

REP

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The Pro Audio Applications Magazine

HEAVY HITTERS: Tape Machines and Consoles

■ ANALOG DECK UPDATE
■ CONSOLE ROUNDUP

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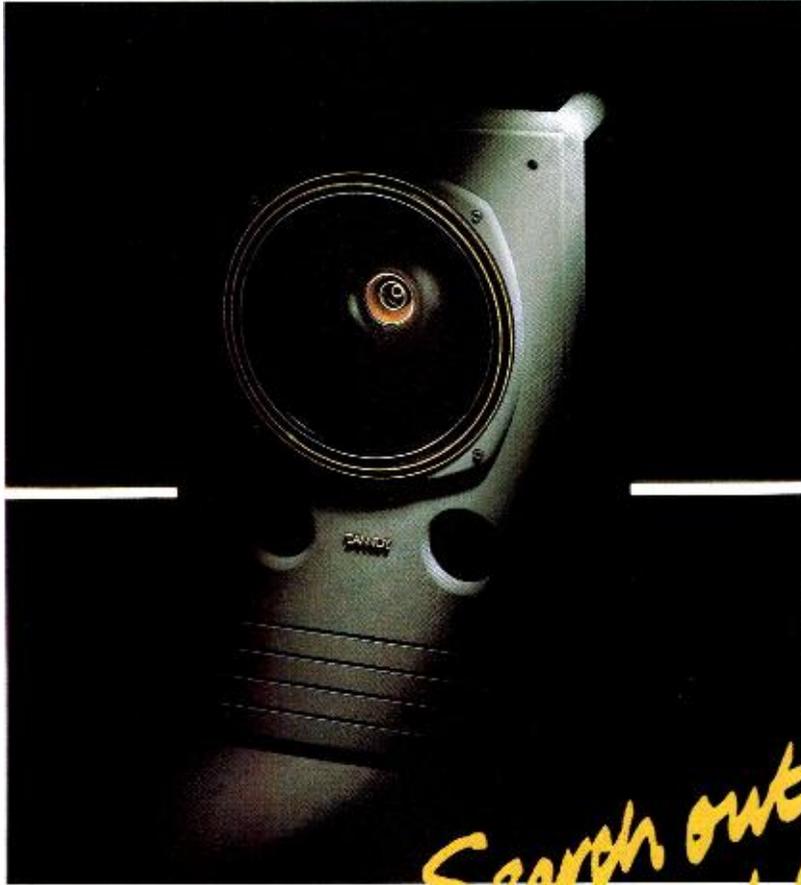


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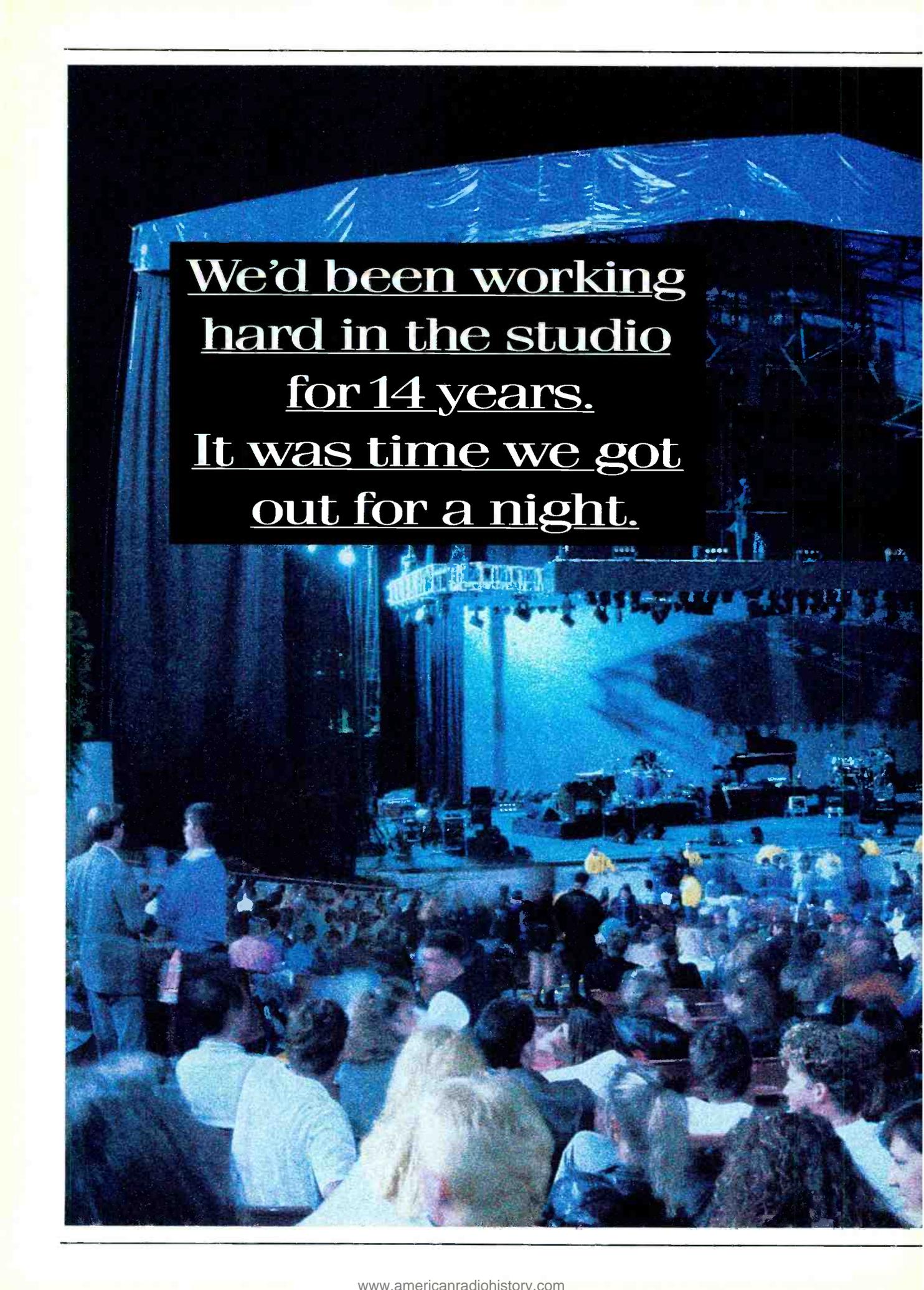
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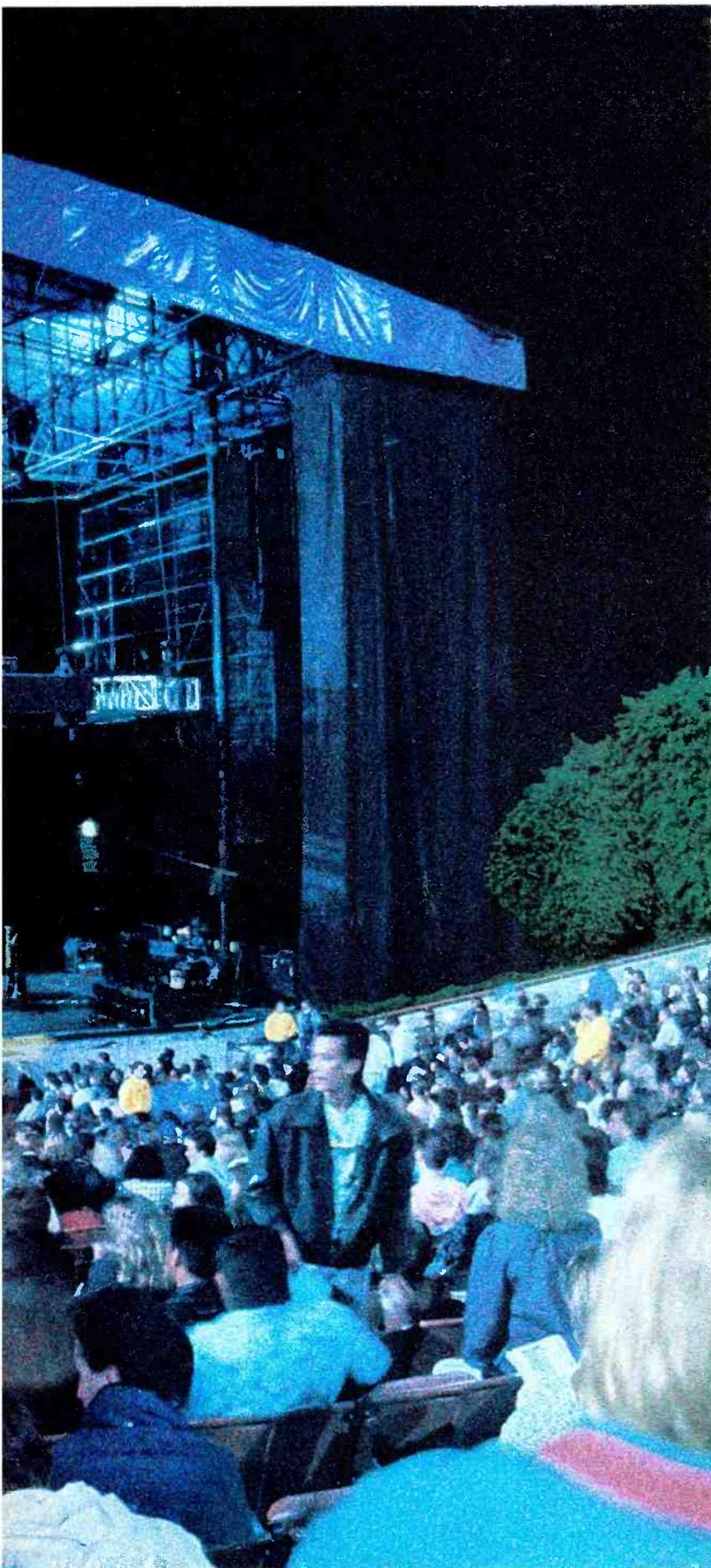
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Not that we won't still work our woofers off in studios from London to L.A. all day. But, at night, we'd like to get out and jam more often.

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Audio Devices

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Volume 22, No. 2

February 1991

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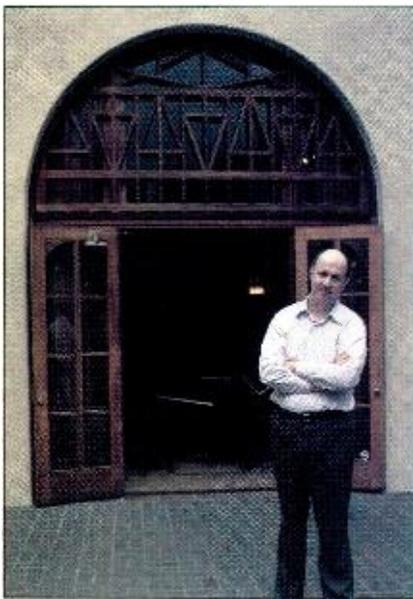


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On the Cover: Westlake Studio D, Los Angeles. The room features a Neve VR Series 72x48 console with Flying Fader automation; tape machines include a Studer A-800, Mitsubishi X-850, Sony 3324, Ampex 2- and 4-tracks and a Mitsubishi X-86HS.

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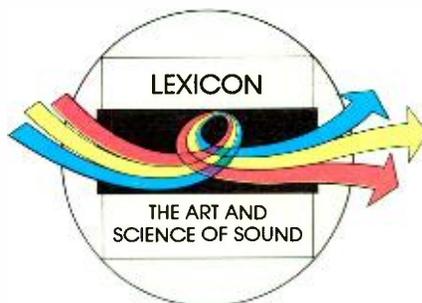
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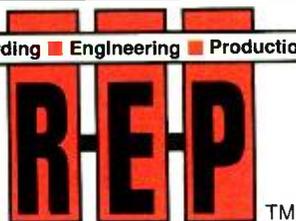
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From the Top

The New Viability

Since engineering some band demos recently at a local studio, I've become convinced that an old idea may finally become a viable one in the 1990s.

Frankly, this will be of little interest if you live and work in a major recording market. Your opportunities are assured. But for the vast numbers of people who live outside of our recording meccas, the key to your survival lies in creating and releasing your own product.

This isn't a new idea. Facilities have been recording and releasing their own albums for years. If you went that route, congratulate yourself on being a visionary. You had the right idea, you were just a little premature. Several reasons now make this scheme a viable one.

1. Duplication costs are lower than ever for shorter runs. That means you can produce only the number of titles that you realistically need, at a viable per-unit cost.

2. The American public is more accepting of a product found outside of the normal distribution channels. I point to the success of three specialty labels — Windham Hill, Narada and Rounder — that flourished by creating a market for music that major record companies initially ignored.

3. Retail outlets are increasingly willing to try an untested product. If retail doesn't work for you, mail order will. Given the right mailing list, you can target the exact audience for your product.

4. The foreign appetite for things American continues apace. Pop music continues to be a dominant force worldwide, but roots music — blues, jazz, country, folk, ethnic — also has a potent audience outside of our borders. Shows such as the New Music Seminar and MIDEM are the forums where you can make foreign deals happen.

CONTROLLING DESTINY

The facility that I usually work at is typical of studios that exist outside of the major recording centers. It exists by getting whatever business it can. It's the usual mishmash — band demos, advertising, industrial video, small-label projects, whatever walks in the door.

What's different with my friends is that they realize survival means expanding beyond just renting time to outside clients. For a couple of years, they have been laying the groundwork for establishing an in-

house record label. Their first CD has just been released, a collaboration between the facility and a local radio station.

For the past eight months, the studio and the station have been running a battle of the bands contest. The bands record for free at the studio, the tunes air on the radio and listeners vote for their favorites. The winners are featured on this CD.

They have no illusions; they are planning to sell their product in local and regional outlets. By keeping costs down, they are confident that they can make a profit with sales of only a few thousand.

THE COPYRIGHT INDUSTRY

A recent report by the International Intellectual Property Alliance, excerpts of which appear in this month's Random Access, proves that markets exist. According to the IIPA, several businesses under the collective term "copyright industry" contribute significantly to the American economy. The numbers are impressive: revenues of \$303 billion a year, or 5.8% of U.S. gross national product. These businesses provide 4.6% of total U.S. employment. Foreign revenues outdistanced the aircraft and aerospace industries combined.

The copyright industry consists of the various businesses that create copyrights as their main function. These include core businesses of sound recordings, motion pictures and video, computer software, and periodical, music, book and newspaper publishing.

Of course, the pro audio industry is an integral part of this group, through the supplying of audio services to affiliated businesses or the outright holding of copyrights. Although our past is in the former, our future is in the latter.

There's a whole different mindset involved in being a creator instead of a supplier. But ultimately, I think it would be worth it. If you're up to the quality expected by the public, and you find your audience, this new revenue source could free you from the vagaries of the modern studio biz.

Imagine, not having to play rate wars, offering \$20/hour after midnight. Or having to scramble for every bit of business just to stay afloat. Or continuously searching out loans to pay for new pieces of gear.

Opportunities are out there; the time is right to find them. ■

Dan Torchia
Managing Editor

Microphone Self-Noise

From: Jerry Graham, sales manager, Gotham Audio, New York.

I just finished Dan Levitin's "Master of the Microphone" article about Bruce Swedien [November]. Unfortunately, Dan makes subjective judgments about empirical data concerning Neumann microphones that are incorrect. I appreciate the opportunity to rectify that information.

On page 53, Dan and Bruce are discussing the Neumann TLM 170; Dan prompts, "But it's still pretty noisy ..." Right after that, he comments that the B&K are "the quietest mics you've used?"

While I have no comment on Mr. Swedien's subjective judgments concerning individual microphones, microphone self-noise is an objective measurement assessed by international standards. All B&Ks, the Milab VIP 50 and the Neumann TLM 170 have been measured according to the CCIR 468-1 (1976)/DIN 45405 (1983) and DIN/IEC 651 (1981) standards. The results of those tests are presented in the accompanying table.

Not only does the TLM 170 exhibit the lowest noise figures by *both* international standards, but it also reproduces the widest dynamic range!

I am sure Mr. Levitin didn't mean to spread inaccurate information, but he should thoroughly check his facts before passing subjective judgments off as measurements of known phenomena.

Dan Levitin replies:

I apologize for giving the wrong impression with my remarks. It is true that most people harbor subjective opinions about microphones. A number of engineers I have spoken to over the years, including Bruce Swedien, Al Schmitt and Jack Renner, have expressed the opinion that the B&K 4006 is the quietest mic they had ever used, even quieter than the 170.

The fact that the comparison is made is, I think, flattering to both mics, both of which are considered outstanding microphones in the industry. But quietness is only one parameter of microphone evaluation, with sound being at least as important.

Neumann is certainly one of the most highly prized microphones in the recording world, and many engineers, I am sure, reach for the TLM170 first in many situations. Some say it is transparent, others say it "enhances" or "colors" the sound in a pleasing way. It all comes down to personal choices and the situation. I've never heard an engineer say they only used one mic for all situations. (Although my friend David Kahne once made a record exclusively with SM57s just for fun.)

I don't have the electrical engineering background to evaluate the test reports, so I'll have to leave that to the experts. But I apologize to Jerry Graham and Gotham if my remarks were misleading. ■

Problems at The Wall

From: Ed Learned, Ypsilanti, MI.

Andy Benham's excellent article in your November issue ["The Wall" at the Wall"] proves that *someone* is willing to tell the real story concerning live music mega-productions. Two friends of mine attended this performance, later complaining about the "bad sound"; Andy courageously reported some of the reasons why.

Too often, these "behind the scenes" articles gloss over problems in a rush to glorify the event, along with the individuals, companies or equipment involved. I found it rather interesting that *Mix's* article on the same concert, published a month later, mentioned few of the problems Andy unearthed; in fact, it read like an advertisement for Turbosound.

While reading about new products is informative, we *really* learn from reading about other people's mistakes. Recognizing problems, and addressing them, will help us improve as an industry.

I can appreciate the need for tact, especially if one counts on enjoying the access necessary to write about large pop music productions. However, several hard questions about this particular production remain unanswered. The interruption of power to the delay stacks without prior permission of the PA company is, of course, inexcusable. So is the fact that it took 3½ hours to turn them back on once power had been restored!

Self-Noise Measurements

MICROPHONES	CCIR 468-1	DIN/IEC 651	DYN. RANGE
NEUMANN TLM 170	26	14	126
B&K 4003	27	16	119
B&K 4004	36	25	123
B&K 4006	27	16	119
B&K 4007	36	25	123
B&K 4011	30	19	95
B&K 4012	30	19	95
MILAB VIP 50	29	18	105



EVEN WALTER BECKER IS TALKING ABOUT SOUNDTRACS.

Soundtracs IL Series

“ You have to be careful about what you spend for a console in a home studio. You want as clean a signal path and as versatile a board as you can get. The Soundtracs IL 4832 is logically laid out, easy to get around on, has great sounding EQs and prints a very clean signal to tape.

We use a 32-track digital recorder — the IL 4832 made the most sense. It provides a 32 buss design in an extremely affordable package. It looks great in the room, too. ”

As a founding member of Steely Dan, Walter Becker is known for his uncompromising point of view. So choosing a console for his personal studio in Maui was a carefully considered decision.

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Letters

With the event staffed by Brit Row engineers and other seasoned touring professionals, how was it that something so basic as system operation was neglected for that long? Crowd size, while certainly significant, cannot excuse such a lapse. I was also curious about the failure of power for the monitor system. Andy reported a tripped breaker; was this due to equipment failure or an improperly balanced load? It appeared to this reader that several basic system checks might have been overlooked.

Another question involves the hardware itself. Several paragraphs were spent on the use of BSS TCS-803 crossover/delays, noting the role of an auto-mute function in shutting the delay stacks down. Output mutes, for the purpose of system protection, have been around a long time. Usually, when power is restored to a unit after interruption, the mute is engaged for a finite period of time, returning after a (presumed) safe interval to the mode it was

in before the power failure.

The efficacy of the 803 mute function with respect to power outages is highly questionable; a unit that "muted and stayed mute" is not one I'd want in my rack, especially if that rack was 200 meters away through a packed crowd. Is this a standard BSS feature or an anomaly?

By the way, I *do* think the Fresh Tracks reviews should be signed. Our opinions reflect our beliefs, and we should feel comfortable accounting for them. I signed mine. ■

Pre-amp addition

From Dane Butcher, president, Symetrix, Seattle.

"Five Questions" in the November 1990 issue lists four companies that offer stand-alone mic pre-amps. You left out (inadvertently, I'm sure) Symetrix. Our SX202 mic pre-amp is a 2-channel pre-amp in a half-rack casing. It's a versatile unit, with phase

reverse and +48V phantom power switches on the front panel, along with a 15dB pad and gain control for each channel. These last two controls enable the SX202 to handle signal levels up to +14dBV.

Specs are equally impressive: Phase shift at 20kHz is less than 10°, symmetrical positive and negative slew rates for excellent transient response, typical 1kHz distortion of 0.007% and noise so low it approaches the theoretical limit.

I'm sure your readers would appreciate knowing that they can improve on their consoles' audio performance at a lower cost than the four mic pre-amps you mentioned. Thanks for correcting the oversight. ■

Send letters to R•E•P, Box 12901, Overland Park, KS 66212. Letters may be edited for length and clarity.

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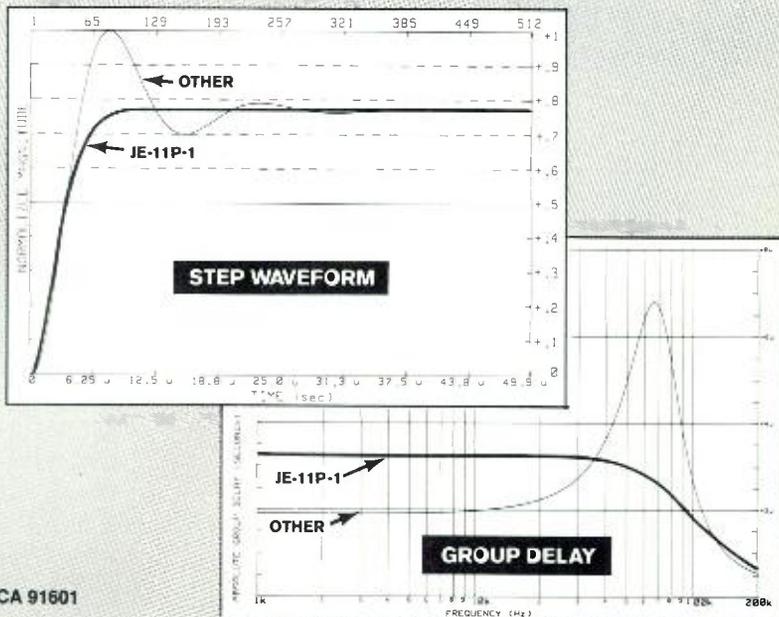
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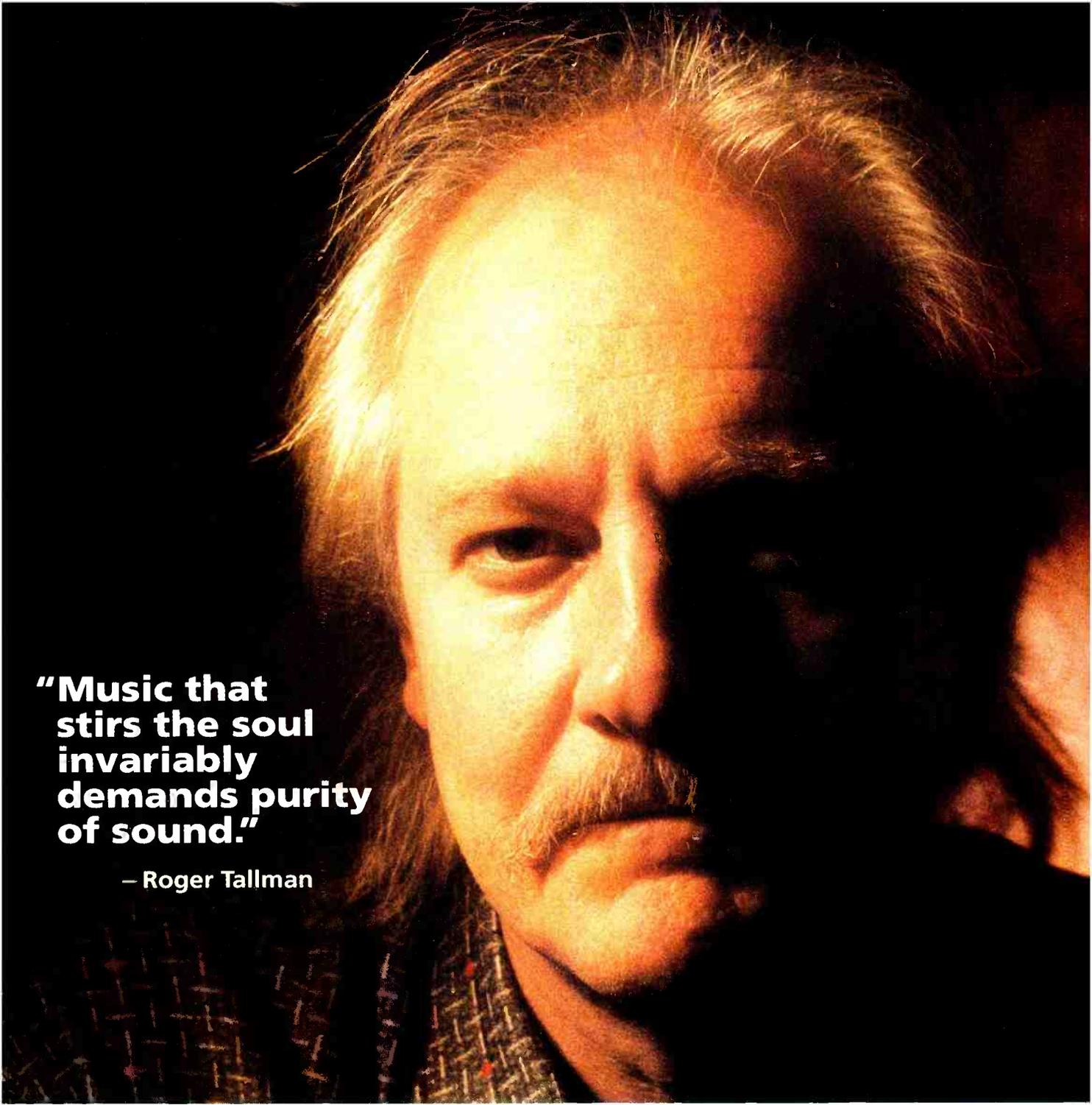
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Random Access

STUDIO UPDATE

Facility/Location	Details
NORTHEAST	
Sound Techniques/Boston	New facility with three studios. Lance Duncan is president; located at 1260 Boylston St., Suite 204, Boston, MA 02215; 617-536-1166.
SOUTHEAST	
ESP Audio Services/Falls Church, VA	Jim Ebert has formed his own production company at Cue Recording, 109 Park Ave., Suite E, Falls Church, VA 22046; 703-532-3642.
Digital Associates/Nashville	Acquired Corner Cartage Company, a music equipment moving and storage company. The company has been renamed Music Movers.
MOUNTAIN	
Rocky Mountain Recorders/Denver	Celebrated 1-year anniversary in October.
SOUTHERN CALIFORNIA	
EFX Systems/Hollywood	Brad Blake has joined the staff as audio post-production supervisor.
NORTHERN CALIFORNIA	
Hyde Street Studios/San Francisco	Celebrating 10th year in business.
Pyramid Sound/San Francisco	Now offers audio-for-video post-production services.
CANADA	
Ambience Recorders/Ottawa	Opened first Foley sound stage in Eastern Ontario in November.
MANUFACTURERS	
Alpha Audio Automation Systems	Cinétel Productions (Knoxville, TN) has purchased The Boss/2 automated audio editor.
Australian Monitor	Sounds Interchange has purchased 24 AM 1000 amps.
Gauss	Kajem Victory Recording Studios (Philadelphia) has upgraded its coaxial monitor systems to include Gauss 3588 coaxials and 4583A woofers in all rooms.
Solid State Logic	Skip Saylor Recording has installed an SL 4000 G Series console in its deluxe mixing room.
Soundmaster International	Sales of the Integrated Audio Editing System: Magno Sound and Video (New York); Weddington Productions (North Hollywood); Warner Bros. Studios (Burbank, CA); and Film House (Toronto).
Soundtracs	Walter Becker, founding member of Steely Dan, has purchased an IL4832 console.
Studer Revox	Sales of the Studer 963 audio console: The Canadian Broadcasting Corporation (CBC) for the radio network's Toronto Broadcast Center; and CBS (New York). Sales of the A827 24-track recorder: Village Productions (Tornillo, TX); SAS Productions (San Antonio, TX); Music Annex (Menlo Park, CA); The Bakery Recording Studio (Hollywood); Sunset Sound (Hollywood); Sunset Sound Factory (Hollywood); and Conway Recording (Hollywood). Sales of the A820 24-track recorder: University of California (San Diego); and Studio in the Country (Bogalusa, LA).

NEWS NOTES

Los Angeles studio **Soundworks West** has filed for voluntary reorganization under Chapter 11 of the bankruptcy laws. According to a written statement, the facility is open for business and is quickly moving to establish a reorganization program.

Carver has won an Outstanding Achievement in the Pursuit of Quality award from the Association for Quality and Participation. The association noted that the company had implemented sweeping changes to improve the quality of its production process, resulting in a near-doubling of productivity since December 1989.

Optical Disc Corporation has established an international headquarters in Amsterdam. Donald Hayes, ODC co-founder and vice president of international marketing, will head the office. The address is Koninginneweg 213, 1075CS Amsterdam, The Netherlands; 31-20-718741; fax 31-20-713256.

CAT Wire and Cable has opened a new manufacturing plant in Miami. The 15,000 square-foot facility contains equipment for extrusion, cabling and shielding for cables up to 1.5 inches in diameter.

Audio Kinetics has appointed 21st Century Ltd. to distribute ES.Lock and component automation products on the West Coast.

Otari has presented **Audio Images** of San Francisco the Dealer of the Year award. The award was based on outstanding quota achievement, product expertise, stability, growth and interaction with the manufacturer.

B&B Systems has opened a New York office at 630 Third Ave., Fifth Floor, New York, NY 10017; 212-599-0375; fax 212-949-4058.

SALES NOTES

Avid Technology has sold 100 Avid/1 Media Composers since its introduction a year ago. Universal Recording, Chicago, purchased the 100th system.

Carver's sales increased 30% to \$7.7 million during the third quarter of 1990, compared to the same period in 1989. ■

"The Beta 58 delivers maximum SPL, to keep the vocals above screaming fans in a loud rock club — without feedback. Yet it has the sensitivity to reproduce the most subtle, breathy whisper for 80,000 people at an outdoor festival. And for guitar amps, the Beta 57 gives me the isolation I need without sacrificing the warmth and tone I want. For live sound, Shure Beta mics are the state of the art."

Steve Folsom

Steve Folsom, Sound Engineer for Melissa Etheridge and John Hiatt.



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Roadwork

By Mark Herman

Clair Update: Clair Bros. reported several items of interest along with its usual extensive repertoire of tours. After three years of development, Clair is releasing its Coherent Transfer System electronic device, a proprietary crossover and limiter with performance specs equivalent to 22-bit digital audio. The first production run has just been finished. All of Clair's systems are scheduled to be equipped with the system in time for the upcoming spring/summer touring season ... All of Clair's concert systems are now using the Clair/TC Electronic 6032 remote control with TC Electronic 1128 programmable equalizers ... Clair has moved its European base of operations from London to Basel, Switzerland, and has entered into a joint venture with the Swiss company Audio Rent. Clair's Greg Hall said, "The move establishes a better service base for the European continent. It will give us a wonderful target area for the launch of the European Clair Bros. product and installation division." Germany and France are expected to be key markets in the future.

Schubert Systems Group (North Hollywood) has been keeping several systems busy on the touring circuit throughout this winter season. In addition to longtime SSG account Bruce Hornsby and the Range (who were out with a 32-box SSG Steradian main and 16 sub system — see the January issue for a system closeup), Toto travelled across Europe for the second time this year with consoles, electronics, monitors and engineers (stacks and amp racks were provided by Encore Sound). John Ostrin engineered the house on a Gamble EX56 and Gary Sanguinet did monitors with a Gamble SC32x16. An additional Gamble HC24 was used for Toto's extensive keyboard mix ... Other work included sporadic dates with Bonnie Raitt, numerous national one-offs and several Christmas events. SSG's equipment inventory continues to increase with the recent addition of more Steradian FOH and monitor boxes.

Trivia Question: Name the five states that contain the most sound reinforcement companies. Answer: Based on a sampling of more than 1,000 companies, California is the leader, with 17% of the total. New York is second with 8.2%; Texas hits third with a 6% share; and fourth-place Florida 4.7% barely edges fifth-place Pennsylvania's 4.5% slice. These states account for just over 40% of all the sound companies.

What's up down-under? Eric Robinson has reinstated the historic Australian sound company — Jands Concert Production Services. He bought the company back from Samuelson Concert Productions after selling it several years ago. To make it even more interesting, Jands — through a special agreement with Clair Bros. — has Australia's first Clair S-4 Series II system in operation, along with the new Clair/TC Electronics TC6032 remote EQ system, custom Carver 2.0 amplifiers and, when available, Clair's new FOH electronic control unit. Jands' system was recently utilized for the final leg of Midnight Oil's world tour.

The Power Plant (North Hollywood) rehearsal facility hosted the intricate Stevie Wonder rehearsals this past December. It's hard to believe, but six major-league consoles were used! House mixer Jim Sanders took two Yamaha PM3000s out front, with two Ramsa WR-S840 40x18 boards handling the monitor wedges. A Gamble EX56 and a Gamble HC24 were used onstage for Wonder's own special in-ear stereo mix engineered by Larry Dropa. A considerable load of signal processing equipment was also present ... Other recent Power Plant clients include Bell Biv DeVoe, Jody Watley, Michael McDonald, Megadeath and Tower of Power.

See Factor, the Long Island City, NY sound and lighting company, has been touring with Bad Company/Damn Yankees (see this month's All Access). Another tour leg is scheduled to begin sometime this month ... Longtime crooner Andy Williams has been touring mid-sized arenas and theaters with a 24-box Meyer MSL-3, four 650 & six UPA FOH system ... Comedian Andrew Dice Clay has had a smattering of dates and several mini-tours ... See Factor has stayed busy with a constant stream of national concert one-offs spread around the country (averaging 4-6 shows a week), as well as various local events in the NYC area, including the

MTV New Year's Eve production and all the "MTV Unplugged" acoustic shows.

Martin America, the U.S. distributor of Martin Audio loudspeaker products, has closed down. All U.S. sales will now be handled through the U.K. office by Dave Bearman, Martin Audio's international sales manager.

Lorenzo Banda, former owner of sound reinforcement company Air Motion (Albuquerque, NM), recently joined with Manticore Sound & Lighting (Cincinnati) to head up its Western touring operations. Manticore has opened a new office in Albuquerque run by Banda; Air Motion itself no longer exists. An enthusiastic Banda said, "1991 has already started out strong; we've put three tours out right away and several more are lined up to go out soon." Tom Whisner still remains as the principle owner at the head office in Cincinnati ... Manticore's main cabinet inventory now includes 32 Electro-Voice MT-4 boxes, 32 Meyer MSL-3s, 20 Meyer 650 subs and 20 Turbosound TMS-3s. Power is supplied by Carver 1.5 and 2.0 amplifiers, along with Crest 8001s for the low end. Manticore also has complete Meyer and E-V monitor systems and a full complement of Yamaha PM3000 and Ramsa WR-S840 consoles.

Speaking of Manticore, the company provided console and EFX gear for the support acts on Judas Priest's late fall tour leg (with main sound by Tasc). Testament's FOH mixer Dave Pig and Megadeath's man Dave Kehrer shared a Gamble EX-56 house console while Rick Decing mixed monitors for both opening acts ... After the Judas Priest tour ended in December, Manticore supplied Megadeath with a complete system for a short U.S. tour leg ... December was the start of a tour with rapper Ice Cube. The cold one carried a Yamaha PM3000 house console, 24 Meyer MSL-3s and 20 Meyer 650 subs for the main system. On stage were eight Turbosound TMS-3 sidefills, eight Meyer UPAs and a Ramsa WR-S840 40x18 stage console ... A tour that ended late last December with Moscow On Ice included full lighting, 12 Meyer MSL-3s and eight Meyer 650 subs. ■

Mark Herman is the president of Hi-Tech Audio Systems, a sound reinforcement equipment rental company based in Half Moon Bay, CA.



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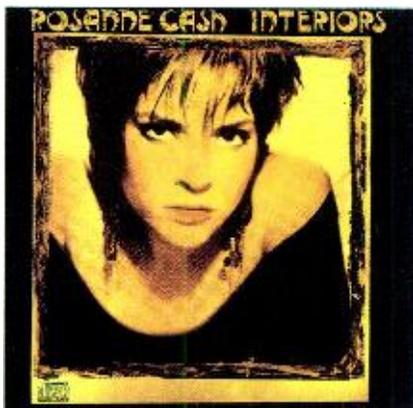
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Fresh Tracks

Rosanne Cash: “Interiors”



Label: Columbia
Produced by: Rosanne Cash (two tracks co-produced by Rodney Crowell)
Engineered by: Roger Nichols, John Guess, Donovan Cowart, Russ Martin, Milan Bogdan
Mixed by: Roger Nichols at Soundworks West (Los Angeles)
Recorded at: Masterfonics and The Music Mill (Nashville); Mayfair Recording (London)
Mastered by: Bernie Grundman (Los Angeles); and Glenn Meadows, Masterfonics (Nashville)
SPARS Code: DDD

Comments: With “Interiors,” Rosanne Cash establishes that she is not just one of our finest singer-songwriters, but a fine producer as well. This first attempt at self-production is the best-produced of her six albums. No small challenge, considering some of the best producers in the industry preceded her. The production is modern and seamless, the presentation of the songs is sensitive.

Of special interest: The acoustic guitars are bright and full, enviably recorded, while Nichols’ mixes are gorgeous and rich in detail. The background vocals on “What We Really Want” are well arranged and performed. Guest John Stewart’s guitar layering on “Dance With The Tiger” gives the song a Fleetwood Mac-like quality; Cash took on no less a production talent than Lindsay Buckingham and in so doing, the student may have excelled beyond the teacher. ■

FOCUS:

ROSANNE CASH, Producer, and ROGER NICHOLS, Engineer, “Interiors”

R•E•P: Your records have always had exceptional engineering, but this one takes it to a new level.

Rosanne Cash: Sonics are really important to me. If the record’s not sonically right, even if it’s played to perfection, I’m distressed. Roger knew what I was after, and he married the sonics and the performance perfectly.

R•E•P: How did you decide you were ready to produce yourself?

RC: I’ve been in the studio for 13 years now, and I paid attention. It was frightening for me in the beginning. I went in and I had never met Roger, but from the first day I felt so safe with him. It was like having Uncle God in the studio.

Roger is a wild guy. There was this lava lamp in the control room. Sometimes Roger would be standing in front of the lava lamp for 10 minutes, just staring into it, like he was dead to the world, not even listening to the playback, and then he’d just reach behind, ever so slowly and tweak a knob.

Many times I’d start to say something, and just as the words were coming out of my mouth, “Roger, do you think you could boost the highs on that,” he’d be there, already doing it. He’s not just a genius, he’s also telepathic. John Guess, the engineer who did all the overdubs with me, was wonderful too.

R•E•P: How did you decide to produce this yourself?

RC: It was a no-choice situation. I had assembled these songs, I did the demos, and the songs were very personal ... While I was making the demos I had a vision of how I wanted the record to sound and I wasn’t willing to compromise.

R•E•P: But your husband [Rodney Crowell] is a terrific producer — you’ve made some great records together.

RC: Well, I had started painting a year before I made this record and I was enthralled with what a solitary process painting is. With just going into that creative space alone, and how it felt to complete something alone. I really wanted to have that experience in the studio that I had had with painting. That is the major reason that I produced this myself. The recording of the album was very much like the content: the process was a very interior one. We were diving pretty deep, all of us, and the sessions were intimate.

R•E•P: How do you go about demoing your songs?

RC: For “This World,” I just sang into a cassette player and then sent it to Stuart [Smith, guitarist], so that he could start thinking about his guitar parts. For several of them, like “Land of Nightmares” and “Mirror Image,” I went over to Vince Melamed’s [keyboardist] house and we just put them down on his eight-track with my guitar and his keyboards and drum machine.

Once I had the demos, we met at my house and went through all of the songs to refine the arrangements. Then we went to the studio and played what we had for [drummer] Eddie Bayers. Eddie’s a quick study — he just walks right in to it. I knew that I only wanted a full drum kit on two or three of the songs. That was my leading vision — that the album was going to rely more on percussion.

R•E•P: There’s a vocal phrasing thing you do on this album which is really great. You tend to sing “out of the beat” ...

RC: Yes, I’m real good at singing out of time ... (laughs)

Continued on page 22

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Publishing A Newsletter

By Dwight Cook

A newsletter is one of the most effective, informative and friendliest ways in which to establish the identity of a recording facility. It is also an ideal way of staying in touch with your clientele and fostering new business.

The initial ideas for creating our studio newsletter came from SPARS business conferences and informal conversations with colleagues who have explored a multitude of cost-effective promotional strategies. Many publicists and other company owners have helped contribute to our newsletter, which has evolved quite a bit over the years.

Keep in mind the old truism: Start small and keep it simple. It well suits the development of a newsletter. Our publication, titled "Sound News," started in 1980 as a yearly one-page flyer. Today, it is a quarterly four-page newsletter. Although producing our newsletter fulfills our promotional needs, we try not to lose sight of the fact that we are in the audio business, not the publishing business.

Our newsletter gets our name on our clients' desks on a regular basis and doesn't require too much time away from our daily operation. Bill Wade, our studio manager, is the writer/editor of the newsletter and the major figure in its production. Bill has the ability to write a newsletter that is conversational, fun and easy to read. He gathers contributions from the staff and encourages submissions dealing with relevant topics.

Bill has creative control and gives the newsletter a consistent style and point of view. This is essential, because our primary goal is to portray our company's unique identity.

STAFF, NOT GEAR

Most importantly, the studio staff is emphasized over the equipment. For in-

Dwight Cook is secretary of SPARS and president of Cook Sound and Picture Works, Houston.

stance, Bill is a motorcycle enthusiast, as are Mark Meyer, our chief engineer and Kate McGuire, our office manager. In discussing motorcycles around the office, we discovered that many of our clients are riders too.

As a result, Bill created "APES on Wheels" (Artists, Producers and Engineers Society). This informal club has been on numerous motorcycle excursions and their ongoing adventures have become a regular feature of the newsletter.

People always want to work with winners, so we include notable and outstanding projects completed at our studios. We also inform our readers of the latest equipment acquisitions and how the new technology is better serving their needs. Out-and-out bragging is never a good idea, so we do this kind of promotion in a variety of subtle ways. We mention our clients and their projects, and position our staff as well-informed, creative people. The "Tip of the Month" column allows our clients to contribute their ideas on a variety of subjects such as music licensing and time code.

Make sure your newsletter has a professional appearance and represents your company well.

Have fun with your newsletter — make it breezy and enjoyable to read. We have jokes and trivia questions with prizes and commendations. This year, we started the "First Annual Cook Sound and Picture Works Awards." Short on pomp, long on circumstance, these awards bring attention to some of the unusual and often overlooked situations that arise in the day-to-day business of studio operations.

Winners receive an engraved, gold spray-painted, crushed and mangled commercial reel with stretched tape hanging from the flanges. Our many categories include: "The Most Creative P.O. Award," which was won by a client asking for four hours of studio time, three station dubs, two cassette copies and a partridge in a

pear tree. We also instituted the "Strangest Booking Request Award" for a client who wanted one of our rooms for playing records and eating pizza. Budget restrictions prohibited this request — there was only enough money for the pizza.

NEWSLETTER TIPS

It really isn't that difficult to start your own newsletter. Here are a few tips that have worked for us. We have a computer network, so we all share the same files. That helps! We all use the same word processing software, and in the first stage of production, all the writing is first reviewed and spell-checked without concern for the layout. After the writing is complete, we review our clip-art library and photos to see what might apply. With our scanner, we can create new clip-art and render photos usable. A draw program allows us to create original art and combine these elements with text.

The next step is the layout. For our desktop publishing venture, we found a low-cost program that was designed for newsletters. To save time, we have a standard masthead which we use for each issue, and our layout is a standard template file. We use a PostScript printer to print a proof to paper so that we can see how the document will look in its final form.

We then save to disk and take the files to a professional typesetter. (With a good laser printer, you may find that it is acceptable to skip the typesetter and print the master copy yourself). The final document, now typeset, is taken to an offset print firm, which also screens and sizes the photographs.

In getting your newsletter started, experiment and find the method that works best for you. For instance, there are a lot of choices to make when it comes to software. If you are not currently computerized, find the software that does what you want and then purchase the computer that will run that software. If you're looking for a low-cost network that works well, or if you want to discuss our newsletter production methods, feel free to call us.

Any newsletter or direct mail ends up in the trash if it doesn't say "read me." Make sure your newsletter has a catchy, professional appearance and represents your company well.

YOUR MAILING LIST

Another thing to scrutinize is your mailing list. If the newsletter goes to the wrong people, it is a waste of time and money. Mail it to customers — and prospective

customers — and build a strong mailing list. While it's possible to buy mailing lists, you may be able to assemble one from directories or by swapping lists with affiliated non-competitors.

**Start your newsletter
small and keep it
simple.**

Try to create a personalized list as well — we've found that mailing to individuals is much more effective than mailing to a company name. In any event, verify your mailing list by requesting address correction at least twice a year.

As for the postage fees for mailing a newsletter, we have had very good results with the less-expensive bulk mailing procedures. If you want to be sure it gets there, and hastily, send it First Class. Both methods allow for address correction by the post office. Some of my colleagues use a mailing service center for their newsletters. We have the manpower and the labeling software to effectively satisfy our needs, but be aware of the post office regulations and sacking requirements, which are so stringent that they could drive a person into the recording business.

Producing a newsletter over the year has played a major role in our success. It has promoted our studio and helped us to establish our company name and reputation with our target market. Client feedback has proven its worth. But a newsletter is only one of many self-promotion tools. We have had success with seminars, open house tours of our facilities, and sponsorship of trade organizations, industry gatherings and parties. ■

The Society of Professional Audio Recording Services is the industry's best source of business information. For information on activities and membership, contact SPARS at 4300 10th Ave. N., Suite 2, Lake Worth, FL 33461; 407-641-6648; fax 407-642-8263.

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February 1991 R • E • P 25

Standards, Part 2

By Rick Schwartz

Last month, I attempted to stir things up a bit when I made a case for better digital audio workstation standardization. Since then, I've talked with a number of manufacturers, various technical committees and several digital gurus to ask how they feel about the topic of standardization. Here's what they had to say:

COUNTLESS COMMITTEES

During the past year, there have been numerous study groups, both here and abroad, looking into the area of DAW standardization. Some of them have been subgroups of various societies including SMPTE, AES and SPARS. There is even a proposed ANSI standard for WORM drives.

I asked around to find out who was well-versed on the standards topic. One name kept coming up — Bill Hogan, a group leader and pivotal member of the Digital Audio Research Study Group (DARSG). According to Bill, many people believe that a major reason for the less than enthusiastic reaction to digital audio workstations has been the fact that most do not support removable media.

"We've held a number of meetings and basically identified the key things that need to be in a file structure," he says. The results of those meetings are being refined (by Bill Elswick from Ediflex and Ted Smith from WaveFrame) and will be distributed as a rough draft proposal. Then it's up to the manufacturers to see how applicable it is.

PANDORA'S BOX

Next, I asked Peter Gotcher, president of Digidesign, what his position is on the standardization issue. His response: "We think standardization, at least on the Macintosh, is achievable and we are working on it with other manufacturers. But the kind of universal standardization that users are asking for is such an unbelievable Pandora's box — standardization is great, but as a user I would rather have a great system that works without media

interchangeability, than a nothing system with file exchange."

David Haynes, a highly respected digital guru from Studer Editech and a member of DARSG, feels that standardization is possible, although he doesn't believe it's going to be an easy task.

"EDL capability gets split into a number of different categories, including signal processing," he said. "There's the concept of just being able to play sound files from different products, and then there's the concept of being able to play them so they sound exactly the same. The latter is a lot harder and practically impossible to achieve."

THE DOWNSIDE OF AIFF

Last month, I focused on an already existing sound file standard called the Audio Interchange File Format. I asked David Haynes how he feels about AIFF. His opinion is that it shouldn't be considered an interchange standard, because it's much too broad.

"You can have 20 different formats of AIFF that are completely incompatible," he says. "AIFF is a set of rules to be followed — your choice is on how to implement them. It is an example of what happens so many times with committees."

Gotcher adds, "The reason Digidesign supports AIFF and the reason we have it in our products is that it is a good import/export format — not to be used as a native file format. Every time our engineers have to write 'code' to work with AIFF files, they find that things run slower. It's too restrictive and complex, and tends to bog down the system."

Although Haynes has not experienced this speed degradation, he agrees that AIFF is too general to be considered a high performance multichannel standard. "When you start getting into 24-channel systems, then you start having to move away from any computer-based file system. You can't base a high-end multichannel system on AIFF."

Bob Dorris from Sonic Solutions agrees. "As soon as you start thinking about random access in a multichannel environment, any type of interleaving is out of the question," he says. "For performance reasons, Sonic Solutions has chosen not to use the Macintosh file format. However, we do provide a conversion utility to convert our own proprietary file system to a standard Macintosh file." He added that Sonic Solutions would support such an interchange standard, if it existed by using the same type of conversion process.

A DUAL MEDIA STANDARD?

Because removable recording media is still a moving target, Bill Hogan feels we need to first define a file structure which is completely media-independent.

"I think it's going to be self-evident what the proper media is — I think we'll see a dual swing toward some kind of streaming tape as well as some kind of removable media (most likely optical)."

David Haynes has a more practical view on the media issue. "With one type of media, you have the opportunity to write translators. Let's say that everybody started using 650Mbyte optical disks and two companies like NED and Studer decided that even though neither is using it online, it would be a published standard. Using a conversion utility, sound files could easily be exchanged." Haynes' objection to a media independent standard is the fact that different drivers would have to be written for every type of media.

One thing is for sure — there's little desire for a real-time archival system. I've heard that Roger Lagedec from Sony was practically shouted down at an NAB meeting for suggesting that R-DAT be used as a transfer medium.

ONE FRAME IS NOT ENOUGH

Most manufacturers agree that the CMX standard for edit decision lists is a simplistic standard, which saves retyping time code numbers, but is not a solution to playlist exchange.

"The CMX spec doesn't address all of the needs of audio," Haynes says. "A problem exists in mounting reels. I believe the CMX system only allows four channels per reel and one reel per machine at a time. You could, however, have six machines with four channels each, I guess."

Bill Hogan pointed out that CMX doesn't give you more than single frame editing accuracy, which is not good enough for the needs of audio. However, he added that there is an extension of the original CMX EDL specification that a SMPTE committee has been working on.

THE REWARDS OF CONFORMITY

There are those who feel the only thing that is holding digital audio workstations back from widespread acceptance in the film markets is removable media and interchange. On the other hand, several manufacturers told me privately that they would rather spend time adding more features to their own systems than on media standardization. Some are reluctant to release file formats into the public domain,

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

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Digital Domain

because of the many years they put into software development.

"At some point down the road the audio industry has to have a commitment to find a true universal standard," Gotcher says. "I think it's five years off, and I think it's going to involve a new dedicated audio operating system. That's going to be the only way to do it and it's going to be painful, but there's no ducking the responsibility."

TOTAL RECALL

Because many DAW products offer real-time DSP on playback, there is speculation that it is theoretically possible, but very unlikely that a user could transfer an audio file with DSP information and end up with exactly the same sound. Gotcher adds, "Crossfade types and automation are difficult issues, you'll find if you do an automated mix on one system and take it to another system the mix data is just not going to map well. There will never be in the

short-term, real, sound-alike DSP engines that are consistent across platforms, so people should get used to the idea right now."

One issue of standardization that has not been widely discussed until now is the issue of nomenclature. There is almost no common terminology between the various workstations. Some of it was an outgrowth from film, television and record industries. Others were conjured up by programmers who seemed to be working in a vacuum — with little connection to the outside world. Bill Hogan feels that the lack of a common vocabulary accentuates the learning curve between the systems. He adds, "Just because you have a different terminology doesn't make your product any better or worse. Icons aren't necessarily the answer because they do not always translate to the real world."

It seems everyone has a strong opinion about the subject of DAW standardization, but it's too early to see much of an

industry-wide consensus. I get the impression that some of the manufacturers are giving lip service to this when they privately feel standardization is unachievable. Although there are a number of technical hurdles involved, I strongly believe that sound file exchange will be possible in the near future.

There are some lessons we can learn from the computer industry about standardization. In the case of the Macintosh, Apple Computer has gone to great lengths to encourage interface consistency, even if sometimes a programmer is forced to break the rules to get around operating system limitations, give their software a fresh look or impart a competitive edge. Only time will tell if digital audio workstation standardization is really worth the price. ■



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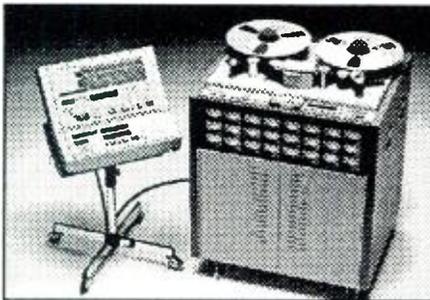
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The format that wouldn't die: Recent technical advances allow analog tape machines to compete on a par with their digital counterparts.

By Chris Pukay

During the past decade, there have been many real improvements in tape recorder technology, advancing raw performance as well as increasing the number of features for a given price range. Most studio professionals are aware of the major advancements, such as the ever-increasing number of tracks or the introduction of affordable digital technology.

However, in the midst of the digital revolution, there have been many advancements in analog tape recording worth noting. Although some of the advancements in tape recorder transport development benefit both analog and digital tape machines, many of the advancements in the signal handling portion of analog tape recorders have allowed analog to compete with, if not rival, digital.

TRANSPORT ADVANCEMENTS

Most major transport developments can be attributed to developments in microprocessor technologies. The first microprocessors were incorporated into tape transports in the late 1970s, where they were used mainly to govern transport commands and to display tape index time. As microprocessors became more powerful and smaller in size, they were used for more applications, such as autolocator functions, allowing the user to store and chase directly to a chosen location.

We have seen autolocators increase in memory capacity and accuracy, with additional features being added, such as locate-to-SMPTE time code and the capability to generate, read and display code numbers. The top-of-the-line autolocators are even capable of performing automatic punch-ins and punch-outs to time code, whether for rehearsing or recording.

Lately, universal autolocators have been developed, which will work with a number of different tape transports. This is accomplished by having a number of different machine ballistics stored in memory. The user selects the ballistics of the specific machine that the autolocator is to be used with. As tape machines become more sophisticated, microprocessors have

been used not only to control autolocator functions, but also to control other user functions and features.

Let's take a look at some of the features incorporated into the modern tape transport and explain just what the benefits are with each one.

CONSTANT TENSION VS. CONSTANT TORQUE

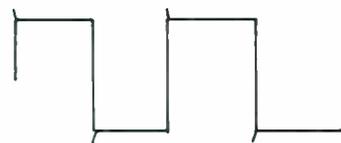
Two varieties of transport types are available on a professional tape recorder: constant tension or constant torque. The constant-tension transport, which applies equal tape tension from the beginning to the end of the reel of tape, is the more sophisticated of the two and also the most gentle to the tape.

In one design, constant tension is achieved by using tension sensors to govern the torque applied to the reel motors. Another method is "open loop," a system that looks at the diameter of the tape pack by using reel tach pulses. This arrangement uses tach ratios programmed into memory to calculate the tape pack diameter on each reel, which causes the corresponding reel torque to be applied.

On the most sophisticated constant tension systems, whether open loop or sensor, a microprocessor is used to monitor tach pulses from tach rollers and the capstan motor so that any tension errors are detected and the reel control system can compensate for them. This is accomplished by making small adjustments in drive to the capstan and reel motors. Some



UNDER



CORRECT



OVER

Figure 1. Phase compensation for analog tape machines.

Developments In Analog Tape Recorder Technology

Chris Pukay is a technical product specialist at Otari, Foster City, CA.

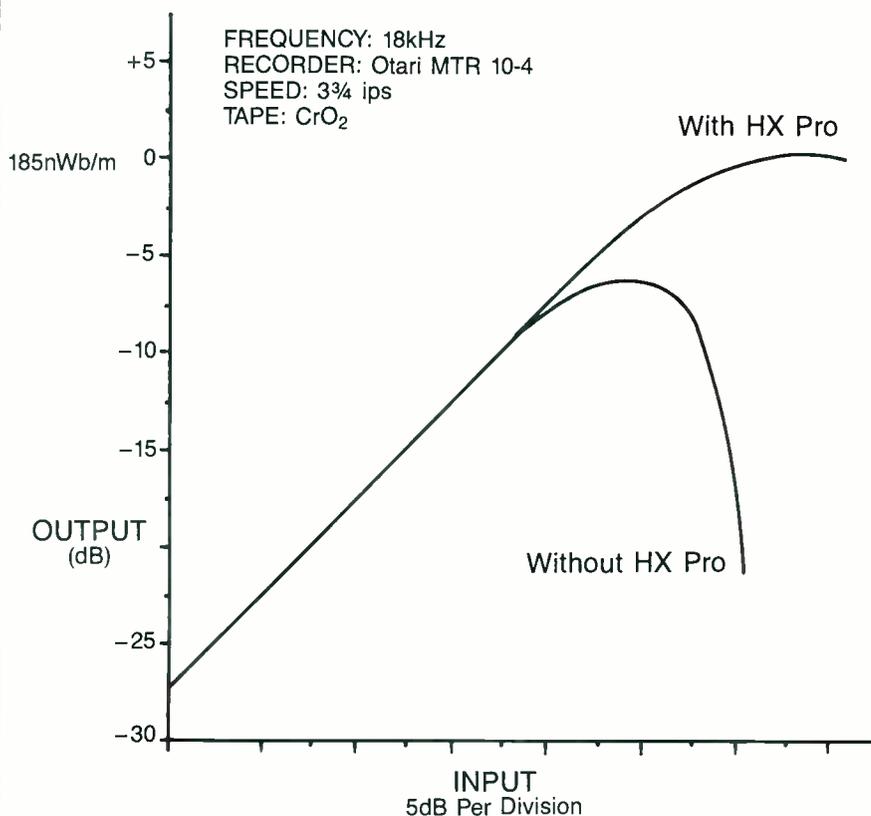


Figure 3. Input/output level comparison, 18kHz, CrO₂ tape. (Courtesy of Dolby Laboratories.)

into the bias circuits of their tape recorders. This is a crucial feature for doing quality audio production. Seamless inserts are accomplished by controlling the turn-on and turn-off of the erase and record bias. The record bias is delayed on punch-in so that an overlap of existing and new material does not occur. On punch-out the erase bias is turned off first, then the record bias is turned off.

This practice prevents leaving a gap on the tape between new program material and existing program material (see Figure 2). The bias is ramped up on turn-on and ramped down when turned off with this type of system to prevent pops and clicks on tape. The timing delays are usually controlled through the use of shift registers.

However, some newer designs use a microprocessor so the timing of the delays is controlled with software. The amount of delay required for a gapless punch-in or a gapless punch-out depends on the distance between the erase and record heads, as well as tape speed.

Another important feature that has been added to audio circuitry by many manufacturers is Dolby HX Pro. Although not noise reduction, this variable bias optimization technique was originally developed by Bang and Olufsen for its cassette decks, and then licensed to Dolby Laboratories.

Circuitry monitors the audio input signal and dynamically adjusts the bias according to how much high-frequency content exists in the signal. This minimizes high-frequency saturation and increases dynamic headroom.

The benefits are greater at slower tape speeds than at faster tape speeds, where there is literally more "area" to spread a given amount of high-frequency signal, minimizing any saturation problems.

Another phenomenon that affects high-frequency output level is self-biasing, where high-frequency program material acts like bias. This high-frequency program bias combines with the existing bias, causing a loss of high-frequency response. In general, as the high-frequency content of the signal increases, the capability of the tape recorder to record high-frequency decreases. Because HX Pro monitors the input signal, when extensive high frequencies are detected, the bias level is reduced. The net result is a constant overall bias level, providing lower distortion and better overall high-frequency response and headroom (see Figure 3).

AUTO-ALIGNMENT

A few of the high-end analog tape recorders now have auto-alignment systems that automatically adjust both repro-

duce and record parameters. These systems considerably reduce set-up time, simultaneously improving alignment accuracy and allowing for better audio quality. The most sophisticated auto-alignment systems adjust both the reproduce electronics and the record electronics. The reproduce alignments include reproduce and sync gain, and reproduce and sync high-frequency EQ, as well as reproduce and sync low-frequency compensation. Head azimuth adjustments must still be manually adjusted by the user.

Record adjustments include record gain, record high-frequency EQ, and on the most sophisticated systems, mid-high-frequency EQ and record phase compensation (see Figure 4). The alignment systems will store alignment data for a number of tape types at each tape speed.

On some systems, session comments can be stored with the alignment data also. Alignment parameters such as bias level and operating level can be tailored to the users' preference. Some alignment systems even allow the alignment data to be stored on the tape itself so it can be recalled at a later date. Let's take a look at one auto-alignment system in particular.

Otari's auto-alignment system uses an 8085 microprocessor to keep track of the alignment functions and parameters stored in memory. The programmed memory is stored on a common EPROM IC. The EPROM contains the instructions for the operation sequence and also has the error-detection instruction set and default values stored for basic setups. The error-detection system will detect any alignment error and display an error message on a front-panel display.

The user-addressable memory is stored in RAM, with user-selected parameters for bias level, digital potentiometer values for all alignment parameters, oscillator frequency data and levels, as well as any session comments that may have been stored in memory. The RAM is battery-backed by a long-life lithium cell.

The electronics of each audio channel have digitally controlled trimmers for parameter adjustments in reproduce, sync and record. The advantage of using digitally controlled trimmers is that trimmer settings can be stored and recalled from memory. Digitally controlled trimmers are also more accurate than conventional potentiometers.

In an 8-bit system, there are 255 steps available in each trimmer. The resolution of the trimmer is better at the upper end of its range than at the lower end of its range (the nature of linear digital bits applied to a logarithmic decibel scale). This is why with most designs, typical readout setting values are in the 150- to 200-step range, still allowing for some upward adjustment if needed.

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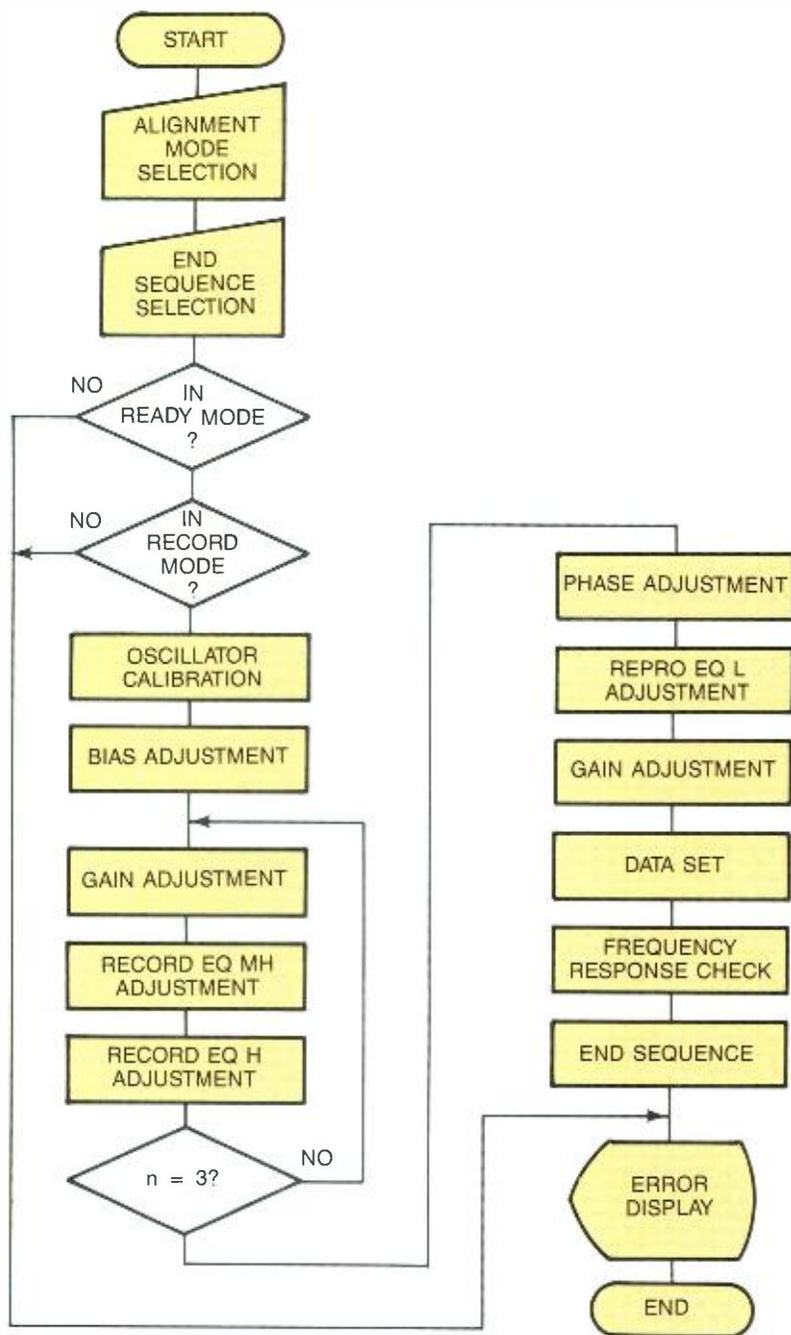


Figure 4. Otari record auto-alignment flow chart.

The digital trimmers, which can be thought of as simple digital-to-analog converters, are made up of a data latch and a resistor array. The resistors are in series with the input side of the gain control circuits and in parallel with the series input resistor for EQ and record phase compensation circuits.

The error-detect system that Otari uses has four different sections to its program. All four sections of the program display their error codes on the alignment screen. The first section of the error-detection pro-

gram looks for errors in data read from the EPROM or stored in RAM when the system is powered on.

The second section of the error-detect program is active during auto alignments. This section of the alignment will display an error message if there is not enough range in a digital trimmer to complete the alignment or if tape dropouts cause the alignment system to misalign any of the parameters.

The third section of the error-detect program checks the different sections of

RAM. An error message is displayed if an error exists in the overbias register, the oscillator register, the potentiometer level register or the frequency-select register, showing the user which register has the error.

The fourth part of the error-detect program detects any operator errors, such as wrong buttons pushed, and displays the error message on the alignment screen. The error-detect system is valuable to the user because many times when the machine is auto aligning the user may not be in the room or the system is too fast for the user to detect an error by eye. With the error-detect system no error goes unnoticed.

Manual alignments can be performed on full auto-alignment systems. But some alignment systems are available that incorporate limited use of digitally controlled trimmers and have the capability of storing different setups in memory, but do not perform the full alignment sequence automatically. The user must perform the alignments manually through the use of an alignment panel provided on the machine.

This type of manual system does not have all of the features of an auto-alignment system but still gives the user some flexibility. The user must operate and control each individual adjustment, which makes this system slower than an auto-alignment system. However, setups can be recalled from memory, which does save some set-up time.

SUMMARY

The advancements that have come about in the past several years have allowed the analog tape recorder to remain the standard format for recording. Analog does not have the format compatibility problem that digital recording currently does. Digital is still very expensive, limiting the number of users. There are also many people who like the aesthetic sound of analog and the soft compression that can be obtained from hitting tape with high signal levels.

Considering all of this, analog will continue to be one of the standard formats in the recording industry for quite some time. ■

REFERENCES

1. "An Implementation of Computerized Record Adjustments For An Analog Tape Recorder" by K. Maruyama and B. Ross. Presented at the 79th AES Convention.

Acknowledgment: Thanks to Tom DeFiglio for his assistance in preparing this article.

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By Mike Joseph

Less than common in our industry is the individual who combines decades of musical ability, proven technical prowess and titled scientific achievement. James Boyk — owner of and producer at Performance Recordings in Los Angeles, concert pianist, director of the music lab, pianist-in-residence and lecturer in music in the department of electrical engineering at Caltech in Pasadena — is such a person.

For seven years, Boyk has been developing one specific analog tape deck into an ultimate analog performer. The platform he chose, in one sense, is surprising. In another sense, it's quite interesting. The details follow:

R•E•P: What led you to the Magnesauros project?

JB: I'm a concert pianist, among other things, and my interest has always been to record the piano sound as legitimately as I could. Along the way I've learned something about recording and something about making vinyl records, an art which is now completely obsolete. I have been privileged to co-engineer recordings for Sheffield Labs, including the Kodo Drummers and the Stravinsky Firebird, with the L.A. Philharmonic. I also co-engineered and co-produced a recording by my friend Lincoln Mayorga, solo classical piano works. I've had quite a bit of experience in the purist sort of stuff, none at all in multi-mic studio work. My goal has always been to record live material better and better.

R•E•P: Tell me a little bit about the tape deck itself. It's an early Ampex?

Mike Joseph is editor of R•E•P.



The Magnesauros is a hybrid Ampex 351 1/2-inch, 2-track.

STALKING THE MAGNESAURUS

The development of the perfect analog tape deck.

JB: Originally a 15ips Ampex 351, it's what they called a portable machine. Our formal name for it is the Magnesauros 351.5, the 5 referring to 1/2-inch tape. I don't know how much it actually weighs, but I think the transport is about 60 pounds and the electronics 30 or more, or roughly 100 pounds all told. It's a well-known machine, transport in one box and two signal chassis, each with one big meter, in another. It's all tube, in fact, all miniature triodes.

The series began around '57 or '58. The date codes on some of the parts in mine are actually as late as '62, which I was pleased about, because it meant that I had very late electronics. The basic deck is a very good machine. In my opinion, it's one of the best off-the-shelf recorders that's ever been made.

R•E•P: How did it perform in stock condition?

JB: Well, the transport tended to have wow rather than flutter, unlike the modern servo decks. The electronics all had some 120Hz ripple. But basically a good machine. In fact, three of our records, our catalog numbers PR3, PR4 and PR5, were made with a stock 351. It was one that had been tweaked and maintained just immaculately by Michael Fraser, who was my recording engineer before he retired from the business.

R•E•P: What led you to owning and improving your own 351?

JB: Back then I had already started thinking, "How could we do this substantially better?" When Fraser retired and sold the machine, I was galvanized. I was in a position where I had to have something, and I decided that it had to be an all-tube machine. I'm simply not happy with any solid-state recorder that I've ever heard personally — none of them touch what in my



Improvements to the 351 include a replacement head nest (custom-modified Sony MCI), custom-made heads, rebuilt motors and a custom flywheel.



The all metal record/play heads were custom-built by Greg Orton, senior staff engineer at Ampex. The erase head is off-the-shelf.

opinion can only be done with tubes. I find a lot of agreement about this among the professionals I talk to, professionals in re-recording and also professionals in equipment design.

R•E•P: What do you think was the magic in the older tube 351 series Ampex machines?

JB: I think the more I look into the 351, the more I realize that it was a brilliantly engineered machine. Not that it was perfect, because it wasn't, but that it was the balance among the various aspects of its performance that was quite remarkable. It's been very hard to make it better without an enormous amount of work, which we have put in.

R•E•P: Detail, if you would, what have you done to your machine to improve the performance?

JB: The head nest was replaced by John French of JRF Magnetic Sciences in New Jersey, with a custom-modified Sony MCI headnest, simply because it gives you control over all the axes of the head, which the Ampex nests do not. John made a little hand-operated gate for the playback head and got custom record and play heads designed and made by Greg Orton, senior staff engineer of Ampex. The heads were custom-made because you can't go out today and buy 1/2-inch, 2-track heads with the appropriate inductances for tube electronics. They're not ferrite; they're solid metal heads, and have nothing weird about them. They work wonderfully. We did find an appropriate off-the-shelf erase head.

Caring for the transport has been done by Shelley Herman of Acoustronics Sound. Herman is a well-known audio guy in the L.A. area. He used to be at Coast Recording and is very knowledgeable. The motors, bearing rebuilding and the trunings were done by Jeff Gilman of MDI/Precision Motor Works in Hudson, MA.

R•E•P: Did you stick with the original Bodine motors?

JB: The original capstan motor was a Bodine, which we replaced, along with all of the motor run capacitors and so on. All three motors have been rebuilt to within an inch of their lives. I gave MDI carte blanche. I told them, "When the machines leave your shop, I don't want you to be saying to yourself, "Gee, if I had \$50 more to work on it, or five more hours, I could make them better." I want you to say, "I don't know how to make them better." So, they're all quite marvelous.

The capstan shaft now has the ceramic face on it. Every moving part has been analyzed with fast Fourier transform analysis (FFT) to find out whether there were any rotationally caused sidebands. The

flutter idler has been tried. The whole assembly has been dynamically balanced.

R•E•P: Did you custom-fabricate any components?

JB: We now have a custom flywheel made of a special material that won't resonate, so we get rid of the 480Hz ring in the standard flywheel. We were damping the original with rubber bands, which, by the way, are very effective! Just put a rubber band around the perimeter, and thread another one around itself in the four round holes that are in the middle of the flywheel. You can reduce the ringing 10dB with just two rubber bands. It's quite amazing, the performance that the transport design was capable of. I'm not saying that it ever even reached that performance level in those days, because FFTs weren't thick on the ground.

R•E•P: Did you learn anything about tape path design, or mechanical performance, in the rebuilding process?

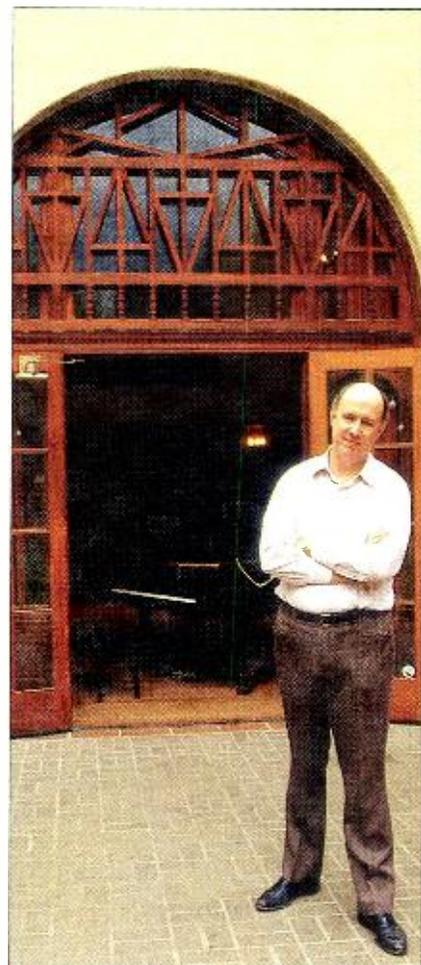
JB: We found out a lot about such things as pinch rollers. For example, the capstan motor mounts to the top plate with four screws, and the common way to remove one of the screws is to lever the pinch roller out of the way. What you're supposed to do is remove the pinch roller with your Allen key and then get at it that way. But most people don't.

Well, it turns out the moment that you lever it out of the way with your screwdriver, you've just ruined it. You can't do that, and this is important to know. You have to then replace the whole pinch roller assembly, not just the tire, once you've bent the little short vertical shaft it's on. If you don't, you've just increased your wow and flutter tremendously.

R•E•P: Something tells us you learned that the hard way.

JB: Exactly. But we also did comparisons. We tried a stock Ampex pinch roller and a brand new ElectroSound. We found out that at least with the two we tried, the ElectroSound was not only less expensive, it was better. It actually gave us smaller and fewer sidebands. I'll say, by the way, for anybody who's doing such analysis, that often you'll see a wow and flutter analysis published on a tape deck. They'll show you a 3k tone and its sidebands. The resolution they use commonly is 50Hz per division.

It turns out that's totally useless and completely meaningless. It will not show you what's going on. You really want to use 10Hz per division. One Ampex ATR that I looked at had a bad capstan sideband at ± 3.2 Hz, down -13 dB relative to the 3k tone. That definitely affected the stability of the signal. At 50Hz resolution, you simply didn't see it. It looked perfect.



Jim Boyk's quest to capture his piano's ultimate fidelity led to the development of the Mag-nesaurus.

So we used 10Hz resolution, and there it was.

R•E•P: Going through the machine, you obviously used a lot of FFT analysis and transducer-generated measurements. How much of your discoveries were just good basic sleuthing, figuring out the relationships between the rotational speeds of the capstan and flywheel vs. the flutter scrape filter or reel motor?

JB: It was tricky, but you ask yourself: What is it that goes around at that rate? "Well gee, that sounds like it's around 5 per second." Where the FFT helps is that you can say it's 4.8Hz, so you can look for something that goes around 4.8 times a second. Measure diameters. You know, there are a lot of things similar in size, for instance, the capstan and scrape flutter rollers, or the pinch roller on one side and the flutter idler on the supply side.

You ask yourself: What is it that has a perimeter, a circumference of x inches,

therefore a diameter of x divided by π ? Well, it's this roller; it's not the capstan because that's only $\frac{1}{4}$ -inch, and so on. So FFT is enormously helpful. I don't mean a little bit helpful; it really makes a qualitative difference in your ability to track down these things.

The net performance result for us was DIN weighted wow and flutter better than 0.03%, and, unweighted, better than 0.06%. That first spec is as good a number as any manufacturer has ever claimed for a commercial tape deck, even a modern servo type. I'm not aware of any manufacturer's spec better than that. It sounds solid as a rock, even on piano.

"Analog recording hasn't nearly reached its true potential."

R•E•P: And the electronics?

JB: It's a line level 15ips machine. The electronics originally had three stages to the record head, or four, including the mic pre, which got dumped into the second line stage before it was eliminated. We now have two stages from our line in to the record head. No transformers at all — we just come into the unbalanced input. The electronics were the purview of Steve Haselton, the chief engineer of Sheffield Labs. He has gone through them extensively, simplifying the circuitry in a number of ways, such as eliminating that one input stage in the record circuit.

Let me give you an example of the remarkable design of the original, which we only discovered in the painful way. First, we eliminated all of the record amplifiers except the actual single triode, which drives the record head. We thought we'd hit the single amp record driver flat, no EQ, very hot from outside, and run it in some approximation of constant current. We found out that it's not capable of driving the head flat.

It turns out that the EQ pre-driver is doing two things: It provides EQ, the NAB or CCIR curve, and it's also providing EQ for the non-flatness of the record amp. We are now going right into the front of the final buffer before the EQ stage of the record amp. We have changed the EQ stage somewhat. But as it stands, once you get rid of the ground loops and hums and so on, it's quite a remarkable recorder. People can judge that themselves just by hearing the record. It's Performance Recording PR7 LP or PR7 CD, distributed via Harmonia Mundi, USA, released in October last year.

Patrick Leonard

DEMANDS

DOLBY SR



Alan Sellen

“With Dolby SR, the music comes back the way I’m used to hearing it, but without the noise.”

Occupation

Producer, keyboardist, songwriter.

Recent credits

Produced and/or co-wrote albums for Madonna, Julian Lennon, Bryan Ferry and many others. Composed film scores including “At Close Range”, “Nothing in Common”, and “Nameless” (due in early '91). And recently released “Toy Matinee”, his own band project.

On what he does

“I like it all, I have to do it all. I feel a need to challenge myself in areas I haven't entered before.”

On his technique

“I find the air and space around the principal elements in a recording are becoming more important to me. The music becomes more centered, with less need for effects and layering.”

On Dolby SR

“I prefer and am accustomed to recording on analog tape. But I don't like tape noise - who does? Dolby SR assures a quiet, transparent recording.”



*“Toy Matinee” (Reprise Records)
recorded and mixed
at Johnny Yuma Studios.*

Dolby SR: now 50,000 tracks worldwide.

R•E•P: Were there any other modifications?

JB: We have an outboard power supply made by Richard Maurer of Musical Fidelity in Culver City, CA, that provides much better power. It has on-board regulation for the filament supply, but not for the B+. I don't like regulated B+; I don't think it's done right in 99 cases out of 100. I think it really degrades the sound.

“My goal has always been to record live material better and better.”

R•E•P: When you put this all together, what do you end up with?

JB: Well, we took our reel of tape made on the Magnesaurus over to Doug Sax at the Mastering Lab, and we played it back and measured things. Their standard mastering playback machine, the one with the preview heads, has its own custom tube electronics, which Haselton also designed. We measured pitch stability from one end of a 10½-inch reel to the other. It was 0.15%. Damn good. Very impressive, considering the changing tension. That's two and a half cents, two and a half hundredths of a semi-tone.

People who know about this tell me that you can edit from one end to another, but I never do that, because no matter who I'm recording, I'm always recording in concert, straight through. I only edit from part of one reel to a similar part of another reel. We can make that spec better if we continue playing with the tension adjustments.

R•E•P: How does the noise measure out?

JB: Noise measurements are enough to drive anybody nuts. I can't come up with anything meaningful. What I want to do is the CCIR/ARM measurement that Dolby has promulgated, but I don't have the proper filter for that. My guess is that it's 67dB below 250n/W. I'll tell you what I've learned, and I've looked into each of these questions elaborately: The most meaningful thing you can say about measuring noise is that with blank tape on the machine and the tape stopped, you read the noise off the playback electronics. Then you run the blank, unmodulated tape. Your tape stop noise, playback electronics only, should be better than 10dB below the silent tape run noise at every point in the spectrum, looking at it with an FFT analyzer. That's the goal. Then you turn

on record with the level pot down all the way. Now you have bias noise on there, and the record electronics, of course, and ideally it should not go up more than 4dB or 5dB above the blank tape playback noise.

R•E•P: And that's mostly bias and tape modulation?

JB: Yes. Now that's the ideal. The theoretical is that it goes up 3dB. If you get 4dB or 5dB, you're doing great. But let's talk about dynamic range for a moment. The stock, factory 351 gives you a signal-to-noise of 60dB, very roughly. When you go to ½-inch tape, you gain 5dB. People think that you ought to gain 3dB because you've doubled the tape width. But the relevant thing is not the width of the tape; it's the width of the track. The ½-inch, 2-track tape uses the tape very effectively; ¼-inch, 2-track does not.

R•E•P: What is the dynamic range of the machine?

JB: Using a peak meter at the Mastering Lab, we actually measured transients off tape, which are 14.6dB above 250n/W, clean. Absolutely not getting into the tape. Nobody would listen to it and say it was overmodulated, compressed. 14.6 above 250, which means it's 16.6 above 200, which means it's 17.2 above 185n/W. That's almost unbelievable, and frankly a level that I didn't think tape could take. It's hot! With piano transients! I think part of that possibility, that advantage, is tube electronics, much more headroom and much more transient capabilities. It sounds marvelous.

R•E•P: And the frequency response?

JB: We did a test tone run before this latest piano recording session, measurements of extreme breadth from 12.5Hz to 40kHz, to learn something about the machine. We were looking for the shape of the response curve. We recorded lots of tones, lots of points, measured with our Fluke meter, being sure that we were putting them onto tape extremely flat. Recorded on our machine at 0 level, not -10, at 250n/W, and played back and measured off the playback head of the tube MCI at Mastering Lab, which is realistic because that's where we play back for mastering the disc. The -6dB points were 13Hz and 30kHz. At 15ips! The -3dB points at 250 were 18Hz and 22kHz, and ±1dB was from 20Hz to about 17kHz. ±½dB was from 22Hz to just under 15kHz at 250. And the bottom end! I've never heard a bottom end like this. That's the reason we went 15, not 30. No headbump. We don't see one. It was ±0.1dB at 25, at 50, at 100. Doug Sax gets credit for that, as headbumps are a function of the playback head.

R•E•P: Tell us about the perceived sound quality of the Magnesaurus.

JB: Speaking as a pianist now, I'm hearing attacks like I've never heard before off tape, and certainly never off digital tape, which completely screws up piano attack. When the hammer hits the strings, it's struck, not plucked-sounding. There are sharp leading edges, with an adamant quality, which is quite marvelous. I'm hearing the tone much better here than I've ever heard before, except off direct-to-disc recordings.

It has all the virtues of tubes, such as high resolution, where you can really listen in and hear the true piano sound in a way that I have simply never heard on any solid-state recording. I can hear the harmonic development of a note as the note sustains and dies.

I can hear the change in the note and the overtones off the tape the way I hear them on the live piano. I've never heard that on any digital, including the DAT recording we made simultaneously at the same session (the PR7 recording), splitting the Blumlein ribbon mic pair signal from the custom-built tube mic pre-amps, through a borrowed Sheffield tube stereo splitter, to the Magnesaurus and DAT recorders both.

On the PR7 CD, we have the analog master tape followed by the digital master tape so people will be able to compare directly. Does the analog have more noise than the digital? Some. But the sound of it is very tube-y. Very smooth. It is very airy, more tube-like than tape hiss-like. It's really quiet, even in direct comparison to the digital.

R•E•P: Any final comments?

JB: Only that analog recording hasn't nearly reached its true potential. It really hasn't been touched in terms of what it's capable of. ■

Photos by Elizabeth J. Annas.



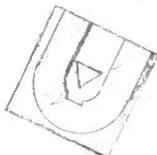
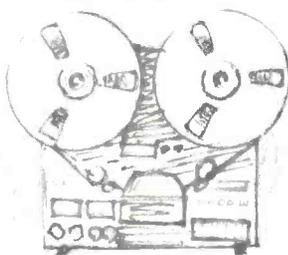
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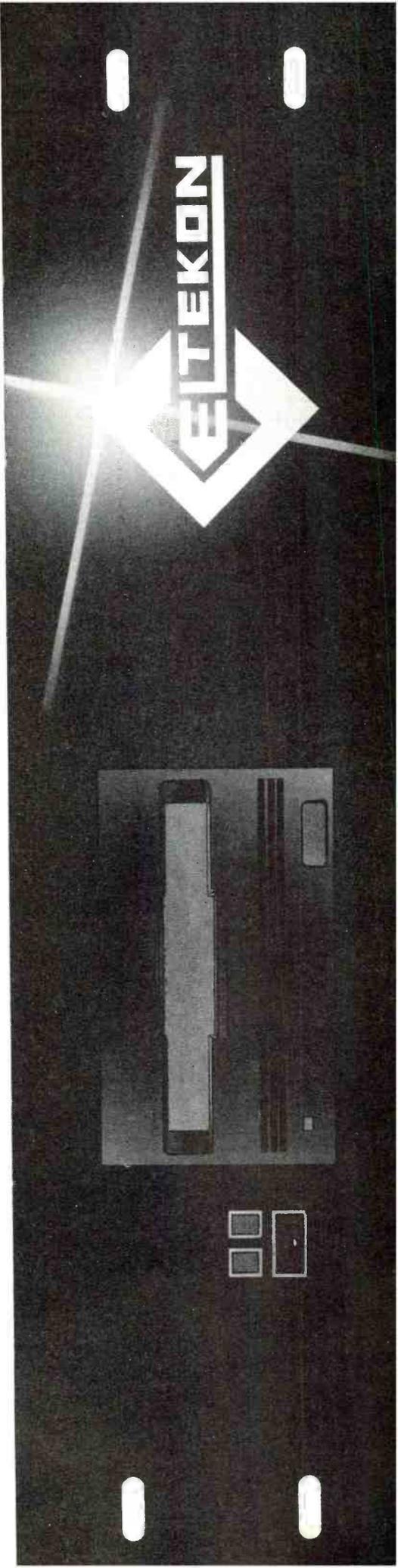
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The Large Console



*Nearly all
manufacturers
are taking steps to make
large consoles more
attractive.*

Commitment

By Amy Ziffer

20th Century Fox installed an SSL Series 5000 console in August. Containing 86 inputs in a 136-input frame, the desk lives on the mixing stage at the Darryl Zanuck Theater on the 20th Century lot in Century City, CA. (Photo by Gary Krueger.)

Bigger appears to be better, if the recent sales of large consoles are any indication.

In 1990, the owner of "the largest (fill in the blank) console in the world" seemed to change practically every month. In this time of economic uncertainty, logic dictates that the wise business move would be to rein in expenditures and avoid substantial debt burdens.

Flying in the face of that notion are film, video and audio production studios regularly installing boards with far more inputs than the number of tracks they're recording. Music studios that formerly got by with 32x24 mainframes are putting in mixers with 56, 72 and 80 inputs.

Box-office records were set in 1989, and may be broken in 1990, despite the beginning of the recession. Television viewership and sales of music are healthy. An economic downturn may actually increase entertainment-sector revenues. Movies, television and prerecorded music are still some of the least expensive forms of entertainment, and all three require the services of recording studios.

Even if the recession is protracted and leads to a leaner, more competitive business climate some feel that a large console can provide that certain something that gives one facility the edge over another.

"During these economic times, especially," says Barry Roche, president of Neve, "the studios that provide the most productivity benefits for their clients will be successful. Larger consoles are one way that the traditionally stronger facilities can give their clients the efficiency they need and keep themselves economically viable."

THE NEED FOR SIZE

Andy Wild, vice president of Solid State Logic's western operations, says much the same thing: "I've been representing SSL for eight years, and each year the demand has been for larger consoles. One reason is that engineers are tending to use more than one multitrack. Nowadays, it's not uncommon to run a 48-track digital plus a 24-track analog, whereas years ago there was just the one 24-track."

"Consequently, you need a bigger desk. In attracting clients to a studio, if you have

a larger console than your competitor, chances are you'll have more engineers who want to come work there."

Larrabee North, in North Hollywood, has the largest SSL studio recording console in the United States, an 80-frame 4000G Series with the Real World Automated Send Network (ASN) and 24 channels of E Series EQ. The Larrabee North facility is a 3-room extension of the original 2-room Larrabee in Hollywood. Larrabee's client base is primarily big-name musical artists — artists who can easily afford to record on 48 or more tracks. Ninety percent of the bookings are mixes, and a substantial portion of those consist of dance remixes, the creation of extended versions that may involve recording additional tracks.

"With remixes," says Kevin Mills, studio manager, "engineers may add 20 tracks of new information, and they want to combine old and new at different points in the song, so it's important to have large consoles." He also points out that generally dance music has many more tracks than rock 'n' roll, even before the remix process.

Larrabee North opened its doors in November 1990, but the decision to expand was made long before news of a faltering economy made the airwaves. The only effect Larrabee is feeling from the economic downturn, according to Mills, is a little more pressure on rates.

"This last year has been a very good year for Larrabee," he says. "That's why we're more than doubling our size. Even in a recession, the studios that can offer not just a large console, but the support personnel and backup, will continue to do well. The large console is just where it starts. It isn't as important as delivering all the rest."

Another tactic is to own a console no one else has. At Conway Recording in Hollywood, the most recent acquisition is a 64-input Focusrite console — only the second in the world. A 64-80-channel version costs from \$400,000 to \$500,000. Most of Conway's projects are albums for major musical artists, but they also do some television and film work. The first few clients on the new board included Toto, Lyle Lovett and Aaron Neville with Linda Ronstadt.

"If you run two 32-track machines or a 32-track and a 24-track," contends owner Buddy Brundo, "64 inputs is about the smallest you can have today in a professional, competitive studio."

UPSCALE IMPRESSIONS

Dan Zimelman of Sonic Image, the U.S. distributor of Focusrite, says, "There has always been a tremendous demand for a world-class large console. The philosophy of Focusrite Audio Engineering has always been: Limited production, strategically targeted." Five are on order for installation this year, and a maximum of eight will be delivered next year.

Music production isn't the only sector of the market in which a large console can help distinguish one top studio from another. Don Bassman, director of the sound department at 20th Century Fox, says, "If you're going to be on the edge, if you're going to set the standards and have all of the bells and whistles and toys, you've got to go in this direction. You can't afford to do anything else. The obsolescence factor is in place, and in order to offset that you ought to get the technology that's going to put you ahead."

What put Fox ahead is a new, customized SSL Series 5000, with 86 inputs in a 136-input frame. The board, which went on-line in August 1990, is installed on the mixing stage at the Darryl Zanuck Theater on the 20th Century lot in Century City, CA.

The traditional practice of mixing film with a 3-person team (one person each for dialogue, music and sound effects) has meant that dubbing consoles have always been larger than those meant for music recording and mixing. Nevertheless, studios used to get by with less. What changed?

"If you're doing a movie like 'Diehard' or 'Predator,' you start out with 400-500 effects alone," Bassman says. "You don't want to marry too many things together because you need flexibility down the line. Artistically, it's best to have as much separation as you can. You're dealing with a lot of faders and inputs, and this is getting more and more pronounced as time goes on."

Tom McCormack, vice president of post-

Amy Ziffer is a Los Angeles-based freelance writer.

production services at Warner Bros. Studios Facilities in Burbank, CA, just supervised installation of a Neve V series board in a new sound stage that will accommodate 50 to 60 musicians. He has observed much of the same thing.

"We need the large console to deal with the music environment of today," McCormack says. "Music is not just done on 4-track — it's 32- or 48-track digital. We have one of the largest consoles Neve has ever built, and we got it with some longevity in mind." The board has been customized with a separate monitoring system with 64 faders, in addition to the in-line monitors.

"It's like having a second console," he asserts.

VISUAL MEDIA

Stereo television is another factor that may be having an impact on console choices.

"It has increased awareness of the importance of good audio, both from the audience's and the producer's point of view," asserts Brad Harrison, western regional sales manager for Harrison by GLW. "That translates into larger consoles. Our new boards are going to be able to handle hundreds of discrete elements while main-

taining a manageable and friendly user-control interface." In the meantime, Harrison is seeing interest in the Series 7en board because it offers so many inputs in a relatively small space.

The largest Series 7en in the country belongs to George Johnson, owner of EFX Systems, a 6-room studio in Burbank, CA. His board has 66 dual-path modules, each half of which can have two switchable inputs, for an astonishing total of 264 possible sources, more and more of which are being eaten up by music tracks.

MIDI has provided more of a boost to some manufacturers than others.

"Music is becoming a much larger participant in film-making," Johnson says. "We did a show for 'Hull St. High' that was very music-oriented; we got a full

24-track."

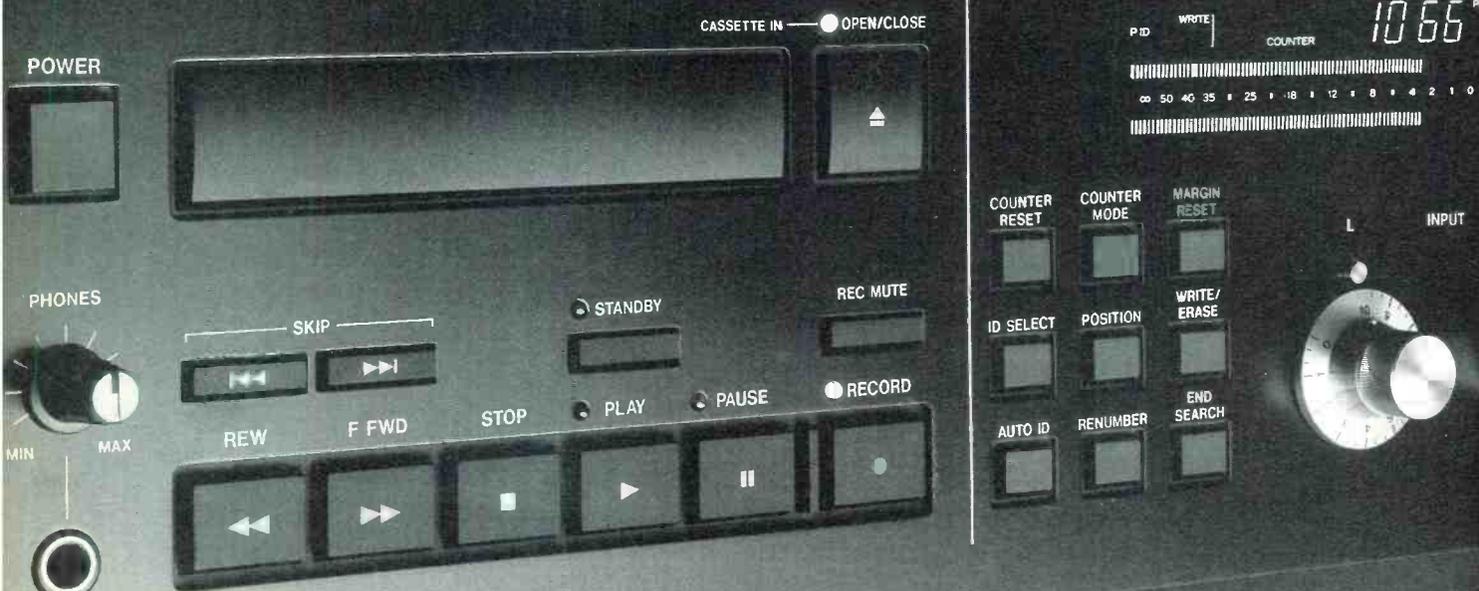
Lee Pomerantz, console products manager for Otari's Sound Workshop console line, says, "Large consoles have always been an important factor in the film and video post sector of the market. People like to keep elements as separate as possible and are typically doing fewer predubs or premixes before going to the stage. That necessitates a large console on the dubbing stage."

At press time, four Otari Premieres were in the process of being installed at Skywalker Sound South, a division of LucasArts Entertainment. Two boards with 88 inputs each will reside on film stages, and two with 72 inputs are reserved for video stages. The Skywalker boards have been customized to what Skywalker general manager, Bruce Markoe, calls a "two person/four person" configuration. There are four separate sets of motion controls, with the two main sections just off center and the other two on either end.

Markoe believes the economic downturn won't really affect his portion of the industry. "There may be some impact, but it won't dictate the size of our consoles. Size is dictated by the needs of the mixers and the shows we're working on."

NOTHING HAS EVER SOUNDED AS GOOD AS TASCAM'S DIGITAL RECORDER.

TASCAM DA-30



Size is also difficult to determine exactly. The last 10 years have seen some novel console design concepts come to market. Dual-path or stereo modules have two channels for each physical input module, and depending on the application, monitor inputs may effectively double the number of returns a console can accept. Others have "half-functional" inputs with limited equalization or aux send capability. The Skywalker 88-input boards, for example, have 124 effective inputs, but not all are fully functional.

Otari's Pomerantz agrees: "We are clearly seeing the trend toward larger and larger consoles, but not physically larger — just more inputs. This is due to the combination of analog multitracks with hard disk and digital recorders, workstations, MIDI gear and special processing equipment in a mixdown situation.

"We've seen an enormous increase in our clients' needs for line returns during mixdown, and this is one of the driving reasons behind the development of our new Series 54 music-production console. Each input module has two complete mirror-image signal paths, which means that a 32-input mainframe console actually has full return capability of 64 signals during mixdown — double the number of

returns in a given mainframe size. Otherwise, consoles get physically too big to be operated by one or even two mixers."

In fact, nearly all manufacturers are taking steps to make large consoles more attractive. Amek's new Mozart can be purchased with an external jackfield to decrease length. D&R has begun selling products direct in an attempt to make it easier for facility owners to install boards themselves and keep the cost of a large board down.

"Someone can get a large frame and have only 10 modules," says D&R's Paul Westbrook, "then add 40 or 50 modules later on. We made it as easy as possible for the end user to get into our products." D&R is also coming out with two console lines that will offer up to 128 or 144 inputs (Avalon and Marilon, respectively) with three signal paths on each module.

Finally, DDA's DMR-12 was designed specifically for home and commercial MIDI studios that don't require full equalization and send capacity on every channel.

Future developments will undoubtedly bring more changes. Bruce Markoe of Skywalker, commenting on how physical size sets limits to functionality, says, "[In the future], size may not be important because of the virtual nature of consoles."

Neve's president Roche notes another trend that has begun to snowball, a trend that has created a third market for large consoles. "One major change we observed in 1990 is a greater emphasis on post-production as music recording studios are leaning toward becoming multiuse rooms. More and more are diversifying so they're better positioned to secure their business."

ANIMAL JINGLES

Los Angeles' Music Animals is a perfect example. Established three and a half years ago, Music Animals concluded a building remodel in October of 1990. The last of what will be five rooms is scheduled to go on line in March.

Says studio manager Rick Perrotta, "I knew when I came on board that Music Animals couldn't maintain five rooms 24 hours a day, seven days a week, with one type of client. We do primarily jingle work, but also sweetening for TV and movies, digital sound effects and records.

"Music Animals itself is a jingle production company, and the wholly owned Zoo Studios facility is operated separately. We also have a record division. When there's a lull in sweetening, maybe there's more record work, or vice versa. We've tried to make the facility diverse enough to ac-

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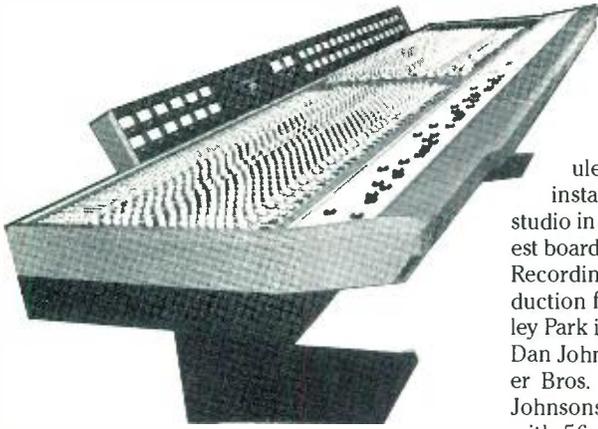
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Film composer Hans Zimmer has installed a 48-input Soundcraft 3200 in his studio.

commodate all of these different situations and thereby stay in business.”

Because of the diversity of its clientele, Music Animals must be able to work with many different formats. It is often called upon to do multiple mixes simultaneously, for example, to stereo, 4-track and mono all at once.

“None of the big makers allowed us to do that and they didn’t want to modify,” recalls Perrotta. Music Animals settled on one model — the DDA DCM-224V — for all five rooms. The 56-input mainframes are stocked with up to 52 inputs each, and they are all heavily modified.

“We have an 8-track matrix, which enables us to do a lot of tricky mixing easily,” Perrotta says. In mixdown the DCM effectively has more than 120 inputs. Yet Perrotta offers a word of caution: “I’m all for big, expensive consoles, but only if the choice is a prudent one, given your market.”

Sunset Sound in Hollywood installed an Amek APC-1000 64-input board in May of 1988, and another studio is outfitted with a custom 56-input board that’s expandable by 12 channels with a portable consolette.

Studio manager Craig Hubler says, “The bulk of our work is records, but we also do a fair amount of film predubbing and Dolby surround mixing for feature films. We wanted to be able to accommodate at least two 32-track digitals, since we have the Otari DPRs.”

Sunset had the console heavily customized by Amek, and Hubler says it has been upgraded further in-house. “We tend to keep our consoles 10-15 years, and they undergo in-house modifications to keep up with the demands of clients.”

PROJECT-ORIENTED

A fourth input-hungry market is made up of home and commercial studios with lots of keyboards and MIDI gear. A D&R Dayner 84ST, which holds up to 81 mod-

ules and has 120 effective inputs, is installed at Ultimate Sound, a MIDI studio in Houston. One of Sony’s two largest boards in the United States is at 45 rpm Recording, a private, 1-room music production facility a stone’s throw from Paisley Park in Minneapolis. Owners Doug and Dan Johnson are also known as the Warner Bros. recording act, The Brojos. The Johnsons purchased a Sony MXP 3056 with 56 inputs.

“What we do often is record with a sequencer,” explains Dan Johnson, “using many virtual tracks and outboard effects. Once you get spoiled, having all that separation, you’ve got to have a lot of inputs.”

At Hans Zimmer Studios in Los Angeles, the bulk of the work is music for film. Hans Zimmer is the composer of music for such films as “Black Rain,” “Driving Miss Daisy” and “Bird On A Wire.”

Co-owner and mixer Jay Rifkin explains the facility’s operation: “We have just raw synth outputs, about 64, from various samplers and modules and so forth. The mixes get very complex because we mix to a minimum of six and a maximum of 12 tracks, and we have a lot of effects returns that have to be assigned to different places. With “Days of Thunder,” for instance, we had an LCR mix for each instrument group. To be able to change the mix at the dub, effects for each 3-track mix had to be independent. Multiply that by the normal number of effects and you get a lot of channels.”

Zimmer has a Soundcraft 3200 with 48 inputs [see the Hands-On product review in this issue]. Soundcraft’s national sales manager, David Kimm, says Soundcraft has been trying to accommodate customers with needs like Zimmer’s.

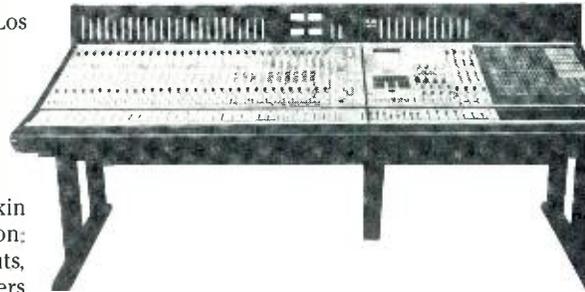
“People need more and more inputs, but not necessarily in larger frames,” Kimm says. “We’ve seen a lot of people using submixers. The 200 Delta is a brand new, little console that people can install directly in other consoles just for, say, effects returns.”

Clearly, though, MIDI has provided more of a boost to some manufacturers than others. Likewise, the economy will impact differently on manufacturers according to how their clients are affected. Two of Trident’s 56-input Vector 432 boards are installed at The Soundshop Recording Studio and The Nashville Network, both in Nashville. The Nashville market and the new facilities springing up in and around

Orlando, FL, are the biggest growth areas for Trident right now.

Wayne Freeman, sales director of Trident Audio Developments Ltd., says the growth in large console sales is directly attributable to MIDI and the number of external devices that have become standard studio tools. “Artists utilize [dozens] of pieces of MIDI gear, and these all have to be brought back into the console,” he says.

SSL’s Andy Wild, though, has a different perspective: “I don’t think MIDI affects the top studios all that much,” he says. “MIDI is used by composers. It’s a songwriting tool rather than a tool that increases the number of sources. There are some artists who use a lot of sequencers, but most may just use it for the drums, and



Five DDA DCM-224V consoles have been installed at Music Animals, one of Los Angeles’ busiest studios.

from then on they’ll track live. It’s more the tracking studios that use the MIDI gear, and even in that area, there’s a trend toward live tracking now.”

CHANGING MARKETS

But Freeman and Wild do agree that the economy probably has little to do with people’s choice of consoles. “The economic downturn just happened to occur at the same time the need [for more inputs] arose,” asserts Freeman, and Wild concurs. “We’re selling to a broad base of clients: film, video post, music, TV. One tends to compensate for another, and we’re buffered. At the moment, film and video post consoles are doing very well. Also, we’re selling to the top studios, and they’re always less affected by a recession than those in the middle market.”

If the economy does have an impact on console sales, it will happen down the road. The newest installations were set in motion months ago, before news of the downturn. Conway Studio C, for instance, was started two years ago, and as Buddy Brundo says, “You can’t stop in midstream. You take risks, and hopefully you choose the right path.” ■

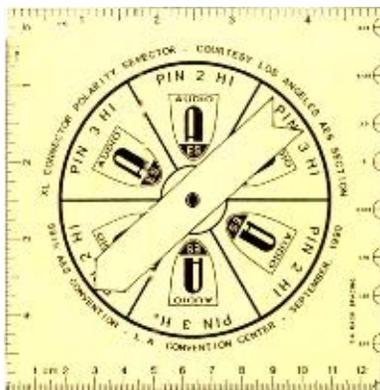
By Mack Clark and Mike Joseph

FIVE QUESTIONS:

Consoles and Connections

Q ■ When interfacing some processing gear to an SSL console recently, I asked the staff engineer if the board was Pin 2 or Pin 3 hot. He has been snickering at me ever since, but won't spill the beans. What's the deal?

A: I'll answer that question with another question: What's the difference between a duck and a duck? Don't know? You are not alone. Most modern professional consoles have patchbays built into their frames, which is the only practical means of interfacing with these beasts. Internally, they use large multipin connector blocks that typically handle 24, 32 or more signal lines on one connector and they aren't necessarily internally balanced. The tape decks and other main outputs also route through multi connectors, where one ground may satisfy a multitude of signals.



The Official AES Polarity Determinator. Is Pin 2 or Pin 3 hot? You make the call.

These consoles do not have the 3-pin XLR connectors that defy wiring specification. (Did you know that there is a real

Mack Clark operates McTech Associates, an audio systems engineering and technical support firm in Oakland, CA. Mike Joseph is editor of R•E•P.

wiring standard that specifies Pin 2 hot?) That being the case, the patch cables that the studio personnel have made up in order to get in and out of the board's bay are of more importance to you, and the studio probably has all flavors and polarities.

The bay itself has a tip/ring/sleeve arrangement, with tip most likely being positive polarity. Smaller consoles without built-in patch-bays may have some XLR connectors whose polarity are hopefully specified in the manual. Beware: Some boards have been known to scrimp on internal polarity inverting devices (using another inverting or non-inverting stage on an opamp section to put the signal back in polarity after an EQ section, for example, before it leaves the board), so ultimate polarity may vary depending on whether the input or output is balanced or not, or where it is in the signal flow.

A studio system of any kind will ideally have a consistency in its XLR connector wiring, whether to mics and cables, or to devices. This is often determined by the polarity of the multitrack. The totally tweeko studio will modify every device as well as all interface panels so that the polarity of all connectors is the same.

If you are uncertain as to the polarity of your studio, ask the guy whether he is certified to operate the Official AES Polarity Determinator, and give it a spin. (The difference between a duck and a duck: One leg is the same as the other.)

Q: The tape machine is aligned for +3 level, the meters read 0VU, yet its output is +4. How did this ever get started?

A: This is a common source of confusion among operations personnel, young and old. It arises when attempting to correlate the +3dB magnetic flux level on the tape with the +4dB voltage output of the equipment. We all know what decibels are — a relative measure or ratio of one quantity to another. Some of the quantities causing confusion here do not have the same absolute reference, but are using the relative scale for comparison.

The key is the tiny little letters (often forgotten) that all professionals are supposed to put at the end of the numbers. A con-

sole output of 0VU represents 1.228V (4dB above 1mW into a 600Ω line, or +4dBm). So, 0VU from your tape machine means the same thing at the professional level outputs: The tape recorder is delivering 1.228V when its meters read 0VU. When we say the machine is aligned for +3, we mean a flux level 3dB higher (relatively) than the original standard of 185 nanowebers/meter.

Technically, this "+3" level is really 261nw/m, but most studios align to test tape recorded with 250nw/m as a "+3" level. The standard studio reference level on tape increases from time to time because of advances in tape technology, allowing "elevated" or "accelerated" levels relative to the standard to take advantage of increased headroom before magnetic saturation. Aligning machines to "+5" (320nw/m) and "+6" (370nw/m) is therefore common practice. The newest tape formulations specify "+9" (520nw/m) for optimization.

Returning to the original question, our alignment procedure determines what flux level (such as "+3dB" relative to some standard) on tape correlates to a 0VU output from the tape machine, which is "+4dBm." It would be more meaningful and less confusing if we were to speak of our tape machine alignments as "261" or "370" instead of "+3" or "+6". You don't have to say the nanowebers part. We'll know what you mean.

Q: Why is it that I interface my "-10" tape machine through a level match device to bring it up to the "+4" level of my console and it comes up about 2dB too hot?

A: A fair question, and somewhat related to the above. "-10" seems to mean different things to different people, especially equipment designers! There are a number of such devices, as well as a number of us in the industry, that assume that the "+4" and the "-10" in question are referenced to the same level, namely 0dBm (1mW into a 600Ω load) or 0.775V. Seems obvious to us.

However, most of the manufacturers of equipment designed to operate at a "-10"

Continued on page 72

Save Your Ears

By David Scheirman

Because you are reading this publication, you make your living with your ears. Stop and think: Could you perform your job as well, would your income level be the same, would your professional reputation be intact if you had a severe hearing loss?

It's a fact that musicians and live sound technicians need to be able to hear things. Not only do they need to hear them well, but hear them better than the average person. This truth should be enough to make you stop for a moment and consider your own hearing health, and the environments that you work in. What have you done for your ears lately?

WORK-RELATED HAZARDS

Did you have your head deep inside a bass bin, listening for a 60-cycle hum, when somebody pushed play on the tape deck? Were you walking past the tri-amplified sidefill stack, with your ear at compression driver level, when the lighting crew's ladder knocked the center-stage vocal mic stand into the floor wedge? Did the drummer hit his primary crash cymbal, hard, three inches from your ear, while you were on the drum riser adjusting the hi-hat microphone?

Each of these simple accidents can be a daily occurrence on a typical concert stage, but any one of them might be the accident that causes you to have either temporary or permanent hearing loss, thus, shortening your career and decreasing your ability to earn a living with your chosen skill.

Accidents are one thing, but constant and intentional exposure to high sound levels is yet another. Did you just finish a 60-show run in tiny concert clubs with that new speed metal band? Was your powerful cue monitor wedge placed on end one foot from your right ear as you mixed stage monitors for that entire world tour? Do you check 64 house mic line inputs every day with a ragged set of stereo head-

phones while listening to a clipping headphone amp? Chances are good that your ears need a rest; but there are also certain techniques that can be employed to offer the maximum amount of protection to your hearing as you continue to do your job.

HEARING PROTECTORS

Earplug use is becoming common among ushers, security guards, video crewpersons and others who must work at their job while surrounded by the high-level sound intensity of today's rock music concert programs. Throw-away foam plugs are often issued on a daily basis at arenas and auditoriums for the working crews; some facilities have a public health official who will provide these items to any member of the general public audience who complains about loud sound levels.

If you are a technician who works around powerful sound systems, and are not actually responsible for mixing sound during the show, it is a good idea to have some sort of hearing protection device available. The same is true if you are a sound-mixer listening to a loud system, while waiting for your band to come on. Here are some basic options:

- Disposable foam plugs: This type of hearing protection device comes in a small cardboard or plastic pouch, and several can be stuffed in a shirt pocket or a briefcase pouch. They are usually intended for one-time use, and are then discarded. Common brands are EAR from Cabot Corporation and Decidamp from North Health Care. Such devices offer a noise reduction rating ranging from about 12dB to 20dB, depending on frequency. These simple plugs mainly reduce high frequencies. They can be purchased in quantity for less than \$1 a set.

- Re-usable silicon insert plugs: These rubberized insert cushions conceal tiny metal filtering diaphragmatic mechanisms to attenuate sound levels. They are often seen in use by gun buffs, construction workers and heavy equipment operators. The Sonic II from North Consumer Safety Products comes in its own plastic storage case with a keychain attached, and offers approximately a 17dB noise reduction rating. Often available in gun shops or industrial safety supply stores, a pair can run from \$15 to \$20.

- Personal custom-fit earmolds: The best hearing protection device, and the one most applicable to working around musical sound, is one that attenuates all frequencies evenly. When correctly designed

and properly fitted, custom-molded flexible plastic earmolds can offer 15dB to 20dB of balanced noise level reduction. In other words, full-frequency sound is still heard, but at a reduced level. The ER-15 Musician's Ear Plug from Etymotic Research costs approximately \$125 (plus a custom fitting appointment with an audiologist.) The ER-20 HI-FI earplug protects against louder sounds and is available in a generic ready-fit version for about \$20 or custom-fit molds for \$75.

- Industrial headsets: When maximum attenuation of very loud sounds is desired, particularly at low frequencies, the cushioned headset works well. Offering up to 30dB of attenuation, hearing protectors from David Clark Inc. have cushioned headpads and tight-fitting earseals. This is also an option for the person who does not wish to stick standard earplugs inside their ear. These headsets have a suggested list price ranging from \$16 to \$24. This is the type of protection often seen in use on airport runways and in the cabs of heavy cranes at construction sites.

ON-THE-JOB TECHNIQUES

- Use mini, close-field monitors as a cue system for live mixing instead of headphones whenever possible. By placing one or two small powered monitors at your mixing console position and giving them the output from your stereo cue buss, you are able to solo-up a mic input or an output mix and hear the signal without having to put on regular stereo headphones. Roland, Yamaha, Fostex, Tascam and several musical-instrument oriented manufacturers offer a variety of compact products. This is particularly handy during set-up and sound-check. Using this method, you'll have less loud, direct sound putting pressure on your ears, yet you will still hear the needed information.

- Dummy headphones can be used as a quick and easy way to lower the sound level of what you hear. Simply put on your regular stereo cue headphones, but don't plug them into anything. Run the cord into your pocket. This will offer isolation for you from the louder acoustical environment that surrounds you during a show, while your ears have a chance to rest.

- Rest away from the job-site whenever possible. Remove yourself from the noisy environment and take time to have a meal, a nap, read a book, or whatever there is to be done in a quieter space. Focus on finding a "quiet zone": No blaring TV or Walkman headphones. This can mean a walk outdoors, a trip to the crew

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

bus, finding a secluded dressing room or whatever. The important thing when working around loud sound levels is to give your hearing system and internal ear mechanism time to recover. If you work in a rock music environment, your hearing will be more sensitive and fresh if you take regular breaks.

SOUND LEVEL METERS

If you do not already include a hand-held, battery powered SPL meter in your working tool kit, get one. Don't rely on assumed level readings from your $1/3$ -octave real-time analyzer unless you are absolutely sure that the correct microphone is in use (mic sensitivities can vary greatly, causing erroneous SPL readings), and that the system is properly calibrated. It's better to have a small portable unit that you can keep in front of you on the mix console or carry around the venue with you as you check coverage.

These handy devices can range in price from \$65 (Radio Shack) to \$2,500 (Briel & Kjaer). I recommend the General Radio 1565-B sound level meter (about \$600); this is one hand-held battery-powered meter that is approved by U.S. government agencies for environmental noise measurements.

Almost any type of SPL meter will do what you need; the accuracy difference between the cheapest and the most expensive can be about 1-2%. This would mean a possible error, ± 1 dB to 2dB at about 100dB SPL. The more sophisticated, expensive units are best for critical situations. Learn the difference between A and C weighting filter scales. (U.S. government agency guidelines stipulate the use of C-weighted measurements for noise environments dominated by frequencies below 500 Hz; A-weighted measurements are most useful for making comparative readings in live show environments and discussing levels with others).

Use the sound level meter to get useful information in the front rows, the high balcony, the back of the hall, at the console — wherever you need to know the actual, average sound pressure level of your show. Find the ideal "pocket" where your show mix is as exciting and powerful as it needs to be, yet where you do not get audience complaints about excessive volume. Use your meter as a daily reference guide, regardless of the type of acoustical environment. Paying attention to the level of your system's operation will be one more step toward protecting your hearing, as well as that of others.

LONG-TERM EFFECTS OF LOUD SOUND

We have probably all experienced TTS (Temporary Threshold Shift) after being exposed to very loud music or other sounds. This is the sensation that someone has stuffed cotton in your ears after you have left the building where loud music was being played. After one or two hours of high-level listening, your shifted hearing threshold may compensate as much as 40dB or 50dB. In other words, your ears have "shut down" to reject the extra-loud sounds that they have been exposed to. Recovery may take anywhere from a few hours to several days.

Prolonged exposure to very loud music can bring on tinnitus, which is a ringing sensation that you hear in your ears, even though no loud sounds are present around you. If you experience this ringing several days after exposure to a powerful sound system, consider it to be your body's way of giving you a danger signal. Damage has been done. Heed the warning.

Have a regular hearing checkup. Get to know your audiologist or hearing specialist. Once or twice a year, get checked for both air and bone conducted sound sensitivity, speech understanding and make sure that your inner ear parts are functioning properly.

If your job involves working with live sound, and you want to continue doing it, take time to carefully consider what your personal approach is going to be as you work to conserve your hearing. You will be preserving your livelihood in the process.

WHERE TO FIND THEM

- David Clark hearing protectors are available from David Clark Co. Inc., 360 Franklin St., Box 15054, Worcester, MA 01615.

- Deci-Damp hearing protectors are distributed by North Health Care, 1515 Elmwood Rd., Rockford, IL 61103.

- EAR plugs for hearing protection are manufactured by the Cabot Corporation, 7911 Zionville Road, Indianapolis, IN 46268.

- Sonic II hearing protectors are manufactured by North Consumer Safety Products, 16624 Edwards Road, P.O. Box 7500, Cerritos, CA 90701. ■

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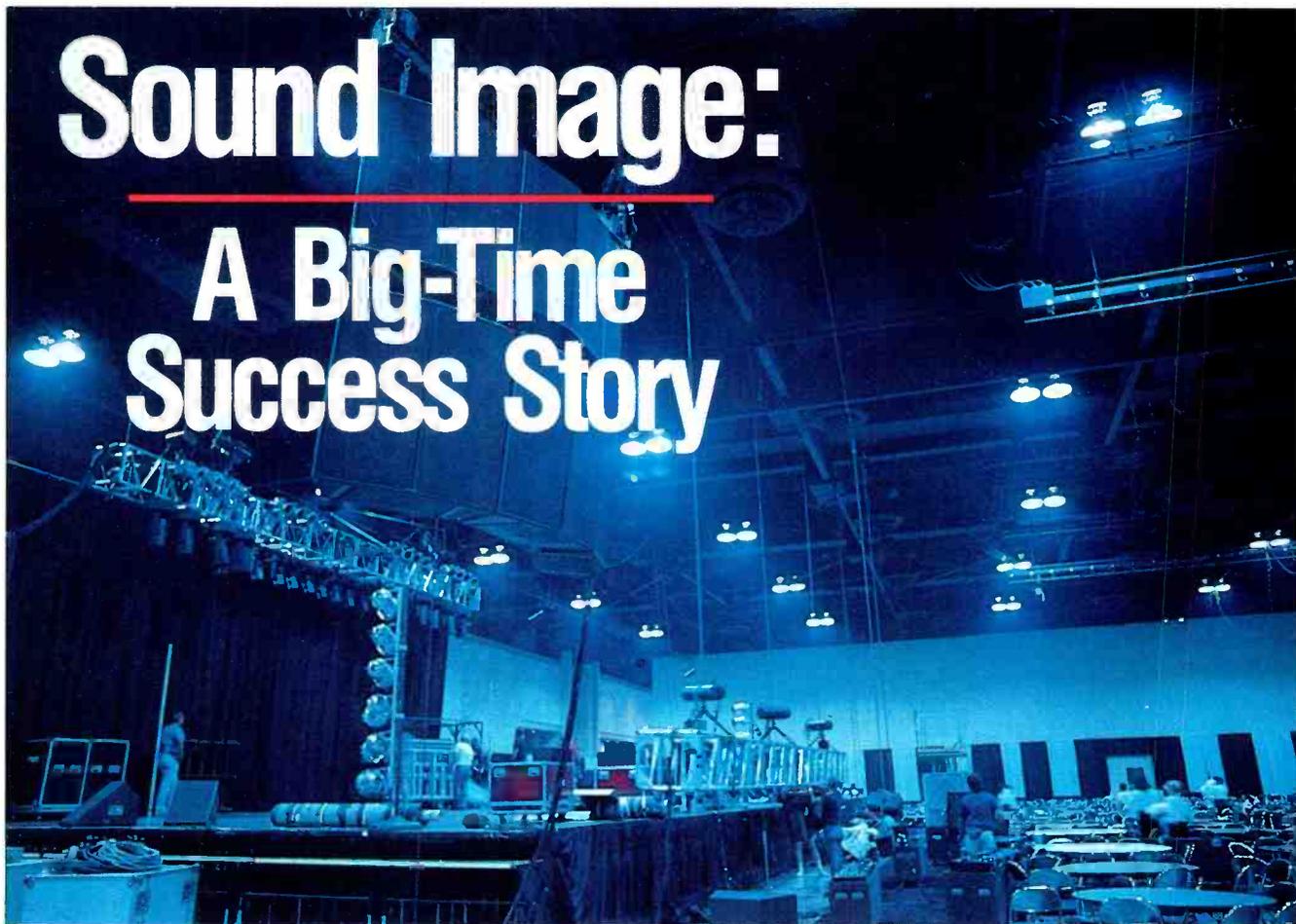
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Proprietary designs and a talent for developing new clients keep this company's inventory constantly on the road.

Sound Image:

A Big-Time Success Story



By Mark Herman

Southern California's Sound Image is an example of a sound company that has managed to prosper in today's tough business environment. It isn't enough to say that it's getting harder and harder to become a full-fledged multiple system touring outfit. It is almost impossible, partly because of high overhead, the current climate of reduced touring profits from cutthroat competition, and rising equipment demands (without any increase in billable rate). It is amazing that smaller sound reinforcement companies can emerge into a

position of established national recognition at all.

Yet, San Marcos-based Sound Image has achieved such success. Currently, the company has up to six full concert systems constantly touring nationally, with the resources to do any size show or venue. Its success formula involves its own loudspeaker design and manufacture, a heavy investment in QSC power amplification, personnel drawn from a pool of veteran independent engineers, a roster of contented clients and the knack for attracting and keeping new customers.

The company's current client roster includes Jimmy Buffet, Barbara Mandrell, Robert Cray, Jackson Browne, Melissa Etheridge and John Denver. Last summer,

Sound Image kept five systems out at once and was still able to provide Buffet with a large stadium system for special venues. Clearly, things are going well.

But it wasn't always this way. Ross Ritto founded the company in 1972 as Silverfish Audio, based in Rochester, NY. Silverfish moved to San Marcos in 1978. In 1984, Ritto changed its name to Southern California Sound Image (although the company is better known by the shorter handle).

Current owners are Ritto and Dave Shadoan, and both actively travel with favorite accounts. Throughout its 19-year history, the company has toured nationally, yet on a much smaller scale in the earlier years.

Mark Herman is the president of Hi-Tech Audio Systems, a sound reinforcement equipment rental company based in Half Moon Bay, CA.

At first, equipment consisted of three small proprietary horn-loaded systems. In 1978, the equipment list grew to include front-loaded systems, before progressing to the current PhaseLoc-style PA cabinet designs.

Long-time senior employee Mike Adams, the operations manager, primary loudspeaker designer and an active touring engineer, says: "In the early 1980s, many of the acts we worked with were phasing out, getting smaller, not carrying production. So, we had to get new clients, new equipment and a new image. Some-time around 1985, we went to our 2-box PhaseLoc main PA system and proceeded to gradually build our inventory up to its current total of six complete arena-size touring systems."

CABINET DESIGNS

The PhaseLoc loudspeaker line began with what is known as the 2-box Series IV Hi-Q and Lo-Q cabinets. The 48"×48"×22.5" Series IV Hi-Q is a double-wide, 3-way direct radiating trapezoidal enclosure, loaded with four 15-inch low-mid speakers, two 2-inch drivers on side-by-side 60° bi-radial horns and four tweeters. The companion Lo-Q vented cavity enclosure features four separately chambered 18-inch low-end woofers.

"One of the reasons for going to a 2-box system is the ability to separate the bottom end from the point source of the array," says Adams. "This makes it more versatile and often better sounding." He further explains that the high-frequency cabinet design "is like having two identical boxes in a single enclosure. There is a split baffle on each side of the enclosure that gives a little more splay coverage than a traditional single box would. As they couple, better coverage is achieved."

"One of the reasons for going to a 2-box system is the ability to separate the bottom end from the point source of the array. This makes it more versatile and often better sounding."

After the Series IV was prototyped and road-tested, Sound Image came out with the smaller Series I and II boxes, designed primarily for such supplemental uses as sidefills, drumfills and rearfill. Simply put,

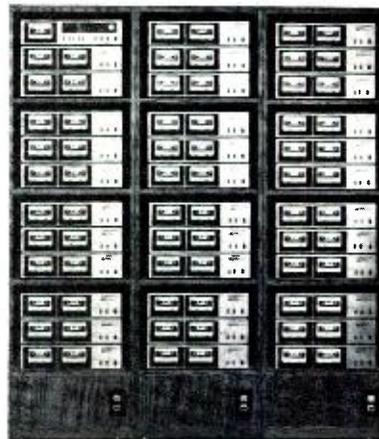
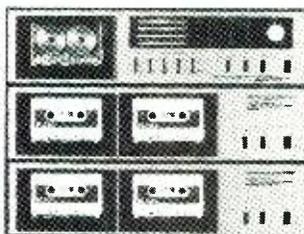
the Series II is half of the Series IV, and the Series I — there are two versions — is loaded with either a single 18-inch or 15-inch driver, a bullet and a 2-inch horn.

The PhaseLoc Series V 5-way 2-box system evolved from the Series IV, but it sports a different cosmetic look in front. It does, however, maintain the footprint of the Series IV. The Hi-Q box consists of two 15-inch, two 12-inch and two 2-inch compression drivers and four tweeters. Sound Image also outfits some of the Hi-Qs with long-throw horns and neodymium drivers

for long throw use in an array. The Lo-Q box is loaded with four 18-inch woofers. Both the Series IV and V have dollies that can go on either end of the enclosure. The Hi-Q boxes (400 pounds) are stacked four-across in the truck with the Lo-Qs (227 pounds) on top.

There are three different types of PhaseLoc monitor wedges — 1×15, 2×15 and 2×12. All models are bi-amped and use a 2-inch driver. The 2×12 dual wedge is used mainly for keyboards, bass and drums. The wedges are powered by QSC

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MX2000s on the lows and 3350s on the highs. Sound Image has more than 100 wedges and typically carries 14 to 16 on a tour.

Like many other SR companies that manufacture their own proprietary cabinets and electronics, Sound Image prefers not to disclose the precise details of its cabinet component load. However, the company did acknowledge that the various components used in the PhaseLoc cabinets were combinations from JBL, Fostex, TAD and Electro-Voice.

Sound Image's mixing console inventory consists of 40x18 Ramsa WR-S840s on stage and a Yamaha PM-3000, Ramsa WR-S852 and Soundcraft Series 4 out front. Adams did a John Windt-style grounding modification — featuring the addition of a solid copper bus bar — on the Soundcraft Series 4.

AMPLIFIERS

One of the interesting things about Sound Image is its intensive use of QSC amplifiers. Ever since its first Series 3 order in 1985, Sound Image has stuck with QSC. With an inventory of more than 600 units, SI is QSC's most prolific U.S. sound reinforcement client.

"The reliability factor is probably one of the main reasons we use them," Adams says. "All-in-all, the failure rate has been minimal. The amps work all the time. They just don't break. And if a problem does arise, the factory takes care of it immediately. QSC's service has been exemplary and they genuinely care if the amps are working right."

The basic amplifier-to-component formula that Sound Image uses is simple. System size and amplifier placement in racks may vary among tours, but the formula remains the same for every FOH cabinet. Each amplifier channel is assigned to only two components, with the exception being tweeters, where the ratio is 4:1. QSC 3800s drive the cone loudspeakers, which mean all 18-, 15- and 12-inch components. The 2-inch exit drivers and tweeters are powered by QSC 3350 or 3500 amplifiers. Subs are powered by the new super high-power EX 4000 units (see sidebar).

SOUND IMAGE IN ACTION

Last summer, Jimmy Buffet embarked on a tour that included several stadium dates. Sound Image put together an FOH Series IV system that had 40 Hi-Q and 24 Lo-Q boxes, eight Series V Hi-Q long throws, two Hi-Q deck frontfills and a special 6-box center cluster. Delay towers, if required, were contracted locally.

For this tour, Dave Reynolds, Buffet's house engineer, and Sound Image's Ritto specified the array setup. The flying system used eight 1-ton motors and four 7-

Q&A: Mike Adams, Sound Image

By Mark Herman

R•E•P: Why are all the PhaseLoc main cabinets run at 4Ω?

MA: Basically, we do not run any of our amps below a 4Ω load, simply because we feel they operate better this way. Sonically, an amp — especially when it is turned up — sounds better at 4Ω than at 2Ω. Because everything runs at 4Ω, one amp channel only sees two components and sometimes four max (tweeters).

If an amp should fail, the result on the array system would be minor. We don't believe in putting all of our eggs in a 2Ω system basket. It is also advantageous to have the option to listen to the array and say, for example, "I want the tweeters on that particular box turned up." Because we have a lot of amp channels driving a limited number of individual components, it is possible to adjust the level on those parts independently and fine-tune the system array precisely.

R•E•P: Is there an ideal ratio of high boxes to low boxes with the PhaseLoc?

MA: No. Each artist and venue can be different. Whatever works where you are at the time is ideal.

R•E•P: Why did you go with direct radiating enclosures?

MA: We tried horn-loaded boxes in the 1970s, but I feel the horn adds too much coloration. If you want a more open and natural sound, the direct radiator works best. You need more of them, obviously, because

their efficiency isn't there, but I'd rather build more boxes, put them up and turn it up than sacrifice what I consider a more natural sound. Direct radiating loudspeaker systems are more hi-fi.

R•E•P: Some of the cabinets use Fostex high-frequency drivers and tweeters. Why Fostex?

MA: The second and third harmonic distortion was measurably lower on the Fostex over many other leading components. The Fostex high end is crystal clear in the 2-inch and tweeter range.

R•E•P: What actually holds the enclosures in the flying system?

MA: Our cabinets use Aeroquip straps that clip into Aeroquip tracks. The track is top and bottom on each box and there is a metal rod that goes entirely through the enclosure on two points per side. So, actually the hanging weight is handled by the straps and the four metal rods running through the box, instead of the box. No matter what, no lateral stress is on the box itself. Once you decide on a desired pattern, it is simply a matter of clipping them in and arranging the splay.

R•E•P: How are your loudspeaker components selected?

MA: Our basic philosophy is that we are not a brand-oriented company. We use whatever component is best for whatever particular frequency range we want to reproduce. PhaseLoc enclosures are loaded with a variety of products from various manufacturers. The new Series V, for instance, uses components from four different manufacturers. Within certain parameters, such as cost and performance, we use the best possible component available. It doesn't matter who makes it, as long as it is the best for us. ■

foot, 6-inch beams per side. Each beam had Series-IV cabinets with 16 inches of L track on the top and bottom, hung two wide and four deep with the two innermost beams also flying the Series V long throws on top.

"This stadium PA system usually takes about four hours to put up," says crew member Rob Stokes. "The record for load-out is under two hours. Without lights in the way, it would only take about an hour to hang the PA."

Buffet's specially designed center cluster array was made up of six small, proprietary trapezoid cabinets hung from a stock Apogee Sound flybar. These cabinets came loaded with a 12-inch speaker and a 2-inch exit compression driver. The cluster was used for vocals only and ran off one of the house console's matrix outputs. Touring engineers chose the Apogee bar because it had the exact dimensions needed for the cluster.

The crew for the tour consisted of Rey-

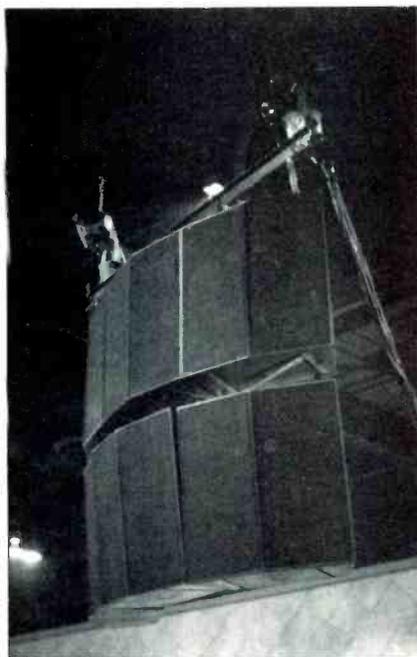


A view of the system used for Jimmy Buffet's summer 1990 tour.

nolds doing FOH mix, Ross at the monitor mix position, and Stokes and Robbie Mailman.

MANDRELL THEATER PA

Barbara Mandrell is a popular artist who plays dates in many different venues. Her sound system must instantly adapt to arenas, sheds, theaters and ballrooms, but still maintain sonic quality and coverage consistency. The 18-box Series V rig that Sound Image put out for Mandrell's last tour was basically a large theater system, which only takes up eight to 10 truck-feet of space, stacks tight floor-to-ceiling and requires about 40 minutes per side to fly



Versatility is the hallmark of Barbara Mandrell's system, as it must perform in arenas, halls, sheds and ballrooms.

using one engineer and a stage hand.

Mandrell's house mixer, Michael (Ski) Wisniewski, an independent live and studio engineer for 12 years, has been using the PhaseLoc Series V system exclusively for Mandrell's recent tours.

"It's been fun using this PA because it is perfect for an artist such as Mandrell," he says. "To do more rock-oriented shows, you would just need to add more cabinets. This PA will get up and go, and has surprising gain for direct radiators. It's a nuts-and-bolts PA, very conventional and

straightforward — done right and powered right.

"For a nice, turn-it-on system, this is the easiest I've ever used, and for some reason it sounds better than any other direct radiating PA I've ever mixed on. It takes less to make them sound sweet and the coverage is very even. I've noticed that opening act engineers walk right up and like it also. Even the dreaded knob-twisters will walk up and tend to leave most everything alone because it already sounds fine."

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February 1991 R • E • P 53

High-Powered Workhorse

Sound Image has used a variety of power amplifiers over the years. Along with such artists as Jimmy Buffet, Melissa Etheridge, The Robert Cray Band, Jackson Browne, Barbara Mandrell and Slaughter, Sound Image has relied on amplifiers from QSC Audio Products since 1984.

"You absolutely have to find and maintain a good relationship with a strong supplier of power amps," says Mike Adams, Sound Image's operations manager. "Your sound systems and your business operations won't work without that. We have used products from other companies, but since QSC brought out the Series III product line, we haven't felt a need to use anything else. We have over 600 QSC amps in our inventory right now."

Sound Image tried QSC's new EX 4000 for Jimmy Buffet's 1990 summer stadium tour.

"We had four of these units set up in a single rack to use wherever extra-powerful amps were needed for auxiliary system support," Adams says. "The tour sometimes used delay stacks in the bigger stadiums. We also had a special 6-box frontfill flying array that was suspended over the center of the downstage edge. Big outdoor shows increase a sound company's need for power amps. Because you usually have a much larger audience area to cover, you need more low-frequency support, and generally it just takes more gear."

Adams sees the EX 4000 as being a powerful, workhorse amplifier.

"Right now we are using the 4000s as the low-end amp in 4-way stereo sidefill racks for the heavy-metal rock group Slaughter. It gives us more dynamic range for very loud bands like that, giving cleaner sidefill monitor washes without clipping the power amps. The extra dynamic headroom that a 1,200W- or 1,400W/channel unit can give you is a valid point in a big amplifier's favor."

Pat Quilter, QSC's vice president of engineering, says that the positive market acceptance of Crest's model 8001, one of the first very

high-powered amplifiers available to drive low-resistance (2 Ω) loads, spurred QSC to provide a high-powered, alternative product.

"At first, we didn't think that the pro audio industry could really support the need for such powerful amplifiers," he says. "Now, I think it is clear that there is definitely a market acceptance for this type of product."

"The EX 4000's design architecture is relatively straightforward, using linear output with multistep transformers to basically double the power of our existing products while also reducing the chassis weight. This is the advantage we get over a traditional Class AB design."

"It's important to note that our new EX 4000 weighs nearly 25% less than our direct competition. And the EX 4000 will drive the same number of speakers and deliver about the same power as three Carver PM1.5s, yet the one EX 4000 would weigh the same and take up less rack space. We feel that this amplifier is an option that anyone working with professional sound reinforcement systems should consider."

Sound Image's Adams noted that QSC has pre-configured the amp chassis on the EX 4000 to accept signal processing modules. "And it will be able to take computer-control interface modules when that becomes available," he says.

Quilter says that the EX 4000 was an important development project for the company and that many new features were incorporated. The EX 4000 is pre-wired with a 26-line ribbon cable so that data collection and remote-control functions can be addressed by a computer interface module.

"Five different signal conditions on each channel in the amplifier can be monitored," he says. "This includes temperature, clipping status, mute protection status, power present indication and speaker output level. We are leaning toward using the RS-485 interface standard for

JACKSON BROWNE: CLUB/SMALL THEATER

Even though Sound Image routinely works large venue tours, the smaller theater tours are just as important, especially if the client is someone like Jackson Browne. Known for an unyielding commitment to quality and perfection, Browne's 1990 summer tour system was designed around 2,500- to 3,000-seat venues and normally used 10 PhaseLoc Series V Hi and six Series V Lo enclosures, although several more boxes were kept in the truck if needed.

Each amplifier channel is assigned to only two components, with the exception being tweeters, where the ratio is 4:1.

"I carried enough boxes in the truck to do 5,000 people if needed," Adams says. "Because it was primarily an acoustic set with low decibel requirements (90dB-93dB), I only used the additional boxes for coverage when necessary. We flew the boxes for several dates but mainly stacked them on the deck."

Each side of the FOH system was set up with a stack of highs, lows columned in the middle and then another stack of highs. Total time required to fly both sides of this system took less than one hour with an engineer and a single stagehand. Band gear, set carts, merchandising and the PA all fit in one truck. ■

Continued on page 55

Continued from page 54



QSC's EX 4000 is the latest example of a high-powered amplifier designed to drive low-impedance loads.

computer interface. This would set amplifiers up like a computer network, where individual units can be on or off without affecting the rest of the network."

QSC hopes to see an industry standard that will allow system designers and operating technicians to work with a universal appliance network control scheme, so that audio devices of all types can be linked and operated via computer, regardless of their manufacturer.

"Even if we develop a unique standard, we plan to make it an open situation for the whole audio industry," Quilter says. "Our approach is that a control scheme shouldn't be used just to sell one brand of amplifiers. The whole industry is waiting for a commonly accepted, workable networking system so that permanent systems and portable ones alike can be brought to a higher level of operating sophistication. The EX 4000 is standing by to be a powerful, cost-effective link in that type of chain." ■

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Circle (27) on Rapid Facts Card

February 1991 R·E·P 55

By Mark Herman

SHOWCO, DALLAS

Headline Act:
ZZ TOP

Support Act: Jeff Healy Band
Dates: Oct. 11 — Fall 1991
Region: World Tour

PERSONNEL

House Mixer: M.L. Procise
Monitor Mixer: Johnny Roberts
Drummer Headset: Bill Sheppell
Support Act House Mixer: Alan Morrison (independent)
Support Act Monitor Mixer: Dan Machado
Other Technicians: Johnny Roberts (crew chief); Dan Huffman (assistant FOH)
Rigger: John Bleich (independent)

CONSOLES

House: Harrison HM-5, 32×16×2 with bus-linked 20-channel extender unit
Monitor: Ramsa WR-S840, 40×18
Drummer Headset Mix: Soundcraft Delta 200, 24×4×2
Support Act House: Yamaha PM3000, 40×8×2
Support Act Monitor: Ramsa WR-S840, 40×18

Mark Herman is the president of Hi-Tech Audio Systems, a sound reinforcement equipment rental company based in Half Moon Bay, CA.

AMPLIFIERS

Main FOH: Crown MA1200, Crown PSA-2
Monitors: Crown MA1200, Crown MT1200

MAIN LOUDSPEAKER CABINETS

Manufacturer: Showco
Model: (88) Prism

SUBWOOFER CABINETS

Manufacturer: Showco
Model: (20) Prism Sub

ONSTAGE MONITOR CABINETS

(HEADLINER ONLY)
Manufacturer: Showco
Model: (4) BFM600 wedge
Model: (3) BFM100 wedge
Crossover: Showco 1017
Engineer's Monitor: BFM600 wedge

MISC. SYSTEM INFORMATION

Configuration Per Side: (40) Flying Prism 4-deep × 10-across floor; (4) Prism frontfills; (10) Subs
Flying System: Showco Prism 10-column grids
Truck Pack: Five across with subs on top
House Snake: Mogami 48-pair
Multi-pair Connectors: Cannon SP
Speaker Connectors: Pyle National
Splitter: 48-channel 3-way

FOH ELECTRONICS (HEADLINER ONLY)

Equalizers: Industrial Research Products TEQ DG-4023
Crossover: Showco Prism Digital 1040
Effects: AMS RMX 16; Eventide H3000; TC Electronics 2290; Lexicon PCM70; Yamaha REV-5; (2) Yamaha SPX 900; (2) Klark-Teknik DN716
Guitar Effects: Tube Tech MP1A; Tube Tech compressor CL1A; Tube Tech program equalizer PE1B
Compressor/Limiters: (2) Aphex Expressors; (6) dbx 900 Series 903
Peak Limiters: Aphex Dominator II
Gates: (6) Aphex 612
Gates: (6) dbx 900 Series 904
Gates: (2) Drawmer 201 (for bass)
Analyzer: Klark-Teknik DN60
CD Player: Tascam 501
DAT Machine: Tascam DA50
Cassette Machine: Tascam 122
Intercom: Clear-Com
Headphones: Beyer DT770
Engineer's Monitors: (2) Yamaha NS10M studio monitors powered by Crown D-75

ONSTAGE SIGNAL PROCESSING

(HEADLINER ONLY)
Equalizers: Klark-Teknik DN360; Klark-Teknik DN410 (parametric)
Compressor/Limiters: dbx 903; Valley Dynamite
Gates: dbx 900 Series 904
Headphones: Sennheiser HMD 224

MICROPHONES (HEADLINER ONLY)

Vocals: Beyer TGX580
Kick: Sampled E-MU drum pad; D-Drum II head
Concert Toms: Beyer M420
Rack Toms: Beyer 201
Floor Toms: Beyer TGX580
Overheads: Beyer MC740
Snare Top: Beyer 201
Snare Bottom: Beyer TGX580
High Hat: AKG 460
Guitar (custom isolation chamber): Beyer MC740; Sennheiser 409; AKG D12
Bass: Showco direct box; Beyer TGX480 and TGX580

SEE FACTOR, LONG ISLAND CITY, NY

Headline Act:
Bad Company

Support Act: Damn Yankees
Dates: Nov. 5 — Dec. 17
Region: U.S.A. Tour

PERSONNEL

House Mixer: Bill Fertig
Monitor Mixer: Russ Sladek
Support Act House Mixer: Night Bob (independent)
Support Act Monitor Mixer: Randy Brown
Other Technicians: Mike Franz
Rigger: See Factor crew

CONSOLES

House: Midas Pro40, 34×12×2; Midas Pro40, 24×12×2
Monitor: Midas Pro40, 36×16

AMPLIFIERS

Main FOH: Crest 4001
Lows/Subs: Crest 4001
Monitors: Crest 4001, Crown PSA-2
Sidefills: Crest 4001

MAIN LOUDSPEAKER CABINETS

Model: (48) Meyer MSL-3; Meyer M3T crossover
Model: (2) Meyer UPA (frontfill); Meyer M1A crossover

SUBWOOFER CABINETS

Model: (20) Meyer 650; Meyer B2 crossover

ONSTAGE CABINETS (HEADLINER ONLY)

Model: (8) See Factor ASR 1x15; BSS 310 crossover
Model: (4) Meyer MSL-3 (side fills); Meyer M3T crossover
Model: (2) Meyer 650 (side fills); Meyer B2 crossover
Model: Meyer UPA & USW (drum fills);

Meyer M1A, B2 crossovers

MISC. SYSTEM CONFIGURATION

Flying System: See Factor Proprietary
Truck Pack: (5) MSL-3s across; 650 subs on top
House Snake: (4) Belden 250-foot 24-pair
Multi-pair Connectors: AMP QL
FOH Speaker Connectors: Cannon EP-4
Splitter: 48-channel, 3-way with transformers

FOH ELECTRONICS (HEADLINER ONLY)

Equalizers: Industrial Research Products TEQ DG-4023
Effects: Eventide H3000; Lexicon PCM70; Lexicon Super Prime Time; Ursa Major Reverb
Compressor/Limiters: dbx 160-X; Valley People Gain Brain-IIs
Gates: BSS 504
Analyzer: Klark-Teknik DN60
CD Player: Panasonic
DAT Machine: Sharp

Cassette Machine: Tascam 122

ONSTAGE SIGNAL PROCESSING (HEADLINER ONLY)

Equalizers: Klark-Teknik DN360
Compressor/Limiters: (8) dbx 900 Series 903
Gates: (4) dbx 900 Series 904

MICROPHONES (HEADLINER ONLY)

Wireless Vocals: Nady 700 with Shure Beta 58; Shure Beta 58
Background Vocals: Crown Differoid 310
Kick: AKG D112
Rack Toms: Ramsa
Floor Toms: Ramsa
Overheads: AKG 460
Snare Top: Shure SM57
Snare Bottom: AKG 460
High Hat: AKG 460
Guitar No. 1: Crown PZM GPB30
Guitar No. 2: Crown PZM GPB30
Bass: E-V RE-20; direct box
Direct Boxes: Countryman

MOVING?

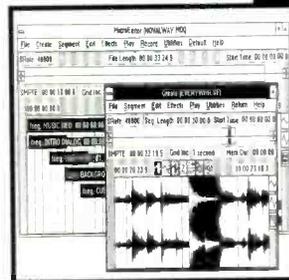
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Circle (28) on Rapid Facts Card

HANDS ON:

By Jim Williams

Soundcraft 3200



The 3200 is Soundcraft's newest entry in the field of large recording consoles. By size and design, it is the largest console Soundcraft has ever produced and returns to a classic split format, rather than the in-line style used by other manufacturers. Input modules up to 36 channels are fitted to the left side, and 24 or 32 group/monitor channels are placed to the right of the center control section.

The input module features a padless mic pre-amp, 4-band parametric EQ, high and low filters, a noise gate, multiple aux and stereo sends, and a unique panning circuit. The group/monitor module has a line input, the same EQ, filter and noise gate, eight aux and three stereo sends. The control section has the usual stereo and aux masters, monitoring and communications, four effects returns with high and low EQ, and the master logic control switches.

Jim Williams is the owner of Audio Upgrades, a component-level upgrade design and consulting service based in Los Angeles.

A large and comprehensive patchbay fills out the right end, although it can be mounted externally to allow the fitting of additional input modules. The meter bridge has mechanical VU meters displaying group outputs 1-32, the eight aux masters, the three stereo masters and a phase meter.

Several unique design topologies exist in this console that are worthy of further description. The mic pre-amp is of a padless design; rather than using the typical 20dB pad switch, this pre has a large gain adjustment range of +2dB to +70dB. This avoids any possible noise or sonic degradation caused by padding resistors before the pre-amp input. The pre-amp can take +4 inputs without risk of overload. Soundcraft does this by following the mic pre with an additional gain stage and by using a dual-gain control pot to adjust each stage in tandem.

The EQ section has four bands, the two middle bands being fully parametric with adjustable Q or bandwidth. The low-frequency band has a switch to select between bell or shelving curves. The high band is sweepable shelving only, with a range of 1.2kHz to 20kHz.

I mention this because the high-mid band allows a bell curve to reach only

11kHz. It would be nice to get a bell curve to go higher, even to 20kHz. The low band starts at 20Hz, and all the bands have a large amount of overlap. Maximum boost and cut is 15dB for all sections. It is a nice touch that when any band is at its center detent, it is switched out of the circuit path. This helps lower noise and keeps the frequency response flat.

Each input and group/monitor module has a full-featured noise gate. Attack, decay, threshold and depth are continuously variable. A hold function is internally set at 10ms to prevent "chatter" when using fast attack and decay times. A key input is provided at line input B, and the high and low filters can be switched into the key sidechain.

Eight aux sends are provided with another unique twist: When the RTG switch is pushed, auxes 7 and 8 can be routed to groups 25 to 32, providing another eight post-fader sends during mixdown. Add to that the two extra stereo sends and you have up to 20 sends accessible at mixdown.

ACTIVE PAN POT

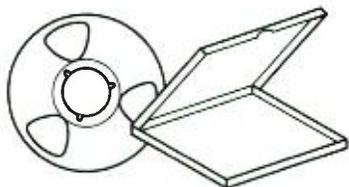
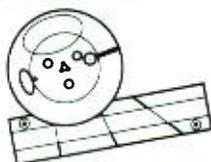
Another unique feature of this console is Soundcraft's active pan pot. By buffering the mix bus resistors with op-amps, a

201-6

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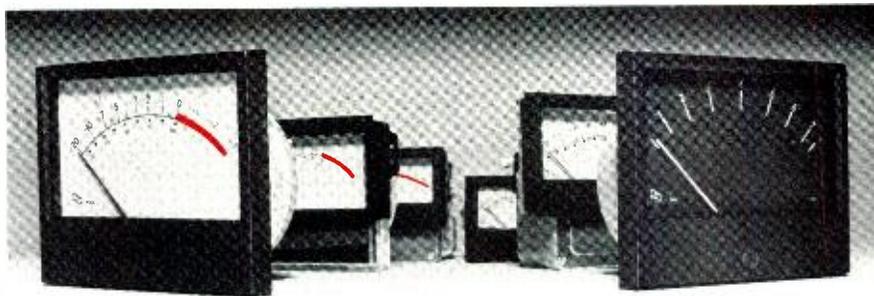
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Circle (35) on Rapid Facts Card

Circle (36) on Rapid Facts Card

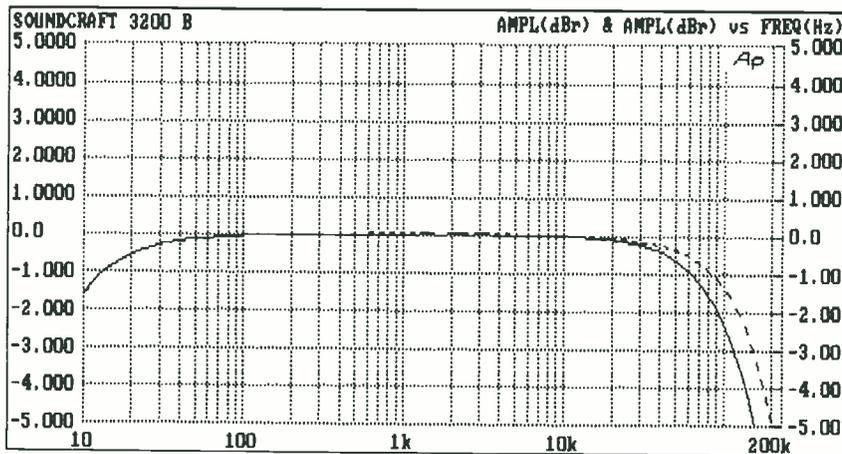


Figure 1. Frequency response, line input to main mix; solid line left, dashed line right.

lower impedance is fed to the stereo bus, resulting in reduced noise and crosstalk. Soundcraft's active panning follows a sine/cosine type of movement, which results in a pan that is smooth from left to right. Soundcraft achieves this by using positive and negative feedback in the design of the panning buffers, a clever design feature.

Because the fader panel is separately mounted, any number of moving fader or VCA automation packages can be easily retrofitted. There is plenty of room underneath to fit power and data cabling, and the fader panel is wide enough to fit the fader and automation card without feeling cramped. Because of a large number of electronic FET switches in this console, the capability exists to tie many of these switches to the automation control.

The group/monitor module is laid out like the input module, minus the mic pre-amp and routing matrix. Monitoring can be switched between the group outputs, tape or line inputs. A nice feature is the Tape + Group switch. This allows the artist or engineer to monitor the tape playback and input source mixed together before the punch-in point. Once the recorder is punched in, the tape machine switches out tape playback and only the input source remains.

Soundcraft has taken this concept a step further by including an optically isolated switch. If master record logic from the recorder is tied to the opto switch, punching in will switch the monitoring from group to tape automatically, allowing the artist to play along to the tape before the punch-in point.

The master section contains all of the stereo mix masters, the aux masters, four effects returns, soloing functions, phones selects, talkback, 2-track returns, and speaker switches and controls. The control room feeds include main, alternate

and close-field speaker outputs. Monitoring sources include three 2-track returns, CD player, two external inputs and a cassette return with levels set for -10dBv consumer levels. Because of the careful design of the switches, you can make 2-track to DAT or cassette copies without concern of leakage or crosstalk to the multitrack.

BALANCED BUSING

This brings up what I feel to be the most important feature of this console: The balanced bus. Balanced busing differs from standard buses in that the balanced bus has two bus lines to mix instead of just one. Like a balanced mic, the balanced bus has positive and negative lines, which do a good job of canceling out unwanted hums and buzzes. They also have the benefit of reducing capacitive crosstalk or leakage and provide an additional 3dB improvement in noise levels over the standard "single-ended" bus.

Unlike some other consoles, every bus in the 3200 is a true floating balanced bus; the stereo mix, group mixes, auxiliaries, everything. The intermodulation between channels is virtually non-existent, giving greater clarity and detail during complicated mixes. The extra circuitry required to achieve balanced buses is small, although they do need double the runs on the master bus board, which can use up a lot of bus board real estate. More console manufacturers should employ balanced buses, simply because it is the single-best development in console design in the last 10 years.

LAB TESTS

So how does it spec out? Well, pretty damn good overall. This is really a test of two boards, both installed in the L.A. area. I thought checking out both might add some interesting insights.

**More console
manufacturers should
employ balanced buses
because it is the
single-best
development in
console design in the
last 10 years.**

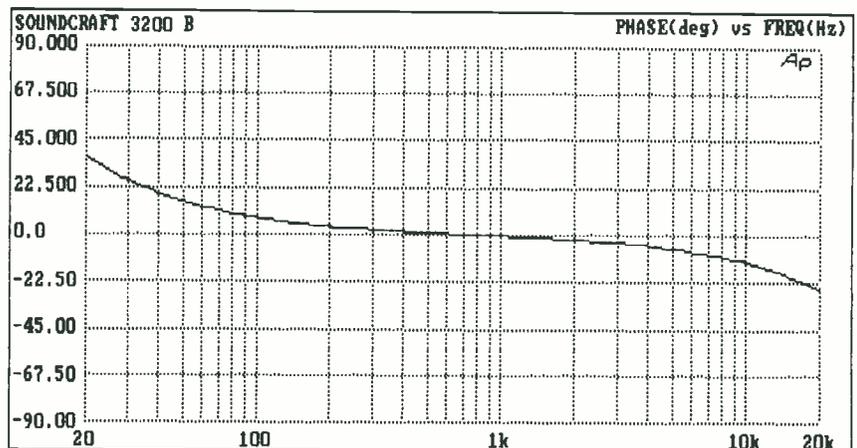


Figure 2. Phase shift vs. frequency; line-in to main mix out.

The first console is installed at Hans Zimmer Studio and has been modified with additional group aux sends. Its patchbay has been externally mounted and an additional 12 input modules have been fitted into the freed-up space on the right side.

The second 3200 has just been installed at Scott Page's new studio, The Arena. This is a stock 36x32 model with an onboard patchbay. The test rig used in both cases is the Audio Precision System One.

The first tests completed were frequency-response sweeps. Tests were made for line and mic inputs to main and group outputs and were consistent, regardless of whether mic or line inputs were used. A typical sweep is shown in Figure 1. Low-end response is down about 0.5dB at 20Hz, and the high end is 3dB down at about 150kHz. The extended high-frequency response is a big improvement over earlier Soundcraft models, such as the TS-24, the TS-12 and the 8000.

This extra high end proves its worth in the phase vs. frequency plot in Figure 2. Phase shift (or group delay) is linear with frequency, and the minor amount of shift ensures that the high and low end will "arrive" at the same time, resulting in a clear

top and a tight bottom end.

Figure 3 plots SMPTE intermodulation distortion vs. amplitude. It is interesting to note that the distortion tests appear to do better while driving the bus harder. This is because the analyzer measures distortion plus noise and the noise falls off at higher levels. Real THD is probably about 0.004%.

Figure 4 plots the main mix bus noise level vs. frequency. Although the noise is quite low, a 60Hz hum harmonic shows up at the -95dB level. It is probably not the console itself but rather its installed wiring and grounding. Nevertheless, it is still inaudible in practical operation.

Figures 5 and 6 show off the benefits of balanced buses and their impressive crosstalk specs. Figure 5, the main mix, has crosstalk in the -80dB to -90dB range. In Figure 6, the groups 1 and 2 have crosstalk in the -110dB range — the best I have ever measured in a recording console. The reason the groups spec better than the stereo mix is because the group sends don't route through a pan pot. The close mounting of the left and right elements in the pan pot allows for a small amount of signal to leak across. All consoles should employ this balanced topology, because

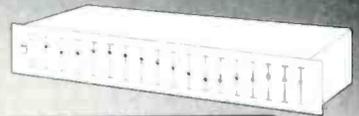
The 3200 returns to a classic split format, rather than the in-line style used by other manufacturers.

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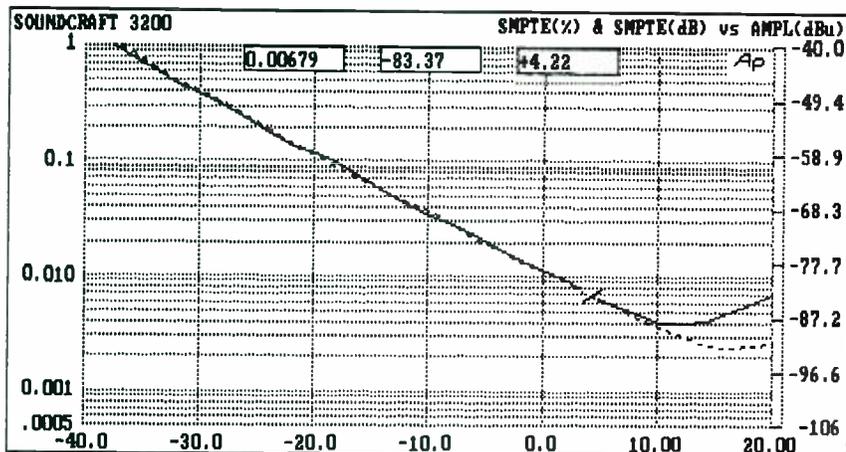


Figure 3. SMPTE intermodulation distortion vs. amplitude, line-in to main mix out; solid line left, dashed line right.

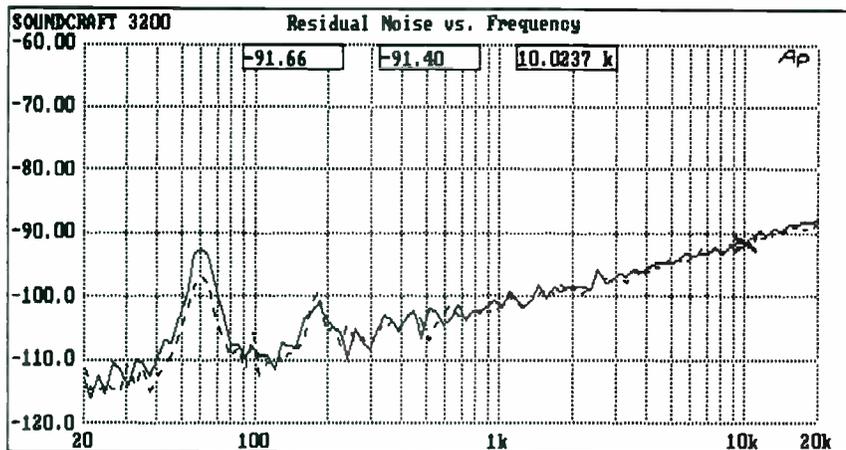


Figure 4. Spectral distribution of residual noise, stereo bus with no channels assigned; solid line left, dashed line right.

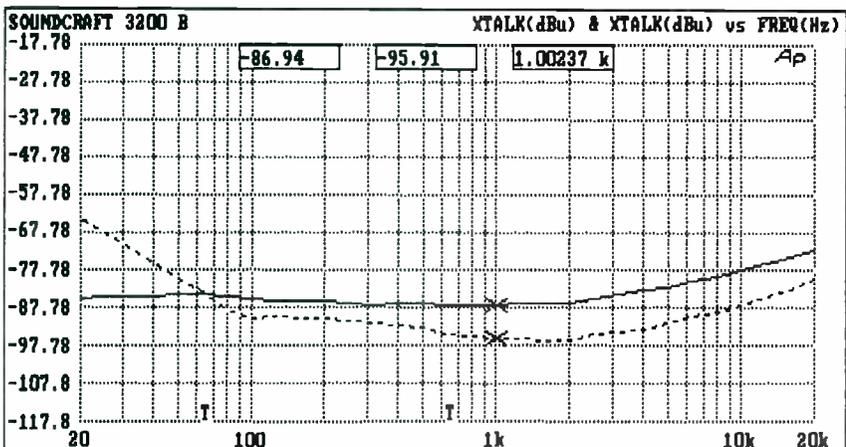


Figure 5. Stereo crosstalk, line-in to main mix out; solid line left, dashed line right.

it doesn't require much additional circuitry — just double the number of bus lines to implement.

Now, for a closer look at the padless mic pre-amp. Figure 7 plots dynamic intermodulation distortion vs. amplitude at the +2 gain setting. DIM is a punishing test for circuitry that uses a lot of negative feedback, as does this mic pre. Once the level climbs out of the noise floor, the DIM reads at about 0.002%, which is quite respectable.

Figure 8 plots the mic pre's noise vs. frequency at +2dB and +70dB gains. I was not able to meet Soundcraft's published spec of -128dB EIN with a 150Ω resistive source. This is probably because both 3200 consoles had rather long snakes wired to the mic inputs, a fact that might have affected the distortion as well as noise at the high gain settings.

Because I couldn't access the mic inputs directly at the patchbay, I can't put much meaning into the results. One last important spec for the mic pre is the common mode rejection ratio. This tells how well the mic pre "cancels out" any noise that might be picked up by the cable. CMRR measured -75dB across the entire spectrum, meaning that the mic pre cancels out noise picked up by the cable 75dB.

HOW IT SOUNDS

Well, how does it sound? Before I answer that, I'd like to say that although specs can't tell you how something sounds, they do allow you to qualify it and they can help in determining whether problems exist. This isn't the kind of equipment you can take home for a test drive, so a potential buyer has to rely on reputation, experience and, of course, the specs. This is even more apparent with a product like the 3200, which is so new there just isn't anyone out there to talk to about it (unless you talk to a salesperson, and you already know what they're going to say about it).

My impression when I first saw this console was, "How did you get this damn thing through the door?" This thing is *big*, about 12 feet long. When I saw the massive supports I realized how the 3200 got the name "Bigfoot." The frame is long but it does hold 68 to 80 modules. The large number of line inputs make the 3200 an ideal choice for MIDI mix suites, where you don't need a lot of redundant mic pre's. However, not too many MIDI control rooms can fit this console in because of the length.

At Hans Zimmer Studio, this is the case, so the console sits in the main room doing post-production work to screen, not the control room. At The Arena, the existing control room can barely hold it, necessitating the construction of a larger

Sound & Video

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This class is for anyone who wants to acquire the basic skills needed to understand audio fundamentals. Topics include:

- The metric system, as it applies to audio.

- The effects of passive electronic components (capacitors, transformers, etc.) on audio frequencies.
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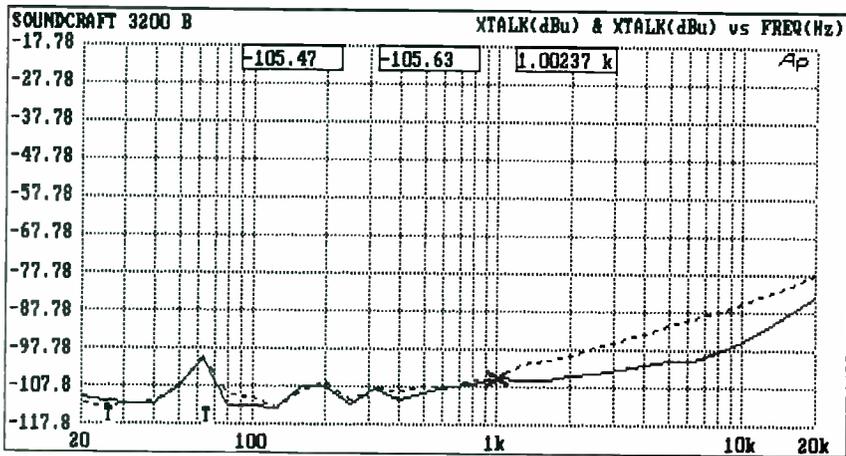


Figure 6. Stereo crosstalk, line-in to groups 1 and 2; solid line group 1, dashed line group 2.

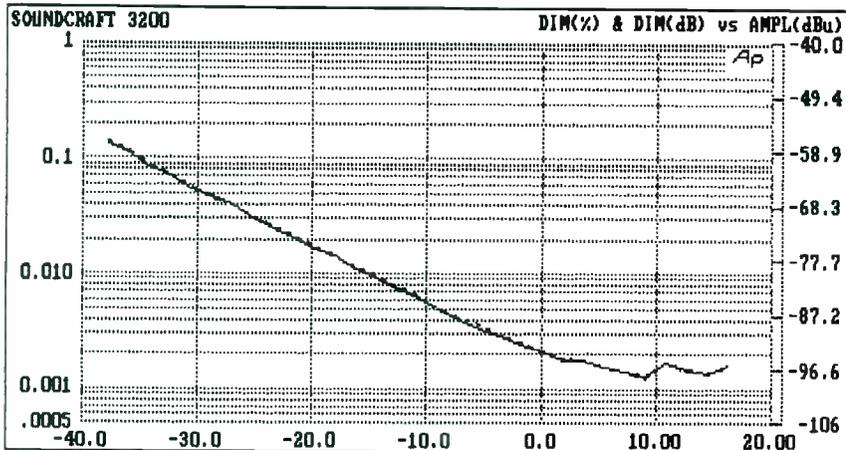


Figure 7. Dynamic intermodulation distortion vs. amplitude, mic pre to insert out.

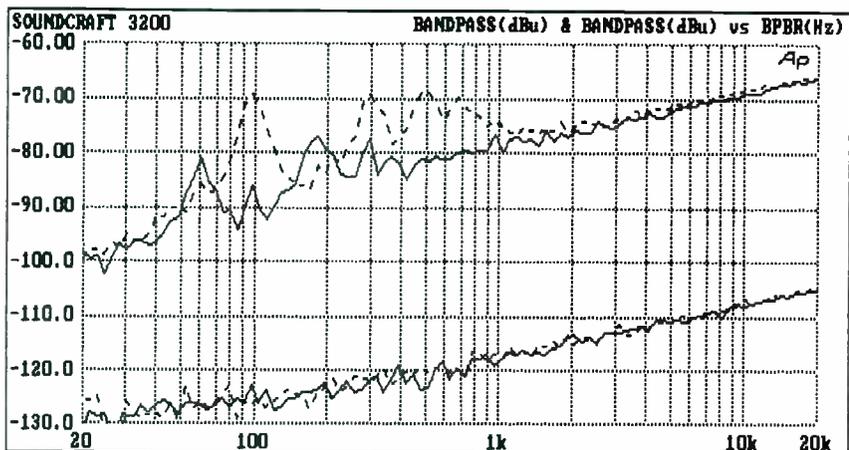


Figure 8. Spectral distribution of residual noise, mic in to insert out; bottom trace +2dB, top track +70dB. Channels 1 and 2 are shown.

control room in the future.

Just as the tests would show, this desk has a clear and open sound. Each section holds its own without any weak or funny-sounding parts. The mic pre sounds as good as the line in, and the comments from the engineers included "clear," "uncolored" and "neutral." There is no change in sound or noise when the EQ is switched in, and because the internal operating level is set at -2dBu, there's plenty of headroom to boot.

Running a DAT through the line-in to mix-out was indistinguishable from a 2-track return patch. Even when clipping an input module, no leakage could be heard with the control room turned full up. The EQ section had lots of control, with the exception of no bell response above 11kHz.

Listening to the movie soundtrack of "Black Rain" at Hans Zimmer Studio was a real experience. This soundtrack has extreme low and high frequencies, and on the 3kW Quedstedt multichannel playback speakers with 22-inch subwoofers, it really let the "Bigfoot" show off its stuff! Movie mixing is a natural with this console, because of the 6-channel mix capabilities provided.

If there is any nitpicking to be done, it would be about noise. There is some noise in the main mix bus, as well as the mic pre-amp at higher gains. For all you "chip-a-holics" out there, this baby is loaded with lots of quiet 5532 op-amps and quite a few TL072s, which I consider pretty noisy. The mic pre front ends and the hybrid sum amps both use the TL072, and Soundcraft has elected to use 2N4403 switching transistors in these noise-critical sections as well.

I would suggest Soundcraft check out some of the excellent low-noise transistors available from Japanese manufacturers, as they are inexpensive and have proved to vastly reduce noise in other Soundcraft models, such as the TS-24, when retrofitted.

If you're in the market for a large, clean and highly functional console without a built-in TV, and you don't want to spend more than \$100,000, check out the "Bigfoot." You may be pleasantly surprised.

Circle (100) on Rapid Facts Card ■

Acknowledgements: Thanks to Jay Rifkin at Hans Zimmer Studio, and Scott Page and Ken Hirsch at The Arena for the loan of their studio time, and to Bill Threlkeld of Soundcraft/JBL for technical schematics and manuals.

First Look

By Laurel Cash-Jones

SAVE FOR THE FUTURE

If you're old enough to still own those items known as 78s, 45s, acetate reference discs, or even some 1950s-1970s original 33 $\frac{1}{3}$ vinyl antiques, you know they won't be coming out on CD in the near, or even distant, future.

As luck would have it, Esoteric Sound has come to your rescue with its Professional Restoration Turntable. It features six switch-selectable speeds of 33 $\frac{1}{3}$, 45, 71.29, 76.59, 78.26 and 80 rpm for accurate reproduction of almost every type of modern and vintage recording in existence. And because you need different types of needles to play these various types of black frisbees, a variety of user-changeable headshells is available.

Among its other modern features are pitch control for the direct drive motor, an S-shaped tone arm, adjustable tracking and anti-skating force and a solenoid braking system. The turntable operates from 120Vac or 240Vac at 50Hz or 60Hz. There is even an XLR lamp outlet on the deck plate, and a built-in holder for a spare headshell.

The suggested retail price of \$375 seems pretty reasonable considering all that you are getting. However, there is one question: Why not make a straight-line tracking version for more modern types of records, which would more closely approximate the cutting lathe and stylus placement?

Circle (101) on Rapid Facts Card

ARCHIVING QUESTIONS

While you are delirious because you have found the answer to transferring that warehouse full of stuff you have, you must now consider the difficult question that continues to plague us: What do you put it on?

Good question. I have a few answers from the Tokyo Audio Fair. It seems that DAT is big in Japan. And DAT has made its presence felt in this country in the professional market. However, there are still questions as to whether DAT will be accepted before it becomes as obsolete as a car stereo that plays 45s. With this in mind, you might spend many days or even years transferring stuff with loving care only to find that DAT is no longer the format of choice and you need to transfer it all again to something else.

Philips' new format, the Digital Audio Compact Cassette, places digitally encoded

information on an analog cassette-sized tape, using a fixed head and allowing compatibility with the current mechanism.

A few years ago, the Sony PCM F-1 digital processor offered a relatively inexpensive way to store many hours of digital audio on standard video cassettes. This still makes a very good way to archive stuff, but you must watch out for the 44,056 sample rate if you need to transfer it to anything else.

If you have decided to go to DAT regardless of future consequences, you may wish to look into the Sony consumer decks, which have a second speed, such as the DTC75 ES or the DTC 700. However, this speed is not without its drawbacks, such as a reduced bit rate (12) and a lower sample rate (32kHz), but it is a convenient way to store lower-quality and reduced-bandwidth material.

One interesting new product that may be a very good and inexpensive way to store vast amounts of PCM digital audio (like the Sony F-1) was presented by Matsushita. Under the Panasonic name (and

with no pricing or marketing plans yet available), a prototype of an S-VHS machine with PCM digital audio recording capability was shown. With this machine, you could conceivably record six hours of digital audio for the price of a VHS cassette.

DAT TO GO

Back on the DAT front, portable units are hot in Japan. In fact, the Aiwa HD-S1 is believed to be responsible for 30% of all of the portable units sold to date, with a good portion of them being shipped to the States via the gray market.

However, very soon, it will have some stiff competition from Denon, Kenwood, JVC and Sony. As of this writing, the Winter CES show is a few weeks away. Next month's column will detail the latest developments that will affect us in the pro world. ■

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

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TAC B₂ mixing console

The B₂ is a 4-bus console designed for smaller sound reinforcement and video post-production applications. It features electronically balanced inputs, busing and outputs; 4-band semi-parametric EQ; six discrete aux sends; and four stereo effects returns. Video post-production versions are available with both serial and parallel AFV interfaces to video edit controllers. Mounting rails enable the console to be rack-mounted or used as a drop-through into studio furniture.

Circle (105) on Rapid Facts Card

Yamaha PC4002M power amp

The PC4002M delivers 700W/channel into 4Ω; has a 10Hz-to-50kHz frequency response, ±1dB; and features less than 0.005% THD. A pair of illuminated peak reading peak-power level meters provides a visual indication of the remaining headroom. Specially selected decibel-calibrated detented potentiometers give predictable and repeatable attenuator settings. A clip indicator lights when output distortion on the corresponding channel exceeds 1%. The PC4002M features twin power supplies and transformers and has a separate power supply for the input stage.

Circle (106) on Rapid Facts Card

Dynacord PCA Series amps

The PCA Series of processor-controlled power amps features DSP technology. Other features include a built-in processor and limiter and a Thermal Brain Circuit, which provides extra loudspeaker protection. Models available include the PCA 2250, a 2×250W RMS 4Ω amp; the 2450, a 2×400 RMS 4Ω amp; and a 2544, a 4-channel, adjustable 2-way stereo, 3-way mono + monitor or 4-way switchable second-order Linkwitz Riley crossover to permit the configuration of active multi-way systems without the need for external crossovers.

Circle (107) on Rapid Facts Card

Turbosound TMS-5 enclosure

The TMS-5 full range, 3-way enclosure is designed for venues where a small, unobtrusive, flown enclosure with the capability to produce high SPLs is needed. A reconfigurable mid/high section allows for vertical or horizontal operation. The unit incorporates a 12-inch LF driver and a 10-

inch MF driver, both loaded with patented TuroBass devices; and a 1-inch HF driver, loaded with a custom flare. A TSW-121 subwoofer provides full, dynamic sound and a physical LF effect. List price is \$2,250.

Circle (109) on Rapid Facts Card

Otari MTR-15 recorder

The MTR-15 2-track recorder comes with 12.5-inch reels and is available with an optional chase synchronizer for post-production applications. A 1/4-inch center-track time-code version of the MTR-15 is capable of recording and reproducing SMPTE/EBU time code. Other features



include a plug-in head assembly, which enables easy conversion between 1/2-inch and 1/4-inch 2-track formats; and a versatile design suitable for rack-mounting or floor stand console configuration with meterbridge.

Circle (123) on Rapid Facts Card

Audio-Technica PRO 37R mic

The PRO 37R remote-powered cardioid condenser mic features a 30Hz-to-15,000Hz frequency response, -41dBm sensitivity and 141dB SPL maximum input at 1% THD. It can be powered with any phantom supply of 9V to 52V dc. The mic, which is enclosed in a rugged housing with a low-reflectance matte finish, is 3.9 inches long and weighs 2.1 ounces. A foam wind screen and a protective carrying case are included.

Circle (114) on Rapid Facts Card

Allen & Heath Spectrum Series consoles

The Spectrum Series of consoles provides direct MIDI control and uses A&H's V-4 software, which includes a self-contained on-board sequencer. All models feature six aux buses and a dedicated stereo cue bus. All input modules have individual source switch selection between mic, line and tape inputs. Tape input and output levels may be externally switched for +4 or -10 operation. The Spectrum 16, which is intended for 8- and 16-track recording, supports up to 40-line inputs during mixdown; the Spectrum 32 can simultaneously record up to 32 discrete tracks. List price is \$8,900.

Circle (111) on Rapid Facts Card

Illbruck ProSPEC barriers and composites

The ProSPEC line of acoustical barrier and composite materials are designed for applications where transmission loss and noise reduction are required. ProSPEC Barrier is a loaded 1 pound/square foot vinyl sheeting with a polyester webbing core so the material can be grommeted, stapled, nailed or screwed. ProSPEC Acoustical Foam is a 1-inch polyether foam with a polyurethane film facing and a pressure-sensitive adhesive backing. ProSPEC Composite consists of a vinyl barrier between 1-inch polyether foam with a polyurethane film facing and a 1/4-inch foam decoupler with pressure-sensitive backing.

Circle (112) on Rapid Facts Card

Mitsubishi CS-1 synchronizer

The CS-1 internal chase synchronizer allows users to chase lock to any time code source, video or film in ±50ms or 1/8 of a subframe, which is eight times more accurate than an external synchronizer. The CS-1 will hold a digital recorder in time-code lock to any video or film source at variable speeds. It can lock to any master transport, whether it provides only time code or time code, tach and direction pulses. The CS-1 also refines electronic editing between two Mitsubishi X-880s for 64-track recording.

Circle (117) on Rapid Facts Card

Yamaha AD2X A/D converter

The AD2X 2-channel A/D converter with digital floating technology provides 19-bit

linear conversion resolution and 0.018% THD. It offers 48kHz and 44.1kHz sample rates with a front-panel indicator and back-panel selector. The AD2X has a delayed auto-reset feature that automatically recalibrates the entire system after approximately 10 minutes of warm-up time. The analog inputs are electronically balanced with greater than 20kΩ input impedance. Input level is from a nominal +4dBm to a maximum of +23.5dBm. Digital outputs are in AES/EBU, S/PDIF and Yamaha Y2 formats. Suggested retail price is \$1,695.

Circle (116) on Rapid Facts Card

be used in conjunction with the SSM processor, which provides fixed equalization points, peak and RMS limiting circuitry and time-domain alignment for the driver elements.

Circle (115) on Rapid Facts Card

Marshall Electronics TEF

The Thermodynamic Electret Film (TEF) is a voltage-generating electret foil that can operate as a condenser mic, electrostatic headphone, contact mic and heat sensor. The TEF generates a voltage when

JBL Control Micro loudspeaker system

The Control Micro loudspeaker and Control SB Micro subwoofer are designed for applications with limited space. The loudspeaker features a distortion-free single transducer, spring-loaded connectors that will accept standard dual banana connectors, and magnetic shielding of the speaker to allow placement in close proximity to computer and video equipment. The subwoofer features a dual chamber band-pass design to smoothly extend bass response to below 40Hz. The dual voice coil LF transducer uses a single 8-inch long-throw transducer with dual 38mm voice coils.



Circle (108) on Rapid Facts Card

Apogee Sound SSM loudspeaker system

The SSM is a compact, high output, wide-bandwidth speaker system intended for front audience fill and monitor applications. It is comprised of two 4 1/2-inch-high excursion woofers and one 1-inch titanium dome tweeter. Power handling is 200W continuous and 800W peak; output at these power levels is 112dB and 118dB, respectively. Frequency response is 80Hz to 25kHz, ±3dB. The SSM is designed to



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Cutting Edge

subjected to a change in temperature or to mechanical strain caused by acoustic waves, vibration or direct contact. The material can also work in reverse by using an alternating voltage to cause it to act as a transducer. The film is aluminized on both sides and becomes active when a shielded cable is attached. In small quantities, the TEF is 50 cents per square inch.

Circle (119) on Rapid Facts Card

Soundcraft Delta Monitor console

Designed for live applications, the Delta Monitor incorporates the chassis of the 200 Delta and Venue consoles and operates as a 12-bus stage monitor mixer with up to 40 inputs. Input features include balanced mic and line inputs, 4-band, two mid-sweep EQ with high-pass filter and polarity reverse, and large PFL buttons

with LED indication. Monitor outputs have two sweepable notch filters with separate on switches and panic dim, which dims the output by 6dB when feedback gets out of hand. Each balanced output has a separate monitor send for the engineer's cue bus.



Circle (104) on Rapid Facts Card

Sonic Solutions Sonic FX effects processor

The Sonic FX digital effects processor harnesses the power of four DSP chips to generate effects without external equipment. It consists of a processing card compatible with Macintosh II's NuBus and software modules from Sonic Solutions. (Sonic Solutions is planning to release software modules for the processor, including a 31-band FIR graphic EQ, Designer Reverberation and Real-time Time Squeeze/Stretch, which will be available for less than \$2,000.) List price of the Sonic FX is \$3,500.

Circle (120) on Rapid Facts Card

Audio Kinetics software

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ucts enables the 1.11 synchronizer to work with any machine controller capable of using the Sony serial command protocol. This will enable video editors to drive the 1.11s and will suit any application where audio or film transports might be used in conjunction with a video editing system. Digital workstations, such as the SSL Screensound, AMS AudioFile and DAR SoundStation II, which are able to drive transports using Sony serial, can also be tied into a 1.11-based control system.

Circle (121) on Rapid Facts Card

Peavey 3680 sound reinforcement console

The Performance Series 3680 console features a S/N spec of the input stage of -133dB while maintaining 60dB of gain. A monocoque chassis construction supplies resistance to flexing of the chassis

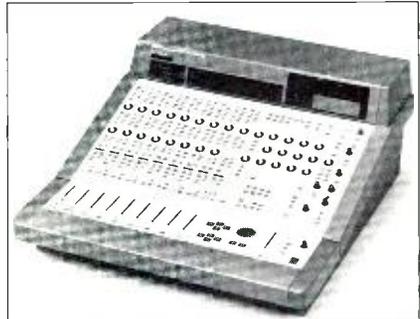
mainframe. Each of the 36 channels occupies its own mini chassis from the input to the 100mm fader; each channel may also be removed separately. An active-balanced input circuit offers 100dB of common mode rejection. Gold-plated connection contacts provide quiet operation.

Circle (118) on Rapid Facts Card

Yamaha DMC1000 digital console

The DMC1000 is a digital console with 14 input channels and eight monitor input channels, which can be mixed onto the stereo bus. All channel parameters are automated and static scenes of all console parameters may be stored onto a RAM card and instantly recalled. The on-board time code-referenced computer stores its automation data to an internal 3.5-inch

floppy disk drive. Bus outputs, channel and monitor inputs appear in Yamaha, S-DIF2 and Pro-Digi formats; channel inputs and program buses appear in an AES/EBU format for direct interface with D2 video recorders.



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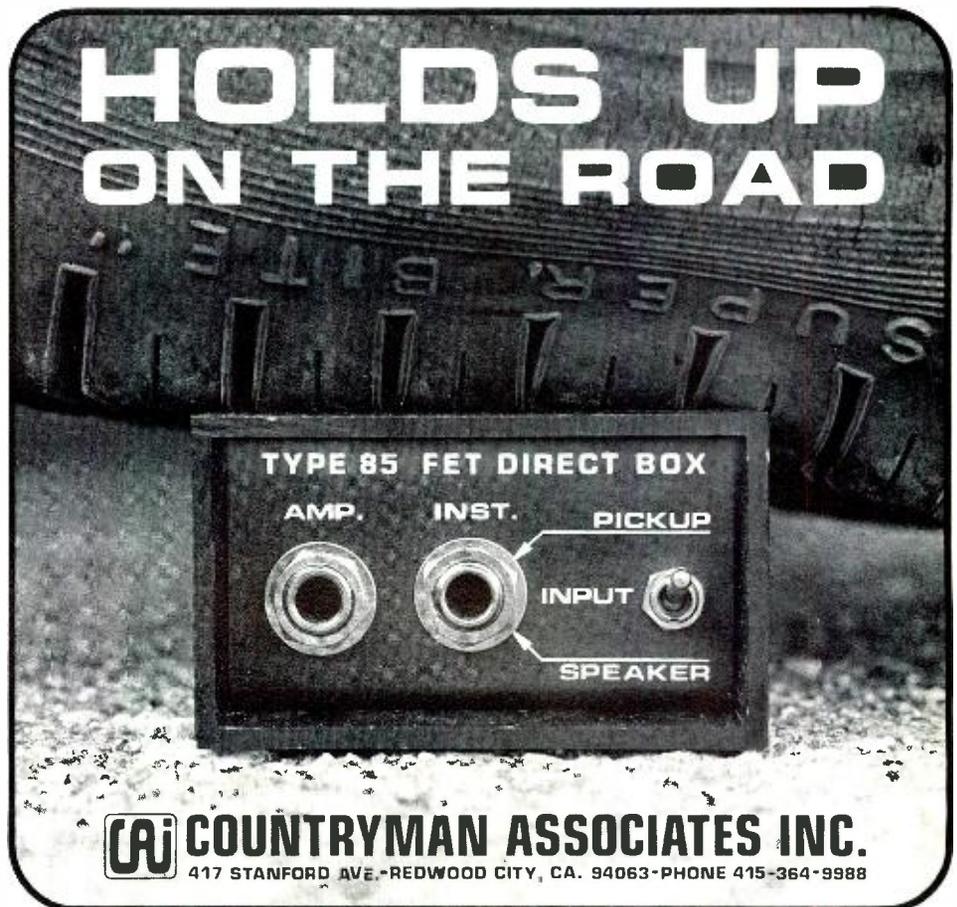
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Hardware and Software Updates

Soundcraft 3200 leasing option

Soundcraft is now leasing the GML Moving Fader system to increase the performance potential of the 3200 recording console. Film composer Hans Zimmer, who recently purchased a 3200, will be the first to use the program.

Circle (124) on Rapid Facts Card

True Image MacSpeakerz 1.5 version

The 1.5 version of the MacSpeakerz loudspeaker design application for the Macintosh calculates and displays the frequency response of any loudspeaker driver/box combination and gives the corresponding enclosure dimension for that response; the vent dimensions are displayed for vented enclosures. A large library of loudspeaker drivers is provided and can be expanded to include new drivers. Families of response curves can be created using the 10 memories; this application enables you to print reports on the finished enclosure that lists the driver and box parameters and frequency plots for that driver.

Circle (125) on Rapid Facts Card

Northstar Hollywood Edge sound effects library

The Hollywood Edge Premiere Edition sound effects library is now available for use with the E-mu Emulator III. The accuracy of the original samples has been maintained by digitally transferring the library through Digidesign Sound Tools at 44.1kHz and by using digital equalization and filtering. The library is contained on two CD-ROMs or two magneto-optical cartridges (EFX 1 and EFX 2); each disk contains more than 560Mbytes of data. There are more than 1,800 samples and 4,000 presets on a total of 161 banks. The samples offer rapid search and sample loading when coupled with Emu's Front Panel Librarian.

Circle (126) on Rapid Facts Card

Micro Technology Unlimited Microeditor

The Microeditor is a Microsoft Windows 3.0 version of the Microsound-AT hard disk audio recorder and visual editing system. New features include instant track editing,

universal 64-track layering with automated digital mixing, up to three track-hours, CD/DAT/sampler digital I/O option, extensive context-sensitive on-screen help, digital crossfade, real-time fading, scrub play, enhanced sample-level visual editing facilities, graphical EDL with snap-to-gridline positioning and creation of up to 2,000 edited tracks without additional mass storage requirements.

Circle (127) on Rapid Facts Card

Soundcraft Delta 8 console

The Delta 8 is an 8-bus mixing console designed for 8- and 16-track recording. Its classic split format is completely modular and offers eight groups with a choice of 20, 28 or 36 input channels. Mono input facilities include six independent aux sends, a 4-band EQ section with two swept mid-bands and high-pass filter, and phase reverse switches. The stereo input module features the Stereo Width control, which provides the ability to continuously vary the range of the stereo image. Master Module facilities now include a second 2-track tape return for use with additional stereo machines.

Circle (128) on Rapid Facts Card

Microtech 10 memory upgrades

Microtech has announced the availability of five new memory and mass storage products that extend the capabilities of the Macintosh Classic computer. The 10-3 provides 3Mbytes of memory; the 10-1 is a 1Mbyte board that can be expanded to 1.5Mbytes; and the 20ic, 50ic and 100ic Europa internal hard drives feature access times as low as 17ms and provide formatted capacities of 20.5Mbytes, 50.2Mbytes and 101.1Mbytes, respectively.

Circle (129) on Rapid Facts Card

T.C. Electronic 1128 software enhancement

The TC 1128 graphic EQ/spectrum analyzer now features a software enhancement that allows real-time control over MIDI using MIDI controller commands. The 1128 is capable of full volume control over MIDI. Sequencer automation of the audio volume level from the front panel gain setting, ± 12 dB, to full mute is now possible. The 1128 offers 10kHz-to-100kHz bandwidth, 110dB dynamic range, balanced XLR in/out, low cut/high cut filters, bypass relay, 0.002% distortion and 100 presets.

Circle (130) on Rapid Facts Card

TAC Bullet input module

The Bullet compact range of pro audio mixing consoles has been upgraded with a new mono input module, which is now fitted to all consoles as a standard. The B1018 features six discrete aux sends arranged as four mono sends from two dual concentric pots, plus a stereo send. The B1018 also features balanced mic and line inputs with pad, phase reverse and +48V phantom, a 4-band semi-parametric EQ, and routing to either four or eight buses via a 10mm long-throw fader and channel panpot.

Circle (131) on Rapid Facts Card

E-mu Systems Emax II enhancements

All Emax IIs, including rack and keyboard 2Mbyte versions, now come standard with stereo sampling at no extra charge. This feature provides true phase coherency, 64x oversampling, digital phase-linear anti-aliasing filters and automatic A/D conversion calibration. E-mu has also doubled the internal RAM memory of Turbo Emax IIs to 8Mbytes at no extra charge. Both rack and keyboard Emax II 4Mbyte versions have been reduced by \$400 and all 2Mbyte RAM Memory Expansion kits have been reduced by 42%.

Circle (132) on Rapid Facts Card

Studer Editech Dyaxis update

Three improvements have been made to the Dyaxis hard disk digital recording and editing system. The digital EQ function provides several windows to allow for varying degrees of control, including real-time equalization and level control; EQ windows are the parametric EQ, graphic EQ and gain control. The new cut/copy/paste function allows information to be transferred between different mix windows quicker and easier. The 2+2 track window allows multichannel playback and with the new Type-in editor feature, users may now change any of the time fields by typing directly into them.

Circle (133) on Rapid Facts Card

JBL rigging hardware available

JBL's Concert Series rigging hardware is now available for general distribution. It is designed with a special bolt that goes through the pan fitting and a steel plate on the inside, increasing the right-angle pull of the system, and thus alleviating the right-angle pull from coming loose. ■

Circle (134) on Rapid Facts Card

Audio-Technica PRO 4C mic

The PRO 4C cardioid condenser mic is specifically designed for close-up vocal use. It encloses a condenser element inside a ball-type multistage protective



screen to reduce wind noise and popping when performers work extremely close. The mic offers a 50Hz-to-18,000Hz frequency response, -60dBm sensitivity, and handles up to 130dB SPL input.

Circle (113) on Rapid Facts Card

Otari Premiere console

The Premiere console is fully compatible with both sprocket-driven and tape-based machines. Each input module features dual line inputs, fully sweepable high and low pass filters, 4-channel panning with precise divergence control and eight aux sends with independent level controls and mutes. An integrated machine control and comprehensive monitor system computerization allow each engineer on a multiple operator-configured console to have monitoring access and machine control of any number of tape record tracks. The Diskmix 3/Film Moving Fader Automation provides fader and mute automation and switch automation on each input module.

Circle (122) on Rapid Facts Card ■

Media

1991 DAR SoundStation product guide

The 12-page, color 1991 SoundStation Product Guide is now available from Digital Audio Research. The booklet provides a comprehensive overview of the features and capabilities of DAR's SoundStation digital audio production system, including recent system enhancements and product options. The "how-to" guide features graphics and photos of the console, an application section reviews the varied uses of SoundStation, and users at top facilities explain their reasons for choosing DAR systems.

Circle (135) on Rapid Facts Card

Studio Pro Catalog

The Studio Pro Catalog features a selection of hard-to-find professional studio paraphernalia for recording studios, musicians and producers. Published by First House Press, the catalog offers a variety of video products, instructional books and videotapes, all discounted 10% to 50%.

Circle (136) on Rapid Facts Card

Cliff Electronics corporate brochure, catalogs

Cliff Electronics' corporate brochure offers seven reasons to consider the company for your next project. Its catalog provides complete product documentation on jack sockets, connectors, cabinet hardware and other audio products for all specification needs.

Circle (139) on Rapid Facts Card

Recording Industry Management CD

The Recording Industry Management Department at Middle Tennessee State University has released the RIMusic 8 CD, which contains the NARAS award-winning recording, "Indecision," as well as 17 other outstanding student projects.

Circle (140) on Rapid Facts Card

Audio Processing Technology CD

Audio Processing Technology has produced a specially recorded CD to demonstrate the sonic transparency and undetectable operation of its apt-X 100 Music Coding System. The CD contains 16 musical sections, each of which is repeated four times; the first version serves as a

non-coded reference and any of the following three versions may or may not have been processed through the apt-X 100 encode/decode cycle, so listeners can determine for themselves the quality of the digital audio data compression system.

Circle (141) on Rapid Facts Card

Newark electronics catalog

Newark Electronics has published its 1,280-page electronics Catalog III, which contains complete technical information and dimensions on more than 100,000 products from 250 manufacturers. Catalog features include a 16-page, 4-color product section, an easy-to-understand "how-to" section for using the catalog, an expanded surface-mount devices section and an indexed premises wiring products section.

Circle (137) on Rapid Facts Card

Custom Reference Guide revision

Star Case Manufacturing has released its revised Custom Reference Guide on how to accurately design custom and standard cases. The guide includes a glossary of key words and phrases used in the case and packaging industry and in-depth explanations of case types, styles, options and related variations. It also provides information for estimating outside dimensions of cases and overall girth dimensions for freight criteria. Each guide is \$3.

Circle (138) on Rapid Facts Card

TOA series of application notes

TOA presents its first Engineered Sound Application Note in an ongoing series of informational materials about its new engineered-sound products. The first Application Note introduces the basic functions and features of the product line; future notes will present application possibilities for using each product.

Circle (142) on Rapid Facts Card

BMI Application Note #220

Basic Measuring Instruments has released its Application Note #220, which describes how studio engineers can use PowerCoach education to solve power problems with electronic recording equipment. The note features a case study with information about the site's electrical environment, the group's monitoring procedures and the use of a graph to find the cause the problem and correct it.

Circle (143) on Rapid Facts Card ■

Continued from page 47

level specified the operating level at -10dBV (316mV), a consumer stereo standard. This is 10dB below 1.0V instead of 0.775V, and also assumes an unbalanced and higher impedance termination.

Consequently, sending a -10dBV signal through a box designed to bring -10dBu up to $+4\text{dBu}$ by adding 14dB, balancing it and matching different impedances, will add about 2.2dB too much gain. The difference in level between a "+4" device and most "-10" devices is actually 11.8dB, not 14dB, when all the variables are taken into consideration. Now you know the ugly truth.

Q: Why does one console sound radically different from another with similar specs or measurements?

A: Not a silly or simple question. Despite the fact that most spec sheets tell us frequency response is flat from dc to daylight, there are indeed discernable differences in the sound of different pieces of equipment: noise floor, headroom, various distortion components (THD, IMD, TIM), transformer or electronic balancing.

Design concept and component selection does, of course, play a significant role

in the outcome. There are those who prefer to work on consoles with a more "discrete" design (few or no monolithic devices or ICs), such as the API consoles or the older Neve boards. Others require the use of large, elegant systems, which place a myriad of devices in the signal path, including digital logic gates and VCAs for automation. The response of the mic pre-amp and sound of the EQ play the largest part in the definition of a console's fidelity.

These definitions are largely determined by audible differences in transient response and phase response. Device selection plays a key role here. For example, the slew rate (a measure of how fast a device responds to large changes in level) of a 5534 op-amp found in many high-end boards is faster (read: better transient response) than that of a 4558 found in many of the small consoles designed for the home studio.

A console design with +15V rails is going to have inherently less headroom in its front end than one with +18V or greater. The way the EQ section works changes phase response by nature, lagging the highs or lows, depending on setting. Filter design is a whole field in itself. Suffice to say that different approaches produce

varying phase responses and thereby sound differently even though they all measure "flat" 20Hz-20kHz.

Q: What is a true digital console?

A: Although there is no centrally agreed-upon definition, a digital console is in basic form a number cruncher, a computer. Whether it inputs signal in a digital form and spits it out the same; takes in analog, converts it and crunches in bits; or uses digital to merely control the analog processing functions is clearly a battle being fought in the marketing trenches.

An analog console processes waveforms that are electronic analogies of physical waveforms (acoustic phenomena). A true digital console does none of that, save possibly the conversion from waveform to numbers. The hybrid console often refers to a digitally controlled analog board that processes our sound signal by a conventional analog method. This processing is in turn controlled by "soft" switches that can be manipulated, stored and recalled by digital means.

Many boards are using MIDI as a control function. This is clearly not digital. The makers of true digital consoles can be counted on the fingers of both hands, maybe one. ■

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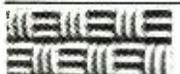
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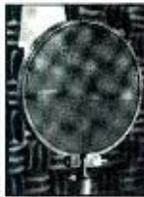
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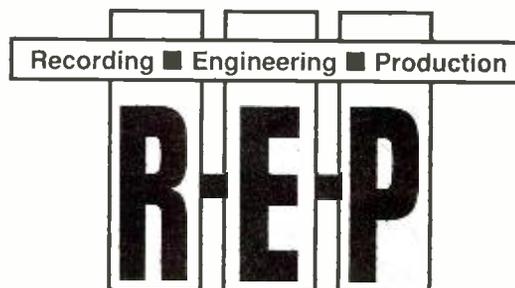
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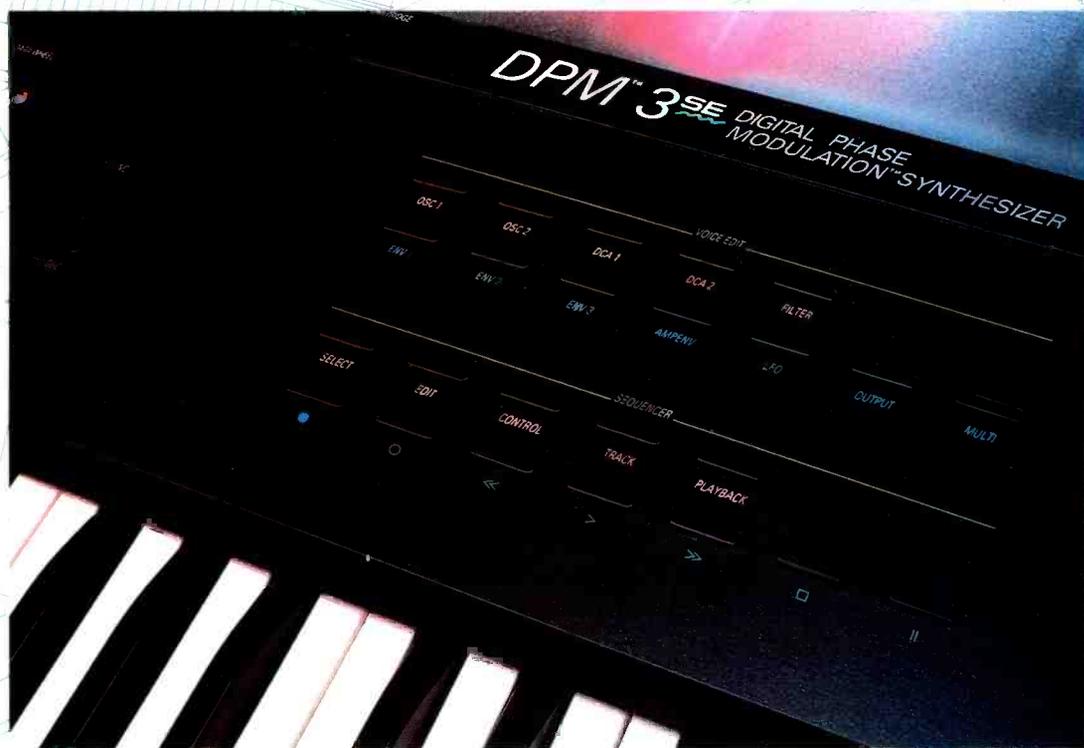
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