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R-E-P

The Pro Audio Applications Magazine

STUDIO OWNER'S HANDBOOK

AN INTERTEC PUBLICATION

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Lexicon's LXP Series digital multi-effects processors combine Dynamic MIDI® effects automation, spectacular effects, 128 user memories, and of course, the legendary Lexicon Sound. Add Lexicon's MRC MIDI Remote Controller, and you have a multi-effects system with an unprecedented range of control. The newest member, the LXP-15, enhances the series even further.

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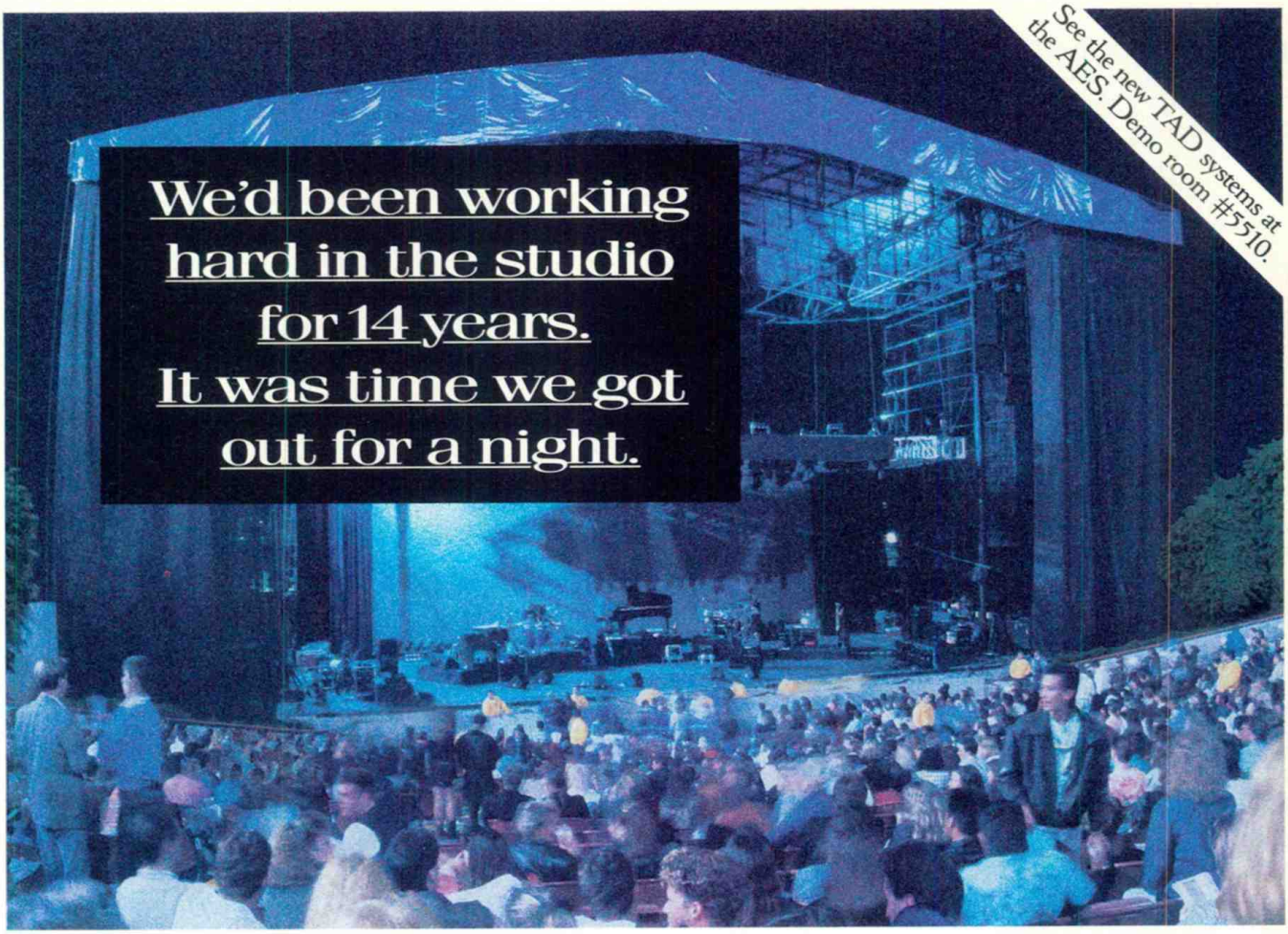
Lexicon
The Art and Science of Sound

Circle (4) on Rapid Facts Card



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, 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 L.A. to London all day. But, at night, we'd like to get out and jam more often.

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Recording ■ Engineering ■ Production

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From the Top

It's in the Book

More than once in my life I've been in the middle of a session and gotten bogged down, wishing I had the perfect reference book there by my side. Sometimes I was hung up over something the studio second should have been hip to, but wasn't, like maybe how the remote looped or whether the mics and their cables were all wired to uniform polarity ('cause it sure didn't sound that way). At other times it was over a piece of gear, complex in setup or obscure in operation. Where was the manual, and why didn't the studio have it in a drawer close by? Once again, it was for a factory calibration chart on a type of tape I didn't personally use often enough to have memorized the setup parameters. Each time, the reference wasn't close at hand. Each time I wish I had captured the info in a less volatile place than my frontal lobe.

I've often thought about a loose-leaf binder or a high-tech Filofax-type thing, with pockets and blank sheets and a Daytimer billing/expense section — the perfect place to log or jot or store the thousands of tiny pieces of information that you need, badly, exactly when you need them, even if it's only four times a year. Of course, it must have a pocket for a Casio or Sharp or Psion or HP palm-top computer/diary. What's life without an electronic phone book and calculator? How else do you get the keys player, who's late, before he's left his GF's house? How else would you get the exact delay time, in microseconds, for a perc track hitting quarter triplets at 102BPM?

There's nothing worse than being in the midst of a date and finding yourself doing what can only be viewed by the client as wasting time, fumbling about, experimenting. After all, you're the high-priced help. You're the guy who's supposed to know about this stuff, be totally and completely up on all of the deeply unfathomable (to the layman) techno details that make this amazing process happen. You're the dude! But wait: the dude is spending four, five, hell, 10 minutes of time *trying* to get some black box to do something that only a dude would understand. Let's see, that's 10 minutes at — oh, with the after-hours discount thrown in — say, $95 an hour. That's, why, almost $16 they just paid to watch the dude learn. Bad news if they're counting pennies.

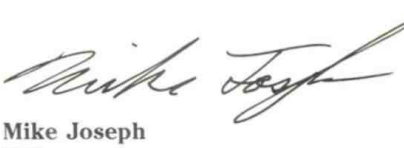
Maybe the studio-plus-engineering-plus-rental-gear time is only costing $60. Or maybe $360. It's the impression that matters — the impression that you're either up on it, with the hip, inside information at your fingertips, or, conversely, less than with it, relying on the hunt-and-peck style of discovery like the rest of the pack.

Case in point: I know a mixer in northern Cal who is often described as an engineer's engineer. He's worked with a lot of big names on both sides of the glass, and he's kept meticulous notes on everything he's ever done. Ask him "What was the mic setup on the second lead guitar OD session on the slow ballad on so-and-so's fourth album, the track that was cut after the dinner break, so it had that laid-back, heavy feel?" No problem. It's right there, along with the setting on the guitar mic's LA-2 during the first pass (not the second, when he used a different pickup and the input drive had to be cranked just so), the board routing, the Kepex tweak and the setup on the Pultec. The guy is in demand because his little black book is dated, referenced and dog-eared, a valuable part of his personal experience and professional life. Hire him, and you get a piece of every session he's ever done.

I like that idea. Those of us who haven't implemented a portable, retrievable archive of data like that probably have a dozen excuses. I know I do.

Good reference material at your fingertips is sometimes more valuable, in concrete ways, than the ability to wiggle your golden ears on demand. The ability to go right to the place you need to go and hit the target, first shot, can't contribute anything but respect to the cause.

With that in mind, R•E•P is inaugurating what we hope will be the nuts and bolts nucleus of every studio dog's reference book: The R•E•P Handbook. We hope you find at least several of this month's inclusions useful. Save 'em. Copy 'em. Swap 'em with your friends. But by all means, use them. And if you have got some ideas, contribute 'em. We'll pay $50 to anyone who gives us a page worth of publishable, fresh, studio-useful material that fits within our ongoing Handbook theme. And that's enough money to buy an electronic pocket diary/calculator! ■



Mike Joseph
Editor

Letters

Microphone Self-Noise

By Bruce Swedien

It was with great interest that I read (sales manager of Gotham Audio) Jerry Grahams' February response to the Dan Levitin interview with me in the November 1990 issue of R•E•P. I apologize for being so late with my reply, but I have been in the studio night and day (using my microphones!) and just have now found the time to write the following comment:

First off, I must say that not only did Mr. Levitin not intend to spread any inaccurate information in the article, but he most certainly, in my estimation, did not put forth any unsatisfactory statements. Dan needn't have apologized either, since his remarks were not misleading in any way. He reported a line of conversation between himself and me on a matter of subjective and artistic judgement exactly as it occurred.

In an effort to be as fair and clear on this matter as possible, I wish to take issue with Mr. Graham's table on self-noise measurements. When I read that table and thought about it for a minute, it just didn't seem to make any sense to me. I know what my ears tell me and I always trust my instincts.

When you read any published Neumann microphone specification sheet, and you examine the specs for dynamic range they state: "Total dynamic range of the microphone amplifier." When Mr. Graham states that the Neumann TLM-170 has a dynamic range of 126, and that the Bruel & Kajer 4006 has a dynamic range of 119, he is comparing "Apples to Oranges." By doing so he is perpetuating a confused situation to a public that deserves better information. All Bruel & Kajer published specifications are for the complete microphone system. From microphone capsule to microphone preamplifier output.

To really check this situation out in a highly scientific manner I asked my friends at Bruel & Kajer Instruments in Copenhagen to do a couple of tests for me. (They are well equipped to do so.) Here is what we found.

Bruce Swedien is a world-renowned engineer/producer based in Moorpark, CA.

In Figure 1 we have exhibited the intermodulation distortion of a Bruel & Kajer Type 4011 microphone, by keeping a fixed frequency of 7kHz and then by making a sweep from 5.5kHz to 8kHz. Where the two tones meet, a peak will naturally occur. The B&K Type 4011 was measured at an SPL of 124dB. This measurement is used to determine harmonic distortion (And hereafter the dynamic range) using the standard microphone test formula:

$$(\text{dB } 1\text{–dB } 2) = 20 * \text{Log} \frac{\text{signal}}{\text{harm. dist.}}$$

From the chart we can see and then calculate... The "dB 1" point is the highest intermodulated tone (49dB) and "dB 2" is the average sweep related tone (7dB) and the "signal" is the sound pressure fed to the microphone (124dB). The actual harmonic distortion is then found to be: 1% (0.8%) at SPL of 124dB.

The dynamic range of the microphone system is calculated by subtracting the microphones self-noise (19dB) from the sound pressure level at 1% distortion. Which in this case shows the B&K 4011 to have a dynamic range of a minimum of 105dB. When the same measurements were performed with the B&K 4004, the dynamic range was found to be a minimum of 124dB. For the B&K 4006 the dynamic range was found to be a minimum of 118dB. The TLM 170 however, was measured to have an actual dynamic range of 90dB.

Fascinating stuff? Well, maybe ... I guess if we want to turn this into a real A.E.S. meeting I could add that, to me, one of the most interesting dilemmas, in regards to microphones, is the way various microphones "color" the sound. For example; when two or more tones hit the microphone, it creates a third tone which I surmise we would call "Non-musical distortion." It seems to me then, that the real objective is for the microphone manufacturers to produce a microphone which makes the least "Non-musical distortion."

"I know what my ears tell me and I always trust my instincts."

In a more technical term; low intermodulation distortion. Sounds wonderful, doesn't it? (Hmm)

Given an array of microphones with

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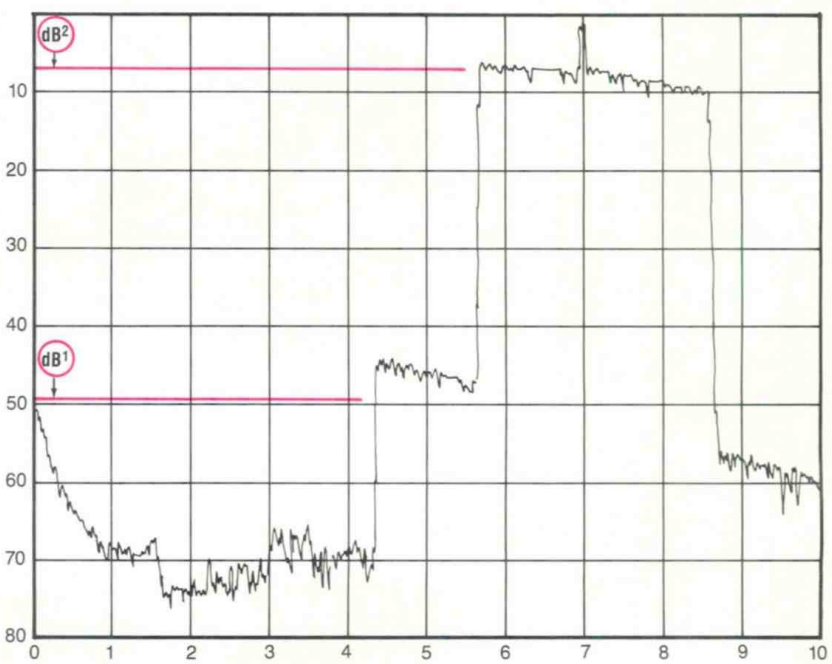


Figure 1. Intermodulation distortion sweep of a B&K 4011 microphone.

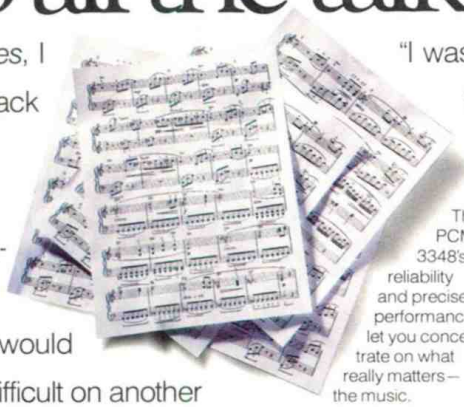
Hugh Padgham makes a career out of listening. But when it comes to our digital multitrack, he wants to do all the talking.

Grammy®-award winning producer and engineer, Hugh Padgham, is a man of few words. So when we asked him about Sony's PCM-3348 DASH 48-track recorder, we had no idea he'd have so many.

He spoke about its incredible transport. "It's so fast and precise, I never have to wait for the machine. Neither does the artist. And that makes sessions run a lot smoother."

The PCM-3348's incredible transport works so quickly and accurately, the machine allows the engineer, or even the artist, to be more creative.

He went on about its easy digital editing. "For Sting's latest record, *Soul Cages*, I did a lot of multitrack editing from the original tracking sessions very simply. And I mean 'simply.' Edits that would be unbelievably difficult on another machine are actually very easy on the 3348. In fact, I don't think we could have made that particular record in any other way."



The PCM-3348's reliability and precise performance let you concentrate on what really matters—the music.

He also mentioned its 48 tracks. "When I was recording Phil Collin's *Another Day in Paradise*, I got ahold of a 3348 halfway through the session. It completely eliminated the need for another slave. Which made overdubbing much, much easier."

The PCM-3348's built-in sampler lets you easily move around bits of a sax solo, for example, without changing anything else.

And, he had a few words about its user-friendly design. "I was convinced that a recording engineer designed the thing. It's so easy to use, you never really notice it's there. That's when you know a machine is good."

For even more words, call the Sony Professional Audio Group at 1-800-635-SONY, ext. 903. But for now, we'll let Hugh have the last one: "Phenomenal."

SONY

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BUSINESS AND PROFESSIONAL GROUP

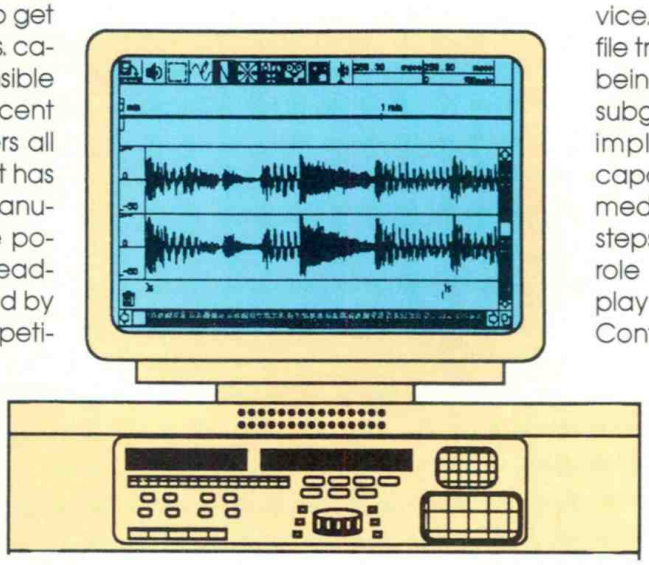
Random Access

DAWS: Of tools, toys and tail wagging

By Skip Pizzi, technical editor of ***Broadcast Engineering.***

The DAW (Digital Audio Workstation) industry, which seemed to be on the verge of infant mortality a few years ago, now looks to be racing healthily toward puberty as the novelty fades, and some serious work is being done on better designs.

The low-end of the DAW marketplace continues to get lower (in terms of price vs. capabilities) and is responsible for the large bulk of recent sales. The volume leaders all inhabit this territory, and it has moved the high-end manufacturers into a reactive position. Rather than go head-to-head with the low-end by introducing directly competitive product, most of the high-end players are positioning themselves toward specific sub-markets of the audio industry. Following the maxim that "the winners are either the cheapest or the best," the big guns have set their sights on one or another audio area in which they can claim the "best" moniker.



Platform wars continue unabated through all this, with Mac, PC and proprietary host computers all still in the melee. New, however, is third-party software development for a few systems. Beyond improving a system's capabilities, a library of third-party applications on the shelf tells the marketplace that a system has achieved significant penetration.

Yet, the workstation is still far from a true mainstream audio production device. An attempt at universal file transfer protocol (currently being formulated by an AES subgroup) and the growing implementation of high-capacity, *removable* storage media are welcome early steps toward that end. What role data compression will play here – if any – is up next. Continued progress toward greater-than-real time upload/download is also essential. The nearly inevitable further improvement in cost/performance ratios will no doubt snag more new customers, too.

Inside this maelstrom of dollars and data, however, it's easy to see how good old *audio quality* – once the *sole* attraction of digital audio systems – can be given short shrift. When that happens, sound the "tail-wags-dog" alarm, and send everyone back to square one. Tools is tools, not toys. ■

Beatles for Kids: Happy Kids Productions, New York, has released an album that introduces kids to the music of the Beatles. "All You Need Is Kids" is hosted by two magical characters cleverly named Ob-la-di and Ob-la-da who tell kids about Beatles music and lead them through "Here Comes The Sun," "All You Need Is Love," "When I'm Sixty-Four," and other songs.

Ditties for the Deaf: Researchers reported that hearing and deaf people can understand words transmitted at high-frequencies, sounds that were once thought to be out of human range, says Dr. Martin L. Lenhardt of the Medical College of Virginia in *Science Magazine*. In order to catch the signals, though, you have to wear a vibrator on your head.

Call for Musicians: Concerned with the "apparent death of new ideas" and apathy within the music industry, the British Record Producer Guild is trying to help bands and songwriters find recording or song publishing deals with mainstream record companies. Send tapes with three tracks to Guild Secretary, Sue Terry, 2000 Doyle Gardens, London NW10 3FX. Tapes should be clearly labelled with a contact name, address and phone number.

PEOPLE

Scott McDavid, former co-owner of Front Row Productions, joined Audio Production Center as creative and production director/manager over all operations ... Sountracs appointed **Tony Allen**, formerly with Studiomaster, as international sales manager ... Shure appointed **Jeffrey Brownstein** to regional sales manager for the northeastern and north central states and Northern California ... **Jay Vicari**, live music mixer of "Saturday Night Live," joined John Alverts Sound Design as the primary mixer on the ScreenSound ... JVC has appointed **John Brown** and **Steve Martin** to newly created positions of director of duplicator sales and assistant director of duplicator sales, respectively. The new position of government sales manager has been filled by **Gary Ballard** ... Digidesign has appointed **David E. Olson**, formerly of Maspar Computer Corporation, to vice president of manufacturing, **Joy D. Covey** to chief financial officer; and **Paul Rice**, former Sam Ash Professional manager to vice president of marketing. These three new managers to Digidesign join **Peter Gotcher**, president; **Evan Brooks**, vice president of engineering; **Paul Lego**, chief operating officer; and **Doug Provisor**, vice president of sales ... **Dave Collie** was named the manager of western operations for Solid State Logic ... NVision has announced the appointments of **Charles Meyer** to vice president of engineering; and **Robert (Bob) Mahoney** to director of marketing ... Former Metaphor executive, **Peter A. Hayes** has been appointed to the position of vice president of marketing for E-mu Systems ... 3M National Advertising has named **L.E. (Ed) Shivitz** to the position of project manager.■

TREND WATCH

Ban the Box: Two individual entrepreneurs and Ivy Hill are redesigning the CD box, making it ecologically safer while maintaining its dimensions for retail display, according to the *Wall Street Journal*. All of the designs eliminate the longbox, which made up an estimated 23 million pounds of garbage in 1990 alone. Warner and Sony Music are test marketing the prototypes in several cities, and insiders say that we can expect to see the new packaging in early 1992.

Universal Command Set: 10 industry manufacturers met in Madison, WI, to begin developing a uniform method of communication for professional audio, lighting and A/V products. Ideally, the common communication command set would allow the user to adapt and interchange any similar products without reprogramming or changing the application environment.

The Tritone Paradox: The way we perceive tones is affected by regional influences, according to Dr. Diana Deutsch, a professor of psychology at U.C. San Diego. A tritone interval, developed by Dr. Roger Shepard, Stanford University, was perceived by Southern Californians to ascend to a point, then descend. British listeners, however, heard the same tritone to descend. Of course, there were also truly tone deaf people who could not tell whether a pair of sine tones were ascending or descending, but "They all claimed to enjoy music immensely," says Deutsch. "What in the world are they hearing?"■

Wording importing one gender imports any other gender words importing the singular import the plural and vice versa and any reference to a person includes a reference to a company, authority, board, department or other body.

— An English leasing agreement for studio space.

Random Access

STUDIO UPDATE

Facility/Location	Details
NORTHEAST	
Cove City Sound Studios/ Glen Cove, NY	Added an SSL 4064 G Series console.
Video Mix/Manhattan, NY	Acquired the Sonic Solutions 8-track Sound-for-Picture system. Installed a J.L. Cooper MS-3000 automation storage system into their Sony MXP-3036 console in the main post room.
John Alberts Sound Design/New York	Opened second mixing room, Studio B, which has an SSL ScreenSound digital audio editing system.
SOUTHEAST	
Masterfonics/Nashville	Purchased a Roland Sound Space (RSS) processing system.
SOUTHWEST	
Saturn Productions/Houston, TX	New studio featuring 16-track Fostex demo studio and 24-track MCI main studio.
SOUTHERN CALIFORNIA	
Music Grinder/Hollywood	Added Studio B, a 20′ × 30′ tracking room, an isolation booth and a private lounge area. Features a custom-vintage modified Neve 8108 console and Studer 24-track machine.
Interlok Studios/Hollywood	Opened mixing room, Studio Four; features 48-track recording, a Sony PCM3324 24-track digital recorder; Otari MTR-90.
UNITED KINGDOM	
Chop Em Out/London	Purchased a second Sonic Solutions hard disk recording and editing system and NoNoise software program.
Dreamhire/London	Purchased two Roland Sound Space (RSS) processing systems.
MANUFACTURERS	
Audiomation Systems	Colorado Sound Recording and Crystal Clear Recorders have installed the company's Uptown automation system.
AMS	GDO Studios (London) has ordered a Logic 1 digital console. Austria's national broadcaster, ORF, has ordered a Logic 2. Norwegian broadcaster NRK has taken delivery of a second Virtual Console System.
DDA	Musicon (Wilsonville, OR) has purchased an AMR 24 console.
Digital Audio Research	Canadian facility the Ocean Group has purchased two SoundStation II systems, its second and third.
Euphonix	Hans Zimmer has taken delivery of the CSII Digitally Controlled Studio System for his facility.
Harrison	Delivered eight Pro-790s, from 12- to 24-inputs, to Seoul Broadcasting Systems in South Korea.
Lexicon	The Bridge and Silk Sound (London) have purchased an Opus.
Neve	Console sales: Chateau du Pape (Hamburg, Germany), VR72; CTS Studios (London), VRP; and Woodland Digital (Nashville), V60.
Peavey Electronics	Fanshawe College (London, Ontario) has purchased an Audio Media Research 1600 console.

NEWS NOTES

Correction: In the Children's Programming Category of the Monitor Awards in July's Random Access, we incorrectly identified the "Drawing The Line" finalist. The finalist is Jeff Kidwell, president of AudioMaster, Inc.

Meyer Sound Laboratories, Berkeley, CA, has contracted Audient Market Services to handle public relations for their line of studio monitors, sound reinforcement speakers and sound system EQs.

Design FX Audio, Los Angeles, bought Mobile Unit #3 from the Record Plant. After an acoustical and electronic upgrading, The Design FX Remote will be back on the road.

J.L. Cooper Electronics moved to an expanded headquarters at 12500 Beatrice St., Los Angeles, CA 90066; 213-306-4131; fax 213-822-2252.

Tannoy/TGI North America, Kitchener, Ontario, Canada, is the exclusive U.S. distributor of Bruel & Kjaer audio products.

Optim Audio, Stamford, CT, was formed by Daniel Gravereaux, founder of Sound Engineering Technologies, and Irving Joel, former chief engineer at A&R Recording Studios, New York, to serve commercial sound system dealers and installers.

Euphonix, North Hollywood, opened a worldwide sales, service and marketing office in Los Angeles, with a full demo suite for a CSII digitally controlled analog studio system.

Sennheiser won the 1991 Innovative Design Award of the North Rhine Westfalia Design Center, for the BF 530 microphone.

JBL Professional has been granted a patent for its Vented Gap Cooling technology.

SALES NOTES

Sales of **Digital Audio Research's** SoundStation II have reached 100. Television Espanola puchased the 100th and 101st systems.

FM Acoustics announced that its 1990 sales increased 23% compared with 1989. ■

British studio performance at a revolutionary American price!

MEGAS Studio is the first 24 buss recording console to combine world-class *British sound* with a wealth of smart, practical features for today's recording situations—*priced from $17,100*!*

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Fresh Tracks

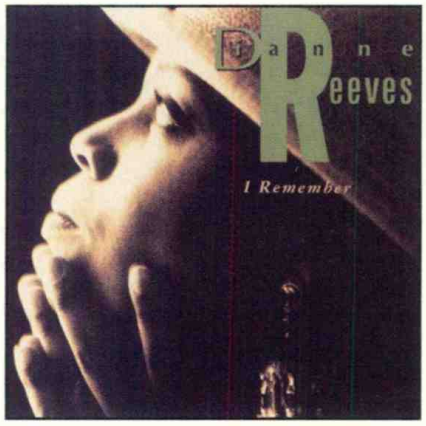
Don Henry: "Wild In The Backyard"

Label: Epic
Produced by: Ray Kennedy and Don Henry
Executive producer: Bob Montgomery
Engineered by: Ray Kennedy, Clarke Scheicher
Mixed by: Ray Kennedy, Don Henry
Recorded at: Skyline Studio
Mastered by: Denny Purcell at Georgetown Masters
SPARS Code: ADD

Comments: A real gem: alternative country acoustic folk punk, with Henry combining endearing and heartfelt silliness, charming puerility, wit and a strong sense of melody. One of the production achievements is the informality and spontaneity captured on tape; we get the sense that everyone making the record had a really good time. This is the kind of thing you might expect to hear if Tom Robbins made a record with John Hartford producing.

Of special interest: Our favorite cuts include "Mr. God" (that's Mr. God to you), "Harley" and "Into a Mall." The always first-rate Michael Rhodes and Eddie Bayers comprise the rhythm section. The engineering is clean, tight and once again illustrates our belief (as if you needed another example) that some of the hottest production these days comes out of Nashville. ■

Dianne Reeves: "I Remember"



Label: Blue Note
Produced by: Michael Cuscana, Charles Mims and Dianne Reeves
Recorded at: Mad Hatter Studios, Van Gelder Studios
Engineered by: Malcolm Ciel, Rudy Van Gelder
Assistant engineer: Robert Reed
Mixed by: F. Byron Clark at Mamo Jo's
Assistant mix engineer: Chris Morris
Mastered by: John Golden at K-Disc

Comments: The essence of jazz is undoubtedly found in its spontaneity. So, too, is the power and production capabilities of the engineer and producer in Dianne Reeve's latest outing. Recorded in just four days (two in April 1988 and two in September 1990), the mixing talents of Messrs. Ciel and Van Gelder are dynamic and rich. In their hands, the trio through sextet becomes more of a single voice in concert with Ms. Reeves, rather than independent voices supporting her unique style.

Of special interest: While some may fault the homogeneous textures found in some of these recordings, the beauty and singularity of each "standard" is the result of careful engineering that paints an entire picture from an atypical vantage point, where the listener is enveloped by the entire performance and not just discrete tracks. ■

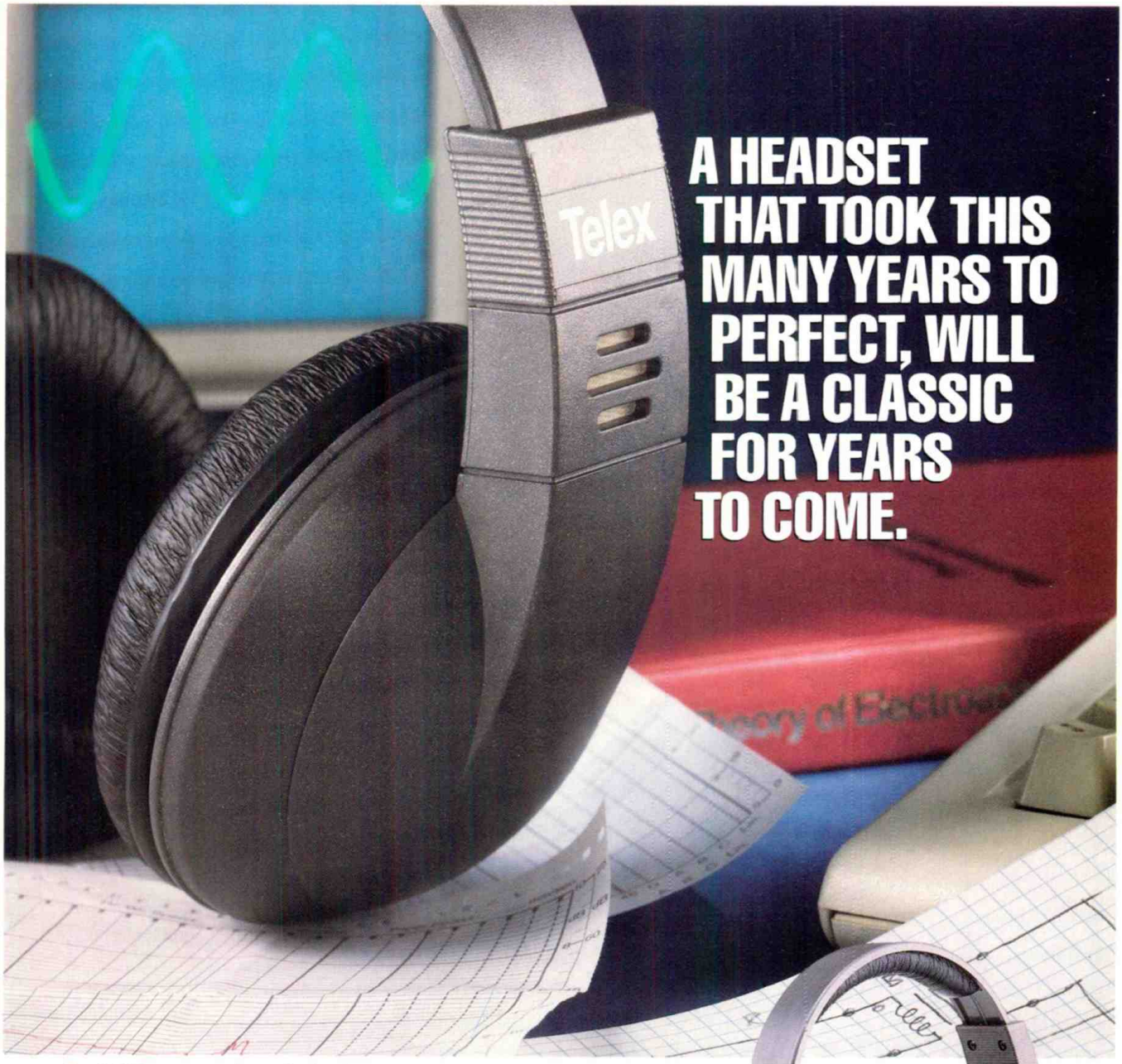
REISSUE ROUNDUP

Capitol Collector's Series: This series of compilations contains some true prizes. Peggy Lee, a compilation of her Capitol singles from the forties. Stan Freberg includes his greatest hits, such as his satires "The Great Pretender" and "St. George and the Dragon-Net." Grand Funk Railroad features Todd Rundgren's production of "The Loco-Motion," which is still amazing. Also, The Raspberries (featuring the Rundgren-like "Go All the Way") and Bobby Darin packages are excellent. Simultaneously, Capitol is reissuing classic albums with excellent fidelity, particularly Steve Miller's "The Joker" and Frank Sinatra's "Come Swing With Me" and "Where Are You."

RCA/Bluebird has been reissuing classic jazz performances (sometimes using the Sonic Solutions NoNoise system) with consistently striking results. Great releases for both historical value and sonic quality include Duke Ellington and His Cotton Club Orchestra (from 1927-1932); Shorty Rogers "Swings"; Sonny Rollins "On The Outside" features Don Cherry, Billy Higgins and Bob Cranshaw; and The Fats Waller Piano Solos.

Barney Kessel with Shelly Manne and Ray Brown "The Poll Winners Ride Again." Remastering engineer Phil De Lancie once again astonishes us with this release for Contemporary. These 1958 recordings come alive. The original engineering was superb, particularly on the drums. De Lancie brilliantly captures the sound of the original recording without coloration or loss of phase coherency. Also recommended on Fantasy, is The Bill Evans Trio "Since We Met."

Guitar Player Presents Legends of Guitar. This series on Rhino brings together classic and often-overlooked tracks of great guitarists. Different discs in the series are Surf Guitar, Jazz, Country and '70s Guitar. The sheer variety of guitar styles and tones presented make these a valuable addition to anyone's music library. In most cases, tracks were taken from original master tapes. ■



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Circle (8) on Rapid Facts Card

Fresh Tracks

By Dan Levitin

Ricky Skaggs "My Father's Son"

Label: Epic
Produced by: Ricky Skaggs, Mac McAnally, Brian Ahern
Engineered by: Rob Feaster, Alan Schulman, Ed Seay
Mixed by: Rob Feaster, Alan Schulman, Ed Seay
Recorded at: Soundshop Studio "A", Treasure Isle Recorders, The Castle, The Money Pit
Mastered by: Denny Purcell at Georgetown Masters
SPARS Code: DAD

Comments: Skaggs' band has become a showcase for the hottest country talent available; what Emmylou Harris's band was in the seventies, and what Miles Davis' bands have always been in the jazz world. David Hungate, Eddie Bayers, Mac McAnally, Paul Franklin, (Elvis Presley's drummer) Larrie Londin, Michael Rojas, Bel Fleck, Leland Sklar and Barry Beckett are just some of the players who contribute.

Similarly, Skaggs' records have always been a showcase for the best production around. While his previous records built up to slicker and bigger production, "My Father's Son" brings a more intimate sound and living room feel. The delicate reverbs are almost transparent, the mixing, unobtrusive. Lyrically, Skaggs expresses back-to-basics and family values on songs such as McAnally's "Simple Life" and the Skaggs/Green original "My Father's Son," on which Ricky plays guitar, fiddle, mandolin, banjo and bass with his usual brilliant verve. ■

FOCUS:

ROB FEASTER, Engineer, "My Father's Son"

R•E•P: What kind of vocal mics did you use?
RF: Ricky has a huge mic selection of his own — he's really into collecting mics. We used one of his C24s and a U67 which was rebuilt by Fred Cameron. During tracking, I used a TubeTec compressor, at 3:1 fixed, pulling 1dB or 2dB. Ricky works a mic real well. I ran the mics through Demiter pre-amps; I bypass the console on pretty much everything. For the background vocs, we used his Calrec/AMS Soundfield Mark IV. You know the one — it's black and looks like a German hand grenade. I don't know any other mic that sounds like it, it's really unique.

Ricky's got lots of cool mics. We had so many mics to choose from, we could just set up different mics and match the mic to the instrument, which meant we didn't have to EQ things very much. It's not that I have anything against EQ — I certainly don't — it was just a nice way to get the sounds.

R•E•P: What about the drums and bass?
RF: I had a rack of Neve Prisms for the drum kit. The basses just went through compressors and then straight to the tape machine. These guys all have pre-amps built into their rigs, so it's line level coming out of the instrument. I used LA-3s on all of them except for Lee Sklar, where I used an 1176.

R•E•P: How did you get the ambiences you did?
RF: A lot of the sounds on the record are just room sounds through the mics. I tried to keep it as much as possible like what you would hear if you were just sitting in this killer room with a really good band playing. There were a lot of musicians on basics, and most of that stuff was kept. Typical basics were two acoustics, piano or keyboard, bass, drums, and Ricky would sing and usually play.

For mixing I used some Rev 5, EMT 250s, Lex 224X and 480. Also, I set up speakers in the room at The Castle. The place really is a castle, built by Al Capone in 1928 as a getaway place. It's been a studio for about 10 years. During the mix I put some speakers out there and miked the room with the Calrec.

R•E•P: How did you get your guitar sound?
RF: Ricky plays only Martin guitars, and he has some gorgeous instruments — they're super nice, full-range guitars. That thin sound you're talking about came from filtering, when I mixed it.

For miking, I started with an M250 up front, between the bridge and the soundhole, and kept it a little off axis. Then I put a Schoeps up further on the neck, pointing almost straight down. Pointed that way, the Schoeps doesn't give you a lot of low end, but you get the feel of the fingers on the neck. With a great player, a lot of their sound is how their hands touch the frets, and with that miking, you really get a sense of movement, of the hand across the frets. A lot of the sound is just a great player's fingers: Ricky would pick up an old, ratty acoustic, and it would sound great.

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

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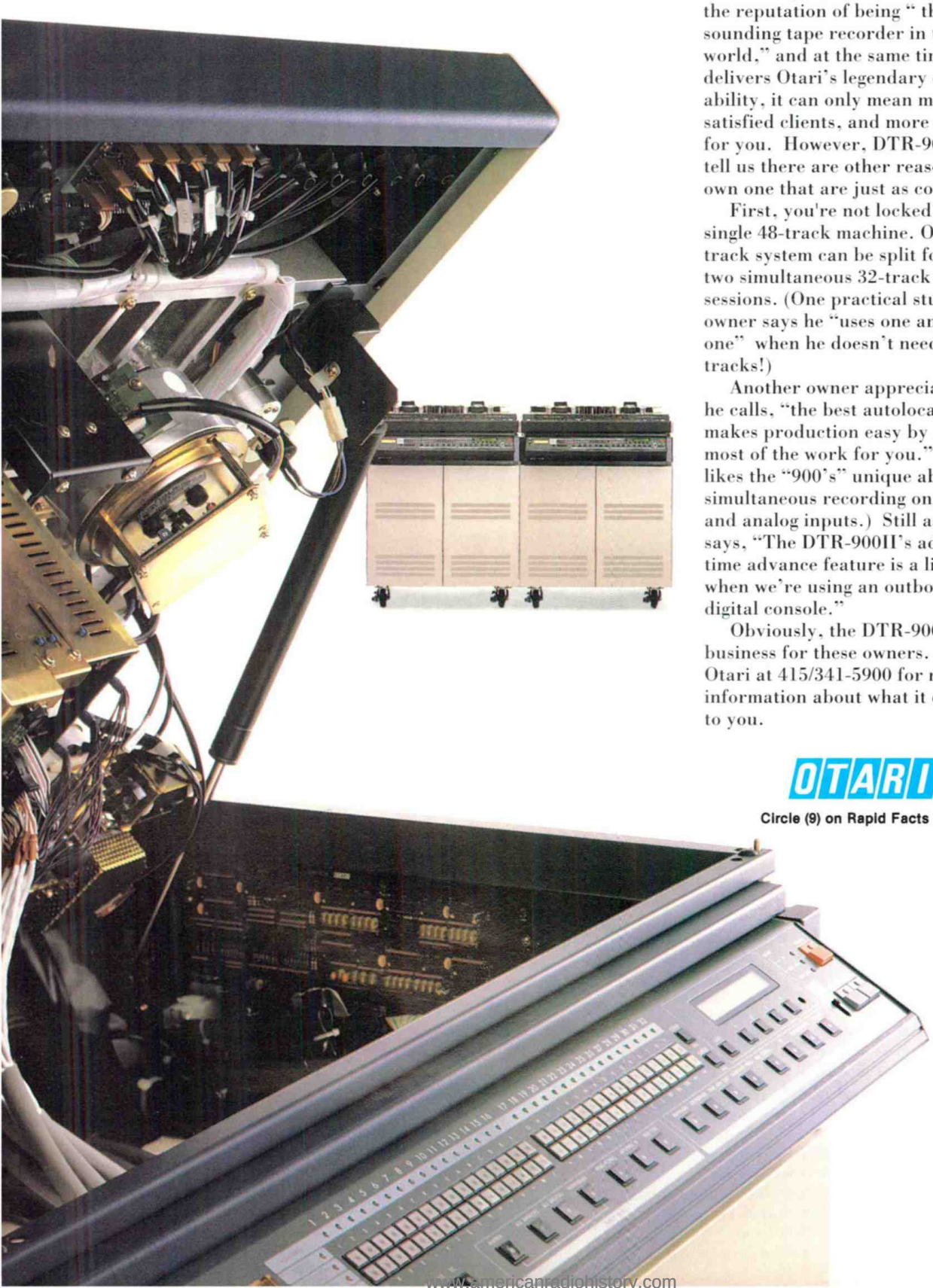

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Obviously, the DTR-900 means business for these owners. Call Otari at 415/341-5900 for more information about what it can mean to you.

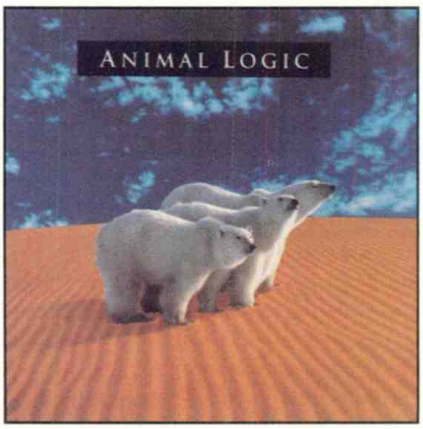
OTARI

Circle (9) on Rapid Facts Card

Fresh Tracks

By Dan Levitin

Animal Logic "II"



Label: I.R.S.
Produced by: Animal Logic, Tony Berg, Frankie Blue
Engineered by: David Tickle, Paul Dieter
Mixed by: Tom Lord-Alge, Tchad Blake, David Tickle
Recorded at: Soundworks West, Groovemasters, Encore, The Control Center, The Enterprise, Cherokee
Mastered by: Bob Ludwig at Masterdisk

Comments: We think of Animal Logic as rock's intellectual elite — the sort of trio you might find drinking cappuccinos in an outdoor cafe, reading Latin American novelists and writing short stories for Esquire. Or maybe Deborah Holland would be teaching Art History at Sarah Lawrence, Stewart Copeland would be that cool English professor whom all the girls swooned over and Stanley Clarke would be the president of some cutting-edge, high-tech national corporation.

But, of course, this is fantasy: theirs is the sort of musical talent that is so unarguable, so undeniably present, that their destiny was assured. Copeland plays with the same witty cleverness and solidity that made The Police a rhythmic phenomenon. Three quavers into the first song and even the most casual listener will recognize his trademarks: the intricate, solid hat and kick, tight snare drum and tom fills. Clarke plays with a rhythmic sophistication which perfectly complements Copeland. Deborah Holland rises above the rhtyhm section, gliding effortlessly through challenging vocal melodies. ■

FOCUS:

STEWART COPELAND, Co-Producer, Animal Logic

R•E•P: There's a remarkable consistently of your drum sound over the years, through different engineers and producers recording them. Do you have a special way of recording your drums? Special mics or placements?
SC: To me they're just these round things with skins stretched over them. I've had lots of different drums, except for this one snare that I've used consistently, so I suppose the way I tune them and hit them contributes to the sound more than the mics. The snare is a Tama — some kind of chrome thing. Actually, I think it was dropped or warped at some point, because I've never been able to find another one like it. One thing [about recording] is, I always look for a big, live room, at the other end of which I can have some mics that are highly compressed, preferably with those old Fairchild limiters. As far as engineering, I usually turn the engineers loose, then after I've recorded a bit I hassle them for a little more *sizzle, oomph, bonk or whap.*

R•E•P: Your hi-hat is very distinctive-sounding. I always know it's Stewart Copeland playing the drums when I hear it.
SC: There's a surprising amount of expression available in the humble hi-hat instrument; it's down to left foot pressure and ruffs played, executed by the left hand to accompany the main beats applied by the right hand. I think the hi-hat is the most expressive instrument in the drum kit.

R•E•P: Also, your hat is always so clear, there must not be a lot of garbage in the hat mic ...
SC: Snare leakage is always a problem. I've used phasing (out of phase placement of the mics) to keep the snare and hi-hat apart.

R•E•P: What was your producer's vision for this album?
SC: The producer's vision was to hire some sucker to produce it for us! Stanley and I produced the first album, but we were so busy making the record we ended up with the rhythm section too low in the mix. Tony Berg was tied up with the Squeeze album when we were tracking which meant he wasn't able to come in and record, but he did come in and give us some pointers and outside advice which was very astute. He actually came on-line about halfway through the overdubs. His main contribution was in vocal recording — he and Debbie established a very good rapport, in fact, far better than Stanley and I would have been able to. Since we're in the band we're kind of like siblings and she wasn't as able to get all gushy and gooey and emotional with us producing as she was with him. And he's a very, very good producer in other respects as well.

R•E•P: How involved in the production were you?
SC: Stanley and I are both compulsive, obsessive producers, so we were very involved with things up until Tony arrived. Then, when he was there we had to leave the room to let him do his job.

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

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Circle (10) on Rapid Facts Card

Speaking from the Heartland

By Richard Trump

For several years now, R•E•P has graciously offered this space for SPARS to present its views on a number of subjects. It has become the custom for this column to serve as the first opportunity for the incoming president of SPARS to state his ambitions for the organization and the recording industry in general. As I assume the role of president for the upcoming year, it occurs to me that a significant item on my "wish list" for SPARS has already been fulfilled.

What is this great achievement to which I refer? Simply put, we now have a membership and leadership that truly represents the diverse nature and broad geographical boundaries of our business. In its 12-year history, SPARS has evolved from an organization composed of a core group of major studio owners to one that represents a true cross section of the industry as it exists today.

One of my primary goals as president of SPARS is to let people know that this remarkable transformation has taken place. Decentralization and advanced forms of communication have created a national network that is the new audio community. I firmly believe that whether your operations are located in New York City, Kansas City or Salt Lake City, Los Angeles, Denver or Peoria, you should be a member of SPARS — now more than ever.

When my facility joined SPARS in 1983, we were undoubtedly one of the smallest studio operations to display the SPARS membership certificate. Although significant in our local Des Moines market, our studio clientele was, and remains, local and regional for the most part. The record business, which was the mainstay of SPARS membership in its beginnings, was an infrequent visitor to our studios. The local and regional advertising business keeps the doors open in secondary (or would it be tertiary?) markets such as Des Moines.

My reasons for joining SPARS were several, but I'd felt for a long time that the industry (and I) needed an organization that encouraged studio owners to talk to each other and to share experiences. Nothing like that had existed prior to SPARS, save a few local groups in various parts of the country. Even these groups tended to concentrate on one specific phase of the business or another. SPARS was the organization that had the potential to concentrate on our industry, not audio in general, and not specific to film or music recording.

My first connection with SPARS was through then Executive Director Gary Helmers, an old college friend. He encouraged me to stick my neck out and join. I felt rather overwhelmed to be associating with names that had images seemingly larger than life. At the same time, I knew that a perspective from Des Moines (or any market for that matter) had value that might be worthwhile to others. In addition, I craved not only to associate with the leaders of the recording industry, but to be able to share with others in similar markets.

Decentralization and advanced forms of communication have created a national network that is the new audio community.

About the time my studio joined as a member, the board of directors of SPARS had come to the conclusion that the organization needed a broader base of leadership; one that might even include someone from — of all places — Des Moines.

Although the presence of a board member from Des Moines wasn't remarkable in itself, it was indicative of a change that was taking place in the organization. The founders of SPARS were recognizing that the potential for the group to serve a more diverse membership was important to pursue.

Coincidentally, a revolution was beginning in the industry. Technologies such as MIDI, R-DAT, sampling and low cost multitracks were emerging as viable professional tools. These new technologies were making performance that had formerly been reserved for expensive, high-end facilities available to the more modest professional studios, project studios and even hobbyists.

Other innovations were changing the industry, too. Stereo AM and television broadcast, CD's, and personal computers were invading consumers' homes and forever changing the demands on our businesses.

As a result, studios all over the country were diversifying to respond to these changes. Even facilities in the major recording centers of the country were adapting to provide a greater selection of services. The need to communicate with each other was becoming more important than ever.

There is no doubt that there is still a heavy concentration of studio operations in the traditional recording centers of New York, Los Angeles and Nashville. But, according to one study of over 5,200 studios, these three areas combined account for only 21% of studios covered. That leaves a surprising majority of studios in secondary or lesser markets.

Of course, changes like those undergone by the industry and SPARS should occur without abandoning the principles and people that have molded events to date. It's significant that in this year of affirming a place for the smaller facility in SPARS, we welcome back to the active board of directors Murray Allen, president of Chicago's Universal Recording, and Guy Costa, president of L.A.'s Quadim Corporation. As SPARS past presidents and visionaries, they will be a welcome and valuable (re)addition to the leadership team.

The evolution that SPARS has gone through during this period makes it ideal and ready to serve the industry at large. Both the membership and the board encompass virtually every type of professional facility. Recording professionals from all sizes of communities should feel welcome and encouraged to join SPARS. Better yet, join SPARS and become involved. Your monetary investment will be rewarded many times over. Your time investment will bring knowledge and business insights from many angles. ■

Richard Trump is the newly-elected 1991-92 president of SPARS and president of Triad Productions, Des Moines, IO.

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

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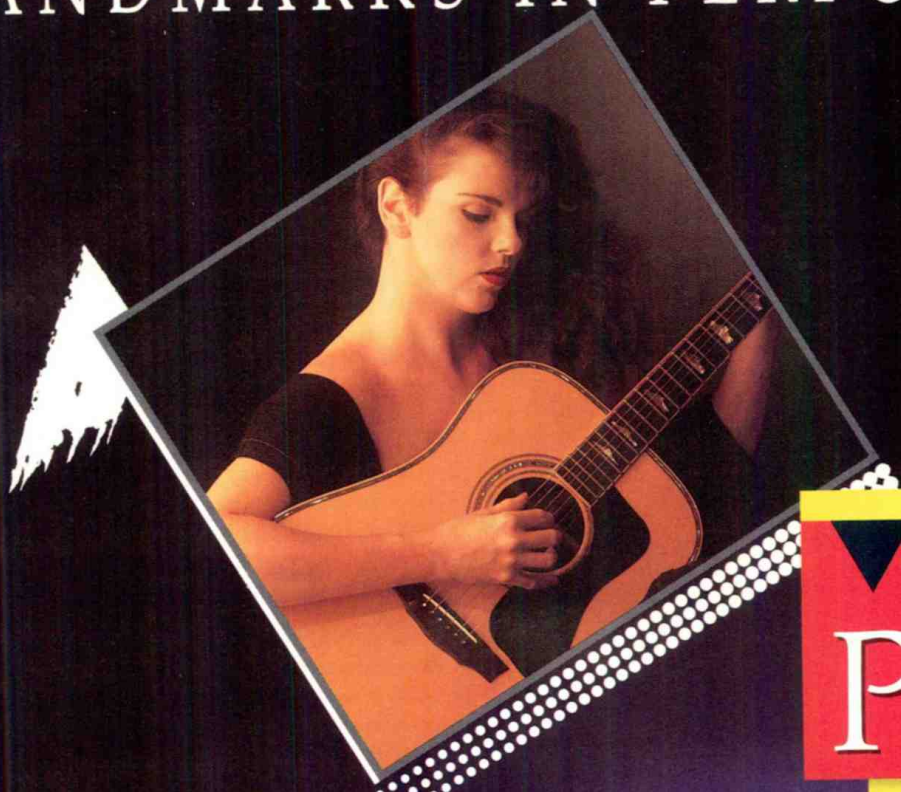

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Circle (12) on Rapid Facts Card

Digital Domain

Digital Speak

By Rick Schwartz

How can it be that someone working in the field of audio for a lifetime can look at the screen of a digital audio workstation like it was written in a different language? It wouldn't be so bad if they all used similar terms, but they don't. With user-friendly commands like "zoom at gates" and "delete and ripple" it's no wonder users are confused. Even different workstation software operating on a common platform such as the Macintosh, with its tightly controlled operating system, bear little resemblance to each other. Where is the workstation for the rest of us?

Working professionals don't have time to spend six months learning how to use these new digital wonders. It doesn't stop after initial training. To maintain speed and keep up with software revisions you need to use a system on a regular basis. Although this may look like another technology-bashing article, it's not. This column will give you new insight into all digital workstations and lay the groundwork for a comprehensive guide to workstations that will appear in a future column. This guide will translate the different terminology of every major workstation into plain English, which will greatly reduce the learning curve.

FEATURE GLUT

So, what makes some systems so hard to learn? There are a number of barriers including the computer, poor user-interfaces and bad documentation. Let's start with the computer. Many engineers fear computers, with good reason. Why are the words "reliable" and "software" rarely used in the same sentence? In an effort to include so many powerful features, programs have grown very large in size. To reduce the number of man-years required to bring a product to market, companies are forced to bring on more programmers — which makes troubleshooting more difficult. Most software companies use Beta testers to help them debug their software. Inexperienced users make good beta testers, because they don't know what to avoid and will try things an experienced user would never think of doing.

THE CONFIDENCE FACTOR

Believe it or not, a user's familiarity and confidence in a product can play an important part in their success. Experienced operators do things they don't even realize, such as saving every time they make an edit and avoiding certain memory-intensive functions. If you're not already computer literate, operating a digital workstation is going to be even more difficult. Before you attempt to learn new editing software, make sure you fully understand the platform it runs on.

A CLOSER LOOK

Stop for a moment and think about what you do in the studio. If you were to break down every action into one of three areas what would they be? For most of us, it would be **recording**, **editing** and **mixing**. Let's start with recording. Recording is simply storing sound onto tape, disk or other media. Most workstations refer to a recording as a **sound file**. Some systems let the user record multiple versions of the same sound file, which are generally called **takes**. Recording from an analog source is easy because most systems have emulated a conventional tape transport control. Digital sources are a little more difficult, mainly because of clocking concerns (which is an article in itself). While recording you can **time-stamp** a file with SMPTE — which greatly facilitates **re-syncing**.

A user's familiarity and confidence in a product can play an important part in their success.

Make sure you understand how each system deals with **disks**, **tracks**, **channels** and **outputs**, as well as what a **virtual track** is. A **disk** corresponds to a reel of tape. The practical limit for most systems is four tracks per disk. Although tracks normally correspond to outputs, some systems have **virtual tracks** or **channels**. Many elements can be mixed to an output internally, although it is not always real-time. Keep in mind that all systems treat channels and tracks differently. Know your system.

EDITING WITH EASE

Since much of your time is spent editing, it's very important to fully understand every editing operation. Hard disk systems perform their non-destructive edits by the use of **pointers** on the disk. A list of pointers is called a **playlist** or **EDL** (edit decision list). A playlist can be graphic in nature or simply a list of time code numbers. Like tape-based systems, an operator first **marks** the sound much as they would with a grease pencil. Marks can be made on-the-fly, while scrubbing, or visually — by looking at the waveform.

It's also possible to play up to a mark or after a mark. A selected part of a sound file is often called a **region**. Sound regions can be **grouped** and locked in place. In addition, individual elements or a group of elements can be moved at once. Most workstations allow the user to **preview** an edit without actually performing it, by playing across the **cut region**. There are two ways of removing an offending sound. The obvious approach is to simply cut it out. The second is to **select** the area before and after an offensive sound and include it in your playlist. When a sound is cut it is moved to an internal storage area, which is commonly called a **clipboard** on computer platform systems.

There are two main types of edits: **cross-fades** and **splices**. There are many different ways to splice a piece of sound. The first is to splice a sound immediately after another. There are two variations on this. The first leaves other pieces of sound in place, and the second will insert a sound and move all others to the right or later in time. This is called **rippling**. The next is to **insert** a sound, substituting one sound for another. It is also possible to insert a sound at the **start**, **end marker** or **cursor**. Finally, most systems will let the user insert a sound at a specific time code location.

The final activity is usually mixing and processing. Mixing includes **level changes**, **fades** and **ducking**. Most workstations use graphic representations of faders and knobs on a computer monitor. To fit a whole studio worth of knobs, buttons tracks and meters on a small computer monitor requires the use of multiple screens and small hard-to-read fonts.

Continued on page 64

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

Luckily this was at the end of the tour, so we only had a few more songs that Jon wanted to get on tape. We selected the songs to record and made sure Jon knew not to do them back to back so we'd have time to change the tape on the multitrack.

"It worked out OK, but you couldn't believe this truck. It was like a tiny wooden step-van — a produce truck. The sun's beating down on this thing. I walk inside and it's got to be 125°. Sweat is pouring off of me. They had this little GE air conditioner like you'd put in your bathroom, mounted at floor level. I guess nobody told these guys that cold air sinks. If you laid on the floor, it was a bearable 80°, but if you stood up, it was 125°."

"After five years of being a studio owner, I started yelling at the walls. Not only was I broke, but I was losing my mind."

SOVIET SUCCESS

O'brien accompanied the band on their historic performance in the Soviet Union at the Moscow Peace Festival where he mixed their sound live to videotape. Upon returning home, O'brien was faced with the challenge of cataloging and listening repeatedly to each and every master — 87 of them.

First he had to listen for technical problems. Did something crap out? Did a wireless go down? Was a card lost on a tape machine? Then he had to listen again for performance. How did the songs come off? Would they work on a record? Meticulous notation was required in order to expedite O'brien's working with such voluminous source material. On a multitrack master from a 1988 Paris show, O'brien's documentation denotes pyro-pot explosions pinning all the drum VU meters on "Lay Your Hands on Me." On "Wild in the Streets," the wireless on the guitar crapped out on the second verse. During "Bad Name," an overhead mic was lost. "There's always something," says O'brien, "little things. Someone steps on a wire, or kicks a junction box. Chairs, risers and road cases get rolled over cables — always something."

Throughout the tour, Wayne Isham and Curt Mavis of The Company had been shooting live concert and behind-the-scenes footage for a Bon Jovi documentary, "Access All Areas." Through liaison Dana Marshall at McGhee Entertainment, O'brien was notified as to which concert footage would be used so he could pull the music and start working on mixdowns. "Luckily, a lot of their selections weren't songs that Jon has in mind for the live album," he says, "so we weren't redundant."

O'brien mixed the "Access" soundtrack at Studio 4 in Philadelphia and Full Sail Center for the Recording Arts in Winter Park, FL. At Studio 4, he used an SSL E Series console and Studer tape machines. In both facilities, he was able to lock his masters to rough cuts of the performance on video. At Full Sail, he used a Neve VR console with Flying Fader Automation and an Otari MTR-100 24-track tape machine. He mixed down in stereo to two tracks of an Otari MTR-12 1/2-inch 4-track tape machine, leaving room for a guard band and a time code stripe.

"When you mix to pix, you tend to do things a little differently than if you're just doing a record," he says. "The idea was to not have the music overwhelm the visual performance — the event. From the perspective of sound, however, when we mixed the songs for 'Access,' Jon wanted it to be a live recording. A lot of the touring artists sound just like their record and Jon wanted it raw. He didn't want to go in during the mix and repair everything.

"I mean, why do that? He'd already done that record. Jon was adamant about it. He wanted the tracks to sound like what people in the audience were hearing — not tons of Harmonizers and all these effects and giant reverbs because that's not live to him. That's not what you get at a Bon Jovi concert. You get the music, raw — in your face. We didn't let the technology overshadow the music or do a lot of wide, sweeping stereo effects because ultimately the end product would be played on a VCR and heard, in most cases, through a small television speaker.

"The effects processing for mixdown was very subtle and minimal. The objective was to match our reverb settings with the ambient sound of the venue we had recorded in. During every concert, we took a pair of microphones and placed them on the house console riser. We'd use Neumann 87s, AKG 414s or any good large capsule condenser mics. Communicating by radio, an assistant rotated the mics while I monitored from the truck, until we got the desired ambient sound in stereo. We used that as a springboard for our reverb settings. Every venue was different, so each show's mixes were a unique approach. The huge arenas required a heavier saturation of effects while venues such as Hammersmith Odean in London hardly required any at all. It was mostly straight ahead."

REPAIRS DURING MIXDOWN

O'brien continues, "We did have some unavoidable repair work during mixdown. During the gig at Hammersmith, a kick drum mic clip broke and the mic fell into the drum's pillow. All I had on tape after that was this muffled thud. The guys really wanted to keep the tune, so I sampled a kick from earlier in the performance, into a Forat F-16, triggered it with the pillow thuds from the Otari MTR-100, and laid it down onto another track of the MTR-100, staying consistent with our policy of no external sound sources in the mix. I made sure to use Tico's bass drum sound, and it worked great. We had our kick back."

O'brien's 1/2-inch tapes were delivered to Walt Tucker Studios in Glendale, CA where they were posted along with additional elements and laid back to a video master. O'brien was brought in as an audio consultant. During the post session, he found himself shuttling between the "Access" project and a downstairs suite in which Jon Bon Jovi was working on his "Miracles" video from "Blaze of Glory."

One of Obie O'brien's more memorable projects is the "Blaze of Glory" album recorded at A&M because he was able to work with guitarist Jeff Beck, who, like O'brien, is an aficionado of vintage cars and motorcycles. Now that O'brien is back from exotic locales via Rotterdam, London, Tokyo, Moscow, Rio, Germany, Paris and Sydney, Australia, he's looking forward to making some headway on mixing down Bon Jovi's live album and several independently produced projects. Queried on whether he has any plans to open another studio, O'brien laughs, "I have much more fun working on other people's studios. If something goes down, you get to say, 'Hey, what's wrong with this?' and watch them run around like a lunatic." ■

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To arrange for a personal demonstration, please call (213) 726-0303. Or write TASCAM, 7733 Telegraph Road, Montebello, CA 90640.

TASCAM

STUDIO OWNER'S HANDBOOK

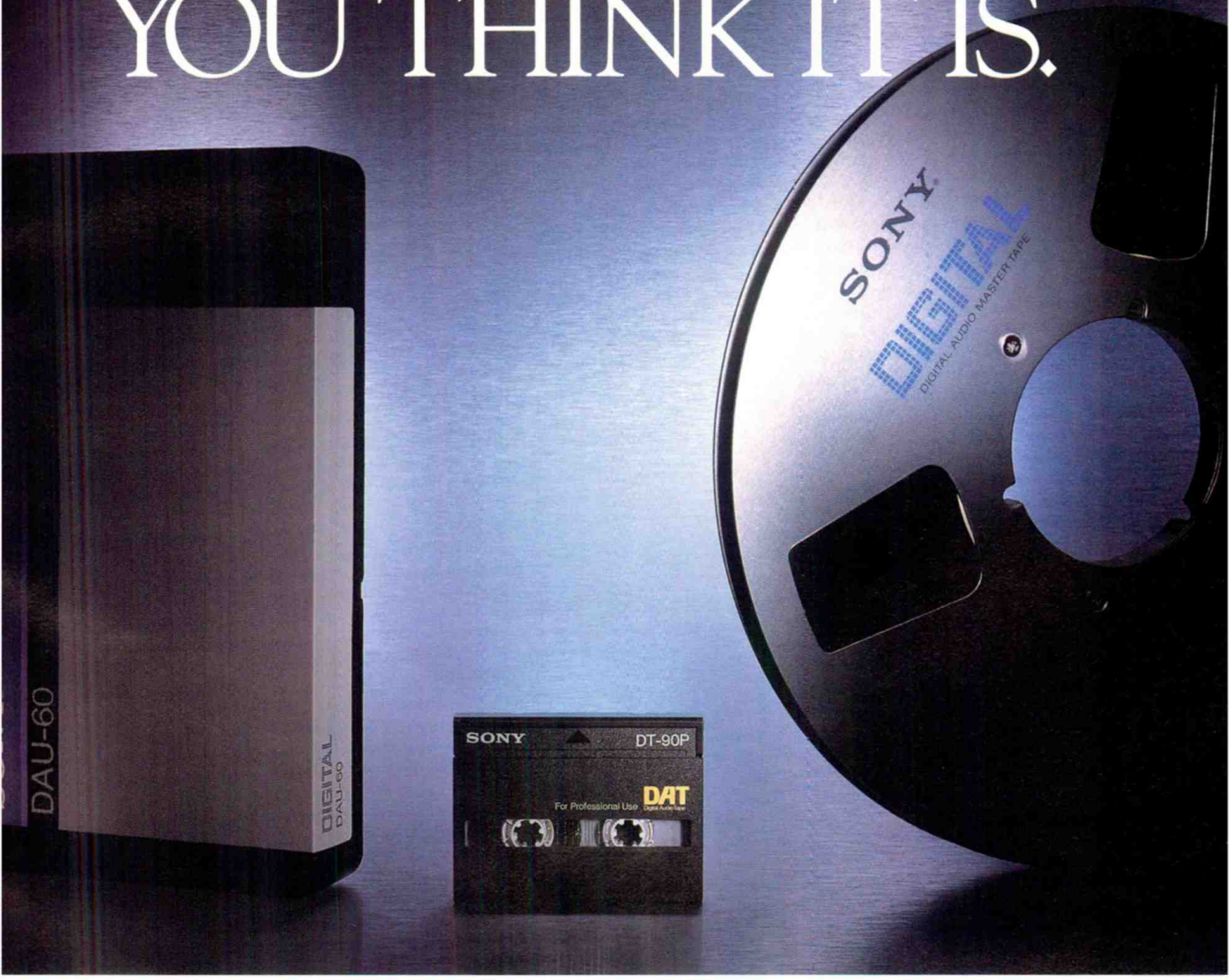
INTRODUCTION

Welcome to the R•E•P Studio Owner's Handbook, a compendium of informative reference material designed to assist working audio engineers, producers, technicians and facility owner/operators in their daily tasks. With this feature, we hope to introduce what will become a regular part of the R•E•P editorial makeup — useful, practical information, in bite-sized, single page, clip-and-save form, designed to collect and reference as needed, for use on the job.

Not everything presented will apply to everyone, but that's OK. Use the elements you need. And if you have ideas, tips or suggestions, by all means submit them. We'd be happy to share the knowledge. After all, that's what this magazine is all about.

Mike Joseph
Editor

THE MOST IMPORTANT DIGITAL EQUIPMENT ISN'T WHAT YOU THINK IT IS.



s the tape.

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SONY
PROFESSIONAL TAPE

Circle (17) on Rapid Facts Card

ANALOG ALIGNMENT

By Vince Casper

Substances that can be magnetized have one thing in common: the electrical currents that produce the magnetism are far less effective at low levels than they are at higher levels. As current increases from zero, very little magnetism results, until a point is reached that in effect overcomes the magnetic equivalent of inertia. The slow start is referred to as hysteresis loss.

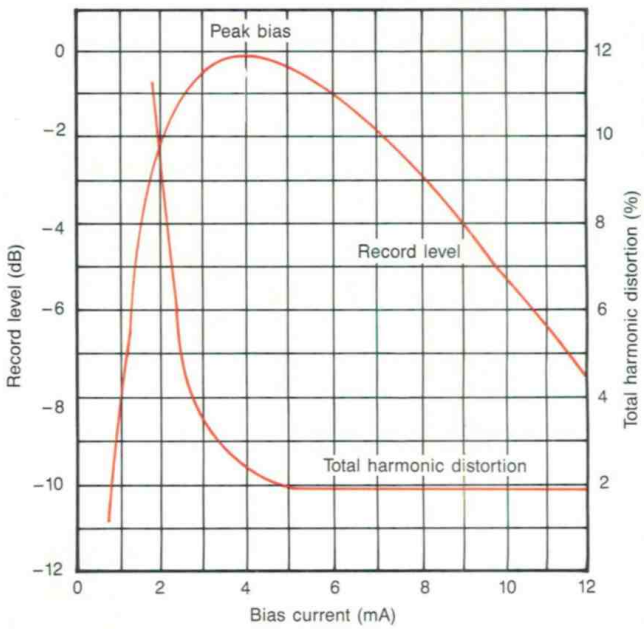
The recording process works likes this: For a given bias (high frequency current) field the signal is recorded at a certain depth in the magnetic tape coating. Near the surface, the magnetization is lowest. At the rear of the coating (near the base of the tape), it is highest. The principle is that when the magnitude of bias equals the magnitude of the coercivity at a given point, recording takes place. If the bias field is increased too far (over-bias), the saturation point is reached and the tape is magnetized as much as it can be. Increases in current produce no increase in magnetism past this point, and the output decreases.

If the bias field is reduced below saturation, the output will again decrease because the magnetization is too near the surface where magnetization values are lowest. Note that changing coating thickness is similar, in effect, to changing the bias level. Matching your recorder bias to the specific tape being used has always been important. This is especially true today with the new high coercivity formulations that go beyond the low-noise high-output tapes we've had for some time.

In overall recorder performance, correct bias is even more important than correct equalization, since the effects on frequency response, distortion, and dropouts are more severe.

Bias is a high frequency current approximately 10 times the highest audible signal (10 × 20kHz) that is mixed with the program signal to linearize the magnetic recording process. The correct level of bias is one that gives the lowest distortion, best signal output at both high and low frequencies, widest signal-to-noise ratio and frequency response, and most freedom from dropouts (See graphs). As we all know, setting the bias on a 3-head professional machine is a simple adjustment. Calibration of the reproduce electronics is one of the most critical adjustments you make. It must be done properly because all record adjustments are referenced to playback. The reproduce is equalized for flat response using the appropriate reference tape. Low frequency equalization (100Hz typically) is usually set during record alignment because of reproduce low frequency fringing effects of multi-track alignment test tapes (a magnetic head-to-tape contact phenomenon). The frequency response adjustment of the sync channels can be accomplished in the same way as that of the reproduce channels.

A generation ago, good bias results were achieved by recording a single relatively long wavelength (1kHz at 15ips) and adjusting for maximum sensitivity or peak bias. However, it is more accurate to do this at a higher frequency, such as 10kHz. The bias trim pot is typically manipulated counter-clockwise or clockwise to obtain a peak reading on the VU meter (use the record level adjustment to keep the signal on the meter). The sensitivity is then reduced ("over-bias") by increasing (clockwise) the bias trim a specific amount of VU's/dB. The bias setting chosen is a compromise between minimum distortion, frequency response, intermodulation noise and maximum modulation level. The amount of bias required is not only determined by the brand of tape employed (and their factory spec), but also by the gap length of the recording head.



Vince Casper is a systems engineer at the Saul Zaentz Film Center in Berkeley, CA.

MONITOR

June '91 GENELEC Company News Vol. 2

THE PRICE OF MONITORING

At the beginning of June an American producer was remixing a new album. He said he had lost $ 30,000 because the previous mix was unusable. Everywhere outside the studio the sound was horrible, he said. He is not the only one. A lot of time and money had been wasted because nobody had been able to hear what is actually on the tape.

This reminds me about an article which was published in Studio Sound some years ago when the first control room monitors designed primarily for sound quality had been in the market for a couple of years. The article emphasized the radical change to be seen in monitoring during the coming years because of the improved quality of digital storage media. The message was: 'today an average home listener having a pair of decent hi-fi speakers has better chance of hearing the recording than the engineer who recorded it! Concerned? You should be!'

This statement was very true and still is. To be commercially viable the studio needs good working conditions. All successful businesses rely on customers who come back again and again.

The customer who pays 30,000 dollars and gets rubbish will never return (except to complain)!

IM

NEW GENELEC TWO-WAY ACTIVE MONITORING SYSTEM1031A

The latest addition to the Genelec product range is the 1031A active studio monitor.

This speaker is an active 2-way DCW (Directivity Control Waveguide) design which complements the already established Genelec 1033A, 1034A and 1035A.

As the most compact speaker in this range, the 1031A is designed primarily for **Nearfield monitoring** in studios and for **Broadcast and TV sound monitoring.**

In both main applications the benefits of the DCW Technology, the carefully controlled directivity, greatly enhances the monitoring uniformity in different rooms. In studios the reflections from the mixing console are minimized and stereo imaging improved. Minimizing the reflections from the environment is important also in TV sound where the rooms are usually full of video equipment and in general less designed for good sonic performance. In both applications the response tailoring controls help users to get neutral monitoring balance.

Many of the 1031A's features are to be found in it's larger relatives. These included DCW design and active crossover filtering which allow for perfect driver phase matching at crossover. The crossover also enables precise adjustment of the monitor to the listening environ-

ment through the use of versatile tone controls. Full driver and amplifier protection are used to ensure system's reliability.

The 1031A will produce 121 dB peak SPL per pair at 1 m with music material. Frequency response extends from 47 Hz to 23kHz (-3dB points). Passband tolerance is ± 2 dB. Off axis response is also smooth and the directivity well controlled.

The 1031A uses a 210 mm polymer composite cone woofer and a 25mm aluminum dome tweeter. The tweeter is mounted in a DCW so as to minimize diffraction and control the system's overall directivity. Following the Genelec tradition the drivers are working acoustically in phase and with the same delay throughout the crossover. Acoustic slopes selected are fairly steep; this is to ensure that when used at horizontal position, the interference range is very narrow. Both drivers are electronically protected from overload.

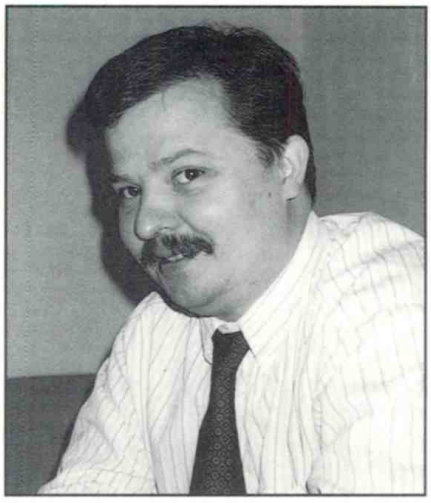
The amplifiers (2 x 120W) are completely new. The power stage driver is the same unit which is used in large models from 1024C upwards. Like in the S30 the woofer amplifier output impedance is made negative to control the Q value of the woofer in order to improve its response in a small enclosure. Needless to say, Genelec has used this technology from the very beginning of the company. The whole amplifier is mounted on rubber vibration isolators which also act as hinges. The system consists of a single unit housing speakers, amplifiers and crossover within a cabinet of dimensions 250x390x290mm (WHD), with a total weight of 12 kg.

NEW DISTRIBUTOR

Genelec has appointed **Solotech, Inc.,** 4820-4e avenue, Montréal, QUEBEC H1Y 2T8, tel: +1 514 5267721, fax: +1 514 5267727 as sole distributor for Quebec.

Contact Michel Dumais

NICK MARTIN SSE MARKETING



Scenic Sounds Equipment started distributing GENELEC in the UK in the beginning of 1987. Before the distribution agreement Nick Martin had been investigating the monitor market for some time and had come to the conclusion that there was definitely a niche for a 'non-compromise' product with price a secondary consideration. Nick Martin comments that when he first met Ilpo Martikainen he was immediately impressed by not only Ilpo's very real belief in working **with** distributors but also in the quality of the team behind him. Nick Martin continues that so many professional loudspeaker companies rely on 'One product Gurus' and not enough on ensuring that their design team has a fully rounded set of design skills.

When Scenic Sounds took over the distribution of Genelec monitors they were only familiar with a couple of the products and decided to try the S30, 1019A and 1025B at first. 'It was clear, from the moment that we first tried them that we were dealing with something very special and very saleable' commented Nick.

Their reaction was justified very quickly as the first two pairs of the large 1025B control room main monitors were sold shortly after their debut in England.

By the late 1980's the trend in studio control room design was to make them larger and larger which meant of course that loudspeakers had to get more and more powerful. Genelec received the message from SSE saying that the 1025B admirable though it was for many purposes, was not powerful enough for the contemporary UK market. Nick Martin asked the Genelec R & D department whether it was possible to design a monitor with the quality of sound of 1025B but with 10dB higher output. The same comments had been received also from Japan. The development of 1035A was started and the two very first units arrived in UK in December 1988. At the same period Scenic Sounds changed their name to SSE Marketing. The first 1035A monitor system was installed in Virgin Records prestigious Townhouse Studios on January 2st 1989 for evaluation by both Virgin's own engineers and their clients. According to Mr. Martin people were coming in from other control rooms to be quite astonished at the quality and power of the 1035A's within the first hour of installation. Many of the people present were astounded by how little set up was required to make them sound so good.

In January 1989 Virgin Records ordered 3 pairs of 1035A for their newly completed Olympic Studios. In February Metropolis Studios ordered 2 pairs of 1035A. The 1035A was presented officially only at the Hamburg AES Convention in March 1989. The smaller brother of 1035A, the 1034A came on the market six months later and was welcomed by the market with the same enthusiasm. Metropolis Studios ordered 3 pairs of the 1034As.

'The response to a distributors request for a particular product has hardly ever been so effectively carried out by a supplier in our experience. These two exceptional products were an indication of the capacity the uniquely balanced Genelec 'design team'.' claims Nick Martin.

The smaller Genelec monitors quickly became accepted by producers and studios who wanted high quality nearfield monitoring. Mr. Martin voices the opinion that: 'The new waveguide range has significantly

raised the expectations of audio professionals. This has in turn lead to the sales of nearfield monitors to those people who work in studios not equipped with Genelec waveguide monitors but who want Genelec quality.' 'One of the points that Genelec has not really stressed as much as they ought to is that they manufacture solutions for all common monitoring problems' says Neal McCormack also of SSE. He continues 'for example the highly directive nature of the 1022Bs make them particularly useful for rooms with less than ideal acoustics, particularly in television and video post production. Who else makes such products?' With the new 1031A small monitor this 'full line' philosophy is continued.

Nick Martin believes that the DCW is probably the most noteworthy development in professional loudspeaker design in the last ten years. The very natural stereo imaging and detailing is one of the many things that customers often comment on to SSE.

SSE has recently sold a pair of 1034As to Telecine who already own a pair of 1025Bs. The chief sound engineer's comment was 'after working with the Genelec's for a year or so I could not consider using any other manufacturer's products!' Telecine specializes in very high quality digital audio for video.

NEWS

Dierks Studio in Cologne, Germany has equipped after unanimous vote their renewed Studio III with Genelec 1034A monitoring system. The studio was designed by Neil Grant.

MAS GmbH, in Berlin has also acquired the Genelec 1034A main monitors.

TELECINE Sound for Video Post Production Studio in London has chosen Genelec 1034A main monitoring system.

THE PARIS AES CONVENTION

This year in Paris it was the 14th time that Genelec attended an AES Convention. The Genelec Demo-room has been growing with the product line each year.

The 1033A was a novelty this year at an European AES, and it was as highly appreciated by the public as its bigger brothers, the 1034A and 1035A.

The number of visitors who came to spend a pleasant moment to 'rest their ears' (as they told) 'Genelec sound', exceeded all the previous records.

By the way the pair of 1034A with amplifier (serial number 131) was stolen after the closing of the show. Please give us a buzz if you happen to see them somewhere.

Genelec demo room prior to the show opening in Paris AES.

RAI TV, in Italy has ordered 300 pieces of the new Genelec 1031A and 60 pieces of S30B for their new TV center outside Rome.

In **Japan** the following studios have purchased Genelec 1035A monitoring system:

Folio Sound Studio, Sonata Club, Roland, Bay Side Studio, West Side Studio.

The 1034A was chosen by **Uncle F, Hyper Sonic Studio, Toppan Printing and Co. Ltd** and **Dai-Ichi Koushou.**

The new 1033A monitors have also concurred the Japanese market. The latest studios equipped with them are **Totsu AV Center, JVC Aoyama, NHK Technical Services, KSS, T's Studio, and MOD Studio.**

MONITOR/ROOM OPTIMIZATION - DCW AND VAME

In the first edition of Monitor Monitor we covered the 15 years of Genelec product development. We now continue with a series of articles relating to Genelec product application.

This is the first such article, concerning with the relation of the Genelec monitoring speakers to the listening environment.

Both monitor and studio designers have discussed the requirements of 'ideal' monitoring for years. It has often been thought that the coloration of the monitoring speakers should approach that of 'typically

colored' home/car listening, to ensure correct output in 'typically colored' conditions.

The alternative criterion is to ensure that the sound is accurately reproduced by neutral speakers in a neutral control room. Transparency is the key word here. Whatever corrections the home listeners then wish in their diverse home listening conditions, they can accomplish using their own stereo controls.

The first approach actually amounts to any number of different criteria due to the vast diversity of home stereo equipment and listening conditions. We have therefore chosen the latter, transparency criterion, for our quest for accuracy. We aim for neutral audio reproduction throughout our monitoring range.

Having said this, we realize that the listening environment plays as great a part in the quality of the final sound as do the monitoring speakers. 'Good' monitors in a 'bad' room may sound as inaccurate as 'bad' monitors in a 'good' room. In case of a problem an acoustician can verify which is at fault by examining the near and far field responses of the monitors in that room.

Room distortions are mostly due to room boundary reflections interfering with the direct sound from the speaker, and so causing unevenness in the perceived response (both in terms of frequency and phase). These problems are never completely absent. Even in a highly damped room there are always some hard reflecting surfaces present, such as the mixing console or floor. All monitors are influenced by their environment.

We at Genelec can therefore only guarantee fully neutral audio reproduction in a free field environment (i.e. in an anechoic chamber). No control rooms are truly designed in this way and more importantly nobody would like to work in such a room.

Therefore Genelec has sought solutions to minimize the monitor's dependence on room acoustics. The two main techniques we have developed at Genelec are Directivity Control Waveguide (DCW) technology and Versatile Active Monitor Equalization (VAME) controls. Both improve the monitor/room response in any situations.

DCW increases speaker directivity, i.e. the amount of sound heard directly from the monitor, and thus reduces the influence of the room acoustics on the perceived sound. Due to physical size limitations of a DCW, this technique is only applicable to frequencies above ~400 Hz.

VAME is aimed at controlling the low frequency room/monitor response, e.g. excessive low frequency reverberation. At low frequencies the speaker output is most susceptible to the room acoustics. Thus VAME controls also allow for optimization of the non-ideally placed monitor acoustics. DCW and VAME together allow for accurate optimization of the monitor/room response.

Both DCW and VAME will be dealt with later in greater detail.

We are not aiming to undermine the studio designer. Together we are striving for neutral audio reproduction. After all there is nothing finer than accurate monitors in a well designed control room.

These are some of the ways in which Genelec attempts to stay several steps ahead of its competitors - with accuracy.

NVZ

THE 'WHO IS WHO' OF GENELEC USERS

SARAH BRIGHTMAN
PAUL MCCARTNEY
CHRIS DE BURGH
ANDREW LLOYD WEBBER
MARK KNOPFLER
RUSH
GEORGE MICHAEL
JIMMY SOMMERVILLE
QUEEN
A-HA
PAUL YOUNG
PRINCE
ERIC CLAPTON
SIMPLE MINDS
JUDY TZUKE
DUSTY SPRINGFIELD
JOAN ARMATRADING
SHIRLEY BASSEY
LIVING IN A BOX
THE HUMAN LEAGUE
VAN MORRISON
GARY MOORE
PROPAGANDA
FINE YOUNG CANNIBALS
THEN JERICO
MARC ALMOND
BANANARAMA
BILL WYMAN
JULIA FORDHAM
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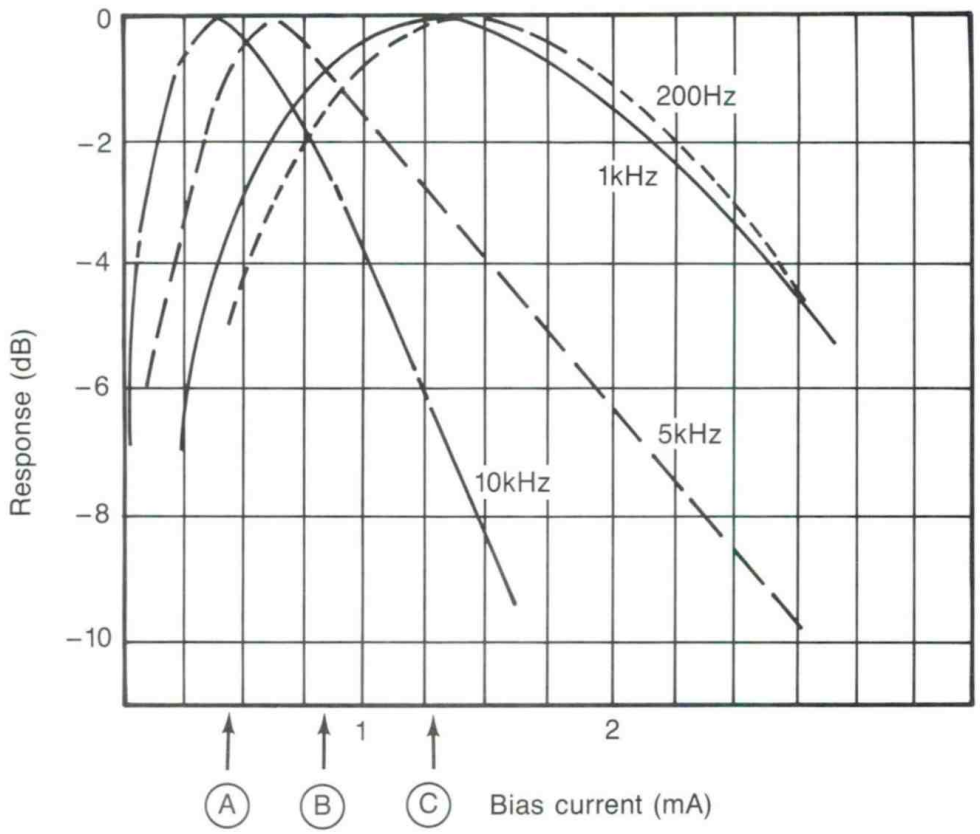

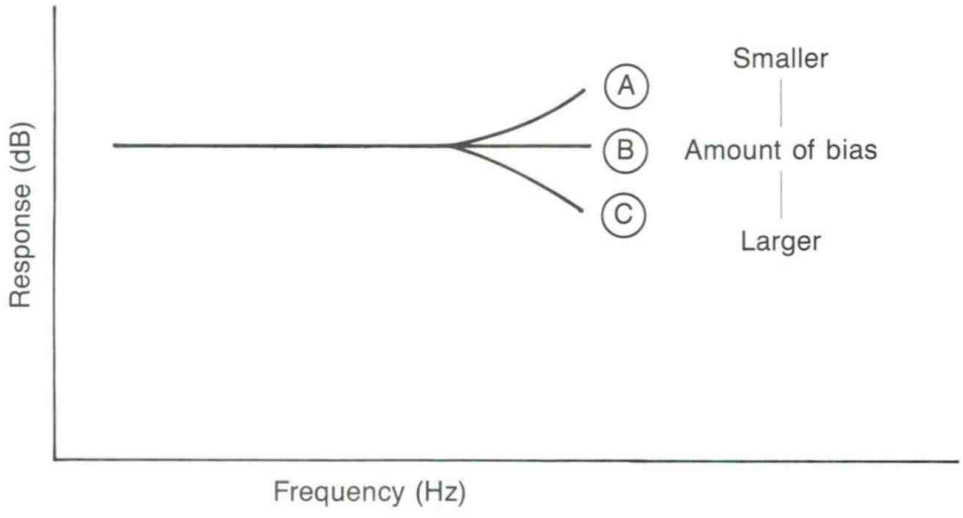

RECORD HEAD GAP LENGTH	AMOUNT OF OVER BIAS
0.25 mil	3.0dB
0.50 mil	2.5dB
1.00 mil	1.0dB

The ideal bias setting corresponds to the point where third harmonic distortion and modulation noise caused by surface irregularities are reduced. For quick reference, it makes sense to tape an overbias chart (out of the recorder's owner's manual) to the inside door of the multi-track's electronics.

Noting the recording conditions, including the type of tape used and the level at which the sine wave was recorded, are very important. All recorders operating at speeds of 15ips or below tend to saturate with high-frequency signals very readily. It is customary to measure frequency response at −10dB re: 0 VU at 7.5ips. Bias adjustment should also take place at these reduced levels. Tape compression or saturation will occur if you attempt to bias at 0 VU at slower speeds. The frequency response vs. overbias chart shows that increased overbias amounts to reduced high frequency response. ■

Recording ■ Engineering ■ Production
R-E-P

TEMPO CONVERSION

			delay in milliseconds						time in seconds			
BPM	**FPB24**	**FPB30**	**1/4 n**	**1/4 t**	**1/8 n**	**1/8 t**	**1/16 n**	**1/16 t**	**1 bar**	**2 bars**	**4 bars**	**8 bars**
80	18.0	22.5	**750.0**	500.0	**375.0**	250.0	**187.5**	125.0	**3.000**	6.000	**12.000**	24.000
81	17.8	22.2	**740.7**	493.8	**370.4**	246.9	**185.2**	123.5	**2.963**	5.926	**11.852**	23.704
82	17.6	22.0	**731.7**	487.8	**365.9**	243.9	**182.9**	122.0	**2.927**	5.854	**11.707**	23.415
83	17.3	21.7	**722.9**	481.9	**361.4**	241.0	**180.7**	120.5	**2.892**	5.783	**11.566**	23.133
84	17.1	21.4	**714.3**	476.2	**357.1**	238.1	**178.6**	119.0	**2.857**	5.714	**11.429**	22.857
85	16.9	21.2	**705.9**	470.6	**352.9**	235.3	**176.5**	117.6	**2.824**	5.647	**11.294**	22.588
86	16.7	20.9	**697.7**	465.1	**348.8**	232.6	**174.4**	116.3	**2.791**	5.581	**11.163**	22.326
87	16.6	20.7	**689.7**	459.8	**344.8**	229.9	**172.4**	114.9	**2.759**	5.517	**11.034**	22.069
88	16.4	20.5	**681.8**	454.5	**340.9**	227.3	**170.5**	113.6	**2.727**	5.455	**10.909**	21.818
89	16.2	20.2	**674.2**	449.4	**337.1**	224.7	**168.5**	112.4	**2.697**	5.393	**10.787**	21.573
90	16.0	20.0	**666.7**	444.4	**333.3**	222.2	**166.7**	111.1	**2.667**	5.333	**10.667**	21.333
91	15.8	19.8	**659.3**	439.6	**329.7**	219.8	**164.8**	109.9	**2.637**	5.275	**10.549**	21.099
92	15.7	19.6	**652.2**	434.8	**326.1**	217.4	**163.0**	108.7	**2.609**	5.217	**10.435**	20.870
93	15.5	19.4	**645.2**	430.1	**322.6**	215.1	**161.3**	107.5	**2.581**	5.161	**10.323**	20.645
94	15.3	19.1	**638.3**	425.5	**319.1**	212.8	**159.6**	106.4	**2.553**	5.106	**10.213**	20.426
95	15.2	18.9	**631.6**	421.1	**315.8**	210.5	**157.9**	105.3	**2.526**	5.053	**10.105**	20.211
96	15.0	18.8	**625.0**	416.7	**312.5**	208.3	**156.3**	104.2	**2.500**	5.000	**10.000**	20.000
97	14.8	18.6	**618.6**	412.4	**309.3**	206.2	**154.6**	103.1	**2.474**	4.948	**9.897**	19.794
98	14.7	18.4	**612.2**	408.2	**306.1**	204.1	**153.1**	102.0	**2.449**	4.898	**9.796**	19.592
99	14.5	18.2	**606.1**	404.0	**303.0**	202.0	**151.5**	101.0	**2.424**	4.848	**9.697**	19.394
100	14.4	18.0	**600.0**	400.0	**300.0**	200.0	**150.0**	100.0	**2.400**	4.800	**9.600**	19.200
101	14.3	17.8	**594.1**	396.0	**297.0**	198.0	**148.5**	99.0	**2.376**	4.752	**9.505**	19.010
102	14.1	17.6	**588.2**	392.2	**294.1**	196.1	**147.1**	98.0	**2.353**	4.706	**9.412**	18.824
103	14.0	17.5	**582.5**	388.3	**291.3**	194.2	**145.6**	97.1	**2.330**	4.660	**9.320**	18.641
104	13.8	17.3	**576.9**	384.6	**288.5**	192.3	**144.2**	96.2	**2.308**	4.615	**9.231**	18.462
105	13.7	17.1	**571.4**	381.0	**285.7**	190.5	**142.9**	95.2	**2.286**	4.571	**9.143**	18.286
106	13.6	17.0	**566.0**	377.4	**283.0**	188.7	**141.5**	94.3	**2.264**	4.528	**9.057**	18.113
107	13.5	16.8	**560.7**	373.8	**280.4**	186.9	**140.2**	93.5	**2.243**	4.486	**8.972**	17.944
108	13.3	16.7	**555.6**	370.4	**277.8**	185.2	**138.9**	92.6	**2.222**	4.444	**8.889**	17.778
109	13.2	16.5	**550.5**	367.0	**275.2**	183.5	**137.6**	91.7	**2.202**	4.404	**8.807**	17.615
110	13.1	16.4	**545.5**	363.6	**272.7**	181.8	**136.4**	90.9	**2.192**	4.364	**8.727**	17.455
111	13.0	16.2	**540.5**	360.4	**270.3**	180.2	**135.1**	90.1	**2.162**	4.324	**8.649**	17,297
112	12.9	16.1	**535.7**	357.1	**267.9**	178.6	**133.9**	89.3	**2.143**	4.286	**8.571**	17.143
113	12.7	15.9	**531.0**	354.0	**265.5**	177.0	**132.7**	88.5	**2.124**	4.248	**8.496**	16.991
114	12.6	15.8	**526.3**	350.9	**263.2**	175.4	**131.6**	87.7	**2.105**	4.211	**8.421**	16.842
115	12.5	15.7	**521.7**	347.8	**260.9**	173.9	**130.4**	87.0	**2.087**	4.174	**8.348**	16.696
116	12.4	15.5	**517.2**	344.8	**258.6**	172.4	**129.3**	86.2	**2.069**	4.138	**8.276**	16.552
117	12.3	15.4	**512.8**	341.9	**256.4**	170.9	**128.2**	85.5	**2.051**	4.103	**8.205**	16.410
118	12.2	15.3	**508.5**	339.0	**254.2**	169.5	**127.1**	84.7	**2.034**	4.068	**8.136**	16.271
119	12.1	15.1	**504.2**	336.1	**252.1**	168.1	**126.1**	84.0	**2.017**	4.034	**8.067**	16.134
120	12.0	15.0	**500.0**	333.3	**250.0**	166.7	**125.0**	83.3	**2.000**	4.000	**8.000**	16.000

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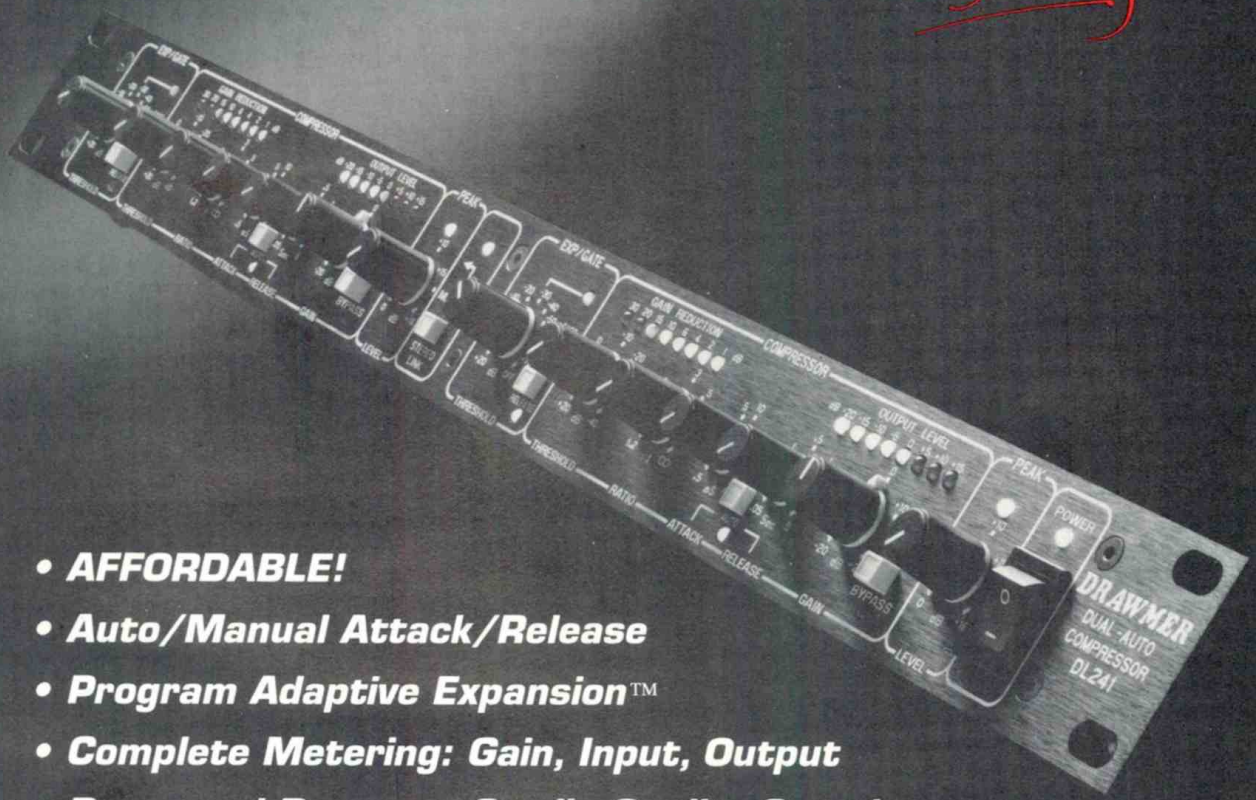

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R·E·P **HANDBOOK**

DIGITAL INTERFACE

By Will Eggleston

Dealing with digital audio in the control room can be a love/hate relationship. All too many times the audio engineer is faced with digital interface situations which require a little more thought than he or she originally expected. Choices need to be made: Master or slave? Internal word sync or house? Time code format? Frame rate? How about plain old protocol format interface? Chances are, the more digital interconnects needed to complete the circuit, the more thought is required to make it work correctly. And, if the number of interconnects don't get in your way, maybe the different manufacturer's actual design of the equipment will.

Here are four universal rules to follow while stumbling through the digital minefield:

Rule 1: There can be only one sample rate in a digital hookup.

Sample rates are supposed to be locked to each other at the time of the transfer. 44.056kHz, 44.1kHz and 48kHz just don't match. Sometimes, if the equipment is just old enough, it is possible to fool the target device into receiving the data without any apparent problems. That is, until you try to play it back at the right speed.

There is basically one thing wrong with this non-conversion approach — depending on which direction you are going, either upsampling or downsampling, you will be dropping approximately one out of every 10 samples or repeating one out of every 10 samples. Not exactly Hi-Fi.

The easy approach is to transfer or copy through the analog ports. A well-designed hard disk system should have some form of sample rate conversion software program that at least provides the ability to switch between rates. Concerning the actual quality of those conversions, some are much more seemless than others. For highest quality, your only real long-term solution, while staying in the digital realm, is to buy a well-designed sample rate convertor. These are hardware solutions which use any one of a number of techniques to rewrite the digital words without losing bits.

Rule 2: Digital formats which differ in structure don't normally talk to each other.

This one's not too hard to understand. There can be communication only when digital devices speak the same language. Looking a little closer at this reveals some specifics about a couple of the more popular digital formats.

The AES digital format is broken down into two types: Pro (AES/EBU) and Consumer (S/PDIF). These formats are very similar in format structure, but have distinct differences in their channel status bits. These bits (or flags) are used to identify the type and configuration of audio products in their communication with other products. The structure of the channel status bits has been defined for quite a few years, however, the implementation of these have gone through their own development process. One example of this is the SCMS copy protection scheme.

The Pro or AES/EBU protocol utilizes a high-level differential electrical interface normally terminating in XLR connectors. Embedded in the bitstream is the "Pro" channel status bit.

S/PDIF (Sony/Philips Digital InterFace) uses a low-level single-ended electrical interface, terminated (in most situations) in an RCA connector. Optical interfaces are also used, sharing the status bit labeled "Consumer" with other S/PDIF formats. Flags which can be set in the digital words include copy prohibit, different types of emphasis curves, clock frequency, and open-ended (as yet not implimented) user bits, all specific in location and purpose to the various formats.

An early and popular format is the Sony Digital Interface (SDIF). This format was structured in the early 1980s under the numeric 1610 and served as the digital protocol for mastering CDs (not to imply that CDs are SDIF). Several years later the 1610 was improved by Sony, thus the 1630 and SDIF-2 protocol was born. Unlike the AES standards for consumer and pro, SDIF-2 has separate physical connections for each left and right audio channel, as well as a third connection for word clock. This results in six, as opposed to two connections for stereo inputs and outputs in the digital interface. SDIF-2 has only two channel status bits — emphasis and copy prohibit. Its word structure is a completely different language compared to AES/EBU and S/PDIF. In short, communication between two devices which speak in different languages is not possible unless some sort of hardware or hardware/software format interface is connected between them.

Rule 3: There can only be one master.

In a simple dual-machine transfer between, let's say, two DAT recorders, digital AES audio is passed from the source (master) machine to the destination (slave) machine. Usually no problem ... unless there's a difference in format implementation technology. Some older machines do not send the sample rate flag downstream. Newer machines may require the sample rate flag to be identified before they will go into motion record.

The simple fix would be to change the order of the decks. In other situations where that is not possible, you will need some form of interface convertor/editor.

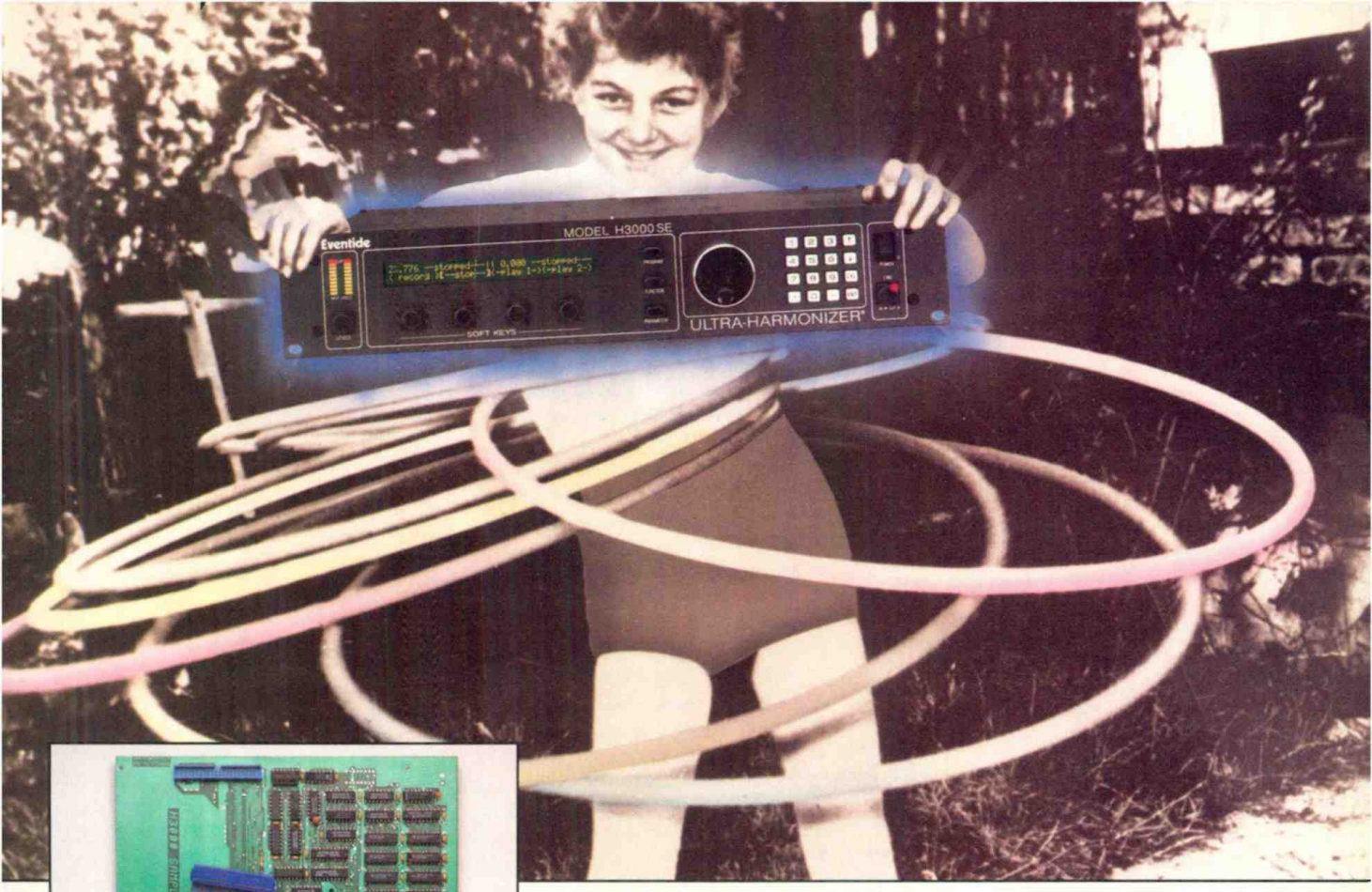
Rule 4: House sync is the grand master.

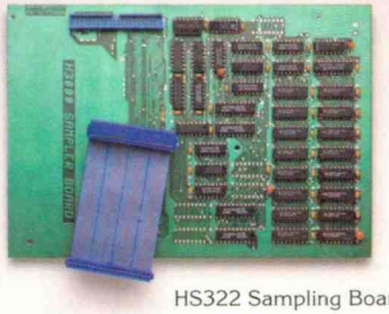
Please refer to Rule 1. In those applications where transfers are occurring between R-DATs or CD players and digital video machines, everybody locks to house. If they don't, *absolute* lock will not occur. For some people this might not be an issue. But for absolute phase-lock between digital frames, every device must run at the same clock rate. The problem becomes more obvious when a number of digital sources are connected to a digital console, where every device has to be running at the same exact frame rate.

Unfortunately, there are only a few digital recording and playback devices which have external word/house sync inputs. Hard disk systems which *do not* have the ability to lock to house video sync are *not* designed for video post-applications.

These rules are not intended to scare engineers away from digital audio interconnects, but rather to serve as a basis for understanding basic problems when trying to pass digital audio between different digital devices. ■

Will Eggleston is a product development manager for Lexicon, Waltham, MA.





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R-E-P **HANDBOOK**

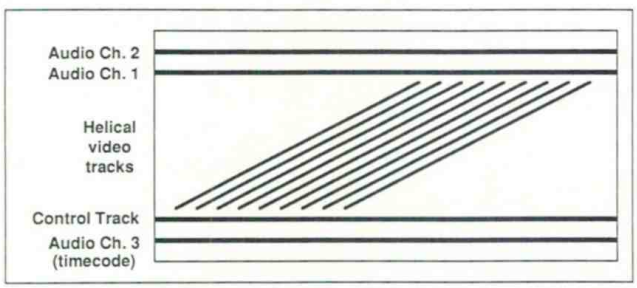
VIDEO BASICS

By Eric Wenocur

Television images come in discrete "packets," or frames. One frame, consisting of 525 lines of information, divided into two fields, fills the television screen one time. The video signal is composed of information representing the black and white detail of the picture (luminance) and the color of the picture (chrominance). In addition there are synchronizing pulses which tell the television where each line and each field begin. Between each field is a vertical blanking interval, containing a vertical sync pulse. Vertical blanking is the "black bar" that rolls by when a television's vertical hold is misadjusted. Video edits are made electronically, by "punching in" during the vertical interval, where they are not seen.

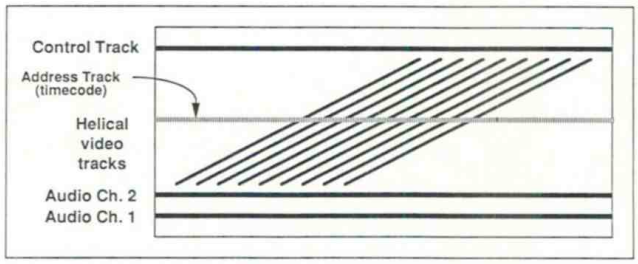
In American (NTSC) television the frame rate is actually 29.97 frames per second, though it can be considered "30" for most purposes. European (PAL) television has 25 frames per second.

Video is recorded by a rotating drum containing magnetic heads, in a pattern known as helical scan. (Helical scan transports are also used for digital VTRs, Sony 1630 and DAT.) Audio, time code and control track are recorded longitudinally beside the video tracks by conventional audio heads. The control track is a series of pulses used to resolve tape speed, and position the video heads over the tracks on playback. Without control track, the picture would roll and break up (as when scanning on a home VCR). A VTR records control track when it is in hard record, or assemble edit mode, but must receive a video signal (or at least vertical sync) to do so. On VTRs with electronic counters, if the counter advances, the control track is present, and the tape can be used for video or audio insert edits.



Track layout on 1-inch (type C) videotape.

Eric Wenocur is Chief Engineer at KLM Video, Bethesda, MD, and a recording engineer, producer and musician in the Washington, DC area.



Track layout on ¾-inch videotape.

Format	Audio channels	Uses
1-inch type C	2-4 longitudinal	Professional: broadcast, editing (master)
Betacam SP/MII	2 long., 2 FM	Professional: broadcast, field acquisition, editing
¾-inch U-matic	2 longitudinal	Professional: field acquisition, editing
D1	4 PCM(48K, 16-bit)	Professional: graphics, editing (master)
D2/D3	4 PCM(48K, 16-bit)	Professional: broadcast, field acquisition, editing (master)
S-VHS/ VHS	2 long. 2 FM	Consumer/ Industrial: field acquisition, editing
8mm/ HI-8	1-2 FM (opt. PCM)	Consumer/ Industrial: field acquisition, editing
Beta I, II	2 longitudinal	Consumer/ Industrial: field acquisition, editing

In hard (or "crash") record everything on the tape is erased and new control track, video and audio recorded. An assemble edit is like hard record, except that the VTR rolls into the edit and starts recording new control track in a continuation of that already on the tape. Assemble editing is used when new material is being added to a partially recorded tape, and it is desired to "pick-up" and continue on. During insert edits control track is not recorded, even if video is being recorded. Inserts can be any combination of video and audio tracks. VTRs with insert capability have buttons to select which track will be put into record — like safeties on an audio deck. There is also a separate "record" button for editing versus hard record.

Each of the multitudinous video formats has different advantages and uses. The digital video formats are analogous to digital audio formats in their principles of operation (although bandwidth is much greater). Besides analog and digital, there are differences in the format of the recorded video signal itself. Betacam, MII (pronounced M2) and D1 record the video in its component form of red, green and blue. The other formats use the composite, or encoded, form of luminance and chrominance.

These format differences are significant in terms of picture quality (component is better, and more expensive), but have no bearing on audio. The following table lists the most common uses for the various videotape formats, and their most common audio track configurations. ■

VIDEO VITAL STATISTICS

Signal Specs:

Analog: 1V p-to-p, 75Ω terminated, 4.5MHz bandwidth required for broadcast-quality resolution, color subcarrier at 3.58MHz.

Wiring required:

Analog: 75Ω coaxial cable and connectors (BNC or RCA), terminated with 75Ω at inputs.

Frame rates/formats:

NTSC: 29.97fps, 59.94Hz field rate;
PAL: 25fps, 50Hz field rate.

Recording formats:

Pro analog: 1-inch type C, 1/2-inch Betacam, 1/2-inch MII, 3/4-inch U-matic.
Pro digital: D1, D2, D3, more on the way...
Consumer/Industrial: S-VHS, VHS, Beta I and II, 8mm, HI-8.

TAXING DETAILS

By Jim Rashfield

You've worked hard all of these years and your business has survived, maybe even flourished. One day you get *the* phone call — the government has decided to audit your business. How prepared are you?

This past year, the city of Chicago audited several recording studios, including our own. We've been in business for over 15 years, and we thought we were doing everything the right way. So when the auditor called, we told them to come in whenever they wanted. They said it was just routine and would take three days. Four weeks later, when the auditor finished, we had found out all we wanted to know (and more) about tax laws and audits.

Although we didn't end up having any serious problems, we could have been more prepared. Here are some guidelines that might help you before the auditor comes knocking on your door.

Hire an accountant. Having a regular accountant will insulate you from most of your tax problems. They usually receive regular notices from the government about changes in the tax laws. However, you can't quite leave it all up to them.

Research local tax laws. The fact that auditors usually find problems isn't because people set out to break the law. More often, the problem is that people don't understand the tax laws.

You might think, "Why learn about tax law when I have an accountant or lawyer?" While having an accountant is very helpful, they can't be held responsible for every transaction you make. A lawyer is only useful after the mistakes have been made. Also, local governments aren't always organized enough to notify accountants of every change in tax laws, and they sometimes have odd exceptions that may apply only to your industry.

Don't think the government will inform you when you're doing something wrong. The government's method of educating you about tax law is to send an auditor to your front door. By that time, you could owe "back taxes" for all the years you were doing it wrong. The city of Chicago told us that whenever they enact a new law, all they are required to do is to list it in the classified section of the local paper for a couple of weeks. This may seem unfair. But just because the law is unfair doesn't mean it can't be enforced. And if you want to avoid long legal battles about the constitutionality of certain laws, then you'll be happy to know that there are ways you can find out what laws apply to you. Unfortunately, it is not always simple.

If you call appropriate government departments, they'll send you copies of the current tax laws. Some of these laws can even be understood by reading them. However, for questions of interpretation, you may run into problems. It's sometimes hard to find anyone in the government who is responsible for answering these types of questions. What's worse is that they may tell you something that's just plain wrong. The first couple of people I talked to each had a different answer on what taxes I should be paying. If you research the laws and get conflicting answers, send your question in letter form and try to get someone in the government to answer in writing.

The bottom line is that tax laws (in fact all laws) are not simple and set in stone. New cases always arise that require some kind of interpretation. Sometimes the only way to get an answer to your tax question is by contesting the law and taking your case to court.

Talk to other local businesses. Other local merchants, especially those in the same industry, can be the most valuable source of information. They may have already gone through an audit and learned the hard way. Take advantage of this by picking their brains about what tax laws you should be following. Use your local AES, SMPTE, NARAS or SPARS groups as sources for contacts.

Make sure your suppliers are doing it right. This may seem to be something you shouldn't have to worry about, but in some cases the auditor can hold you responsible for other companies mistakes.

For example, the City of Chicago is holding us responsible for paying 6% rental tax if we rented equipment from a company that didn't charge us the tax originally. So, not only must we make sure that we charge the rental tax, but we also have to make sure that we're being charged. What if the company we rented from is in the suburbs and doesn't normally pay city taxes? They wouldn't know what to do with the money if they collected it. In this case, we're responsible for assessing ourselves and sending the tax to the city.

Another wrinkle in this rental law comes from the fact that several studios who are being audited have rented things to each other without charging rental tax. We asked the auditors who would be responsible for paying the rental tax. They replied that whoever was audited first would have to pay it.

Consider the implications of the law. Some laws may seem straightforward but may have important underlying implications. For example, one local studio thought that they were being smart by not paying their engineers directly. They had their clients pay

Jim Rashfield is president of Acme Recording, Chicago.

the engineers instead. Normally, studios pay their engineers as employees or sub-contracted laborers. However, under this other plan, all of this particular studio's session time was classified as a rental, since the studio couldn't show that it had paid anyone to operate it. They had not been charging the 6% rental tax for all of the years they were in operation.

Keep all of your records. In tax law, you're guilty unless you can prove yourself innocent. If you don't have the proper records, the auditor has the power to assume the worst possible case and charge you for it. Also, although most people think there is some kind of statute of limitations, some local governments have given themselves the power to go back as far as they want to if they think you were doing it wrong.

You're never too small. Maybe your business is just starting out, or you're free-lancing and getting paid "under the table" because it doesn't seem like that much money. At what point do you take the plunge and start dealing with taxes as a full-time business does?

No matter how small your business is, do it the right way from the beginning. If you're audited years from now, the first few years could cause you trouble.

Follow the law. Once you know what the law is, follow it. Avoid any temptation to cheat a little bit on some tax or another. The best way to avoid future audit problems is to do it right in the first place. And if you do get audited, remember, the auditor isn't always right.

Don't take everything the auditor says for granted. Some tax laws are open to interpretation, and the auditor will usually take the strictest interpretation. There were several times during our audit when I successfully questioned certain interpretations of the law and several times I even caught the government giving me false information.

Keep in close contact with your accountant. Some people prefer to have their lawyer or accountant handle everything with the auditor. This is convenient, if you can afford it. Otherwise, be sure to question your accountant on every point that you don't understand. The accountant will probably tell you to only give the auditor what they ask for and nothing more. When you get the final report at the end of the audit, be sure to go over it with a lawyer or accountant.

Keep your cool. Owning a business is hard enough. It's always disappointing when your first contact with the government isn't some kind of congratulation. After all, you're employing several people, producing some kind of product and generating money for the local economy.

Instead, it's a focus on what you've done wrong. They'll demand detailed records and ask you to be accountable for decisions that you hardly remember making. Finally, they'll be taking your time and your money.

If you'll be dealing with the auditor yourself, keep a check on your temper. It's easy to get frustrated with the whole process, but getting mad at the auditor will do you no good and may make your situation worse.

The more prepared you are for an audit, the quicker you'll be able to get back to the real work. ■

R-E-P **HANDBOOK**

FUNCTIONAL FORMS

By Ron Streicher

The job's not finished until you've completed the paperwork." This old adage probably originated with some government bureaucracy in mind, but is nonetheless true for the recording studio as well. To the engineer, attention to paperwork may seem to be just another tedious chore which gets in the way of the art of creation, but without it, a project can rapidly become a serious muddle and grind to a halt.

Among the paperwork involved in the recording process are session booking forms, setup charts, tape and edit logs, maintenance requests and service performance forms, and, of course, time and materials billing logs. As with the project itself, paperwork can be divided into three basic groups: before, during and after the session.

Every studio's method of operation is different, and studio managers will need to develop their own particular set of requirements for booking and organizing a session. Certain fundamentals are common to all situations, however, and one of the most important forms should be the session booking form. This, of course, should include the name, address and telephone numbers of the client. But don't forget the pager, cellular phone and FAX numbers as well. These numbers should also be secured for all key contact persons involved, such as personal and business managers of artists, leader, principal artists, etc. Just whose names you will need will vary with each type of group or session, so your form should provide sufficient space for multiple entries.

The date, time and expected duration of the session should also be carefully noted, as well as any provisional or holdover time. This will help to avoid conflicts or embarrassments later if you or your client find that the time booked and the time required do not agree. Remember, studio time booked is usually time billed, so it is to your advantage to get the scheduling confirmed in writing ahead of the session. It is always a good idea to give a copy of the session booking form to the client. This way he or she can confirm the details, and hopefully avoid any errors or misunderstandings.

A complete technical run-down should accompany the booking form. This should include a detailed list of all equipment required (either from the studio's own inventory or rented from outside sources) in the studio and control rooms; an accurate plot of the set-up required in the studio (don't forget to count how many chairs and music stands will be required); and a provisional layout of microphones, stands, DI boxes, headphones, video monitors and similar technical equipment.

For major dates, there should be a scale drawing of the studio, and if possible, it should be marked with a grid overlay to assist the setup crew in preparing the studio prior to the session. If different setups will be required for each musical selection, a separate sheet should be prepared for each.

Similar pre-production forms should be prepared for the control room, showing the proposed layout of the mixing console and signal routing requirements, tape machine and track assignment, tape and noise reductions formats, etc. Since most of the information will come from the session mixing engineer (who may be an independent operator and not one of your regular staff), these set-up sheets should be designed as intuitively as possible. They should be easy to read and interpret, so that a minimum of time is required to prepare the control room for the session. If automation systems are employed, much of this information will be kept in the computer, but a printout is still helpful to assist the engineer in getting everything properly established.

If video playback will be involved, be sure to determine which format(s) are involved: audio, video, time code, cue track locations, etc., and note these on the session booking form.

The more information you can get confirmed in writing, the less likely misunderstandings will be which could cause problems during the session, or worse yet, cause the session to abort. Remember, you want your client to come back for repeat work, and if they do, this information will already be on file to assist in scheduling future sessions. Producers like that — it shows that your studio is *client-oriented*.

One of the jobs of the second engineer is to keep complete and accurate logs of the recording process. There are many methods of logging tapes, and again, each studio will need to generate a form which works best for its own particular operation. However, certain pertinent information should always be included, so that the next day, or a year later, someone working with these recordings will know exactly what is on the tapes and where to find it.

The header on the tape log form should contain the name of the client and the project title (and number, if there is one). The date of the recording and the names of the first and second engineers should also be included.

Basic technical information should be next, including the tape format, track assignment, noise reduction information, location of calibration tones, record machine ID, time code format and location, etc. A specific line (or check-boxes) should be included for each parameter, with a few additional lines for general technical comments or other information.

Next comes the body of the log form — the listing of the contents of the tape. Columns should be headed for: take number; identification of the take; duration of the take, start ID number (if a DAT recording); tape time position, if there is one (the "at time"). A column for comments or notes is also important. All of this information must be complete and accurate. If not, a lot of time will be wasted during post production trying to reconstruct what happened during the session and where a particular take is on the tape.

By the way, the best way to avoid confusion in identifying takes is to begin the session with "take one" and then number each subsequent take sequentially until the end of the session. If no two takes are given the same number, then no confusion can result later as to which take to use. However, if a take is slated as "song one, take one," and then later on a slate is called "the next song, take one," somewhere, some time, someone will be

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confused and pull the wrong take! It should be obvious that verbal slates should be recorded onto the tape with each take, and these should agree with what is written on the log sheets. If an incorrect slate is given, this should be carefully noted on the log, and, if possible, a corrected "end-slate" should be recorded at the conclusion of the take.

A copy of the tape log should accompany each and every tape made during the session. In addition, a copy of the log should be put into the project file — together with the session booking forms, etc. Another copy of the session log should be given to the client. Multi-part NCR forms or copying machines are a must in this regard.

Another important set of forms which should be generated during the session are the technical logs. These record the actual position of all performers in the studio and the microphones used to record them. Console settings, signal processing and all other technical parameters in the control room should also be carefully noted, so that the sound of the session can be accurately recreated at a future date if necessary.

Maintenance requests or service logs should also be kept accurate and up-to-date. Any problems noted during a sesion which cannot be immediately corrected should be noted on a maintenance request form and given to the appropriate personnel for their attention. Once service is completed, it should be noted on a service log. Your chief engineer should devise appropriate forms for your studio's particular needs.

The life blood of the recording studio, as with any profit-making enterprise, is the accounting process. For billing to do its job, a session accounting form is essential. This should provide all of the information necessary to bill the client properly and fairly for the time and materials used, as well as any other appropriate charges related to the session. A basic accounting form should include the actual starting and ending times for the session, and should note any "down time" which occurred while on the clock. If your studio bills for it, setup and strike times should also be noted. Special additional charges such as equipment rentals, overtime or penalty charges, meals or refreshments, etc., should also be indicated. And, of course, a complete list of materials used should be included.

If there are any special circumstances which occurred during the session which the billing department (or anyone in the front office) needs to know about, these should also be noted by the second engineer. Billable items such as damage to equipment or facilities caused by the client, meals provided during the session, telephone calls, etc. should be marked. Similarly, if anything occurred during the session which would cause a reduction in the billing to the client, this information should also be included.

Editing logs should be generated whenever the takes are assembled into a "finished" version. The take number, bar numbers, ID markings and any other identifying information should be carefully noted. If scores are available, these should also be marked as to which takes were used for each segment. This is important, so that if additional editing (or re-editing) is required, it will be clear just where every bit of music came from. As with other logs, copies should be placed into the project file and given to the client. ■

For more information on organizing a recording session, readers are referred to the paper "Location Recording Practices: A Tutorial" by Ron Streicher. Preprint #2155, presented at the 76th Convention of the Audio Engineering Society, 1984, October, New York.

R·E·P **HANDBOOK**

TIME CODE

By Eric Wenocur

Time code is a system that assigns a unique address number to a segment of video or audio tape. It is a digital signal, with each address represented for longitudinal time code (LTC) by an 80-bit "word." The bits are used for marking the address (hours, minutes, seconds and frames), carrying "flags" that indicate special parameters and carrying user-defined messages (user bits). Most time code is recorded longitudinally on tape, like audio, using frequency modulated bi-phase encoding. The time code appears as a variable duty cycle square wave, modulating between about 1200Hz and 2400Hz, at play speed. Longitudinal code does not read accurately at slow tape speeds, and reading at wind speeds requires wide-band audio circuitry.

Because timecode was originally developed for video editing, it identifies tape position in units of frames. One frame of SMPTE time code (33ms) is equal to about 1/2 an inch of audio tape at 15ips. Some synchronizing equipment can control tape position in subframes (1/100 frame) as well, but the smallest increment for a time code address is the frame. Because time code provides a constant frequency standard, recorded on the tape, it is also used for "locking" machines together (resolving the speed of one transport to another).

SMPTE time code, developed by the Society of Motion Picture and Television Engineers, is used in the U.S. and other countries that have NTSC television systems running at 30 frames per second (actually 29.97). EBU time code (European Broadcast Union) is used with PAL television systems, running at 25fps. There are six distinct time code variations, differing in frame rates and counting methods, and thus their applications.

Time code Type	Real-time count?	Uses
29.97fps non-drop	No	Locked to NTSC video
29.97fps drop frame	Yes	Locked to NTSC video (broadcast)
30fps non-drop	Yes	General purpose, not video locked
30fps drop frame	No	Special, cross-resolved DF tapes
24fps	Yes	Locked to 24fps film
25fps	Yes	Locked to PAL video (25fps)

The most perplexing distinction between time code types is that of drop frame. When used with NTSC video, time code must run at 29.97fps (1/10th of 1% slower than 30fps). But since it counts to "30," there is a time discrepancy of 108 frames per hour between the count and the true elapsed time. This is a problem where exact program length is critical. With the drop frame system, every frame is numbered but the first two frame numbers in every minute, except the tens of minutes (10, 20, etc.), which are skipped, thus making the count represent "real time." Drop-frame code runs at the same frame rates as its non-drop counterparts, but certain numbers are "dropped" from the count.

Another time code variation is Vertical Interval Timecode, or VITC. In terms of frame rates and formats VITC is the same as longitudinal time code (though the word length is longer). However, VITC is recorded by the spinning video heads of a VTR, in a section of the video signal between the visible frames. This allows it to be read accurately at slow tape speeds, or even stopped. A final variation is "visual" time code, also known as a burn-in or window. This is simply a numeric display of the time code on a videotape inserted into the picture for ease of viewing.

Timecode used with audio tapes can be either 29.97 or 30fps, and can be striped from a free running generator (locked to its internal crystal). Time code being striped on videotapes *must* be locked to the video, or to a sync generator to which the VTR is also locked!

On 1-inch videotapes, longitudinal time code is usually recorded on audio track 3. Vertical interval timecode may also be present in the video. On 3/4-inch tapes, time code can be on an audio track, or on a special address track, which does not use an audio channel. Address track code must be recorded simultaneously with video (in hard or assemble modes), and is usually an option on industrial 3/4-inch decks.

Time code should not be recorded on audio tracks at 0VU, because it tends to crosstalk. Generally, levels around –10 to –5 are fine. Likewise, keep code away from audio summing buses and mic level circuits, and be careful when converting a balanced code output to unbalanced — leave the unused "low" side unconnected.

Time code should be reshaped or regenerated when dubbing between tapes so that the square wave edges remain sharp. A reshaper will improve the signal quality, but does not alter the count in any way. Regenerating uses a time code reader/generator that creates fresh code locked to the original being fed into the reader.

Regenerating can be broken into two methods: Momentary jam sync means the generator locks to the reader for a short burst, to pick up the count, then continues counting — ignoring the input to the reader. Continuous jam sync means that the generator will follow the reader explicitly, even if the code stops or jumps. The first type can be used to fix tapes with broken or missing code, but must be used with caution if the source time code is already "in sync" with audio or video. Most of the time code dubbing should be a continuous jam sync (terminology may vary). ■

TIME CODE VITAL STATISTICS

Signal Specs:	Digital, 80-bit word-per-frame, longitudinal bi-phase recording on tape.
Frequencies of interest:	2,400Hz maximum at play speed (48kHz at 20× play).
Wiring required:	Standard audio cable and connectors, some equipment balanced.
Frame rates/formats:	24fps, 25fps, 29.97df, 29.97ndf, 30df, 30ndf (depending on application).
Equipment available:	Generators, readers, visual code inserters, synchronizers, combinations.

Eric Wenocur is Chief Engineer at KLM Video, Bethesda, MD, and a recording engineer, producer and musician in the Washington, DC area.

Live & Direct

Equipment for Concert Sound Systems

By David Scheirman

A wide variety of new gear is available for use in live sound systems. As is usual by this time each touring season, soundmixers on the road have obtained and tried out different new consoles, signal processing gear and other assorted technological "fixes" that can help to make live sound projects work more smoothly.

Without attempting to crowd news items about dozens of different new products into the minimal space available to this column, I'll briefly touch on a few things in use with some concert systems this season that you may not have encountered yet.

ATL MONITOR CONSOLE

ATL (Acoustic Technical Laboratory) of Yamanashi, Japan has spent the better part of the past decade designing and developing a high-fidelity stage monitor console. With input from Meyer Sound Laboratories on both ergonomic and electronics design, the desk has been successfully road-tested as a joint-venture between the two firms. Dubbed the Meyer/ATL 32/12 Monitor Mix Console, the product is seeing applications in the fields of concert stage mixing, film sound location mixing and television and audio-visual production. A smaller 24-input version is available, and ATL also offers the M4084 house mixing console in a 40-input configuration.

The 12-bus console features transformerless, electronically balanced inputs. A notable feature is the desk's simple electronic assignment system, enabling the board operator to create up to 12 separate program mixes and then assign them in any order to the 12 main outputs. This is a handy way to do fast set changes or audio scene "specials," an important tool for use in fast-moving concerts or theatre productions.

"Although this console was first introduced in the U.S. several years ago, we are seeing a renewed interest in it for the North American market," says Mark Johnson of Meyer Sound Laboratories. "We've had a demonstration unit making the rounds of several major touring concert sound companies."

The console is lightweight (161 pounds in the 32-input configuration), relatively compact, and its power supply can operate on 100V, 120V, 220V or 240V 50Hz/60Hz. With a growing number of units in the hands of users in different global regions (Japan, Hawaii, U.S., Europe and Australia), the console is a viable option for anyone looking at high-performance, mid-format monitor desks.

JBL DIGITAL CONTROLLER

When one of pro audio's biggest manufacturers finally unveils a new product, you can bet that it will be the end result of a carefully considered research and development project. Such is the case with JBL's new ES52000. This digital loudspeaker system controller can be configured as a dual channel 2-way or single channel 2-, 3- or 4-way electronic crossover with system response EQ filters, precision signal alignment and transducer-protecting digital limiters.

The crossover filters in the ES52000 are of the zero-phase-shift FIR (Finite Impulse Response) type, and 64× oversampled 18-bit analog-to-digital converters are used. A 44.1kHz sampling rate and 24-bit signal processing are used in the digital domain for optimum dynamic range and minimum signal distortion.

"Our dealers and pro users have been asking for something like this for a long time," says Mark Gander, vice-president of marketing for JBL Professional. "The ES52000 gives the system designer a versatile tool that can be pre-configured to work with a variety of our different loudspeaker enclosures, giving consistent, reliable control of complex high-performance systems."

Watch for JBL to introduce a new, very compact trapezoidal enclosure housing a 2-inch compression driver and tightly packed, new-generation 14-inch woofer (prototypes are currently designated the 4892) that is specifically designed to make full use of the ES52000's chip-programmable signal processing options.

MIDI CONTROL OF EFFECTS UNITS

With more and more special effects units coming to market that have integral MIDI-interface technology, it makes sense to link several devices together with a personal computer for keeping a handle on program changes and indexed audio scene "specials." A variety of hardware/software combinations are available to help do computer-assisted MIDI parameter setup and program changes in both MS-DOS and Macintosh formats.

One high-tech portable combination for working in the Macintosh domain is comprised from the following:

Computer:

Model 125 from Outbound Systems, Boulder, CO; 800-444-4607.

Specifications:

- Only 9.3 pounds including hard drive and battery
- Compact size: 12.3″ × 7.8″ × 3.6″
- Backlit, black and white LCD screen
- ac/dc, operating time on battery: up to three hours.

MIDI Hardware:

MIDI-Timepiece from Mark of the Unicorn, Cambridge, MA; 617-576-2760.

Specifications:

- Standard E.I.A. 1-space rackmount device
- Four MIDI channels in, four MIDI channels out
- Connects easily to personal computers

Software:

X-or from Dr. T, Chestnut Hill, MA; 617-455-1454.

Specifications:

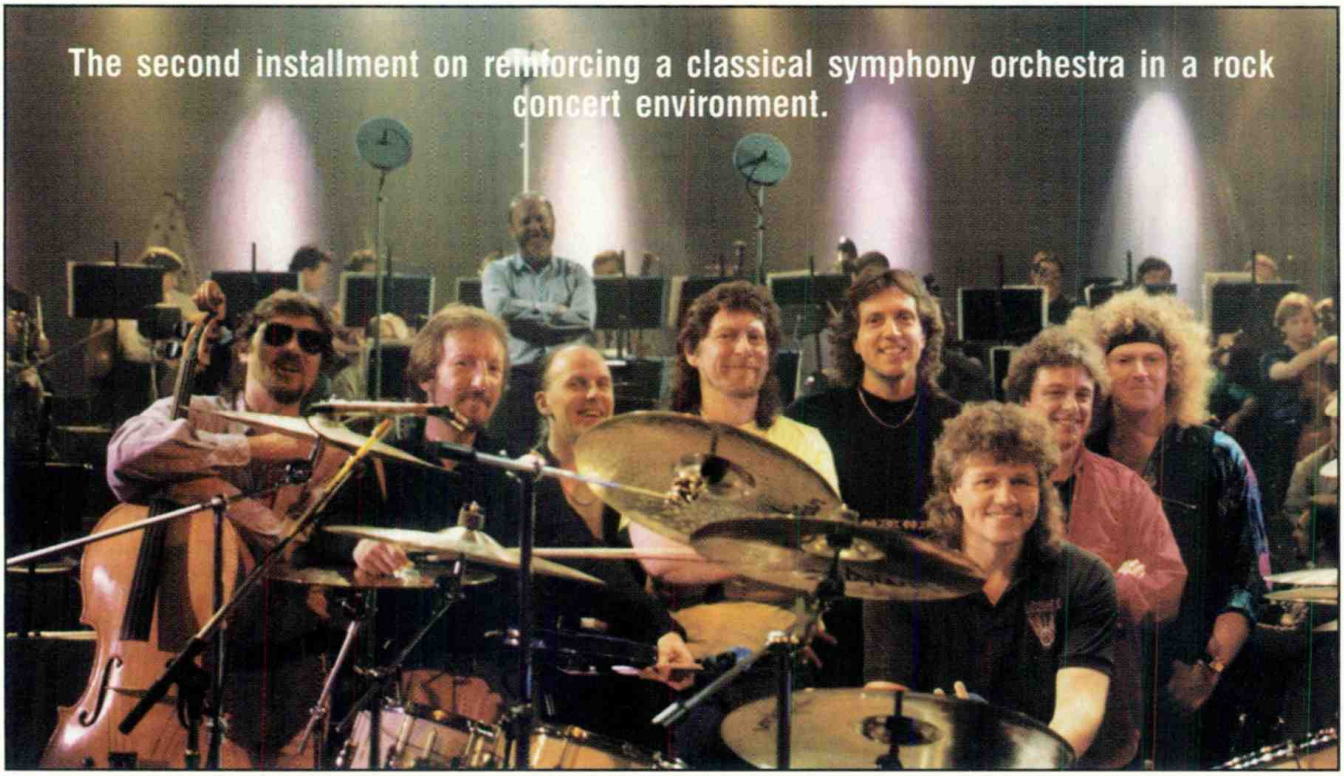
- Indexing and program setup/operations for MIDI control

These system components give the soundmixer or system operator a very compact, portable, user-friendly rig that can be linked easily to special effects devices like the Lexicon 300, Yamaha SPX-90II or any other MIDI-technology devices for EQ and effects processing from manufacturers like T.C. Electronic, Rane, DigiTech, Alesis, etc. And, the Outbound portable "Mac" with the MIDI-Timepiece and a few patch cables will virtually fit in a briefcase — just the ticket for globe-trotting engineers who want to bring their own computer system and software to hook up with an existing rack of MIDI-compatible special effects processing.

While this system is not inexpensive, it can help to prevent blowing an effects cue for special delay and reverb sounds on critical live productions, and it can save hours of MIDI re-programming time when the band wants to change the order of the set list around. This is just one very portable combination of computer/software/MIDI hardware components that can get the job done for you. Those of you who have other favorite computer-based MIDI-linking systems for keeping track of effects cues and making program changes may wish to share your information with other readers in care of this magazine. ■

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

PART TWO: The MOSCOW SYMPHONY With ELECTRIC LIGHT ORCHESTRA PART II



The second installment on reinforcing a classical symphony orchestra in a rock concert environment.

By David Scheirman

Last month, an overview of the sound system design used for the 1991 World Tour by Electric Light Orchestra Part II with the Moscow Symphony was presented. This project pairs the 78-piece Moscow Symphony from the Soviet Union with the re-formed English rock group E.L.O., presented by Rockview Promotions, in conjunction with Stas Namin. This month's continuation provides a detailed look at the innovative concert sound technologies that are enabling the two groups to perform together on the same stage.

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

SYMPHONIC ENSEMBLE MIC SYSTEM

As any symphonic sound engineer will confirm, the choice and placement of overhead "area" mics on the live stage is critical. In a typical classical music situation, a sound reinforcement technician has the advantage of a reflective, acoustically live environment in which to place the microphones. We did not have that advantage during times when the symphony played alone, and such a situation would have spelled disaster when E.L.O. Part II was playing, because of excessive drum reflections and bass build-up.

After careful consideration, a minimum number of exceptionally sensitive mics were positioned above the ensemble on extendable aluminum poles. Positions for five mics were worked out during rehearsals, and the system included a center "tree" setup of three Sennheiser MKH-20 omni condenser mics that were suspended about 10 1/2 feet above the symphony risers. The principal woodwind, violin, viola and cello players were carefully positioned within the general pickup area de-

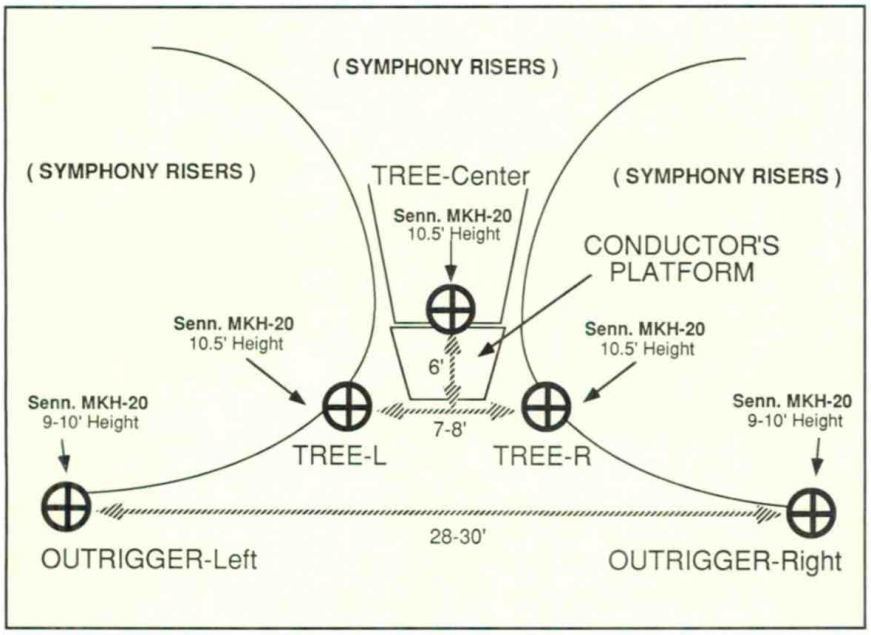


Figure 1. The overhead ensemble mic system included Sennheiser MKH-20s located in a left/center/right "tree" grouping and two outriggers.

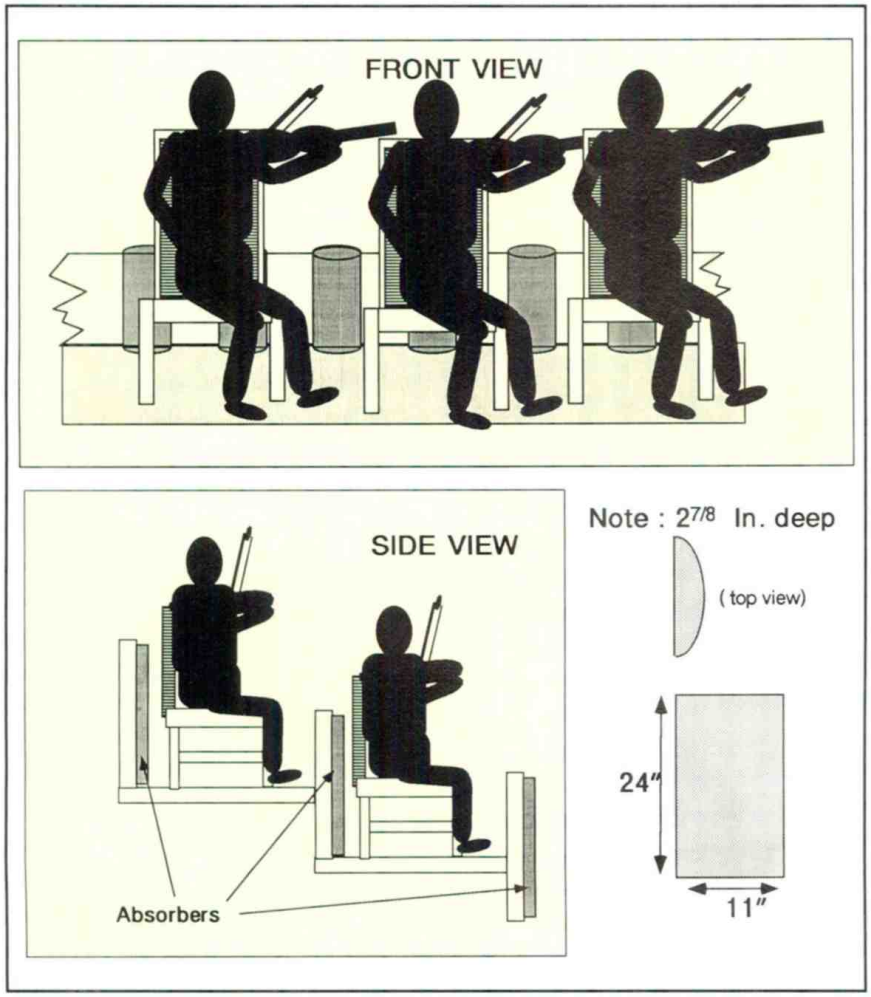


Figure 2. View of the riser seating area with ASC Trim-Traps installed.

fined by these mics. An additional pair of "outrigger" mics were spaced about 28 feet apart, in front of the ensemble and directed to pick up the combined sounds of brass and percussion sections, as well as most of the violins, violas, cellos and string basses (See Figure 1).

In the overhead pickup system, the microphone signals were routed directly to high-quality Harrison MP-8 pre-amps located in the backstage area, and a line level output from those devices was routed directly to George Massenburg parametric equalizers located at the house mixing console. The outputs of these units were then inserted directly into the console input module fader for level control, and the entire overhead mic system was assigned to an audio group and VCA on the Harrison HM-5 console.

PORTABLE ACOUSTICAL TREATMENT

Before rehearsals I was convinced that the shape and style of the symphonic riser area would have a lot to do with our success or failure in isolating the sound of the symphony from the rock band. There were some discussions regarding a possible overhead "cloud" that offered both reflective and absorptive sides. The lighting truss took precedence over this. The issue of plexiglass barriers proved to be unacceptable because of stage lighting and other aesthetic considerations. With the rear side of the rock group's drum riser a scant eight to 10 feet from the conductor's platform and within reach of the first violin and viola sections, it was apparent that some sort of absorbent acoustical treatment would be necessary in the symphony area to deaden things.

No one knew whether the musicians would be able to play together effectively as an ensemble if they were in a deadened space, unable to hear other sections in the orchestra for pitch and time reference. A variety of contingency plans were considered, including a wireless infrared headphone system, a digital-clock lightbulb visual cue system for one beat per measure referenced to the rock group's kick drum, and a "me vs. them" pan-pot headphone monitoring system that would give each symphony player the option of setting his or her own balance in relation to a full mix. The solutions to these problems ended up being relatively straightforward, but the first step in making it work was to control the acoustical environment in the symphony riser area.

Products from Acoustic Sciences Corporation in Eugene, OR, were found to offer the ideal combination of acoustical performance, appearance, portability and price. We chose the company's energy-absorbing Trim-Trap product, composed of hemispherical soft goods available in a va-

Instrumental Section	Riser Area	Distance from E.L.O. risers	dB S.P.L. (C)
E.L.O. centerstage	(band area)	(directly in front)	114dB
4′ in front of ld. gfr. amp	(band area)	0 ft.	111dB
E.L.O. drum riser, center	(band area)	0 ft.	118dB
behind drum riser	(band area)	(directly behind)	108dB
conductor's platform	center	8-10 ft.	103dB
bass viols	forward, far stage L.	6-8 ft.	105dB
cellos	center stage L.	14 ft.	104dB
clarinet	upstage center	13 ft.	104dB
2nd violin	upstage center R.	14 ft.	103dB
1st violin	forward stage R.	6-8 ft.	105dB
harp	forward, far stage R.	12 ft.	103dB

Figure 3. Environmental noise measurements taken while both groups performed together.

riety of fabrics and colors. The product was color-matched and pre-fabricated in lengths tailored to fit the set. Mounted on 2-foot centers on every vertical face of the symphony-area stage risers, the Trim-Traps helped considerably in the diffraction and absorption of broad-brand noise in the performance environment (See Figure 2).

Sound-level and frequency-response measurements taken in rehearsals while the rock group played before and after the addition of the Trim-Traps confirmed that the acoustical absorption system, which totaled 265 linear feet, gave a significant advantage.

This measured advantage varied from 2dB to 5dB at frequencies between 200Hz and 2kHz, depending on where measurements were taken when the rock band was playing at full volume. However, simple noise attenuation does not tell the whole story. During a typical performance, the sound level was still fairly high in the symphony area, but a stroll through the different zones proved that each instrument could be heard clearly, even soft ones like flute or viola, because of the softened, diffused nature of the acoustics. Figure 3 shows typical environmental noise measurements taken in both the band and the symphony areas during a performance of the rock group and symphony together.

SYMPHONY MONITORING CONSIDERATIONS

Although it might seem important to offer the symphony musicians a traditional, high-level monitoring system in order to hear themselves and the time and pitch information needed to play in sync with the rock group, I was convinced that this would spell disaster. Adding more full-bandwidth, reinforced audio to the already noisy symphony riser area would have significantly decreased the acoustical headroom of the mic systems, and it would have greatly increased the feedback potential.

The final solution consisted of a small-scale distributed speaker system, which included one dozen Control One monitor speakers from JBL Professional mounted on mic stands. Four discrete mixes were sent to these compact enclosures in four different zones, including the upper stage left riser area (horns and woodwinds), the upper stage right riser area (percussion), the lower stage right riser area (violins, harp, keyboard and woodwinds) and the lower stage left riser area (viola/bass viola/cellos).

A very slight amount of cross-feeding was found to be necessary (a bit of first violins to the trumpets, for example) and all zones received an "absolute time" signal that comprised a sampled electronic metronome sound from a Wendell Jr. system, triggered by Bev Bevan's bass drum in the rock band area. This was the same signal fed to conductor Konstantin Krimets' monitor system mounted on his lift platform, thus giving him a consistent foldback system that followed his up and down movements (See Figure 4).

MAIN SPEAKER SYSTEMS

Showco's system included the vertically oriented Prism arrays with floor-mounted subwoofers that offered a full-bandwidth, high-fidelity coverage-controlled main speaker system (important to the sound team) and complemented the visual aspects of the show's lighting and set designs (important to the tour producers).

A compact centerfill system was used in large venues and was fed a discrete mix

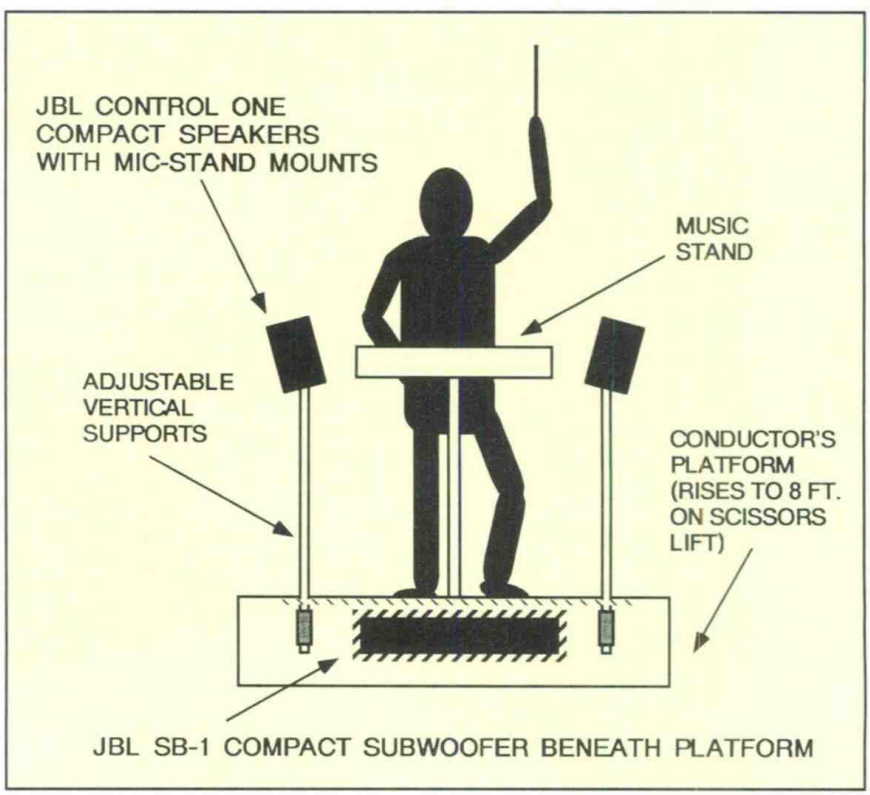
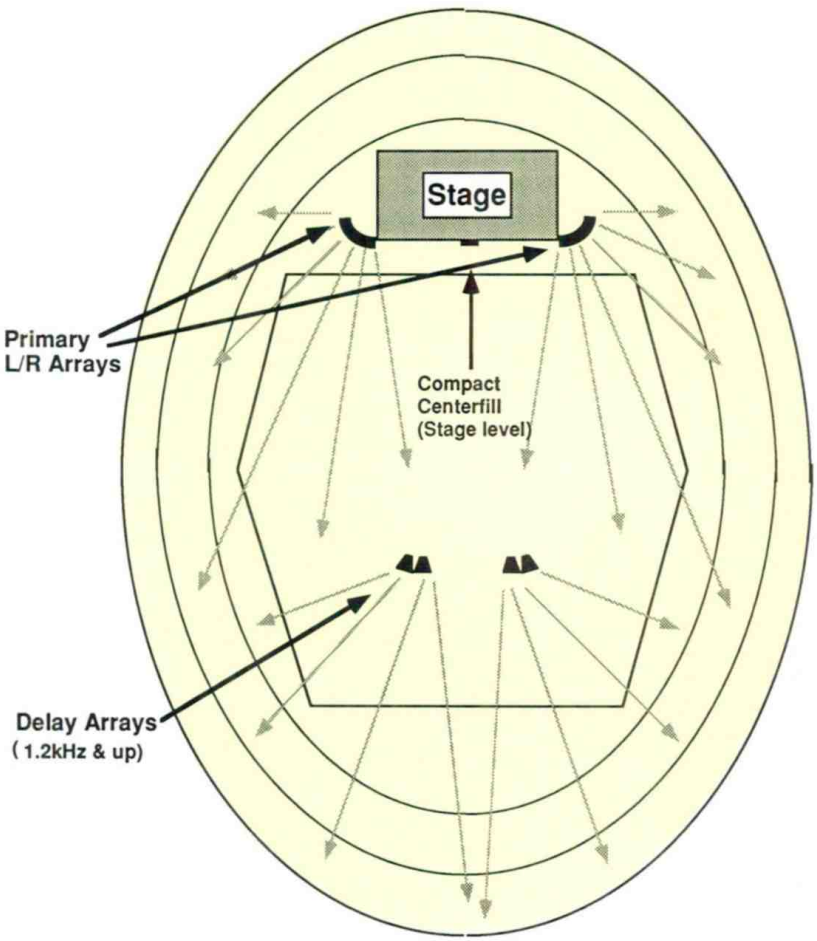


Figure 4. The conductor's monitor system included JBL Control One enclosures and an SB-1 compact subwoofer.

ELECTRIC LIGHT ORCHESTRA TOUR 1991 WITH MOSCOW SYMPHONY ORCHESTRA : Sound Reinforcement System



Speaker System Setup, 15,000-seat Arena (typical)

Figure 5. The main concert speaker system included a delay array for rear audience reach.

that included vocals, symphony mix, and solo instruments. A key component of the main sound system design in the largest venues was a "delay array," positioned behind the house mix position. This supplementary mid/high system was used to obtain a gain advantage for the symphony's sound in relation to the rock group's sound, so that a clear, present mix was offered to audience members seated in the rear areas of large arenas (See Figure 5).

The Moscow Symphony quickly adapted to the unusual acoustical conditions and did an exceptional job of blending with the rock music of E.L.O. The precise close-mic signals that were available, the acoustically treated symphony riser area and the simple but effective monitoring system were three specific tools that enabled the sound crew to have far greater control over the sound options for the symphony musicians than would normally be available. After the first few days of rehearsals, classical musicians in the Moscow Symphony Orchestra and veteran rock performers in the E.L.O. Part II band were well-adjusted to their stage space, able to play separately and with each other, and seemed pleased and excited about the chance to work together

on the same stage. All had an awareness that this was a once-in-a-lifetime opportunity ... not only in East meeting West on a concert stage, but classical music and rock coexisting in a way never before experienced by audiences.

From a technical perspective, this project required an extensive amount of advance planning and research, and a great deal of audio teamwork and flexibility. From a personal perspective, it was a thrill to be involved with it. My sincere thanks and congratulations go to our board operators: stage monitor mixer Chris Wade-Evans, front-of-house rock soundmixer Mike Ponczek and symphony soundmixer Jeff Cohen. Each has made specific contributions to this live sound effort without which things would not have worked as well as they have. And, it does work well. ■

MIC COMPLEMENT FOR MOSCOW SYMPHONY

Section:	Instrument Number:		Mic
Strings	First Violins	(12)	SMS*
"	Second Violins	(11)	SMS
"	Violas	(10)	SMS
"	Cellos	(8)	SMS
"	Bass Viol	(6)	SMS
Woodwinds	Flutes	(3)	Barcus-Berry 6100
"	Clarinets	(2)	Barcus-Berry 6200
"	Oboes	(3)	Barcus-Berry 1377
"	Bassoons	(2)	Barcus-Berry 1378
"	Contrabassoon	(1)	Neumann U-87
Brass	Trumpets	(4)	Sennheiser MK-403
"	French Horns	(5)	Crown GLM-200
"	Trombones	(4)	Countryman 2-C
"	Tuba	(1)	Neumann U-87
Percussion/Timpani		(1)	Sennheiser 421 (2)
"	Bells & Triangle	(1)	Beyer M201 (2)
	Snare, Bass Drum	(1)	Beyer M201, EV RE-20
	Gong & misc. perc.	(1)	AKG 460B (2)
Harp	Harpist	(1)	C-Ducer CP-8
Keyboard	Electronic keyboard	(1)	direct input
Total players in ensemble:		78	Total inputs: 82

* (SMS = Symphony Mic System, "Wings for Strings" developed by Soundlab Electronics GmbH, W. Germany)

POSTSCRIPT

After the Wembley Arena show in London, Mr. Stas Namin of Moscow congratulated us and said, "Never before have I heard my symphony orchestra sound so good! Most amazing!" *The Birmingham Mail* (5/29/91) noted after the band's comeback show, "Last night E.L.O. ... electrified the audience ... made an emotional return to hometown Birmingham ... [and] revived the spirit of the '70s pop supergroup ... E.L.O. Part II were stunning."

ELO PART II AND THE MOSCOW SYMPHONY—CHOOSING MICROPHONES

Before finalizing the sound system design specifications, a test was conducted using actual classical musicians and a wide variety of microphone systems. I knew that it would be imperative to determine before rehearsals what type of microphone products would work best in a high-noise environment such as what would be encountered on stage with the Electric Light Orchestra Part II rock group.

Five different musicians with representative instruments from brass, woodwind and string sections were hired to set up in a large reverberant room. The musicians were supplied with earplugs, music stands and sheet music. This small ensemble was then surrounded with a noisefield consisting of broadband pink noise played through a 4-way, high-performance concert sound system at stepped, calibrated levels that measured as high as 108dB (A) at the musicians' location.

A high-quality monitoring system located 100 feet away in a "quiet" room was used to preview individual mic lines and to assemble an ensemble mix while audio technicians in the room with the musicians carefully tried every conceivable method of microphone setup, attachment and location on instruments such as the flute, English horn, trumpet, viola, cello and violin.

At times, up to three different competitive mini condenser mics were attached to a particular horn bell ... sometimes, three different types of mic technology were tried on the same violin body simultaneously. Mini-mics were stuffed inside, used in phase-differential pairs, and pick-ups were taped, wrapped and attached at different locations for A/B comparisons.

The results of this testing convinced me that the woodwinds would be the most difficult to pick up in a noisy environment and that no type of condenser microphone would offer acceptable results. Accordingly, diaphragmatic transducer products from Barcus-Berry with optimized signal processing were the winners here.

The higher acoustical output of the horn instruments, coupled with the natural projection and semi-protected area offered by the bell, made miniature condenser microphone products applicable. Even at high surrounding noise levels, it was possible to get a clean, natural sound of the instrument with very little noise leakage by using careful mic placement in the bell with custom clips.

I also determined that the strings would be the toughest type of instrument to get a natural sound on, in addition to being extremely difficult to isolate from the surrounding noise field. The hands-down winner in the string instrument test was the innovative SMS (Symphonic Microphone System) product group developed by Soundlab Electronics of Germany. The SMS units require the modification of a stringed instrument to insert a subminiature microphone element (custom-built by Sennheiser) into the wooden body. A rugged mini-cable then connects to a 48V-powered compact pre-amp with four active filters. The system is available in versions optimized for use with violin, viola, cello and bass. ■

This feature is written with reader interest and education in mind. The mention of specific brands of manufactured products is not to be taken as an endoresement by the author, R•E•P or Intertec Publishing.

All Access

By Mark Herman and Louis Adamo

dB SOUND

Headline Act:
Allman Brothers Band

Dates: August 1991-Winter
Region: World Tour

PERSONNEL
House Mixer: Bud Snyder
Monitor Mixer: Jeff Nelson
Head System Engineer: Bruce "Slim" Judd
Technicians: Cory Stone

CONSOLES
House: Gamble EX56
Monitor: Ramsa WR-S840

AMPLIFIERS
Main FOH: Crown PSA2
Lows/Subs: Crest 8001
Monitors: Crown PSA2, MA1200

FOH MAIN CABINETS
Model: (12) dB Sound HD3 3-way
Model: (8) dB Sound HD4 4-way
Flying System: dB Sound E-30 Super Grid

LOW END CABINET SUBWOOFER
Model: (8) Electro-Voice MTL-4
Model: (12) dB Sound HDB

ONSTAGE MONITOR WEDGES
Model: (16) Electro-Voice FS212
Crossover: Electro-Voice XEQ-3
Model: (4) Meyer Sound Labs UPA-1
Crossover: Meyer Sound Labs M1A
Model: (2) Electro-Voice DML-2181
Crossover: Electro-Voice DMC-2181

HOUSE SIGNAL PROCESSING
Equalizers: Klark-Teknik DN300
Crossover: Electro-Voice MTX-4 (dB modified)
Reverb: Lexicon 480L
Delay: Lexicon Super Primetime, Roland SDE3000
Other Effects: Eventide H3000, Yamaha Rev7, Yamaha SPX-90II
Gates: Drawmer s201
Compressor/Limiters: dbx 160X, dbx 166
DAT Machine: Panasonic SV3500
Cassette Machine: Yamaha C200
CD Player: Panasonic SL4700
Headphones: Sony MDR-V6
Intercom System: Clearcom MS200
Analyzer: Klark-Teknik DN60
Monitors: Ramsa WS-A500
Light Module: Little Lites

ONSTAGE SIGNAL PROCESSING
Equalizers: (6) Klark-Teknik DN360
Effects: Yamaha SPX-90II
Gates: dbx 904
Compressor/Limiters: dbx 903
Headphones: Sony MDR-V6
Analyzer: Klark-Teknik DN60
Light Module: Little Lites

MICROPHONES
Vocals: Shure Beta 57
Background Vocals: Shure Beta 57
Kick: Electro-Voice RE20, AKG D-12E
Rack Toms: Shure SM98
Floor Toms: Shure SM98
Overheads: Shure SM81
Snare Top: Shure SM57
Snare Bottom: Shure SM57
High Hat: AKG 460CK-1
Guitar No. 1: AKG D-12E, Sennheiser 421
Guitar No. 2: Shure SM57, Sennheiser 421
Keyboards: Electro-Voice RE20, Sennheiser 421
Bass: Beyer M88, Electro-Voice RE20

MISCELLANEOUS
House Snake: 50 pairs
Multi-pair connectors: AMP, COAXICON
Stageboxes: dB Sound Custom 15-channel Amp G-2
Splitter: 3-way passive with Jensen transformers ■

Mark Herman is a contributing editor to R•E•P. He and Louis Adamo are co-owners of Hi-Tech Audio, a sound reinforcement equipment rental company based in South San Francisco.

MARYLAND SOUND INDUSTRIES

Headline Act:
Michael Bolton

Support Act: Oleta Adams
Dates: July-October 1991
Region: USA

PERSONNEL
House Mixer: Monty Monfort
Monitor Mixer: Mike Prowda
Head System Engineer: Dave Lohr
Technicians: Chuck Wells, Stephan Terzak

CONSOLES
House: (2) Yamaha PM3000
Monitor: Ramsa WR-S840
Support House: Yamaha PM3000
Support Monitor: Yamaha PM2000

AMPLIFIERS
Main FOH: Ramsa 9220, Crest 7001, Crest 8001
Lows/Subs: Crest 8001
Monitors: Crest 7001, SAE P.50
Sidefills: Ramsa 9220, Crest 7001, Crest 8001

FOH MAIN CABINETS
Model: (28) MSI MS10
Flying System: MSI Custom Flying System

LOW END CABINET/SUBWOOFER
Model: (26) MSI MS10B

ONSTAGE MONITOR WEDGES
Model: (8) MSI FM 2×12
Crossover: MSI Custom Digital Crossover
Model: (4) MSI FM 2×15
Crossover: MSI Custom Digital Crossover
Model: (2) Meyer Sound Labs UM-1
Crossover: Meyer Sound Labs M-1

Continued on page 64

Roadwork

By Mark Herman

SR Mixing Console Spotlight

Almost everyone wants to know what's happening with the upper echelon live concert console manufacturers and their expensive, high-tech models. This month we are featuring the latest news on the versatile Midas XL3, which has been this year's big, new, high-end console hit throughout Europe and the U.K. With over 57 units already placed since its debut at the 1990 Los Angeles A.E.S. show, the XL3 has dramatically grabbed the lionshare of the international console action. However, with only a few sales in North America, it remains relatively unknown on this side of the Atlantic.

The XL3's selling price point has it placed in range with the TAC SR6000, and conveniently sandwiched below the ATI Paragon, TAC SR9000 and the Gamble EX56. Yet, it's above Soundcraft's new Europa, Ramsa's WR-S852, the widely sold Yamaha PM3000 and the soon-to-be-released Yamaha PM4000. Independent bench tests and reports from various well-known sound companies have shown the XL3 to exhibit excellent noise and distortion characteristics and a clean and responsive equalization section.

A 16-channel extender unit, or "stretch" as the English say, is available for those seeking additional inputs. This could prove necessary for FOH engineers since the XL3 has no dedicated effects return inputs. Initial reports regarding the XL3's use as a 40×18 stage mixer describe it as possibly the best console in the industry for monitoring use.

The XL3 has 40 inputs with 16 discrete sends, eight VCA masters, eight auto mute groups, 16 main outputs, stereo left and right, 4-band EQ, 2×16 matrix and two VCA "Grand Masters." This modern Midas console will be more standard than the Pro 4, Pro 5 and Pro 40 models that often featured one-of-a-kind configurations. A multi-pin rear panel connector option is available, and if additional matrix outputs are desired, Midas offers the rack-mountable XL88 matrix unit. Other options include center master section and the VU meter bridge that most of the major touring acts are using.

Midas certainly had foresight when it placed significant importance on the design of their VCA controls. On the XL3, the 16 auxiliary outputs can be brought down on faders and those 16 outputs in turn can be assigned in any combination across two "Grand Master" VCA fader groups. Currently, European engineers seem to be in a very pro-VCA mind-set regarding contract tech riders. VCAs are the wave of the future, and this has undoubtedly contributed to the XL3's appeal to competing sound companies.

Standard wiring configuration is pin 3 hot (pin 2 option is available) with every input and output, including insert send and return, balanced. A transformer option is available. The chassis is made out of steel, with a mother board instead of ribbon cable, and the signal ground is totally floated from the chassis ground via a 1.5″ × 1/4″ flat copper bar running the length of the console. All of the console levels are VCA controlled; audio is never run through the Penny & Giles VCA faders. Other features include insert points on all outputs, FET muting in each of the input channels, sealed Alps potentiometers, complete console linking capability, and a module exchange and parts service program that is available worldwide with 3-day delivery.

At one time in the '70s Midas was the premier name in live-sound console manufacturing; it was disappointing to see the company decline so rapidly several years ago. Now Midas appears to have regained its golden touch after surviving the near-fatal slump in the '80s when the company essentially folded before being purchased by Klark-Teknik in 1988. Previous model XL1 and XL2 releases were failures in the U.S., but the current XL3 model designed by Andrew Greyland is a completely different story. The ability to be either an excellent house or monitor console, wide international distribution and engineer acceptance, good noise specs, an innovative VCA design, solid manufacturing and a highly touted EQ section make the Midas XL3 an attractive large format console.

Engineers currently using the board include Paul Owen, monitor mixer for AC/DC and Metallica ("Personally I find that with the XL3, the stage monitors easily go 3dB louder than with the Ramsa 840 I'd been using previously."); Mike Sprauge, monitor engineer for Motley Crue ("I'll be specing the Midas from now on."); Vince Buller, monitor engineer for Black Crowes ("It doesn't do anything untold, only exactly what I ask it to do. The EQ is great."); Laars Brogard, FOH engineer for Rod Stewart; Mick Hughes, FOH engineer for Metallica; Rob Collins, FOH engineer for Dire Straits; Gungie Patterson, FOH engineer for Judas Priest; Gary Bradshaw, FOH engineer for Simple Minds; and Robbie McGrath, FOH engineer for AC/DC.■

Mark Herman is a contributing editor to R•E•P and president of Hi-Tech Audio, South San Francisco.

HANDS ON:

Genelec S30NF Loudspeaker

By Mike Joseph

It has often amazed me that so many multi-thousand dollar projects have been recorded and mixed in multi-hundred thousand dollar rooms on loudspeakers costing less than $500 a pair. Would you expect a photographer to use an 85 cent plastic viewfinder lens on his $2,500 Hasselblad? Or a pit crew chief to put department store econo-tires on his Formula 1 contender? Why the tradition of using consumer emulating (read: low-end) loudspeakers in a super-critical monitoring application?

An explanation of sorts does exist. The soffit-mounted control room monitors of the '60s and '70s were so out-of-line with what consumers were hearing in their living rooms and automobiles that an honest need truly existed for mixdown monitors that reflected an outside reality. Initially, some bright lights took 6″×9″ car stereo speakers and stuffed them into shoe boxes. Later, until the venerable Auratone 5C came along to dominate the meter bridge market, mixers used everything from Radio Shack Minimus speakers to every flavor of "off-the-shelf." You probably have your own favorite horror stories.

The '80s saw a standardization on the Yamaha NS-10, a device which balanced the size and response of a home bookshelf speaker with other qualities needed for mixing. And they sounded pretty good. The fact that they became standardized across an industry was a major plus in itself — a person or project could go from room to room, and, thanks to the "Near Field" nature of mounting these speakers on the bridge, achieve results close enough to the last room to pick up where they left off. They didn't have to relearn the monitor system.

But for all of the benefits the Yamahas and their ilk create, they don't provide features that professionals in a grueling production environment really need: flat or user-contourable full bandwidth frequency response; wide dynamic range; high, long-term output; freedom from component destruction; low distortion; uniform, controlled polar response; etc.

POWERED SOLUTIONS

Although not a new idea (Philips, among others, designed and built a consumer unit in the '70s which used many of the currently popular ideas), companies like Genelec and Meyer have tightly analyzed professional monitoring requirements and determined that self-powering a loudspeaker allows the designer to incorporate functions such as overload protection,

Mike Joseph is editor of R•E•P.

SPECS AND DESCRIPTION

Manufacturer:	Genelec
U.S. Rep:	QMI 15 Strathmore Rd. Natick, MA 01760 PH-508-650-9444 FAX-508-650-9476
Model:	S30NF
Price:	$4,199 per pair
Design:	3-way self-powered with internal protection circuitry.
Components:	(1) 8″ Woofer, Cone (1) 3 1/2″ Midrange, Cone (1) 3/8″ × 2 1/2″ Tweeter, Ribbon
Output Level:	>103dB Cont. Sine Wave at one meter, 100Hz to 3kHz >122dB Peak IEC-wtd Noise at one meter, 100Hz to 3kHz
Size:	12 5/8″ H × 19 1/2″ W × 11″ D
Weight:	44 pounds

response-contouring and electrical-to-mechanical power matching into a coherent single system. All of the parameters can be controlled at once. The results? Small, highly accurate speakers that provide greater linear output than any single previous family of designs.

One of the excellent powered monitors currently enjoying worldwide success is the 3-way Genelec S30, of which four versions exist. In addition to the horizontally mounted NF (near field) designation reviewed here, there is a standard S30 (meant to stand vertically, with components so oriented), and two high-powered varieties, the S30B and BNF, far field and near field, respectively, featuring higher powered amplifiers and a small waveguide on a heavier duty ribbon tweeter to develop higher acoustic gain (add 5dB) and a narrower horizontal directivity.

Genelec is a highly respected professional loudspeaker manufacturing company located in Finland. Its larger designs grace many of the top-flight European studios, as well as several very astute facilities stateside. As with most Rolls-Royce-type companies, Genelec is known for delivering the absolute highest quality possible, albeit for a price, which in the past has typically been high. Of course, some of that is dollar conversion-related: the American greenback has been sagging of late.

The S30 series is an attempt to bring Genelec's renowned uncompromising performance level down to a price range that, although still well above other non-powered, bookshelf-sized control monitors, is less than similar competitive units. And what you get, pound for pound, is arguably more.

PRODUCT DESCRIPTION

The S30NF, similar to other members of its family, is a 3-way, high output near field monitor capable of presenting over 120dB SPL peak at 1 meter. Cruise level is stated as greater than 103dB SPL at 1 meter using an IEC-weighted noise source, measured from 100Hz through 3kHz. As the frequency response indicates, the output is wide and flat, deviating less than 3dB from linear, reaching from approximately 42Hz (–3dB) to 20kHz (flat), the arbitrary limit of our measurements on the top end (See Figure 1). Clean output is present well into the lower '30s on the bottom.

Components include an 8-inch woofer in a 0.8 cubic foot tuned enclosure, a 3.5-inch specially formulated cone midrange, and a $3/8'' \times 2\,1/2''$ high output ribbon tweeter. A balanced XLR connector feeds the built-in, 3-section amplifier, which delivers 65W, 65W and 50W to the respective speaker components. Included in the amplifier sections are 18dB/octave active crossovers centered at 375Hz and 4kHz (measured), variable level controls for frequency response contouring, as well as an overall input sensitivity adjustment, high-pass subsonic filtering, a variable bass roll-off filter and an ultrasonic filter. Also fully integrated into the electronics is component overload detection circuitry, which prevents overdrive-related destruction of the midrange and high-frequency drivers.

The package weighs 44 pounds and measures 19 $1/2''$ wide, 12 $5/8''$ high and 11″ deep when in its near field (horizontal) configuration.

MEASUREMENT ANALYSIS

In our independent anechoic test measurement facility, a full set of response curves was run on the Genelec S30NF using frequency sweep and TEF-type measurements to determine performance. We were especially interested in the areas of phase and frequency response linearity, and the dynamic compression response,

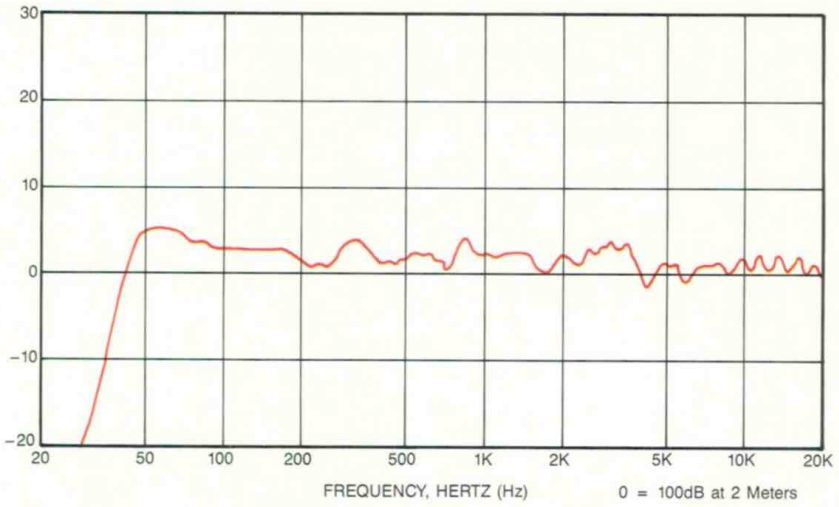


Figure 1. Genelec S30NF anechoic frequency response, 2 meters and low frequency near-field composite.

which is to say the performance of the amplifier/component/protection circuit combination. These are the areas in which a well-designed powered monitor speaker should excel over more traditional designs.

Before measuring the speaker acoustically, we ran voltage transfer curves, measuring the response of the electronics up to the speaker components themselves (See Figure 2). The tests showed straightforward filter designs, with little of the complex magnitude/phase compensation that other designs have been seen to incorporate. A low-frequency second order infrasonic filter provides approximately 6dB of lift, suggesting a B6 type alignment (AES Journal, Keele, June 1975), which should offer a lower cutoff frequency (at the expense of some additional amp power) while providing good, solid low-frequency excursion control.

The crossover bandpass filters appear to be fourth order Bessel types, excluding the high pass in the midrange, which is apparently a 24dB/octave Butterworth. A slight notch is inserted in the midband response, conceivably to remove a small aberration (midrange cone resonance?).

The TEF printouts from measurements made in the anechoic test chamber show the rest of the story. Both S30NF speakers in the supplied mirror-imaged pair measured within 1dB of each other, indicating superb factory quality control in component matching. Acoustic measurements were completed at multiple distances (0.5 meter, 1 meter, 2 meters and 3 meters), with more than 50 different "snapshots" collected. From this mountain of information, we assessed the following areas: frequency response, directivity, polar patterns, ETCs (wave propagation),

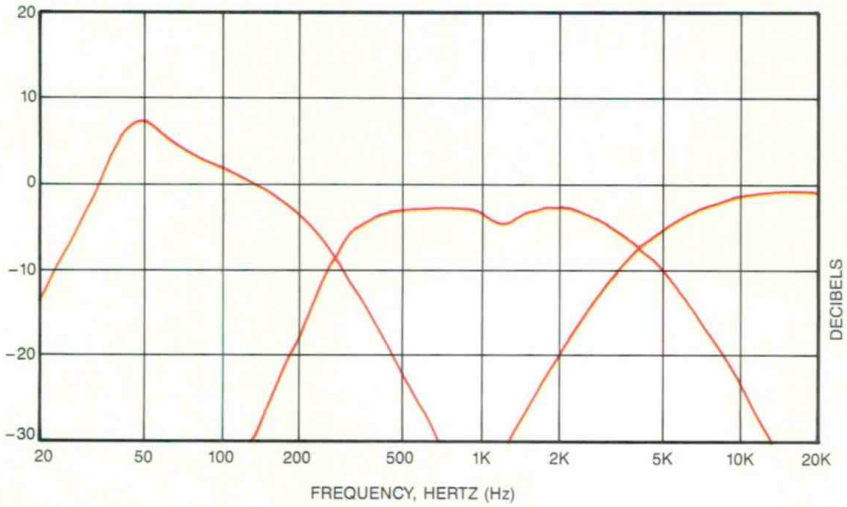


Figure 2. Voltage transfer measurements of electronic circuitry. 0=1V.

attack and decay performance, phase response and power compression.

As mentioned earlier, the frequency response is excellent, well within ±3dB from below 100Hz to 20kHz, without excessive rapid deviations away from linear. The response remains remarkably uniform off-axis (when viewed in the normal horizontal, on-the-meter-bridge orientation), as shown on the composite polar response graph, which indicates the –6dB down response (See Figure 3). The total average horizontal response at –6dB is about 140°, extending well past 10kHz. In a feat of solid engineering, Genelec seems to have used the best aspects of each particular component type, creating a system whereby the horizontal high- frequency pattern from the ribbon tweeter comes very close to matching the horizontal pattern of the midrange and woofer, virtually guaranteeing that the sound heard off-axis will closely track front-and-center response.

This is further supported by Directivity measurements for both the vertical and horizontal axes (See Figure 4). The Directivity curves view the polar pattern response information in a different way, with the X-axis representing angular degrees off of the front center baffle, and the Y-axis representing frequencies from 200Hz through 20kHz. The horizontal curve (of prime importance to near-field monitoring) shows a virtually flat response with a widening of the pattern at approximately 740Hz and a narrowing at approximately 1.2kHz. A secondary narrowing occurs at 3.6kHz, and the typical tweeter high frequency narrowing, although far reduced below that of a cone or horn tweeter, gradually begins at approximately 12kHz. Translated, this all means that when listening off to the side of the speaker, one will hear more 740Hz than flat, but less 1.2kHz and 3.6kHz, with fewer highs off-axis as one gets to the extreme high end of the frequency band. By off-axis, we mean well past 90° (perpendicular to the side), and almost around to the back. This is very impressive and unmatched by most other speakers. One can't make enough of the importance of this uniformity in pattern propagation for a near-field monitoring application, where moving your center of operations two feet sideways is in the normal course of console operation. The S30NF shows itself to be a stellar performer here; no laser-beaming as you move about.

The vertical response, although far less critical (the mixer tends to keep his or her ears at one elevation), is generally smooth, with exceptions existing in the 250Hz, 850Hz and 4kHz regions. By nature of its long-but-not-wide dimensions, the ribbon tweeter is far more directional than the other components in the vertical plane — closer to 60° than the 140°+ horizontal

measurement. This is actually good as far as cancellations from reflections off the console surface go, a phenomenon related to the height of the meter bridge and the vertical location of the speakers. These reflections can be minimized by a narrowing of the vertical pattern at problem frequencies, usually the mids and highs.

beyond audibility. This measures a total of approximately 500°, an amount typical of 3-way designs of this size, but far more uniform.

The vertical orientation of the tweeter and midrange on the front baffle virtually ensures that moving about on the horizontal axis will not alter what you hear (the crossover between the woofer and mid is basically too low to have an effect). As stated previously, the vertical arrival-time path-length differences caused by

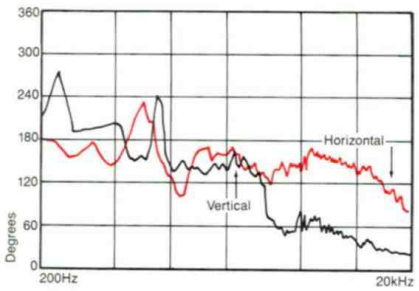


Figure 4. Horizontal (red) and vertical (black) coverage vs. frequency.

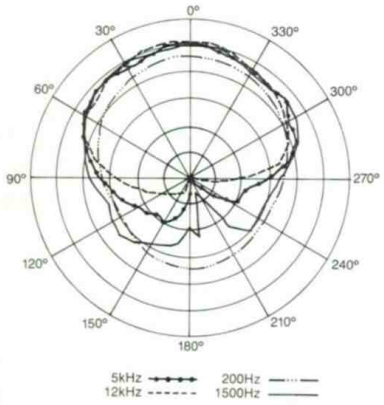


Figure 3. Horizontal polar response curves. 200Hz, 1.5kHz, 5kHz, 12kHz.

WAVEFRONTS AND WATERFALLS

An important consideration when discussing on- and off-axis frequency response is phase uniformity. Is the delay gradual with the rise in frequency, or abrupt and inconsistent? Do the harmonics of the signal (eminating from the different drivers) arrive in phase or in time with each other? With many, if not most speakers, they don't. In fact, it is truly amazing how many common, popular monitors evidence atrocious wavefront delay linearity. This is due to a number of reasons, including delays introduced in passive crossover filters and physical placement of drivers on the front baffle. A self-powered monitor can conveniently address these problems by introducing low phase-altering active filter designs and electronic signal offset (read: time delay) in the before-amplifier section drive circuitry.

The S30 family of monitors, although less complex than other powered designs in their augmentation, use well-realized filters to accomplish just that, as evidenced in the phase vs. frequency graph (See Figure 5). The anechoic measurement taken at 3 meters shows an extremely uniform curve, without glitch or bump, gradually increasing in phase delay (measured in degrees) until the tweeter passband (approximately 4.5kHz), where it flattens out to

off-axis offset between the mid and high components are less of a factor than, say, board-top reflections.

Figures 6 and 7 show 3-D Waterfall views (amplitude vs. frequency vs. time) of wide-bandwidth signal arrival times and decays. Again, the S30NFs show remarkable response in their freedom from specific resonances or ringings, suggesting a lack of coloration in the sound. Curves this uncluttered, especially when considering uniformity of the attack response, are rare (See Figure 6). Note on the decay 3-D that the holdover decays present are wideband and rapidly diminishing, indicating a superbly damped mechanical system and a lack of problematic resonances (See Figure 7). At the extreme upper end of the spectrum, the tweeter does show a noticeable holdover time, yet the decay rate is just as rapid as the other two components, but more linear. The freedom from overall lateral "mountain ridges" suggests smooth, uncolored performance, implying high listenability over time. To repeat, there is little evidence of resonances that would cause blare, harshness or roughness in the sound of the speaker.

ETC curves are used to measure whether a speaker has reflective surfaces that might re-radiate the signal after initial excitation. Many monitors have exposed metal speaker frame edges, corners of horns, or cabinet boundaries that provide convenient reflective surfaces to the original propagating signal. In fact, some energy time curves look downright ugly, with the original signal reflected milliseconds later at relatively high levels, sometimes only 5dB or 8dB down. This contributes to so-called smear and an overall lack of clarity.

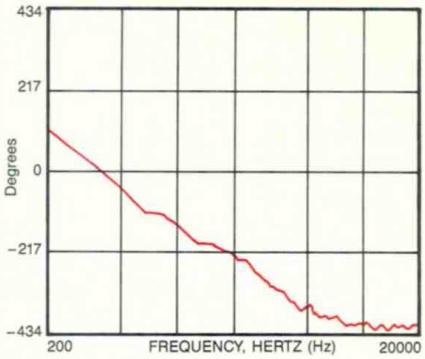


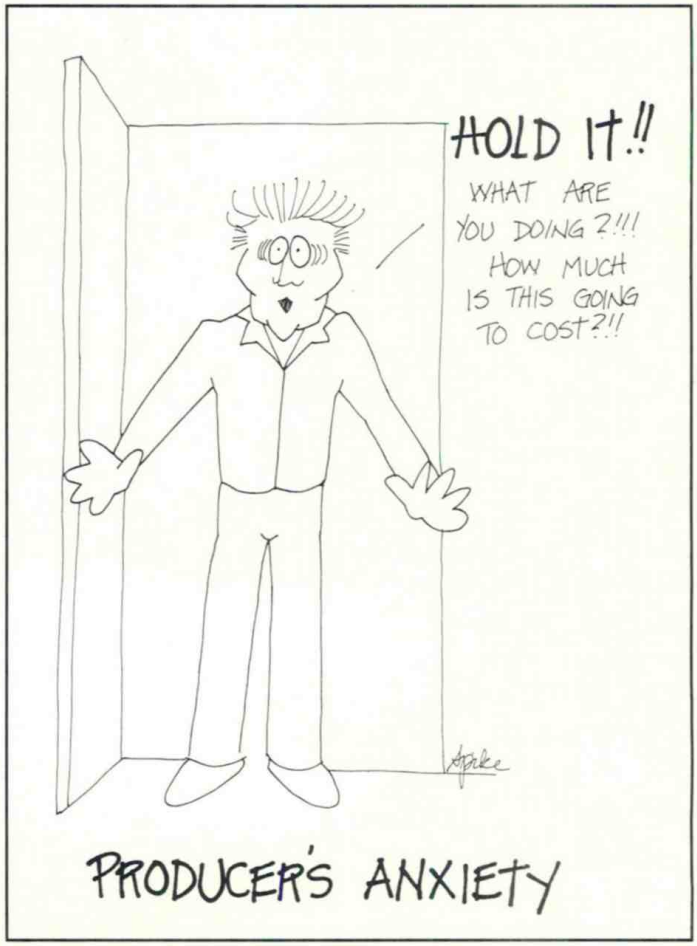
Figure 5. On-axis phase vs. frequency response.

The S30NF is excellent in its freedom from these reflections (See Figure 8). There exists an almost total lack of reflected energy in the upper frequency range (the area of greatest potential trouble and most noticeable to the ear), with only a slight ripple existing approximately 24dB down, one millisecond after the initial signal. Measured arrival time offset between the midrange and tweeter is the equivalent of less than 2 inches when the microphone is placed on-axis of the mid-point.

Finally, Figure 9 shows a family of dynamic compression traces, plotting frequency response to various output levels. With the S30NF, there is virtually no dynamic limiting effect up to and including the point where the protection circuit cuts out the tweeter to save it from long-term overload abuse conditions. Response remains linear and stable well over 100dB SPL continuous. As our Hands On reviews analyze a greater number of self-powered monitors with built-in processing and protection, it will be interesting to note the effect the protection circuitry has at various long-term operating levels.

LISTENING TESTS

As might be expected, the speakers sound as good as they measure. Aside from a minor nit, the S30NFs are among the best smaller speakers we have ever heard, period. Monitoring both prerecorded material and live percussion, vo-



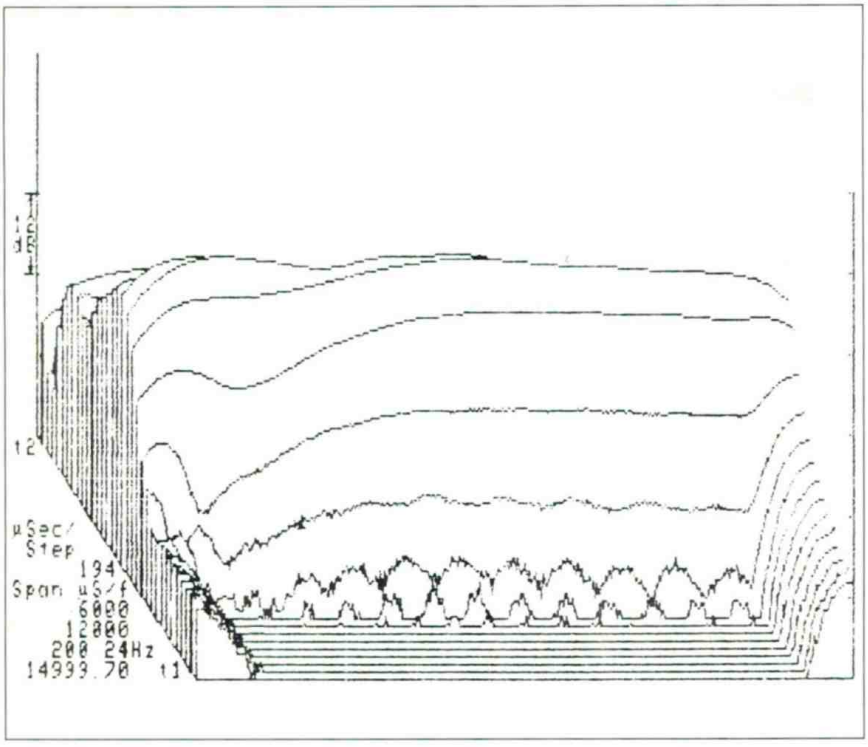


Figure 6. 3-D waterfall of arrival time.

cal, piano, acoustic and electric guitars and bass, we got a very good feel for the performance and capabilities of these speakers.

The frequency response is wide ranging indeed. One can virtually forget the need for subwoofers. The deep low end is solid, uncolored and very tight. Low bass response was noted to shift slightly pending the type of console these speakers were placed on, proving once again that physics is physics: the proximity and nature of boundary-plane coupling will reinforce or alter the bass by various amounts. Adjusting the various rear-panel controls allowed us to contour the speaker back to a response we felt was normal or flat. Conversely, the balance could be altered to emphasize any region desired. We learned quickly to appreciate the presence of these filter, rolloff and amplifier section level controls.

The speakers had more than enough cruise power to play uncomfortably loud, with nary a strain. Peak levels (drums, percussion, guitar stabs and vocal shouts) could be made unbearable. The levels at which the system could be forced to shut off components were above those tolerable for any extended close-distance listening. I can't possibly imagine any rational

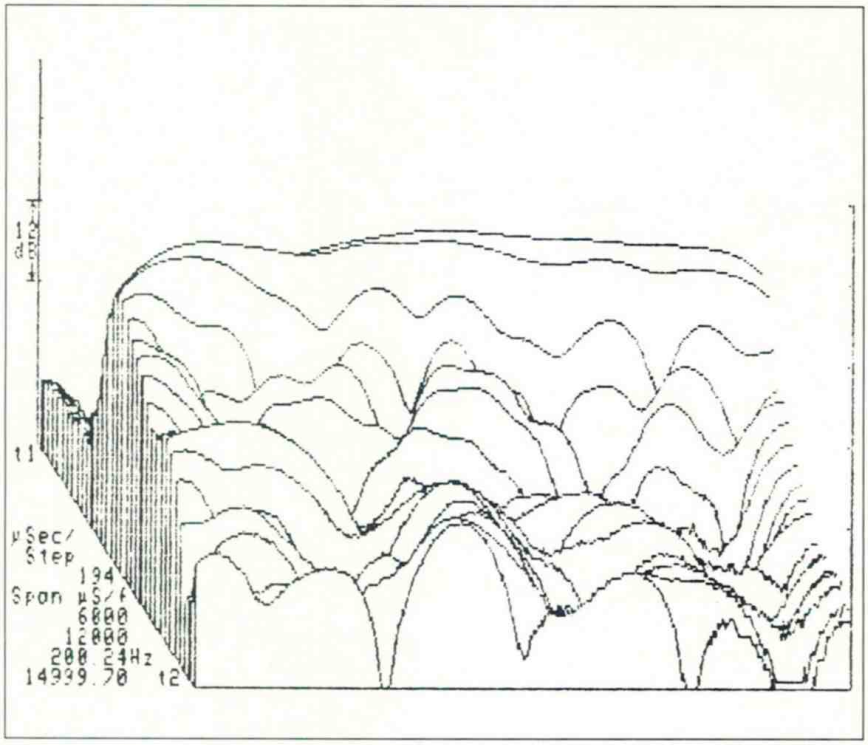


Figure 7. 3-D waterfall of decay time.

need for more SPL in a near-field, although someone must — Genelec does manufacture the S30BNFs for just such applications.

The high-frequency ribbon was noted to have a quality most readily described as smooth or silky, the opposite of harsh or blare-prone. This is not to say that the highs were not forward or aggressive, merely free from aggravating roughness when pushed. Material that sounded overly edgy or harsh on horn tweetered speakers (but not in, say, AKG K-240 headphones) sounded normal in the Genelecs. Sourced from a B&K omni, the high hat sounded like the high hat played in the room, not an altered reproduction. For extended loud listening this smoothness was considered to be a major plus. For those either deaf or looking for a harsher, sometimes painful top-end projection (Speed-Metal, anyone?), the uncolored, even-handed response of the ribbons may not suit.

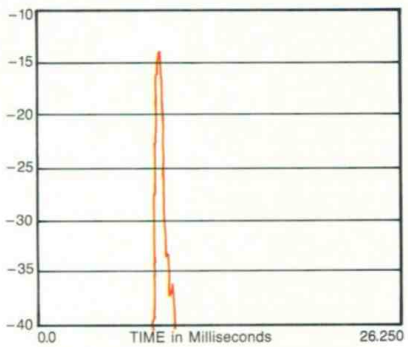


Figure 8. ETC, high frequency: energy magnitude vs. time.

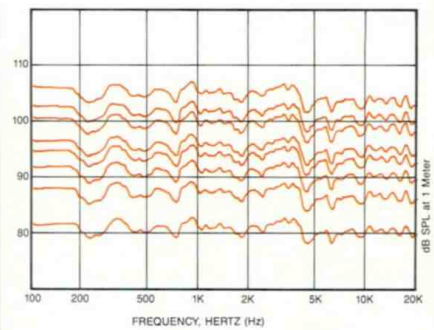


Figure 9. Anechoic frequency response, 1 meter, at various input levels.

Being a 3-way design, one would expect the imaging to rate well behind a good 2-way or the theoretically ideal coaxial. Although imaging was possibly less focused than the latter, it was by far more tightly focused than any other 3-way we have heard, as well as the majority of 2-ways. Chalk this up to tight placement of drivers, steep active filter responses with minimum phase shift, and an overall linearity in the frequency and time domain. In short, shut your eyes and the speakers become windows to the studio.

On the nit side, a good kick drum hit would waft a puff of air into your face from the cabinet tuning port, something that varied by working distance to the speaker. More than a meter away was not a problem. This effect could sometimes be disconcerting. However, it might be noted that the Genelecs are not the only speakers to do this. Various other high-priced competitive devices suffer from the same minor annoyance. It is a side effect of high transient capabilities at low frequencies. No doubt an inexpensive solution exists, whether from the factory or via application of a little Yankee ingenuity.

THUMBS UP

The S30NF is bound to appeal to individuals who are looking for clear, uncolored, loud sound. It is one of the more transparent-sounding speakers we have ever reviewed, but it does not give up its ability to get aggressive when pushed, as so many "pretty-sounding" consumer-derived designs do. More important, the protection circuitry doesn't "breath" or move when tickled, allowing a stable mixing platform without disconcerting side effects. It simply cuts a given component's output when abused, without compression, limiting or band-pass shifting. How basic. How useful.

In short, we highly recommend these monitor speakers as reference platforms from which to judge the quality of sound. They apply to all types of monitoring situations. We even found that in listening to our favorite, well-worn CDs, more than several new elements, previously unheard, were revealed in the mixes. This alone was impressive to our-heard-it-all-before ears.

"Shut your eyes and the speakers become windows to the studio."

You might ask: What is it worth to have the ability to hear every nuance cleanly and clearly, as loud as you want, across the full bandwidth? To us, there seems to be little issue. Why take a picture with a fogged-up viewfinder? You'll never know what you're working with. ■

Circle (100) on Rapid Facts Card

A nod and thank you from R•E•P to Ed Long for the near field concept and terminology. R•E•P would like to thank Kerry Geist for his assistance in the evaluation of technical information collected for this review.

First Look

By Laurel Cash-Jones and Fred Jones

GET WORKED OVER

For those of us who would rather get "worked up" about some new audio product than an aerobic "work out," (and before we "overwork" the "work" jokes) you will be excited to hear all about "The Works," a new sound effects package from the folks at Sonic Boom.

These are the same people who brought you Dynamic Range Volume One (Guns & Bullets), which has become the predominant choice for SFX editors on many of this summer's blockbuster movies.

"The Works" is Volume 2 of the Sonic Boom Sound Effects Library, and is a 10-CD collection (not available in any store) of mechanisms, actions, machines and motors. Every type of sound you have ever wanted from these devices is available. Sounds such as levers, latches, ratchets, stresses, buttons, switches, solenoids, signals, electrical effects, pneumatics and servos.

Also included are extra-long, 6-minute-plus backgrounds that include mining, manufacturing, shipping, refining, packing, bottling, printing and more. All together, "The Works" contains over 2,500 newly recorded, all-digital sound effects.

Circle (101) on Rapid Facts Card

STATION CONTROL TROUBLE?

Are you having trouble controlling your station? If so, you need the new Control Station CS-10 from J.L. Cooper Electronics. Designed to be used primarily in conjunction with the new Digidesign Pro Tools (which we talked lots about last month), the CS-10 provides you with an easy-to-use hardware control interface that allows rapid access to the most frequently used features of Pro Tools without having to rely on the Macintosh interface.

The CS-10 features conventional controls that look and feel like a tape recorder transport, with large buttons for record, play, stop, fast forward and rewind. It also sports a footswitch interface so you can punch in hands-free. The optically encoded jog/shuttle wheel allows for effortless scrub type editing. There are also programmable function keys that are user-programmable so that you can initiate complex or repetitive commands with only a single button.

There are also eight faders to facilitate on-board mixing, and six potentiometers for effects sends one and two, pan left and right, boot/cut, frequency and bandwidth. There is even a padded arm-rest for your mixing comfort.

Circle (102) on Rapid Facts Card

GET YOUR LIP SYNCED

Also from J.L. Cooper is the Sync•Link, a new type of device that combines a Macintosh MIDI interface with a SMPTE and "Smart" FSK synchronizer for synchronizing MIDI sequencers, those dreaded drum machines, and hard-disk recorders to audio or video tape.

This little box reads and generates all SMPTE time code formats, as well as "Smart" FSK sync that is compatible with other J.L. Cooper products. The Sync•Link supports MIDI time code, direct time lock, MIDI clock with song position pointer and is universally compatible with all Macintosh MIDI sequencers.

It is surprisingly affordable considering all of the problems it either solves or eliminates; list price is $199.50 and it can be rack-mounted into a 1/2-rack space or used as a stand alone unit.

Among the unique features on the Sync•Link are jam sync, which provides SMPTE regeneration for repair of weak or faulty time code tracks and tape duplication, SMPTE and "Smart" FSK flywheeling helps to protect against tape drop-outs and MIDI input is merged with time code in both SMPTE and "Smart" FSK mode.

Free run is a feature that lets Sync•Link act as the master SMPTE and MIDI synchronizer in a tapeless environment via an internal clock. Dual Macintosh serial port capabilities feature one MIDI input and one MIDI output per port, with LEDs to indicate port activity.

Circle (103) on Rapid Facts Card

STUDIO ANIMATION

Now you can have more animation in your studio. Audio Animation, known primarily for their broadcast products, is introducing their new all-digital audio studio processor "The Paragon-Studio." Designed as an open architecture device to provide for future expansion and non-obsolescence, the unit sports a 3 1/2-inch 1.44Mbyte floppy disk drive so that the user can easily reconfigure or expand the user's capabilities.

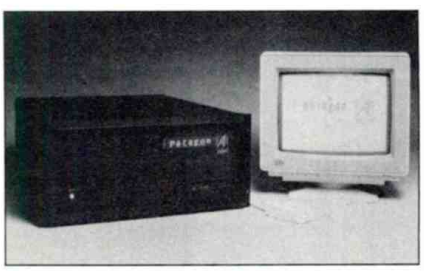
"The Paragon-Studio" will offer four independent I/O channels of signal processing in an AES/EBU digital format, and will support both 44.1kHz and 48kHz sampling rates. Each channel can be user-configured with up to two signal processing functions, both of which will work simultaneously and independently of processors in other channels, regardless of each processor's configuration.

Among the user-selectable and configurable features is a Digital Parametric Compander, which allows dynamics control within a specific EQ curve. When the compander function is turned off, this processor functions as a standard 5-band parametric EQ with ±24dB of boost or cut.

Second is a Digital Bandlimited Gate with user-selectable sidechain-type bandpass filters to trigger the gate. The processor can also be used as a standard-type gate.

Next is a Digital 1/3-octave graphic EQ with ±24dB of boost or cut.

The processor also has a digital Bandlimited Compander which can be set up as a dedicated bandpass filter, which will allow compression, limiting or expansion in any given band. These dynamics controllers can be controlled by the energy contained in any other frequency band.



The several hardware option packages planned for the Paragon-Studio include a 4-channel A-D/D-A I/O card and a SMPTE IIR-type digital EQ and dynamics processor, plus a FIR-based phase-coherent EQ and room tuner. Other options will be announced as they become available.

Suggested list price of the Paragon-Studio is $9,500 and shipping will begin in November of 1991.

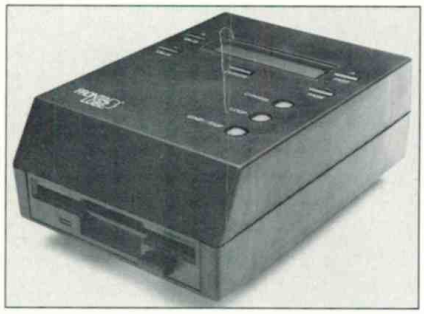
Circle (104) on Rapid Facts Card ■

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

Cutting Edge

FRONTAL LOBE SEQUENCER

The Version III portable sequencer/librarian will work with any synthesizer or sound module. The sequencer has 16 tracks, 32 MIDI channels, 256 parts, 96 ppq resolution, controller chase, controller remapping, MIDI channel remapping, automated track mutes and automated MIDI port selection. Cut, copy and paste can be



performed in bar edit or single even modes. Other features include macros, time calculation and time fit, programmable quantization, compare and undo, and variable speed rewind and forward keys that let the user hear the song forward or backward in real time.

Circle (105) on Rapid Facts Card

OTARI DE-24

The Otari DE-24 editing system is designed for the initial stages of audio post-production. The dedicated controller allows remote operation of a Sony BVU master video deck and two slaved Otari tape machines, allowing access to capture or entrance of time code addresses, record arming/disarming, record protect, bus assign and machine transport controls. The unit can also trigger seven individual sources. The 4-input/24-output router provides automated signal routing to the MTR-90 24-track tape machine, enabling the user to assemble a 24-track master from several different remote-controlled dialogue, ADR, and effects sources.

Circle (106) on Rapid Facts Card

NVISION EM2012-00

As an input to the NV2000 High Definition Audio System, the EM2012-00 18-bit dual program input module features 64× oversampling 18-bit delta sigma A/D converters, AES/EBU local digital output and up to 18dB of input gain in 6dB steps for interfacing with a wide range of equipment, and a transfomerless input amp.

Circle (107) on Rapid Facts Card

HARRISON PP1 MODIFICATION

Warner-Hollywood Film Studios installed 96 channels of Audiomation Systems' Uptown moving fader console automation system in a Harrison PP1 film mixing console. Uptown replaced the Harrison switch logic boards with nine switches on each channel, four EQ subsections, filters, line AB automation system and console. Each mixer has an automation panel that can alter fader status within a single section of the 3-section console and show automation system status on an 8-character LED display. The modified software accommodates film mixing with features such as feet and frames display, and insert and delete time code functions.

Circle (108) on Rapid Facts Card

BSS EQ

The FXS-960 dual channel, dual mode 1/3-octave graphic EQ has channels on the front panel that are switchable between wide and narrow constant bandwidth characteristics. 45mm faders with true grounded center detent positions ensure absolute zero cut or boost when centered. Additional front panel features for

each channel include a Hi-pass filter with independent bypass, output gain trim control with peak clip LED and EQ In/Out bypass switches on each channel. I/Os are via LXR connectors and are electronically balanced with the outputs floating.

Circle (109) on Rapid Facts Card

PANASONIC SOFTWARE TOOLKIT

The SV-3900 Software Developer's "Toolkit" consists of utilities designed to facilitate the development of application-specific software for the SV-3900 Pro-DAT. An MS-DOS version, model SDT-390B, is also available. Compatible with Symatec's Lightning C, Apple MPW C and Pascal high-level languages, these utilities allow users to implement control of individual or grouped SV-3900 machines connected to a master PC or AV system via a bidirectional RS-422, ES-Bus serial network. The utilities consist of transport, system control and supervisory functions that can be added via modular C utilities to existing software.

Circle (110) on Rapid Facts Card

NADY UHF 950

The 950 UHF wireless system has 10-channel synthesized frequency selection, True Diversity, audio companding, switchable balanced level out (line/mic), 115/220Vac power, 20-25Vdc power option, bass boost and a monitor volume control. The transmitters include a metal body pack for a lapel mic or instrument and an all metal hand-held mic.

Circle (111) on Rapid Facts Card

BARCUS-BERRY PIANO PICKUP

The planer wave piano system uses a single sensor attached to the soundboard. The sensing device is 2 1/2-inches long, 1-inch high and 1/2-inch wide, and it can be installed quickly. The system also permits special effects such as chorus, flanging and digital delay.

Circle (112) on Rapid Facts Card

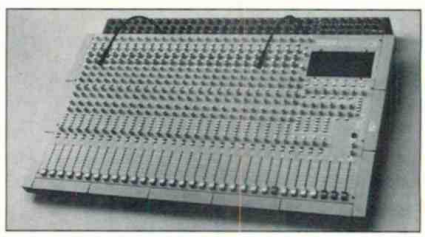
AUDIX DRUM MIC

The D1 drum and percussion mic has a hypercardioid pattern that offers off-axis response to reduce noise and to allow greater control over the mix. The mic has weight and strength characteristics that allow for unrestricted mic placement and the abuse that goes along with "2B" sticks.

Circle (113) on Rapid Facts Card

BIAMP REINFORCEMENT CONSOLES

The Olympia Series of mixing consoles comprises full featured, four sub-master consoles, which include 4-band EQ with sweepable sides, six auxiliary sends, four mono and two stereo returns, a stereo input channel, a Talkback system and external power supply. The Columbia Series consists of eight submaster consoles with all the features of the Olympia Series plus two additional auxiliary send buses, direct outputs and auxiliary left and right main outputs with independent level control. Olympia consoles are available in 16-, 20-, and 24-channel versions, while the Columbia consoles are offered in 24-, 32-, and 40-channel versions.



Circle (114) on Rapid Facts Card

SYMETRIX CROSSOVER MULTI-MODE

The 524-E Multi-Mode crossover has four crossover bands and can be configured as a mono 2-, 3-, or 4-way crossover or as a stereo 2-way crossover. Crossover points

and filter slopes (6-,12, or 24dB/octave) can be set for each band, and each band can be individually processed with a driver protection limiter and phase alignment compensation delay. High frequency EQ compensation for direct connectivity horns is also available with a subsonic filter for woofer excursion control. Features include a user-interchangeable card that contains the crossover points and filters slopes, limiter attack and release times, and EQ insertion.

Circle (115) on Rapid Facts Card

FAIRLIGHT MFX

The MFX is a digital 24-track disk recording and editing system for audio post production. The console has push buttons and a jogger control for all functions with a menu system for all commands. A color screen and LCD pan display the audio tracks, system options and status. Two AES/EBU digital inputs and outputs are provided with 64× oversampled analog inputs and 24 analog track outputs. 16 tracks can be played back simultaneously.

Circle (116) on Rapid Facts Card

FUJII HEADS

The Sendust magnetic head for recorders and high-speed cassette duplicating systems use alloy material that allows for longer wear. Unlike ferrite heads, Sendust heads exhibit no gap deterioration or erosion and have better saturation characteristics. The heads are characterized by high electrical resistivity, small grain size, low losses and less contour effect. The headstack is encased in solid brass with precision gap alignment and a highly polished hard face.

Circle (117) on Rapid Facts Card

CRICKET POLARITY TESTER

The Cricket polarity tester from Galaxy Audio indicates absolute polarity on mics, mixers, mic cables, EQs, crossovers and speakers. The unit consists of a send and a receive unit, a balanced 1/4-inch and XLR jacks, an unbalanced 1/4-inch speaker out jack and internal speaker. The receiver has 1/4-inch, XLR jacks and an unbalanced 1/4-inch internal mic. The receive unit tests both tip and ring on a 1/4-inch plug of pins and three on the XLR plug.

Circle (118) on Rapid Facts Card

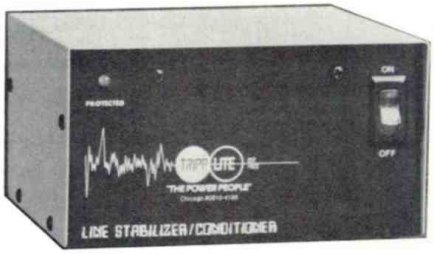
BMI POWERVISA

The 100 S PowerVisa detects all disturbances that are harmful to electronic recording equipment, and monitors true RMS ac voltage, ac current and temperature. After monitoring, the ADVICE printout suggests possible solutions. In the event of a power shortage, an LED lights and either prints a message immediately or the user can print a report of the 10 worst events of each disturbance type. The device also prints daily and weekly strip charts summarizing all disturbances.

Circle (119) on Rapid Facts Card

TRIPP LITE LINE CONDITIONER

The LS 600 and LS 604 line conditioners plug into a 120V wall outlet and automatically regulate fluctuating incoming voltages. Both feature two ac outlets with 600W output and regulate low voltages,



correcting brownouts and preventing equipment damage. The LS 604 also corrects overvoltages from 87Vac to 140Vac. Both have complete spike and line noise suppression, circuit breakers and illuminated on/off switches.

Circle (120) on Rapid Facts Card

RENKUS-HEINZ ATM SERIES

The ATM Series modular flying hardware system allows for the construction of various custom loudspeaker arrays, splay angles and tilts, and it eliminates custom designed and manufactured fly bars. The package comprises a heavy duty tubular steel truss, truss connecting bars, quick release pins and shackle mounts. The system is certified at a 6:1 safety ratio. ■

Circle (121) on Rapid Facts Card

Hardware and Software Updates

SUNRISE AUDITION 4

The Audition 4 advanced digital sound editor for the Commodore Amiga personal computer features cut, copy and paste and allows users to echo, flange or filter the sound. A sequenced loop capability enables users to create long scores that require less memory than normal. A preview mode allows the trial of edits and effects before they are selected.

Circle (126) on Rapid Facts Card

ANALOG DEVICES ADC

The AD 1879 dual 18-bit analog-to-digital converter has a 106dB dynamic range and uses a differential, sigma-delta architecture to improve mode rejection properties, eliminating external digital input filtering. Each channel includes a 1-bit quantizer front end, noise-shaping modulator and a digital decimating filter. The device has a total harmonic distortion plus noise of 98dB. An on-board voltage reference ensures stability over temperature and time.

Circle (127) on Rapid Facts Card

ROLAND DIGITAL SAMPLER

The S-750 16-bit stereo digital sampler features a 24-voice polyphony, 32-part multitimbral capabilities, 44.1kHz and 48kHz sampling rates seven looping modes, and a CRT interface. The 2Mbyte memory can be expanded to 18Mbytes using an optional expansion board and 4Mbyte Macintosh SIMMs. The device has a 20-bit digital-to-analog converter and 24-bit processing. The unit comes with a SCSI interface for connecting the unit to hard disks, magnetic optical disk units or a CD-ROM player.

Circle (128) on Rapid Facts Card

DIGIDESIGN PROTOOLS

Pro Tools Multitrack Digital Audio Production System combines multitrack digital audio recording and editing, signal processing, MIDI sequencing and automated digital mixing into an integrated digital audio workstation based on the Macintosh II platform. Pro Tools offers from four to 16 channels of digital audio recording and playback with balanced, oversampling analog inputs and support for both AES/EBU and S/PDIF digital formats. ■

Circle (129) on Rapid Facts Card

LETTERS

Continued from page 6

the least possible "Non-musical distortion" — is that the answer to a music producer/engineer's prayer's? Not to me it isn't! That quality in certain microphones, for certain sonic applications, is absolutely necessary. I must say, at this point, that I have many mikes in my collection, which, if we did the above test to them, would not fare very well. In fact, they would probably look downright awful! In reality though, I use them on every project I am involved in, with wonderful results.

Why even worry about all the tests and graphs and hoopla regarding self-noise and dynamic range and so on ... In my opinion, we *must* know these facts, to make the most of our sonic canvas, as we paint our musical panoramas. I don't ever want to leave a sonic opportunity behind, eternally never to be a part of my musical accomplishments, just because I didn't know how to use my tools and equipment.

I hope this isn't sounding as though I am out to "Get" Gotham Audio and specifically Neumann microphones. Nothing could be farther from the truth! I only want the reader to know the truth about microphone technology, or perhaps "microphone art" would be a better word for the subject. More than that, I want the reader to know the truth about microphone specifications.

I own 105 microphones in 15 Anvil cases. In my collection there are several superb Bruel & Kajer microphones that I use with great results on every one of my projects. I also own many spectacular Neumann microphones that I treasure dearly. Some of these Neumann mikes I have owned for more than 30 years. I have one Neumann U-47 tube microphone that I used in August, 1960 on Joe Williams, when I was recording an album that I did with Count Basie's band at Universal Studio in Chicago. I used that very same mike yesterday on Michael Jackson at Larrabee Studio in Los Angeles! It sounds absolutely magnificent! If that isn't an incredible mike I don't know what is.

Microphones are artifacts of our culture. A microphone is a modern symbol of the human urge to capture a bit of the living world and then examine it carefully at our leisure. Microphones are portals to the temporal universe of sound. My microphones are among my most prized possessions, many of which are kept in handcrafted, velvet lined wooden boxes. They are the Voodoo, the magic wand, the secret weapon of the Record Producer/Music Recording Engineer's trade and craft. Listen to a microphone with your heart first, then think about it. React passionately to what you hear. Trust your instincts. Don't be impressed with specifications that might be misleading. ■

DIGITAL DOMAIN

Continued from page 24

Knobs are chosen because they are intuitive, take up little real-estate and are easy-to-read.

Although more and more manufacturers are including real knobs, most use a familiar pointing device called a **mouse**. Mice are great for pointing, but they do not make circles well nor are they very accurate over small distances. One solution that works well is a screen representation of a knob, which brings up a pop-up fader when it's selected. After the setting is made, the on-screen knob indicates the change in position.

Since much of your time is spent editing, it is important to fully understand every editing operation.

Once you have learned one system, it becomes your point of reference. Each system differs in the way they indicate tape movement. Although tape generally moves across a fixed head on an analog recorder, some companies use a moving play head instead, because it's easier to represent on a computer screen. Tape direction is not as standardized. Many systems simulate the operators' perspective of a conventional recorder with tape moving horizontally from left to right. Film sound engineers look at things another way. The AudioFile simulates the perspective of the playback head with tape moving from right to left. Screensound takes things a step further by rotating their display 90° to emulate the way a movieola works (with the film moving toward the operator).

Audio has changed little in the last 40 or so years. The terminology has changed, but the work has more or less remained the same. As users we need to get manufacturers to use more consistent terminology in their products. Human interface-aware design should come first, not last. Until then, it's important for everyone in audio to spend the time and master at least one system. Once you have done this, other systems will come easier. Don't wait for the perfect system. It's time to jump in the water and start getting wet. ■

ALL ACCESS

Continued from page 52

ONSTAGE SIDEFILLS

Model: (4) MSI MS3W
Crossover: MSI HSX-301

HOUSE SIGNAL PROCESSING

Equalizers: White 4650
Crossover: MSI HSX-301
Reverb: Lexicon 224XL, Lexicon 300, Eventide H3000, Lexicon 200
Delay: Lexicon Super Primetime, Lexicon PCM-42
Other Effects: Yamaha SPX-900, Yamaha SPX-90II, Alesis MicroVerb
Gates: BSS DPR-502, Aphex CK1, Aphex 612
Compressor/Limiters: dbx 160X
DAT Machine: Panasonic SV3500
Cassette Machine: Teac C3RX
CD Player: Tascam CD-501
Headphones: Sony MDR-V6
Intercom System: Chaos
Analyzer: Klark-Teknik DN60, Crown RTA
Power Conditioner/Light Module: Furman PL-8

ONSTAGE SIGNAL PROCESSING

Equalizers: Klark-Teknik DN300
Effects: Yamaha Rev7, Lexicon PCM-42, Yamaha SPX-90
Gates: Aphex 612, BSS DPR-402
Compressor/Limiters: dbx 160X
Headphones: Sony MDR-V6
Power Conditioner/Light Module: Furman PL-8

MICROPHONES

Vocals: Sony UHF WRT67A
Background Vocals: Cetec Vega, Sennheiser 431
Kick: Beyer M88, AKG D112
Rack Toms: Ramsa WM-S5
Floor Toms: Ramsa WM-S5
Overheads: AKG 414
Snare Top: Shure Beta 57
Snare Bottom: Beyer M88
High Hat: Shure SM91
Guitars: Sennheiser 409
Keyboards: Countryman DI
Bass: Countryman DI, Shure SM57

MISCELLANEOUS

House Snake: 52 pairs
Multi-pair connectors: IBM, AMP, VEAM
AC Power Conditioning: Proprietary
Stageboxes: MSI 8-packs
Splitter: Transformer Splitter ■

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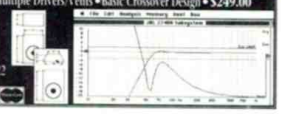

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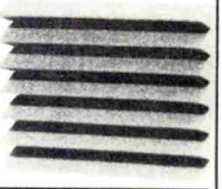

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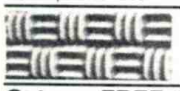

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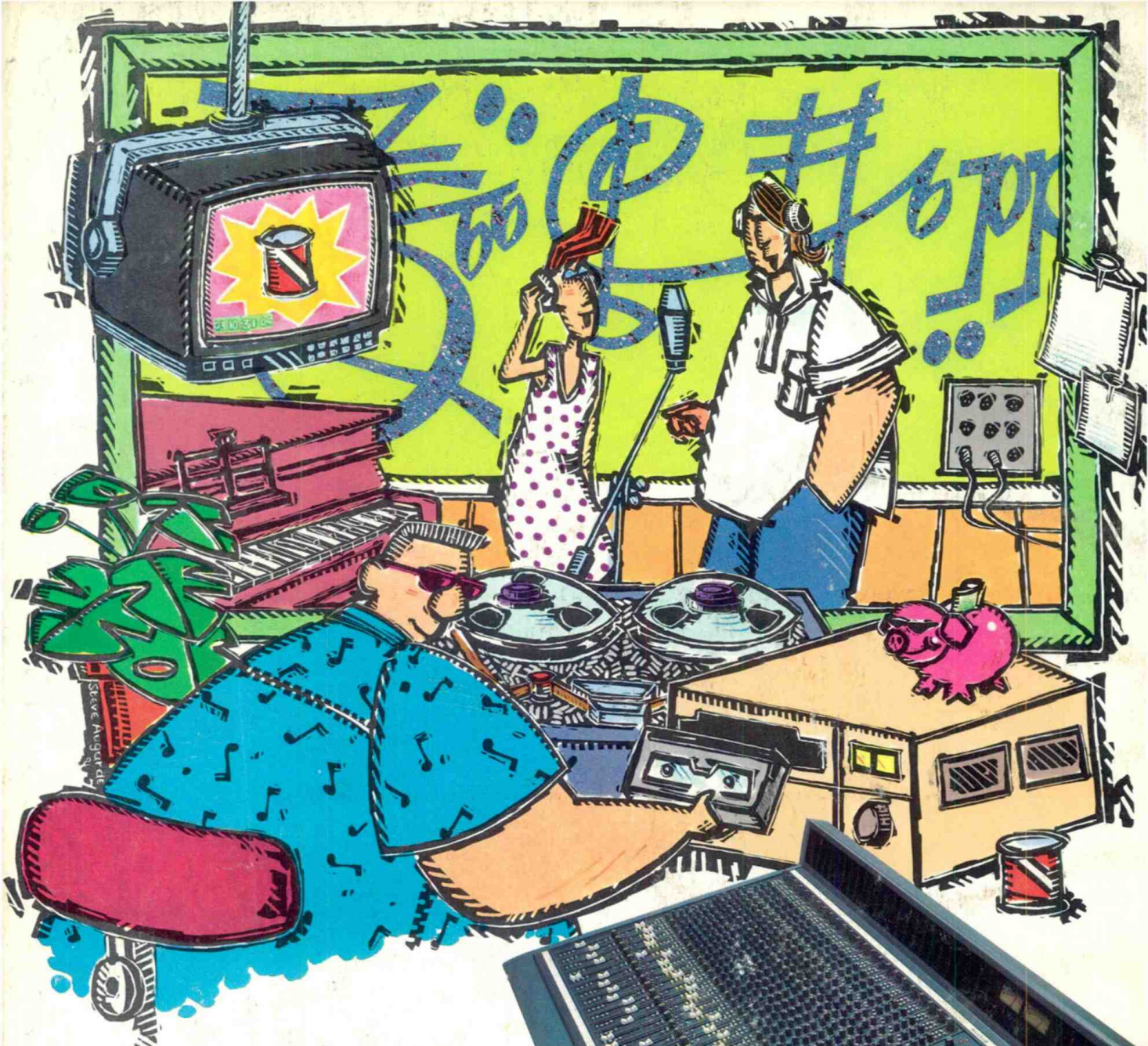

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