of McLachlan's songwriting and delivery, the emotional range of her voice — smooth, whispy and powerful — outclass Amos in several dimensions. McLachlan's instrumentation is imaginative and she avoids slick, hackneyed production tricks. And while unfortunate comparisons to Joni Mitchell will inevitably be made, as they are to any literate and sensitive female singer, McLachlan possesses her own unique voice and personality.

Of special interest: The production is pop, but with the same artistic integrity that marks Daniel Lanois records (in fact, McLachlan thanks Lanois in the liners). The drums are mixed dry and Gabriel-esque tom fills set the mood in some tunes. Compression of the instrumental tracks help the vocals achieve prominence, and this is done without sacrificing dynamic range. Most importantly, the instruments are mixed in a way that frames the songs, and permits the vocals to be the centerpiece of a tastefully set sonic table. Her version of Donovan's "Wear Your Love Like Heaven" is ethereal with a hint of U2-style guitars. ■

Def Leppard: "Adrenalize"
Label: Mercury
Produced by: Mike Shipley and Def Leppard
Engineered and Mixed by: Mike Shipley
Additional Engineering: Pete Woodroffe
Executive Producer: Mutt Lange
Mastered by: Bob Ludwig at Masterdisk (New York)

Comments: Though relegated to the status of Executive Producer, the influence of Mutt "Mr. Overdubs" Lange is still felt in the Leppard's massively layered sound. Co-writing all but one of the songs, Lange also acted as consultant throughout the recording. Arguably the best-produced and largest-sounding of all hard rock bands, the sound of Def Leppard's new release is massive. In addition to layering, careful use of EQ and reverbs impart to each instrument enormous size while maintaining clarity and depth.

Of special interest: There are no outrageous surprises in the drum and guitar tones — they are fairly standard hard rock sounds, just bigger than anything else. The impressive, heavily produced vocal harmonies and layerings are a Def Leppard trademark. Following the accidental death of guitarist Steve Clark, co-guitarist Phil Collen fills in with intuitive ease. Three years in the making (!), vocalist Joe Elliot explained, "The beauty of spending so much time making a record — you can come back to something four months later and say 'that's horrible.' But with most people it's already in the shops." ■

Dan Levitin is RbEbP's music production editor.

Fresh Tracks

Megadeth: "Countdown to Extinction"
Label: Combat/Capitol
Produced by: Dave Mustaine, Max Norman
Engineered and Mixed by: Max Norman
Recorded and Mixed at: The Enterprise (Burbank, CA)

Comments: On their fifth release, Megadeth may find the breakthrough they've been waiting for. Without changing their sound, they have distilled it to its essence, writing more melodic tunes and performing them with cleaner and greater skill. As always, Megadeth has the tightest and most ferocious staccato machine gun thunk-thunk rhythm guitars to be found anywhere. (How do they get those rapid-fire digga-diggas so clean? See accompanying interview.) Mustaine's vocals are recorded more prominently on this outing, and the bass guitar is more refined, sounding less like a third rhythm guitar than on previous efforts.

Of special interest: The mixes are clear; it is easy to distinguish all the parts. The lyrics have the same type of epic literateness found in Blue Oyster Cult but with less emphasis on fictional futurism and more on alienated reality. The ominous samples of George Bush announcing "no new taxes" and "read my lips" in "Foreclosure of a Dream" are devastatingly wicked. ■

FOCUS:

DAVE MUSTAINE, MAX NORMAN, Producers, Megadeth

R•E•P: Where did you learn production and engineering?
DM: One of my engineering teachers was once a writer for your magazine, Dennis Dager — I kind of picked up stuff here and there on the way to the fifth album. Before we started recording, I went to Trevas Institute in Hollywood and took one of their 30-hour courses on engineering. It was really interesting because I learned a little of the vernacular — I knew in my head the sounds I wanted, but I didn't know the terminology associated with it. Like the inverse square law and a lot of things that brain-dead musicians didn't know anything about ...

R•E•P: How did you record the guitars?
DM: Max Norman and I set out to have the ultimate sound on guitar without having to overly layer things. There is one guitar left, one right and then a counterpount/harmony line up the middle. The left and right are me, the middle is Marty.

For amps, we have Ampegs modified by Lee Jackson, a Groove Tube Mosfet power amp, and a Boogie. Most of the rhythm guitar is through a Bogner pre-amp with a solid-state VHT2150 power amp. We also used the BBE sonic enhancer — I think what it does is slow down the high frequency so the low end and high frequencies hit at the same time. The difference between using it and not using it is substantial. I won't record guitar without it now.

R•E•P: How do you minimize guitar and amp noise?
DM: Noise gates. Also, the amps don't make any noise to begin with. We've paid attention to speaker damping, ground loops in the racks, so that the equipment is all meticulously maintained. If the speaker damping isn't perfect, it wreaks havoc with the sound because it drives the amps improperly.

With a lot of the parts we had a hard time getting performance noise to go away because we weren't prepared to record within the digital boundaries. Now we know that you have to play extra careful and extra good because there's no margin for error. By performance noise I mean placement of hand — the hub of my style is to play from my right hand — I'll rest the knife edge of my palm against the bridge with my thumb toward the pickup to kill the strings that are ringing out. A lot of times I was playing and keeping strings ringing, but I never noticed it before because we weren't recording digital. One solution we came up with was to tape off the strings I wasn't using.
MN: They have Hush units in the amps, but we switched those out because they have a little bit of an unnatural sound to them sometimes. All the guitars were put down stereo with two ambient tracks and a main close mic track. The close mic track was soft-gated with a low threshold so that it's never going to chop anything off. I did some frame accurate punches to get rid of noise using the computer, I did that for string noise, too. I didn't do that for the ambient tracks — those were left alone. That gives it a natural sound because nothing is cut off. If there was a bunch of

string noise I would have to wipe that off the ambient track as well and then cut in some ambience to fill in the hole.

The guitar miking was unusual — we used two Marshall cabinets, miked on every speaker — clockwise from the top left it was a 58, 421, 58, 421 — so they would be alternating, kitty-corner from each other. I find the 421s a little more mellow. I prefer to leave the cabinets on the floor, but we lean them back about 10 to 15°. We had a couple of 87s in the corners of the room.

R•E•P: Where on the speaker do you place the mikes?
MN: On the hot spot — I go out and put a set of headphones on listening to pink noise or white noise and the brightest placement is the one I use. This usually seems to occur if you place the microphone right where the voice coil is — that's not in the center of the speaker, it's actually an inch and a half away from the center. They were all pointed straight in, 90° on axis.

R•E•P: How do you avoid power struggles, filling the role both as producer and band member? How do you get your bandmates to trust that you're doing what's best for the band, and not just mixing your own parts louder?
DM: Up until now, as a band we've always overlooked the fact that the vocals are supposed to be heard most in the song. This is the first time we've gone into a record and I've told everybody I'm adamant that I want the vocals up. We have good musicians and it's balanced out — you can hear the ride cymbal, and the hi-hat when they're playing. Signal processing was held to a minimum, and we paid attention to parts — the bass was really simplified, for example. Before I think we were playing rhythm guitar on bass, essentially, but now Dave Ellefson has metamorphosized into the bassist we all knew he could be.

R•E•P: What kind of reverbs did you use?
MN: There is no reverb on the guitars or drums, they are absolutely the way they were recorded. On the vocals there is all kinds of stuff — the ART- SGX , a cheap box, but pretty cool. Also, delayed echo using a 480 set on fat plate. The voice and bass were recorded using Massenburg's compressor and we compressed just a little more during mixing to knock out any occasional humps and peaks using the SSL's channel compressor.

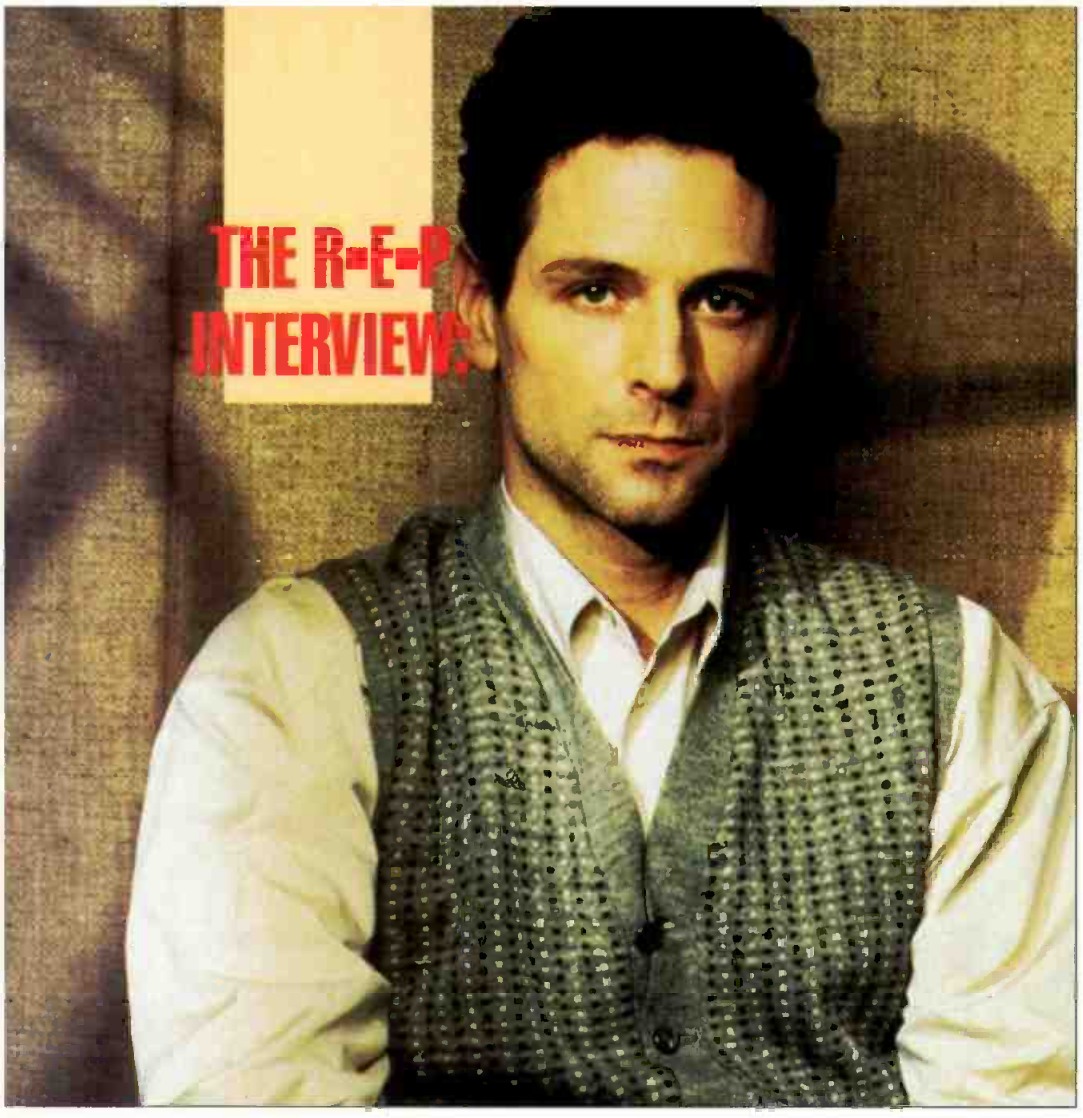
R•E•P: How did you mix?
MN: Three ways: to DAT, to DAT through a Pygmy converter and also to 1/2-inch analog on a Studer 820. I ended up using everything from the Studer — I thought it sounded better. You see, we recorded the whole album digital so there were enormous peaks. In mixing to digital we found we just couldn't just get enough on tape because there would be peaks at +12 from 0. The good thing about 1/2-inch is that it will nicely reduce all those peaks. And then of course Bob Ludwig has these marvelous compressors to smash it down into the... ■

Phish: "A Picture of Nectar"
Label: Elektra
Produced by: Phish ("with a lot of help from Kevin")
Engineered by: Kevin Halpin, Jon Altschiller
Recorded and Mixed at: White Crow Studios (Burlington, VT)
Mastered by: Bob Ludwig at Masterdisk (New York)

Comments: Phish is a difficult band to describe. The grooves on "A Picture of Nectar" range from frenetic college-radio hyperfunk all the way to casual bebop (complete with swinging ride cymbal). Most of the songs fall in between, somewhere around funky or Latin-flavored rock. The wide variety of material on this album is remarkable, especially considering the production, or lack thereof.

Rather than simulate a gigantic, high-energy rock concert, Phish has set up in your living room and played their bar set for you. For the most part, all we hear is the four members of the band, minus overdubs, extra parts, or other textural enhancement. By keeping things simple, clean, and dry, Phish has produced a tour-de-force of technical musicianship and innovative improvisation — these guys can seriously play.

Of special interest: The bass sounds on this album are fantastic: warm, rich, and round, with just enough popping, plucking and squealing to remind you what's so cool about having a really good bass player. The grand piano is somewhat plinky and Bosendorfer-like, and well reproduced. It's percussive enough to help the grooves along, yet warm and full enough to provide plenty of harmonic support. — Reviewed by Bill Copen ■



LINDSEY BUCKINGHAM: RETURN OF THE SOUL LIFTER

By Dan Levitin

As the arranger/producer behind Fleetwood Mac from 1975 to 1988, Lindsey Buckingham is largely responsible for that group's superstardom and megasuccess on the five studio albums, *Fleetwood Mac*, *Rumours*, *Tusk*, *Mirage* and *Tango In The Night*. As a songwriter, Buckingham's own compositions are some of the high points in the group's long history. From 1975's "Blue Letter" and "I'm So Afraid" through 1988's "Caroline," he consistently combines pop elements into songs with depth.

Out of the Cradle is a true solo album and finds Lindsey playing all of the instruments, with occasional assistance on bass and percussion from Larry Klein, Buell Neidlinger and Alex Acuña, and Mitchell Froom playing organ on one track. Buckingham's two greatest strengths — his abilities as songwriter and arranger — are on exhibition here. He has the ability to write songs that sound as if you've heard them before, but that hold your interest over multiple listenings. As an arranger, he brings a lot of musical ideas to his songs.

Countermelodies, harmonies and clever melodic nuggets adorn the spacious halls of his songs like fine paintings in a house. It is easy enough to pass by them and not pay attention to them. But if you stop and reflect for a moment, you'll notice that each supporting musical element is able to stand easily on its own as a complete song.

Indeed, Buckingham's talents as a virtuosic guitarist and vocalist are often overlooked, no doubt because of his sharp instinct for balancing song elements so seamlessly that none stands out and takes attention away from any other. *Out of the Cradle* is a fresh and vibrant look at pop music through the eyes and ears of one of the best pop craftsmen of the last two decades. Buckingham makes everything he does seem so effortless and so smooth that it is easy to overlook his real talents. The vocal performances here ought to win him best male vocalist grammy for 1992.

Dan Levitin is R•E•P's music production editor.

Buckingham spoke to R•E•P about the new record and his approach to production.

R•E•P: You told Timothy White in 1987 that you considered your main contribution to Fleetwood Mac as an arranger.

LB: Yes, if I were to pick one thing as my main contribution to the group, it wouldn't be as a guitar player, a singer or a songwriter. It would be as someone who could take raw material and forge it into something complete; I guess to some degree with more success than I can do with my own material a lot of times. If you heard the way some of their songs sounded in their raw state and tried to make sense out of them... My contribution was to give them form and balance these things with what they would all have to offer...

> If you can hear a sound in your head — and you can get a sense and understanding of how it might work — it's not so important what equipment you use, it's what you do with it.

R•E•P: Yes, and the thing I like best about your three solo albums is similar. It's your idea of the song as containing an enormous number of musical elements — not just the rhythm section, guitar and vocal lines, but all these other musical parts that swim in and out of each other. That sense of craftsmanship and creating something is still there.

LB: Yes, definitely. A lot of times the message is in the form of what's going on as much as anything else.

R•E•P: How do you prepare for a career doing that? Clearly, if you want to be a guitarist, you practice guitar; if you want to be a songwriter you write a bunch of songs. During the five years before your first record, how were you woodshedding and preparing to be someone who does this?

LB: Well that's tough. I started playing at such a young age. I'm 42 and I started playing when I was about six. I never had any lessons and have never been taught, and I don't read music — and that's why talking to someone like you makes me nervous because you could always tell me what I'm doing wrong!

I didn't start writing until I was 21, but having had the guitar as an appendage, in a way, was so ingrained in me, that by the time I got into the idea of listening to parts and seeing how they fit together, I wasn't also trying to overcome all of the hurdles of learning to become a guitar player. The first thing that got me into the line that I'm on now is that I went out and got a Sony 2-track tape recorder that had sound on sound, and you could bounce back and forth.

R•E•P: So you practiced multitracking...

LB: Well, since I was 21, yeah. I remember at that age going down to Eber Hi-Fi (in San Francisco) and asking, "Do you have, like, 4-track tape recorders?" and they're looking at me like, "What are you, kidding?" Because at that time something like that didn't exist. And when I finally did get a 4-track, I got an Ampex AG440 with 1/2-inch tape, which I managed to buy because an aunt that I never met left me and my two brothers a house that resold for about $40,000. We split that three ways, so out of the blue I was able to afford a $4,000 tape machine.

R•E•P: What year is this now?

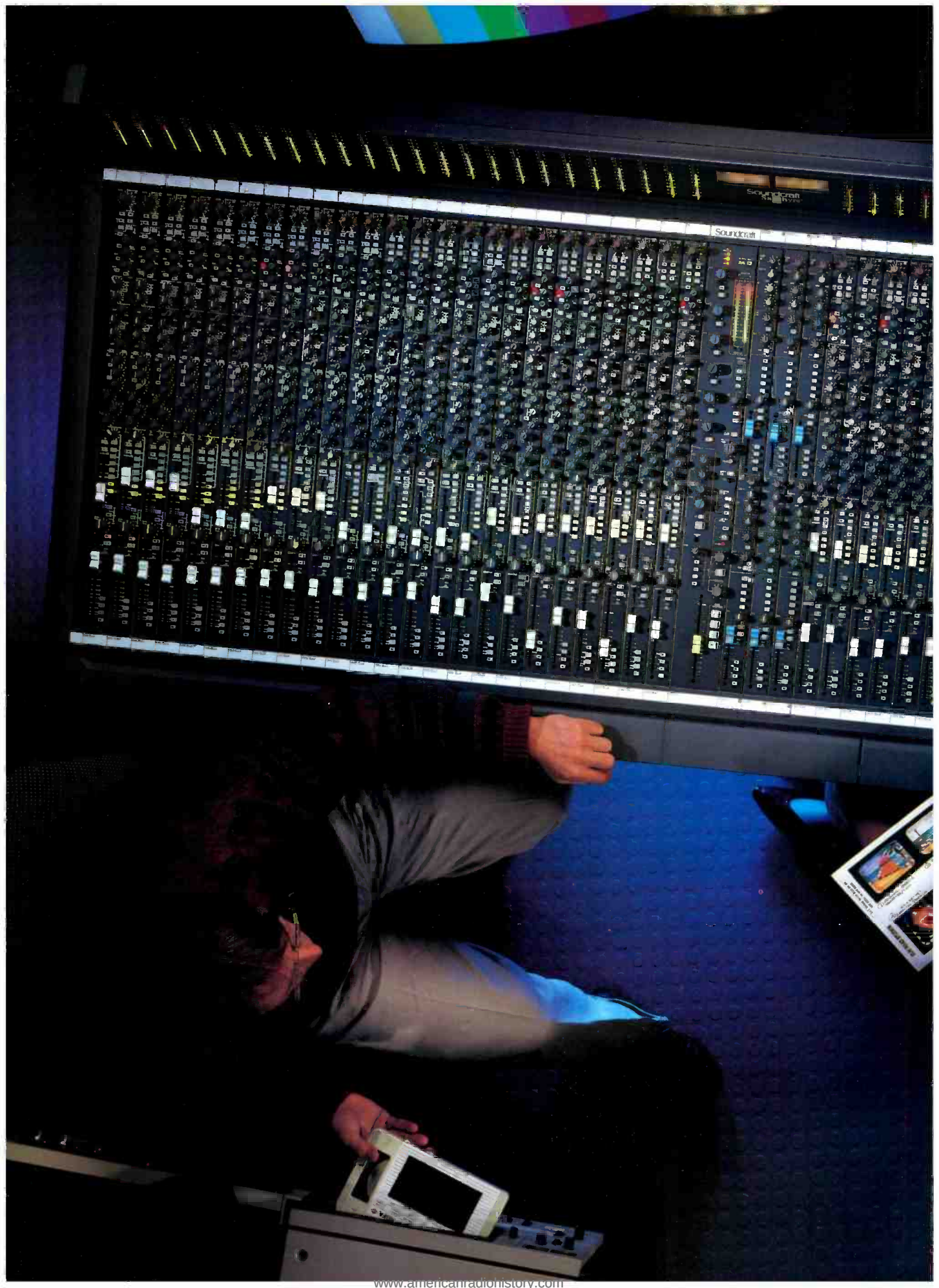
LB: 1971. So I put that up in my father's coffee plant in Daly City and every night I'd drive up after he left and I'd just work until midnight or 1 a.m. putting my own material and some of Stevie's down. And I guess that whole Les Paul sensibility really just sort of became that much more a part of me. Then you start to understand how parts fit together and the jigsaw of it all. You know, you can apply that back to a band situation pretty easily.

R•E•P: The jigsaw metaphor is very apt. In your arrangements, a part will come in and then it will stop, and you'll leave just the right amount of space — fitting like a piece of sky in the jigsaw puzzle that fills the space between the mountains you're building. Or another part will come in that locks just right. You don't have the problem of parts just not making sense together...

LB: The only problem I have... One of the things about working alone is that it becomes more like a painting where you're putting strokes on the canvas, and you may start off thinking this is your song, but by the time you're done, the canvas has led you off in a totally different direction. I guess that's as it should be, if your intuitions work correctly. One of the byproducts is that sometimes you run into a little density problem. But that's something I'm working on.

R•E•P: Did you ever as an exercise take songs that you admired and try to piece them together track by track?

LB: You mean like Todd Rundgren doing "Good Vibrations" (on *Faithful*, Rhino Records 70868) or something like that? Not really, that's pretty academic... I certainly have come



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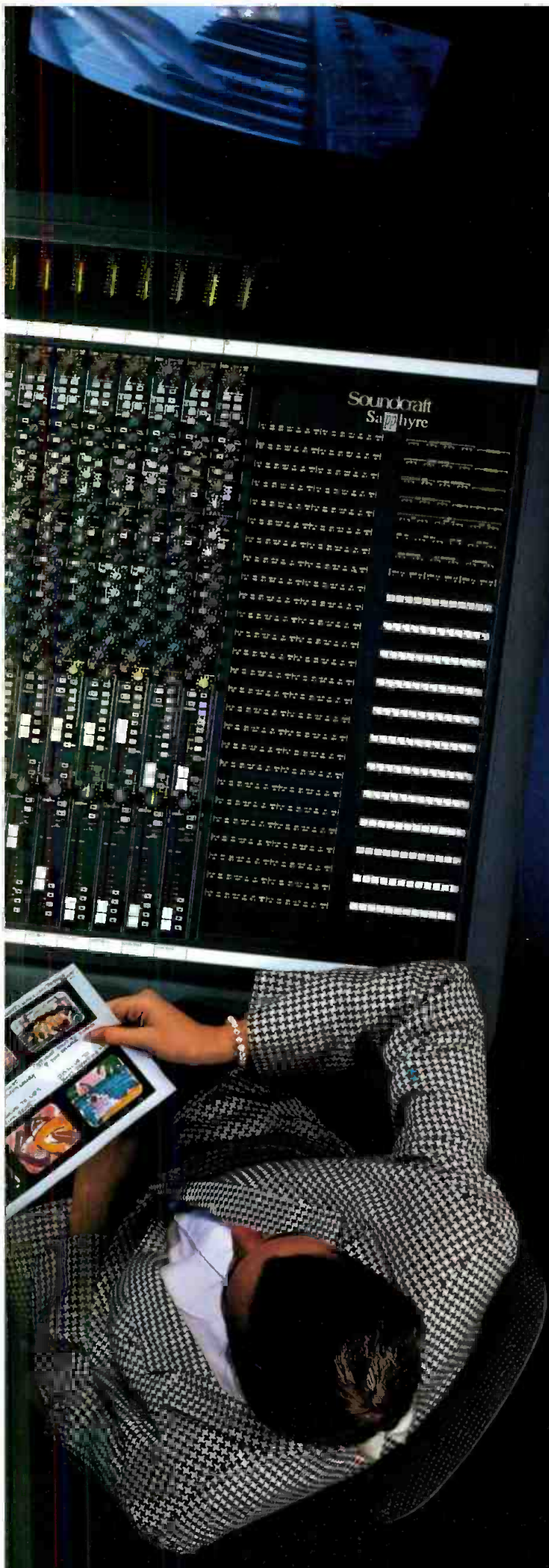

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close to that by ripping off lots of stuff. But you know, I think you should have a good, healthy sense of borrowing. I think that's kind of important.

R•E•P: How did you approach arranging with Fleetwood Mac?

LB: In Fleetwood Mac I approached the work from an orchestral standpoint. I wanted to find parts that were good for the song itself and that made sense for the record, but they didn't necessarily stand out. You can listen to The Everly Brothers records, for example, where Chet Atkins or somebody is playing a key part for the record but you don't really *notice* it. It's just in there.

R•E•P: There's a recurring guitar sound of yours I particularly like. It's on the intro to "Wrong" on your new album, and you used it on "World Turning" in 1975. Sort of a Dobro-ish sound.

LB: Oh, yes. That's actually a gut-string recorded direct. One of the things we did on this album to prevent it from getting too dense—and not wanting it to come off too Phil Spector, and still dealing with a bulk of things going on—was to record a lot of things direct because then they are more contained. About halfway into the record, I turned on the TV and saw Daniel Lanois. He's great. I love what he does, and I've always thought we'd get along great. But he's kind of got this spacy air about him and he was going on and on, almost like Floyd the barber from Mayberry—(impersonating Floyd) "Oh, well, you know, you just don't ever want to record anything di- *rect* because you lose all the dynamics without a mike..."

And I thought, well, that's fair enough, but we were trying to keep things contained not only by recording a lot of stuff direct, but also in mono. The present train of thought is that if you want to record an acoustic guitar, you set up a couple of mikes and maybe mix in the direct to get this spread. Well, that already takes up so much space, so we thought, "Why not try to make these things points?" So even on the densest of songs you have points of things that you can pick out from left to right.

> Having left a group situation, this (solo album) was the way I thought I could get my orientation back. So that I could get to the point where I wanted to work with musicians again.

On "World Turning" that *was* a Dobro, but this was just a gut-string, recorded direct.

R•E•P: Wow! It doesn't sound like a gut-string. It sounds so metallic.

LB: Well, we put a lot of treble on it. Richard and I are not engineers in the way that Bob Clearmountain is. Our theory is we just turn the knobs until it sounds good. I'm not that well-versed in technical things.

R•E•P: There are a lot of guitar sounds on *Cradle*. I like the cheap distorted sound on "This Is The Time."

LB: There are a lot of things that are just guitars used in unusual ways. If

LINDSEY • B

you can hear a sound in your head and you can get a sense and understanding of how it might work, it's not so important what equipment you use; it's what you do with it. When we wanted a fuzzy or distorted sound, most of the time we wouldn't set up an amp; we'd go through the GT pre-amp.

R•E•P: What kind of equipment do you have in your studio?

LB: We have a black velvet Elvis, which was very important. We had that up on a wall, so it was like the Elvis shrine. The console is a Neotek 48-track; it has really nice, flexible EQ. An SSL and compression on every channel isn't something we felt we needed. We did not mix the album at the house; all of that organization was done somewhere else. I have an Augspurger monitor system, a JBL system and some NS-10s. This is all in what *was* my garage. I have a couple of old AMSs, a Yamaha Rev 5 and Rev 7, a Lexicon PCM42, and PCM70, which is wonderful. The direct we use for all that stuff is a Bertech ITR1.

We have four LA4s, which I like because they're really soft sounding. We have some other compressors that aren't soft sounding, the DBX160 limiters.

R•E•P: You used that on that lead guitar, I'll bet.

LB: Yes, that's right. I probably used that on most of the leads, because it has a little more of an aggressive thing to it. I've got some Drawmer S201 gates.

R•E•P: What do you record your vocals on, an 87?

LB: Yeah, and also that smaller one that looks just like it, the 89. That's another thing. I have a few mics, but we pretty much just used one or two mics for everything. You can do that because you're not trying to get an array of colors all at one time so you have a lot more control. A lot of it wasn't, "How do I get sounds through miking?" It was more of a thought process. If you hear the sound, then you know how to approach it. It's the same psychology as using the same guitar for any number of sounds. It's not what you've got; it's what you *do* with what you've got.

There were a couple of special tunings that I used. I have an older Strat and for a lot of the "chimey" kinds of sounds, or for figures that I wanted to play that were in a more delicate vein, I would restring the Strat with all high Es and Bs — the first three strings would all be strung at high E and the lower strings at B. Then you can make a figure of six strings that would all be a half or a whole step apart. You can get this kind of koto thing going, and fingerings where everything is open all the time.

R•E•P: How do you decide, as the songwriter, performer and producer, whether you are being too self-indulgent? Whether you're being a good judge of how many parts to put in an arrangement?

LB: Well, with respect to density, I think sometimes that is a problem for me. Having left a group situation, this (solo album) was the way I thought I could get my orientation back. So that I could get to the point where I wanted to work with musicians again.

But in a general sense, I think that there were two things that helped that. Richard Dashut is my best friend and he co-produced; he has been through everything since *Rumours*, so he understands a lot of the process and he understands me. Because he's not a musician, he's great with the big picture. I can get lost in details sometimes and he'll walk in and cut through that. He can sit down with a guitar and come up with a great seed for a song. He just has a general, good sensibility about things.

Also, Lenny Waronker, the president of Warner's, was coming up every month or so, and he's made the project one of his own things. He was reacting to everything that was being done. He was a producer for many years, too, so he and I have a lot in common and I respect his judgment. Between those two things I think it was easier to keep myself from going over the top.

R•E•P: You left one of the greatest rhythm sections in rock 'n roll history. At some point, don't you think you should hook up with another great rhythm section?

LB: Most definitely. For all the construction on this you could certainly make the case for that being one of the weaker parts on this album. There definitely is something to be said for having somebody else playing — I'm very aware of that. That's why I say that getting through this album was only a step in getting out from one group and into another. I'm planning on touring, so that's going to come up soon anyway. There's no replacement for five or six heartbeats all beating the same. It was a question of timing and whatever my own needs were at the time.

The rhythm section is very important. When I put a band together, I want to first find a bass player and drummer who are on the same wavelength. It's important to have the core as the bass and drums. ■

There definitely is something to be said for having somebody else playing — I'm very aware of that ... There's no replacement for five or six heartbeats all beating the same.

SAN FRANCISCO'S HYDE STREET STUDIOS:

THEN AND NOW

Before Hyde Street Studios, there was Wally Heider and the original San Francisco Sound.

Recorded history by Jennifer Maxwell, Nicole Sanchez and Dan Levitin

Wally Heider opened his San Francisco studio in 1969 in a building that was previously home to an assortment of film offices, screening rooms and storage for 20th Century Fox. Heider's was a quick success, counting among its first clients the Jefferson Airplane, Creedence Clearwater Revival and the Grateful Dead. The studio soon became a mecca for musicians from around the country, whose recordings would shape popular culture and music for years to come: Moby Grape, James Brown, Paul Simon, Merle Haggard, Journey, The Dead Kennedys, The Pointer Sisters and Herbie Hancock.

Creedence Clearwater Revival, for example, recorded more than four albums in studio C between 1969 and 1970, from *Green River* through *Cosmo's Factory* and part of *Pendulum*. In fact, *Cosmo's Factory* was named for Studio C, the hit factory that had been so kind to them. CCR ruled the American airwaves during that period, with a string of hits and double-sided singles that led some to dub them "The American Beatles." John Fogerty's use of unique guitar tones and layered parts, combined with his genius for production and powerful vocal and lead guitar styles, made the group's success a certainty.

Ironically, CCR's label, Fantasy Records, used its share of CCR profits to build a world-class studio across the bay from Heider's in Berkeley, the competition from which may have been partially responsible for Heider's eventual demise.

When Heider opened for business, his equipment was revolutionary, and other studios had to scramble to keep up with the standard that he set. Striking a deal with the nearby Ampex Corporation, allowing the company to experiment with new equipment in his studios, Heider became the

Jennifer Maxwell and Nicole Sanchez are free-lance writers based in Stanford, CA. Dan Levitin is R•E•P's music production editor.

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NEW! Dual Mono Operation

proud first owner of 16-track Ampex machines, serial numbers 1-5. He was also first to install a Quad 8 Board.

SERVICE WITH A SMILE

As well as luring bands with up-to-date technology, Heider instructed his staff to do anything to make their clients happy. Studio manager Ginger Mews recalls a day when Heider came in and bellowed, "If they (the clients) come in here and I say, `Lie down, Ginger, so they can walk on you,' you lie down!"

Grace

Slick reportedly wanted to be surrounded by a ring of light while doing her vocals on Jefferson Airplane tracks. Heider promptly installed 12 light canisters on the ceiling of Studio A in the shape of a circle, with different colors at the poles of the compass.

At the request of the Grateful Dead, Studio C's entry doors were "covered with airbrushed paintings," recalls current owner Michael Ward, who bought the studio in 1980. "It looked like fluid on glass against a cloudy sky, and (on the opposite wall) there was a 10-foot rose. "It was this dedication and accommodation that attracted some of the biggest bands during the studio's golden age. Studio A was built as an exact replica of a room that Heider built at United Western in Los Angeles, because he felt a successful room could always be repeated.

Like all studios, Heider's has its share of stories. When Jerry Garcia and a small group of musicians were recording his first solo album, he wanted to ensure privacy and a closed session. Legend has it that he put up a sign at the entrance to the studio that read "Tennessee Ernie Ford." No one bothered them the whole time.

Following the initial success of Studio A, Heider sought to build a second and much larger studio on the first floor of the building. But because of sound leakage, the short-lived Studio B instead became a game room and lounging area.

Next came Studio C on the second floor, built mostly as an upstairs rehearsal hall for Jefferson Airplane and Quicksilver, with the control room built almost as an afterthought.

Studio D was soon built on the opposite end of the second floor from Studio C and was a direct copy of the highly successful Heider-designed Studio 3 at United Western (now Oceanway). The design avoided perfectly parallel walls, with "mid-range/diffuser/absorber/gypsum devices — we call them Wheat Chex — everywhere, like some sort of geometric disease," describes Ward.

Studio E, the final studio built before Heider's departure, was created as a media room, and one of its first projects was for Word Records, enacting the entire Bible, not exactly a typical Wally Heider undertaking. This studio, too, is precisely modeled after a Heider studio located at Heider's L.A. complex.

Mix magazine's David Schwartz worked at Heider's in 1973. "I remember the day I started. The place was a beehive of recording activity, with four studios and a post-production room. There were 15 albums being produced at one time: David Rubinson and Fred Catero had studio A locked out, working on five albums, Herbie Hancock's *Headhunters*, The Pointer Sisters' first album, Lydia Pense and Cold Blood, the Hoodoo Rhythm Devils and an album by Malo, Santana's brother.

"Upstairs in C there were a couple of Airplane/Starship projects, Hot Tuna, Crosby/Nash, Pure Prairie League, Commander Cody. Tower of Power had been in there for a year working on what became their biggest record with the tracks "You're Still a Young Man" and "Bump City." Jim Gaines, Mallory Earl, Steve Jarvis — these guys were recording as fast as they could.

"But within five months everything changed drastically. The manager, Mel Tanner, left the studio and within a month the bottom fell out completely. It went from being booked around the clock to being empty for a couple of weeks at a time. The oil crisis, the recession of '73, the record company's executive staffs crashing all led to real changes in recording budgets. By the summer of '73 it was a vast wasteland."

THE NEXT STEP

Because Heider was a trailblazer and had opened with cutting-edge equipment when he began Filmways/Heiders, it was unnecessary to update the equipment in 1974. But the advent of 24-track recording made it imperative that the studio update its gear or fall behind competing studios.

Heider's headaches began when he went to Filmways and asked for the money to upgrade and Filmways refused. As former staff engineer Jeffery Norman explains, "It was the great, classic case of a corporation taking over just to gain something, but not to put anything back." Harry Sitam, in charge of maintenance from 1970 to 1976, adds, "(Filmways') manager would not allow me to buy parts to maintain the equipment even up to basic NAB specifications."

Filmways' refusal to provide money to meet client needs was a direct contradiction to how Heider felt the recording business should be run. In the early days, when Heider still had working capital, he was known to give clients thousands of dollars of compensation if he thought they had received an unfair deal at his studio. As Sitam recalls, "Even if there was some kind of gray area, he'd see in favor of the customer. It's that kind of investment and good will that made him so famous world over."

Thus began the demise of Filmways/Heider's studios. Heider became so distraught about the decline of the studio that he maneuvered his way into being fired by Filmways. Although the corporation wanted to claim he had resigned, Heider took out a full page ad in the Hollywood Reporter, proclaiming "I WAS FIRED!!!" He threw a giant going-away party for himself, flying a handful of his San Francisco crew to Los Angeles for a huge dinner and celebration. Soon after, he went into private life in his home state of Oregon.

After Heider left, Filmways paid little attention to the San Francisco studio. Filmways became so out of touch with its Northern California investment that at one point, when employees sent a request down to Los Angeles for higher wages,

Filmways' response was, "You mean we still *have* a studio in San Francisco?"

It was then that Filmways realized it needed to find someone to fill the administrative role left empty by Wally Heider's departure. Filmways sent up Gary Blum, whose Los Angeles style seemed at odds with the more laid-back San Francisco scene. Engineer Susie Foot recalls, "He dripped L.A. And this guy heading up a bunch of San Francisco hippie engineers was just ludicrous."

Explaining that he needed help with a serious studio decision, Blum called Foot into his office one day. "I thought he was going to ask my opinion about some piece of gear or something, but he had these two turquoise bracelets on his desk and he said, 'Which one do you like better?' This was his duty as manager — picking out jewelry to wear."

TURNABOUT

The staff at Filmways/Heider/s rallied together to oust Blum and presented an extensive petition to Filmways with the signatures of virtually every employee and several clients as well, including producers Pat Ieraci, David Rubinson and Skip Drinkwater, outlining their dissatisfaction with the choice of administrator. Filmways did nothing. Only when many staff members, including maintenance men Harry Sitam, Michael MacKenzie and Gary Odell, threatened to quit en masse was Blum fired.

Yet Filmways continued to resist funding the declining studio. Rubinson, a mainstay at Heider's, eventually left and reluctantly started his own studio, The Automatt. Rubinson and Catero had been asking for two minor modifications to studio A — a 4-channel headphone cue system instead of stereo, and mute switches on the monitor section of the board. Sitam muses, "Rubinson had Studio A block-booked most of the time with major acts. The studio would have made a lot of money if it had just done these (modifications)."

In 1980, a partnership composed of Dan Alexander, Tom Sharples and Michael Ward acquired the San Francisco studios. The rooms were reopened as Hyde Street Studios, named for the street on which the building is located.

Walking into a multimillion dollar studio, the new owners began with ambitions that exceeded reality. They first attempted to operate all four studios, which, what Ward says, was "complete madness." The new studio ran into financial problems, and Hyde Street's equipment was not as good as it should have been.

But Ward and his partners were willing to spend money and learn from their mistakes. They began remodeling the studios, with "flexibility as one of the mantras," Ward says, because of the need to compete in a wider musical market consisting of everything from rock to jazz to rap.

They also added to their equipment inventory. As one of the nation's largest dealers of second-hand audio, Alexander played a major part in the selection of new equipment, much of it reflecting his taste for "troublesome English consoles," as Ward describes it.

Alexander owned the first Helios console ever built, previously located in Olympic Studio Two. It was the console that recorded The Rolling Stones' *Beggars Banquet*, Led Zeppelin's *Led Zeppelin II* and Queen's *A Night at the Opera*. It was moved into Studio C, and although it was a famous console for its time, Alexander admits that its sound left something to be desired by today's standards. It also required large amounts of money to make it operational.

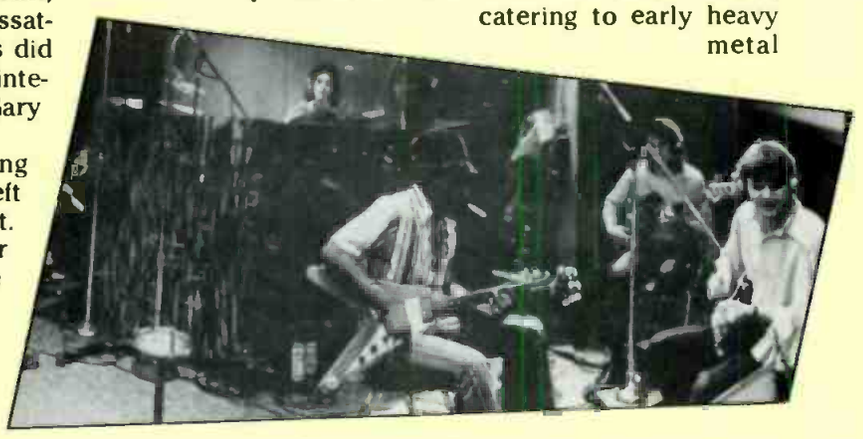
UNUSUAL TASTES

Gluttons for maintenance punishment, the studio acquired a left-handed Trident B-Range console for Studio D. The Trident was found to be a source of constant trouble and expense. Eventually these consoles were replaced with more cooperational equipment, including an 48x48 Amek 2500, a 40x16x34 API and the recently installed Neve 8048 in Studio A (see the following in-depth article). Additionally, Alexander's large collection of vintage tube microphones, tube compressors and other exotic gear gave the studio an edge over local competitors.

Under the new ownership, the studio's patrons have included artists Joe Satriani, Blue Öyster Cult, the Dead Kennedys, Leon Redbone, Ronnie Montrose, Chris Isaak and Robert Cray, and producers Sandy Pearlman, Steve Brown, Mark Senasac, Eric Jacobson and this author.

Tom Sharples left the partnership in 1985 to head up R&D for Otari America. Ward and Alexander later divided the studios, with Alexander taking Studio C and Ward keeping the rest of the building and the Hyde Street name.

In 1986 Alexander leased Studio C to Sandy Pearlman, who ran it as Alpha & Omega Studio until 1991. Pearlman used it for his own projects, including those on his short-lived MCA-distributed label Popular Metaphysics, and also subleased it to other producers and artists. Ward kept control of his studios, except for a brief sublease of Studio A to a producer who ran it as Power Stroke Studios, catering to early heavy metal and thrash acts.



Alexander ended his involvement with Hyde Street recently, but Ward will continue to run the studio in its current capacity. An extensive 3-year program of rebuilding and consolidation has led to a complete redo in Studio A (as outlined in the following article); the opening of digital production room Studio B with tie-lines to the analog rooms; the addition of two private producer's lounges with audio and video tie-lines; a general aesthetic face-lift, including new paint, carpeting and cabinetry; full tie-lines to all control rooms from Studio C, which is available as a large and live-sounding isolation room; and new monitors, an acoustic face-lift, a Studer 800 III and a 48x48 Amek 2500 in Studio D.

All of this puts Hyde Street in a position to match the glory from its past, following the dictums laid out by Wally Heider 25 years ago. ■

UPDATING A

Hyde Street Studios' A gets a Neve 8048 and an ATR-124.

By John La Grou

Few recording facilities stand as venerable as Hyde Street Studios. Since Wally Heider first opened its doors to the heart of San Francisco's blossoming psychedelia, Hyde Street has been synonymous with the evolution of popular music. In more recent years, Michael Ward has provided the vision, keeping Hyde Street sailing smoothly in the changing tide of artistic and technical demands. This is the story of Hyde Street's most recent rebuild of Studio A, spotlighting the addition and exhaustive makeover of a classic Neve console.

By decade's end, it was clear that the 1980s had gifted the Bay Area with a fair number of slick, modern studios, many with the latest and greatest in console, recorder and outboard technology. When it came time to rebuild Hyde Street's Studio A, Ward mused about joining the Bay area fray with yet another modern console and perhaps a digital machine. But following crowds is not always the ideal solution. "We needed to develop a niche," says Ward, "that wasn't overpopulated and was consistent with our background and tastes."

Ward wanted Studio A to become a first-caliber tracking and mixing room with a marketable edge. As part of the planning process, he researched every available modern console. Unfortunately for Ward, he found that flexibility requirements had forced virtually every manufacturer into using integrated circuits throughout the console in just about every function. Not that Ward disliked modern designs, but he knew that another "just-out" console installed into the Bay area market wouldn't give Studio A the particular draw — a unique quality of sonics and character — that was necessary. Something else was needed.

THE KEY

To achieve his vision within budget and spec, Ward felt that his console choices boiled down to a modern API or one of a handful of vintage discretes. Laboring through all the alternatives, he settled upon a mid-'70s Neve and found one in England. This particular desk, a custom-built 8048, was commissioned in June 1975 and installed into the British CTI film studio. It remained there for 15 years. The console offered an all-discrete signal path and a huge surface area on which additions and modifications could be performed.

Apparently, the board did not receive much use. Garry Creiman, Hyde Street's chief project engineer and Neve junkie (he recently completed the modification and coupling of dual Neve 8078 consoles at Record One/

John La Grou is a principal of Millenia Media, an audio/video design, production and consulting team in Sacramento, CA.

CLASSIC

Hyde Street Studios

Ocean Way Recorders) says that when the board arrived, it appeared about 10 years newer than Neve consoles of similar vintage he had worked on.

Without doubt, central to Studio A's successful makeover are Creiman's numerous enhancements and upgrades to the Neve console. One can safely say that this 8048 has been taken to a level of functionality that places it in the company of most any contemporary desk. The many one-of-a-kind operation panels added by Creiman have even been color-matched to the original Neve gray-blue.

Creiman has taken great care to avoid changing essential Neve concepts or signal paths. In his opinion, the console functions not to be disturbed include the Class A gain, summing and buffer stages, transformers and EQ curves. He simply worked around and in harmony with Neve's fundamental designs. "In doing so," says Creiman, "we were able to maintain the unique and beautiful sonics of the Neve approach while bringing much of the routing, switching and monitoring functions up to modern standards."

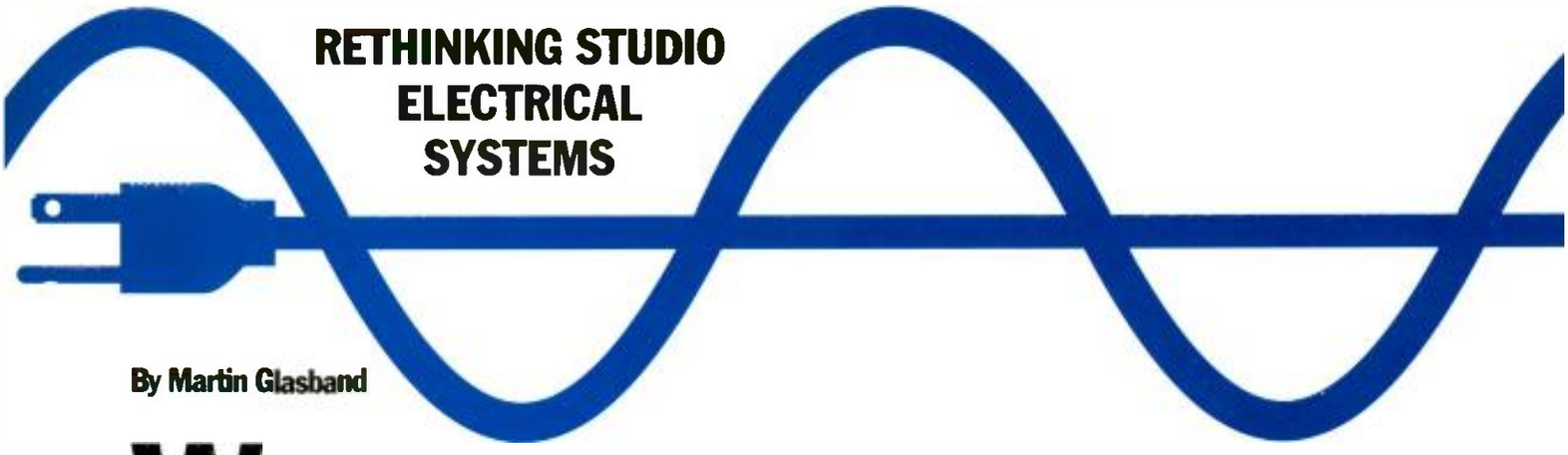
CREATIVE ROUTING

There is one signal path modification, however, that Creiman couldn't resist. This console sports 4-band 1081 and 3-band 2074 input modules. All of the discrete Neve 4-band modules were built with at least one Class AB stage. Some later versions were even shipped

refinements in live/dead treatments. This is why, in addi- spare for others to follow in kind. ■

AUDIO NOISE AND AC SYSTEMS REVISITED

RETHINKING STUDIO ELECTRICAL SYSTEMS



By Martin Glasband

We've addressed the problems peculiar to hospitals and their sensitive equipment. I guess it's about time we turned our attention to addressing the problems of recording studios," said one highly placed electrical inspector.

"Intriguing," said another inspector.

"This is so simple!" laughed one elated audio engineer. "Why didn't anyone think of this before?"

These are some of the typical responses to the June 1991 article in R•E•P, "Audio Noise and AC Systems." The solution to audio noise proposed therein has been well-received by engineers on both sides of the "Silicon fence" dividing electrical and audio/video industry personnel.

The subject of equi-potential 120VAC systems for use in audio/video facilities has become the focus of discussion in many circles. For almost three years at the "Zoo Studios" in Studio City, CA, the system's compatibility with audio equipment continues to be proven. Other audio/video facilities using equi-potential AC are growing in number and at least one major TV network is currently planning to convert its sound stages and production facility's power system to resolve noise problems.

120V symmetrical AC systems have been cropping up in unexpected places. One of the largest videotape duplication companies in the country has installed an equi-potential system for its video racks and has reduced its noise floor 75% (in an unbalanced system). This applies in the audio and video industries, plus the communications and data processing industries. Even in high-tech "clean" environments, such as microprocessor manufacturing and R&D facilities, symmetrical AC power enables technicians to measure fractions of microvolts with cleaner operating test equipment.

In all of these areas, a 60/120V, single-phase, 3-wire AC system (symmetrical or balanced AC system*) outperforms all other 120V, 120/240V or 120/208-240V systems. It is the only class of 120VAC systems that directly addresses the common problem of AC-induced EMI. Symmetrical AC is uniquely transparent and causes no noise in electronic circuits. The theory behind it is simple. Unfortunately, however, other more common and less effective classes of AC systems prevail throughout high-tech industry. How is it that such a simple system remains largely unheard of and in the background?

HISTORICAL EVIDENCE

Down through the years, AC systems in recording studios, as elsewhere, have occupied a back seat in priority and understanding. Electrical engineers for years have been preoccupied with handling grounding system noise problems, which few realize are often problems of their own creation.

Often the task of wiring studio AC has been given to an electrician who has little understanding of the equipment for which he is supplying power. And then, to this person is entrusted the matter of dealing with EMI. So he installs orange iso-receptacles, an iso-transformer and proceeds to attempt to clean up the grounding system by sinking it. But sinking a grounding system doesn't work. So it's on to the next plunge.

It's too bad that many studios have opted for taking the high-priced gamble of purchasing expensive engineering services and costly noise filtering/suppression equipment, only to come up somewhat short of their expectations. (The filtering equipment probably would have operated more cleanly with an equi-potential system.) It's not so much that the correct technology has never existed; it's that the correct technology has never been applied.

Old school electrical engineering practices, products and systems fall short of what is needed in the audio/video industry. Much of the National Electrical Code (NEC) sections dealing with audio/video and related electronic wiring systems (Articles 518, 520, 530, & 640) were written long ago and have little to do with the needs of today's modern installations.

The time also has come for studio engineers to rethink their priorities involving electrical wiring. The simple mistake of taking for granted AC wiring in studios has led to a morass of unnecessary grounding fixes and has retarded the development of proper electrical systems for studios. The price for this mistake has been many years of studio noise problems, millions of dollars and countless man-hours wasted. Realizing that conventional studio electrical systems need to be re-examined is the first step in correcting the problem. Seeing that, one can now study the situation. First, a brief review of material from the June 1991 article:

Let's go right to the source of noise, EMI induced by conventional AC systems. Figure 1 is a 120V isolation transformer plugged into a typical RF filter

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common to most every piece of audio and video equipment. Note the current flow through the grounded capacitors. Here is where noise problems originate. As more gear is turned on, the voltages present throughout the grounding system (signal reference grid) are raised relative to the impedance of the grounding system. This may be only a matter of millivolts, but in high gain and high impedance audio equipment, it can be very audible.

MYSTERIES EXPLAINED

Theoretically, lowering the grounding system's impedance should reduce the voltage present, but in reality, Ohm's law demonstrates that significant improvement is unobtainable.

Copper building wire — for example, 12-gauge wire used in branch circuit wiring — has only about 0.1Ω resistance for every 50 feet. Larger sizes have, of course, even less, but the difference is insignificant. Regardless of the grounding conductor size and length, Ohm's law, there will still be an unacceptable voltage present in the grounding system.

Furthermore, the grounding electrode (ground rod, water pipe, etc.) presents an even greater obstacle. Many of us have had the experience of driving one or more ground rods with huge copper wires to supplement studio grounding systems and have learned something about futility.

Commonly, if one can achieve 5Ω or less above true earth ground, one is doing quite well. Shaving millivolts off a signal reference grid (grounding system) through grounding techniques is truly a logistical nightmare.

But what if RF filters could be made to operate more cleanly? By design, they are most efficient at doing what they are intended, suppressing stray radio frequencies from entering or exiting equipment chassis. Notice in Figure 1 that they are balanced.

However, the voltage supplied to them is unbalanced. Currently, the electrical industry recognizes only one basic type of single-phase, 120VAC circuit. To ensure system safety, one of the two 120V supply conductors is always grounded. However, this means that one side of the RF filter has potential relative to the grounding reference; the other is neutral. Consequentially, AC leaks through the capacitors unchecked directly into the grounding system.

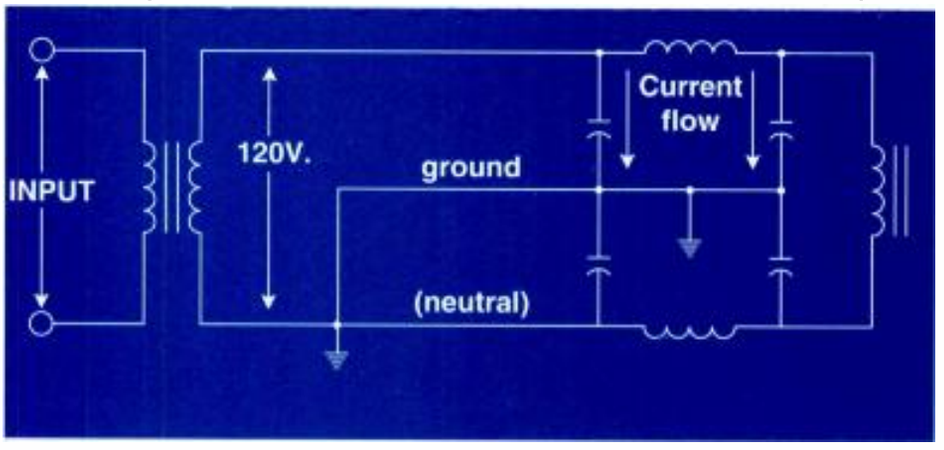

Figure 1. RF Filter fed by typical 120V, single-phase power system.

What would happen if the AC supply was balanced? Figure 2 is an example of such a 120VAC application with an RF filter. The potential to ground on each side of the AC line is 60V with each line operating 180° out of phase to the other. Thus, a 120V (RMS) supply is maintained.

As a result of this configuration, trace currents flowing 180° out of phase through capacitors on opposite sides of the filter null at the common chassis grounding connection. Voltage formerly present in the AC grounding system is thereby eliminated. The difference is dramatic. So pronounced is the effect that studio grounding systems lose much of their strategic value in countering low-frequency noise problems. Harassing EMI ceases. When a symmetrical AC supply is used, the noise floor of any audio or video facility is greatly reduced.

ASSEMBLY REQUIRED

The key component in this type of system is the transformer. In electrical terms, this particular transformer is called a 120/60V, single-phase (center-tap) isolation transformer.** No primary voltage is specified here because applications vary among cases. However, all common primary voltages are available.

Current improvements in transformer specifications, such as lower impedance and reactance and better shielding, all contribute to the "purity" of an equi-potential system. But even a run-of-the-mill version can provide a dramatic (42dB in one measured case)

improvement in noise levels. Of course, the size of the transformer would depend on system requirements. 1kVA to 50kVA (8A to 400A) is the general range. By design, this kind of transformer is the only type that delivers a balanced 120V supply.

Similar isolation transformers providing a 120V supply have either one grounded line that unbalances the power or two ungrounded "floating" lines that are unstable and potentially dangerous. *One should never use these transformers.* On the other hand, a center ground transformer has a stable output voltage, and, for safety's sake, an adequate system fault current capacity that enables fuses and breakers to operate properly.

Symmetrical AC wiring has also been shown to reduce EMI in equipment where RF filters are not used. Two-prong AC plugs are generally an indication of this design. In such equipment, magnetic/capacitive coupling in poorly wound power supply transformers can create hum as do RF filters. This is commonly true where interference from power supplies originates in audio grounded chassis.

In the case of symmetrical power, because the audio ground exists roughly at a mid-point between primary line potentials in the power supply, a greater measure of nulling occurs in transformer coupling (except for poorly made transformers), as is similarly the case with capacitors in RF filters. Furthermore, the highest potential to ground is only half that of conventional AC systems. Once again, an equi-potential supply demonstrates inherent compatibility with audio equipment.

On paper, symmetrical AC looks like a balanced audio circuit. It is quite possible that audio and AC grounding systems will no longer be considered separate (but commonly joined) entities. A properly designed symmetrical AC system is actually a part of the audio electronics. There is no reason why fully balanced electrical/electronic systems should not be treated as a whole unit. The concept of virtual integration could be the technology of tomorrow.

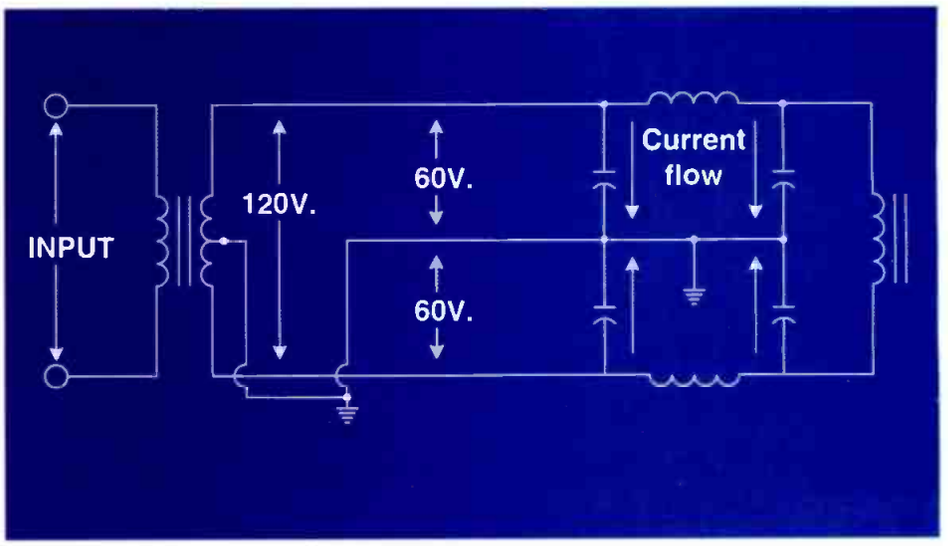

Figure 2. RF filter fed by 120V, 1f equi-potential power system.

NOT ON THE BOOKS

Currently, there are no provisions in the NEC for this class of AC system. There isn't even a UL-approved receptacle device that one can use to plug in one's equipment. However, guidelines have been developed that make it possible for studios to convert to this system to the satisfaction of most electrical inspectors.

In the February 1992 issue of *EC&M* (R•E•P's sister Intertec publication), there is an article titled "Applying a 120V System with 60V to Ground," by Fred Hartwell. *EC&M* is among the leading and most respected of the electrical industry's trade journals. It is widely read by electrical engineers and inspectors.

This article makes reference to the June 1991 R•E•P article and is generally a discussion of a 120V equi-potential AC system from the viewpoint of an electrical inspector. The article may be of some assistance in the short term for those who may need to provide an authoritative reference for an electrical inspector.

A possible code restriction could place symmetrical AC in highly controlled or authorized personnel use areas only. It would seem impractical to restrict symmetrical AC outlets to these locations. The average studio has large rooms where musicians and lesser trained studio personnel do their work. Portable symmetrical power supplies are also applicable outdoors and in a variety of remote locations. Use of the L-15 or proposed L-15e receptacles (see sidebar) in conjunction with more accurate GFCI (ground fault circuit interrupt) devices would ensure routinely accurate GFCI performance and greater safety, especially where symmetrical AC is used outdoors.

SAFETY CONSIDERED

It has long been the contention of electrical inspectors that studios are operated unsafely because of various grounding compromises that are made. Without question, they are right. But what other choice is there for studio engineers? By virtue of the fact that for safety reasons, audio and electrical grounding systems are indelibly linked and problems with noise have always existed.

It seems unlikely, but there are actually few examples of 120V apparatuses, manufactured under UL guidelines, that could not be operated safely (lights, etc. excepted) with symmetrical AC power. The voltage and phase are the same as conventional 120V power. Only the line to ground voltage is different, which should be of no consequence.

According to UL standards, power circuits in equipment must be isolated from the ground. The UL permits the use of 2-prong cord plugs on ungrounded equipment, provided that manufacturers adhere to specific insulation guidelines. Equipment using this type of cord connection should not be a problem if that equipment chassis is not

grounded to the neutral side of the AC supply. In most cases, the chassis ground reference is left floating to avoid loops in the audio grounding system.

Sometimes in musical instrument or consumer audio/video equipment, the chassis is referenced to the neutral. This most certainly means trouble. In an equi-potential AC system, a chassis so referenced would become energized. Fortunately, this is not the usual case, because UL regulations prohibit the use of neutrals for grounding purposes. But it happens anyway. (Check your unbalanced audio gear and your video monitors!) Some equipment slips through the cracks because of confusion that exists with manufacturers over nomenclature used in the electrical industry.

In a standard 120V, single-phase wiring system, the neutral (white wire) is referred to as the grounded conductor. It's intended for use as a current-carrying supply conductor. Being grounded, however, does not mean that it may used as a grounding reference for equipment chassis. In any AC system, the grounding conductor (green wire) is the only correct reference for chassis grounding. The code specifically prohibits its use as a current-carrying conductor.

In every situation, prudence dictates that 2-wire AC cord connected equipment be checked out. (In Japan, nearly all equipment used and exported has a 2-wire cord.) If a neutral-to-ground chassis is found, modification of the chassis grounding and retrofitting of the equipment with a 3-wire, U-ground cord would be the proper course of action to take.

It has long been the contention of electrical inspectors that studios are operated unsafely because of various grounding compromises that are made. Without question, they are right.

RECENT UPDATES

A number of sound safety measures have been developed since the original R•E•P article was published. Because of characteristics unique to this type of system, simple misuse can easily compromise the most basic of electrical code safeguards. For example, lamp sockets on music stand lights would remain energized even when turned off.

Most studio equipment currently uses a single-pole power switch. This means that (among other things) greater care must be taken by service personnel while working on switched-off gear. Two-pole circuit breakers and exclusive use of GFCI devices or hard-wired AC equipment connections in lieu of GFCI protection seem to have become standard safety measures upon which most electrical inspectors agree.

Use of 2-pole GFCI breakers have been recommended and some will probably work if their internal op-amps can function at about half the normal DC circuit voltage. By design, a 2-pole GFCI is connected to the neutral bus. Operating within a 120V symmetrical system, the input voltage on a 2-pole GFCI breaker's power supply would therefore be only 60V instead of 120V.

Even though some may work, at $130 each a more practical alternative is suggested. Standard GFCI mastering

PLUGGING IN

Interestingly, a new ANSI configuration for this system type and voltage has been suggested for receptacles that would allow the use of conventional, 3-wire, U-ground cord plugs (Figure 3). The configuration would be similar to the standard NEMA L-15 style (ANSI C73.11-1972), but both parallel slots on the receptacle device would be the smaller size currently designated as the ungrounded (or high voltage) side of the device. This would preclude the use of polarized 2-prong cord plugs (commonly used in lighting equipment, coffee makers, etc.) having one larger neutral blade.

Oddly enough, standard 3-wire, U-ground cord plugs already in use have two smaller blades and one ground pin and are compatible with this new style. This means that only minimal retrofitting would be necessary.

For the sake of the multitudes, it would be nice to see the current NEMA L-15 or the proposed L-15e receptacle configuration accepted for use with symmetrical AC systems. Should another standard be adopted, the consequences could be catastrophic. Many pieces of gear are commonly used in the home, in the studio and on the stage. For that reason, it is unlikely that many manufacturers will opt to use a different male plug configuration on equipment.

Nevertheless, an entirely different standard receptacle (female) configuration is possible. If this happened, adapters for audio equipment would be required and would likely run rampant. With all of the rented studio business, few could argue that lights (with plug adapters) would not be used anyway and often with this system.

Recently, a major manufacturer of plug adapters was sued in a wrongful death product liability case and lost because its adapters (about one inch long) failed to plainly exhibit a grounding warning. One wonders what good a warning would have done anyway. How often do those who use adapters take the time to read the directions? What if something terrible like that happened in a studio? A configuration that mandated use of adapters could leave studios wide open to such liabilities. ■

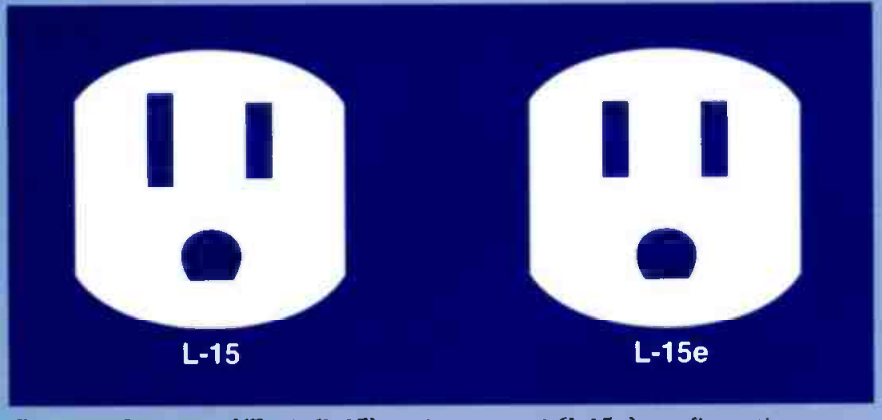

Figure 3. Standard NEMA (L-15) and proposed (L-15e) configurations

devices (used with spas and jet tubs) without slots for cord plugs are a fraction of the price. They, too, operate at 120V, but they derive their power from both lines (120V) on the device, which is a more compatible configuration with symmetrical power.

Equi-Tech, Portland, manufactures GFCI device panels designed specifically for this application. The panels have an accurate GFCI testing module, a multichannel system monitoring device and cost far less than an electrical panel full of 2-pole GFCI breakers. Other products developed are compact 40A-to-70A equi-potential systems for smaller studios, portable versions for mobile/remote use, and a few smaller models (up to 3000W) in both rack and bench styles for equipment downstream of UPS backups and a variety of other applications.

Equi-Tech also distributes large and small sizes of symmetrical 120V isolation transformers for hard-wired electrical systems manufactured to audio/video industry specifications. Capacitive and inductive resonance properties are engineered to smother higher frequency EMI, even under extreme load conditions. New products employing this technology are appearing on the scene regularly.

A DISCLAIMER

An unsettling practice continues by a few well-meaning audio technicians who attempt to handle the electrical installation themselves. This may be an overzealous and uninformed approach to hazardous electrical safety matters. Beware! Electrical power is a technology requiring years of education and training. Numerous safety factors and, in many cases, manufacturing specifications must be considered in any electrical installation. Misapplication can result in damage to property, liability problems and serious injury or worse.

The National Electrical Code is a comprehensive collection of safety measures developed through many years. It is not intended to be a bureaucratic obstacle (as viewed by some) but a collection of proven guidelines designed to protect property and human lives. A healthy approach to the problem would be a willingness to work with those whose business is electrical safety.

Safety standards don't necessarily have to be impractical standards. There are many sides to an issue. Electrical Code Panels 15 and 16 are the forums where input is needed. (Panel 15 handles motion picture studios, theaters and similar locations; Panel 16 deals with sound recording and public address equipment).

As proposals are made for code changes, various documentation will become available. Inquiries can be made to the National Fire Protection Association, Electrical Code Section, Batterymarch Park, Quincy, MA 02269. Full lists of technical committee panels 15 and 16 are available by writing to the above address.

Let's proceed to implement this system properly and in a spirit of cooperation. The problem of AC-induced audio noise is soon to be a thing of the past. Adequate standards are almost, at long last, a reality. ■

**Note:* *Previous articles written have referred to the system described herein as a 2-phase system. Although the point may be arguable, electrical industry people prefer to use the term "60/120V, single-phase, 3-wire" for this class of system mainly because it accurately describes the phase relationship and voltage between supply conductors as it is applied to equipment.*

***Note:* *Transformer manufacturers use a 120/60V designation to indicate a center-tap 120V transformer output. A 60/120V transformer designation indicates an "either/or" output (60V or 120V) but not both simultaneously. In either case, no center tap is available. This is completely contrary to the electrical system description where a 60/120V designation indicates a center-grounded neutral. Therefore, a 120/60 transformer supplies a 60/120V system.*

COURTROOM PRODUCTIO.
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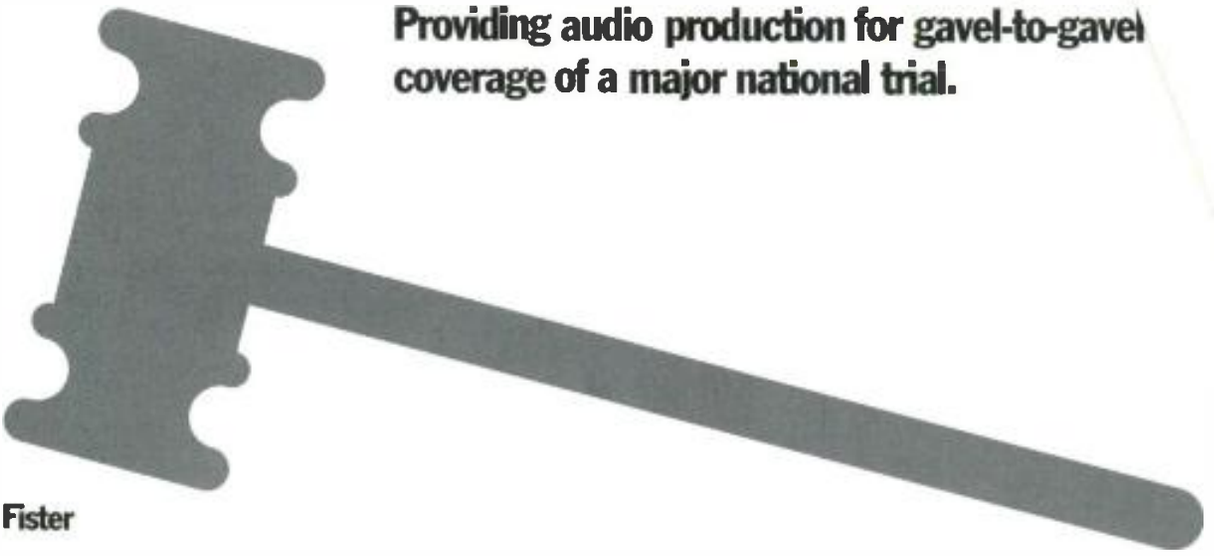

By Ray Fister

Courtroom audio for video has never been a bed of roses, with problems usually arising from HVAC, traffic or room ambience. And in this case, the challenge was mixing audio in a cavernous Milwaukee courtroom for the sanity trial of serial killer Jeffrey Dahmer.

CPI, a Milwaukee production company, was contracted by IDB of New York on behalf of *Courtroom TV* to shoot video and supply audio for the world. Even though CPI is mainly a TV and radio commercial production house, we have been working with IDB since the summer of 1991, covering various Midwest legal trials ranging from murder to prison break.

Shooting has generally consisted of a single camera in the courtroom, with a second camera on the streets doing live standups sent out via satellite. The audio would normally be a 1- or 2-mic setup in the court and one for the standup talent. The Dahmer trial opened a whole new "can of cable."

COURTSIDE

The dry run for the trial was the hearing held on Monday, Jan. 13, 1992, at the Milwaukee County Safety Building, where we set up the basic layout and fine-tuned the production. It must be noted that the judge, the Honorable Larry Gram, his bailiff and sheriff's deputies were most helpful and cooperative in letting us infiltrate the confines of the court. Because this was the first time that *Courtroom TV* had ever attempted a multicamera court event, director Mike Butler was sent to Milwaukee to control the program and to help refine the trial coverage.

Jury selection began on Thursday, Jan. 23. The first order of business was to run seemingly endless yards of audio and video cable throughout the courtroom on the fifth floor of the Safety Building, through a window in the forensic/mental health department, down to the media pool room on the second floor (luckily, just below the courtroom), to the *Courtroom TV* truck (supplied by Image Video of Canton, OH), and then to the satellite uplink truck (provided by IDB).

The Forensic/Mental Health department cooperated with us by supplying coffee and a telephone. (In return, I furnished them a direct audio and video feed of all courtroom proceedings. It never hurts to be friendly!)

The courtroom was, of course, huge, old, dusty and complete with acoustics from hell. Shortly before the trial began, the County of Milwaukee had installed a 10-foot glass wall between the court area and the public gallery to protect the defendant. Camera 1 was a Sony 3-chip M7 operated daily by David Michuda of CPI. This was located inside the glass on the defendant's side of the room about eight feet behind Dahmer's desk.

Camera 2 (affectionately referred to as "Robocam") was perched on top of the glass wall to the left of the room near the prosecutor's desk. The robotic camera was used to keep crew personnel to a minimum and to comply with the judge's wishes not to create any disturbance within the courtroom. The robocam operators were supplied on a daily basis by some of the local TV stations. Camera 3 was positioned also to the left of the room, facing the gallery, to shoot family and spectator reactions. CNN supplied the camera and the operators (known only to me as Ted, Bruce and Tom).

Another camera was located in the media pool room to shoot correspondent Steve Johnson. This camera was operated by CPI employees David Kagan and Dave Berger. An additional camera was used and operated by the locals to shoot the podium located in one corner of the media room for press conferences.

AUDIOLAND

As for the audio, the initial mic setup consisted of EV 635 microphones on the judge's desk, witness stand and prosecutor's desk. Because the attorneys would likely move around the courtroom, we planted a Tram lavalier mic on the front of the jury box to pick up speech directed at the jury, not originating near any of the other mics. We chose this mic because of its high quality of sound, plus the strong pickup with the surface reflection of the jury box helped out.

EV 635s were also mounted to the right and left sides of the court clerk's

Ray Fister is an audio production engineer with CPI Audio/Video/Film Productions, Milwaukee.

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moved to open n additional mics
snake. One ant's desk, to pick
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front Michael St. James to the
witness box.)

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en by using brown duct tape to
d the flat mic clip. And they sounded
eat! Some of the audio would be lost
as the lawyers wandered around the courtroom, but the lavs generally came through, covering most of the dead areas. Occasionally, the vent system and the normal court ambience would be heavy, but a bit of bass EQ cut helped.

We were originally not allowed to place a mic in the area directly in front of the clerk's desk, but about four days into the trial we were given permission to add one, so we chose a Sony ECM 50 lavalier to attach to the house mic (again to cover more of the dead areas.) This worked like a champ, giving the area a "linkage" to pick up the attorneys walking from their desks to the witness box (see diagram).

In the "lost audio" department, halfway through the first day of jury selection, the prosecutor, E. Michael McCann, wheeled out a podium from a corner of the courtroom for his statements to the potential jurors. We were told that this podium would not be used, so, of course, the podium saw some major action throughout the trial. At the end of the first day we placed another EV 635 on the podium attached with a Latin Percussion claw clip. These legal guys kept us hopping.

CABLE RUNS AND GEAR

In addition to all of these feeds, an audio and video feed for a VHS player (provided for the jury to view taped testimony) was run but never used. Perhaps this was a good thing.

We ran another EV 635 to the gallery for reporters who would witness any in-chambers proceedings to report to the media pool. Although this mic was used mostly during jury selection, it came in handy later in the trial.

Meanwhile, we were also controlling audio coming from the media room, consisting of the podium mic for press conferences and an overhead mic to pick up reporters' questions. There was also a separate feed for the *Courtroom TV*'s Johnson. Three separate buses were sent out at one time: channel one to the our truck, channel three to the media pool and channel four to the truck for the standup. The feed to

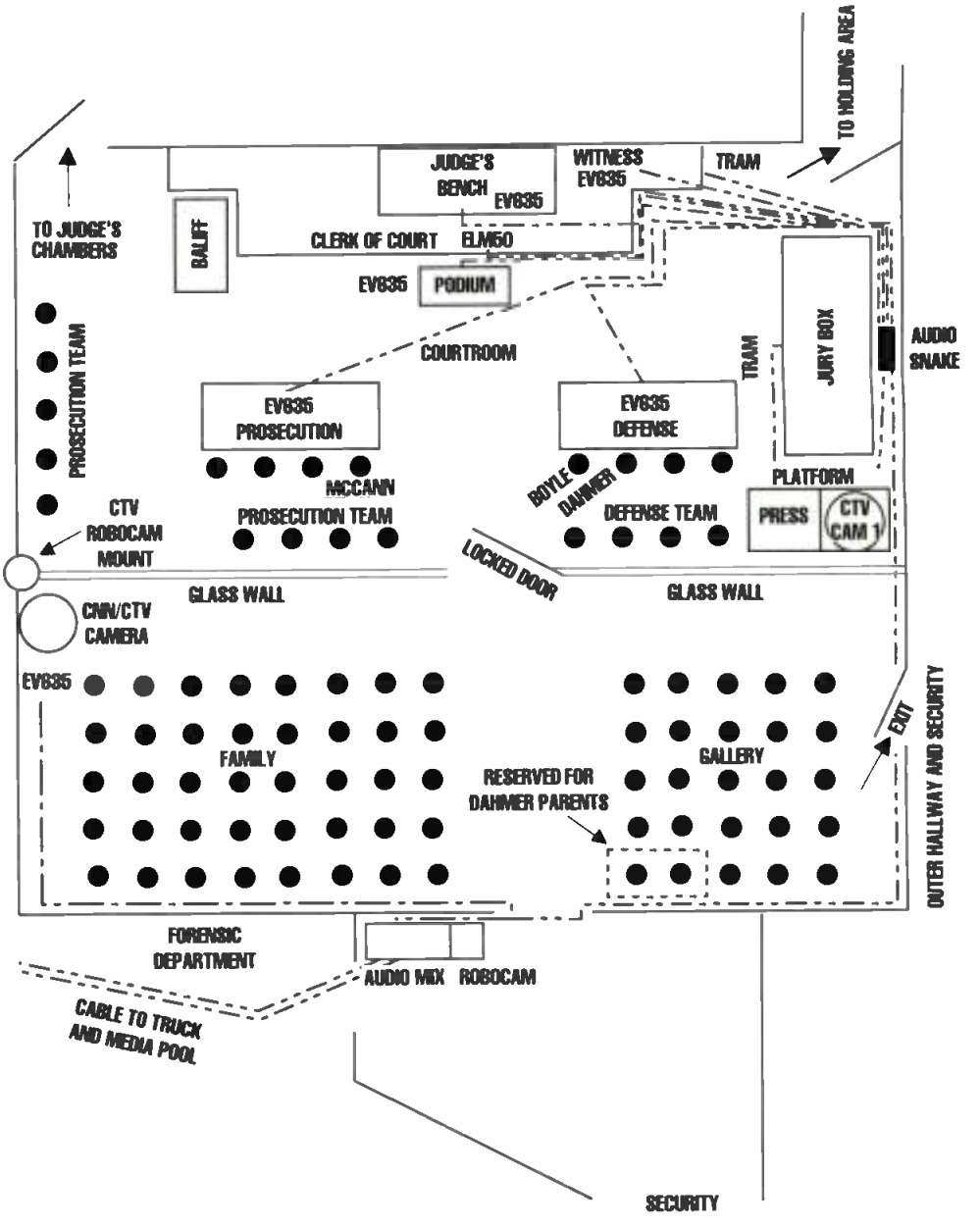

Figure 1. Diagram of courtroom showing production locations and wiring.

DAHMER TRIAL EQUIPMENT LIST

1-Ramsa WR-8112N 8x4x2 mixer
1-Shure 4x1 mixer
10-EV 635 dynamic microphones
3-Tram lavalier microphones
1-Sony ECM 50 lavalier microphone
1-9-channel Whirlwind snake
1-Sony video monitor
1-Realistic amplified speaker
1 pair-Fostex stereo headphones
Yards and yards of cable and multiboxes ■

PRODUCTION CREW

Director — Mike Butler (Courtroom TV)
Producer — Andy Regal (Courtroom TV)
Crew chief — James Kagan (CPI)
Switcher — Mark Kagan/Mike Sacks (CPI)
Audio — Ray Fister/Michael St. James (CPI)
Camera 1 — David Michuda (CPI)
Camera 2 — Locals (Robocam)
Camera 3 — CNN personnel
Camera 5 — Locals
Camera 6 — David Kagan/David Berger (CPI)
Technical support — Image Video, Akron/Canton, OH
Rentals — Video Images, Waukesha, WI (Tim Ward); Select Sound, Milwaukee (Dennis Frank) ■

the media pool was sent to one main multibox and from there was routed countless times to various other multiboxes in the room to service the local TV, radio and print media and the rest of the world.

Other than the main fader mix, I was sending (via the monitor mix-outs) one mix to the only TV station in town that was providing gavel-to-gavel coverage of the trial, and another monitor mix to a multibox located in the gallery of the courtroom for reporters (and for CNN live taping).

Above: Audio and video equipment located in downstairs media room/ press pool location.

Right: Author at audio mixing location outside of courtroom.

The main audio mixer was a Ramsa WR8112 8x4x4 configuration with a Shure 4x1 mixer run into one of the Ramsa's channels to submix the media pool audio and to supply tones. All of the main faders were active, as was the Shure. The channel assignments were as follows: 1) judge's mic; 2) witness mic; 3) prosecutor's mic; 4) defense mic; 5) jury box (Tram); 6) witness box (Tram); 7) clerk desk (ECM 50); 8) Shure mixer with input a) setup tones and gallery mic; b) media overhead; c) Jury VHS (not used); d) media podium; and e) overhead.

HOME BASE

The mixing area was located just behind a door to the rear of the courtroom. The Robocam operator was also located in this area. In order to monitor the audio and keep in touch with the director, I was listening to a single-sided intercom headset with a talkback mic and a set of Fostex T10 headphones using only one side. I also used an amplified Realistic speaker for backup (a good choice because of its compactness).

For three weeks, this was home. Our regular production clients piled up occasionally at our studio, making it impossible for me to always be at the trial, but this proved to be a needed break from the difficult proceedings.

Dealing with the subjects of focus during the trial was a different story. At first, Milwaukee County prosecutor McCann was unhappy with the open mic placed on his desk. Although we gave the judge, defense and prosecutor a kill switch near each mic, McCann was still concerned with having complete privacy while discussing matters with his associates.

I explained to him how I would run the mix by bringing up the levels of anyone addressing the court, jury or attorneys, and keep the gain down at all other times. This was important because the courtroom was very ambient. I took McCann back to our mixing position to show him how the console operated, and I assured him that his comments, both public and private, were my ultimate concern. Once he was happy, everything fell into place.

COMPLETE COVERAGE

There was virtually no audio in the court that we were unable to produce. During the initial hearings, we tapped into the courtroom's own house PA system. This consisted of mics for the attorneys, the judge and witnesses. The court mics were some old EV products, later replaced by new Realistic PZMs.

A 4-channel amp was controlled by the bailiff. Initially, picking up the house system proved to be a solid backup until the PZMs were brought in. After that, this system consisted mainly of feedback and the overall ambience of the courtroom.

Among the courtroom's security measures were a canine sweep of the court and surrounding areas for explosives or firearms, a metal detector in the hall before entering the courtroom, and many many extra-duty sheriff's deputies. These deputies were most cooperative and helpful in making our jobs run smoothly.

A typical day started with a 6:30 a.m. call (with court starting about 9 a.m.) and ended around 6 p.m. The day would begin with a standup from Johnson live to the satellite to recap the previous day's proceedings, and would end with the daily press conference and another Johnson standup. We were in constant touch with our truck, the satellite truck and the director in New York. Although the proceedings were sad, gruesome and emotional, they were boring most of the time. The director was responsible for keeping the crew in light humor and compliments.

On the last day of the trial the verdicts were read. Having left the gallery standup mic available, I was able to make use of it by capturing the families' reactions to the verdicts. Ordinarily, because of the glass wall dividing the courtroom, I would be unable to pick up any sound from the gallery. This was a handy bit of luck.

Striking the set was no easier than putting it all together, except that I was lucky enough to be preoccupied at the studio with clients, so St. James had to pull the audio down. After about three hours, all was wrapped, but the media room looked like a hurricane passed through.

Ultimately, this event was an act of trying to create a controlled set in a complicated space. Everything went well with the help of the professionals working together to pull it off. ■

CHECKING UP ON THE CURRENT STATE OF ELECTRONIC FRONT ENDS.

Modern Mic Preamps

By John LaGrou

Audio professionals are familiar with the trade-off between a console's quality and its cost. It's an unavoidable compromise. Console builders must make a conscious, deliberate choice of design philosophy and component selection to best target the budget and needs of their particular audio niches. Even the most expensive consoles cannot avoid certain inherent trade-offs. And for low- and mid-priced recording boards, sacrifices are an unfortunate side-benefit.

One console function that is routinely immolated is the microphone preamplifier. As a result, engineers often find it desirable to bypass console mic amps in favor of dedicated, external preamps. To get the most from your setup, you need to be aware of general design characteristics of outboard microphone preamps and know what designs are currently available.

In just a few years, the professional audio market has seen a rapid increase of manufacturers producing stand-alone, high quality mic amps. They are now available with tubes, FETs, bipolars, IC op-amps, hybrids, IC function modules, with transformer coupling, transformerless, and so on. Listed prices for stand-alone units run anywhere from $150 to $7,500 per channel.

There are many reasons why outboard mic preamps are gaining in popularity. One is the emergence of the small personal-use/project studio. Unlike large production studios where an entire band may track together, in many personal-use studios, tracks are often produced singly or just a few at a time. Many rooms have no need for numerous simultaneous mic inputs. For these studios, a small rack of high quality outboard mic amps is ideal.

Another reason for the growing use of stand-alone preamps is that creative engineers and producers desire a larger sonic color palette from which to express their work. When you consider that mic pres may amplify audio signals in excess of 1,000:1, it's no wonder that this single link becomes a key contributor to sonic coloration. These various colors and textures, in part, give our acoustically recorded sound its signature. If we rely solely upon our console mic amps, we could be missing some wonderful colors in the audio paintbox.

Outboard mic preamps are not for everybody, though. Some engineers we spoke with track through the console most of the time "for convenience." One symphony engineer noted that on multiple-mic symphonic recordings where the union scale ticks away, a decision for off-console devices might be outweighed by the additional time, cost and complexity incurred. Likewise, in a hectic production facility, a staff engineer simply may not have time to configure a rack of outboard pres. But when time and resources allow, external preamps are usually viewed as the right way to go.

DESIGN TECHNIQUES

Contemporary preamp design can be categorized into four types of active elements: discrete semiconductor, vacuum tube, integrated circuit, and hybrid (i.e., any combination of the prior three). Within these categories are found FETs, bipolars, IC function modules, IC opamps, discrete opamps and so forth.

An important design parameter is the coupling of input, interstage and output circuits. Common coupling methods include transformer, capacitor and direct. All preamps use at least one of these coupling methods, and many offer

John LaGrou is a principal of Millenia Media, an audio/video design, production and consulting team in Sacramento, CA.

a combination.

Within these classifications exists a wide array of design techniques and specifications, far beyond the scope of this article. It suffices to say that each design approach, when done well, has a definite place in professional audio and can provide the engineer with solutions not achievable in the studio console.

Most stand-alone mic preamp channels offer, at minimum, a balanced XLR-3 input with switchable phantom powering and gain control. Per standards, phantom voltage is usually supplied in series with 6.81kΩ resistors, though these resistors should be modifiable for use with speciality microphones. Gain control can be found either stepped or infinite. Infinite control often provides greater flexibility, as stepped controls frequently fall 'in-between' the desired gain range. One recently introduced preamp offers a concentric gain control with both stepped course and infinite fine tuning — a great idea.

Other panel functions found on modern preamps include high impedance DI inputs, overload indicators, VU meters, separated input and output gain controls, attenuation switching, remote gain control capability, phase switching, balanced/unbalanced switching, and selectable output impedance for bridging or terminated loading.

Preamp input impedance seems an issue of both personal taste and objective criteria. One preamp specifies an input impedance of less than 1000Ω, whereas another shows a figure of 7.8kΩ. Most preamps, however, claim a frequency-dependent input impedance between 1kΩ and 1.5kΩ. By definition, a minimum ratio of about 5:1 between preamp input impedance and mic output impedance is required for proper bridging. Too little input impedance will increase noise and unduly load certain microphones.

Many specifications play a purely objective role. These include voltage gain, input noise, common mode rejection ratio and so forth. Certain preamps are better suited for specific applications. If you're looking to purchase, review carefully your I/O requirements and select the best preamp for the intended venue.

It should be noted that such specifications as THD, slewing, frequency response and phase response are important but, curiously, do not always translate into a specific predictable sound quality. Such specifications should be treated with respect, but your ears should be the final judge of any preamp's performance.

Concerning measureable specifications, if the preamp will be used in environments where very long cable runs and EMI problems are common, assure yourself that the unit's CMRR is sufficiently high. One currently manufactured preamp has an audio range CMRR that drops below 35dB which, in our opinion, would not be suitable for use in electrically noisy environments.

Another key parameter is voltage gain. If you're using low sensitivity microphones, such as the Beyer M-160 (1mV/Pa), a preamp with less than 60dB gain may not always be suitable. Be sure that the self-noise of your microphone and preamp is also suitably low. Most high quality modern mics and preamps are designed with low self noise, though certain units may not be adequate in high gain situations.

Preamp designers are offering increasing amounts of available output voltage. Unclipped levels in excess of 30dBu are not uncommon. An ironic twist on this trend is the growing use of A/D converters. Most professional A/D converter ICs clip around 3V. Overload of this next important stage could be a real problem. The lesson here is know your system.

"EVERY ELEMENT OF THE SIGNAL PATH IMPACTS QUALITY."

SOUND QUALITY

Every element of signal path impacts quality, though sonic coloration in mic preamps seems to be most affected by the selection and design of active gain element(s) and I/O coupling. As such, included in the comparison matrix (See page 43.) is a listing of each preamp's gain element(s) and coupling methods.

Recently, in designing a 130Vdc Bruel & Kjaer-type preamp system for use with the Sacramento Symphony, we had an opportunity to test and listen to various preamp designs implementing discrete, IC op-amp, and IC function module designs. I'll briefly characterize our assessment of each, though the reader should understand that these opinions are limited to the few specific topologies we explored. In alternative topologies, of which there are many, the identical active device could exhibit a markedly different personality. The goal here is to provide the reader with a starting point and some technical background for further comparative investigations.

Our recent tests did not include vacuum tube units, though it is widely accepted that tubes provide a sonic character often unattainable with semiconductor technology. Good tube designs with high quality coupling can capture a very pleasing perspective on vocal and instrumental timbre. It's not hard to understand why fine tube mics, compressors, EQs and preamps are still sought.

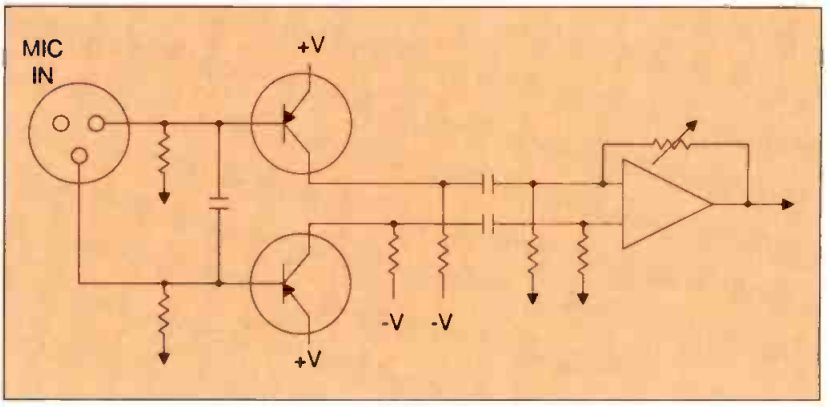

Figure 1. An example of discrete Hybrid direct feed design.

CHIPS AND ICS

We began our analysis with function module preamps. These little gems are near-complete preamps in a single IC package — add a power supply, and they're almost ready to roll. The benefits of function modules include relatively low cost, good audio technical specs, design simplicity and ease of manufacturing. They are commonly used in mid-line mixing consoles, and, although we wouldn't necessarily choose them for critical recording applications, most are superb for general use. For our applications, we looked at models manufactured by Burr-Brown and Analog Devices.

In our listening tests, we found that these function modules exhibited varying degrees of "personality," each adding its own subtle (and sometimes not so subtle) character to the original source. The exact sound character varied, owing to additional circuit design and loading characteristics, but overall might be described as wandering, to some degree, from the original timbre and sonic quality of the source.

Another similar design approach uses a single IC opamp. These chips usually exhibit low-noise, high gain/bandwidth, good common mode performance and stability. The venerable Signetics 5534As (or hot-rodded clones, such as the MA-332) still rank among the top performers in low noise, IC opamp solutions. The 5534As sound like 5534s, a device many are familiar with because they are so regularly put to use.

Better front-end specs on these designs can often be achieved by the inclusion of a coupling transformer at the inputs of the single IC, but be prepared to live with whatever sonic influence the transformer might contribute. If the secondary impedance of the transformer is well matched to the noise resistance of the IC, acceptable technical performance can be achieved, especially if a superior transformer is used.

Our tests with mid-line mic transformer units ($20 to $40) proved disappointing. Low frequencies, such as found on bass drum or large organ (60Hz and below) really suffered. If transformer coupling is in your future, settle for nothing but the best.

Ironically, coupling transformer coloration, whether slight or drastic, is often artistically desirable. In "Neve Retro," (*R•E•P*, February 1992), the process of rebuilding old Neve consoles was explained. Rupert Neve has said that the harmonic distortion of those 1960-era transformers contributed to his console's unmistakeable sonics. Old Neves, as well as modern transformer-coupled designs, are sought out by top engineers every day. In fact, the chart on page 43 shows that the majority of contemporary, non-console preamps are transformer coupled.

CLASS "A" AND HYBRIDS

Finally, we tested two families of discrete front ends, a pure Class 'A' approach and multiple discrete-hybrid designs incorporating a discrete transistor gain element before, or in feedback with, a monolithic op-amp.

The sound quality of the all-discrete Class 'A' approach is reminiscent of vintage Neve mic amps, but the design is difficult to manage technically. Finding the proper tradeoffs in operating current, gain settings, audio specs and stability over a wide temperature range can be elusive.

On the other hand, we found that the capacitively-coupled discrete-hybrid approach retains the transparency of a discrete front-end while minimizing the "personality" of the opamp. The hybrids take advantage of the IC's ability to accurately couple the front-end transistors and still maintain wideband stability. One example of this approach proved particularly transparent and was optimized and fine-tuned for use with high voltage B&K microphones. Some

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916-363-1096

PSE
612-866-4984

Rane
206-355-6000

Sontec
703-626-9177

Studio Tech
312-676-9177

Summit
408-395-2488

Symetrix 2
206-282-2555

Tube Tech
212-596-5958

other contemporary preamp designs substitute an all-discrete opamp in similar configurations, with positive results.

One last point: something we know from past experience again affirmed itself during our tests. The physical layout and critical reference paths (ground and signal) of circuits can often contribute to audible performance, especially designs prone to instability at ultra-sonic frequencies.

HOW THEY'RE USED

I spoke with a few leading engineers and asked them about their selection and use of outboard mic preamps. Here's what they said:

Tom Jung (DMP Records) said, "Mic preamps are much like microphones — all exhibit a unique personality. These days, all of DMP's recordings are converted to digital early in the recording chain. Usually, this means running a short cable from mic preamp to an A/D converter." Jung says that he is particularly fond of the Summit, Studio Tech, and P.S.E. preamps.

"For 2-track direct ensemble work, we especially like the Speiden stereo ribbon mic into the PSE," he said. (Author's note: Listen to index #9 of Bob Mintzer's Spectrum for a real sonic treat, DMP DT-461.)

"We also like our B&Ks into the PSE. The Summit has an especially warm quality that complements the starkness of certain digital conversions. DMP is currently testing a prototype Sony tube mic with a C37-type capsule. The Sony tube mic into the Summit tube pre really sounds great and will probably be used for sax on an upcoming Brecker project. We've also found the Studio Tech MPE to be a consistent, all around pre for medium gain applications."

Bruce Swedien (Michael Jackson, etc.) said, "In all cases, the music dictates my choice of microphone and preamp. I really have no favorite combination of preamp and microphone. I'll try new techniques for each session and each musician. The main thing I look for is the emotional response we get as a result of using the right mics, preamps and so forth."

Swedien said that he's found the mic amps in some newer consoles to be "one of the weakest areas." To overcome these weaknesses, he uses a collection of Neve 1064, 1073, and 1083 input modules, as well as the Massenburg 8300, Jensen, and Studio Tech MPE. Swedien says he "loves his GML" and that the Jensen is a "very good unit" but that the old Neves probably get used more than the newer designs. "Our tools are of great importance," he says, "but remember, nobody ever left the record store humming the preamp."

John Nowland (Neil Young, Merle Haggard, etc.) said, "We're doing a lot of work in Neil's studio using a combination of new and vintage recording gear. For vintage mic amps, we're using an old Neve console and Wally Heider's original UREI tube console. For new gear, we're using the Summit tube preamp quite a bit. We like the Summit with 6-string, steel guitar, and some of Neil's vocals.

"For other applications, we've been using the API 512b preamp modules. The APIs give us the punch and clarity we need for live recording and reinforcement," says Nowland. "In general, when choosing a mic and preamp, a lot depends on the talent's mood. We usually lean toward vintage tube mics into the Summit or Neve, but the feeling of the moment is what ultimately determines our choices."

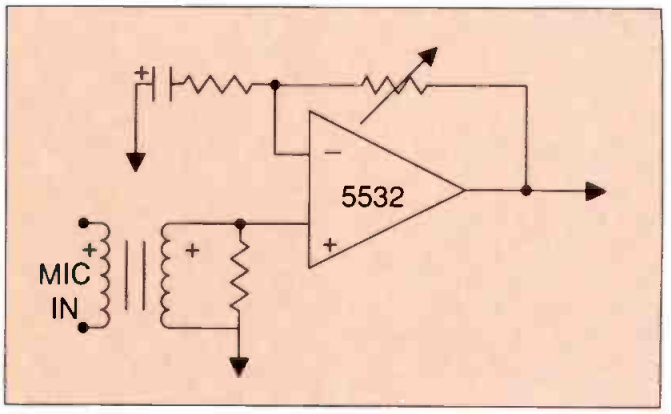

Figure 2. Simple transformer input.

Jeffrey Norman (Huey Lewis, Grateful Dead, etc.) said, "Some console preamps, such as the SSL, seem a bit bright, even brittle. In many cases, I'll bypass the console and use external preamps direct to tape. I really like the Lighthouse, GML, and Neve preamps." Jeffrey stated that "a top preamp with an average mic is preferable to an average preamp with a good mic." He tends to choose mic amps that have "a very full, warm quality with articulate low end response."

Norman says that "vocals are perhaps one of the hardest things to record successfully. We've had good results with Huey Lewis using a Neumann M-49 into the Lighthouse preamp. John Fogerty, as well, records convincingly on a U87 into the Lighthouse."

SUMMARY

One thing is certain: all microphone preamps, console or stand-alone, exhibit unique coloration to a lesser or greater degree. This has been observed repeatedly by numerous blind tests and, more important, everyday A/B comparisons in studios everywhere. If nothing else, this demonstrates that there is no such thing as a straight wire with gain.

Further, because of each preamp design's unique loading characteristics, any microphone will respond differently when matched to different preamps. With the seemingly infinite combination of mics, preamps, and source material, all we can do is try new variations and techniques. This is one place where an engineer really applies the art.

We can argue that *accuracy* is the critical measurement of preamps. And in many applications, such as when recording the acoustic environment of a symphony orchestra, accuracy *is* crucial. But the questions must then be asked, "By whose definition or opin-

The matrix to the right shows nominal configurations. Some manufacturers offer optional coupling methods, mounting configurations, gain structures, etc. Items with an asterisk require purchase of additional equipment, such as a power supply and/or dedicated rack.

ion of accuracy? Should the recording resemble what the conductor, the person in 15th row center or the second tier right hears? In what venue? With what acoustical treatment? Using which microphones and cables? And will one preamp perform best under all such parameters?

Subjectively, certain preamps might not be chosen for orchestral recording. However, those "reject" pres might sound terrific on tomorrow's vocalist or next week's jazz flugelhorn. We'll never know until we try. If you sample a comparison, you'll find that there are no "bests," only "differents." Some combinations will be ideal for your specific applications and microphone selections. Put them through the rigors of your next sessions and find the "paint brushes" that fit your own sonic palette. ■

MIC PREAMP FEATURES

MANUFACTURER	MODELS	ACTIVE CHANNELS	ELEMENTS	GAIN	IN	OUT	RETAIL PRICE
API	3124	4	DS	60	XFM	XFM	$2,095
	512b*	1-4	DS	60	XFM	XFM	695/ch
Avalon	M2V	2	DS	62	XFM	DIR	3,090
	M22*	2	DS	62	XFM	DIR	2,590
Benchmark	MPS-400	4	DS/MO	73	CAP	CAP	1,460
DeGeer	MANIBUS	2-6	DS	65	CAP	CAP	15k/2ch
Focusrite	ISA-116*	4	MO	60	XFM	XFM	3,200
Hardy	M-1	1-4	DS	60	XFM	DIR	1,397/2ch
Innovative	VTMP-2	2	VT	52	XFM	CAP	1,549
Jensen	Twin-Servo	1-4	DS	60	XFM	XFM	2,390/2ch
Lighthouse	EF-85	2	DS	55	XFM	DIR	3,200
Manley	DMMP	2	VT	60	XFM	CAP	2,400
Massenburg	8300*	2,4	DS	70	CAP	DIR	3,300/4ch
Millenia Media	HV-3	2	DS/MO	65	CAP	DIR	1,150
PSE	MIC-1	2	DS	70	XFM	CAP	1,500
Rane	MS-1	1	FM	60	CAP	DIR	189
Sontec	MPA-1*	2	DS	70	CAP	DIR	785
Studio Tech	MPE	2	DS/MO	68	CAP	DIR	795
Summit	TPA-200A	2	VT/DS	70	XFM	DIR	1,950
Symetrix	SX-202	2	FM	53	CAP	CAP	299
Tube Tech	MP1A	2	VT	70	XFM	XFM	1,965

DS=Discrete Semiconductor, MO=Monolithic Opamp, VT=Vacuum Tube, FM=Function Module, XFM=Transformer, CAP=Capacitor, DIR=Direct

Live and Direct

Beyond Left and Right: Bringing Power to the People

By David Scheirman

Improving the distribution of sound to audiences at concerts and special events often requires going beyond the typical left stack/right stack approach to sound system setup. Audiences can be served with a twin-stack, or double array system, but more events are using distributed systems to offer improved fidelity, better coverage, and special effects imaging.

In the past the term "distributed system" often meant nothing more than a bunch of small paging speakers, strung together on a 70V line in a ballroom, convention hall or restaurant. Today, this term can encompass any sound reinforcement system that makes use of more than just left and right main speaker arrays.

Reasons for going beyond left and right can include the following:

- Providing greater involvement in the stage show for more of the audience: large-scale video technology brings the visual image closer. A properly designed and implemented distributed system can give the audio image more presence and impact.
- To reach asymmetrical audience areas. When an event crowd is not set up in a convenient, easy-to-cover rectangle, it takes strategically placed delay stacks or other specialized system branches to get the sound where the people are: in a building annex, a side alcove, or a series of upper balconies.
- In large-crowd situations, such as outdoor concerts at stadiums, the quality of sound for the large audience is helped enormously when the sound is distributed through the use of mid/high frequency arrays at the halfway point, or full-bandwidth delay arrays in the rear of the audience area.
- For special effects imaging. 'Quad sound,' such as has been used by groups like The Who, Pink Floyd and Rush, relies on special loudspeaker arrays located at the side or rear parts of the audience area. Even on a smaller scale, this technique can be quite effective, whether for live concerts or for use with playback program material at corporate presentations or theatrical events.

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

LEFT/CENTER/RIGHT

The first step in going "beyond left and right" often means adding a center array. This can be a smaller stage-level system for front-fill audience coverage or a full-scale hung array that handles only vocal and solo instruments, or it can be the primary sound source for an installed performing arts center system, which then relies on left and right speaker locations to widen the program's sound image or to place stereo effects.

UNDER-BALCONY SYSTEMS

The same type of buildings that benefit from central clusters also often require under-balcony distributed systems to provide optimum sound in these acoustically different areas of the audience. Smaller, low-profile speakers are required with proper hanging and rigging fittings.

DELAY TOWERS

Anyone who has attended a number of major, outdoor rock concerts has probably encountered delay towers: scaffolding located several hundred feet back in the audience area, supporting speaker system arrays intended to take up where the stage-area system leaves off. This is particularly important for high frequencies, which are more susceptible to gain loss-over-distance than are lower frequencies.

Without delay arrays, an outdoor mega-event for 25,000 people can sound less than impressive if you're at the rear fringe of the audience area.

DISTRIBUTED DELAY RINGS

Shows of all types can benefit from the setup of delay speaker 'rings' that are carefully placed to assist the stage sound starting at 100 or 150 feet into the audience area. In low ceiling hotel ballrooms and convention centers, this technique can mean the difference between sound problems and a sound triumph. Logistics can be a challenge; precise location and the safe running of speaker cables is important.

Delay 'rings' allow greater control of the sound in different parts of the audience area, particularly when they are properly set up in zones with level, signal delay and EQ adjustment for each area.

POTENTIAL PROBLEMS

Whenever your sound system moves "beyond left and right," that means locating some of your loudspeaker system resources in areas that may not be as accessible, secure or practical as the traditional left/right sound wings. Is the labor time available to get the gear out there, set it up, tweak it, use it, and tear it down? Is the security available (fencing, guards, scaffolding, etc.) to safeguard the gear in the crowd environment? Is the existing electrical power distribution system able to handle the extra load of long ac runs to amplifier racks several hundred feet away?

For these reasons and more, rental sound system contractors can command a healthy, well deserved fee for providing distributed-type sound systems. Even the simplest vocal-only paging system for a small-town bicycle race must confront the above issues. Where will the speaker towers be located? How does the speaker line get strung without being a safety hazard? How will the system be zoned correctly to prevent echoes?

TECHNOLOGIES THAT HELP

There are several important aspects of a properly distributed sound system design:

- Digital delay units. Become familiar with high-quality, user-friendly delays. Don't try to use low-grade, musical instrument effect-type delays. Remember that your entire program mix is passing through this important part of the signal chain. Units with multiple delay 'taps' such as a 1x3, 2x4, etc., are particularly useful. The ADD-3 from Audio Digital, the DN-716 from Klark-Teknik and the YDD-2600 and DDL-3 from Yamaha are useful tools.
- Distribution amplifiers. simple high-quality DAs (often in 1-rack space package, with 1-in-4 out or 8-out configurations) from companies like Aphex, Ramko and RTS allow the system operator to take the program mix and send it to four, eight or more speaker system zones with individual level control of each send.
- RF signal links. When the system

(Continued on page 56)

Choosing The Right Analog Operating Level

By Del Eilers

Deciding which operating level to use, let alone understanding the options of an operating level, can be confusing and frustrating. By following some basic guidelines, you should be able to eliminate some of the confusion in choosing which level to use.

Operating levels are discussed using three different units: dB, VU and nano Webers per meter, which all measure the same thing. dB, of course, stands for decibel, and VU for volume units. Nano Webers per meter (nWb/m) is the measurement unit of recorded flux on the tape.

dB and VU are the same except that a VU is measured using a standard volume indicator or VU meter. dB can be measured on many different meters with different meter ballistics. The VU meter, however, has standardized, defined characteristics that are intended to make all VU meters react in the same way to dynamic levels of sound.

FLUX LEVEL

A number of years ago, it became standardized that the recorded flux level be indicated for playback rather than VU, where the zero calibration can be changed. The fluxivity measurement is expressed in units of flux per track width, so that the number is independent of what recording format is being used. The standard numbers are expressed as nano Webers per meter of track width.

There are two different measurement techniques used in measuring recorded tape flux. One technique was used by a German alignment tape manufacturer and another by U.S. manufacturers. These techniques result in about a 10% difference in value. Thus, if you use fluxivity values, you should know whether you are using the U.S. short circuit measurement number or the European open circuit flux measurement. The chart lists the commonly used values for each.

Del Eilers is a Senior Technical Service Specialist for the Professional Audio/Video and Specialty Products Division of 3M Company.

FLUXIVITY VS. OVU

The zero on a tape recorder can be recalibrated to a wide range of recording levels. Back in the '50s and '60s, the VU meter was calibrated so that the zero conformed with the broadcast standard operating level, the NAB (National Association of Broadcasters) level. This was done so that recordings exchanged would all play back at the same level throughout the broadcast industry and that these recordings could be interspliced with each other.

The maximum recommended operating level shown in the chart relates back to the basic practice of where to set the operating level. That level is determined as 8dB below a recording level which yields 3% third-order harmonic distortion in the playback of a midrange sine wave (pure tone) recording.

The tone is usually 1kHz. As the recording level of the tone is increased, eventually a point is reached where significant harmonics can be heard and measured in the playback of this recording. It is generally accepted that when the playback of a recorded tone has third-order harmonic distortion information that is 3% in amplitude of the fundamental, that recording level is the maximum level for the tape, a point where the harmonic distortion products in program material can barely be heard.

One practical problem with audio recording is that the information you wish to record is rarely steady and constant in level. Since there needs to be a cushion between peak levels indicated by the VU meter and where distortion actually occurs, and in order to compensate for the "slowness" of the VU meter, the zero level is set at a significantly lower level than the level where distortion occurs. The recording engineer must choose an operating level based on the compromise of how peak levels and transients sound and how much tape noise will be heard underneath the program material. The higher the recording level, the less tape noise will be under the signal, but the greater the risk of having transient sounds lose their punch and realism.

HOW MUCH HEADROOM DO YOU NEED?

Today's electronic musical devices have given us the ability to create sounds that don't occur in nature and can have significantly greater peak levels during these transients. Someone recording this type of program material is likely to determine a need for headroom greater than the conventional 8dB. Thus, an engineer would calibrate the VU meter's zero point for a fluxivity level that is greater than 8dB below the tape's MOL.

When recording live performances or one-time-only unique sound effects, it is also likely that the recording engineer will want greater headroom. Live performers almost always perform more loudly in the actual concert than they did in any rehearsal.

Some engineers like to hit the tape hard with high recording levels in order to use the tape as a soft limiter. If this is the recording technique preferred, then switching tapes to one with a different MOL means that the 0 level on the VU meter should be recalibrated. ■

Level Comparisons

ANSI (U.S.) nWb/m	DIN (German) nWb/m	dB Referenced to185 nWb/m	3M Tape Type Operating Level
520	570	+9dB	#996
370	410	+6dB	#226, 227, 250
250	280	+3dB	#206, 207, 806, 807
185	200	0dB	Original NAB Standard

ANSI is the American National Standards Institute, the U.S. standards body. DIN stands for Deutscher Industrie Normenausshuss, the German standards body.

This article is an excerpt from "Choosing The Right Operating Level - To Change Or Not To Change," literature item number 84-9811-5450-7, which is free from 3M Professional Audio/Video and Specialty Products Division, 3M Center Building 223-5N-01, St. Paul, MN 55144-1000.

Digital Domain

OMF: Open Media Framework

By Rick Schwartz

Since the first SPARS conference on digital audio workstations four years ago, there has been much talk but little action to allow users of different workstations to exchange sound files. Mack Leatherby would like to change that. Leatherby is the audio product manager for Avid, a company known for its video production software for Macintosh. He outlined Avid's plans at this year's SPARS event, which took place in Los Angeles May 16 - 17.

According to Leatherby, Avid believes that technology's next step will be the integration of digital media in computer-based technologies. The people at Avid realize it will not be an easy task.

"In addition to the technical issues, there are also political issues and end-user concerns," Leatherby concludes. "We need to come up with a simple solution for a really complex problem — our solution is called the open media framework (OMF)." In short, Avid's OMF is a software architecture for digital media integration through a common set of software services and interchange formats.

A 3-PART PLAN

According to the white paper documents released by Avid, OMF will be a cross-platform strategy that allows users to import files without translation. Development of OMF will evolve through a series of different introductions. Phase one, demonstrated at the last NAB conference, shows direct import and export of digital media between different vendors. Phase two is scheduled for this summer when Avid publishes a draft version of its file interchange standard.

The final phase is far more ambitious. During the fall of '92 Avid will introduce the OMF engine, derived from core technology developed for the Avid Media Composer. This will allow third parties to create applications based on the OMF engine, or to add new features to existing products using this technology.

Leatherby adds, "What we see for the future is a building block environment, enabling a user to work on one machine for sound manipulation and integrate that work into a video post-production environment."

ANY QUESTIONS?

At the SPARS event the talk was unfocused and dry, but the spirited question and answer session which followed was the high point of the entire conference. Some of the attendees found it a little disconcerting that a video company was proposing standards for audio products, a charge that Avid strongly denies, saying it has supported 44.1kHz digital audio from day one.

In the midst of all the manufacturers lining up to praise Avid on its noble undertaking, one voice of reason raised some important questions. Tom Scott from Lucasfilm who stepped up to the microphone, causing quite a stir.

Scott said, "The thing that bothers me about this is, I look at the work that's been done (on OMF) so far and I don't see any work — all I see is marketing. I look at the list of manufacturers, and there is very little overlap. It's as though a group of manufacturers with dissimilar products got together and said if you can sell my stuff for me, I'll sell your stuff for you." Scott also mentioned the conspicuous absence of key players like Sony and Emc (an Avid competitor).

He continued, "As a way to sell Avid products this looks terrific, but where are all the other video editors and media." Leatherby said, "Your point is absolutely valid, and, as I said, this thing is open. Anybody can participate. We spoke to folks at Emc and some of the other companies. OMF is not something where people are locked out; participation is available to all vendors." According to Avid, about 30 companies have agreed to participate by NAB.

STANDARDS BY COMMITTEE

Scott also asked why Avid did not take part in any of the industry's standards meetings. There was no response. Although two or three meetings have been held, Scott commented that he felt the committee headed by Bill Hogan had gone almost nowhere.

According to Andy from Buzzy's Recording Service, one of the big stumbling blocks in the standards meetings was choice of language — what he calls "media dialect." Because of the different backgrounds and perspectives of committee members, he believes they were talking "at" each other. For example, he mentioned one company that used the word "store" as a noun and another used the word "store" as a verb.

Scott adds, "It was like sledding through molasses to get the committee together often enough to get any real work done. All of the manufacturers would like to be at the standards meetings, but they just can't be — so, it's going to take some sort of an ad hoc arrangement like this that will take this and present it to the standards committees."

"The thing that bothers me about this is, I look at the work that's been done (on OMF) so far and I don't see any work — all I see is marketing." - Tom Scott, Lucasfilm

PERFORMANCE PROBLEMS

David Fredrick of Sonic Systems raised the performance issue. "We need to keep in mind that every manufacturer has optimized its filing systems for (maximum) performance. If you're talking about putting together OMF in the same manner that MIDI was — quite frankly MIDI didn't turn out that well. Let's not shoot for the lowest common denominator. We need to keep in mind that each system has optimized the way data is stored and organized (on disk). If you're asking the manufacturers to give up performance in order to adhere to a standard, I don't think you're going to please anyone."

Another manufacturer added, "I know that we're signed up for this, but there are major questions in my mind. I'm alluding to how hard it's going to be. I would hope you will spend the necessary time looking at the needs of audio, because if you want our support, you are going to have to. As soon as one company feels like the standard is not going to fulfill its needs, it's going to sign off from it."

(Continued on page 57.)

Rick Schwartz is a contributing editor to R•E•P and director of post-production at Music Animals, Los Angeles.

R•E•P: On-Line

A Short Forum on QuickTime

By Tim Sadler

R•E•P contributing editor Rick Schwartz recently dropped in on the forum to weigh in on the issue of who will set the audio standards for digital workstation file transfer. Here are excerpts:

From: Tim Sadler, (R•E•P) #75300,3142
To: Rick Schwartz, #70672,1377

Hey, Rick! Welcome to the forum. For those who don't know Rick, he is director of post-production at The Post Complex, a Los Angeles studio facility.

As one who has watched in awe as desktop, non-linear editing has come of age, I have often wondered when the issue of standards would raise its ugly head. I say ugly because this issue is so often misunderstood and can cause developmental paralysis in an industry. Sometimes it's better to let Darwinian, defacto standards fall into place, sometimes not. But an aspect often overlooked is that a robust exchange format will provide all the standards that are really necessary.

Programmers and developers don't like standards, because they fear the imposition of limitations in their proprietary code. A strong exchange format mitigates against these limitations. Video people will *not* watch out for audio's interest. A case in point is Apple's QuickTime. Even with enough hardware to produce 30fps video, you are saddled with a 22k sampled audio rate. Are we going backward, or am I facing the wrong way? We have had 44.1k audio on the desktop for more than two years! Apple took the available bandwidth and carved it up in favor of the picture.

From: Rick Schwartz, #70672,1377
To: Tim Sadler, (R•E•P) #75300,3142

With all of the hype that QuickTime has gotten, almost nothing has been written about its audio capabilities. I have been told that the RastorOps MediaTime card will digitize audio at 44.1kHz along with 30fps video that can be played back as a QuickTime movie. If this is true, QuickTime may still have a place in the pro audio industry. If not, audio continues to be the forgotten stepchild of video. I have mixed feelings about a video company being involved with audio standards. If an audio manufacturer proposed a standard on their own — other companies would be tempted to shoot it down, just because that company is a competitor.

From: Rich Parker, Sysop #75300,2405
To: Rick Schwartz, #70672,1377

Rick, I very much believe in standards that integrate various mediums of expression. PostScript is an example of this for the print world, and this integration of graphic images and text has spurred the development of completely new production tools, which are now called "imagesetters" instead of "typesetters." Of course, this is old news now. There is a great deal of interest in providing standardized file formats so that any DTP application can both view and edit any document produced by any other application; this is sure to come to pass, as industry leaders are currently working toward that end.

We live in an age of "multimedia," and it is not the least outlandish to expect that all current media will merge in the near future to provide consumers with all variety of real-time video, audio and still-image I/O. If it requires the impetus of a video company to start the ball rolling to attract the attention of the audio companies so that a compromise technology can be developed, then I believe that it's to the betterment of all. This is just my (humble) opinion.

From: Bob Olhsson, #72340,17
To: Rick Schwartz, #70672,1377

QuickTime audio is also rarely if ever in sync! I was very disappointed that Apple also neglected to lay down timing resolution standards, which means developers products are unlikely to work together without lots of tweaking. The bottom line to me is, "Can you earn enough per hour using QuickTime to pay for a Macintosh?" The answer I see is "No," which then defines QuickTime as a very expensive toy.

File access or fast exchange formats will have to happen, in my opinion, before this stuff will ever really be practical. The reason is because people who are getting paid have to meet deadlines, which means unexpected delays, dead equipment or scheduling hassles can only really be covered by the ability to easily move a project to another

(Continued on page 56.)

POST MODERN PRODUCTION

By Francis Daniel

The obvious fact is that an increasing level of high-quality audio work is being done in facilities that have little, if any, acoustical design. The historical truth is that some very good audio has come from acoustically questionable spaces. Talented ears can "hear around" all kinds of obstacles, including badly designed rooms. It's a challenge, and there are surprises, but it can be done.

Several factors have combined to multiply this occurrence in recent years. The most significant development is the proliferation of relatively inexpensive digital equipment that has allowed a lower entry price into the pro audio industry. On the other hand, there is no corresponding price reduction in acoustics; Sheetrock, fiberglass and concrete cannot be sampled. It still costs a lot to build a good facility.

Here we are with the remains of a post-'80s economy. More people are getting into the business at a lower cost, and everyone, including your clientele, has less money to burn. It is not surprising that few people are rushing out to spend $350 a square foot to build nice, new rooms.

Enter the "Project Studio," a catch-all term for any space that has equipment and a professional product. What can people in this category do to progress profitably? Fortunately, a lot – with good guidance and relatively little money. There is good design advice and sophisticated acoustical treatment available at realistic prices. With a fax machine, Federal Express and the telephone, you can get a lot of designing bang for your buck. And if you can see through the hype, you'll find more advanced acoustical products around.

IMPORTANT QUESTIONS

Let's look at the first thing you definitely should do. Consider not how your room sounds to you, but how it will sound to your neighbors. The word is isolation. If you need it, and don't have it, you could be in big trouble. Law suits are still a growth industry.

The time to think about this is before you commit, when you can still act on professional advice. I turn away calls all of the time because the prospective client has already bought a space that simply cannot be adequately isolated. There is no magic here. The laws of physics still apply, no matter how many voodoo artists claiming to be studio designers tell you otherwise.

It may be hard to discern whom you should listen to. Anyone can give you good references and not mention their disasters. Because the isolation issue is a basic one that professional acousticians, as distinct from studio designers, deal with all of the time in many contexts, you might ask designer candidates what other kinds of acoustics they do. Incompetence doesn't last very long in the tough world of major league architects and developers. This is the larger world of the professional acoustician, one that requires unique training.

You can also perform a second objective evaluation. Does your candidate belong to the appropriate engineering organizations? Membership in The Audio Engineering Society and The Acoustics Society of America are two good indicators of those who are keeping up with the field of acoustics, not just talking a good game. The pros will belong to both.

Once selected, there is some good news: it should not take thousands of dollars to review your space and give you a report. In a recent real life example, a drummer who bought a loft space with a wood joist floor and residential neighbors below found that he was in trouble, period. In this case, a free telephone call was all it would have taken to avoid an insurmountable problem.

SOUND MATTERS

The second area to consider, after isolation, is the acoustic characteristics of the room itself. Do not assume that because you are listening on so-called nearfield monitors (come see my paper at the October AES in San Francisco) the room doesn't matter. It does, in many ways.

On the upside, small spaces are not condemned to "no bass." We all know examples that disprove this nonsense. The automobile listening environment and headphones are two obvious cases. In fact, it is probable that more hours of listening are done in these environments than in rooms, and they both enjoy lots of bass.

What does happen in small rooms is that at low frequencies there are fewer (or no) resonant modes (standing waves) to reinforce some frequencies, and please note: cancel others. In fact, the room response below the modal region is smoother than above it. The bad news is that your woofers better be able to generate those low frequencies by themselves, without those energy-storing modes to help things. Subwoofers are worth considering.

The historical truth is that some very good audio has come from acoustically questionable spaces.

The next item to look at is the ceiling. Reflections from the ceiling are a common fact, and they will raise Cain with your stereo imaging. This one is easy to solve with the appropriate treatment applied to the area between the monitors and the listening position. The easiest solution is to glue some Sonex up there. More sophisticated solutions allow absorption of the loudspeakers' direct wave while allowing diffuse reflection of the later room sound.

Finally, if your back is to the wall, literally, you also have reflections from there to contend with. The ever-present modular diffusers used by so many designers are not always the answer. Some of us feel that you really need to be at least four feet away for them to sound good. If you don't have that much room, consider some other solutions.

To summarize, if you have a project studio and have neighbors, get a professional acoustician to check out what can be done before you start. With proper interior acoustical treatments, your project studio can sound great — and you can have good bass. A little design advice and the right materials are all it takes. Just don't expect nearfields to make the room, or your neighbors, disappear. Only headphones will do that. ■

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For information about SPARS, contact Executive Director, Shirley Kaye, at 800-771-7727.

HANDS ON:

RAMSA WR-S4424 MIXING CONSOLE

By Jim Williams

I don't know about you, but I am always amazed when products are released offering better performance at a lower price. Take mixing consoles. It seems it wasn't too long ago that live boards ran up 5-figure price tags for even the lower level models. Now the Ramsa division of Panasonic has released three cost-effective live mix/recording boards. The WR-S4400 series are offered in 12-, 16- and 24-channel versions, all listing for under $3,200. The model being reviewed here is the largest, a 24-channel WR-S4424.

These consoles are 4-bus designs, with additional left/right main stereo outputs. Each bus has a 12-segment LED meter display, and there are two additional meter displays for the main outputs and PFL levels. Meter select switches allow swapping the meters to the four aux sends. Electronically balanced cross-coupled circuits drive the group and main outputs from XLR connectors.

The input modules feature switchable A or B inputs (mic/line), with A being an XLR-3 with selectable 48V phantom and a range of -60dB to +4dB, and B covering -54dB to +10dB on an unbalanced jack. Both have a factory stated 20dB of headroom. The 3-band EQ sports fixed high and low shelving curves at 12.5kHz and 70Hz, and a sweepable middle covering 200 to 6.3kHz. The long throw faders are a special design mounted at a right angle, which should help in keeping dirt and fluids from entering the element.

Each module has a mute switch and four aux sends, with the aux 1 pot routed to a direct out jack via a switch. These direct outs can be used as an additional "single channel" aux send, or as adjustable feeds to a multitrack recorder. Aux 3 and 4 are selectable pre- or post-fader, and all the auxes can be jumpered internally to select pre- or post-fader, pre- or post-EQ. A pre-fader listening, or PFL switch, is fitted along with signal present and overload indicators. The insert pickoff points are pre-EQ, with the typical tip-ring-sleeve format.

The four group modules have the usual fader and balanced outputs, plus mutes and pre-fader insert points. A panpot to stereo mix is included as are PFL switches. Also included on the group strips are the master aux rotary faders with PFL switches and the four effects return pots with assignment switches and panpots. The master left/right outputs are similar to the groups, minus the panpots, but there are additional pre-fader, pre-insert recording out jacks, a nice feature. In keeping with this "dual domain" concept, the 4424 has a small monitoring section oriented toward recording and live sound monitoring.

The monitor section offers headphone feeds and control room feeds, as well as the PFL mix and logic switching. A mono switch is available to check mono compatibility. The control room monitor output is useful as a separate summed L+R pair of outputs for feeding a center cluster or front/side fills. Ramsa has thoughtfully included an internal jumper to remove the board's PFL feed to the CR output for just such an application.

Also included are talkback facilities with routing to the groups, auxes and mains. The talkback can be used for audience announcements, or band cues, and as talkback to auxes during recording or slating tracks. Club sound mixers will appreciate not having to

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eat an extra input module to announce acts.

THE LAB TESTS

Whenever a reasonably priced device is tested, one tends not to expect ultimate performance. But this console does very well. Even if it was twice the cost, it would compete favorably with other pricier consoles.

Figure 1 plots the frequency response from a microphone input to the main outputs. The low end is down 0.5dB at 20Hz, and the cursor pinpoints the -3dB point at an impressive 80kHz. Phase shift is equally linear with 32-degree shifts at 20Hz and 20kHz.

Figure 2 shows THD and noise vs. output level. THD is even with frequency, and it hovers in the 0.007% region at +4dBu out. Similar measurements of SMPTE intermodulation distortion vs. level showed that at +4 out, the IMD spots at 0.005%. All the distortion tests made show the spec deteriorating slightly with increasing level, probably because of PC board layout effects, such as stray capacitance, inductance, op-amp drive and bandwidth restrictions, or a combination of all. This is pretty typical.

This climbing THD doesn't normally show up when op-amps are tested out of large systems, but it tends to show up when there are large amounts of PC board real estate to cover near ground planes and power and output traces. In a perfect world, the THD should bottom out just below the clipping point and not make much of an upswing before clipping.

Figure 3 measures the stereo crosstalk of channels 1 and 2, panned hard left and right, and sent to the main output busses. Our -67dB measurement is typical, and falls just shy of Ramsa's published spec of -70dB. It should be noted that a number of factors (such as signal drive level and module gain staging) effect crosstalk, so some deviation from the published crosstalk spec is possible in normal measurement variations.

A sweep of the mic input common mode rejection ratio, or the ability of the balanced input to reject such outside noises as hums and buzzes, showed a consistent -64dB throughout the audio bandwidth, which is quite respectable. Ramsa claims an impressive -80dB at 1kHz, but I couldn't achieve better than -64dB.

Again, drive signal level and mic preamp symmetry (resistor tolerances in the balanced legs, for example) can have a major effect on measured CMRR. There is no one commonly practiced standard for measuring CMRR. For this measurement on the Audio Precision, I used a 2V signal padded down by 10dB and fed to a mic input, with the indicated results. A higher input level than that possibly used by Ramsa, or one channel with looser mic preamp resistor tolerances, would most likely indicate higher CMRR values than factory spec. Tolerance-matching on the mic preamp legs (inverting and non-inverting sides) and drive level is everything here.

Figure 4 plots the noise of the main bus with one channel assigned, and

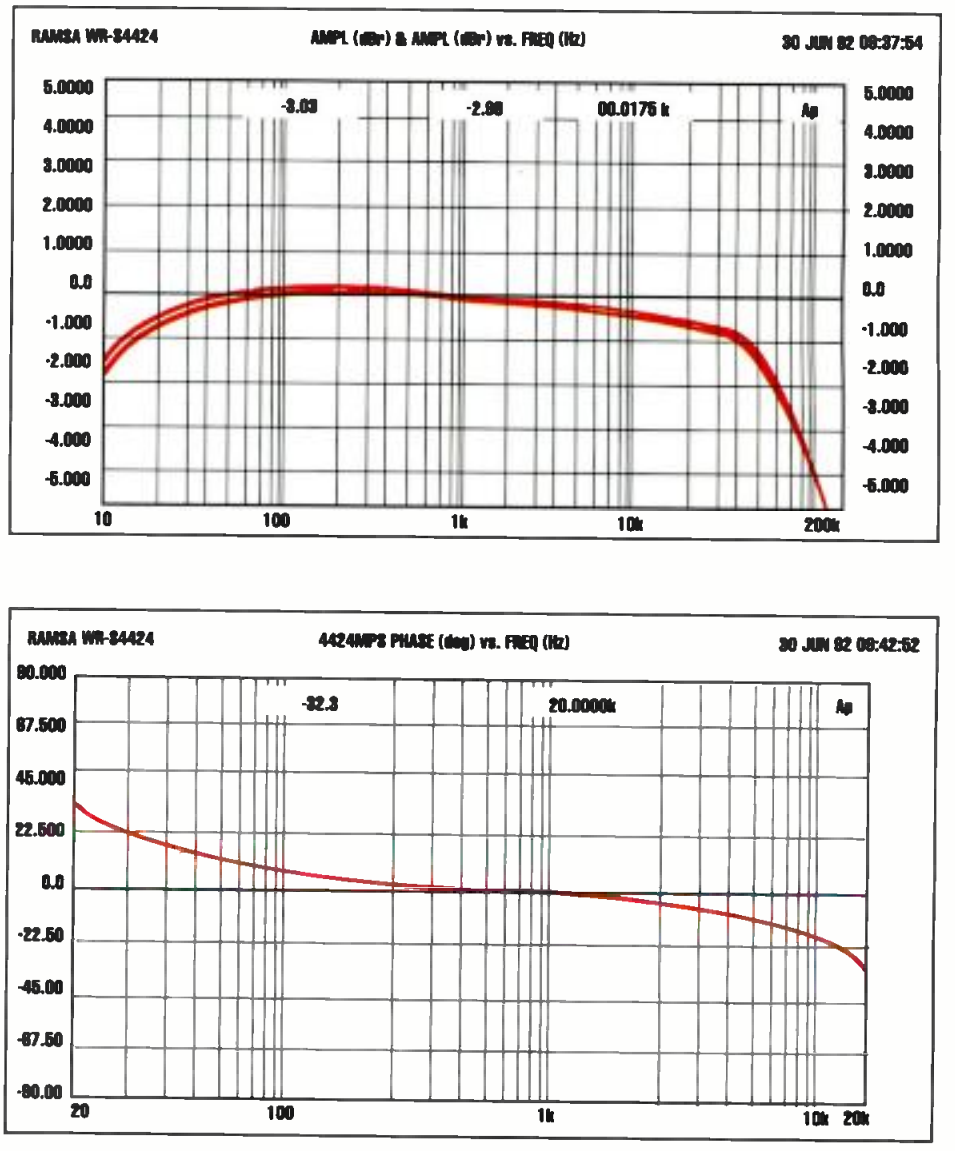

Figure 1: (Top) Frequency response, microphone input to left and right outputs. (Bottom) Phase response, mic in to L/R outs. Note channel uniformity on both graphs.

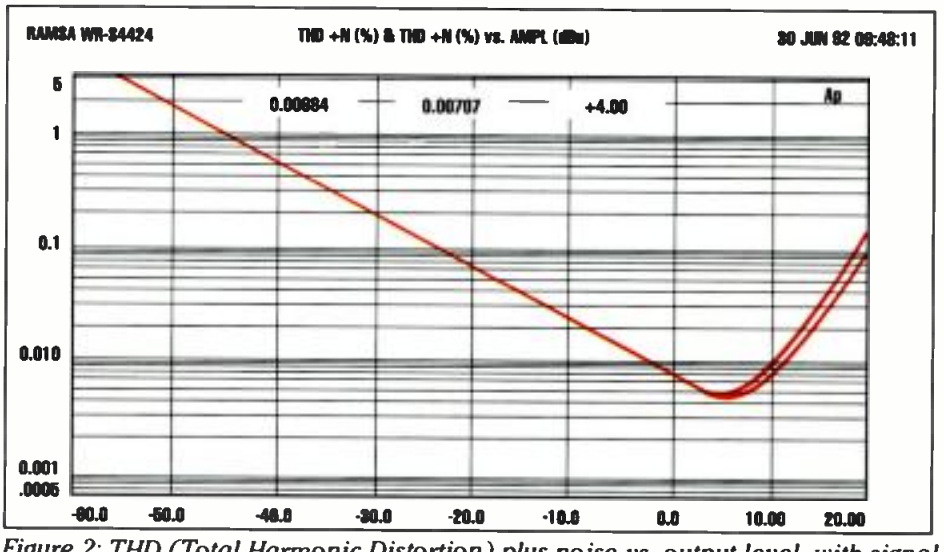

Figure 2: THD (Total Harmonic Distortion) plus noise vs. output level, with signal routed from a single mic input to the stereo outputs.

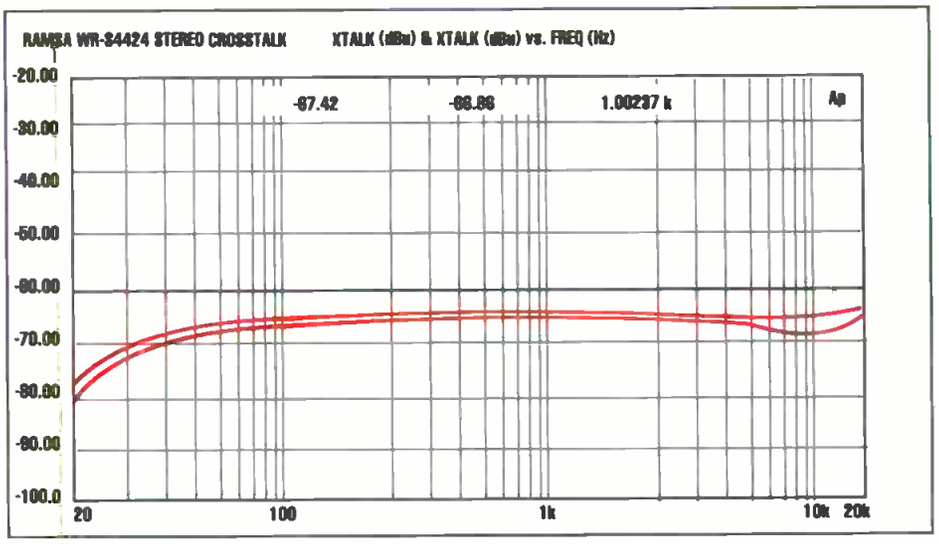

Figure 3: Stereo crosstalk of channels 1 and 2, from 20Hz to 20kHz.

levels set at a unity 0dB in and out. Hiss levels are low, in the -90dB zone. 60Hz ac hum is -102, but the 120Hz and higher harmonics creep toward -90dB. This is actually quite good, considering that the power supply transformer is located in the same area as the main mix cards.

Unlike other low range consoles, the Ramsa 4424 uses what is called a "backgrounded" bus assignment, which means that the non-assigned bus resistors are left connected to the buses at all times, with their inputs connected to ground. This helps minimize capacitive crosstalk and maintains the same noise levels regardless of how many channels are assigned.

Figure 5 plots the response curves of the 3-band EQ. Ramsa and others are now offering more intelligent turnover points for shelving EQ. I'm glad that the old 100Hz and 10kHz EQ points are losing popularity. On the WR-S4424, mid-frequencies sweep from 200 to 6.3kHz. A little wider sweep range on top might be useful, but may not be possible with this EQ circuit topology.

Figure 6 shows the mid control centered at 1kHz, with various amounts of boost and cut applied. Notice that with increasing boost or cut, the frequency is shifted higher. This is not Ramsa's doing but a result of this EQ topology's reaction to changing impedance. Many other console makers use this type of circuit design for sweepable mids, and users may want to adjust the frequency control slightly to compensate for this effect.

The overall construction of the mixer seems good, with the large surrounding areas of plastic trim helping to add to the strength and rigidity of the frame. The inputs are configured into 4-channel removable sections, which should put smiles on repair techs' faces. Nothing is harder than trying to service a console without easily removable modules!

The circuits use 2SC1844 NPN transistors in the mic inputs, and the rest of the console uses NJM2068 dual op-

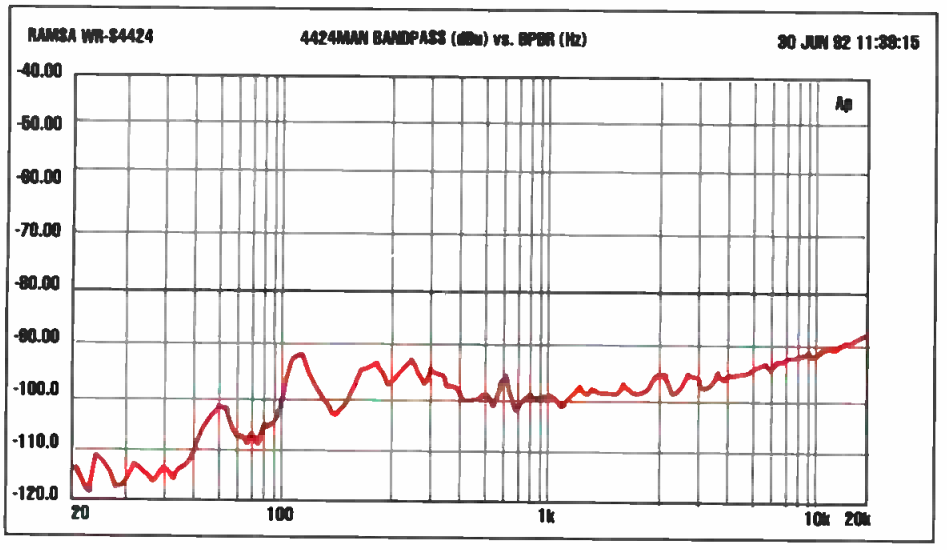

Figure 4: Measurement of the main bus noise level with one channel assigned and levels set at unity gain (0dB indicated). Output level is +4dBu.

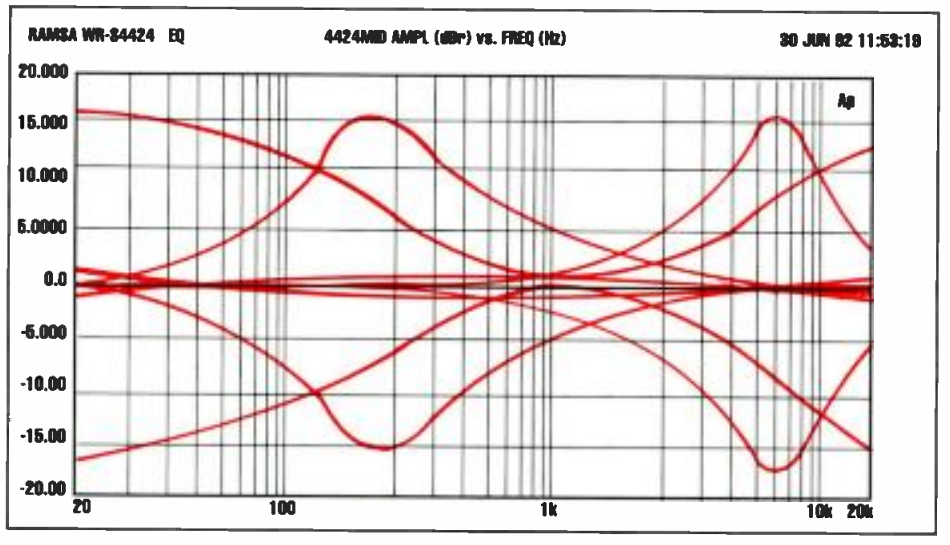

Figure 5: EQ curves showing high- and low-frequency shelf, and mid-frequency peak/dip sweep range.

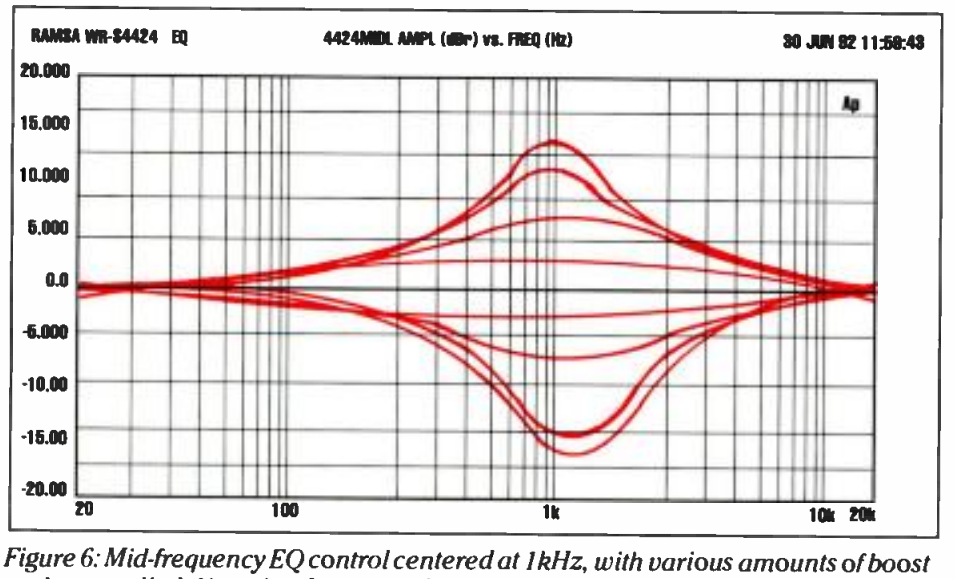

Figure 6: Mid-frequency EQ control centered at 1kHz, with various amounts of boost and cut applied. Note that frequency is shifted higher with increasing boost or cut. See text.

amps with 4556 types on the output feeds to drive 600Ω loads. The slew rate isn't mentioned, but probably rests in the 4V/ms area.

THE VERDICT

As I listened to this console, two factors came to mind. First is the wide bandwidth. Although I've poked fun at live sound mixers in the past, I do take the live sound experience very seriously, especially at today's ticket prices! Because of the limitations of analog tape and 16-bit digital, live sound offers the best chance to hear very high fidelity, and wide bandwidth is central to obtaining it.

... the "real world" of live audio hell, not the safe world of labs and audio stores.

The second factor has to due with the "real world" of live audio hell, not the safe world of labs and audio stores. On this console, all grounding is carefully routed with a distributed "star" scheme. Input, summing and chassis grounds are run separately from each input, so those nasty, sloppy grounds from all that interconnected equipment won't be amplified and passed to the outputs. The expected result is no ground loops, hums and buzzes, and this design should go a long way toward getting there.

Even though this is no $80,000 console, it does meet the following tough criteria:

- It sounds good.
- It tests well.
- It works well.
- The price is good.

If you add it all up, the Ramsa WR-S4424 looks like an ideal nightclub or small live system console, with the added benefit of doubling as a recording board. ■

First Look

By Laurel Cash-Jones and Fred Jones

QSC GOES WITH THE BIG BAD WOLF

At least that's how the tabloids would put it. Actually QSC has decided to enter the computer control market and has selected Lone Wolf to implement its MediaLink Network Protocol for the remote operation of its EX Series of power amplifiers.

The MediaLink System is designed to be an open system that will be made available to all manufacturers, which should make it easily compatible with various other types of network interfaces, such as MIDI, PA-422, DMX and RS-232. Lone Wolf has developed and will support the Virtual Network Operating System (V-NOS) to ensure compatibility. QSC has chosen fiber-optic connections between amplifiers, because of their ability to interconnect without the worry of potential ground loops. This also gives the network the option for upgrade to carry digital audio when the network data rates are increased.

This remote computer control system will provide monitoring and control of all critical power amp functions, and the QSC user interface software is also capable of controlling other devices on the network in addition to QSC power amplifiers.

Monitor functions include input and output signal levels (peak and average), thermal status of heatsinks and transformers, clipping, and power/protect/muting status. Control functions include gain control of 0 to -80dB in 1dB steps, polarity invert, channel-muting, aux input and control port switching.

Circle (101) on Rapid Facts Card

JL COOPER COMPETES WITH NASA WITH ITS MOST RECENT LAUNCH

Now we're sure we can get a job with a tabloid if things don't work out here. Actually JL Cooper is launching its new AVSIX audio for video mixer. The AVSIX is an inexpensive 6-input, dual-channel mixer that can be interfaced with a variety of the most popular video editing systems. The AVSIX allows editor control of preview monitoring, transition starts and duration, as well as a built-in preview switcher. Requiring no special interfaces, it is well-suited for connecting to a variety of protocols, such as GPI and ESAM, RS-232 and GVG-100.

The AVSIX is said to offer high-quality studio performance with such studio standard features as balanced inputs, 10-segment LED PPM level indicators and a built-in calibration test tone generator. Suggested retail price is $995.

Circle (102) on Rapid Facts Card

WOOF! WOOF! WOOF!

The folks at Tannoy appear to be barking up the right tree with the introduction of the new Tannoy CPA 5 SB SubWoofer. The CPA 5 SB is a small, passively bandpassed sub-woofer for use with small, high-powered monitors, including the Tannoy CPA 5 ICT. (Do you think Tannoy's accountant had anything to do with the name of this new series of speakers?)

Efficiency is said to be the key to the effectiveness of the CPA 5 SB with its ability to generate sound levels in excess of 4dB higher than regular sub-woofers driven with an identical power amplifier.

This cute, little sub-woofer comes in a jet-black enclosure that houses four 5-inch, low-frequency drivers, measures in at a trim 21.6" x 11.8" x 7.8" and weighs 31 pounds, but please don't tease it about its weight, because the CPA 5 SB is a very sensitive creature. Rated at 93dB SPL at 1W/1M, it is very efficient. It can also handle 150W of power and maintains a stable impedance load when hooked up to a speaker system that uses satellite loudspeaker units. Stand-alone impedance of the unit is rated at 12Ω, but the actual working load when connected to satellites is rated at 6Ω. Frequency response is from 46Hz to 210Hz, and the retail price is a mere $495.

Circle (103) on Rapid Facts Card

WE'VE BEEN REBORN!

This is becoming too much fun. Time to talk about some recent and important upgrades to some products you (or someone you know) may have. First is the Fostex D20B. Among its new features is the ability to post stripe time code of either the IEC or Fostex time code standard on an existing tape.

Another first is its ability to jam sync SMPTE time code against the A time (absolute time) recorded on most other DAT machines. This allows the D20B to actually generate SMPTE time code and allows you to use tapes with no time code as pseudo-coded masters for quick sync solutions without having to stripe the tape.

The Fostex D20B is now plug-compatible with a variety of equipment that will allow it to perform VTR emulation. Among these are Synclavier, Grass Valley, CMX, Sony, Ampex, Convergence and Videofonics.

Circle (104) on Rapid Facts Card

BUT WAIT, THERE'S MORE!

Also in upgrade-land is the AKG DSE 7000 digital editing/mixing system, used primarily for radio production. The operating system software has been upgraded to version 2.0 and has made virtually every DSE 7000 "new" again. One of the major limitations of the original system, the total amount of track time (17 minutes), has been increased to 16 hours, and the total number of edits per project is now 15,000.

Operation of the unit has been accelerated by increasing the load-in time from hard disk to 4X real time and screen updates in as fast as 1/30 of a second. The unique "undo" feature now cancels the most recent edit, even if the DSE 7000 has been used on another project or has been turned off.

Circle (105) on Rapid Facts Card ■

Laurel Cash-Jones is an editorial consultant to R•E•P and a legend in the audio industry. Fred Jones is a free-lance engineer, producer and writer.

Cutting Edge

NADY WIRELESS

The improved design in Nady Systems's hand-held wireless microphone transmitter, the Nady HT-10, is now standard for the Nady 101, 201, RW-1, 401, 650 and 750 wireless systems, and Nady's wireless camcorder and video microphone systems.

The Nady HT-10 features an all-metal case and a compact, tapered shape with no protruding antenna. The HT-10 is designed with a threaded sleeve for access to a battery compartment that is larger than before to accommodate a variety of alkaline batteries. Also new is an end-mounted studio on/off switch similar to that on the top Nady 2000 wireless microphone, which allows the user to mute the audio without turning off the transmitter.

Circle (150) on Rapid Facts Card

ORBAN STUDIO OPTIMOD

The new Optimod-Studio 460 gain control system for broadcast studio applications provides two channels of slow and fast automatic gain control (agc), high frequency limiting/de-essing and peak control. Applications include production, control of signals being sent from studio to transmitter site, control of signals being transferred to cart, open reel, or digital storage medium, and processing of voice or other sources. Key features include a front-panel density control for optimizing the processing of single tracks or mixed program material and a defeatable silence gate that freezes level control during pauses or quiet passages to prevent noise rush-up. The voice mode option provides additional overshoot protection on voice or other material with unusually high peak-to-average ratios by adjustable HF limiter/de-esser for protection and de-essing of sibilant voices.

Circle (151) on Rapid Facts Card

NEW NEUMANNS

The new Neumann KFM 100 stereo microphone contains two pressure microphones, flush-mounted on a wooden sphere, diametrically opposed to each other. The sphere is 20cm in diameter. Arrangement and distance of the capsules result in a nearly constant directivity factor and a smooth diffraction of the soundwaves around the sphere. This microphone has low frequency response down to 10Hz.

Neumann has also introduced the third generation of the Binaural "artificial head" microphone system. The KU 100 (a.k.a. Fritz) offers improvement in acoustic performance and technical specifications over its predecessor through transformerless circuitry and a built-in battery supply. For acoustical measurement applications, single-ended BNC connectors, and standard XLR type connectors, are provided.

Circle (152) on Rapid Facts Card

AKG DIRECTIONAL LOW-PROFILE BOUNDARY MICROPHONE

The new AKG C 547BL is a hypercardioid boundary microphone for theater, studio and sound reinforcement. Designed to be visually unobtrusive, the microphone can be placed completely off-camera and still provide a high level of sound pickup. Rejection of low-frequency noise is achieved through the use of a switchable bass-cut filter, a transducer shock mount and isolating rubber feet. Stray field interference from stage lighting or other electrical equipment is addressed with the incorporation of a low impedance, RF suppressed output. A snap-on windscreen for use on open-air stages is supplied.

Circle (153) on Rapid Facts Card

GENELEC MONITORING SYSTEM

The Genelec 1037A is a 3-way active monitoring system including drivers, amplifiers and active crossovers designed for budget and home studios, general-purpose broadcasting/TV studios, digital workstations and post-production facilities.

The system can be used both in vertical and horizontal orientation by simply rotating the DCW unit. Bass frequencies are reproduced by an 305mm bass driver loaded with a 65-liter vented box. The -3dB point is 38Hz, and low-frequency response extends down to 30Hz. Midrange frequencies are reproduced with a 130mm direct radiating driver loaded with a proprietary DCW. The high frequency driver is a 1-inch metal dome.

The active crossover network uses three parallel bandpass filters with crossover frequencies of 420Hz and 3.2kHz. Bass, midrange and treble level controls with 1dB steps are employed to change the balance between the drivers in different acoustic conditions. Low-frequency tilt and roll-off controls have 2dB steps to permit refined low-frequency equalization. The crossover network is driven by an active balanced input stage. Variable input sensitivity allows for accurate level matching to mixing console outputs.

Bass, midrange and treble amplifiers respectively produce 160W, 120W and

120W of short term power, and the system incorporates a special automatic circuitry for driver overload protection and amplifier thermal protection. The amplifiers are capable of driving the stereo system to peak output levels in excess of 125dB SPL at 1.7m with program signals.

Circle (154) on Rapid Facts Card

KLARK-TEKNIK CROSSOVER

Klark-Teknik has introduced the DN800 configurable crossover with four inputs and eight outputs. The DN800 can be configured a stereo 4-way, stereo 3-way, or 4-input/2-way system. Plug-in frequency cards allow a choice of 12dB, 18dB or 24dB per octave slopes with Linkwitz-Riley, Butterworth or Bessel responses. Band overlap is possible. The DN800 features trimmers for phase adjustment between bands and switchable phase reverse for each output. Each output also includes a gain control and signal, limit and over LEDs. Inputs and outputs are electronically balanced, and output balance transformers, fixed EQ cards and high-quality limiters are available as internally fitted options.

Security plates cover most controls after initial adjustment, leaving only mute and gain functions accessible. Overall security covers in both aluminum and perspex are available.

Circle (155) on Rapid Facts Card

CM CONSOLE AUTOMATION

CM AUTOmation's new MX-816 console allows programmable fader movement, fader recall, snapshots, scenes, mutes, crescendos, decrescendos and timed audio fades. The system supports CM Automation PRO MIX-net for up to 32,000 audio channels with a 100-patch internal memory to store/recall snap shots and scene fade times, and uses standard DX 2150A VCAs and 5532 low noise op-amps. Groups of eight channels are summed out to produce mix/send out. Gold-plated audio jacks are used throughout.

Special features include 28 internal pre-programmed master up or down autofades, separate receive channels for scene recall/channel volume and a "joystick" scene fade feature.

MIDI control features include assignable MIDI controller numbers for volume, MIDI controlled audio muting (gated or toggle types) using note events and programmable note numbers for channel mute. Internal patch memories are up and down loadable via MIDI system exclusive.

CM rates AUTOmation audio performance at more than 95dB S/N, with frequency response from 10Hz to 30kHz, ±1dB, less than 0.01% THD (non-weighted), and better than 116dB dynamic range.

Circle (156) on Rapid Facts Card

CELESTIAN HIGH FREQUENCY

Celestian has introduced new Slot and Bullet tweeters to complement the BX Series low-frequency drivers. The Bullet Tweeter features an even conical dispersion designed to be used in either 2- or 3-way systems. The Slot Tweeter features a 70° x 30° dispersion pattern for applications requiring wide nearfield coverage and minimized high-frequency beaming, such as high quality monitoring situations.

Both drivers feature titanium field replaceable diaphragms and edgewound voice coils with copper-clad aluminum wire for lightness, maximum efficiency and resistance to fatigue. Four tapped holes allow easy mounting in any type of enclosure. The flare is die-cast aluminum for durability and finished in black.

Circle (157) on Rapid Facts Card

RSP STUDIO GATE

The new RSP Technologies Studio Gate TM comprises four complete gates with individual wide range controls for threshold, hold, and release functions, including LED indicators. Individual in/out switches and LED indicator are provided with +4dB or -10dB operating level reference switches. Each pair of gates offers a stereo master switch for stereo tracking. The Studio Gate's hold control is ideal for gated room effects on drums and minimizes erratic triggering. A key input allows the gating of one instrument to be controlled by another and frequency sensitive gating.

Circle (158) on Rapid Facts Card

SOUNDTRACS CONSOLES

Sountracs is offering four new console models. The sophisticated Jade production console features fader automation on channels and monitors, mute automation on all inputs and dynamic gate processors on every channel. Audio features include the FdB parametric equalizer on all channels, an equalizer on the monitors, balanced inputs, outputs and buses, extended bandwidth electronics and TT patchbay.

Soundtracs' addition to the popular Solo range of consoles include the Solo Rack and Solo Logic. The Solo Rack is designed for 19-inch-rack fixed installations and has 12 mono inputs each with a swept 4-band EQ, four aux sends and long throw faders. In addition to the stereo outputs, there is also a mono

out for separate speaker feeds.

The Solo Logic utilizes all the sonic features of the already successful Solo MIDI, with the addition of full fader automation. This built-in system is frame-accurate for faders, half-frame-accurate for mutes and uses a 12-bit fader system to give smooth control over the fader range. Automation control is accessed via a front panel LCD and rotary dial , but all modules have read and write keys for quick operation. Mixes can be saved internally or to a MIDI sequencer, and the Solo Logic can also be remotely controlled via the MIDI Manager page of a sequencer. The Solo Logic also offers remote machine control for tape machines fitted with MMC.

The advanced Exiomconsole provides up to 64 stereo channels, all with total recall and mix automation via a MIDI sequencer, in rack-mountable chassis. The console features eight stereo channels each with gain control, 2-band EQ auxiliary send, pan, mute and level. A rear expansion port allows linking of eight of these single rack space devices.

The Exiom is intended for programming suites and MIDI studios where mixer fader moves, mutes and EQ changes are recorded dynamically and later accessed for on-screen control. This recorded parameter data can be stored indefinitely for instant recall.

Circle (159) on Rapid Facts Card

DSE 7000 UPGRADE

AKG has provided a new system (Version 2.0) in a self-installing format at no charge to all registered DSE 7000 workstation owners. Version 2.0 DSE 7000s

Cutting Edge
(Continued from page 55)

are faster and easier to operate, and they feature greater production capacity along with a selectable "new user" help mode, which automatically gives new operators advice while they're working. Master length and number of edits per production are now "virtually unlimited," at more than 16 hours from start to finish with edit capacity of more than 15,000 edits per project. Operation has been accelerated with productions now loading from hard disk as quickly as one-fourth of their audio time with screen updates as fast as 0.03 seconds.

Other enhancements are the new "shift-key" functions and the fact that the long-throw faders have been programmed to match industry standard Penny and Giles M3000 console controls while retaining the noise-free advantage of fully digital mixing. Standard tape-based editing is more closely emulated with the scrub wheel upgraded to be virtually indistinguishable from cueing real tape and autolocator settings and edit points saved, even between sessions. The significant advantage over tape — the "UNDO" feature — now cancels the most recent edit even if the DSE has been turned off or another spot has been worked on. All of the DSE 7000s are shipped standard as Version 2.0 models.

Circle (160) on Rapid Facts Card

NO-CREAK GOOSENECKS

The Rubber-Neck "No-Creak" gooseneck is now available with SLR connectors (X series) pre-wired for existing SLR mounts, (L series) threaded for podium use with locking SLR, and (H series) hollow center with male to female threading. The "X" series is internally wired male to female XLR. The "L" series has a locking XLR on the microphone end and is threaded on the opposite end for mounting to speaking formats, such as podiums, drive-in banks and restaurants. The "H" series is for threading microphones to an end and running wire through the counter. Standard sizes on the "S" series are 12 and 18 inches; on the "L" series are 11 and 17 inches; and on the "H" series are 10, 16 and 20 inches.

Circle (161) on Rapd Facts Card ■

Live and Direct
(Continued from page 44)

design begins to get spread out over long distances and very large audience areas, consider using a broadcast-quality radio-frequency audio signal link, with the transmitter at the system control position and a receiver on each remote speaker tower. Systems from companies like HME and Sennheiser are applicable to this situation. Research your frequency selection carefully, and remember that even the joy of doing away with 500 feet of signal-carrying XLR cable must be balanced by the compromise of relying on a wireless system that may be susceptible to interference or RF 'drift.'

Not for the faint-hearted, the design and implementation of distributed sound systems can offer exceptional results. Getting the 'power to the people,' particularly in large-audience situations, will usually require this type of system setup approach.

Companies that offer distributed system services that are correctly engineered and deployed will often find a ready market for their systems, as they are hired on a subcontract basis to assist with major outdoor events. When the Pope visited North America, large-scale distributed systems were used. When political rallies are held in Washington, DC, you'll find distributed systems in use. When the Olympics, the Gran Prix LeMans or the Master's Cup Tournament are staged, you'll find distributed systems there. When the Grateful Dead, Rolling Stones or Bruce Springsteen play to stadium crowds, a distributed system will be implemented for the rear audience areas.

Smaller-scale productions need them, too. When GMC or Ford introduces its new auto models to a dealer group, distributed systems come into play. When Xerox or 3M or the American Medical Association holds a major convention, distributed systems cover the audience. When a touring Broadway-style production sets up in a 2,000-seat theater, distributed systems bring the sound of the show to all parts of the building.

Going "beyond left and right" requires specific tools and technologies, and it can offer superior performance. Improved audience coverage at lower stage-area sound-pressure levels and increased client satisfaction will be the result. ■

On-Line
(Continued from page 47)

available facility.

It's amazing how developers forget that users' time is valuable, usually more valuable than most software and hardware prices. If it'll get the job done with fewer all-nighters, people will gladly stand in line to pay for it.

From: Rick Schwartz, #70672,1377
To: Bob Olhsson, #72340,17

I have some of the same gripes about QuickTime. The reason "QuickTime audio is rarely in sync" is because the number of images or sound segments you getdepends on playback hardware. You probably know QuickTime is simply a software architecture that will retrieve stored data at the best rate your hardware can provide. Fortunately, there is nothing in the QuickTime spec that limits playback speed, image size or sample rate (that I am aware of).

In the real world, as you know, frame rate is often limited by processor speed or hard disk throughput. If the CPU or disk are too slow for real-time playback, frames are sometimes skipped, although the elapsed time is supposed to be kept constant, even if elements have to be truncated to keep up. Don't write the technology off until you've seen 30fps full-screen playback on a Quadra 900. It's pretty impressive. When hardware codes are available, we should see improved, consistent playback.

"Can you earn enough using QuickTime to pay for a Macintosh?" Yes. In fact, I worked on a QuickTime project today that would come close to paying for a Mac. A friend of mine, Mark Waldrep, is also currently involved in QuickTime audio production. Although I agree that multimedia is overhyped, there is some work out there, and I expect more in the future.

My real interest in QuickTime is the possibility of adding random access digital video playback capability to digital audio workstations at a reasonable cost. QuickTime seems to have some potential in that area when you supplement it with powerful third-party NuBus cards and a fast CPU. For more on this subject, see "Digital Domain" in the July issue of **R•E•P**.

While on this subject, does anyone know whether somebody makes a reasonably priced digitizer that will sample picture at color video frame rates (29.97) referenced to house sync? ■

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Digital Domain

(Continued from page 46)

One thing that seemed clear was that the programmers had a very different view from the marketing people. Ask Rob Currie from Digidesign, who said, "People shouldn't underestimate the problem here. The computer industry has been working for a couple of years to figure out how to interchange (electronic) mail, which consists of only 256 characters of text. These are big companies that have a lot more money than any of us do."

THE $64,000 QUESTION

According to Leatherby, Avid has set aside the necessary resources to develop a standard, including providing product marketing people. But who really pays for it, and how will it be administered? Does Avid plan to charge people to use this standard?

Leatherby quickly answered, "The interchange standard will be totally open with no licensing charges." So why are they doing it? Avid is well aware of the political benefits of this and the long-term potential of intellectual property rights. According to Leatherby, they plan to license the core technology for the Media Composer, which includes the protocol on the way a system "looks" at audio files.

According to Leatherby, OMF plans to use the Sound Designer II file format for the simple reason that there are almost 10,000 systems that use it. This could explain why Peter Gotcher now strongly supports OMF, even though he had mixed opinions about file interchange a year ago. (See "Digital Domain," February 1991.)

THE VERDICT IS OUT

Many workstation companies have sent in their participation papers. Although it's too early to judge the OMF interchange standard, they have succeeded in getting more support from the manufacturers than any of the industry or organization standards committees. Maybe the fact that they are outsiders to the mainstream audio industry is an asset. Andrew from Fairlight may have summed it saying, "I think OMF is a good practical move in the right direction, and, therefore, we will support it. Let's not get utopian here, let's create something that can work for some people." ■

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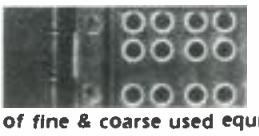

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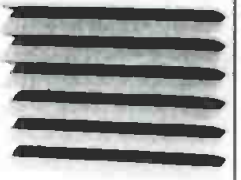

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After more than twenty years, UREI Compressor/Limiters remain the choice of audio professionals, having earned a reputation for excellence as hard working tools of the trade. It is difficult to find a recording or broadcast studio that does not own at least one UREI Compressor/Limiter. And engineers in the Sound Reinforcement and Installed Sound industries have long considered our products as vital links of any high quality audio equipment chain. With experience as our teacher, and modern technology as our guide, we are proud to offer three LA Series Compressor/Limiters, beginning with the LA-22.

The LA-22, a dual channel unit, contains three Gain Reduction circuits, can be used as a Dynamic Expander, and is equipped with a Full Parametric Filter on each channel. Its unmatched versatility sets it apart as a truly unique multi-function tool. Designed with innovative "spectral agility," the user has the option to reduce or expand gain across the total audio bandwidth or at a chosen center frequency with variable "Q" of 1/6 octave to 2-1/2 octaves. With proper settings in the expansion mode, you can use the LA-22 to "lift" vocals in a live or studio mix or increase intelligibility in paging systems or radio broadcasts. Conversely, in the gain reduction mode, the compression can be frequency focused to control levels to prevent feedback, for De-essing, De-popping or to creatively "fatten" the sonic character of particular instruments and vocals. The parametric filter circuit, completely accessible via the rear panel barrier strip, can be accessed and routed to the Side Chain, thus making the LA-22 a frequency dependent gain reduction or expander system.

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