

REP

The Pro Audio Applications Magazine

AUDIO FOR VIDEO AND FILM

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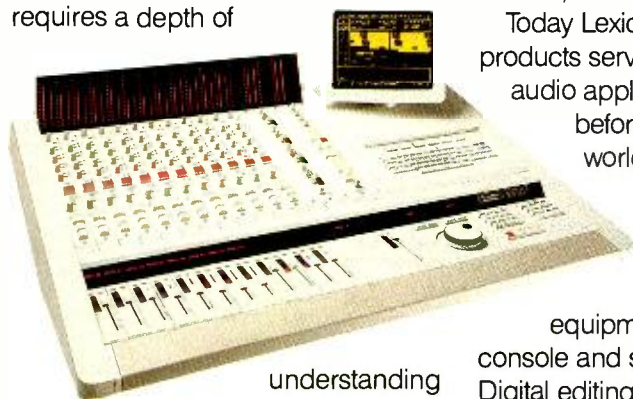
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Excellence in digital audio technology through a unique blend of scientific precision and artistic interpretation.

To perfect the Lexicon Sound, we must exploit the power of the latest digital hardware, harness that power with superb software, and expertly integrate the two. It requires a depth of



understanding that only experience can provide, and an expert fusion of the art and the science of sound.

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When Lexicon introduced the world's first digital audio product in 1971, it was heralded as a major technological achievement, a breakthrough.

We've built on that reputation with other achievements, like reverb and time compression/expansion, that have earned us more than a dozen awards, including an Emmy.

Today Lexicon products serve more digital audio applications than ever before. There is OPUS, the world's only fully integrated random access digital audio production system. OPUS replaces a room full of equipment with a comfortable console and single equipment rack. Digital editing and mixing has never been smoother, more accurate, and more natural.

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itself. But combined, the number and breadth of their effects is astonishing.

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great digital audio products of all time, and *Stereophile* ranked it as "one of a handful of genuine advances in sound reproduction".

These are just a few samples of Lexicon's digital expertise. Our full range of products serves the needs of recording engineers, musicians, film and video producers, radio and television broadcasters, as well as discerning audiophiles. In each



product we've merged technical excellence with artistic elegance. The result is the Lexicon Sound.

For more information about Lexicon products or a demonstration of their capabilities, contact us at (617) 736-0300, FAX (617) 891-0340, or write Lexicon, Inc., 100 Beaver St., Waltham, MA 02154.

lexicon
The Art and Science of Sound

We'd been working
hard in the studio
for 14 years.
It was time we got
out for a night.





Spending years on end cooped up in small, dark rooms with a bunch of engineers takes certain special qualities. Durability, for one. We've always been known for that. Of course, incredibly clear, uncolored sound quality doesn't hurt, either. Or hand-assembled components, with gap precision to plus or minus one-millionth of an inch.

These features got TAD speakers into studios like Record Plant, NOMIS and Masterfonics. And the same features are now getting us out of them.

See, we had this funny idea that if TAD could make music sound terrific in a small room, we could make music sound terrific in a huge arena. And every outing we've had with Maryland Sound has proved us right.

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.

TAD Technical
Audio Devices

When music is your business.

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Subliminal messages, yes; intentionally placed, no. The ruling in the Judas Priest case could cause lasting changes in the audio industry.

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On the Cover

The audio post-production suite at NFL Films, Mt. Laurel, NJ, designed by Russ Berger of the Russ Berger Design Group, Dallas. Photo by Stephen Mullen.

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You can't afford to spend less on a DAT. And you certainly can't afford to spend more!

Introducing the new, improved Pro-DAT Recorder from Panasonic: the SV-3700. "New?" "Improved?" Aren't those just overused buzz-words for breakfast food or laundry detergents? Sure. But the SV-3700 is new, and it is improved, and we want to tell the professional user about its 4th generation technology as directly as we can.

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Subjectively, these technical advances translate to accuracy in the spectral balance, ambience, and "space" around instruments that form the most important part of natural musical and "correct" sound.

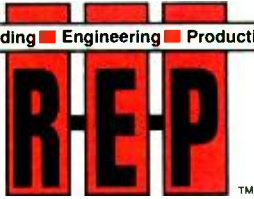
Oh yes, there's another very important improvement in the SV-3700. Price. When you visit your dealer, you'll find that in professional applications you can't afford anything less than the SV-3700. And you certainly don't have to spend more. For more information, contact Panasonic Pro Audio, 6550 Katella Avenue, Cypress, CA 90630. 714-373-7278.

Panasonic

Professional Audio Systems

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

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The Meeting of the Mediums

Nineteen-ninety is clearly an arrow shot into the heart of change. Some corners of the biz are exploding; some are merely experiencing the waves before the storm. But the storm is massing. The more audio/video and recording facilities we visit around the country, the more conversations we have about magneto-optical drives, hardware platforms, sampling rates and user interface protocols.

After the first flush of enthusiasm, many users in the various production disciplines are acknowledging that digital disk is really just a currently missing piece of the puzzle, and not the last word. The entire audio-for-video gamut consists of more than just quick, random, visually graphic access to CD-quality sound bytes.

The total puzzle picture concerns cost of the storage medium per track/minute; ease, cost and design implementation of signal manipulation and routing; archival volatility; ultimate supreme fidelity; totally flexible syncability; final transmission and distribution mediums; and production application requirements (e.g. recording a mono 4-hour lecture vs. posting a 200-cue 30-second stereo Coke ad), among others.

Our talks with film and video post production facilities convince us that although digital disk-based editing and assembly will some day be a major portion of commercial audio-for-vision production, analog medium formats will be around for a long time. Recording field audio with sync for eight weeks in hot tropical climates is a job for a stable, inexpensive storage format, and 2-track linear analog suits the bill wonderfully. Back home, transfers to 4- or 6-track full-coat mag film stock is a high-fidelity, totally reliable, brute-force medium that delivers, when coupled with Dolby SR, digitally competitive fidelity that truly inspires awe. Heard a THX-approved movie in a new theater lately?

Music production houses continue to reap the benefits of analog cost efficiency (somewhere around \$0.34/track-minute at 30ips on 24-track analog tape) and universally transportable compatibility — cut a track and ship the tape to Greece — which still outweighs the digital disk benefits of time slipping and in-

stant access.

The need in this sector to have a partially completed work that can go anywhere and talk to anything is crucial. Linear digital tape decks, although arguably the best current compromise between cost and performance, are not, in either of the two current formats, common enough and affordable enough to generically suit the bill. They are still the Ferrari's of the industry.

Ad and commercial production houses are squarely in the middle of the analog tape/digital tape/digital disk dilemma. Some directors still have the voice-over talent read a scene live, over and over again, under hot stop-watched direction, chiseling a 30- or 60-second spot down from 25 minutes of once-virgin tape stock with a blade, just as it was done 30 years ago. Others have adopted the multitrack music world's OD mania: stripe the donut with sync in stereo on the 24-track, then punch in the voice-over on various tracks until you get a keeper or run out of tracks, at which time you globally assemble the best snippets. (Note that the Brits aptly call mixer/editors "reduction engineers.")

The production shops that recognize the obvious when they see it have already invested in disk-based recording systems. The advantages of instant access, easy sync, edit previews, time domain manipulation (length without pitch change, etc.), speed of assembly, and internal mixing capabilities all see the medium as an ideal platform for the short shot. No wild-sound spin-ins, cart machine inserts, needle drops, external SMPTE sync gens/readers or low-fidelity, multigeneration fixes need apply.

So where does that leave all of the other production disciplines? In the not-too-distant future, it's easy to see a world where a software-driven digital disk package runs in the background behind all of the above scenarios, video and more. Sound F/X, looping, processing, noise reduction, drop-ins, VO's, editing, time shift and synthesizer scoring all will go to magnetic, optical or virtual (RAM) disk. Multiple basic takes, longer linear recording, archiving, final mixes and huge productions (ask Quincy Jones about 300+ individual tracks per song) will naturally apply analog or digital linear tape, chosen by the desired and intelligent balancing of performance compromises vs. cost.

Mike Joseph
Technical Editor

NED's DADIS: Industry Standard?

Continuing its pledge to help in the standardization of digital audio communication and data exchange, New England Digital has published the standards utilized by the company's systems. The standards were contained in a paper, titled "New England Digital's Digital Audio Data Interchange System," delivered to the Audio Engineering Society Sub-Group on Operational Requirements for Professional Disk Recording.

NED first launched its effort at an open system at last year's AES convention, where it announced its intent to publish the SYNCnet communication network and protocol. NED's Frank Sullivan reiterated the intention at last May's SPARS workstation conference.

Although there are several standards in use for various segments of audio production, including MIDI 1.0, CMX EDL, SMPTE time code, AES/EBU, the sum to-

tal "do not provide the level of standardized control necessary to the operation of an entire recording/editing environment," according to the paper.

NED is the current market leader in high-end workstations, with more than 800 systems in the field. Copies of the AES paper and "An Introduction to the SYNCnet System, A Communications Network and Protocol," are available from the company.

CDS Update: The buzz about Cinema Digital Sound is growing. REP columnist Rick Schwartz has dealt with the CD-quality system for film sound, developed by Optical Radiation Corporation. The table below, obtained from the company, compared the system with other film sound systems currently in use.

Feature	35mm "Academy" Optical	35mm Dolby Stereo Optical	70mm Dolby Magnetic	70mm Cinema Digital Sound
No. of Channels	1	2 matrixed to 4	4 full-bandwidth 1 subwoofer	5 full-bandwidth 1 subwoofer
Dynamic Range New Print Worn Print	52dB 44dB	59dB 51dB	78-80dB	96dB 96dB
Channel Separation	NA	12-49dB	50dB	100dB
Frequency Range	30Hz-6.3kHz	40Hz-12.5kHz	30Hz-14.5kHz	20Hz-20kHz
THD	1-7%	1-7%	3%	0.01%
Control Channel	None	None	None	MIDI
Synchronization Track	None	None	None	SMPTE time code
Film ID Information	None	None	None	ID Data Fields

GML/Console Alignment

In what the company says is an "unprecedented" display of industry acceptance, GML has signed technology agreements with four high-end console manufacturers.

GML has signed OEM agreements with Focusrite and API, and had console systems at both company's booths at the recent AES show. Focusrite displayed a 64-input console and automation system, scheduled to be delivered to Hollywood's Conway Studios immediately after the show. At API, a console/system with var-

ious automated switch options was similar to a system installed at Dave Hewitts' Remote Recording facility.

Additionally, GML has signed option agreements with Sony and Soundcraft. Sony consoles with GML systems have been shipped to Wisconsin's DV Productions, Sony Classical in New York and California's Golden Era Studios. A Soundcraft 3200 with an 80-input GML system was installed in film composer Hans Zimmer's studio.

People

Pete Wandless has joined Focusrite as sales manager ... GML has appointed **Adriane Benacquista** to sales and marketing administrator ... **Vic Steffens** has been appointed to product specialist/customer support at Allen and Heath ... **Don Morgan** and **Vince Perry**, both directors of engineering at Sony Systems and Technology, have been presented awards for U.S. patents issued in their names; Morgan for his "System and Method for Performing Error Correction on Still Frame Audio Tape Format Video Signals," and Perry for "Automatic Noise Reduction for Individual Frequency Components of a Signal." ... **Bill Feitz** has formed Feitz Advertising, and will act as account supervisor. **Russel Holmes** has been named creative director ... **Hans Tschernig**, president of Dynacord, has been appointed to the additional position of vice president of Mark IV Audio ... Fuji has promoted **Randy Lucio** to manager of national duplication sales, Professional Products Group, for the Magnetics Products Division ... **Dave Ogden** has been promoted to product manager for AKG Acoustics ... **David L. Ball** has been named Audio Animation's applications engineer. **James M. Ruse** has been named product manager ... **Rick Porter** has joined Apogee Electronics as part of its engineering team. **Pam Mongeon** has been named manager of Apogee's purchasing department ... International Tapetronics has named **Michael J. Bove** as regional sales manager (Midwest) and switcher systems specialist ... **George Meals** has been named East Coast regional sales manager of Numark ... **Scott Heineman** has been appointed product manager for dbx Professional Products and Orban Broadcast and Professional Products ... Neve has added three technical service engineers to its staff: **Peter Lewis** and **Stephen Morris**, both in the New York office, and **Vincent Pietrorazio**, based in the Bethel, CT, office. ■

APRS changes name, postpones exchange

The United Kingdom's APRS has changed its name to the Association of Professional Recording Services; the previous name contained the word studios. The change, which was made at the association's annual meeting, reflects the fact that equipment manufacturers, rental companies, consultants, and cassette and CD duplication, comprise more than half of the membership. Earlier in the year, APRS made major structural changes in its membership groups.

At the same time, APRS announced that it had postponed this year's Digital Information Exchange, which was scheduled for the end of this month. A U.K. publishing company, British Thomson, unexpectedly ceased publication of two out of four magazines closely associated with the event.

This year's exchange was to be the fifth annual event. APRS said it fully intends that the event will occur sometime next year.

trendwatch

Radio: Digital audio broadcasting is picking up steam. The FCC has issued a notice of inquiry to collect public opinion on DAB. Among the issues to be explored are DAB's impact on current radio service; terrestrial vs. satellite digital transmission; and spectrum allocation. A Louisiana-based company, Strother Communications, has asked the FCC to allocate spectrum and grant permission for testing in Washington, DC, and Boston.

Fiber optics: Lester Audio Laboratories tested a fiber optic transmission system for audio at the Goodwill Games in Seattle. The company's DAS 2000 transmitted ambient sound, microphones and commentary digitally over 1,000 feet to the host truck. The event marked the first time that digitized audio was sent over fiber-optic cable in a live international broadcast.

Consumer DAT: Sony has been sued by the National Music Publishers Association concerning Sony's plan to import consumer DAT machines. The NMPA was one of the groups that helped stall DAT legislation in Congress because a taping royalty had not been included. A spokesman for the Home Recording Rights Coalition, a pro-DAT lobbyist, speculated that the suit might be a ploy to obtain royalty legislation.

Music sales: US spending on prerecorded music is estimated to reach \$8.3 billion by 1994, according to an industry forecast by Veronis, Suhler & Associates. Estimated annual growth was a modest 5.3%, compared to 8.1% annual growth from 1984 to 1989. Net unit shipments were estimated to be 950 million by 1994. Three major formats will dominate by 1994, according to the study: CD, cassette and cassette singles. DAT was not included as a factor because of its current uncertainty.

"There are those who may...believe that this has been a one-sided trial and that the plaintiffs have presented no credible evidence. Such a belief would be erroneous."

— Washoe County, NV, District Judge Jerry Carr Whitehead, in finding that Judas Priest was not responsible for the deaths of two fans after they listened to the album "Stained Class."

Random Access

STUDIO UPDATE

Facility/Location	Details
NORTHEAST	
Audio Plus Video International/ Northvale, NJ	Beth Simon promoted to director of sales and marketing.
Chestnut Sound/Philadelphia	Installation: Sony APR 24 Studio Technologies mic pre-amp and Milab VIP 150 microphone.
Soundwave/Washington	Installation: New England Digital Post Pro SD in Control Room A.
MIDWEST	
Ajax Recording Team/ Fort Wayne, IN	New equipment: Technics SLP-1300 CD player, Sennheiser 441 and 421 mics, and an Eventide HS322 sampling card for the H-3000B/SE.
SOUTHERN CALIFORNIA	
Group IV Recording/Hollywood	Installation: 60-input Neve V series console with Flying Faders in Studio A.
Rumbo Recorders/Canoga Park	Studio C completed; features refurbished Trident Series 80 32-input mixing board, a 24-track Otari MTR-90 recorder, Tascam DAT and cassette machines, a Sony 2-track mastering deck, and a second 24-track recorder.
NORTHERN CALIFORNIA	
Coast Recorders/San Francisco	Designed by Bill Putnam, the revamped Studio A features a refurbished 44-input discreet Neve with Necam 96 automation and a Sony APR 24.
Motherlode Audio Video/ Grass Valley	New equipment: Studer Editech Dyaxis digital workstation, Neve mic pre-amps, an SV-3500 R-DAT, a portable R-DAT, Sound Ideas CD sound effects library, and a Neumann U-67.
Bill Rase Productions/Sacramento	Celebrating 25th year in business.
UNITED KINGDOM	
Eel Pie Studios/West London	The Mill Recording Studio (Cookham) now manages all booking for Eel Pie. Both studios offer Neve VR consoles with Flying Faders and Mitsubishi digital multitracks.
MANUFACTURERS	
Allen and Heath	Sale of two Sigma Series consoles to New Kids on the Block producer Maurice Starr.
Mitsubishi	X-850 32-track machine ordered by Castle Sound Studios (Edinburgh, Scotland).
Neve	Sales: Eldorado Recording Studio (Hollywood), 48-input V series console and Mitsubishi X-800 digital recorder; Apollo Theatre Recording Studios (Harlem, NY), VR60 with Flying Faders; Studio 56 (Hollywood), VR60 with Flying Faders and Mitsubishi X-880; Angel Recording Studios (London), 60-channel VR series console with Flying Faders; Puk (Denmark), 72-channel VR with recall and Flying Faders; Sweet Silence (Denmark), VR72 with recall and Flying Faders; and Medley Studios (Denmark), VR60 with recall and Flying Faders.
Solid State Logic	Installations: Larrabee Sound (Los Angeles), 80- and 72-input consoles with Real World Automated Send Matrix; Miller/Wishengrad (Hollywood), ScreenSound digital audio for video editor.

NEWS NOTES

In recognition of its achievement in the development of the apt-X 100 digital audio data compression technology, **Audio Processing Technology** has been selected as a finalist for this year's Prince of Wales Award for Innovation and Production.

David Carroll Electronics (Berkeley, CA) has completed installations of Otari film mix consoles for The Saul Zaentz Film Center (Berkeley) and Zoetrope Studios (Rutherford, CA).

Bob Bentrup and John Casey have formed **Techshare Marketing Ltd.**, a sales, marketing and distribution firm based in the Mid-Atlantic. Its territory includes Maryland, Virginia, D.C., eastern Pennsylvania, southern New Jersey, North Carolina and South Carolina. For information, call Bob Bentrup at 301-256-4130.

Scharff Weisberg has purchased the audio and communications equipment rental division of VRI Scharff Rentals.

SALES NOTES

Sales of **Lexicon's** OPUS digital audio production systems has surpassed 50.

Total Audio Concepts has sold 2,000 Scorpion consoles. The 2,000th console was purchased by a Birmingham-based PA hire company, SSE.

ADDRESS CHANGES

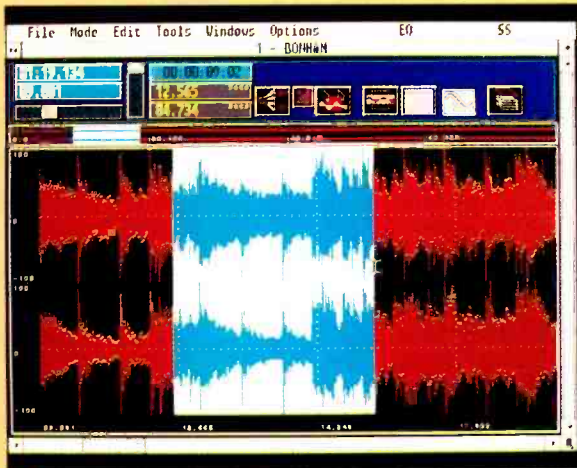
New England Digital has relocated to the Rivermill Complex, Lebanon, NH 03766. The new center houses all of NED's manufacturing, R&D, product development, sales, marketing, finance and administration operations.

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

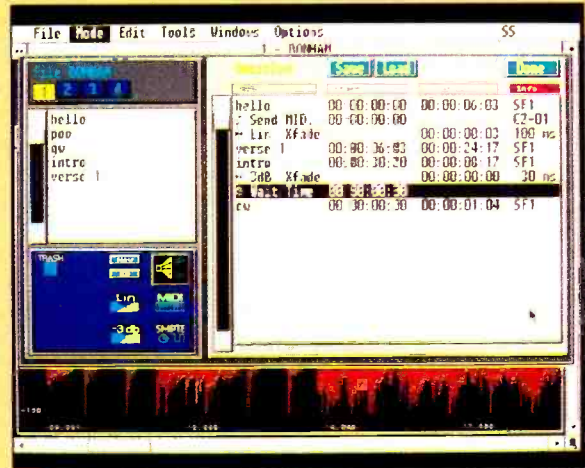
Neve is building new international headquarters in Litlington, England, five miles from the current office in Melbourn.

Sunkyoung has opened its new U.S. corporate headquarters at 4041 Via Oro Ave., Long Beach, CA 90810; 213-830-6000; fax 213-830-0646. ■

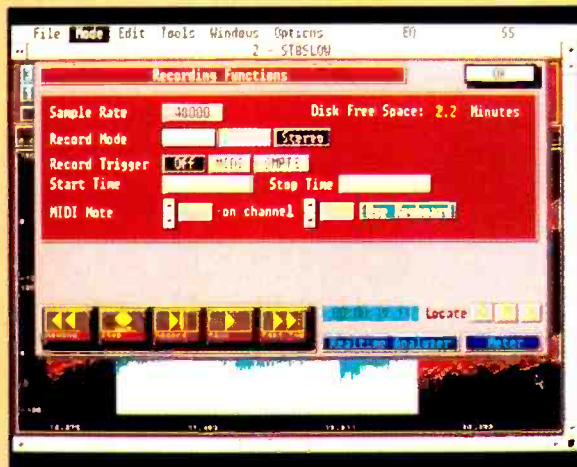
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AMPEX
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Mariah Carey: "Vision of Love"



Executive Producer: Tommy Mottola
Produced by: Rhett Lawrence, Narad Michael Walden, Ric Wake, Mariah Carey, Ben Margulies, Walter Afanasieff
Engineered by: Patrick Dillett, Bob Cadway, Chris Toland, Dana Jon Chappelle, David Frazier
Studios: Tarpan, Oakshire, Cove City Sound, The Plant, Power Station, Skyline, Hit Factory, Shakedown
Mastered by: Bob Ludwig at Masterdisk
SPARS CODE: AAD

Comments: While she's been accused of filling the niche for Whitney Houston and taking up the slack for those of us burned out on Madonna, the production forces found within Mariah Carey's "Vision of Love" are deeply rooted in popular engineering styles. This album exhibits a strong collection of mixing formats with a variety of producers and engineers testing their talents at various venues. Most of the album was mixed on Neve V series, though SSL 4000-Gs, an Amek 2500 and a Neve 8058 were also used.

Of special interest: The synchrosonic usage of digital delay (both discrete and pre-reverb) adds more depth to the lead and background vocals on this recording. While not a difficult feat to engineer, its addition makes for a wonderful surprise when used sparingly. ■

Tony Bennett and Bill Evans: "The Tony Bennett/Bill Evans Album"

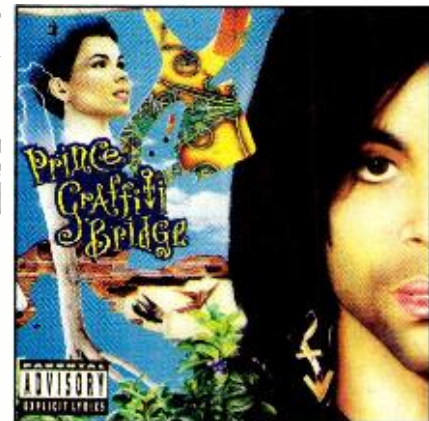
Label: Fantasy Original Jazz Classics
Produced by: Helen Keane; Orrin Keepnews, executive producer.
Engineered by: Don Cody
Mixed by: Don Cody
Recorded at: Fantasy Studios (1975)
Mastered by: Phil De Lancie
SPARS Code: AAD

Comments: The CD reissue of this important collaboration is part of Fantasy's larger reissue program for its jazz catalog. Stripped of the lush, Vegas-style orchestras that often obscure his sensitive renditions, Bennett is at his best here and shows himself to be one of our best vocalists. Evans' playing is the perfect complement.



Of special interest: The trick of mastering, it has been said, is to improve the original recording without anyone knowing that you've done so. Phil De Lancie's digital remastering for the CD reissue is skillful and carefully preserves the concept of the original recording. When A-B'd to the record, the CD sounds better, and not just for the absence of vinyl surface noise. De Lancie has made some subtle EQ moves that improve the sound, without seemingly altering it. ■

Prince: "Graffiti Bridge"



Producers: Prince, Levi Searcer Jr.
Engineered by: Michael Koppleman, Dave Friendlander, Tom Garneau, Femi Jiya, Eddie Garcia, Junior Vasquez, David Z., Larry Ferguson, Susan Rogers, Coke Johnson, Keith Cohen, Levi Seracer, Arne Frager
Studios: Paisley Park, Electric Lady, United Sound, Sunset Sound
Mastered by: Howie Weinber and Michael Koppleman at Masterdisk
SPARS CODE: AAD

Comments: This much-awaited production is a splendid collection of reworked and newer material for the upcoming film. The sparse recording techniques are often juxtaposed with a bombastic orchestration of digital effects, vocal sound bites and clever segues.

Of special interest: While "Graffiti Bridge" doesn't sport the musical continuity of its cinematic predecessor, "Purple Rain," the engineering techniques used are tres slick and make use of a variety of samples and previously recorded loops, a la De La Soul. ■

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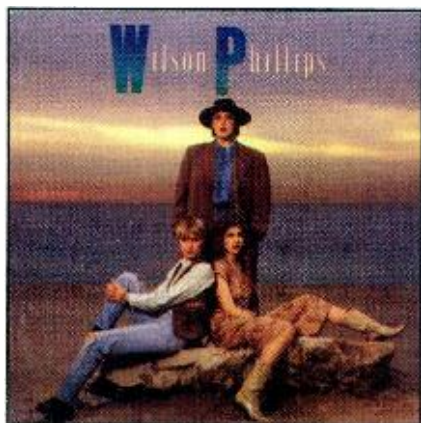
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SONY

PROFESSIONAL AUDIO

Wilson Phillips: “Wilson Phillips”



Label: SBK
Produced by: Glen Ballard
Engineered by: Francis Buckley, Julie Last, Gabriel Moffat, Tom Biener, Rail Rogut, Cliff Magness, Glen Ballard
Mixed by: Francis Buckley
Recorded at: Studio Ultimo, Record One, Westlake Audio, Sound Castle, Music Grinder, Ocean Way, Lion Share
Mixed at: Garden Rake
Mastered by: Bernie Grundman
SPARS Code: ADD

Comments: Pop/light rock with terrific vocal blends. Comparisons to The Bangles are sure to be made. The production has tons of sheen and sparkle, which translates well on radio. Look out for lots of WP clones in the months ahead.

Of special interest: The vocals sit consistently on top of the band, up front, and yet the band does not sound at all distant or back. Buckley says he didn't use any studio tricks to achieve this unusual vocal quality (it is most apparent on the single, "Hold On") so it is logical to assume it is just the product of great tone on the part of the vocalists.

Focus: FRANCIS BUCKLEY Principal engineer, “Wilson Phillips”

Francis Buckley's previous work includes recording the first Black Flag record and, with Glen Ballard, Paula Abdul's "State of Attraction." He has been the chief engineer for MCA Music in Universal City for the last nine years, cutting demos for songwriters. He spoke with R•E•P about recording Wilson Phillips.

"I recorded the vocals on a brand new U87. I think what makes the vocals stand out is that the girls are really great singers and have great tone. They're not seasoned professionals, but they've been singing for a long time. There was some live double-tracking, but no Harmonizer or Publison or anything like that. The record has lots of layering because the girls kept coming up with more and more vocal ideas. On 'Hold On' there are over 15 tracks of vocals; some songs had more than 21.

"The vocal reverb was Lexicon 480, usually on [the preset program] Buckram. It's a real nice program because you get a nice little explosion and then the background clears itself out. I'm also a big fan of Alesis reverbs. They're smooth, they're clean, and they do the job. You really don't have to spend \$20,000 to get a good digital reverb.

"I didn't use very much compression to tape, although we added some compression in mastering, basically just to keep the VU meters full.

"For the guitars I used TLM-170s. Mike Landau [principal guitarist] has a big rack that has everything in the world in it. He uses a Soldano head and a cabinet built by Bob Bradshaw. Each of the two cabinets had one 12-inch or 15-inch speaker in it, and I placed them side by side but angled away from each other, at 10 and two o'clock. I placed the mics about a foot and a half back and a little off the center of the cone. I used the same setup whether he played dirty or clean; he basically controlled the sound with his pedalboard and the TLMs picked it up. I recorded all his parts with his effects.

"Steve Lukather has bigger cabinets than Mike Landau; he uses a custom Bradshaw setup — I don't remember exactly what the configuration was. I used the TLM 170s on his setup in the same way.

"Joe Walsh brought in this little amp — not much bigger than a Pignose, about the size of a Mouse — he wanted me to keep that one miked all the time because he likes the crunch that comes out of it. So he walked in with just that, and had us rent a couple of other amps for him; one of them was a Roland Jazz Chorus, and he played through two medium-sized cabinets. Joe was real easy to work with and he's quite a character. I admire that he's still living the rock and roll lifestyle." ■

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Tony Bongiovi
Power Station

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David Cook
Dreamland Studios

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Milan Bogdon
Masterphonics

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AT4053
Hypercardioid
Capacitor

Jeff Baxter
Producer/Artist

"If I'm not getting what I want from another microphone...I've been putting up the 4051 and it nearly always does the job."

Mack Emerman
Criteria Studio

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The Politics of Diversity

By Pete Caldwell

The audio recording industry, like many high-tech industries, is entering a new era of specialization and diversity. The keys to survival and success will be in the hands of those who understand these inevitable changes. The diversification is manifesting as both more specialized endeavors and a widespread geographical decentralization. In addition, we are beginning to see a broad divergence in the scale of operations.

To put it simply, recording studios are growing more focused in the services they offer and the market segment they pursue. Highly professional operations are proliferating in the smaller markets, broadening the scope of the audio industry beyond the traditional centers of New York, Chicago and Los Angeles. It is interesting to note that today's facilities are tending toward the very large or the very small. The mid-sized operation appears to be on the decline.

SPARS must, and will, respond to all trends in our industry. It is our role to create communication channels that accurately report on an evolution affecting all of us. I choose diversity as the theme of my presidency, and I dedicate my term of office to an open organization that is responsive to a diverse membership. Indeed, the wheels are already in motion in several key areas.

MEMBERSHIP

SPARS' membership is increasing at a very healthy rate. What is most encouraging is the fact that the diversity of the audio industry is reflected in the diversity of membership. Thanks in part to the board of directors' recent action to create new membership categories, the SPARS rolls are now replete with smaller specialty stu-

Pete Caldwell is the president of SPARS and president of Doppler Studios, Atlanta.

dios, educators, ancillary services (such as leasing companies and equipment dealers), and independent engineers and technicians.

Additionally, in the advisory member categories, there is a growing new class of mid-level manufacturers to supplement the membership of nearly every major manufacturer of audio equipment in the world.

LEADERSHIP

The newly elected SPARS board of directors is a dedicated lot. They work. They sacrifice their time and their money. And, for the record, they receive no salary or traveling expenses.

SPARS must, and will, respond to all trends in our industry.

Most important, they exemplify the industrywide diversification we are experiencing. As this business changes, it is our business to change as well. Virtually every size facility is represented, every specialization or audio endeavor is spoken for, and we come from the full range of market sectors. Furthermore, Shirley Kaye, executive director of SPARS, is a dynamo. She has possibly done more for SPARS than any single human since Joe Tarsia, our founding president.

It is not by accident that the last two SPARS presidents don't come from New York, Chicago or Los Angeles. Of course, all of us in SPARS will continue to look to these major centers for leadership, because these cities (along with Nashville's unique position) still represent the Meccas of our industry. But the changes taking place in the smaller markets affect the major leagues. We're all responsible for the pulse of an industry that grows in importance as each year goes by.

PROGRAMS

Several years ago, the SPARS board decided to change course on programs. The thrust of this decision was to organize a smaller, more manageable number of programs and to do them well. Some long-term ideas were shelved, and the organization turned its attention to the basic mandates of its charter: education,

communication and excellence.

Plans were implemented to update the testing program; review and revise the internship program; continue the business conferences; and expand these conferences and seminars into other more technical areas.

The highly successful and much publicized digital workstation conferences in Chicago and Nashville show that our plan is working. The manufacturers and the customers have seen that SPARS is supporting a much needed, and sometimes uncomfortable, forum.

Our newsletter, Data Track, has been revitalized and is providing a valuable information resource beyond that of the trade media. We've also instituted a nationwide phone campaign to contact each member, and a local chapter organization is presently under discussion.

CONTROVERSY

Lastly, there is the controversy over personal project studios. SPARS is an organization of audio professionals. My dictionary defines a professional as one who works at an endeavor as a primary means of livelihood. It's that simple. If you do it for free, you are a hobbyist. If you do it for money as a primary means of support, you are a pro. In this definition, there is no specification as to where you work, how good you are, or how much you charge. All pros are welcome in SPARS.

This said, SPARS does take strong stands regarding business practices and business ethics. SPARS also makes recommendations as to technical conventions and practices. SPARS does not sit in judgment on these or any other issues. The organization is simply a conduit for ideas.

How can SPARS provide a forum for this timely dialogue without the participation of the project studios themselves? We encourage them to participate because they, too, are a real part of today's industry. If we ignore this situation, we are sticking our heads in the sand and avoiding a very significant development.

I am quite proud of SPARS' accomplishments and am grateful for the benefits I've personally derived as a member. I look forward to the challenges of my presidency and am convinced that through SPARS we can ultimately celebrate not how different we all are, but how much the same. ■

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

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built-in. And 4 speeds are standard. A PWM reel servo system keeps things running smoothly and accurately. Speaking of accuracy, for audio post applications a chase synchronizer is available. And, of course, every MTR-15 is equipped with Otari's 37-pin standard parallel interface, with RS-232-C/RS-422-A serial interfaces optional. And so you can choose exactly the machine you need, 1/4" or 1/2" versions are available, plus a 1/4" with center track time-code.

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optional floor-standing console with meterbridge.

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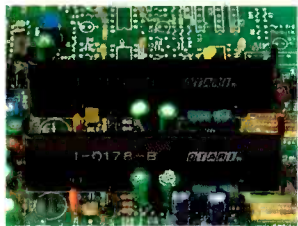
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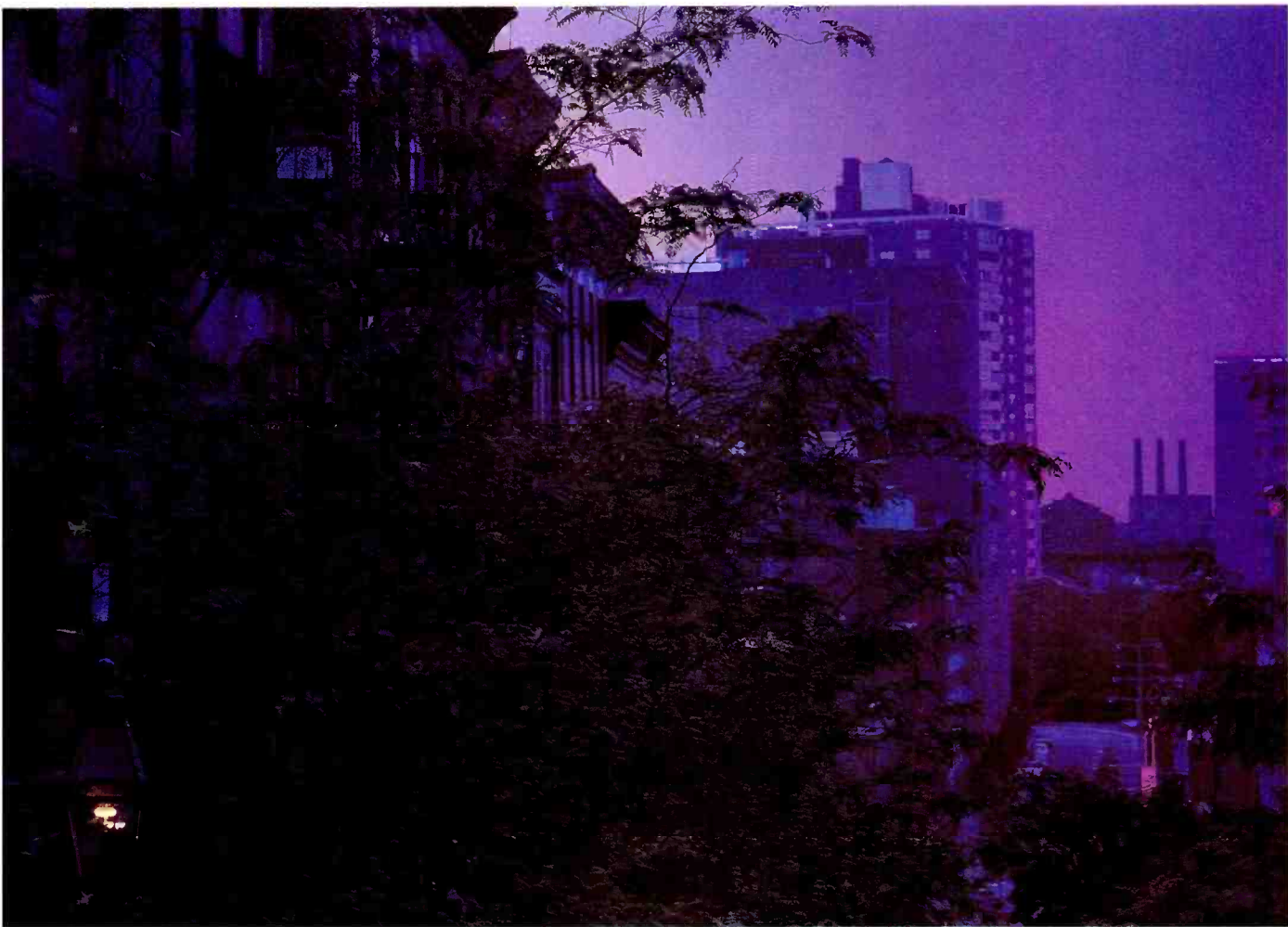
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10 Great Products Not At AES

By Rick Schwartz

No matter how good a product is, manufacturers are always looking for new ways to promote their products. Smaller companies are sometimes dependent on word-of-mouth advertising. After all, it costs thousands to exhibit at a major trade show. We thought it might be nice to feature several unsung products you may not have heard of.

NO. 1: FULTEK DSG

The Fultek Digital Signal Generator is an audio technician's dream. In addition to providing high-quality tones and a built-in slate mic, the DSG-1A also acts as a powerful diagnostic tool for testing speaker and line polarity. The unit has standard pink noise, Dolby SR noise, and even "pink tone," which consists of 31 ISO frequencies at the same time. Up to eight custom sequences of tones can be stored, as well as the NBC standard, which includes a digitally sampled left/right voice slate. The unit can be controlled by remote, which makes it ideal for multiroom facilities. Fultek is well known in the Hollywood area for its Universal Resolver and its intercom systems designed for film dubbing stages. For more information call (818) 505-8836.

NO. 2: LA RUE TIME CODE AMP

The words time code and problem just seem to go together, don't they? Most time code problems are a result of bad transfers. Often the code is not properly reshaped or recorded at an improper lev-

el. The La Rue Time Code Amplifier can correct most common time code problems to get a session rolling quickly. AID distributes the device in L.A.; call (213) 469-4773.

NO. 3: LASERDRIVE 4100

The 4100 is the first optical disk drive that eliminates the need to flip cartridges by using heads on each side of the disk. It also provides more storage capacity than any other optical drive, 5.6Gbytes (pronounced jig-a-bite). Although a common 600Mbyte drive will store an encyclopedia full of text, it only holds about an hour of high-quality digital audio. Optical cartridges may not be the world's best editing medium (because of their slow access and retrieval times), but they are ideal for archival applications, such as music and FX libraries. The more sound you can store on a disk, the less you have to swap cartridges. Imagine how many sound effects could be stored on a 5.6Gbyte cartridge! A multiple cartridge, high-speed auto-changer is also available. Remember you heard about this one here first! Contact Laser Magnetic Storage International at (800) 777-5674.

NO. 4: LIGHTHOUSE MIC PRE-AMP

This is a high-end, stereo device in a 1-unit rack-mount package. Many engineers carry around their own mic pre-amp so they can bypass the console and print the cleanest possible signal to tape. As expected, the Lighthouse has a minimum of controls. The first is a variable-gain potentiometer which provides a gain of up to 55dB. The only other controls on the unit are phase and phantom power switches. The device is a direct-coupled amplifier with discrete proprietary op-amps and a transformer input with no coupling capacitors in the audio chain. Frequency response of the unit is 10Hz to 50kHz (± 1 dB). Noise with no input is 95dBm (at minimum gain). If you want a high-quality pre-amp and are looking for something original, this product could be for you. Contact: James Goforth at (818) 506-8942.

NO. 5: STUDIOMANAGER

StudioManager is a graphic studio scheduling application for the Macintosh. It includes a powerful underlying database and can generate and print work orders. The user can select two day-at-a-glance views of prime-time or full 24-hour days.

For more information contact IntraMedia at (213) 666-9032.

NO. 6: CD JUKEBOX INTERFACE

CD Jukebox Interface is a hardware interface for the Sony CDK-006 CD jukebox. It has +4 balanced outputs and works with any Macintosh computer to control up to four CD jukeboxes. The search engine uses FoxBase (considered by many to be the fastest database for the Macintosh).

The use of a commercially available database is a big plus, because it makes it relatively easy to modify the program for special applications. Sound effects listings are available for most major libraries. To search for an effect, just type in any keyword and the program will give you a list of every entry that contains that keyword. The application also supports proximity searches.

Search times are very fast because all records are indexed (kept in RAM). SMPTE time code locations can be entered for each effect to create a printable EDL. Using an external event trigger, sound effects can be triggered to time code. For more information call Rich Nevins at (213) 461-6006.

NO. 7: THE SWITCHBOX

This is high-quality cassette switcher that can greatly simplify the task of making cassette copies. These days it seems as if everyone involved in a session wants to leave with a cassette copy. Unfortunately, dubs are almost always the last thing to get done. Anything that makes your life easier at five in the morning can't be bad. The Switchbox has ins and outs on the back panel for up to six stereo cassettes.

There are also +4 inputs and outputs with monitor output trims for both channels. Gold plated connectors and rack ears are popular options. A common record bus allows any machine to be connected to any or all other machines. Easily cleanable membrane switches have LED indicators above them to indicate source and monitor status.

The only active electronic device in the signal path is a $-10/+4$ line amp. For this reason the specs are quite impressive. Frequency response is 15Hz to 30kHz (± 0.25 dB), with distortion less than 0.006%. Hum is also very low because the unit uses a separate power supply. Contact Sound Logic Ltd. at (213) 319-7309.

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

WHAT MAKES IT A LEGEND?

NO. 8: VAULT MANAGER 2.0

Have you ever been unable to find a master in your tape library? The Vault Manager is Macintosh software that creates a log of every master in your library and keeps track of its location, as well as every time it enters or leaves the vault. It works with or without an optional bar code reader that plugs into your keyboard. Bar code labels can be easily printed using a Laser printer. Call InterMedia at (213) 666-9032.

NO. 9: DORROUGH DIGITAL TRANSFER METER

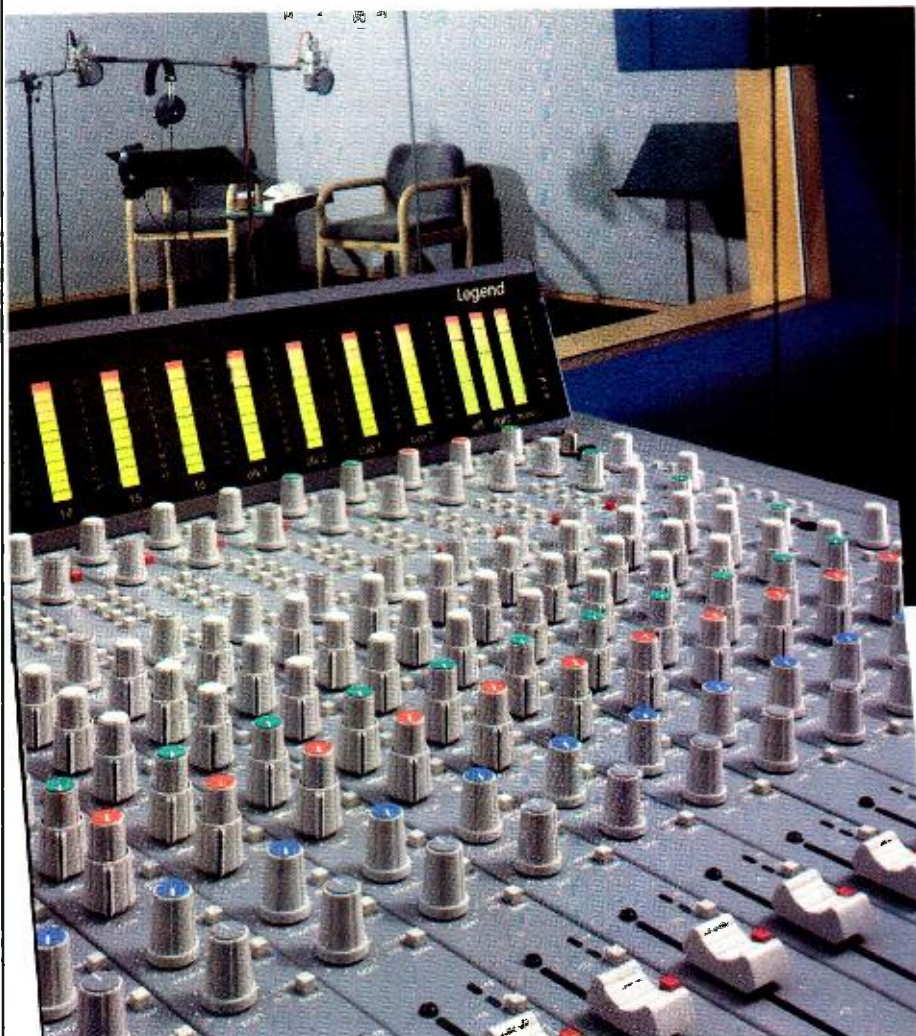
OK, this product was at the show, but we like it so much we've included it anyway. Dorough Electronics is known for its high-resolution LED meters, which simultaneously display both peak and average levels. The Dorough model 60-D is the first we've seen that contains two scales reflecting the relationship between analog and digital levels.

The top scale is designed for digital applications, with a range of -60 to 0dB. The bottom scale corresponds to nominal analog levels, reaching all the way up to +20dBm. The meter can be specially ordered with a switchable infinite peak hold, which is ideal for digital applications. Call (818) 999-1132 for more information.

NO. 10...

Of course, there were many more than 10 great products that weren't at the AES show. The real value of a product has nothing to do with the size of its booth or glossy brochure. Great products are made by word-of-mouth.

If you call any of the companies, tell them you read it here. And if you know of other unsung products, let us know and we will try to include them in future columns. ■



No other recording console in its price range regardless of how prestigious can equal its sonic performance, features and professional quality.

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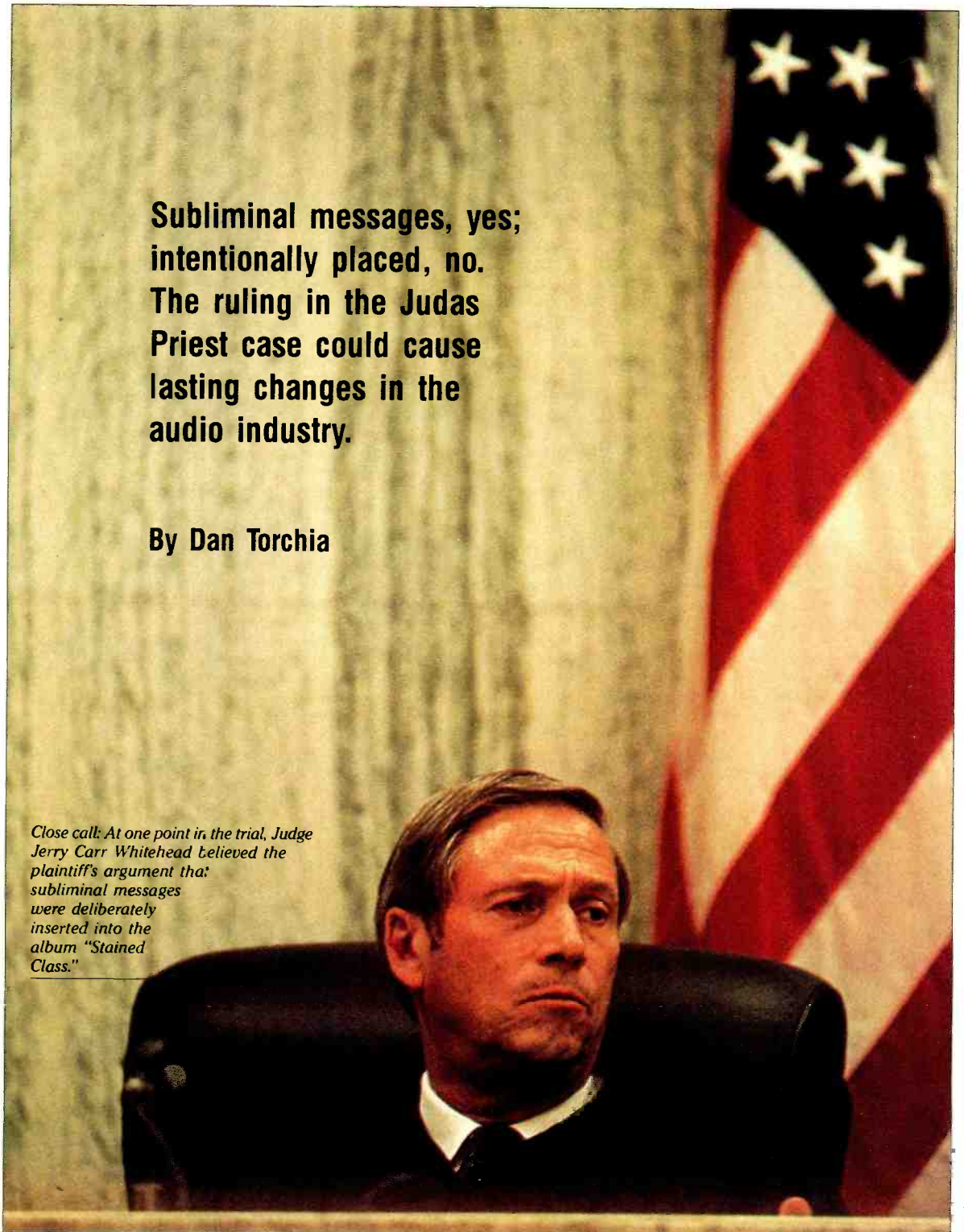
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Subliminal Secrets— **JUSTICE AND JUDAS PRIEST**

**Subliminal messages, yes;
intentionally placed, no.
The ruling in the Judas
Priest case could cause
lasting changes in the
audio industry.**

By Dan Torchia

Close call: At one point in the trial, Judge Jerry Carr Whitehead believed the plaintiff's argument that subliminal messages were deliberately inserted into the album "Stained Class."



Joe Gosen/Reno Gazette-Journal/Sygnia



David Parker/Reno Gazette-Journal/Sygnia

The Judas Priest case is over. Having apparently won a significant court challenge, the band, and with it the rest of the audio industry, can go back to business as usual, right? Read on.

True, the band and its record company, CBS, did win the major points. They successfully defended the lawsuit brought on by two families of young men who killed themselves, allegedly after listening to the album "Stained Class." But a civil lawsuit is much more than a verdict. Lines of argument can be used in other cases. Narrow rulings can be broadened in other jurisdictions. Because the case was the first of its kind, it was a trailblazer.

It appears that a new exception to the First Amendment was carved out. Subliminal messages, heretofore thought of in terms of self-help audiotapes and tirades by right-wing ministers who hate heavy metal, was given a thorough examination. The techniques that engineers and producers use every day, were laid out in open court. This case will not be the last of its kind.

And this case is far from over. The plaintiffs have announced their intention to appeal, and the defense has said it might file a counter-appeal. Final disposition of this case could be a long time coming.

BACKGROUND

Some initial background is in order. Judas Priest, the individual members of the

band and CBS Records were sued by the parents of two Sparks, NV, men who committed suicide, allegedly after listening to the band's 1978 album "Stained Class." In simple terms, the plaintiffs alleged that the band deliberately inserted subliminal messages, which contributed to the men's suicides.

This was not a First Amendment case. The lyrical content was not debated. About a year before the trial, Washoe County, NV, District Judge Jerry Carr Whitehead ruled in a pre-trial motion that subliminal messages fell outside of First Amendment protection. The trial, which was to determine whether the messages existed on "Stained Class" and if they were deliberately inserted, became a product liability case. From the beginning, the judge stressed that he would dismiss the case if the plaintiffs concentrated on lyrical content, which was clearly protected.

The trial lasted 19 days, during which 43 witnesses were presented. Judge Whitehead was the sole deliberator of the evidence; by mutual agreement, the plaintiffs and defendants waived a jury trial. Two weeks after hearing the final witnesses and closing arguments, he delivered a 93-page ruling on Aug. 24, after first sifting through the thousands of pages of transcripts and more than 150 exhibits.

In the end, the judge ruled in favor of the band. Subliminal messages did exist, but they were not intentionally placed, he ruled. Rather, they were the result of the

combination of several sounds on different tracks. Other factors led to the men killing themselves.

THE IMPLICATIONS

However, it was not a total victory. Several factors lead to the inescapable conclusion that this issue is far from over.

1. The judge nearly ruled in favor of the plaintiffs. The judge was initially skeptical of the plaintiff's arguments, and nearly threw out the case at one point. However, after hearing the evidence, he thought the plaintiff's position was credible. At one point in the trial Whitehead believed that messages had been deliberately inserted, although he later changed his mind.

"There are those who may ... believe that this has been a one-sided trial and that the plaintiffs have presented no credible evidence. Such a belief would be erroneous," he wrote.

2. By engaging in questionable behavior, lawyers at CBS most likely caused the case to go to trial, in the judge's estimation. In late 1987, the plaintiffs started requesting the original multitrack tapes to examine for subliminal content. The judge's granting of such a request was unprecedented.

Despite what would be understandable trepidation concerning the magnitude of such an order, CBS stalled for almost a year. After being ordered to produce the masters to all songs on the album, it revealed the existence of a single 2-inch tape only after its own expert witness examined it. CBS was ordered to pay \$40,000 in sanctions for its actions. (The sanction was only against CBS counsel in New York; it did not affect local defense counsel in Reno, where the trial was held.) It could have been worse; the penalty was limited because Whitehead believed the ultimate outcome of the trial would not have been altered.

"If all of the 24-track tapes had been made immediately available and had their playing demonstrated that no subliminals existed on the tapes, this matter could have been quickly concluded and the expense of both trial preparation and the actual trial of the case could have been avoided," Whitehead wrote. Later, he wrote, "The court is of the opinion that the conduct of CBS warrants significant sanctions even to the extent of directing liability for the plaintiffs." In other words, finding in favor of the plaintiffs.

3. The First Amendment/subliminal ruling has serious implications for other parts of the audio production industry. In an attempt to show that subliminal applications exist in other parts of the production industry, the plaintiffs introduced into evidence a 1985 R•E•P article on the film sound for the movie "Gremlins," which

deals with the creation of sound effects that were later buried in the audio bed.

Given the judge's ruling that subliminal messages are not protected by the First Amendment, could similar techniques used in other audio applications come under legal scrutiny in the future?

4. The case did not resolve the issue of teen suicides and possible subliminal causes. Immediately after the ruling, the plaintiff's lawyers received dozens of calls from people telling them of cases similar in circumstance to the Judas Priest case. Two similar cases are pending in Georgia. Because there had been no rulings on the issue before this one, the case is likely to be influential far beyond the cities of Reno and Sparks.

AN ORDINARY DAY

Pages in court documents reduce all events to timetables. Investigations of events past seem to point to inescapable conclusions. It would be too easy to dismiss the suicides of two young men with drug and alcohol problems as inevitable. Both were high-school dropouts with no steady employment and possibly no real future. But were their deaths inevitable?

Dec. 23, 1985, started out as an uneventful day. Raymond Belknap, 18, and James Vance, 20, had been best friends for five years. Both loved heavy metal, particularly the music of Judas Priest. Both also exhibited love and care for the families, the court record shows.

At noon, Belknap went with his mother to watch his youngest sister get her first haircut. Sometime after, he met up with Vance; they went to the Belknap house between 1:30 p.m. and 3 p.m.

Belknap gave Vance a copy of "Stained Glass" as a present. Vance had the album a couple of years earlier, but had gotten rid of it when he became a born-again Christian. (During this period, Vance stopped his substance abuse, went to church and quit listening to heavy metal.)

They spent the afternoon drinking, smoking pot and listening to the album. While listening to the record, they began chanting a phrase similar to "just do it, just do it." They then became violent and starting trashing objects in Belknap's room.

Although the time frame for the next event is unclear, they barred the bedroom door and exited through a window with a sawed-off shotgun and two shotgun shells. A church playground was about a block away. They walked to it. Police estimated the time was shortly past 5 p.m.

After wedging the gun into the ground, Belknap stuck the barrel under his chin. Saying, "I sure f—ed up my life," he pulled the trigger, dying instantly. Taking the shotgun, Vance wedged the gun in a similar fashion. However, it wasn't wedged tightly enough. When the gun recoiled, it

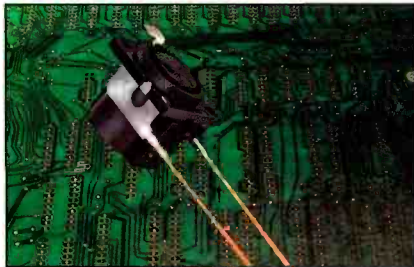
The First Amendment/subliminal ruling has serious implications for other parts of the audio production industry.

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From a professional standpoint, it is tempting to dismiss William Nickloff as an amateur engineer far out of his element.

pitched forward. Instead of killing himself, Vance blew off the lower half of his face. He lived three years, undergoing 13 surgeries before dying from complications in November 1988.

In depositions before he died, Vance talked about a "power" the music had over them.

"Sometimes if you take a drink you will get nauseated, and sometimes you will take a drink and you will feel fine and be able to drink all night, and the music was like that. ... It was a real burst of power," he said.

Although Belknap and Vance listened to music all afternoon, there was no evidence that one of the songs, "Better By You, Better Than Me," was played more than twice. Although two other songs, "Beyond The Realms of Death" and "Hero's End," were initially cited in the subsequent lawsuits as a contributing factor (most likely for their lyrical content), "Better By You" became the focus of the case.

LAWSUITS FILED

Aunetta Roberson, Belknap's mother, filed suit in May 1986, alleging that Judas Priest and CBS should have known that it was likely that the music and lyrics would have a substantial effect on the emotions and behavior of people who listened to the music.

According to the complaint, there was a "direct and proximate cause of the content of this record album, the deceased Raymond Eugene Belknap's suicide was precipitated by the lyrical instructions of the music which he was listening to just prior to his death and at the time of his death, which created an uncontrollable impulse to commit physical harm to oneself, or suicide." The word subliminal was not used, but a reading of the complaint makes it clear that the plaintiffs were talking about a power that the music had, beyond what the lyrics might suggest.

Vance and his parents filed suit two months later in July 1986. The differences between the two cases were minimal, and they were consolidated in August 1986.

Judas Priest's and CBS' response was typical for this type of case. They argued that the lyrics and music were protected by the First Amendment. Relief under product liability was not warranted because the product, a record album, was not an applicable product under the law.

From then on, the case began its tortuous path through the legal system. Depositions were taken. Motions were filed. Trial dates were set and postponed.

WHERE ARE THE MASTERS?

During the discovery process, during which both sides in a civil case collect evidence, the plaintiffs requested in November 1987 that the defendants produce the

master tapes. According to Ken McKenna, one of the plaintiffs' attorneys, in his closing argument, they weren't sure what they were looking for, but were looking for some factor that drove Belknap and Vance to suicide.

The plaintiffs' request was granted in January 1988. The significance of this cannot be overemphasized. The multitracks are analogous to reporter's notes or film outtakes. The granting of the motion meant that production and technical decisions made more than 10 years earlier were going to undergo intense scrutiny. Such a request had never before been granted.

Despite the fact that the case had been going on for almost a year and a half and that the album had been re-released on compact disc, a corporate attorney for CBS told the court "that it is likely that CBS never did and does not now have custody of the multitracks and production file relating thereto."

January became April. Still no tapes. Whitehead again ordered CBS to turn over any multitrack and 2-track tapes for all nine songs on the album, and any pertaining records. Time was running out, as a trial date of Oct. 10, 1988 had been scheduled.

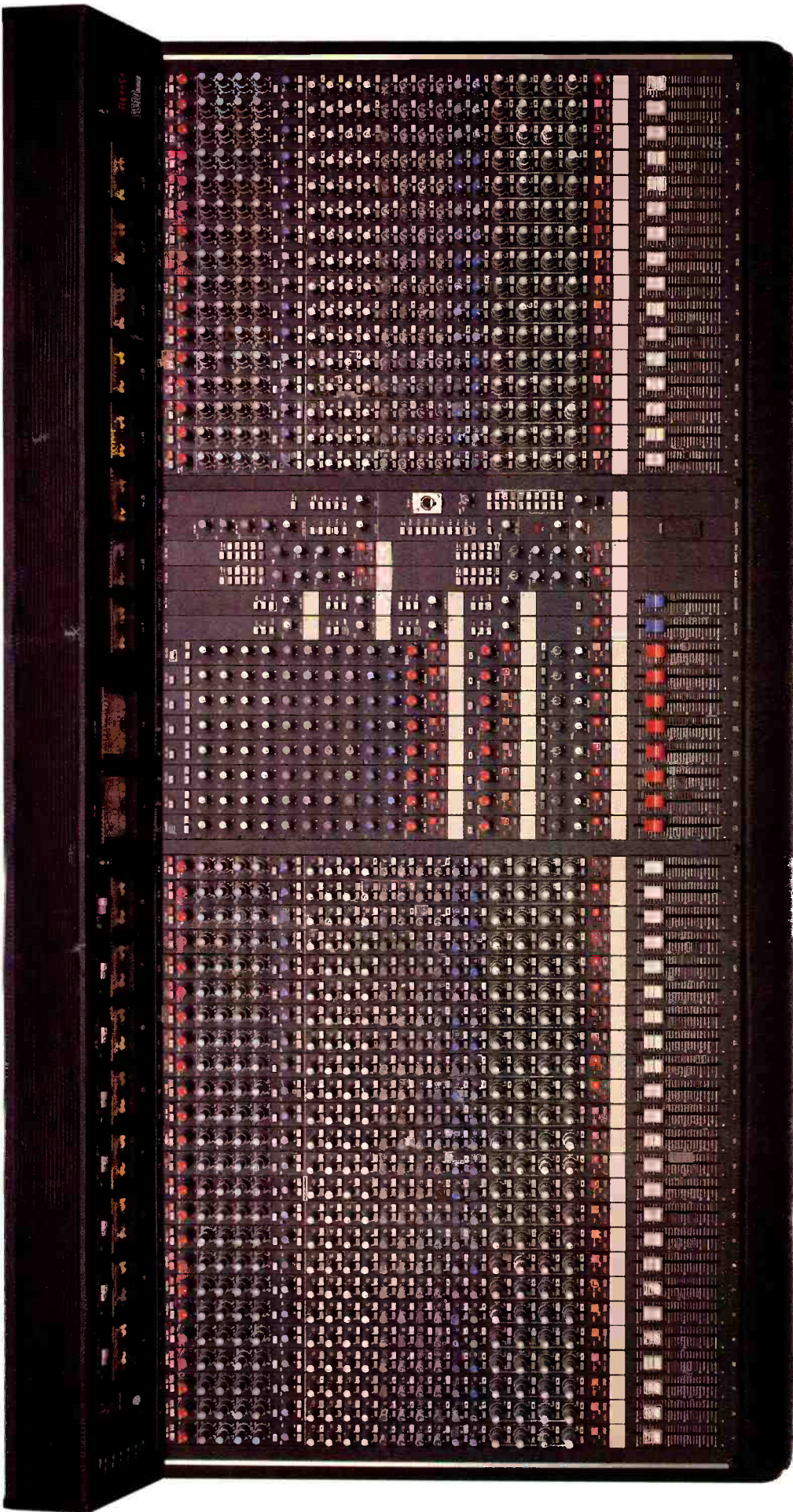
Who had the tapes? CBS said Judas Priest owned them. Judas Priest said CBS owned them. More months went by. An employee of Judas Priest's management company found the 24-track master of "Better By You," but she had been told to look for only "Beyond The Realms of Death" and "Hero's End." (Remember, the judge had ordered that masters for all nine of the songs be turned over.) It was now late September. Trial was supposed to begin in less than three weeks.

NICKLOFF'S DISCOVERY

While lawyers tried to secure the master tapes, an expert witness hired by the plaintiffs changed the whole complexion of the case. William Nickloff, a self-taught engineer who ran Secret Sounds, a company that created subliminal audiotapes, conducted tests on a CD of "Stained Class." He said he detected sounds resembling human speech at several locations in "Better By You, Better Than Me." The words: "do it."

From a professional standpoint, it is tempting to dismiss Nickloff as an amateur engineer far out of his element, which was how he was portrayed in the national media. A marine biologist by training, he got involved in subliminal audio while in the military. He started Secret Sounds in the early 1980s, but ran into money troubles and closed it several years later. He is now an investigator for the Food and Drug Administration.

Continued on page 32



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THE LURE OF

With its roots in the movie theater experiments of the 1950s, subliminal messages and their lure remain as strong as ever.

Subliminal experiments first became known in the 1950s when a researcher inserted the words "Hungry? Eat Popcorn" for 1/3,000 of a second, every five seconds, during a movie. Sales supposedly increased 58%. As a result of the public's outcry, the TV networks and the Federal Communications Commission prohibited the use of subliminals in advertising.

In the 1970s, there were isolated incidents of visual subliminal messages, most notably in a children's TV program and the movie "The Exorcist." In the advertising world, the practice was eventually abandoned because of its ineffectiveness.

It is important to note that these instances dealt with *visual* messages. On the audio side, allegations of subliminal and backward messages in records have existed since the 1960s. Beatles' recordings were played backward for the existence of messages, particularly in relation to the "Paul is Dead" incident in the late 1960s. Led Zeppelin's "Stairway to Heaven" has often been cited as having backward satanic messages.

As a result of the popularity of heavy metal in the 1980s, and a coincident rise in teenage suicide, there have been many charges of subliminal messages driving teens to kill themselves.

The artist most mentioned is Ozzy Osborne, whose song "Suicide

Solution" has been cited in three lawsuits brought by parents of teenagers who killed themselves after listening to the song. One case in Georgia is still pending; the second case, in New Jersey, no longer has heavy metal as a factor. The third case, in California, bears examination.

Osborne, who coincidentally is a CBS artist like Judas Priest, was sued in 1988 over the death of a California teenager. The case was thrown out on First Amendment grounds and upheld on appeal.

What makes the case notable is that the evidence revealed the presence of a 28-second instrumental break in the middle of "Suicide Solution" that includes masked lyrics, sung at 1½ times the normal rate of speech. In the words of the plaintiffs, the lyrics "are not immediately intelligible. They are perceptible enough to be heard and understood when the listener concentrates on the music and lyrics being played during this 28-second interval."

In dismissing the case, the California court said that there was nothing in Osborne's music that could be characterized as a command to suicide. As for the masked lyrics, the teenager was not listening to the song at the time of death, nor was there an indication that he ever heard or understood the lyrics in the 28-second interval.

FEW STUDIES

For all of the controversy surrounding the issue, there have been few psychological studies to determine whether subliminal messages have an effect on listeners. Some psychologists contend that media oversimplification and public misperceptions have clouded the issue. For a psychologist examining human behavior, the issue is not whether the messages exist; it is whether people are affected by them. If they are not, it doesn't matter whether the messages exist.

R•E•P's research revealed only two studies that deal directly with the issue of messages in music.

In a 1984 study, Stephen B. Thorne and Philip Himmelstein of the University of Texas at El Paso recorded three songs backward: "Revolution No. 1" by the Beatles, "Stairway to Heaven" and "Black Sabbath," by Black Sabbath. A total of 65 volunteers, divided in to three groups, heard the music and were then asked to fill out a questionnaire. According to the results, people who indicated they thought that record companies were inserting messages were predisposed to hear a satanic message.

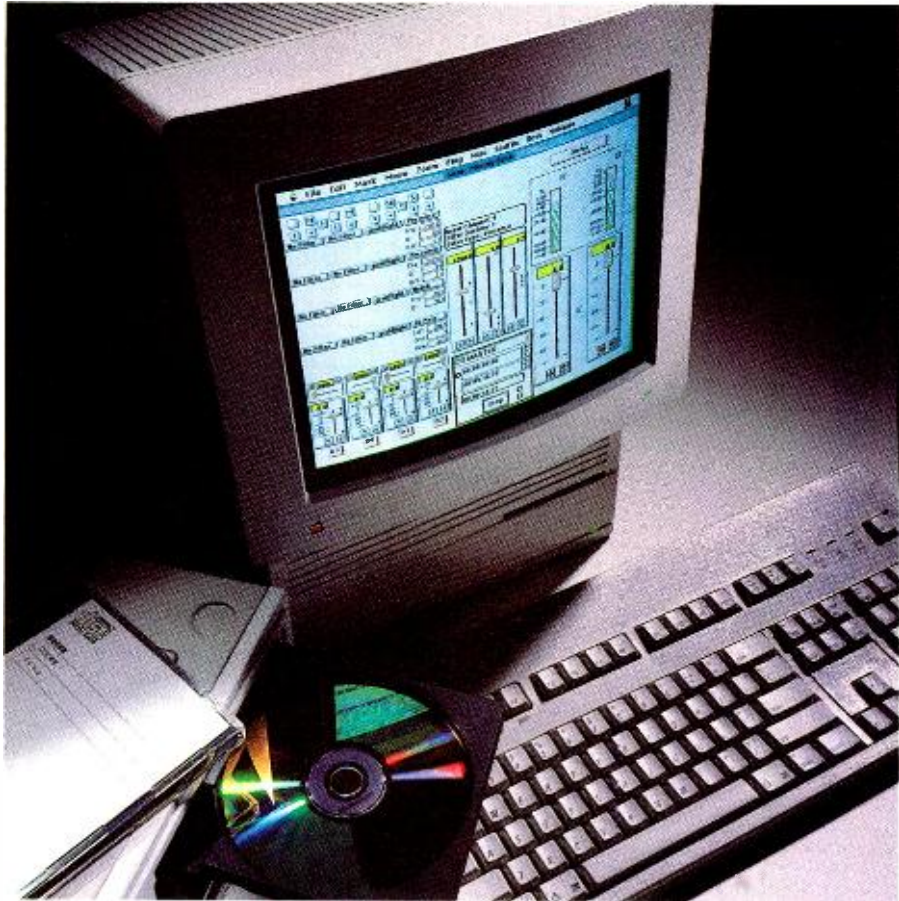
In another test, two psychologists at the University of Lethbridge, Alberta, John R. Vokey and J. Don Read, recorded a series of backward messages that included sentences from Lewis Carroll's "Jabberwocky" and the 23rd Psalm. Groups of people listened to the material and were asked what they heard. The researchers also listened to the same material and heard such phrases as "Saw a girl with a weasel in her mouth" and "I saw Satan" from "Jabberwocky." The researchers found no evidence that subjects are influenced consciously or subconsciously by the semantic content of backward messages. People's perception of these messages is most likely a function of active and creative construction on the part of the listeners.

SELF-HELP TAPES

A variable to the issue is the proliferation of subliminal audio tapes, designed to help listeners lose weight, stop smoking or be better lovers, among other things. Millions of these tapes are sold every year, their claims ranging from dubious to outright fraudulent. For example, one manufacturer claimed its tapes could address arthritis, cancer and AIDS.

Although the manufacturers of such tapes claim their tapes work, expert opinion is divided. One psychological study recently released concluded that subliminal messages don't influence behavior. He added

Continued on page 32



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Continued from page 28

He has never mixed a record, never operated a 24-track machine. Most of his audio experience was with smaller tape formats. His early analysis can best be described as crude, considering the abundance of workstations and software-based programs available in 1988.

But to dismiss Nickloff is to miss this point: While an industry snickered, he managed to convince the judge that subliminal messages existed on the tape. The difference between winning and losing was that the judge believed the messages were randomly arrived at, which released the defendants of liability.

On Oct. 7, 1988, the plaintiffs informed the court of the discoveries. CBS and Judas Priest moved to postpone the trial, which was scheduled to begin in three days. The motion was granted.

Finally, on Nov. 9, 1988, the defendants informed the plaintiffs that the master tape of "Better By You" was available for inspection. During the interim, the tape was shipped to Los Angeles for examination. However, Whitehead had granted a defense request that they be present for any inspection. The tape was examined without the plaintiffs being present. The master to "Better By You" was the only one produced among the album's nine songs.

(During closing arguments, the plaintiffs alleged that the defendants altered the 24-track to eliminate traces of the "do it," by

somehow spreading the words from one track onto several tracks. This would account for the fact, they said, that Nickloff initially found the "do its" by analyzing a CD copy; could not find the words on any individual track on the multitrack master; but found them after combining only a certain number of tracks. Ultimately, the judge rejected this argument, which would have been most difficult to accomplish. Whitehead ruled that the original 24-track did not differ from the safety master.

To date: One tape had been found. Legal maneuverings continued. Dozens of witnesses had given thousands of pages of testimony. Many motions had been filed. The case lumbered on. It had been almost three years since that December afternoon. Almost 2½ years since the first suit was filed.

In about three weeks, Vance will die in his sleep. Trial is still more than 18 months away.

The paramount questions become: Did the phrase "do it" exist on "Better By You, Better Than Me"? If so, was it placed there intentionally?

SUMMARY JUDGMENT

In a civil proceeding, after all of the evidence is collected (called the discovery process), the defense may file a request for summary judgment. This essentially asks the judge to dismiss the case for lack of evidence. This is a fairly routine request.

In August 1989, Judge Whitehead denied the motion. In his ruling, he stated

Continued from page 30

that expert opinion was divided and that other researchers pay more attention to other evidence.

GOVERNMENT REACTION

If the government has any concern over subliminals, it is minor at best. Food and Drug Administration Guidelines specify that recordings not containing claims for specific disease conditions or therapeutic use are allowed, according to Jo Ann Marone, an FDA spokesperson. In the past year, the FDA has ordered tapes removed because of fraudulent medical claims.

Another government agency, which could regulate non-medical claims from tapes, the Federal Trade Commission, declined comment on the issue.

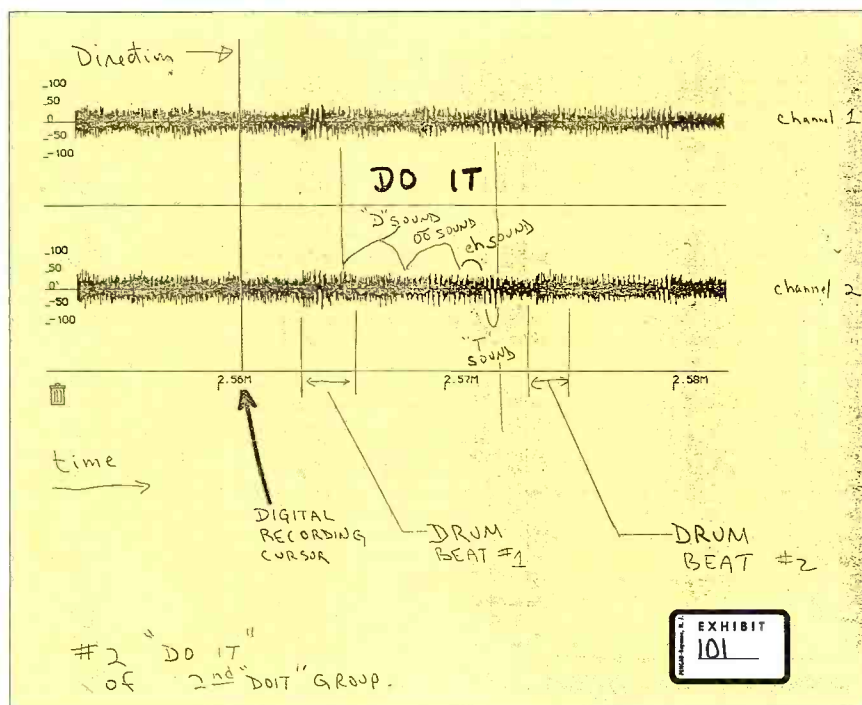
There has been only one congressional hearing on subliminal communications, in August 1984, and that was strictly informational in nature. According to the published transcript, the hearing dealt mainly with subliminal messages in such applications as self-help tapes and anti-theft, in-store systems. The hearing did not deal with the record issue at all.

THE FUTURE

The entire issue is likely to continue to be troublesome for the audio industry. Testimony concerning subliminals in the Judas Priest case is likely to be used in other cases. If claims by self-help tape manufacturers continue to go unchecked, government regulation is possible.

Most important, the public's perception concerning the issue could cause an adverse ruling for the industry. If self-help subliminal audiotapes are allowed to be sold, doesn't that prove their effectiveness? If the public believes that, it is a short leap to conclude that alleged subliminal messages in records are equally effective. If the public believes that the existence of subliminal messages proves their effectiveness, rather than looking at the question in two parts as psychologists do, then the outcome of the next trial could be very different.

Additional reporting: Sarah Coleman.



Can you spot the subliminal message? This is a reproduction of William Nickloff's analysis of "Better By You, Better Than Me," which the plaintiffs entered into evidence. Nickloff alleged that "do it" sounds were deliberately inserted between the drum beats shown here.



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The judge ruled that subliminal messages are not protected because they do not advance free speech, and that people have a fundamental right to be free from unwanted speech.

that subliminal communication was not entitled to First Amendment protection for three reasons.

1. Subliminal communication does not advance any of the purposes of free speech.

2. An individual has a First Amendment right to be free from unwanted speech.

3. The listener's right to privacy outweighs the speaker's right of free speech when subliminal speech is used.

"The court finds it difficult to accept that any expert can identify the subliminal messages as 'a substantial factor' that led Vance and Belknap to shoot themselves," he wrote. "Because of this, the court has seriously considered granting the motion for summary judgment.

"The court concludes that it must allow the public to decide these important and unique issues after a full hearing and must not impose its own personal opinions."

(Despite the judge's misgivings, he had little mobility to throw the case out. The Nevada Supreme Court has viewed the right to trial as a fundamental right. Rules governing summary judgments are drawn more tightly than in other states. Litigants "are not to be deprived of a trial on the merits if there is the slightest doubt as to the operative facts," according to that court.)

THE TRIAL

In the end, the public didn't decide. A week before the trial was scheduled to begin, both sides agreed to try the case without a jury.

The plaintiff's case was that "Stained Class" was filled with subliminal messages, not only in the music but in the album artwork. (Bryan Wilson Key, who first gained

notoriety in the 1970s with his book "Subliminal Seduction" and has claimed to find sexual, subliminal images in most everything he encounters, testified that a phallic symbol and the word suicide — spelled "suiside" — were embedded in the album artwork.)

Nickloff and another expert witness provided computer analysis purportedly showing the location of the "do its" and how they could not be random occurrences. Additional witnesses testified how subliminal messages could influence behavior.

The defense presented testimony from the band, album producer/engineer James Guthrie and second engineer Andy Jackson denying that subliminal messages had been inserted. Their expert witnesses, Anthony Pellicano and Eddie Kramer, testified that their analyses revealed no subliminal messages. The sounds presented did not sound like "do it" and were random combination of sounds from different tracks.

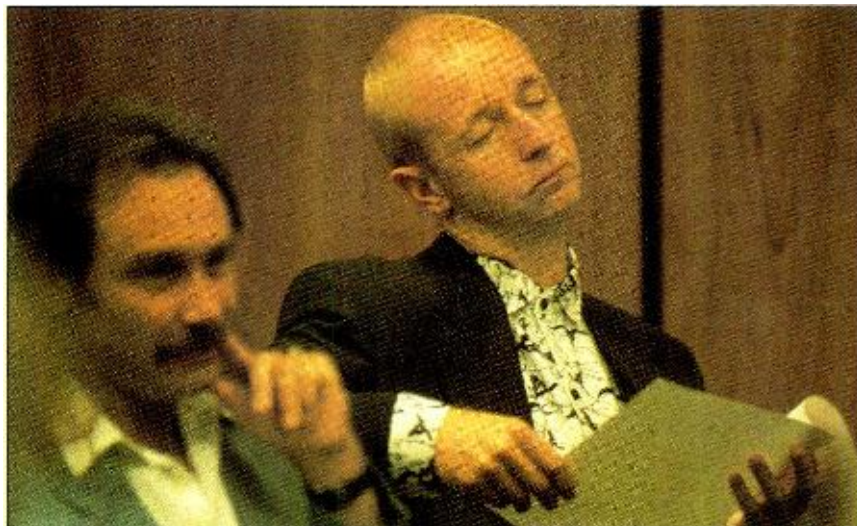
Although denying that subliminal messages were on "Stained Class" Judas Priest lead singer Rob Halford admitted to putting a backward message on a song in 1985 as "an artistic experiment." Jackson also testified that a month previously he inserted a backward message on a recording after the band he was working with asked him to.

THE RULING

The judge's major findings were:

1. The 24-track tape "Better By You, Better Than Me" admitted into evidence was the unaltered original.

2. Although subliminal "do its" occur several times in the song, they are a re-



Marilyn Newton/Feno Gazette-Journal/Syoma

During testimony, lead singer Rob Halford denied that subliminal messages existed on "Stained Class," but admitted that he inserted a backward message during a session in 1985 as an "artistic experiment."

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*Steve Klong
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sult of chance combination of sounds, and were not intentionally formed.

3. The defendants were not liable for the subliminal messages because they were not intentionally placed.

Concerning subliminal stimuli, Whitehead ruled that there was significant evidence of perception below consciousness. He also found that there was credible evidence that Belknap and Vance perceived the "do it" message, but that other factors contributed to their actions. The evidence did not indicate that people responding to subliminal stimuli would respond with actions of this magnitude.

THE EFFECTS

Although it is too early to tell what effect the case or the ruling will have on the industry, it is possible to make a few observations.

1. The actions that engineers and producers make every day will come under increasing public scrutiny. In the past year, we have seen labeling laws proposed and passed, lip-syncing laws proposed and an album declared to be obscene. These cases affect the actions of what engineers and producers do in the studio. The fact that this case went to trial increases the likelihood that others will, too.

2. The industry needs to deal with the issue of subliminal messages. Are there in

stances where subliminal audio is a permissible production technique? Is it OK for advertising but not for records? Subliminal-like techniques are used in the ad world all of the time.

In fact, the very words that Judas Priest were tried on, "do it," were used in a Southern California amusement park TV ad. In that application, the voice of Stevie Wonder was sampled, pitch-shifted several octaves lower and buried in the music bed. The ad and its production techniques were demonstrated at the Society of Professional Audio Recording Services workstation conference in Nashville last May.

The other side to the subliminal issue concerns self-help tapes. The evidence of their effectiveness is inconclusive at best (see sidebar). But their popularity is growing, and they are easy to produce; any reasonably equipped studio can produce acceptable product. This is a possible revenue source. How should studio owners react, faced with an ever-shrinking revenue picture? Can they afford to take the moral high ground?

3. Producers and engineers need to think about what they would say if they were ever taken to court. In the Judas Priest case, the band, producer and engineer were forced to account for actions taken almost 15 years ago. Could you do it? Decisions made in the passion of crea-

tivity, in the haze of alcohol or drugs, in the midst of a 16-hour lockout, in the middle of a project that is behind schedule and over budget, or for whatever reason, may not be viewed kindly years later. The fact that the band and record company were named in the suit, but not the producer or engineer, shouldn't be taken as a source of comfort. Engineers have been sued in two cases, both unrelated to the issues in the Judas Priest case. It could, and has, happened.

ISSUE CONTINUES

The ultimate conclusion we can make is that the audio industry has the opportunity to come to grips with the issue and how it affects the public. After all, two young men died, one after much pain and disfigurement. Two families were left grieving. Real people listen to what we produce, a fact easily forgotten in the confines of a studio. It is time to figure out how we will react next time, as there *will* be a next time.

A final quote from Judge Whitehead: "Perhaps in an important sense, the plaintiffs have succeeded, since they have brought forth public discussion and debate on a subject which should be of concern to all of us ... it is unknown what future information, research and technology will bring to this field." ■

Accidental Words?

According to expert witnesses for the plaintiffs, the *recognizable* words "do it" occurred when several tracks from the master tape of "Better By You, Better Than Me" were combined. There was no "smoking gun," a single track with the actual words buried in the mix.

This was the crux of the case. The plaintiffs said that these words were subliminal and intentionally placed, while the defense said that the phenomenon was purely random and did not constitute a subliminal message. The judge ruled somewhere in the middle, that the "words" were subliminal but occurred by accident.

No less an industry legend than Eddie Kramer testified for the defense that after analyzing the master tape, he could find no masked or subliminal messages. (In addition to his engineering work with Jimi Hendrix and the design of Electric Lady Studios, Kramer was the inventor of the pan pot, a revolutionary development if there ever was one.)

"When one combines the snare on track 5 with the stereo guitars (through a Leslie cabinet) on tracks 13 and 14 with the vocal on track 20 ... there is an apparent sound that very remotely sounds like 'do it,'" according to his written analysis.

VOICES, NOT WORDS

Other engineers contacted by R•E•P reported that they had experienced other-worldly noises by random track

combinations, but none had ever experienced words.

According to George Massenburg, who won the 1990 engineering Grammy for his work on Linda Ronstadt's "Cry Like a Rainstorm, Howl Like the Wind," his method of combining different tracks for the right combination will occasionally result in "found treasures."

"On occasion, we have experienced some vocal-like sounds, but never anything like a 'do it,'" he said.

Another engineering Grammy winner, Bruce Swedien, said that he occasionally encountered a resultant harmony when doing choir recordings.

"We would occasionally hear this beautiful tone about two octaves up," he said. "It sounded like a voice, but there weren't any words."

Several years ago, a conservative preacher alleged that the track "Billie Jean" from Michael Jackson's album "Thriller" contained a backward satanic message. Swedien, the engineer for that album, vehemently denied the allegation; indeed, anyone who knows Swedien, one of the industry's nicest and most down-to-earth individuals, would find the charge laughable.

"Nothing could be further from the truth," he said. "During the recording, I kept the tapes in a locked vault, and I was the only one who had a key. They're now locked away in the CBS vault."

Of the preacher who made the allegation, Swedien said, "Those guys need a hobby or something."



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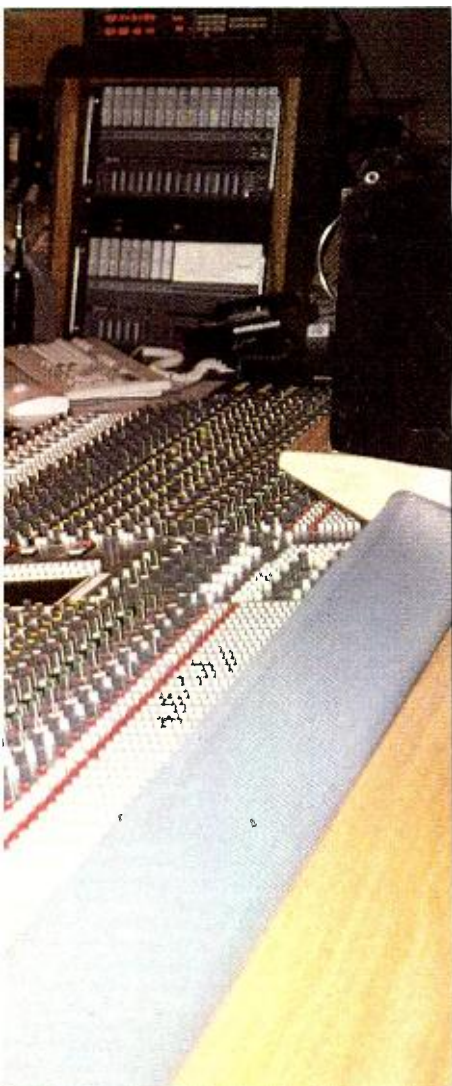
THE R-E-P INTERVIEW

Gary Lux

By Brad Aaron



One of Hollywood's busiest scoring mixers talks about the art of putting music to picture.



If you've watched any television lately, there's a good chance you've heard audio mixed by Gary Lux.

Part of one of Hollywood's busiest and best production teams, Lux is one of Mike Post's main engineers and has worked on some of Post's best-known creations, including "L.A. Law" and "Doogie Howser, M.D." His other TV credits include "Hunter," "Loose Cannon," "Mission: Impossible" and "Designing Women."

Although it might be argued that TV work does not have the creative freedom that recording albums has, Lux's work makes a convincing argument that there is an enormous satisfaction in producing audio for TV.

Lux comes out of a musical background, playing bass in high school and in college. He started his career as a gofer in 1979. In 1985 he became head scoring mixer at Universal Studios. Since 1988 he has been an independent scoring mixer.

In addition to his scoring activities, Lux recently started his own consulting/rental

Brad Aaron is a Los Angeles-based producer, engineer and free-lance writer.

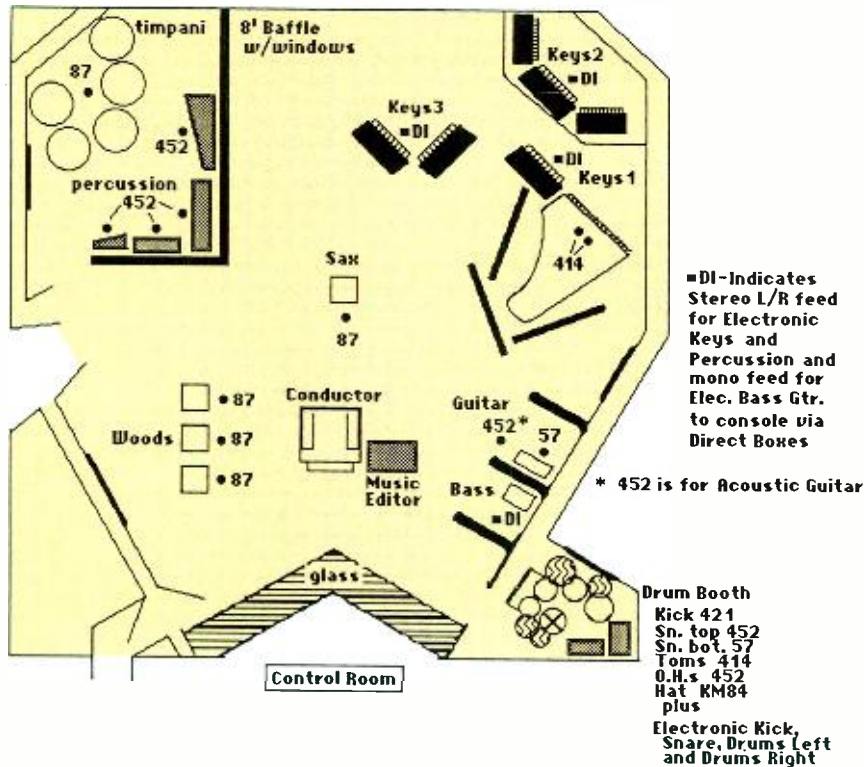


Figure 1. Room and mic layout for "L.A. Law" sessions at Group IV Studios in Hollywood.

business, Luxsound, which rents outboard processing racks at "remarkable" rates, with such equipment as Eventide HR-3000 harmonizers, Lexicon 480Ls, TC2290s, AMS RMX-16s and Massenburg EQs.

R•E•P: From your perspective as the scoring mixer, why don't you describe a typical session.

GL: Generally, it starts off with a contractor calling us up and letting us know what the instrumentation is. I'll speak to the assistant engineer and we will block out the room. I'll tell him the microphones that I want. He'll have the room set up just the way that I want it. I'll come in and I'll immediately see certain things that I want shifted or moved.

R•E•P: How long before downbeat do you get there?

GL: I like to get to the studio about an hour and a half before downbeat. It gives me enough time to make some changes and do all the preparing I have, and that leaves me time for the unexpected, which happens every day.

Generally, everything will be laid out on the console as I want it set up. I'll punch it up, assign it to where it has to go. I'll get my echoes ready; put on some clicks and listen to the echoes; and I'll tune up the chambers, scratch mics, which is the most important thing — making sure that

the microphone location written on the console is where it is out in the room.

R•E•P: It seems like the key to being on top of everything is that hour and a half before downbeat.

GL: Well, preparation is everything. There are so many variables. We're engineers, we take it for granted. You look at the console and it's just 6,000 buttons, no big deal. Any number of these buttons could flip the wrong way, you're not getting the signal. It just has to be checked. Everything has to be checked, and then you can still expect the unexpected.

R•E•P: What shows do you currently mix?

GL: "Hunter," "L.A. Law," "Mission Impossible." From week to week, it varies because not every show is done every week. The Mike Post shows that I have my hand in are "Hunter," "Quantum Leap," "L.A. Law," "Wise Guy" and occasionally "Doo-gie Howser, M.D."

R•E•P: Are you Post's principal guy?

GL: Well, he calls me his mixer of choice. I work for him when he goes to the independent studios. When he goes to Fox to work, he'll use Armin Steiner, or if he goes to Burbank Studios, he uses Bobby Fernandez. Both of these guys are great mixers. They are the staff guys at those studios and so they've got a lock-out on

who gets in there.

R•E•P: How did you get started?

GL: I first became a gofer, and then a floor setup guy at Evergreen Studios in Burbank in 1979. Although I was very musical, I wasn't qualified to be a music engineer or mixer. At Evergreen, I set up sessions, worked with more than 100 different mixers, learned microphone techniques and placements. I saw thousands of television and movie dates, along with records, advertising gigs and commercials.

I gradually worked my way into the control room as an assistant, and that's where I really got all the chops, from assisting all the mixers, different types of mixers, record dates to film dates, seeing all the different techniques that guys would use. I knew I was going to do well when I would say to myself, "Why don't they try this?" and then the producer would say it out loud two steps after I would say it to myself.

R•E•P: What made you decide to go the route that you have gone, rather than toward records? Most people seem to go toward records because there appears to be a lot more artistic freedom in the music business.

GL: Well, that's not altogether true. Having a musical background and not being good enough to be a player, I got a lot of satisfaction out of mixing scores.

R•E•P: How do you decide where everything — the musicians and their gear — is going to be placed in the room? When do you make those setup decisions?

GL: As soon as we find out what the show is, and what the instrumentation is, there is a game plan. You know the room that you're in, you know what your limitations are and what the advantages are for doing certain things.

For TV mixing, most of the time you have to be a little more "defensive" in your approach on how you record. Although I like to approach every score differently, I usually like to set it up as orchestral as possible. It's not always feasible, because in an orchestra you have the brass off to one side, and if you have the strings wrapped in a semicircle around the podium, and you have the brass just blasting away into cellos, basses and woodwinds, then you're not going to get a good sound. That works for big feature-movie-type scores where you really want everything to bleed into each other. You have to keep it a little cleaner for television.

R•E•P: Let's take it to the next step: You've already placed the musicians and now they're giving you music. How do you decide where you're going to place each section, or instrument, in the mix?

GL: Again, it's fairly simple. I would say the majority of work that I do is stereo right now. Rarely are any mono dates done. Your new stereo channels get the left and right imagery and a certain point because everyone's playing in the room. You can't get rid of anything that is on the second channel. You can raise it or lower it somewhat (things that you would put on that discrete channel).

For Mike Post's dates, we go as stereo as we can get with the rhythm section and the brass. I usually keep the percussion in the center channel. Sometimes during scenes where we're not hearing the dialogue when we're doing the score, it's hard to place a triangle or shaker. It is best to have that control on the dubbing stage.

When we do "L.A. Law" with the sax sound, I'll put that on the center channel and I'll put its echo in stereo. A lot of times they really want to hear that sax and they should because that's the logo for the show. I'll put that on the center channel and give everybody a little bit more leeway further on down the line.

R•E•P: I've noticed that on some sessions you mic instruments individually. Then other times you mic two instruments with one mic; still other times you mic entire sections, either stereo — two mics — or sometimes mono with just one overhead. How do you come to these decisions?

GL: In television, the biggest consideration is the size of the orchestra. In other words, we'll have an orchestra, and large is having 30 people. (By symphony standards that's puny.) So, what we have to do is what I'm trained at: getting as big a sound as possible with the few instruments available. The stereo imagery is what really helps make things sound bigger than the amount of men that we have on stage.

For example, many times I'll have eight violins, two violas, two cellos and two basses. That's really a very small string section. However, panned right, placed right, with the right echo, you can create a pretty big sound. Not as big as if you had 30 violins, but still a big sound.

R•E•P: Describe "panned right, placed right, with the right echo."

GL: Most of the time I will take my violins, and I'll pan them left/right, in stereo; I'll take violas and pan them left, I'll put the cellos right, I'll put the basses straight up in the center. Unlike what a symphony orchestra would be, where all the high strings would go high to low, left to right; violins left, violas, cellos, soft right, basses all the way to the right.

R•E•P: How much does processing lend to that big sound of yours?

GL: Most of it is in the type of echo that you use. I like the Lexicon 480s and the

Notes:
87 on French Horns is approx. 9' in air.
89s on Violins are approx. the same.
47FET on Timp. is approx. 8' above instr.

DI - Indicates Stereo L/R feed for Electronic Keys and Percussion and mono feed for Elec. Bass Gtr. to console via Direct Boxes

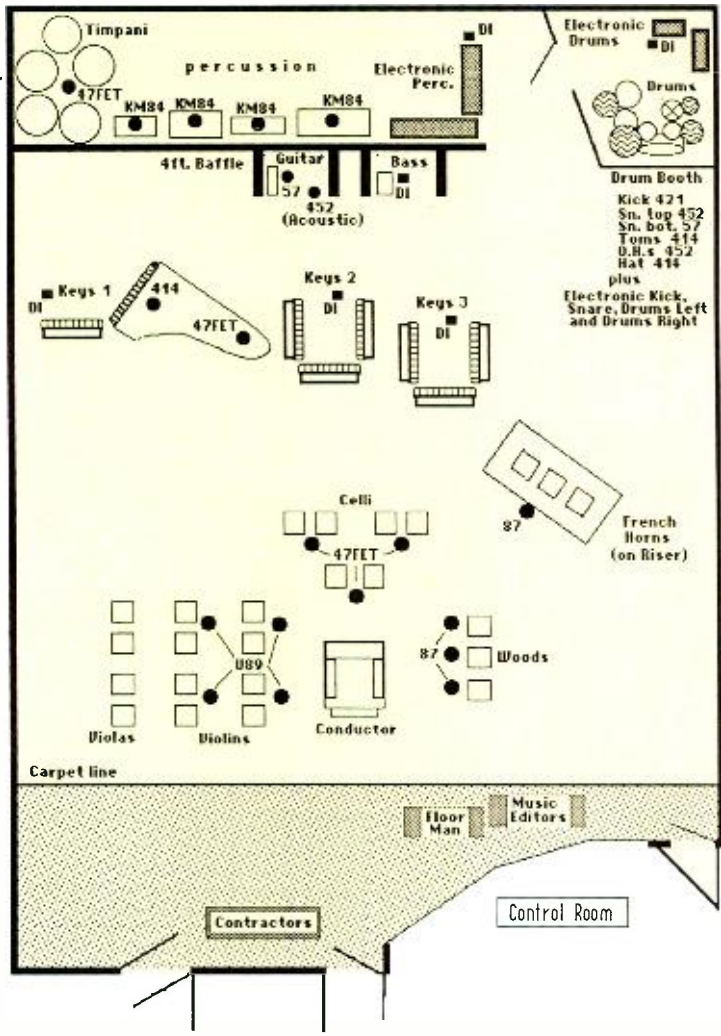


Figure 2. Room and mix layout for "Quantum Leap" session at Universal Studios' Stage 10.

AMS echoes. Generally, in a good unit like that, you'll find whichever chamber you're looking for and is appropriate. Of course, if you're looking for symphony sounds, you dig in for the symphony setting, modify it, do whatever you need to make it right. Most of it is done in the echo for orchestra and stuff — making things sound bigger than they really are.

R•E•P: Do you use any DDLs or compression/limiting, anything like that?

GL: I rarely use any compression/limiting. On an orchestra, there's really nothing to put it on. I use them on vocals, but for an orchestra, I'm a purist in the approach.

R•E•P: Let's play a little word association. Let's talk about mics. I'll mention an instrument, you tell me what you mic it with. OK? Violins.

GL: On violins: different rooms, different microphones. I generally try to use a mi-

crophone that doesn't color the sound, one that captures as much of the true essence of the instrument as possible. I like the Neumann U89 on violins. I think it's a real smooth microphone. It's not like an 87, which is a little honky in the midrange. For certain rooms that are a little deader than others, I like to use a KM84 because it is a little brighter. It does color the sound a little bit, but I'm compensating for the room that I'm in.

R•E•P: Violas.

GL: Any full range microphone, an AKG 414, or again the KM84 or even an 89 or 87. Or a 47, which is one of my favorite overall microphones, along with the TL170. I would use a 47 FET or TL170 on almost anything.

R•E•P: (Shure) 57s on guitars?

GL: I like 57s on guitars. Guitars are a raunchy sound. Why blow a capsule on a

452 if you don't have to? And 57s sound great.

R•E•P: What about piano?

GL: I do different things. I really like the Yamaha pianos, because they are very bright and they are not as traditional as a Steinway. But for cutting through, I like the Yamahas, so I like to use a 47 FET on the low side and a 414 on the high side. Or I'll use a TL170 on both of them and again be happy.

R•E•P: Drums. Why don't you go around the kit?

GL: I have my favorite microphones, but I love experimenting and I try to do something different on every session. Generally, I like a Sennheiser 452 on top of the snare with a 57 underneath. On the high hat, I like the KM84. I usually put 10dB pads on that. On the tom-toms, I like using 414s with pads on them and I like using 421s. Different microphones: one a condenser and the other a dynamic microphone. For overheads, I like either the 452s or 414s. They are really bright — great for cymbals.

R•E•P: You like a lot of bright mics because you don't have time really to chase any EQ. You need to have that coming to you right away.

GL: Pretty much. The microphone usually does all the work. On the drums there's a lot of EQ done. Mostly taking out frequencies rather than adding. I'll add top and some bottom, but mostly I trim back midrange.

R•E•P: What do you think about the current quality of TV audio? Do you think TV has improved over the last few years?

GL: Oh, yeah. TV is full bandwidth. The only limitations that we have is the size of the speaker. It broadcasts full spectrum, top to bottom. It's just the size of the speaker that really stops you from hearing the bass and really stops you from getting all the weight.

R•E•P: Sonically, commercials are some of the best sound stuff on TV, don't you think?

GL: The commercials sound really good these days. Unfortunately, the time and budget doesn't lend itself in television to achieve the results of records. We just don't have the time. We have the technology, but without the budget and time, we can't make our television work sound like records. We could do it, but it wouldn't be cost-effective.

R•E•P: It's pretty close now. When you listen to "Hunter," that stuff sounds every bit as pumping as any record.

GL: Well, I like to think so, but again, any

type of situation that you can multitrack, remix and spend some time on, you can make better. I don't think multitracking would have its advantages in our situation. It's so exciting to do the music as fast as we do it; it gets the musicians pumped up.

R•E•P: When you work with Mike Post, does he give you a lot of autonomy? Like where you are going to place things in the mix?

GL: It's pretty much understood as to where it's going to be. Mike knows what I do. The reason why I am there is because he wants me there, and he trusts what I do. I know what his sound is, and I know what he is going for. He has ears like a hawk and he knows, through his headsets, exactly what's going on. He will tell me if he would like something different. I get it the way he wants it, immediately.

R•E•P: Tell me a horror story. There has to be a story somewhere in your career where you felt you were going to drown.

GL: My favorite story is actually from a time when I wasn't a scoring mixer. I was assisting on a McDonald's commercial. Generally, when you are doing an advertising gig, you will have the band in, the rhythm section, then you do the overdubs. After that, the singers will come in and then you will mix. Well, we were at the point where we had just gotten into the track for this national McDonald's spot.

To make a long story short, we go to punch in an overdub, the first overdub after basic tracks. We started to punch in a guitar, I think it was, and boom! I wiped out a big hole right in the middle of the track. I did not "safe" the machine. I just wiped it all out.

R•E•P: Across the board? All 24 tracks?

GL: Yeah! All 24 tracks. I mean if you're going to waste it, you just take them all! So I looked at the engineer, and he looked at me. He knew what I had done. I then walked out of the control room, went into the bathroom and threw up. I was sick as a dog and I came back in like a puppy with my ears back, hoping that the engineer wasn't going to beat me for doing this. He was really cool and we wound up doing it on a previous take.

However, that was my big horror story. Every assistant feels at a certain time that he is ready to move into that mixer spot, then something like this happens: a humbling situation that comes out of the clouds and just snaps your ass in half.

R•E•P: You could have been killed that day. Do you find most of your favorite moments in sessions based on, or triggered by, an acceptance by your peers? People you're pumping with?

GL: Absolutely. There isn't a session that

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MOVIES

"The Blues Brothers Movie"
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"Psycho III"
"Sweet Liberty"
"The Money Pit"

TELEVISION SHOWS

"Hunter"
"L.A. Law"
"Loose Cannon"
"Major Dad"
"Mission: Impossible"
"Quantum Leap"
"Wise Guy"
"Designing Women"
"Doogie Howser, M.D."

I do with Mike that at some point — it might be the second, third or fifth cue down the road — he'll go over to the mic and he'll smack his baton and say, "Sounds great, Gary!" And that, for me, is a personal moment.

R•E•P: You could run a few days off of that.

GL: That's it. That's as good as it gets. ■

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Interfacing Audio to VTRs

By Eric Wenocur

Whether providing an audio feed in the field or laying back a soundtrack in the studio, the increasing demand for high-quality sound on video productions is throwing many recording and sound reinforcement engineers into the unfamiliar, confusingly labeled realm of videotape recorders (VTRs).

Because they are foremost designed with the requirements of video production, most VTRs have audio sections that are of moderate fidelity. Some features that would be senseless in a studio are

Eric Wenocur is senior video engineer at KLM Video, a post-production house in Bethesda, MD, and a recording engineer, musician and producer in the Washington, DC, area.

quite useful in the field.

CHANNELS AND TRACKS

VTRs typically have at least two audio channels, but the newer 1/2-inch broadcast formats, such as Betacam SP and MII, provide two normal longitudinal audio tracks and two FM tracks recorded with the video signal.

D-1 and D-2 format digital VTRs have four channels of top quality digital audio. Table 1 lists track assignments for some of the more common professional VTRs.

The FM tracks on Beta SP and MII provide high-quality recording and a place for additional audio when needed, but they deserve a few cautions. Most basic is the fact that non-SP studio Betacams (such as

the BVW-10 or 40) do not have FM channels at all! Thus, it is wise to record the same audio on both the longitudinal and FM tracks on a shoot, in case the tape ends up in a non-SP machine during editing.

If all four tracks are to have different audio content, be sure that the tape will be played on SP studio decks! Also, because the FM audio is recorded with the video, it cannot be re-recorded (insert edited) later by itself. So, don't count on the ability to overdub audio on these tracks after the video is finished.

One tricky, but vital, aspect to dealing with VTRs is time code. On 1-inch Type C machines, time code typically goes on audio track 3. Betacams and MIIs have a dedicated track (but without metering),

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VTR AUDIO INTERFACING TABLE

VTR Model	Audio Channels	Conn Type	Bal/Unbal	Hot Pin	Input Imp. & Ref. level	Mic
Sony BVU-150 Time code	2 (*1)	XLR (*1)	Bal (*3) (*1)	2	>10K +4 (*1)	3K -20/-60
Sony BVU-800 Time code	2 Adrs. trk.	XLR RCA	Bal (*3) Unbal	2	600/10K +4 high 1.5 Vpp nom	600 -60
Sony BVU SP Time code	2 Adrs. trk.	XLR RCA	Bal (*3) Unbal	2	600/10K +4 high 1.5 Vpp nom	600 -60
Sony BVU-950 Time code	2 Adrs. trk.	XLR BNC	Bal (*3) Unbal	2	600/10K +4 high 1.5 Vpp nom	600 -60
Sony BVH-2000 Time code	2 Typ. Ch. 3	XLR XLR	Bal (*3) Bal (*3)	2 2	150/600/10K +8 (*8) 150/600/10K +8 (*8)	
Sony BVH-3000 Time code	2 Typ. Ch. 3	XLR XLR	Bal (*4) Bal (*4)	2 2	150/600/10K/47K +8 (*8) 150/600/10K/47K +8 (*8)	
Sony BVW Studio Time code	2 Dedicated	XLR XLR	Bal (*3) Unbal	2 2	600/10K +4 600 2.2 Vpp nom	600 -60
Sony BVW SP Time code	2 Ing/2 FM Dedicated	XLR XLR	Bal (*3) Bal (*3)	2 2	600/10K +4 (*7) 10K .5-18 Vpp	600/3K -60
Sony BVW-35 Time code	2 Ing/2 FM Dedicated	XLR BNC	Bal (*3) Unbal	2 2	>3K -60/-20/+4 (*7) 10K .5-18 Vpp	
Sony DVR-10 Time code	4 digital Dedicated	XLR XLR	Bal (*4) Bal (*4)	2 2	150/600/>10K +8 (*10, 12) 10K 2.4 Vpp nom	
Sony 5000 series Time code	2 (*2)	RCA (*2)	Unbal (*2)		47K -10 (*2)	600 -60
Sony 9000 series Time code	2 Adrs. trk.	XLR BNC	Bal (*3) Unbal	2	10K +4 10K 1.5 Vpp nom	3K -60
Sony VO-8800 Time code	2 (*1)	XLR (*1)	Bal (*3) BNC	2	10K +4 10K 1.5 Vpp nom	3K -60/-20
Panasonic AU-660 Time code	2 Ing/2 FM Dedicated	XLR BNC	Bal (*3) Unbal	2	600/10K 0/+4/+8 (*9) high .5-8 Vpp	
Panasonic AU-500 Time code	2 Ing/2 FM Dedicated	XLR BNC	Bal (*3) Unbal	2	600 -60/-20/+4 (*7) high .5-8 Vpp	
Ampex VPR-6/80 Time code	2 Typ. Ch. 3	XLR XLR	Bal (*4) Bal (*4)	3 3	50K +8 (*11) 50K +8 (*11)	
Ampex VPR-300 Time code	4 digital Dedicated	XLR XLR	Bal (*5) Bal (*5)	3 3	50K +8 (*11, 12) 10K 2.4 Vpp nom	
JVC 850 Time code	2 Adrs. trk.	XLR RCA	Bal (*3) Unbal	2 2	10K -20/+4 >10K 1.5 Vpp nom	>3K -60

- * 1 Optional time code card available from manufacturer.
- * 2 Address track is an optional third party add-on, can be RCA or XLR, bal or unbal.
- * 3 Transformer balanced.
- * 4 Electronically balanced—outputs are inverting/non-inverting stages.
- * 5 Electronically balanced—outputs are ground compensating (same level wired bal or unbal).
- * 6 Built-in NR cards optional, but format compatible with Dolby A (most common), SR and dbx Type 1.
- * 7 Chs. 3 & 4 can be fed from Ch. 1 & 2 connectors (switchable).

VTR AUDIO INTERFACING TABLE

Output (source) Imp. & Ref. Level	Noise Reduction	Audio Monitor	Limiters/ AGC
+4 into 600 ohms	None	8 ohm HP only 1/2/mix mono	Lim. switch
+4 into 600 ohms low 1.5 Vpp nom	None	Bal. XLR 1/2/mix mono	Lim. switch
+4 into 600 ohms low 1.5 Vpp nom	Dolby C	Bal. XLR 1/2/mix mono	Lim. switch
+4 into 600 ohms low 1.5 Vpp nom	Dolby C	Bal. XLR 1/2/mix mono	Lim. switch
37.5/150/600 +8 37.5/150/600 +8	None (*6)	Bal. XLR L/R 1/2/3 mo/st	None
600 +8 600 +8	None (*6)	Bal. XLR L/R 1/2/3 mo/st	None
+4 into 600 ohms 75 1.2 Vpp nom	Dolby C	Bal. XLR 1/2/mix mono	Lim. switch
+4 into 600 ohms (drv 600) 2.2 Vpp nom	Dolby C	Bal. XLR L/R 1/2/3/4 mo/st	Lim. switch
+4 into 600 ohms (drv 600) 1.5 Vpp nom	Dolby C	Bal. XLR (ch. 4) 1/2/3/4 mono	AGC switch
low +8 low 2.4 Vpp nom	None	Bal. XLR L/R 1/2/3/4/C mo/st	(Watch out for digital clipping)
-5 into high imp. (*2)	None	Mini phone 1/2/mix mono	Lim. switch
+4 into 600 ohms low 1.5 Vpp nom	Dolby C	RCA (-5) 1/2/mix mono	Lim. switch
+4 into 600 ohms low 1.5 Vpp nom	Dolby C	None	AGC switch
150/600 0/+4/+8 low 2.5 Vpp nom	Dolby C	Bal. XLR L/R 1/2/3/4 mo/st	Lim. switch FM clipper
600 +4 low 2.5 Vpp nom	Dolby C	HP only 1/2/3/4 mono	AGC switch on Lng and FM
< 50 ohms +8 < 50 ohms +8	None (*6)	Overbridge console only	None
< 30 ohms +8 < 300 ohms 2.4 Vpp nom	None	D-sub or console 1/2/3/4/C mo/st	(Watch out for digital clipping)
600 -20/+4 low 1.5 Vpp nom	None	Bal XLR 1/2/mix mono	Lim. switch

* 8 Shipped as +8 (600 ohm term). Impedance and level internally adjustable (LA-02, VR-05 boards).

* 9 Shipped as +8; impedance and level switches on S7 and Audio Main boards.

*10 Shipped as +8 (600 ohm term). Impedance and level internally adjustable (AD-28, LO boards).

*11 Shipped as +8; level internally adjustable.

*12 AES/EBU digital I/Os also.

whereas the 3/4-inch format uses an address track that records time code as a longitudinal audio signal on the portion of the tape where video vertical blanking resides.

Address track is almost universal on 3/4-inch, but was not standard on many industrial models, so time code is still put on an audio track occasionally (particularly when it must be "post-coded" after the video is down). Although this might not be the audio engineer's responsibility, a quick investigation as to whether the 3/4-inch field and editing decks can handle address track code could save a shoot.

Some additional oddities in the track department: 1-inch Type C is capable of four audio channels, but this is rarely used (or even provided) in the United States, so don't plan on it. Sony also manufactured a 1-inch VTR (the BVH-2180) with two additional channels of PCM digital audio. This machine was relatively popular in major production markets, but don't depend on being able to play these tracks back at every 1-inch equipped facility. The two digital VTRs listed in Table 1 have one analog cue track, as well as the four primary digital tracks, which often holds duplicate program audio because some decks mute the digital tracks when running at non-play speed.

GOZINTAS AND GOZOUTAS

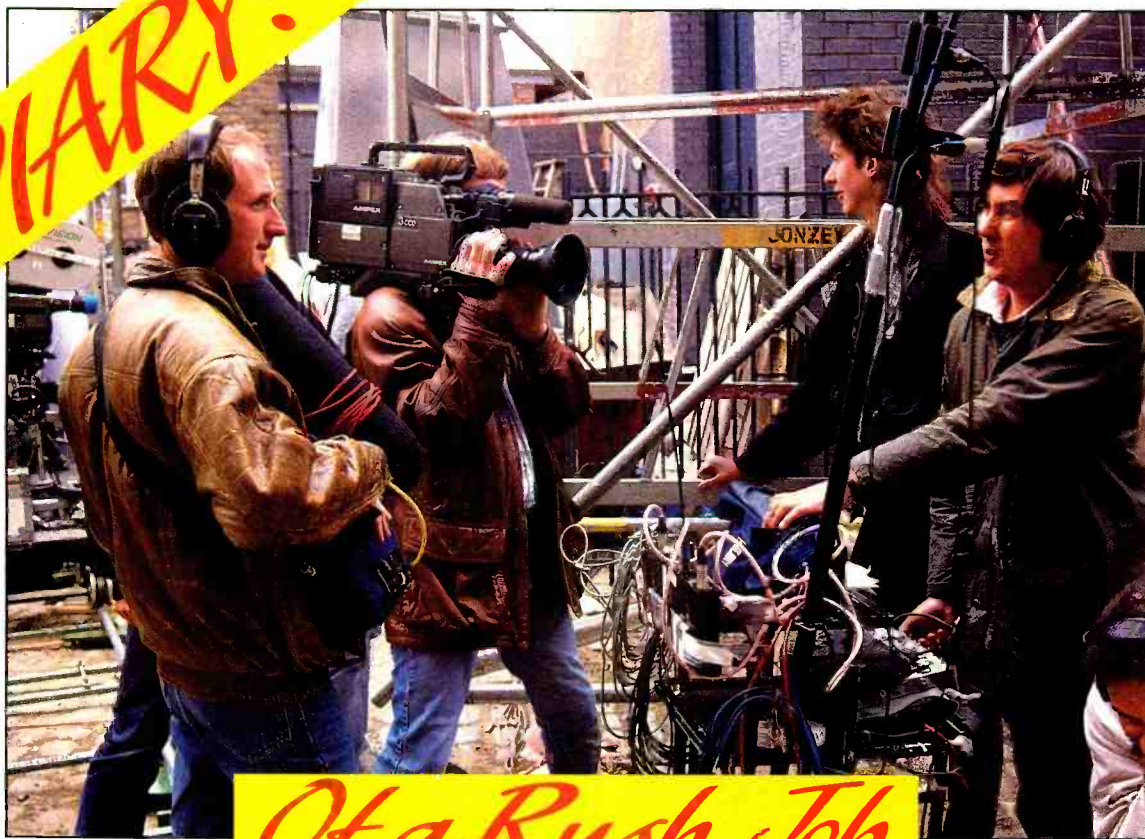
There is no lack of variety in the input and output schemes used on VTRs. Thankfully, some semblance of consistency has arisen in the professional arena; virtually all broadcast decks use XLR connectors on inputs and outputs. But seriously, the accompanying table lists input and output levels and impedances, and other information pertinent to interfacing. Impedance is listed first, and switchable values are shown with slashes between. The prevalence of 600Ω loads and balancing transformers is probably due to these machines being first used by broadcasters, but can be disconcerting to today's "bridging-type" recording engineers. Fortunately, most terminations can be switched off and the levels readjusted with the input controls.

Likewise, many of the decks can accept line or microphone level signals, using switchable attenuators or pre-amps. In some cases, particularly on portable "shoulder-mount" units, the inputs can select between mic, line or camera feeds on one or both channels. This is usually pretty clear from the panel markings. Even some 1-inch VTRs have mic jacks on the back somewhere, in case of emergency.

On the output side, source impedances tend to run 600Ω or lower, so driving most anything is no problem. Output levels are commonly listed as "+4dbm int 600Ω," which is the proper terminology but ignores the fact that so many systems are no longer terminating. The result will sim-

By Anthony Faust and Des Bennett

DIARY:



Of a Rush Job

All for a good cause: the world's quickest feature film, chopped, channeled and delivered 14 days after the title was decided and nine days after the cameras first rolled.

May 8: It starts. The phone rings. Can we help Telethon 90 in the making of the fastest feature film ever?

It's for a good cause. What's involved? Don't know. We arrange to meet Russ Malkin, producer, and John Gore, director, to learn that a number of renowned companies have agreed to provide services and/or equipment for a 3-day shoot.

The script will be written (once a name has been chosen) by a team of scriptwriters in four days. The only restriction on the storyline is keeping to the sets provided by Granada Tours. The Guinness Book of Records later creates a special page for the attempt.

The Dominion Theatre has already been booked to show the film on May 27, the night of the ITV Telethon broadcast. It is the only London West-End cinema available.

Anthony Faust and Des Bennett are technical directors at Atlantic Post-Productions, London.

We agree to help with production, but say that a new approach to shooting is required. Editing and dubbing has to be re-engineered, if the project is to have any chance of success in the time available. Breaking from tradition, it is decided that time code would have to play a major role in the film shooting, along with video editing and AMS AudioFile post-production to speed up the whole process. As the joke goes, we have to use a clock to save time.

MAY 9: THE BIG PLAN

We meet the production team for the second time and outline the technical schedule from the moment the cameras first turn over to the film being projected at the Dominion Theatre. The schedule is agreed upon by all parties and the dynamic duo accept direct responsibility for time code synchronization of the shooting, video editing, telecine neg transfer, neg cutting, AudioFile post-production of sound, and double-headed theater projection.

MAY 11: TESTING AT SAMMY'S

A 2-camera Aaton Film time code test is arranged, which includes two Panaflex Panavision 35mm film cameras, Kodak 5248 film stock, Samuelsons Video Assist System with Betacam SP video recorders, Fostex DAT with time code, Nagra IVS audio recorder with time code, time code generator readers, and audio and video D/A systems.

This is our first contact with the three Musketeers from Sammy's — Barry Measure, Karl Kelly and Steve Campbell. The test is scheduled for 11 a.m. and everything required is made available. By noon, the wires are buzzing — time code is arriving at all destinations except the Aaton time code reader/generator on the Panaflex cameras. It turns out that there is one vital piece of information missing from the instructions that Moe Shaw from Panavision had previously faxed from Los Angeles. Unfortunately, L.A. is now asleep.

We fax Shaw anyway and await the cru-

cial nugget of info, which arrives at 5 p.m. Brit time. The Aaton time code reader on the camera requires external input level at 2.5V before it will read. Surprise!

Finally, with the assistance of Kelly as camera operator, Bennett on sound/video assist, and Faust as talent, we shoot 400 feet of 35mm stock and stripe code on 35mm film, Betacam SP video, Fostex DAT and Nagra IVS. Pictures are cut to 35mm film and Betacam SP video. Program audio is dropped onto Fostex DAT, Nagra IVS and Betacam SP video. The test is successfully completed by 6:30 p.m.

As arranged, the film is sent to Technicolor for processing, where a print is also made. Both neg and print have time code photographed on the edge of the picture.

MAY 13: THE LOCKUP

Sound and picture rushes are sent to Luke Rainey at Wiseman. Rainey is considered one of the most experienced telcine film-grading/Aaton time code operators in the United Kingdom. Faust and Rainey have experience with coded rushes, so it only takes 15 minutes to sync-up the 10 minutes (400 feet) of stock using the Telcine/Nagra-T/Betacam SP Video Aaton time code system. Both 35mm NEG

and POS time code are tested. Everything is in sync within one-half frame. Success.

MAY 14: PARTY PLANS

Dame Edna Everidge and Richard Harris perform a ritualistic "Naming of the Film" press launch at the Dominion Theatre where 12 scriptwriters wait, pens poised on blank paper. Harris chooses the name "Fast Forward," which is unfortunately pre-owned. The "The Fastest Forward" is created and the race against time is officially on.

The Dominion Theatre has become headquarters for production while we, as technical directors, operate out of Atlantic Post-Productions.

MAY 15: PARTS IS PARTS

The production needs a list of equipment and services as long as a scrolling reel of credits:

- 2 AMS AudioFiles.
- 2 24-track recorders.
- 1 32-track digital recorders.
- 2 Nagra-Ts.
- 5 Betacam SPs.
- 2 Fostex DAT machines.
- 32 tracks of Dolby SR.
- 1 12-channel mixer.
- 2 loudspeaker monitors.

- Time code generators.
- Video monitors.
- 2 on-line edit controllers.
- 6 reels of 2-inch tape.
- 50 reels of 1/4-inch tape.
- 70 DAT cassettes.
- 80 Betacam SP cassettes.
- 30 U-matic cassettes.
- 1 day of Foley studio rental.
- An undetermined number of hours of 24-track mixdown.

We also need to find two feature-film editors and four on-line/off-line video editors who would work around the clock, away from home, over a bank holiday weekend for no remuneration whatsoever. Right.

MAY 16: ORGANIZING AND COMMUNICATING

As we work the phones, the list of unprocured equipment grows smaller. However, we are still having serious difficulties finding editors (film or video) with the right experience. One film-trained video editor, Keith Gaisford, calls in person to see how things were progressing. Within five minutes he volunteers himself, his equipment, his company and premises, and becomes the first video editor.



MAY 17, A.M.: MORE DETAILS

In order to secure a second AudioFile for post-production the following week, we meet with D.B. Post-Productions, which at that moment is hard-wiring a brand new AudioFile into its editing suite. Two cups of tea later and the deal is made: We can road-test the new AudioFile system as D.B.'s contribution to the Telethon.

Throughout the day, it is essential to ensure that the projectors at the Dominion Theatre are tested. Two phone calls and a meeting later, Ranks and Max Bell Theatre Projects sort it out, ready to project a film in 10 days (a film which had not yet been scripted, cast or crewed), fully synchronized to two stereo Nagra-T 1/4-inch machines. Because there is no time to produce an optical soundtrack, the plan is to prepare a negative optical time code track and to print it onto the answer print sound track used to synchronize the two stereo Nagra-T machines during projection.

We meet with the producer to see how all of the other parts of the plan were coming. The producers indicate that crews for camera, sound, lighting, grips and full transportation (two coaches) are ready to travel to the location at Granada Tours Manchester the following day.

We report our progress, saying that with 36 hours to go before the cameras started turning, we still don't have any audio, video, DAT or multitrack tape, but have signed on (only) one video editor.

MAY 17, P.M.: EVER MORE DETAILS

At Granada Tours, Malkin, the film's producer, approaches Midge Ure regarding possible music for the film. After a short chat, he agrees to supply a stereo DAT master of an arrangement he is recording, which could be used as the title music.

MAY 18, 8 A.M.: HOTTING UP

Sammy and Grip-House vehicles start their journey to Manchester from London with cameras, sound and video assist equipment on board. The first coach with production staff leaves London. By 11 a.m., we succeed in finding two more experienced TV network video editors. It is agreed they will all meet on location, as all essential tape stock for the shoot is now delivering.

At 6 p.m., the tech crew leaves to catch the 7:15 to Manchester, having arranged a van from Sammy's to collect the equipment that arrived overnight. Great news on the mobile phone: A feature film editor, Timothy Gee, agrees to join as super-

vising editor. Later in Manchester, they meet the first assistant director, Ken Touhy, and arrange the crew call time (5:45 a.m.).

MAY 19, 6 A.M.: MAKING IT HAPPEN

We can be found unpacking and setting up a system of time code and video distribution on three small trolleys. This system enables video pictures from the two Panavision Gold film camera viewfinders to be recorded onto two separate Betacam SP recorders with time code and guide-track cue sound for video editing. Master program sound is set to be recorded on Nagra IVS and Fostex DAT tape decks with time code. All time stamps are time-of-day.

By 7:45, Sammy's video assist operators arrive. Over the next three days and nights, for them nothing is too much trouble. The first setup proved to be the most difficult (as is usually the case). All who have looked at the collections and connections of the video assist and time code equipment can hardly believe that it would be reliable enough to move between locations without losing a lot of setup time. Their confidence is understandably shy — even well-designed systems are not made to be trolleyed around cobblestoned streets, least of all a system

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DIARY:



Partial view of the video assist/time code setup.

that has been cobbled together for the first time.

The Betacam Edit Suite is beginning to take shape in a Portacabin about 400 meters away from the action. The video assist system has been moved to the second setup and continues to function, and confidence by all is regained. The umbilical multiway to and from the cameras, together with the necessity of knowing beforehand each magazine change on both cameras, causes a slight annoyance initially, but the problems are soon worked out.

Thanks to the unflappability and understanding of Touhy and directors of photography Peter Hannan and Colin Davidson, we become known as the "Time Share Unit." By the third scene setup, video assist is now on one trolley (purloined from Lee Lighting) and is ready to go as soon as the cameras are loaded and turning over.

At 4 p.m., video editing starts. Setting up is slower than anticipated because the only edit controller we were able to borrow was an Editmaster, and none of the video editors have used this system before.

Explaining to the camera crews that pictures are being "fine-cut" on video that day is not easy. However, the spirit of the telethon and the fact that the editing is being supervised by an experienced film editor reassure all who inquire. "Time Share" seems to be working.

Apart from brief meal breaks and groups of fee-paying tourists sight-seeing around Coronation Street, shooting and recording continues through until midnight.

MAY 20: SPEED AND ALACRITY

The now mobile video assist is switched on pre-dawn to test a second Fostex DAT recorder that has arrived overnight from Multi-Track Hire. It works flawlessly.

Throughout the day, two questions are being asked: Can a third camera be used to shoot additional material, and can sync sound be recorded on that third camera? This puts pressure on the great time code plan because these latter pictures and sound will not be available to be edited until after processing and a Telecine transfer in London, creating a serious loss of time.

We decide that the third camera can record its own time-of-day time code and that a portable Sony 2500 DAT without time code will be used where sync sound was needed, locked up later. Agreeing to the "wild" third camera would automatically add at least one day to the editing and possibly more to the sound post-production.

That evening, the third camera develops a fault. An attempt to discover where the fault lies results in the damaging of a special American tool. Faust hears that the camera is going to be sent back to London overnight. He suggests calling the RAC (Royal Air Command) on the grounds that they might have such a tool. The idea is so unusual it is accepted, albeit with a certain amount of skepticism.

The RAC engineer arrives and immediately sets about removing the camera cover with the correct size tool (which he always carries as part of his tool kit for servicing large American cars). This allows access to the offending American circuit board for direct replacement. Much time is saved. Three-camera shooting continues until midnight. Editing is now running so

well that it is catching up on shooting. Only dialogue sequences are being cut, however, and the third camera's material becomes even more essential. The first reels of 35mm rushes are sent to Technicolor for processing.

MAY 21: THE GODS ARE SMILING

It's spring in Manchester, and not a drop of rain has slowed things down! The script is drastically rewritten as the story-line must change to suit the production time now available. Throughout each day's shooting, major lighting, camera and multi-mic sound rig changes are occurring with incredible speed, moving from interior to exterior effortlessly. It is amazing what can be done for a good cause.

Three cameras continue shooting until late afternoon, then reduce to one camera, because of the number of camera and sound crew members who must be at their day jobs in the morning. Faust returns to London to prepare for post-production; Bennett remains to oversee recording and de-rig. 35mm rushes are sent by courier to Technicolor for processing.

Late that night, a request comes in from production: Will all parties continue shooting until 2 a.m. on the 22nd? The unanimous answer is yes.

**MAY 22, 2 A.M.:
DONE, BUT NOT OVER**

The call goes out: It's a wrap! All that's left on location is to de-rig, including the edit-suite, and to drive back to London, arriving at 6 a.m.

Later, Rainey and Faust control the first sync-transfer of film and sound rushes at Wiseman's Telecine suite. Betacam SP color video rushes are compared with the black-and-white location video assist tapes, which contain edited pictures and sound. The system proves to be within a frame. The mobile Betacam Edit Suite arrives in London and gets unloaded at Rapid Rushes, Wardour Street. Another time code 2-machine edit suite is being put into action at Tiny Epic.

Bennett collects the second AudioFile from Richard Daniel at D.B. Post-Productions and oversees the delivery to Atlantic Post headquarters of the 24-track, Dolby SR and a monitoring loudspeaker system from Audio FX. To make sure all systems were calibrated, Audio FX does a full line-up of Dolby and 24-track after delivery.

Editing continues throughout the day and into the night. Gremlins attack one of the edit suites. It is decided to go with the suite that is reliable.

We urgently set up the audio post-production system in order to upload the wild DAT takes for editing on the Audio-File. The third camera idea eats into precious audio post-production time.

MAY 23: LOOSE ENDS

Technicolor and neg cutting become a little agitated, suggesting that the schedule is getting too far behind. Bennett keeps talking to keep things going while Faust checks the edit decision list for any errors. By 3:30 p.m., Reel 1 is locked to off and the first EDL is ready to be faxed the neg cutting suite, together with a follow-up phone call to confirm the numbers. Reel 2 is locked-off by 7:30 p.m., and the second EDL is faxed through for neg cutting. The director and editors decide to

complete the editing through the night before any further EDL lists can be checked and faxed.

MAY 25: POST BEGINS.

Audio post-production (three days late) begins with uploading DAT master dialogue EDL takes into the second Audio-File. Using both Audiofiles, we transfer and edit all dialogue tracks in a whirlwind 36-hour marathon. The Dolby SR-encoded, edited tracks are transferred to 24-track tape at Atlantic.

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MAY 26: MIX AND MATCH

Bennett arrives at Berwick St. Studios with the 2-inch masters to start the final mixdown. Through the next non-stop 21 hours, Bennett mixes the five reels down to 1/4-inch, using one of the two Nagra-T machines, while Faust continues to edit and lay tracks.

MAY 27TH: SHOWTIME

By 8 p.m., the audience arrives at the Dominion Theatre and is told by the producer that the soundtrack is still being mixed in a nearby studio. The audience also learns that two taxis are standing by to rush the soundtrack to the theatre shortly. Minutes tick by. At 10:30 p.m., Gore (the director), Bennett, Faust and a number of assistants, together with the master 1/4-inch and the Nagra-T, are rushed by taxi to the theatre. In the projection box, we meet Max Bell and Ray Steele for the first time, along with their team of expert projectionists and the second Nagra-T.

The tapes are immediately laced up, and we do a test run between the projectors and the two Nagra-T machines. Only one machine is able to sync up. It seems that at the last hurdle, the plan is going to fail.

The Nagra-T, which has been at the the-

atre for tests, has never actually run in sync, although it is reading time code, and neither Bennett nor Faust were aware of this until their arrival with the master tapes.

Time is running out and it is decided that the show would run with only one Nagra-T showing one reel at a time. The opening title reel is mute, and lasts two

minutes, during which time Bennett miraculously manages to make the offending Nagra-T sync up.

At approximately 11 p.m., the audience is shown a 50-minute feature film titled "The Fastest Forward," nine days after the cameras started to roll and 14 days after the title had been decided upon. The film rolls without any breaks. ■



One of the external sets used in the production.

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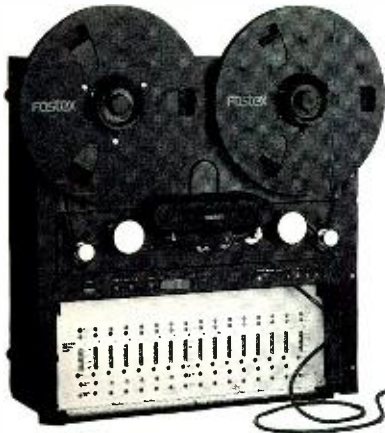
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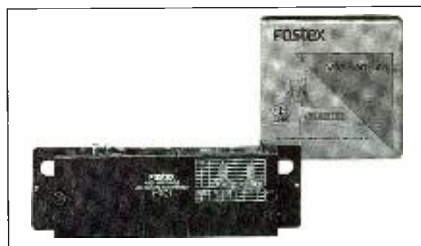
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FIVE QUESTIONS:

Counting Time

By Mike Joseph

Q: Once and for all, what are the differences between the different time code synchronization formats?

A: In 1971, the Society of Motion Picture and Television Engineers (SMPTE) standardized on the current system of time stamp/location address synchronization as a means of resolving audio, video and film lock-up problems in production and playback. Film originally used the mechanical sprocket-lock inherent in cameras and projectors. However, video and audio needed a more accurate and, importantly, video frame-locked system for synchronization.

The binary SMPTE time code signal frequency varies with frame rate and format, but for 30fps is about 2,400Hz (LTC, see below), based on the 80-bit time code information word length, times 30 frames-per-second. VITC (also see below) uses a 90-bit binary word.

The U.S. standardized synchronization frame rate for black and white television has always been 30fps (based on 60Hz power line frequencies and the early need to tie the vertical frame and field rate into ac line frequency to avoid "hum bars" from floating through the picture). In most audio and pre-edited video situations, 30fps is used, as it accurately reflects actual absolute elapsed time.

With the advent of the black and white-compatible NTSC color TV standard and its different video signal "speed," 29.97 frames per second or drop frame synchronization became necessary to realign the time code display and the clock. In drop frame synchronization, the synchronizer still reads 30fps, but drops two frames every minute in order to resolve to the color video sync information.

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

Additionally, these two dropped frames are left in every tenth minute, to create a total number of frames adding up as close to the clock as possible. Drop frame synchronization still generates an error of up to 75ms every 24 hours.

The European PAL standard is 25fps (based on 50Hz power), and the cinema standard is 24fps. MIDI Time Code, or MTC, is an electronic synchronization system, relying on SMPTE code recorded on tape, but converting it externally to information usable by MIDI devices via various tempo-mapping techniques. By utilizing some of the 32 unassigned "user bits" in the SMPTE word, MTC allows a means of providing a real-time reference for MIDI information.

Q: What is LTC vs. VITC?

A: LTC, or longitudinal time code, is an audio time code signal (or stripe) recorded on a dedicated audio track, whether resident on a video deck, audio deck or film camera. Its main drawback lies in limitations of readability at extremely slow (scrubbing) or high (winding) speeds. VITC, or vertical interval time code, solves this problem by printing its address codes as part of the video signal in the vertical blanking interval which occurs at the beginning of each frame.

VITC is an integral part of the video signal, and is separated from the video information by the deck's internal or external reader/generator. It can only be added or recut when recording or copying, and as such, is difficult to alter. Using VITC allows full use of all the audio tracks on a deck, but limits editing and re-stripping flexibility. Most audio production-related work utilizes LTC in the video environment.

Q: Will I still need external time code readers and generators when I get my digital disk-based editing system?

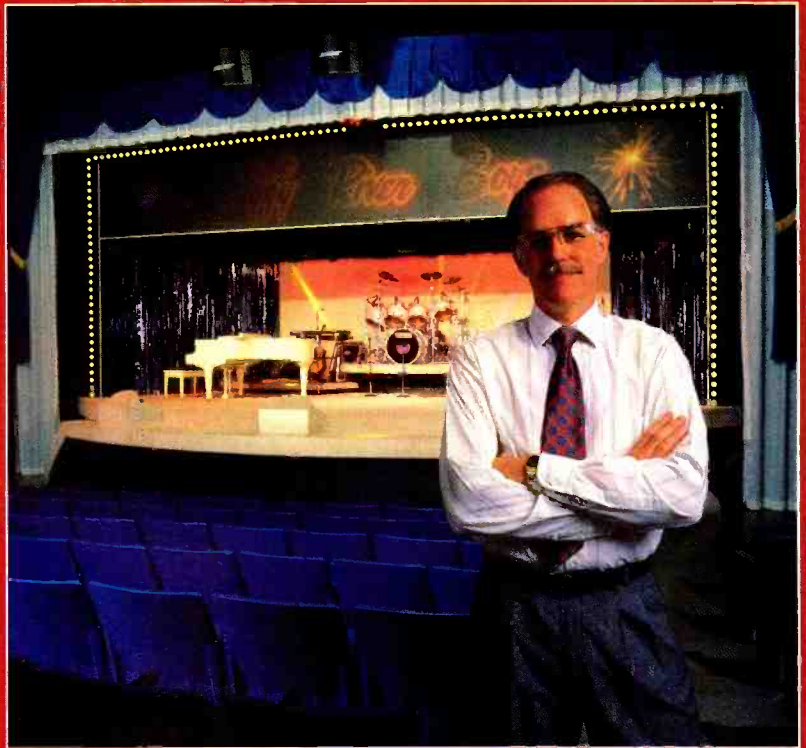
A: For the computer system itself, that

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—Thomas Tyson
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Bose Acoustimass Professional
Powered Speaker System

SUN SOUND: REAL WORLD CONTROL

A Northeast regional company is making the transition to nationwide status.

S

un Sound Audio of Northampton, MA, has been supplying quality concert systems to the touring industry for several years. Although much of the company's work has involved one-nighters and regional mini-tours in the Northeast, nationwide touring has become an important part of its operations.

"Moving from being a regional to a national touring company has been a real challenge," says Sun Sound owner Herb Mayer. "Financing the acquisition of new equipment is probably the toughest part of it. We often have to expand and build more gear, sometimes on very short notice, like when we have to configure a system to please a particular client.

"Meeting the challenge is worth it, though. Each thing you do on a larger scale can lead to something even more profitable and prestigious."

When production needs for 10,000 Maniacs' recent national tour were under discussion, Sun Sound's name ended up at the top of the list. The band's sound mixer, Oliver Dow, a native of England, felt that the company's high-tech approach to packaging road systems would give him what he needed for the 1989 nationwide tour.

"P.A. rigs are a dime a dozen," Dow says. "You can always find somebody willing to truck around a pile of black boxes and set them up for you. We were much more interested in working with a knowledgeable, technically capable outfit that would give us service and full support."

For the 10,000 Maniacs show at Great Woods Amphitheatre in rural Massachusetts, Sun Sound provided a 48-box EAW KF-850 system. One dozen enclosures were hung on each side of the stage from Sun Sound's custom aluminum fly bar with a pair of chain motors; another dozen were stacked two high on each side at stage level.

The EAW boxes were powered by Crest 8001 dual-channel amplifiers. Each Sun Sound custom amplifier rack houses four amps, along with a front signal cable connector panel and a trio of heavy-duty fans. Front and back covers are removable. The entire rack has a foam surround to offer protection during transport, and is housed in a traditional road case equipped with wheels.

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

"The Crest amps are wonderful," Dow says. "They genuinely do run the low end of this system at a 2Ω load, and there are no overheating or power supply problems."

Dow operated the system from a location near the center line of the seating area. The main speaker system was set up in left/right format, with separate level control for the lower and upper arrays via the matrix output section of a Yamaha PM-3000-40 mixing console.

Eight separate special effects devices were available, with each dedicated to certain sounds on different musical selections in the program. These included four Yamaha SPX90IIs, two Yamaha REV-5s and two Lexicon PCM 70 digital effects processors. Four of the devices were for general effects use, and the other four for specialty effects, such as gated snare reverb or flanged bass.

Channel-insertable signal processing included parametric equalizers from Klark-Teknik, dbx compressor/limiters and Drawmer noise gates. Custom cable harnesses fabricated for Sun Sound by Sonix (see accompanying sidebar) linked the Yamaha mixing console to the electronics racks and to the ASM Real World automated send matrix, a unique and flexible computer driven mixer/router.

"I don't like to go 'over the top' with front-of-house gear," Dow says. "There's no point in having specialized equipment that is just treated like toys. The main thing I wanted to accomplish was to get a certain consistency with the group's sound, to be able to have a mix that complemented their musical material, and that could be something they could count on.

"For me, that mainly meant figuring out a way to pre-set reverbs and delays and having a reliable system of cues and program changes, so that I could then mainly focus on the sound of the band and the system in each venue, so that each show sounded its best."

By David Scheirman

To accomplish his goal, Sun Sound provided Dow with the new ASM (Automated Send Matrix) system from Real World Design. This is the first major commercial product to come from the company, a small-scale electronics designer/manufacturer that is responsible for custom gear in Peter Gabriel's recording studio near Bath, England. (See Figure 1.)

Originally designed with Solid State Logic consoles in mind, the ASM can be interfaced with most mixing consoles. A full-blown system will add two to eight additional sends per chan-

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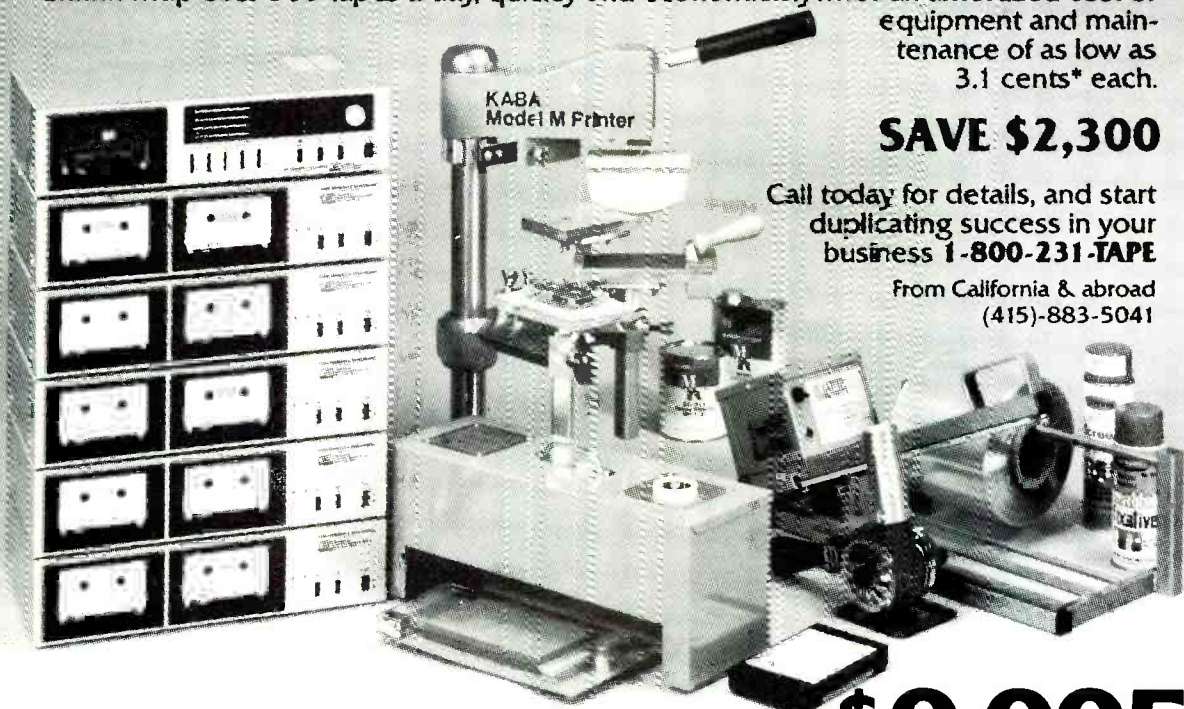
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Circle (28) on Rapid Facts Card



One dozen speaker enclosures were hung in left and right arrays; another dozen were stacked two high at stage level on each side.



EAW KF850 enclosures are suspended in a hanging array. One dozen cabinets are hung from Sun Sound's custom aluminum fly bar with two chain motors.

nel and, depending on the size of the console, can accommodate up to 96 channels.

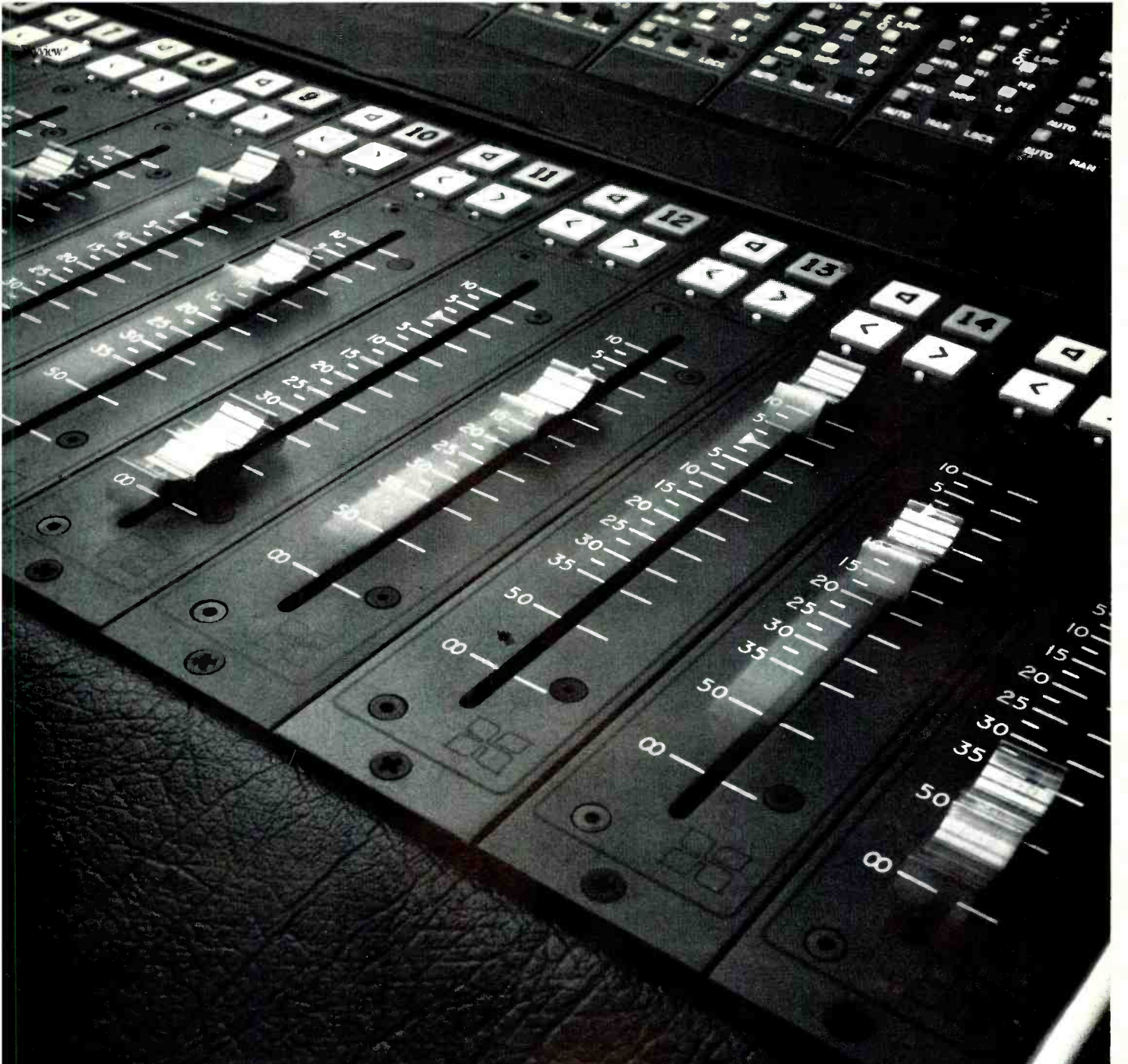
The system includes an audio main-frame (five or seven rack spaces high, to hold 10 or 15 modules) and a computer frame (two rack spaces high, with up to four master audio sends along with computer controls). The computer section includes a backlit character display, a 3½-inch floppy disk drive and control keys.

For this tour, Sun Sound ordered a 16-input, 8-send system incorporating a manually cued MIDI remote system that uses an Atari 1040S personal computer. An Atari SM124 monitor was installed atop the Yamaha mixing console to display system status data and cue and program change information for the eight MIDI-linked reverb and delay devices.

With only a limited number of systems in use worldwide outside of Gabriel's studio, Sun Sound owner Mayer was hesitant to get involved with such an "exotic." But once he understood what could actually be done with the system, and that its applications would last beyond this particu-



Each of Sun Sound's custom power amplifier racks house four Crest 8001 power amplifiers. Input and output signal cables are connected on the front panel.



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lar application, he felt it would be worthwhile to incorporate the ASM into Sun's inventory.

"With the ASM, a sound mixer can store different effects device patch changes for each song, and up to 32 songs can be stored for a show list," he says. "And the set list can be stored in different configurations! My technicians have found it to be fairly easy to get familiar with, and we feel that computer-controlled effects systems for concert sound is the direction the industry is heading."

The system offers three different levels of data storage. "Patch" is a group of MIDI program changes on up to 16 channels. "Song" includes 32 patches that can be titled and called up in order. "Show" enables up to 32 "songs" to be arranged in different orders. An override function is provided at each of the three levels.

Although recording studio applications can be more complex, Dow found that he needed no more than eight or nine changes in a single song.

"We start by taking a post-fader aux-

Specialized Technical Support Services

As regional companies, such as Sun Sound, make the transition to offering national touring services, personnel resources can often be stretched quite thin. Because assembling a major touring concert sound system is quite labor-intensive, customized work is often difficult to perform in deadline situations.

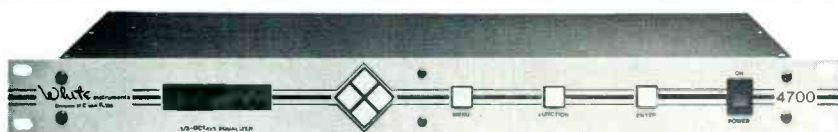
Sun Sound uses the services of SONIX, a small specialty electronics design and fabrication company in Northampton, MA. Formed in 1977 as a small local sound company with hopes of becoming a regional sound vendor, SONIX has grown into a service facility that specializes in mixing console modifications, cable harness build-up and fixed-installation work. SONIX designed and built the intricate cabling interface to connect the ASM computer, special effects devices and the PM-3000 mixing console for Sun Sound.

"Installation of specialized modifications to mixing consoles can be a very tricky business, as some things do not work in practice as they do on the test bench," says J. Scott McArthur, SONIX owner. "If a modification is performed correctly, the enhancement will be evident, and the electrical or mechanical characteristics of the console will not be compromised."

SONIX services many brands of professional sound equipment, and has a full audio repair facility. The company has performed modifications and custom work on consoles from Stevenson Interface, Soundcraft (200, 400 and 800 ground and power supply modifications) and Yamaha (PM1800 and PM3000). The company has also completed numerous custom interfaces, switching and cable devices for the sound, lighting and pipe-organ industries. Regional installation and custom system work clients include Amherst College, Smith College, the University of Massachusetts and Dartmouth College.

"Our goals are quality and reliability," notes McArthur. "We've worked on everything from some highly specialized corrections to older 'vintage' recording gear, up to Solid State Logic pipe organ relay repairs and interfacing. We keep a select group of qualified subcontractors for specialty work, and this is one of the main reasons that large projects can be completed in very short time frames."

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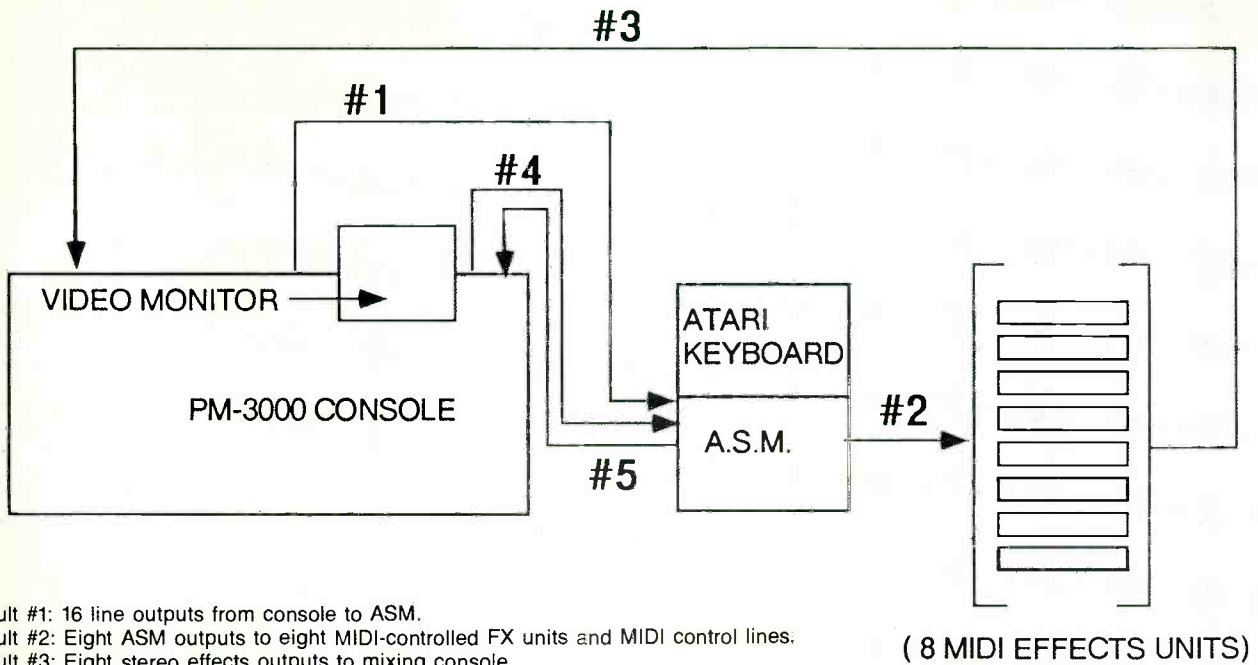
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 Mult #5: 16 console effects channel insert returns from ASM.
 (Multicables #4/#5 allow the ASM to mute the 16 effects returns.)

Figure 1. ASM interface.

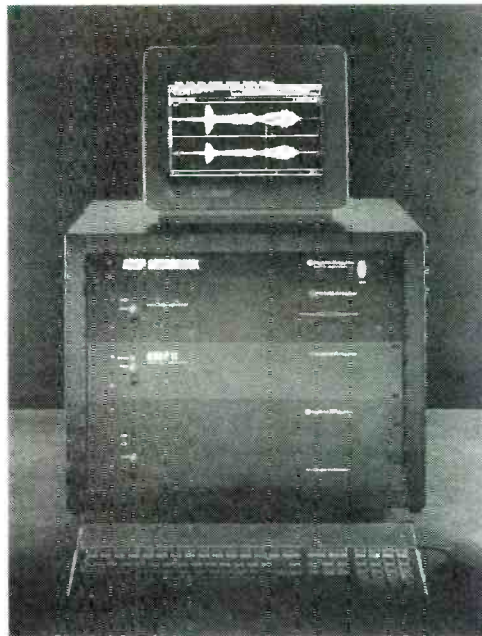
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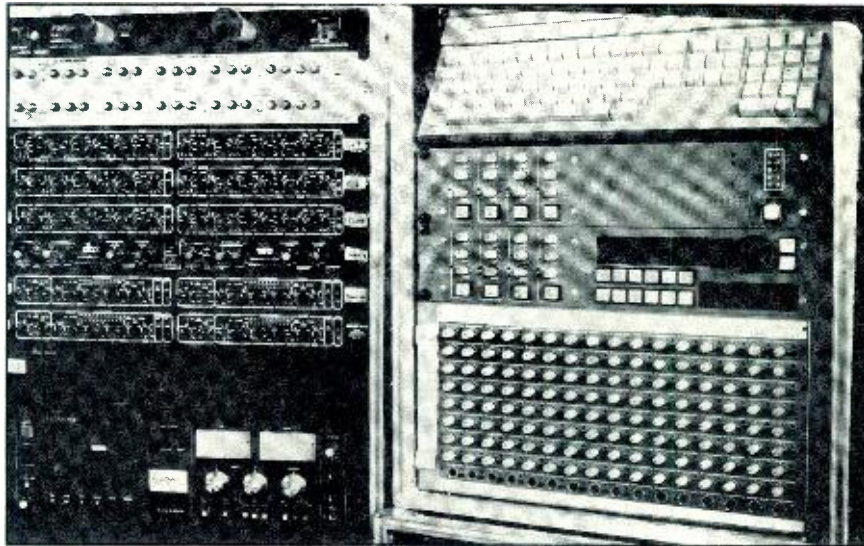
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Real World's ASM (Automated Send Matrix), shown mounted in a road case, below the Atari computer keyboard.

iliary line output, and determining just what all effects devices that signal will need to go to during the course of the show, and at what level it needs to be returned into the mix," he explains. "The information is entered via the computer keyboard, and the ASM memory section stores that data to disk. I can easily change the parameters for each song, or change the order of songs in the set. And I can have all of this data with me on a floppy disk, and then work on program notes and cues and things on another computer away from the main sound system if I need to."

Real World custom-made a mini-control remote panel, which allowed the access at the console to the primary computer-controlled functions of the ASM, rather than having to reach over to the main control panel in the rack.

Is there a worry about system crashes?

"Well, we had a show at one building where they lost power at the venue four times," Dow says. "When the system crashes, the ASM is left in the last patch mode you were using. So when the power came back on, of course the band didn't just jump right in at the same bar of the same song as if nothing had happened.

"It takes the ASM about 30 seconds to get back into operating mode. It would be nice to have an auto-boot function so that if you had a system crash, you'd be back up on your hard disk automatically when power was restored. That should be just a matter of changing the software for the system."

Dow said he was also looking at doing

effects cuing for the stage monitor system from the house in the future. At the shows, the system gave the sound mixer an ability to easily create audio "scenes" by using the available bank of reverb and delay devices. Resetting up to eight MIDI-linked effects devices for the next song was as simple as one push of a button on the mini-control panel located on the console.

It is interesting to ponder the next logical developments in live sound mixing now that the personal computer has taken its place at the mixing console. Whether used for such simple chores as filing and displaying set lists and song cues on a video monitor, or placed in a more active role (such as the Real World System) to address and control special effects devices, it is certain that we will see more uses of the computer in conjunction with live sound systems. It's just a matter of time before the software and specialized peripheral hardware are developed to complete tasks that have traditionally been handled in manual fashion. ■

Hands On:

Akai DD1000

By Rick Schwartz

While some manufacturers continue to argue that optical disks do not work well for digital audio applications, Akai is shipping an optical disk recorder that records four tracks of CD-quality digital audio onto one disk.

The DD1000 uses a Sony magneto-optical (MO) drive, which takes 650Mbyte (ISO-standard) rewritable cartridges. The disk, housed in a protective casing, is 5.25 inches in diameter.

The problem with optical drives as a recording medium for digital audio has always been simple: speed. Optical disks have access times that are much slower than conventional fixed hard disks. The benefit is that they use a high-volume, removable cartridge. This is a big plus over conventional hard disks, because it eliminates the need to upload and download material before *and* after a session.

Recording time on an optical cartridge is about the same as a 10-inch reel of tape at 15ips (30 minutes of stereo at 44.1kHz). Unformatted cartridges currently cost about \$250 but can be reused millions of times without flaking, print-through or any high-frequency loss. Word on the street is that MO cartridges will be falling in price in the next six to eight months as the format gains popularity and production is increased. Optical cartridges are crash-proof and their shelf life is excellent, so you don't have to worry about losing precious masters.

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



Hard-disk recorders have a number of advantages over tape. All editing is non-destructive, because it is done using "pointers" to the original recording. No matter how many edits you make, your source file is left untouched. Disk-based systems don't need fast-forward and rewind buttons, because they're random access in nature and will play sound from any part of the disk almost instantly.

Although most hard-disk recorders can emulate analog "scrubbing," experienced users often find graphic waveform displays to be more accurate in identifying edit points because of their extremely high resolution. However, if you prefer to work the old-fashioned way, you will find scrubbing to be smooth and natural sounding on the

DD1000. (Scrubbing tip: Try using the LED indicators to locate editing marks at low playback speeds.)

The DD1000's capability to crossfade sounds allows for smooth transitions and natural sounding edits, even on difficult program material. Real-time digital signal processing on the DD1000 allows pans, level adjustments and crossfades of up to a minute to be auditioned instantly. Once you've "cut" using a hard disk, it's hard to go back to a blade.

Just how Akai records four tracks of digital audio onto a single disk remains a secret. But one thing is for sure: The user is never aware of any of the limitations the medium might have. In fact, the DD1000 appears to be more responsive than oth-

er workstations on the market.

INSTANT ACCESS

Most hard-disk recorders have a short delay before a sound can be played back from the disk. The DD1000 does not. Playback is instantaneous, thanks to an ingenious priming routine, which loads the first part of a sound into RAM. This instant playback feature allows the unit to be used as a digital cart machine. Thanks to an effective voice allocation algorithm, sounds overlap in a seamless manner. When triggering samples with a MIDI keyboard, the unit feels like a 4-voice digital sampler with the remarkable capability of playing stereo samples of up to 30 minutes (one hour in mono).

GETTING AROUND

The DD1000 has six basic modes, which are accessed using dedicated buttons with LED indicators. Functions within these modes are accessed using six soft keys below the screen. A page button steps through the function pages within each of the operating modes. By using the Tag and Jump keys, the user can toggle between any two desired editing screens, which can be a real time-saver. Cut and paste keys are used to rapidly move data around without the need to re-enter time code numbers.

Before you can use the DD1000, you must first format a blank disk, which takes place in the disk mode. Formatting a disk is a real-time process that takes about 28 minutes per side. It's a good idea to always have a couple of formatted disks around, because you never know when you might need them.

The disk mode is also where you copy files to an external disk, or to rename and delete files — although the fastest way to delete a soundfile is to record over it and then abort the recording. Files can be grouped in categories by "tagging" them with any letter in the alphabet. These "tags" are then used by the disk directory as a means for searching through lists of files with the same tag, much the same way files in a computer directory can be grouped by being placed in a folder. This feature could be used to categorize sound effects or to keep music projects created for different clients in separate directories.

Now that you have a formatted disk, you're ready to do some recording. Once in the record mode, you need to select whether your source will be analog or digital. AES/EBU and fiber-optic jacks are provided for digital inputs. Although the manual suggests that the AES/EBU XLR jack will work with DAT machines, most of them support S/P DIF appearing on an RCA jack. If the format is correct, you may need an RCA-to-XLR adapter cable.

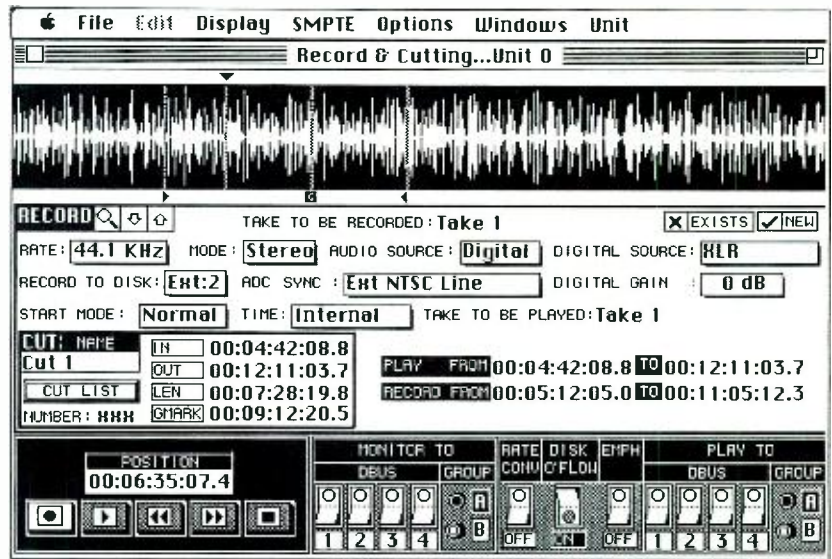


Figure 1. Record/edit window.

Sampling rates of 48kHz, 44.1kHz or 32kHz are selected in a setup window. Digital inputs automatically configure to the source sampling rate. Inputs can be set for mono left, mono right or stereo. Pre-emphasis does not automatically configure itself and must be set correctly. I noticed that emphasis could be changed after recording, which could be dangerous. Akai should consider attaching an emphasis flag to each take during recording to eliminate the possibility of incorrect settings.

The DD1000 stores and recalls all setup parameters, which makes recording fast and easy. A display window shows the cur-

rent time and remaining free time, and markers can be placed in a sound file during recording. Recordings can also be time-stamped with incoming SMPTE time code, which simplifies re-synching.

I was pleased to find the presence of real-time sample rate conversion in the recording setup page. Many studios record their music onto a DAT recorder, using its analog inputs, which default to 48kHz. Unfortunately, CD pressing plants require that tapes be recorded at 44.1kHz, thus the need for sample rate conversion. Until recently, sample rate conversion was an expensive process, requiring specialized equipment. On the DD1000, just set the

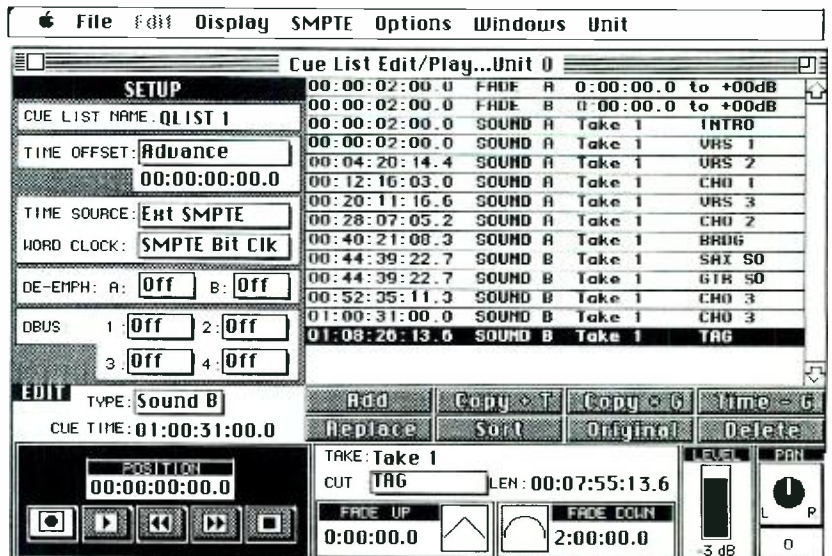


Figure 2. Cue list screen.

ScreenSound. A fully integrated audio for video editing suite



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AES/EBU interfacing keeps digital audio transfers free of analogue distortions and losses, preserving the highest audio integrity through to the final format.

Above all, ScreenSound is a dedicated system - purpose-built to bring the advantages of hard disk sound manipulation to audio post production.

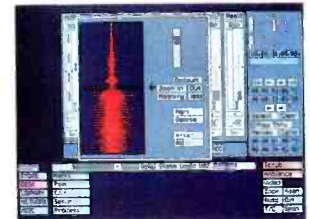
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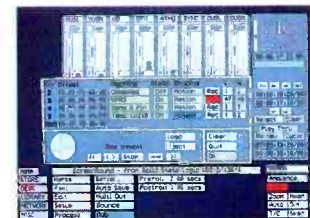
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desired sample rate in the record window, turn sample rate conversion on, and the unit will do the rest. It will even convert from 48kHz to 32kHz to save disk space.

A finished recording is called a "take." Takes are then edited into "cuts" in the edit cuts mode. Editing is facilitated using a general purpose marker (GPM), which behaves something like a movable playback head. After the GPM is set to a point within a cut, the location numbers (given in SMPTE time code, beats and bars or sample points) can be copied and pasted into the start or end times.

Up to 10 cut points can be entered on the fly. Using this method, you can easily mark the beginning of musical sections in one pass. Edit points can be fine-tuned using the button marked "detail" and the scroll wheel. Each recording can have up to 50 cuts, which are then assembled using either the playsheet, QList or song mode.

The playsheet allows up to nine cuts from anywhere on the disk to be played instantaneously, using either the built-in numeric keypad or a MIDI keyboard. Playsheets may be assigned a MIDI patch number, and a new playsheet can be called up and primed in about two seconds through a MIDI patch change command, or by using a front-panel command on the DD1000.

A "Record to Q" function allows for cuts within a playsheet to be triggered in real time while recording them into a QList, so they can be further edited to match the visual time code numbers. The playsheet mode can be configured for either 2- or 4-track operation. The difference is that 2-track operation interrupts a currently playing cut when a new one is triggered; 4-track operation allows any two cuts from the disk to play simultaneously.

The QList is actually an edit decision list, which allows cuts to be freely shifted in time relation to each other or overlapped and then triggered against time code. This mode is ideal for post-production applications. Lock-up time while chasing time code is almost instant (less than a second). Once "locked," the DD1000 has a sync accuracy window that uses a 4-digit display to show speed deviations from an external time code source.

The DD1000 is one of the few digital audio workstations that has a "song mode," which is a natural for users who are used to working with sequencers and drum machines, where patterns are created and then chained together. It is also useful for the creation of extended dance remixes because it lets you quickly assemble and repeat song parts often. Each element in a song has a user selectable overlap amount (a sort of auto-crossfade), which can help to make difficult edits work. Songs can also be converted to a QList for

further editing if so desired.

Because the DD1000 is a 4-track unit, it will record two stereo pairs of digital audio. You can even overdub while hearing another track, although simultaneous recording of all four tracks is not possible. I still can't figure out how it can read and write data onto the same disk at the same time, but it works!

If you find yourself running out of tracks, you can digitally combine tracks using a command called "retake," which writes a new file to the disk, including all levels, fades and panning information. Because the new composite is created digitally, there is no signal degradation. Although retakes are not real time, you can open the new mixed take, paste it into a new QList, and continue overdubbing.

The only limitation is that you still have only four outputs. Creating a submix involves the sacrifice of further independent control of the mixed tracks. Because your original tracks still exist, it is always possible to make changes and perform another retake.

The DD1000 is not exactly portable, but it is "luggable," being about the same size and weight of a small 3/4-inch video deck (37 pounds). Both the drive and cooling fan are relatively quiet compared with most other workstations, which makes the DD1000 suitable for use in a quiet studio environment. The unit is 5U high and can be rack-mounted at a vertical angle of up to 23°. Disk spin-up and system boot time is fast. Some workstations take minutes, but the DD1000 is ready to go in seconds. Because of the decision to keep the operating system in ROM and not on disk, software revisions will be installed by inserting new EPROMs into the top of the unit.

Optical disks are hard-sectored, unlike conventional disks. The DD1000 must use cartridges that have 1024byte sectors (512 types will not work). Although ISO/ANSI standard disks (as used by the DD1000) do not offer as much storage capacity as the newer Maxtor Tahiti-type formatted disks, they are more widely used (ensuring future availability) and available from a number of manufacturers. Although the manual says not to remove a cartridge during recording. It is too easy to accidentally bump the eject button on the unit. There should be some kind of software-controlled drive-lock to prevent this from occurring.

BACK PANEL

In addition to all of the normal ins and outs, the back panel contains some unique items worthy of mention. The RS-422 jack is intended for interacting with VTR machines in a post-production environment, and it conforms to the Sony BVU-800 protocol. A Centronics port connects to a printer to allow hard copy output of the

disk directory or a QList.

There are also two footswitch inputs, which are GPI closure devices that can be configured for triggering a variety of functions within the unit. Extra optical disk drives are connected to an additional SCSI port and may be daisy-chained to increase sound storage.

A record overflow setting allows the DD1000 to record across two disks for a total of one hour of continuous stereo recording at 44.1kHz. Normal (512K-sectored) magnetic drives will not currently work with the DD1000, but this may change with a future software revision. A SCSI-2 jack is reserved for future applications, one of which is an optional remote controller called the DL1000.

REMOTE CONTROL

The DL1000 supposedly will look a lot like the front panel of the DD1000, with a few changes. Most notably, there will be a couple of faders that control the output levels for each track. Fader moves may be recorded into a QList, thus allowing for the creation of automated mixes. A couple of cosmetic changes have also been made to the unit. The DL1000 will have an angled LCD display (similar to that used in Akai's popular MPC60) for easier viewing, and a larger scrub wheel with a finger indentation, which will be inset into the front panel.

Also, the DL1000 will read and generate SMPTE and will read VITC (but not write it). The most significant feature is the DL1000's capability (through SCSI and SMPTE connections) to remotely control up to seven DD1000s, including control of all internal functions for each unit.

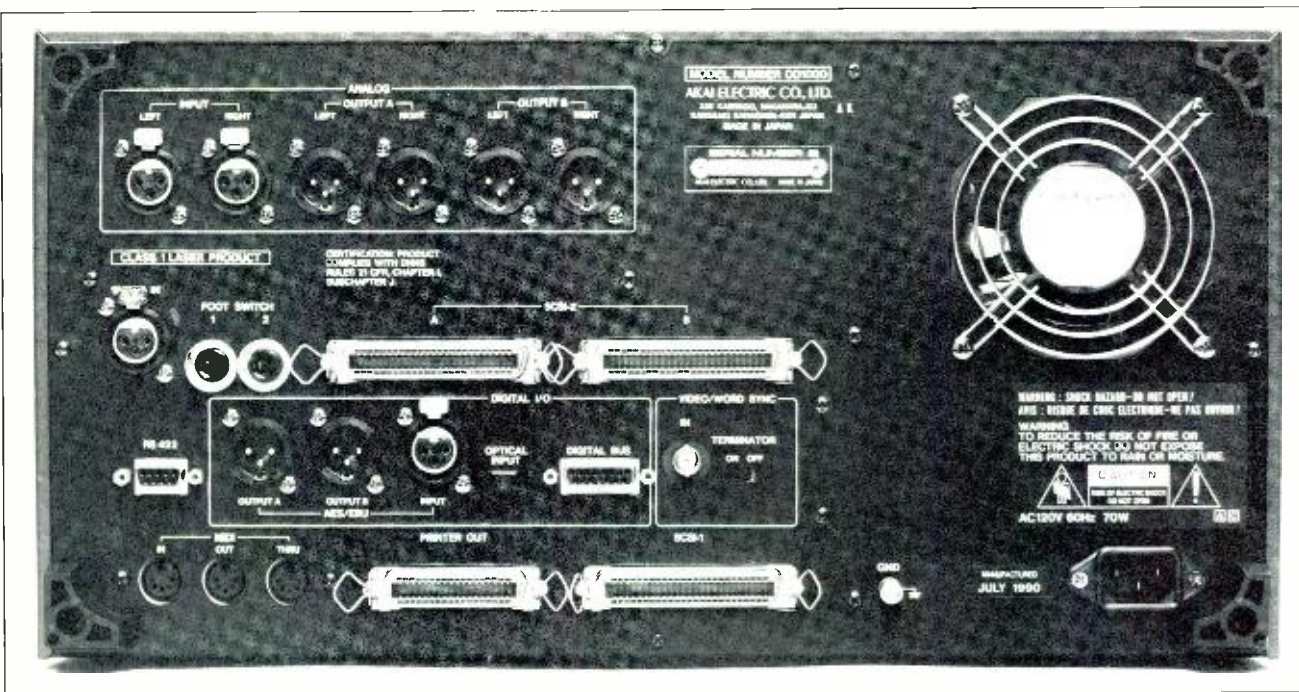
SYNC

Akai clearly did its homework on digital sync. The DD1000 will lock to almost anything. There are nine different types of sync references for the digital converters. Of the two most exotic, one is SMPTE bit clock, which allows the unit to varispeed or slew up to 10% to match free-running tapes from the field. The second is external video sync (NTSC or PAL), which connects to "house sync," which can be found at most video editing facilities. Typical users will find that the internal XTAL works fine for most applications.

METERING

Zero, as displayed on the meters, is really the maximum operating level. There is no reference to nominal operating levels. I inputted a digital tone from a DAT test tape that corresponded to 0VU (+4) on the analog outputs. The Akai's meters read -17, leaving only three LEDs to display signals below 0VU.

It would be nice to see a center detent



The DD1000's back panel.

on the input and output level controls indicating unity gain, along with an uncalibrated switch (similar to an analog two track machine). The manual specifies recording at a "healthy level ... averaging around 0dB on the meters. If it stays too long in the red, the recording may be clipped and distorted." There is no doubt about it. Digital clipping is a brick wall. If you hit the wall, a take is most likely unusable.

MACINTOSH SOFTWARE

The user interface is good as far as samplers go, but it will benefit from future Macintosh software. The Macintosh front end will control most of the parameters of the DD1000 using the computer screen.

The preliminary software I saw had four main windows. A record/edit window displays the waveform (including all markers) and allows the user to trim, name and save cuts. (See Figure 1.) This screen is a combination of the record and edit pages and contains all of the recording setup parameters.

The next screen is a cut list directory that allows the user to add, delete and rename cuts. The third screen is the QList editing page and contains all QList parameters, including levels, pans, fade up parameters, time code location of each cut, and other functions. (See Figure 2.)

The final screen is a graphic time line display of the A and B output tracks of a given QList. Cut names and take names are displayed in a graphic manner, such as a piano roll, with fade-in and fade-out

times clearly indicated for each cut. By the time it is released, it will also include the playsheet and song modes.

Because of the larger area for displaying graphic information afforded by a personal computer, there is not as much need to be stepping through pages. Akai has big plans for the DD1000 in the post-production, motion picture sound editing and broadcasting industries, and a specialized software front end is the key to penetrating these markets.

With the Macintosh as a front end, the DD1000 becomes an "engine." Powerful software will integrate the DD1000 with external MO drives, digital samplers (such as the S-1000) and possibly even provide machine control on the A-DAM digital multitrack. Akai is already working on such future enhancements as time scaling and digital EQ.

THE BOTTOM LINE

The DD1000 is a serious entry into an already crowded field of digital audio workstations. One major advantage it has over others is price. It costs about as much as a good 4-track analog mastering deck (\$13,500). This is really not bad, when you consider that the DD1000 is a stand-alone unit and doesn't require an expensive computer with a large hard disk. The real test is how it sounds. If you like the sound of an Akai S1000 digital sampler, you'll love the sound of the DD1000; it sounds great and should satisfy the most discriminating listener.

The DD1000 is relatively easy to use and

should get even better as the user interface becomes more refined. Documentation is very good (it's even printed on recycled paper!), which helps to shorten the learning curve. Akai plans to include a 2-page reference guide for people who don't read manuals (like me).

I should mention that I had some initial confusion because of the choice of terminology. For example, it took me a while to realize that Copy+T really means to perform a butt cut. Is it logical? Yes, but wouldn't abut or splice be more intuitive? Also, I experienced some minor inconveniences, such as a take playing back on different outputs than it was recorded on, and the absence of a cancel button. I would bet that most of these types of things will be ironed out by the time the unit hits the streets.

The DD1000 is amazingly complete for a new product. It appears that Akai has been waiting to release the unit until almost all of the bugs have been worked out. They are. If Akai continues to improve the DD1000 at this rate, it is going to be a really nice product.

Almost anything is possible on the DD1000, but now the unit seems best-suited for music editing and broadcast applications. With a good Macintosh front end, it could become an even more powerful tool for post-production. It's definitely worth checking out.

Circle (100) on Rapid Facts Card ■

First Look

By Laurel Cash-Jones

AS YOU MAY RECALL...

Last month, I covered the new joint venture between LucasArts and New England Digital regarding the new version of Sounddroid. Well, it now seems to be very fashionable to launch into a joint venture (which I guess is better than being purchased by someone).

To wit is the joint development venture by Soundmaster and Leonardo Software regarding the creation of their new Integrated Audio Editing System. The soon-to-be-completed system is said to be "the first completely integrated digital audio editing system with integral information management software combined into a

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

production system of unparalleled sophistication and ease of use." (Haven't I heard this somewhere before?)

Perhaps yet again for the first time, users (that means you) will have a digital audio sound effects librarian connected to the Soundmaster editing system, including its digital audio module, which will be extremely useful in SFX spotting, creating EDLs, and printing cue sheets and dialogue replacement scripts.

The system hardware revolves around the tried and true Soundmaster synchronizer family of products. Just in case you are not familiar with them, the Syncro synchronizer uses a 5MHz parallel bus, distributed-intelligence architecture based upon the 8088/87 microprocessor. The hard disk recorder, also known as the Syncram module, resembles a 2-channel digital audio workstation with random access editing capabilities. To the Syncro module, Syncram appears as just another audio or video deck. There's more to the hardware

of this system, but if I tell it all here, there will be nothing more for you to find out when you get the literature you're going to send for, so let me get to the software.

The software portion of the system is based upon the Leonardo Professional Librarian software package, which coincidentally is now being distributed by Soundmaster. Among its features is the ability to organize tapes, DATs, CDs, carts, samples and floppy disks. It can also control the operation of up to 16 of the Sony CDK-006 multidisk CD players. It also manages sound effect or ADR spotting lists that can be referenced to reel, scene, time code or feet/frames, and prints out a variety of forms that are common to this type of work.

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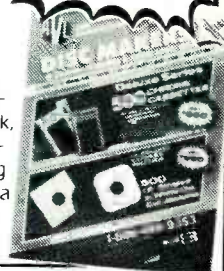
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system that yields no clipping artifacts. The Paragon has four bands of compression and bands of limiting, including user adjustable crossover frequencies, attack times, release times, coupling (be careful, coupling is considered an illegal act in some states) and mix level.

It is designed primarily for the broadcast market, but it has uses for compact disc mastering because of its extremely flexible user interface. Several Paragon add-on hardware and software options will also be available, including a digital 10-band graphic equalizer, digital FM stereo generator and an AES/EBU input/output package.

Circle (102) on Rapid Facts Card

PUT ANOTHER HARD DISK ON THE BARBIE

From the land down under comes a new entry into the digital audio workstation market from a newly formed company called Soundtracker. According to Roger Savage, co-owner of Soundtracker, "We

started designing Soundtracker over two years ago with the idea that the system should be designed by operators and not try to be all things to all people. What this has accomplished in the user interface is that it allows people to use their time creatively, as opposed to spending it trying to figure out how the computer works."

Soundtracker's hardware consists of a control console, a dedicated IBM (or compatible) 386 computer, and a modular audio processing unit that has up to six DSP cards with four analog inputs and outputs. A disk storage unit houses up to seven drives; a magneto-optical erasable disk is used for backup. The most interesting feature is that Soundtracker is said to be the first true multiuser audio editing system that is designed for sound post-production. (Sound familiar?)

Circle (103) on Rapid Facts Card

DAT'S NOT ALL!

I promise, no more DAT jokes! While wandering through my local consumer au-

dio store, I happened upon the first *legal* DAT machine to invade this country, and a few of the features intrigued me enough to include them in this column. Playback programming is now available for up to 60 tracks in any order (just like a CD player). There is good news in the input section in that there are optical, coaxial and analog inputs. The biggest surprise is the introduction of a *second speed* that allows you to record up to four hours on a 120-minute tape. This is accomplished by cutting the normal speed of 8.15mm/s to 4.075mm/s and by lowering the sample rate to 32kHz and the bit rate from 16-bit linear to 12-bit non-linear.

Interestingly enough, the printed specifications don't change very much (I wonder how they do that); the S/N stays the same (92dB) as does the dynamic range (92dB). The most significant change is in the THD spec, which goes from 0.0045% at 1kHz at standard play to 0.08% at 1kHz. I'll let you know how it sounds. ■

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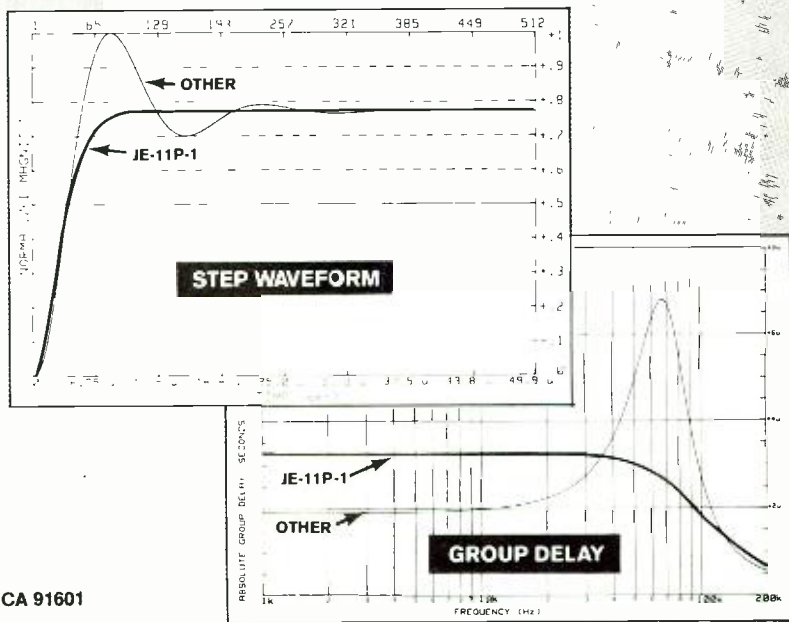
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Cutting Edge

Cipher Digital CDI-328

The CDI-328 random access recorder is available in 2- or 4-track versions and samples at 48kHz, 44.1kHz and 32kHz. It uses oversampled Delta/Sigma A/D conversion and features an extremely stable sample clock. The CDI-328 can be referenced to external time code, video or word clock without degrading its phase-jitter and noise features. The unit can be controlled from its own remote edit control unit or by a host editor, and can also be operated from the front panel of the rack-mounted sound storage processor. List price is \$13,000.

Circle (104) on Rapid Facts Card

ART MDC-2001

The MDC-2001 total signal system controller from Applied Research and Technology is designed for use as a master controller for live sound reinforcement, vocal or instrumental tuning or enhancement, or a final level controller/signal enhancer

for tape mastering. The unit features a new VCA with up to 15dB more dynamic range and 80% less distortion as other VCAs currently available, and provides two channels of stereo processing with more than 45 LEDs to monitor all functions and level variations. For external control, a switchable detector loop is available for gating, keying or ducking. Available in standard 1U rack design, the retail price is \$599.

Circle (106) on Rapid Facts Card

Studiomaster Trackmix series

The Trackmix recording console is available in 24- or 32-input versions and designed for 12-, 16- and 24-track recording. Features include built-in MIDI muting; six aux sends per channel; individual 48V phantom power; direct outs on all channels; 12 group outputs; full 24-track monitoring; built-in talkback microphone; and external rackmount power supply. An optional stand is available. List price for

the 24-input version is \$9,750; for the 32-input, \$11,095.

Circle (107) on Rapid Facts Card

Community CSX loudspeaker series

The CSX loudspeakers feature heavy-duty mesh grilles made of 16-gauge expanded steel, steel corner protectors and durable black-carpeted exteriors. Standard features include acoustically transparent grille cloth, high-current quick disconnects to the speaker leads, oversized steel input panels, and a new crossover network with PowerSense proprietary circuitry. PowerSense monitors the operating power levels in every CSX model and provides a positive indication of overload conditions. For permanent installations, T-Nuts are included. An optional wall-mounting bracket is available, and the CSX25 and CSX35 have injection-molded stand socket inserts that fit most popular stands. Retail prices range from \$321 for the CSX25 to \$1,066

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Saki Magnetics replacement heads for Otari recorders

The 0-900 Series heads are Saki's factory-equivalent replacement record and playback heads for the Otari MTR-90 Series 24-track studio recorders. The series meets or exceeds Otari specifications in all essential characteristics and are priced about 25% less. The heads, made of permalloy, are available immediately.

Circle (115) on Rapid Facts Card

Pearl battery power supplies

Pearl Mikrofonlab has introduced two battery power supplies, the BA 48/M mono, with a 3-pole XLR connector; and the BA 48/S stereo, with a 5-pole XLR connector. The supplies require two 9V batteries, and both provide a switch for a 20dB pad. An LED indicator and a beltclip are included.

Circle (116) on Rapid Facts Card

Nagra D digital recorder

The self-contained Nagra D digital audio recorder provides expanded headroom, which allows for a capacity bit stream of up to 20. The recorder also features an 80 micron track width, which allows for tape compatibility; rotary head format; a universal time code track; and variable speed playback and high-speed copy functions.

Circle (117) on Rapid Facts Card

Valley International PR-2A, PR-10A powered racks

The PR-2A accommodates one or two 800 Series modules in a 1U rack space. Identical modules can be linked via the front panel Link switch. The PR-2A's power supply design provides improved performance and additional headroom. XLR connectors are provided for all audio inputs, outputs and external inputs. The PR-10A accommodates up to 10 800 Series signal processors in a 3U rack space, and pro-

vides XLR connectors as the standard interface for all inputs, outputs and external inputs. The unit also offers improved RFI and electromagnetic shielding capabilities. A 2-section bipolar power supply, providing improved regulation and heat dissipation, is employed. Each section of the power supply powers five 800 Series modules.

Circle (112) on Rapid Facts Card

Soundtracs PC 32 console

The PC 32 Series is an extension of the PC MIDI Series consoles. The series is fitted with 32 input/output channels, providing 72 line inputs on mix down with MIDI control of muting on inputs, monitors, auxiliaries and effects returns. Twenty-four LED bargraph meters are provided to monitor 24 tape returns.

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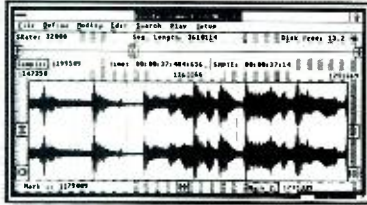
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KRK custom-built monitors have been available for four years. Full production monitors are now available nationwide. All speaker components use Kevlar, a synthetic material. Tweeters are pure, stamped Kevlar with inverted domes; woofers are honeycomb polyglas and Kevlar with strong magnets. KRK monitors do not use horns, which eliminates distortion, throaty characteristics and phase anomalies. The cabinets are made of triple-braced 1-inch MDF. All wiring is 12-gauge silver-plated copper. The models available are the KRK-703, a compact, 2-way system; the KRK-1002, a medium-sized 2-way system; and the KRK-1303, a high-performance 13-inch 3-way system.

Circle (119) on Rapid Facts Card

Spectral Synthesis Digital Studio

The Digital Studio system is a combination of software and hardware that converts a 286 or 386 AT compatible computer into a direct hard-disk multitrack recording, editing and mixing workstation. The system provides 16-bit CD quality sound, random access to all digital audio files, and real-time, non-destructive auditioning of edits. The system controls one or two SCSI ports; the second port is optional and is added via a daughter board. The StudioTracks software is included with the Digital Studio system, and operates under the Microsoft Windows environment. The system requires the FlyBy bus controller board, which provides real-time control of Spectral's Digital Audio Bus and digital I/O via the built-in CD/DAT interface.

Circle (120) on Rapid Facts Card

Literature

Sound Studio Production Techniques

Written by Dennis Nardantonio, an electrical engineer and owner/operator or Strata Studios, this guide to pro audio recording covers all significant technical aspects, as well as proper applications, of products in a studio environment. Featured sections include audio electronics, monitoring, studio acoustics, MIDI, recording techniques, and mixdown. Published by TAB Books, the paperback costs \$19.95; hardback, \$29.95.

Circle (128) on Rapid Facts Card

Magna-Tech Electronic bulletin

A bulletin describing the EL II high-speed electronic looping system is available from

Magna-Tech Electronic. The publication illustrates and describes the basic EL II control console and its components, the EL II monitor selector and control unit. Dimensions for all components and lists of available accessories is included.

Circle (129) on Rapid Facts Card

Hardware and software updates

IBM software for Crown IQ System 2000

Software that allows the computer-driven amplifier control and monitoring network of the EQ System 2000 to work with IBM and IBM compatible computers is available from Crown. The software uses four screens that manage all control and monitoring functions, and is capable of controlling up to 2,000 amplifiers in any one given system.

Circle (130) on Rapid Facts Card

Audio Kinetics serial control option

Designed for the ES.Lock 1.11 synchronizer, this serial control option can be used with selected Sony and Panasonic video machines or Studer A820/A827 multitrack audio machines. Transport crawl can be specified and controlled accurately. Any Sony, Panasonic or Studer machine can be connected to an ES.Lock 1.11 with the same single cable.

Circle (131) on Rapid Facts Card

Altec Lansing A700 update

The Alpha Series A700 loudspeaker system is now available in a durable black finish. The system features a trapezoidal-shaped slope-front cabinet, which houses a 515-8G driving a vented bass horn and a 909-8A compression driver on a MR994A Mantaray horn.

Circle (132) on Rapid Facts Card

Audio Precision Bittest.DSP software

Bittest.DSP is a general-purpose bit error test program for digital audio design and service work using the System One Dual Domain from Audio Precision. The program generates digital data patterns which are analyzed to provide bit level error detection for digital audio signals passing through digital interfaces, digital transmission links, and recorded & reproduced from digital media. The program is included with software version 2.00a, available to System One DSP owners.

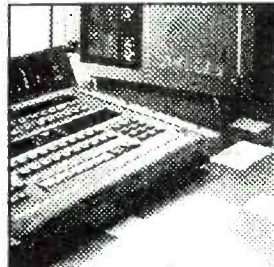
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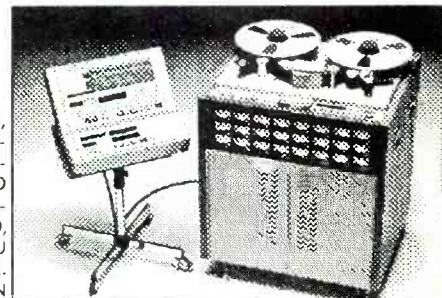
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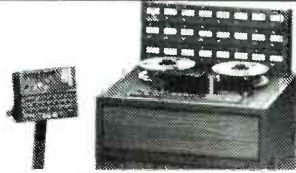
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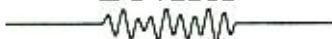
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