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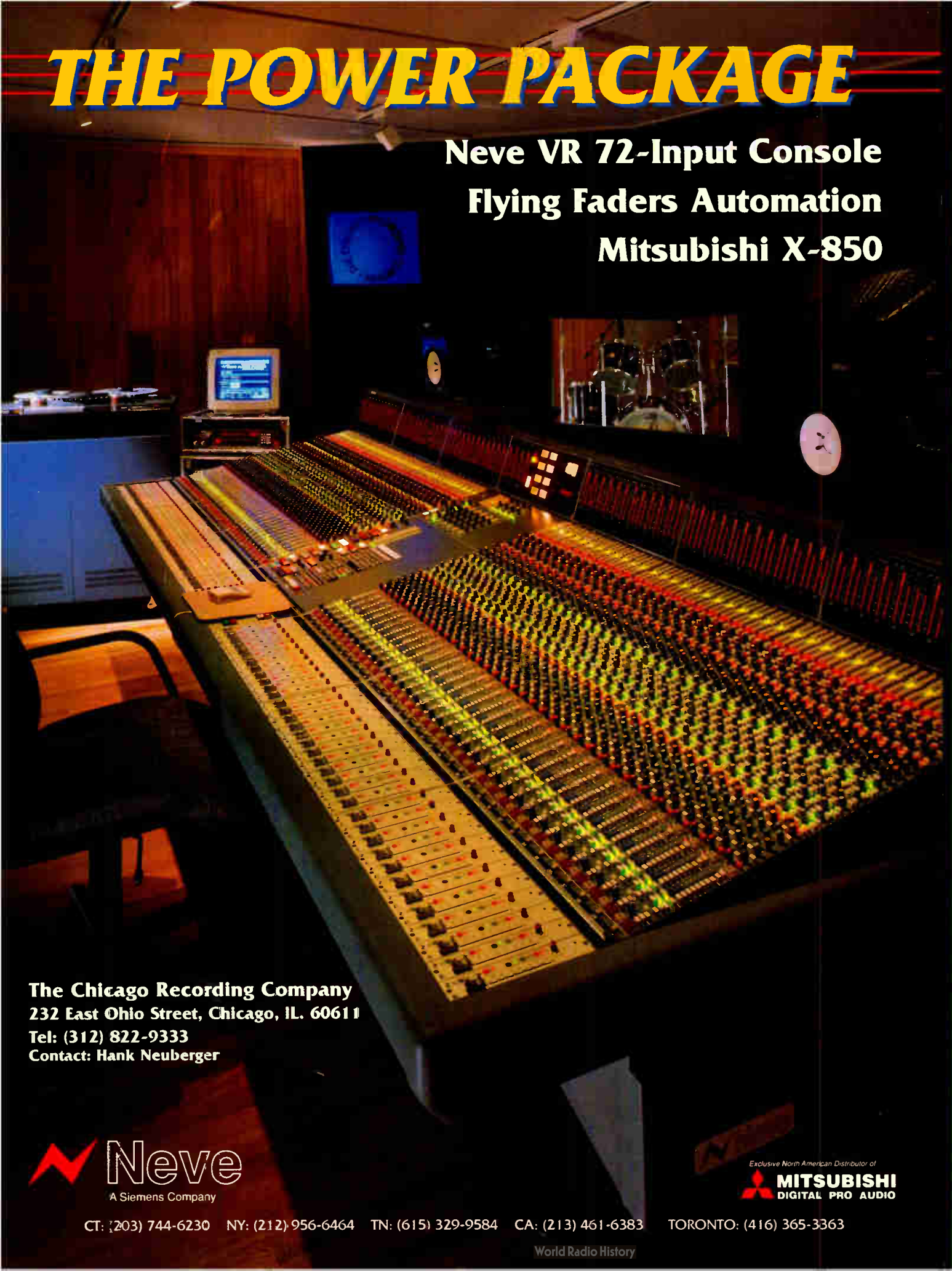

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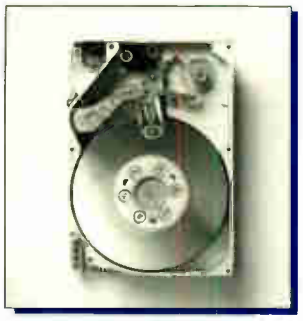

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World Radio History

Founded 1977 by
David M. Schwartz and Penny Riker Jacob

Cover: Designed and built by recording industry veterans Andy Waterman and Jon Baker, The Bakery is North Hollywood's newest state-of-the-art facility. A fully automated 48-input Amek Mozart console is the centerpiece of this 33 ft. x 17 ft. control room, which is designed for sound recording and audio/video finishing needs. **Photo:** Ed Freeman.

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BPA

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FROM THE EDITOR

The recent Technology Entertainment and Design Conference (TED2) held in Monterey, Calif., brought together several hundred people from the fields of audio, music, literature, computer, graphic design, film, video, architecture and education, for four days to discuss the future. TED2 was launched with an implicit suggestion that these fields are merging, and that we are perched on the threshold of a multimedia production revolution, thanks to the computer and its rapidly evolving storage and processing capabilities.

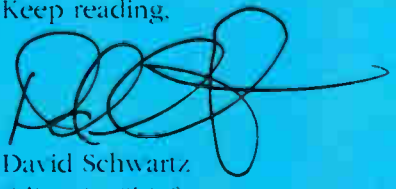
Wonderful examples of hypermedia and interactive programming were described and demonstrated. While this was not an exhibition of products, sponsoring organizations such as Pacific Bell (and its Smart Yellow Pages), Walt Disney Imagineering, Apple Computer and Letraset showed their progress in exploring the new media. Sony demonstrated its latest versions of high-definition television. Adobe provided photo processing workstations where one could scan in photographs, retouch, edit, make color corrections and produce 4-color separations. Jaron Lanier presented his virtual reality simulator—where you put on the eyephones and Power Glove and climb around in a three-dimensional, computer-generated world. Holy Tron!

The show's producers created a loosely choreographed learning environment that mixed seminars with discussion periods. Herbie Hancock demonstrated his equipment rack and composition procedures—stylish evidence that technology in the right hands is a beautiful thing. Scientist/designer Payson Stevens showed his NASA hypermedia presentations, used to inform governmental leaders of the health problems threatening Planet Earth. Douglas Adams, author of *Hitchhiker's Guide to the Galaxy*, discussed the fragile makeup of an author's psyche.

Perhaps the most passionate of the awesome parade of presenters was the visionary's visionary, Ted Nelson. For 30 years Ted has been preaching his Xanadu concept of a world information network, where users could quickly and equitably deposit and withdraw printouts and screen data. People have a strong reaction to this man and his ideas. Whether his notions are impossible or inevitable, he has a compelling presence—that of a Don Quixote for the hyperage.

The big trade show this month is in Atlanta, where the National Association of Broadcasters hosts an exhibit for 35,000 or so to see the latest equipment. NAB has evolved into a place where television technology meets audio. Meets computers. Meets graphic design. Gee, this is starting to sound familiar.

Keep reading.



David Schwartz
Editor-in-Chief

World Radio History

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CURRENT

SPARS WORKSTATION CONFERENCE; NATIONAL STUDIO EXAM

The Society of Professional Audio Recording Services will host a weekend technical conference with leading manufacturers of digital audio workstations on May 19 and 20 in Nashville. SPARS president David Porter will chair the events. Manufacturers giving presentations and offering hands-on demonstrations include AMS, DAR, Studer Editech, Lexicon, New England Digital, SSL and WaveFrame.

All events will take place at the Hermitage Hotel. Registration is limited. For a brochure and reservations, contact Shirley Kaye, SPARS executive director, at (407) 641-6648.

In related news, SPARS will administer the National Studio Exam on April 28 in 14 cities across the U.S. The exam consists of 200 multiple-choice questions, and is an established educational gauge for the audio industry. Contact Shirley Kaye at (407) 641-6648.

NEWS FROM AES

The Audio Engineering Society's 8th International Conference on "The Sound of Audio" will be held at the Capitol Hilton Hotel in Washington, D.C., May 3-6, 1990. Skip Pizzi, of National Public Radio, will chair the event. Dr. Floyd Toole of the Canadian National Research Council will serve as Papers Chair.

Also, due to conflicts with the the fall SMPTE convention, new dates for the 89th AES convention have been announced: Friday, September 21, to Tuesday, September 25. All exhibits, papers, workshops seminars and tours will be held at the Los Angeles Convention Center—under one roof!

The new schedule allows for longer load-in and load-out, and there has been an expansion of all programs.

Contact Ronald L. Bennett for more info: (818) 986-4643.

S.F. NARAS PRESENTS RECORDING TECHNOLOGY DAY

The San Francisco chapter of the National Academy of Recording Arts & Sciences will present Recording Technology Day on Saturday, July 21, 1990, at the Golden Gateway Holiday Inn in San Francisco.

Scheduled events will feature: seminars on record production, engineering tips, CD formats and studio operations; exhibits of equipment, production software, synths and samplers, and industry services; and demonstrations of a MIDI recording session, audio workstations, DAT recording and microphone techniques.

Co-sponsored by *Mix* magazine, Agfa Tape and Audio Images Corp., Recording Technology Day is open to the general public from 10 a.m. to 7 p.m. Tickets are $8 in advance and $10 at the door. Contact Alex Behr for more information: (415) 653-3307.

SHOWBIZ EXPO

The seventh annual ShowBiz Expo will be held June 2-4, 1990, at the Los Angeles Convention Center. More than 225 exhibitors are expected to display and demonstrate products and services for the film, video and television industries.

Sony Corp. has signed up to host a comprehensive high-definition television presentation, and a new series of events has been added: "Equipment Shoot-Outs."

For more information concerning the Expo, contact Nancy Keiter at (213) 668-1811.

HARP EXTENDS MEMBERSHIP

The Hollywood Association of Recording Professionals held its first official membership drive February 22 at the Roosevelt Hotel in Los Angeles. More than 100 people attended the open meeting, representing nearly every sector of the recording industry.

HARP was born largely out of the mid-1989 home studio controversy, which led to the eventual closure of at least two home studios in the L.A. area.

Now that the home studio issue is being handled by the zoning commission in a series of public hearings on a comprehensive Home Occupations Ordinance, the members of HARP were able to turn their attention to issues of concern to all in attendance, namely, the changing nature of the professional audio industry.

Chris Stone, former director of the Record Plant and moderator for the evening, opened the meeting. "I remember eight or nine years ago," Stone said, "saying to a group very much like this one—diversify or die. We're going to have to be in more than one part of the business in order to be here next year. Now I think it's a matter of survival."

After an address by Terry Williams, HARP president and owner of Lion Share Studios (see following story), Jim Mandell, owner of Interlok Studios, described the two types of HARP membership: a regular membership, open to commercial facility owners and managers in the L.A., Ventura and Orange County areas; and an associate membership, open to manufacturers, dealers and other audio professionals. The latter is an attempt to negate charges of exclusivity and open up communication on all fronts, particularly with regard to record labels.

Denny Diante, former vice president of A&R for CBS Records and current VP of A&R for MCA, and Roz Schrank, head of A&R sessions department at Warner Bros., provided input from the label side, or the client side. One of HARP's chief concerns is how to handle disputes over late payments and non-payment of interest charges for extended-billing payments.

Currently HARP is offering members a group medical and

—CONTINUED ON PAGE 192

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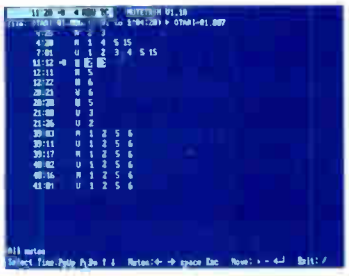
A new justification for investing in a moving fader automation system.

Not everyone's business demands moving fader automation.

But if you've been feeling competitive pressures, as well as pressures related to this technology —like the ability to instantly "re-create" last week's mix with the sonic transparency that only moving faders can provide—we can remove some of the obstacles you've been facing.



Our new mute trim function allows mutes to be inserted and deleted, or trimmed, on a frame-by-frame basis. Fader values and mutes (and unmutes) may be entered off-line via direct keyboard entry.

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DISKMIX 3 is a time-code driven system that provides unlimited mix data storage direct to hard disk, as well as complete off-line editing, including splice, merge, copy, fader and mute set and trim, plus insert and delete. The system uses multiple micro-processors and 10-bit data conversion, while high speed, dual ported RAM distributed over a proprietary bus system facilitates maximum data transfer with no system delays. This technology is optimized for the latest *Penny & Giles* motorized faders to provide full fader travel in less than two SMPTE time-code frames.

DISKMIX 3 is designed with a user-interface very similar to that of current VCA-based automation systems. So if you are already using automation systems, DISKMIX 3 will be a quick study. In fact, the entire system is easy to understand and to use. It keeps you abreast of what's happening during all phases of mixing and gives you constant feedback in all modes of automation.

For a new brochure that gives you a complete run-down on these and a host of other features that allow you to deliver a better, more creative product to your clients, call your nearest Otari dealer, or call Otari at (415) 341-5900. Perhaps this time, your decision about fader automation can be a positive one.

DISKMIX™

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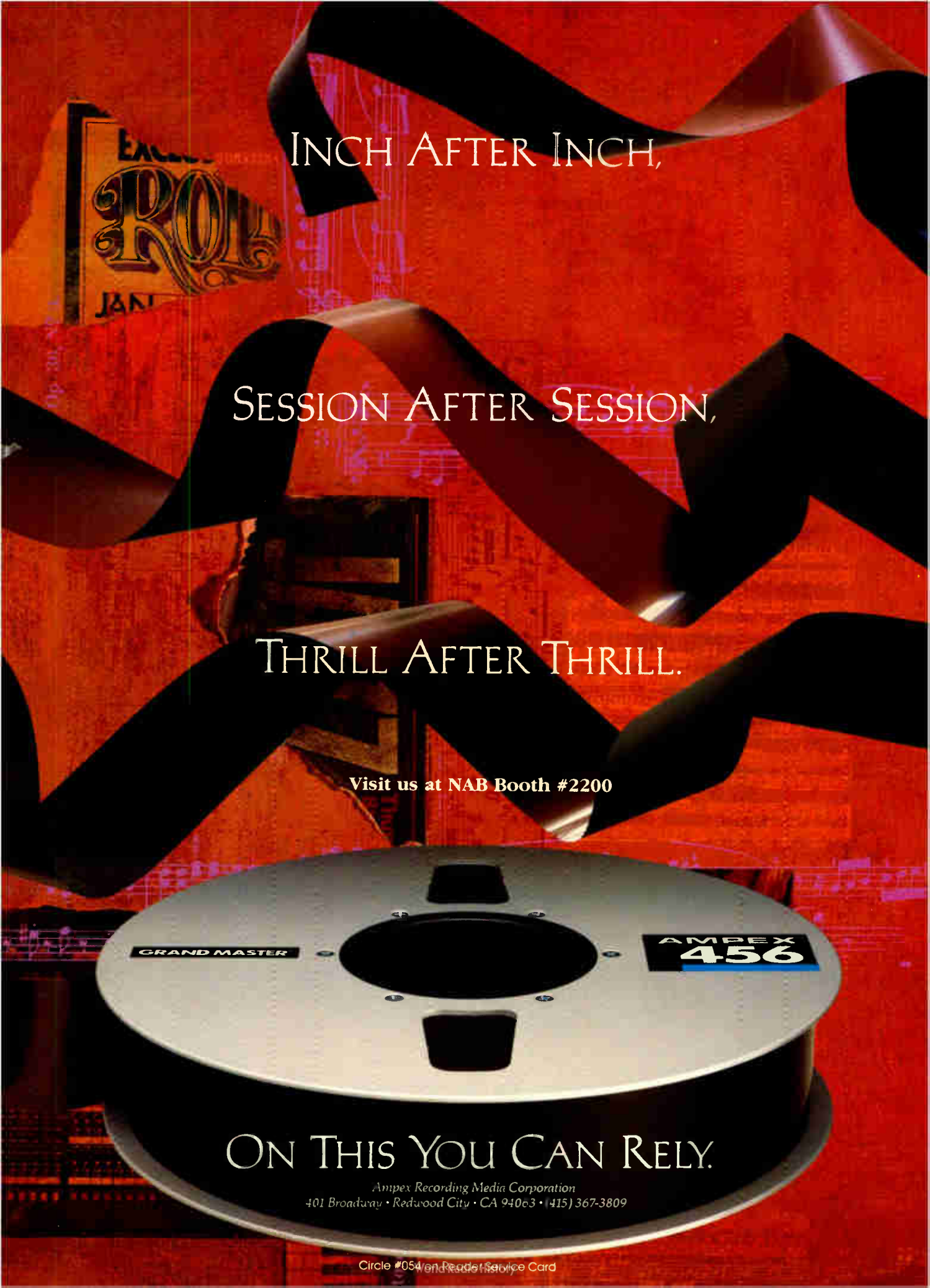
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INDUSTRY NOTES

Klark-Teknik (Farmingdale, NY) agreed to take over U.S. distribution of UK-based **Edge Technology**'s Turbosound and BSS product lines...At **Korg USA**, (Westbury, NY) **Seiki Kato** succeeded **Don England** as president; **Michael Kovins** was promoted to executive vice president; **Kim Holland** is now senior vice president, Korg product development; **Mitch Colby** is senior vice president of Marshall products in the U.S.; **Joe Castronovo** is senior vice president of finance and operations; **Joseph Bredau** was appointed national sales manager; **Larry DeMarco** is the new director of marketing communications; and **Charlie Bright** has been promoted to director of product voicing...In Santa Monica, CA, **Gamma Electronic Systems** reacquired two patents. The first, known as "optiphonics," will be used with the company's B.A.S.E. technology; the other, known as "copy not," is an anti-piracy device...**Peter Wellikoff** moved up to president at **Celestion Industries** (Holliston, MA). **Brian Coviello** joined the company as national sales manager for MI and pro audio...**JVC** promoted **Mike Yoshida** to vice president in Elmwood Park, NJ...In Richmond, VA, **Richard Foate** joined **Alpha Audio** as national sales manager...**UCLA Extension** will offer a course called "SSL Recording and Mixing Techniques," beginning on May 17. For info call (213) 825-9064...In Washington, DC, **Advanced Television Systems Committee** appointed **Gary J. Handler** (Bell Communications Research) and **Leonard F. Coleman** (Eastman Kodak) to its executive committee...**Electronic Industries Association's Consumer Electronics Group** brought aboard **David E. Poisson** as executive director of government and legal affairs...**Electro-Voice** of Buchanan, MI, has a new project engineer: **Matt Ruhlen**...**Westwood One** promoted **Robert A. Steinberg** to account manager of its Western region sales department in Los Angeles...**Northeastern University**'s Department of Music, working in conjunction with the College of Business Administration, formed the first music industry degree program in Boston. It will lead to a BA or BS in music, with a concentration in music industry...**Private Music**, the independent label that's home to Leo Kottke, Nona Hendryx and others, has moved to 9014 Melrose Avenue, L.A., CA 90069...**Editel/NY Sound Room** named **Donald J. Cuminale** as chief audio technical engineer in NYC...**Houston Pearce** joined the **NAB**'s radio board of directors; he's president of WTUG-FM in Tuscaloosa, AL...At **NED** (White River Junction, VT), **David Hartley** is now VP of sales; **Franklin B. Sullivan** moved up to VP, marketing and product development...**Solidstate Controls** promoted **Robert Gentles** to vice president, international development, in Columbus, OH...**Buena Vista Sound** named **Dave Campbell** and **Gregg Rudloff** as re-recording mixers in Burbank, CA...**Bennett Kaufman**, who's worked with hard-rocking guitarists such as Lita Ford, moved up at **RCA Records** (NYC) to director, A&R—West Coast. In L.A., "pro-active force" **Robbie Snow** will take over as product manager, West Coast...**Music Annex Audio Post Production** hired **Jon Grier** as sound designer/mixer in San Francisco, CA...The **Academy of Motion Picture Arts and Sciences** awarded **SMPTE** with a special commendation. Academy president **Karl Malden** notes, "By establishing industry standards, (the members of SMPTE) have greatly contributed to making film a primary form of international communication."...**Digital F/X** brought aboard **Robert Berger** as director, software development, in Mountain View, CA...**Panamax** opened two branch offices. **Michael Ross**, national account manager for the Southeast, is based in the L.A. area; **Steven J. Fair** will head the Canadian office in Toronto...**Gerry Ghinelli** joined **Trutone Media** as general manager in Hackensack, NJ...Not all government jobs are dull: The **Texas Department of Commerce** opened the Texas Music Office in Austin this past January. The office is the first state government agency in the country to exist solely for music industry promotion...In NYC, **AudioTechniques** formed a broadcast division and hired **Steven Kureczko** as broadcast sales engineer. ■

World Radio History

SESSIONS
AND STUDIO NEWS

NORTHWEST

Way out West—At **Soma Sync Studios** in SF, producer/engineer **Steve Savage** completed the new **Sneetches** LP, titled *Slow*, for Alias Records...Producer **A.P. Alexakis** of Shindig Records brought several San Francisco bands, including **the Zacharys**, **Wannabe Texans** and **Sinful Doin's**, into **Sound & Vision** studios for an Iron Cowboy Club compilation album. **Kevin Army** engineered the sessions...**Elvin Bishop** was at **Starlight Sound** in Richmond, CA, working on an album for Alligator Records. **Bill Thompson** engineered with assistance from **Lynn Levy** and **Whit Lehnberg**...At **Triad Studios** in Redmond, WA, **The Defenders** backed up **Jennifer Lara** on her latest reggae release. **David Dysart** engineered and **Charlie Morgan** produced... Engineer **Reed Ruddy** recorded author **Robert Fulghum**'s reading of *Everything I Needed to Know I Learned in Kindergarten* at **Lawson Productions** in Seattle. The Random House Publishing release was nominated for a Grammy Award in the spoken word category...At **Dave Wellhausen Studios** in San Francisco, **Maria Muldaur** recorded two songs to be included on an album for Music for Little People. **Jim Deerhawk** produced and **Dave Wellhausen** engineered...

NORTH CENTRAL

Mannheim Steamroller and **Fresh Aire** recorded and mixed projects for American Gramaphone at **Sound Recorders**' Omaha, NE, and Kansas City, MO, studios. **Chip Davis** produced the albums and **John Boyd** engineered ...At **Seagrape Recording Studios** in Chicago, producers **Kevin Michael** and **Bruce Richmond** tracked and mixed three cuts for the Champagne, IL-based **Vehicle in Tow**. **Mike Konopka** engineered...**Ron Abraham** was at **The Disc Ltd.** in East Detroit, MI, doing final mixing on his project with **Dave Palmer** engineering...

NORTHEAST

At New York's **Power Play Studios**, **Rest in Pieces** finished their LP for RoadRunner Records with **Bryan Martin** engineering and **Barry Sandoval** assisting...In a recent satellite session, actor **Fred Gwynne** read the voice-over for a Hyundai commercial from **Soundwave Studio** in Washington, DC, that was transmitted over a phone patch directly to tape at **dB Sound** in New York City. **Jim Bloch** engineered for Soundwave...**Run-D.M.C.** were at **Studio 900** in Manhattan working on their latest release for Profile Records. **Julio Pena** was at the board...**Melba Moore** was at **Soundtrack** in New York City cutting vocals for her new release, *Face to Face*. **Gene McFadden** produced, **Steve Goldman** engineered and **Jim Kvoriak** assisted...London/PolyGram artist **Tom Stacy** was at **Acme Recording Studios** in Mamaroneck, NY, recording his new album with **Rob Mathes** producing and **Rory Young** engineering and programming... **Strike Twice** worked on their 24-track demo at **Island Media Services** in West Babylon, NY, with engineer **Al Watts**. **Pat Gordon** assisted...Producer **Joey Gardner** was at **D&D Recording** in Manhattan with Tommy Boy recording artist **TKA** laying down tracks and vocals for their upcoming album. **Arty Oganyan** engineered the project...Recently at **Marathon Recording** in NYC, **Vanessa Williams** was in cutting vocals with producers **Kenny Hairston** and **Trevor Gail**. **Matt Wells** and **Will Schillinger** engineered, assisted by **Dug Larsen** ...**Jimmy Miller** produced his latest project with artist **Ken Richards** at **Lakewest Recording Studio** in West Greenwich, RI...**Chung King Recording Studios** in NYC reports that **Finesse and Synquis** were in remixing songs for their next album on MCA/Uptown Records. Producers included **Puffy**, **Howie T** and **Spiderman**. **Steve Ett** engineered...**The System** (**David Frank** and **Mic Murphy**) produced **Natalie Cole**'s track "Wild Women Do" for the Touchstone film *Pretty Woman* at **Science Lab** in NYC. **Steven Seltzer** engineered, **Hugo Dwyer** was mix engineer, **Mojo Nicosia** edited and **Leroy Quintyn** assisted, with an additional rap track by **Akeem**...**Sam Groom** (former soap star of *Another World*) was at **New York Audio Productions** recording the narration for an upcoming Random House Audio Book, William Deihl's *27*. **Robert H. Donlan** engineered the session and **Robert Kessler** produced...At **Omega Recording Studios** in Rockville, MD, **Bob Yesbek** engineered an all-digital session with a 40-piece orchestra recording several concertos for Washington Pro Musica Productions ...**Jonathan Most** mixed the single and album track "Make You Sweat" for **Keith Sweat**'s upcoming self-produced album at **The Hit Factory** in New York City. **Vincent Davis** was executive producer and **Bobby Wootan** co-engineered...**Leslie Gore** completed two new tracks at **Red Rock Recording Studio** in the Poconos, with **Benjy King** producing and **Kent Heckman** engineering... **Voice in Time** was at **Waterfront Recording Studios** in Hoboken, NJ, laying down tracks for an upcoming independent release. **Doug Conroy** engineered the sessions...At **White Crow** in Burlington, VT, Boston's **O Positive** was in recording their debut album for Epic Records. *Toy Boat, Toy Boat, Toy Boat* was engineered and produced by **Peter Walsh**...Island Records artist **Tony D.** was at **Studio 4 Recording** in Philly cutting tracks with engineer **Jim "Jiff" Hinger**... **Baby Monster Studios** in Manhattan has been busy recording Rave-On Productions' *Third Rail Screaming*, a blues/R&B compilation album featuring **Paula Lockheart**, **The Chris Carter Group** and **The Uptown Horns**. **Gil Abarbanel** engineered

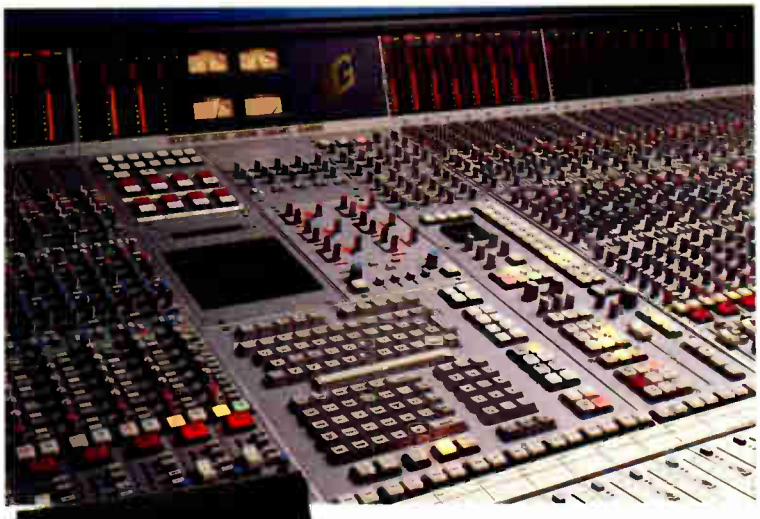
World Radio History

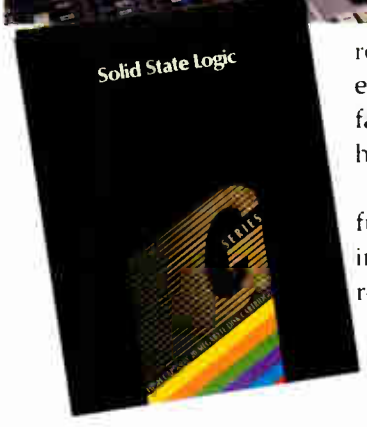
"No one will ever buy a console with a television in it"

Visitor to AES, 1977

It is hard to believe that a modest VDU could attract much attention. Today, even effects processors use visual displays. Why have they become so necessary?

Quite simply, the greater the number of functions in a system, the more flexibility there must be in showing its status. In the recording studio the central piece of creative hardware is the console. To unlock its full potential, Solid State Logic gave engineers digital control of its facilities. The VDU was a side effect of this plan.





In the intervening years our designs were enhanced, incorporating the suggestions of the many leading studios who had adopted our system. Ultimately, the G Series Master Studio System evolved.

G Series offers the fastest execution of complex commands by storing the entire operating program in 2Mbytes of on-board RAM. Its removable Data Cartridges preserve mobility of data, without the capacity limitations of floppy disks. Each cartridge holds 20Mbytes of removable RAM–the equivalent of 80 floppy disks.

Because G Series software represents over ten years of evolution in some of the busiest recording studios in the world, it incorporates an unparalleled degree of user experience. Advanced facilities like Selective Rollback and Group Set make mixing faster. Rapid comparison can be made between mixes. Large or complex mixes can be handled effortlessly on or off-line.

Throughout, SSL has preserved compatibility with earlier systems, creating a functional standard for the industry. By providing a realistic upgrade path, the investment of studio owners has also been protected. Most importantly, G Series remains at the forefront of audio production technology.

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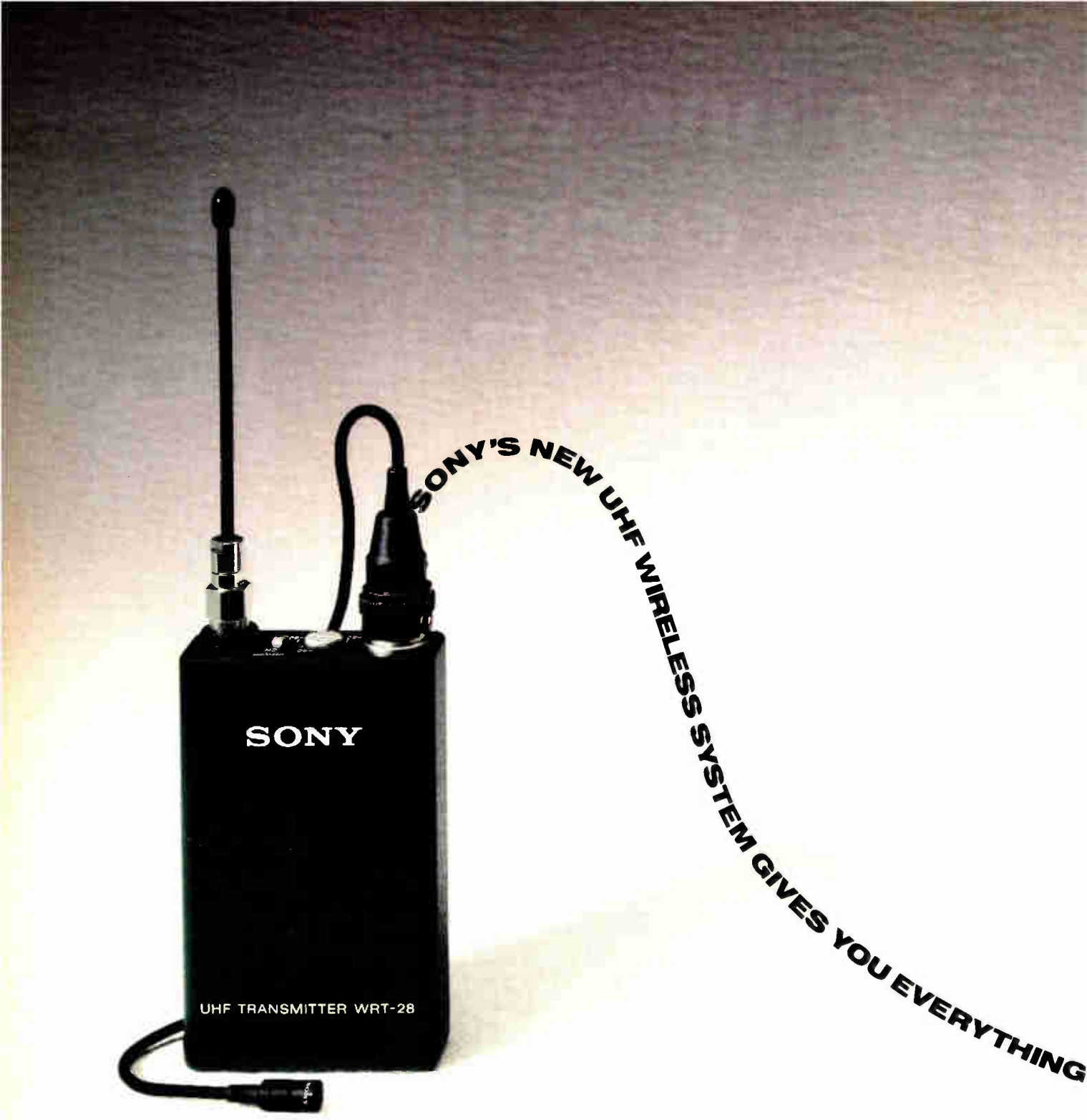

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and **Steve Burgh** produced...**Cross-eyed Marguerite** were at **Sabella Recording Studios** in Roslyn Heights, NY, cutting the first three songs for their debut album. **Charles Greene** produced...At **Shakedown Sound** in Manhattan, producer **Arthur Baker** completed mixes for MCA artists **Oingo Boingo**. **Mark Plati** engineered with **Gordon Davies** and **Steve "Dweeb" Doria** assisting...**Kid Creole and the Coconuts** were at **Crystal Sound Recording** working on the soundtrack for the Golan Globus film *Lambada—The Forbidden Dance*. **August Darnell** produced the tracks with **Michel Sauvage**, **Larry Buksbaum** and **Steve Vavagiakis** engineering, and **Johnny Byrne** and **Beatrice Winkler** assisting...At **Alpha Wave Studios** in Edgemont, PA, **Tommy Conwell and the Young Rumblers** finished a ten-song demo for their upcoming album. **Brian Bricklin** co-produced the album with the band...Producer **Tink Abraham** was at **Susquehanna Sound** in Northumberland, PA, producing an album project for **Rich Hodge**...**Bobby Orlando** produced **The Flirts**' vocals for a track at **Pyramid Recording Studios** in New York City. **Steve Wellner** engineered with assistance from **Phil Painson**...

SOUTHERN CALIFORNIA

Barbara Weathers stopped by **Lion Share Recording Studios** in Los Angeles to cut vocals for her upcoming Warner Bros. release. **Maurice White** and **Billy Meyers** produced, **Paul Klingberg** engineered and **Guy DeFazio** assisted...**Larry Robinson** was at **The Rock House** in L.A. remixing **Foster Sylvers**' new single for A&M. **John Van Nest** engineered with **Scott Seymann** assisting...At **Devonshire Studios** in North Hollywood, producer **Tom Werman** was in overdubbing with **Stryper**. **Eddie Delena** engineered and **Mike Bosley** assisted... Two tracks from **Cher**'s Geffen Records release *Heart of Stone* were recorded at **Ignited Productions** in Hollywood. Songwriter **Jon Lind** produced the platinum album...European PolyGram recording artist **Mory Kante** was at **Galaxy Sound Studios** in Hollywood cutting his American debut album. **Bill Drescher** engineered with **Bill Zalin** and **Spencer Chrislu** assisting. **Nick Patrick** produced ...**Laura Branigan**'s "Moonlight on Water" was mixed at **Larrabee Studios** in Los Angeles by **Keith Cohen**. **Richard Perry** produced the track for Atlantic Records...**John Du Prez** composed and recorded the music for the motion picture *Teenage Mutant Ninja Turtles* at **Mad Hatter Recording Studios** in Los Angeles. **Larry Mah** acted as chief engineer with **Darren Mora** assisting...MCA's newest rap act, **Vicious Beat**, finished tracking and mixing their debut album at **Paramount Recording Studios** in Hollywood, with **Mike Schlesinger** and **Yasuji Maeda** behind the board ...Producer **George Landress** engineered and co-produced a CD release at **Music House Productions Studio** in Sherman Oaks. **Bill Belote** composed, performed and co-produced the jazz and new age collection entitled *Mindsailing*...At **Scream Studios** in Studio City, Virgin Records artists **The Origin** completed mixing their debut album, produced by **Paul McKenna** and **David Kershenbaum** and mixed by McKenna...In San Fernando, **Branam's Fox Run Studio** welcomed **Milli Vanilli** for a project engineered by **Jared Held**, assisted by **Tim Andersen**...**Record Plant**'s remote division (Los Angeles) recorded Enigma Records artists **Untouchables** live at the Roxy in L.A. **Bill Dooley** engineered with assistance from **Gary Long** and **Buzz Burrowes**...At **Artisan Sound Recorders**, **Greg Fulginiti** mastered recordings by **Joe Satriani** for **Chris Lord-Alge**, and **Elton John** for **Chris Thomas**...Rappers **D.J. Jazzy Jeff & the Fresh Prince** were at **Group IV Recording** in Hollywood to cut their version of the Disney classic "Supercalifragilisticexpialidocious" for Disney's *35th Anniversary Special*. **George Belle** recorded and mixed the tune...Blues legend **John Mayall** recorded and mixed his upcoming Island Records release at **Control Center Studios** in Hollywood. **Bobby "Howling" Fields** produced, **Dave McNair** engineered and **Ralph Stanfield** assisted...At **Elumba Recording Studios** in Los Angeles, **George Clinton** was in to mix "Scatter the Fire" for **Lady Smith Black Mombazo**'s upcoming Warner Bros. release. **Larry Fergusson** engineered the project and **Donnell Sullivan** assisted...At **Genetic Music** in North Hollywood, songwriters **Steve Dorff** and **Larry Herbstritt** produced three tunes for BMG Music Publishing with vocalists **Suzie Benson** and **David Morgan**. **Richard Rosing** engineered and mixed...

SOUTHWEST

Several artists have finished projects at **Master Productions** in Weslaco, TX, including **Patsy Torres**, **Manuel Rodero** and **El Grupo Bagdad**. Projects were engineered by **Hugo "The Transformer" Rodriguez**...**Wayne Watson** of Dayspring Records was at **Rivendell Productions** working with **Paul Mills** on basic tracks for a new album...Profile recording artists **Nemesis** were at **Planet Dallas** in Dallas working with engineer **Rick Rooney**...*Texas Beat* reports the following artists in Austin, TX, studios: **Asleep at the Wheel** at **Arlyn Studios**; **Water the Dog** at **Congress House**; **Bryne Deshaune** at **Keylight Recording**; **Zydeco Ranch** at **Wyldwood Studios**...Arista artists **Anderson, Bruford, Wakeman and Howe** were recording at **Omega Audio** in Dallas...

SOUTHEAST

Shoot the Moon recorded master tracks at **Audio Animations** and **Master Sound Studio** in Atlanta. Engineers on the project included **Jeff Tomei** and **Roger Kennerly**, with production by **Warren Tuttle**...Also in Atlanta, **L.A. Reid** and **Babyface** worked on several projects at **Soundscape Studios**, including **Pebbles** for MCA, **Babyface** for CBS and **After Seven** for Virgin. **Jimmy Dutt** engineered, assisted by **Jim Zunpano** and **Ted Malia**...Producer **Clyde Brooks** was at **16th Avenue Sound** and **Emerald Sound** in Nashville with **Simon Townshend** and his band **On the Air** producing the last few tracks for their upcoming album on Dignity Records...**Mylon LeFevre** and **Broken Heart** were at **Bill Lowery's Southern Tracks** in Atlanta working on a new album for Starsong Records. **Russ Fowler** and **Tag George** were at the controls...**New Kids on the Block** returned to **Musiplex Atlanta** with producer **Maurice Starr** and engineer **Sidney Burton** to track vocals for the "Grammy Living Legend Tribute"...Christian rock group **Blitz** was at **Transmedia Studios** in Atlanta working on several tracks for their third album. **Hugh Harrer** engineered and mixed the sessions... PolyGram artists **The Rizzutos** were at **Music Mill** in Nashville tracking

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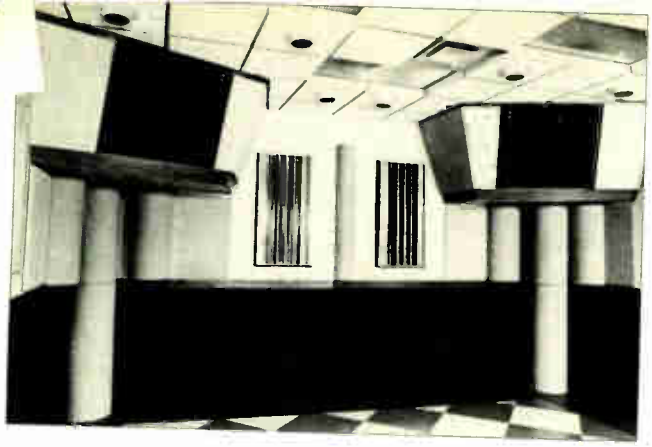

Oberlin Conservatory, Oberlin, OH, installed ten JBL 4430 Bi-Radial™ and ten JBL 4435 Bi-Radial studio monitors.

with producer **Butch Curry** and engineers **Joe Scaife** and **Mike McCarthy**...Also in Nashville, **Steve Earle** was at **Sound Emporium** working on an MCA Records project with **Joe Hardy** and **Mark Coddington** at the controls...**Digital Recorders** in Nashville reports that **Kenny Rogers** was in to track his next Warner Bros. album. **Jim Ed Norman** produced and **Eric Prestidge** engineered, assisted by **John Kunz**. .Island Records producer **Bobby Fields** was at **Airwave Studios** in Birmingham, AL, cutting tracks with **Lolly Lee** for her first project. **Michael Panepento** and **Lee Bargeron** were at the controls... Country singer **Linda Revis** finished mixing her album at **Mangum/Alford Recording Studio** in Jacksonville, FL. **Larry Mangum** produced...At **Cheshire Sound Studios** in Atlanta, **Johnny Gill** cut vocals and mixed a tune for his MCA/Motown album. Producers **De'Rock** and **Kayo** were at the console with engineer **Jim Dutt**. **Mike Alvord** assisted...Producer **Fernando Adour** was at **Criteria Recording Studios** in Miami recording vocals for CBS International artist **Emmanuel**. **Eric Schilling** and **Carlos Nieto** engineered with assistance from **Steve Whaley**...A recent session at **Suite 2000** in Nashville included overdubbing and a digital album mix for artist **Dave Olney**, produced by **Jim Rooney** and **Tommy Goldsmith**...At **New Memphis Music** (Memphis), soul legend **Eddie Floyd** was in working on new tracks with **Roland Robinson** producing and **Nikos Lyras** engineering...At **Recording Arts** in Nashville, MCA artists the **Bellamy Brothers** were recording with producer **Emory Gordon**. **Steve Tilisch** engineered with assistance from **Jeff Coppage**...

STUDIO NEWS

Philip (Roscoe) Gallo Productions in San Francisco added a Digidesign Sound Tools disk-based recording system to its 250-voice MIDI room. The new system includes a Panasonic SV-3500 DAT recorder...**Lion and Fox Recording** in Washington, DC, installed a Soundtracs Eric mixing console, the first in the U.S. The console features a 64-channel split configuration, 24 buses, 16 aux sends and snapshot memory of all routing, input, monitoring and muting configurations...**Brielle Music** opened its Studio B in lower Manhattan. Equipment includes a Sound Workshop Series 34 console, Studer A80 and Otari MTR-12 multitracks and full MIDI implementation...Former members of Steely Dan and Steppenwolf, **Walter Becker** and **John Kneff**, recently opened **Maui Recording** on the island of Maui, with a Soundtracs IL4832 console...**Midilab**, a digital sound design facility in Chicago, recently purchased a ProDisk-464 digital audio recording and editing system...Newly acquired gear at **Susquehanna Sound** in Northumberland, PA, includes an Otari MX-80 32-track recorder and 32 channels of Dolby SR noise reduction. The MX-80 currently is paired with an Otari MTR-90 24-track machine...**Chapman Recording Studios** in Kansas City, MO, installed 24 tracks of Dolby A noise reduction... **The Indiana Symphony Society**, located in Indianapolis, installed a 16-channel Soundcraft 200 Delta console for use in master recording and mixdown...New York's **Soundtrack** went digital with the Sony PCM-3348 48-channel recorder...**Hyde Street Studios** in San Francisco announced the addition of Studio B—a 64-track computer-aided keyboard/MIDI production room with audio, video and MIDI tielines to the main room...NYC's **Passport** recently added a 24-input Soundcraft mixing board and an Akai S1000 stereo sampler. ■

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by Stephen St. Croix

LET THERE BE LIGHT...
BUT NOT LIGHTNING

PART ONE

I sit here today, surrounded by hundreds of thousands of dollars worth of technology: audio systems, elaborate video monitor systems with Dolby ProLogic surround sound decoders, and literally more than a kilowatt of power to feed the six speakers. Little techno-toys are scattered informally at my side. My newest monster video editing equipment awaits me, only inches away. All this, yet I write without distraction, without temptation.

How, you might ask, can he develop the type of discipline necessary to pound out this column without distraction under these conditions?

The answer is easy: I am writing by the light of seven candles.

I am writing by candlelight because I'm sitting here in the dark, after six hours of blackout so far, because somebody crashed into the pole down the block that held up the power lines. This probably happened because we're currently in the grips of a major sleet storm. This sleet is interesting, because it is doing a nice job of glazing over the snow from the snowstorm we had a couple of hours ago.

This brings me to another point. Not only am I tapping out this

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WE CARE

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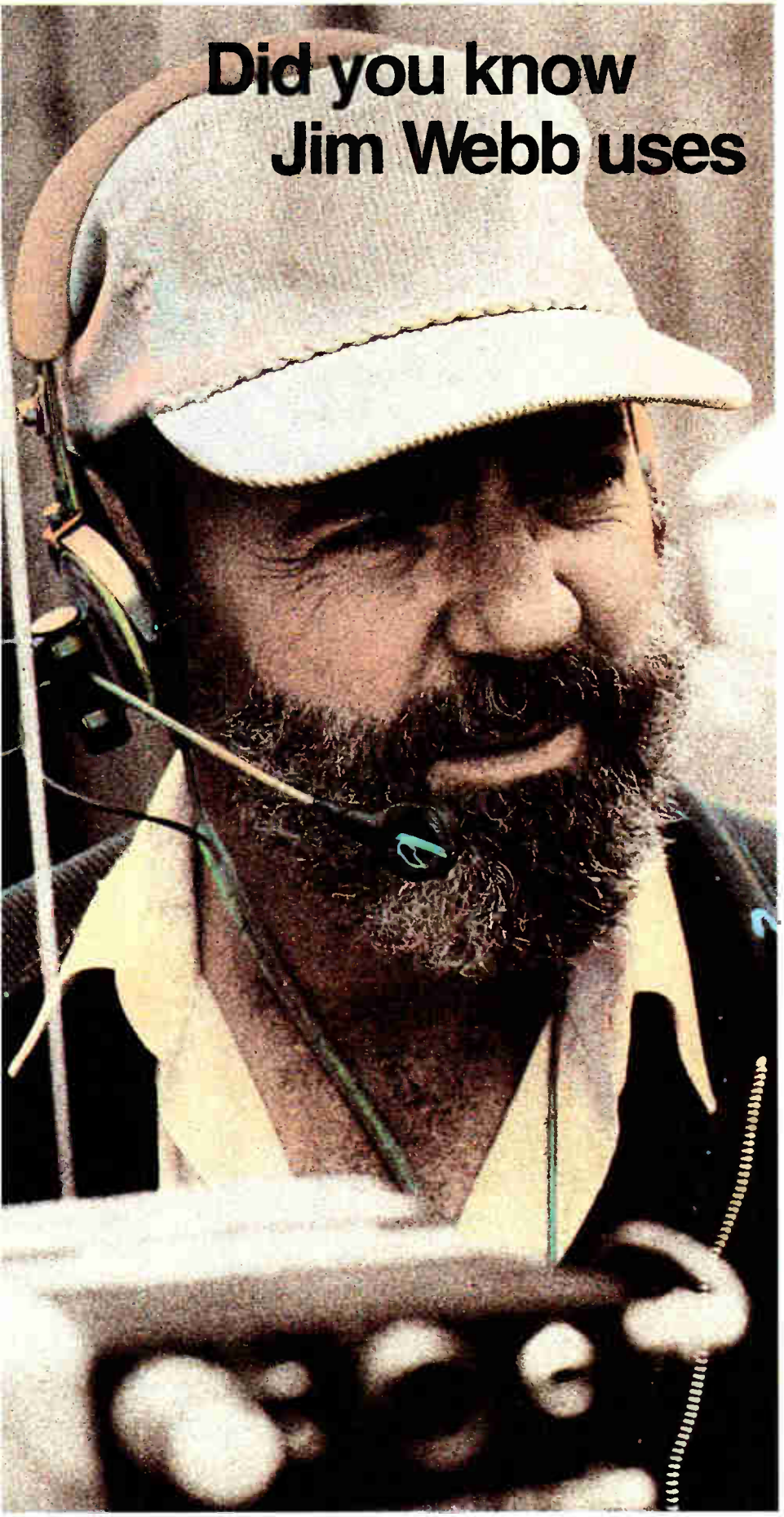

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Each Flex module is an HR (Half Rack) compatible, UL/CSA/VDE approved, self-contained processing unit. Each capable of being EIA rack-mounted either horizontally or vertically, with inexpensive, readily available hardware. Or simply set on a shelf, stand-alone fashion.

HIGH-POWERED COMPATIBILITY. Using standard 3-pin, ¼" or barrier strip connectors, FLEX modules are directly compatible with professional audio gear. And since they are remote powered—via Rane's proposed power supply standard—troublesome ground loops, hum and agency approval problems are solved up front by design.

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ARE STAGGERING!

and upgradeable. It boasts a large and growing number of functions and components to choose from. Mixers. Preamps. Splitters. Crossovers. Dynamic controllers. Equalizers. Amplifiers. Line drivers. And much more under development.

And thanks to Rane's efficient bus design, system wiring is greatly simplified in even complex mixing and splitting layouts.

COST EFFECTIVE CAPABILITIES. Modular flexibility. Uncompromising performance. All without a premium price. That's the FLEX System manifesto. There is no expensive mainframe to buy; you only pay for the functions you want, when you want them.

Say, for example, you only need a 3 channel mixer with one channel of crossover. The FLEX System delivers. And when your needs expand, just add more modules. No need to obsolete old equipment for a loss.

Whether you use two modules or twenty modules, the FLEX System remains cost effective. And supremely flexible. Year after year.

SUPERLATIVE PERFORMANCE, RANE RELIABILITY. The design and performance of each and every Flex module is, in a word, superlative. Every model carries top-grade studio specifications, utilizing the best components available. The result is unsurpassed performance and reliability.

Our HR compatible modules may be compact, but they're stuffed with more top-notch features than you would have thought possible. For example, the **FMI 14 Mixer Input module** measures only 1.75″ × 10.5″, yet it boasts a −128dB EIN mic stage, switchable phantom power, true 20dB pad, powerful 3-way EQ section, insert loop, two source-selectable Aux sends and balanced master channel outputs. A single DIN cable, supplied with each module, routes the Master and Aux buses from unit to unit for quick and clean hook-up.

The **FME 15 MicroGraphic Equalizer** brings Interpolating Constant-Q filter performance to the Flex line, pioneered by our full-sized GE 30 +15/−20dB boost/cut, 2-octave down to 1/30th-octave bandwidth range for notch capability, and a full 10Hz-20kHz frequency sweep range for unprecedented flexibility.

current balanced outputs, and you've got a powerful, flexible new crossover standard.

This is but a sampling of the innovative Flex Modules to be released this year. We encourage you to obtain separate, detailed data sheets on the many FLEX System modules. Then compare these with the best standard equipment available. You'll discover that FLEX offers the best of all worlds: compact, cost effective, flexible, uncompromising performance.

The **FMM 42 Master Module** not only provides Aux returns and mixing, but features extra mic and stereo line inputs with ducking capability for paging and other applications.

For even more mixing flexibility, the **FPM 44 Program Mixer** allows 4 separate mic or line inputs to be mixed to 4 output programs, with pre or post fade switch selection for the Aux sends. Both the direct balanced/unbalanced terminal strip and the DIN Flex bus inputs and outputs can be used simultaneously for easy expansion and integration into larger systems.

Carrying on a fine tradition of innovative equalizer technology, Rane sets yet more new standards with the Flex Series. The **FPE 13 Parametric Equalizer** provides 3 separate bands, each capable of model which has set new industry standards. Minimized filter interaction, smooth combined response and fully balanced three-pin and terminal strip input/ output are but a few of the features. Both the FME 15 and the FPE 13 also provide an exclusive Patch I/O jack which allows direct connection to an insert loop jack with a single ¼″ TRS patch cable.

The **FAC 24 Active Crossover** is the next generation to follow in the respected footsteps of our AC 22 and AC 23 designs. In addition to the proven 24dB/octave Linkwitze-Riley performance, the FAC 24 features a true 24-position frequency selector switch to provide plug-in card accuracy and repeatability with the convenience of a knob. Add to this a built-in CD Horn EQ section, electronic phase alignment, summing LF input and three-pin high-

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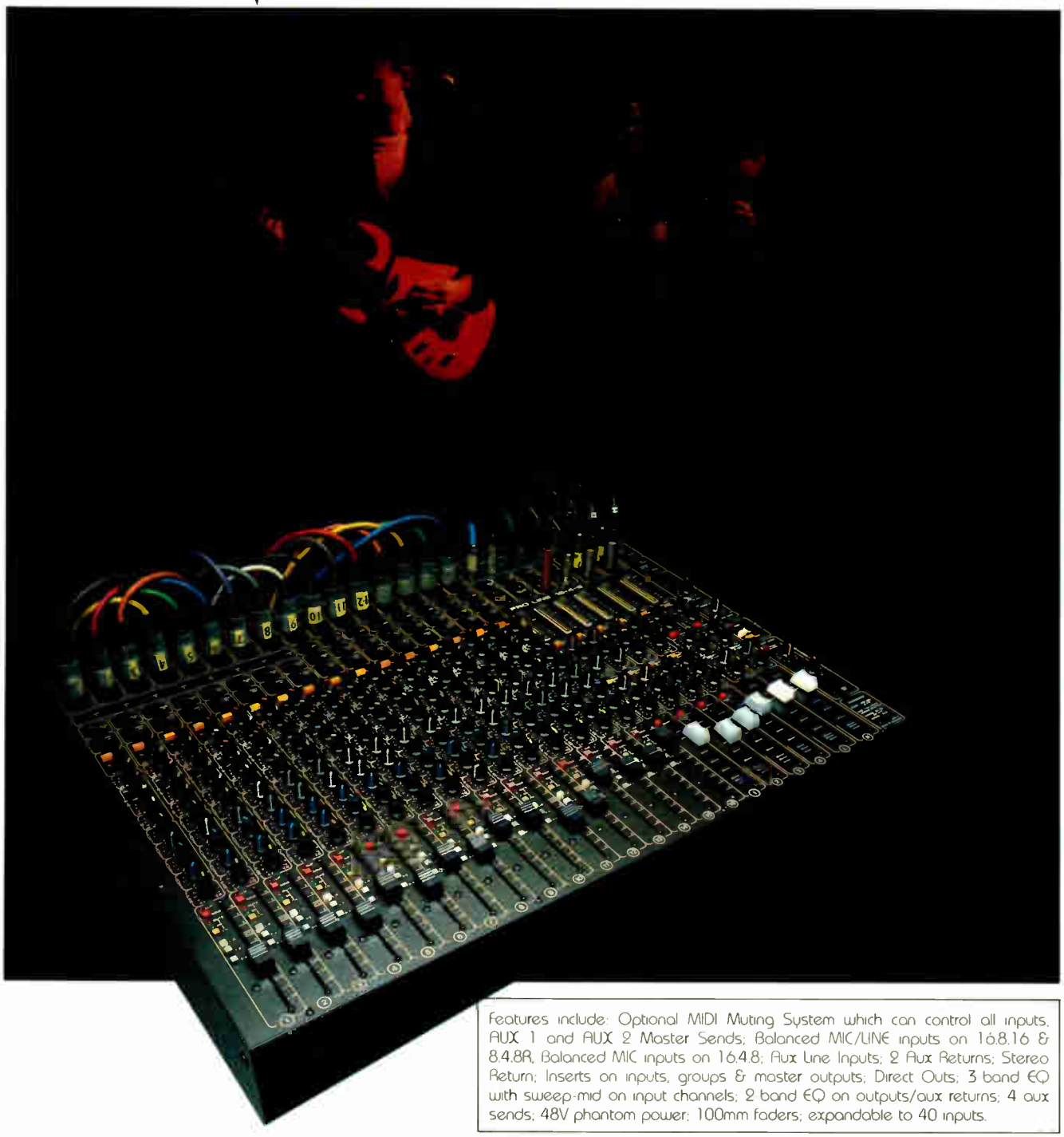

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World Radio History

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column by candlelight, but I'm beginning to freeze, even though I'm wearing three shirts, two sweaters, a jacket and two pairs of pants. And this is the *warm* room, the one with seven candles.

But, even in this condition, I must sympathize with whoever crashed into the pole. You see, I also twisted up a good friend's new car as I slammed into a steel guard rail while attempting to make it here today.

Gee, an entire place shut down just because a measly flow of little, tiny electrons has stopped. No light, no computers, no heat, no water. No work, no play. Barely enough light to type, but not enough to see what is in the little portable LCD's window.

No electrons, no rock 'n' roll. And I thought that I had no addictions!

I suppose that it is fairly obvious to all that we can't get very far without power, so I won't be making that the point of this column.

PART TWO

It stayed cold, so I left and went to Laguna Beach, California, where I now type.

As I sat in the dark thinking of how important it is to have power, I remembered the 20 or so times that we have had total blackouts at our place in the last ten years. Then there were the 50 or so brownouts, and the 30 significant surges. We run a strip monitor, so we know.

This may or may not be typical for you, but it *does* happen to all of us sometime. Power fluctuations, line frequency deviation, switching transients, spikes, hash and a plethora of other forms of garbage await you at the socket-o-life.

Remember: The stuff you are buying from the power company is *not* as advertised. Their job is to provide the best possible service, with the fewest number of interruptions, to the largest possible percentage of their customers. If part of the grid goes down, power is usually switched from another feed point as fast as possible. If this is automatic, the power company considers it to be "instant," and if it requires manual intervention, it is called "fast." It may be instant or fast as far as the average refrigerator in the average house is concerned, but it ain't good enough for rock 'n' roll.

Our studio environments require power feeds that are much cleaner than the power company delivers. Many of you already know this and have gone to great pains to assure that you are isolated from the 115-volt (plus or minus 12 volts), 60Hz (plus or minus a few) power feeds.

Many of you *think* that you know, and have taken precautions only to find that bizarre incidents are still taking place.

High-current, voltage-regulating, saturated-core isolation transformers can do a lot to help, while the newer battery-buffered systems that always deliver a reconstructed 60 Hz are even nicer. There is no switchover time to the battery in the event of a power loss, as there used to be in the older ones. No spikes, no transients. Also, they can even do a better job of cleaning up the line when there is power, as your feed is always literally being regenerated there.

Of course, the problem is that as your power demands go up, the prices of these systems skyrocket. If you thought that a good isolation transformer regulation system big enough to handle your console alone was expensive, wait until you price one of the battery backup safety systems. These are so costly that you normally find them only in small local areas to protect personal computers, since they can give you the 15 minutes that you need to back up your data in the event of a power loss, plus do an excellent job of protecting your system from the severe confusion that voltage spikes can cause.

You know, you can't even blame the power company for all of these problems. Often, they do put a pretty clean signal on the grid, a nice, smooth 60Hz sine wave at the appropriate voltage. But circumstances beyond their control can do amazing things with that once civilized *soup du jour*.

Transients caused by nearby refrigerator or air-conditioning motors starting up can be deadly. Remember, once you are a few miles from the source, line impedances become a factor. Any electrical engineer knows that you can't maintain a clean rail if the power supply outputs or the wires from the supply have too high an impedance. I promise you, for example, that you can make the audio dynamic range (in the real world of listening to headphones on a Walkman®) improve audibly simply by brushing a little Tweek onto the ter-

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minals of that little AA cell that powers it. Really. The same goes for choosing batteries with low internal impedances, especially in battery-operated audio equipment that draws high current or that may not have sophisticated battery bypass filtering (and most gear does not).

But I digress. Again.

I won't spend too much time on spikes, blackouts, hash and RF, and, well, you know. Because you *do* know. You know that your power feed has all this stuff on it, and you know that it is usually there simply because you don't operate your studio 20 feet from a power station, and there are millions of other people out there polluting the feed.

What you may *not* know is just how serious the garbage is or how huge and fast some of these spikes can be, and how some of your new digital gear might react to them.

Analog stuff usually lets you know that a line problem is more than it can handle by snapping, popping, distorting or humming. We all know this.

But many of the new high-speed digital signal processing devices and digital recording machines may complain in a much more elusive fashion. Spikes can cause small but critical data errors in the execution of DSP code that do not cause pops and clicks, but may change the frequency of a digital filter, or cause errors in reverb characteristics that don't actually crash, but subtly alter the sound.

Yes, this is true, believe it or not. Don't be so sure the next time you catch a surge or spike showing up in the lights that you got away with the mix that was printing at the time just because nothing actually popped or crashed. To me, the only thing worse than a surprise crash or catastrophic failure is an unwanted surprise, a subtle *change* in the mix—a glitch that alters the sound in some way that you can't quite pin or re-create. You might miss it and only notice when you are proudly playing the CD for your friends three months later.

Warning: This scenario is *not* theoretical. It has happened, all the way to the part about playing the CD three months later.

You cannot predict how today's new digital equipment may respond to power artifacts that exceed the ability of their power suppliers to absorb. Your reverb might get just a bit tinny, but the parameters may show no change. Small changes in delays or EQ settings can occur, again with no change in the parameter displays. Time code offsets may be erased. MIDI maps may be reset. DAT copy-protect or emphasis flag status may change, as if by magic. Very bad magic if it goes unnoticed.

What can you do? Well, some of the answers are a bit obvious, and some are not. Here they are:

1. Ground the hell out of your place with a good, solid, single-star ground. It must be clean and low-impedance from DC to light. That's DC to *light*, not to 60 Hz or even 60 kHz. Ground all gear directly to it, not to another piece of gear and *then* to it. Have your power ground grounded. Remember, it is up to you to provide that good low-impedance reference ground that all of the filtering and isolating you do can depend on.

2. Put in all the filtering, spike protection and isolation you can afford. Put in regulating isolation transformers wherever you can afford to, starting, of course, in the most critical areas.

Let me tell you a little story, the story of how lightning *ten miles* away can make your phone ring or light bulbs pop, just like in the cartoons.

Lightning is pretty interesting stuff, but it is often misunderstood. When a cloud becomes electrostatically charged (common when rain is produced) and moves along through life, the area on the ground immediately below is constantly forced from its normal neutral condition to a charge state that is opposite that of the cloud. Like charges repel, opposites attract.

The lightning clouds are usually negatively charged, so as they move over land, they repel the negative charge in the ground, leaving a positive charge behind. Got it? The good old ground, zero-volt friend that it usually is, now has a tremendous positive voltage to it. Some reference that is!

If your power lines (on poles or buried) or you happen to be in this field, some rather interesting low-frequency voltage modulations can take place as the ground reference voltage changes. Really big ones, in fact. I've seen 145- to 165-volt surges for up to five seconds on our monitor equipment! I've seen equipment that didn't like it much resting on our floor the next day.

Since your power feed is referenced to ground, and that ground has just moved wildly through a serious voltage change, that changes the actual voltage of your feed, relative to *your* local ground. This change can be very fast and very large. Phones *do* actually ring with the voltage surge right before a strike, though it may be ten or 15 miles away! Nice, huh?

If you don't want your equipment to ring before a strike, you had better isolate.

But you ain't seen nothing yet. Let's say that the cloud slows down for a bit and just sits there pushing negative charges out of the same chunk of earth for a while. Eventually, the potential voltage difference between the negatively charged cloud and the now positively charged ground becomes great enough to cause components of the air between them to ionize, conduct and suddenly it's spark city, big time. The voltage difference is neutralized, and the ground potential returns to zero, fast. Real fast.

Of course, very little can actually be done within the studio walls to save you from an actual lightning strike, but that should not be a problem, as there are only about 20 million lightning strikes on the planet per day.

3. Let's say that you have done a great job with all of the above. Good. Now you are ready to start cleaning up your own act. You now have a pretty clean feed.

Don't mess it up from within. Unfortunately, the very equipment that you are working so hard to protect is often the source of severe line pollution of its own.

Digital studio equipment and analog gear with switching power supplies are terrible offenders here. They put more garbage on the line than you would ever imagine. Isolate and filter the line locally at each of these units. Observe the classic grounding rules as if your life depends on it. The quality of your end-product, audio, *does* depend on it.

4. Use fiber optic links wherever possible to eliminate ground loops. This really helps.

5. Don't call me if you have done all this and you still have problems. Call a real estate broker. ■

Stephen St. Croix still sports a silver ring that has a chunk melted out of it from a lightning strike to his studio. The studio is now named Lightning.

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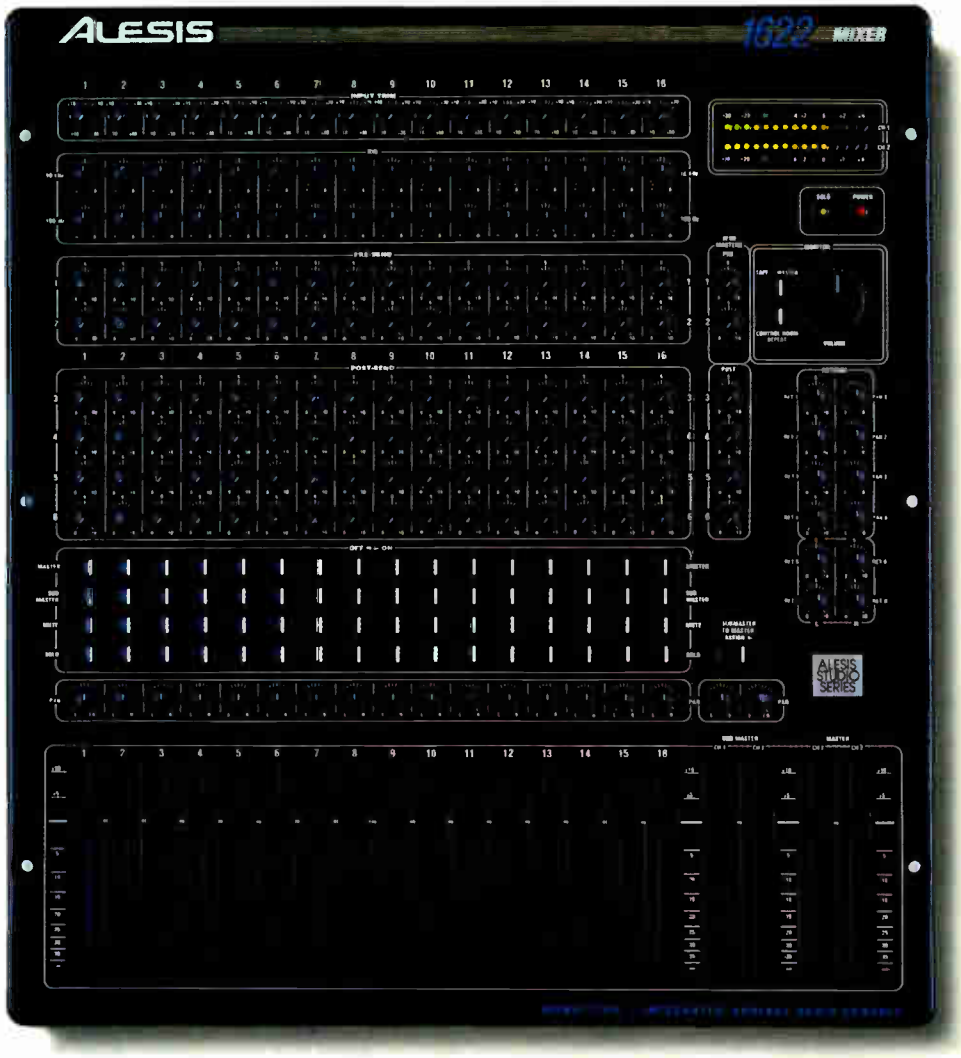

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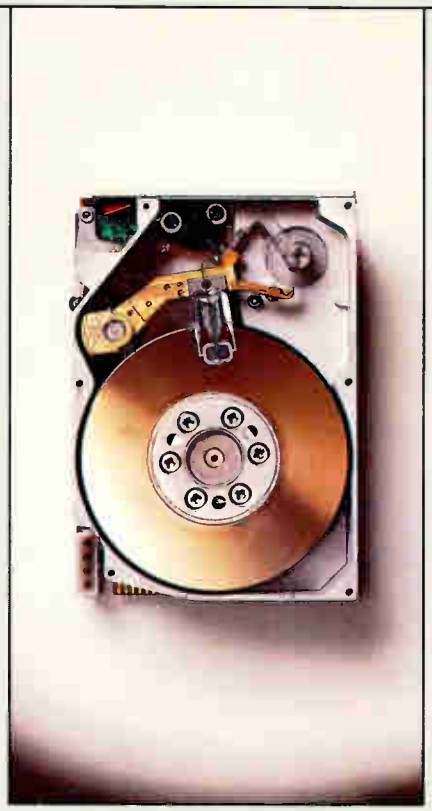
World Radio History

by Ken C. Pohlmann

Beyond Tape

Without question, a length of tape makes a great place to store things, particularly if the items you're saving occur in a linear sequence, and will be retrieved in a linear sequence. On the other hand, if you wish to manipulate the sequence of the recording, tape is far from ideal. Think of it this way—tape is like mass transit—for a simple trip from Newark to Penn Station, it's a very cost-effective way to go. However, if you want to detour to pick up your dry cleaning and buy flowers, mass transit could be a problem.



All of which brings us to disk drives. As audio production grows more diverse and sophisticated, time-honored tape methods grow more taxing. In the same way that America has, for better or worse, abandoned its trolleys and trains and embraced the automobile, tape is losing ground to the disk. Disk storage offers flexibility beyond belief; aided by programming, a disk system can run circles around a razor blade in many applications, albeit at a substantially higher cost.

A staple of the computer industry, magnetic hard disk drives (sometimes referred to generically as Winchester drives) are increasingly becoming an ubiquitous fixture in the audio industry. It is safe to say that without the computer industry, a technology as sophisticated as the hard disk would never have been developed for a relatively small industry such as professional audio. However, given the availability and affordability of these drives, which can store 20 to 700 megabytes of data, audio manufacturers have not hesitated to take full advantage of them. Moreover, hard disks are almost ideally suited to many audio applications—offering relatively fast access times and random access, the paramount requirements for audio editing, for example.

In most systems, the hard disk medium is non-removable; this greatly lowers manufacturing costs and simplifies the medium's design. The storage disk is actually a series of disks, usually made of rigid aluminum alloy, stacked on a common spindle. The disks are coated, top and bottom, with a magnetic material such as ferric oxide, with aluminum oxide undercoat. Alternatively, magnetic thin-film can be used so that data tracks may be placed more closely together, allowing greater data density and faster track access. Thin-film disks are also more durable than those of conventional oxide, because the data surface is harder. This helps them to resist head crashes, the event wherein the head touches the surface, usually bringing catastrophic damage to oxide disks, necessitating, at best, a trip to a service center for data recovery.

The disks rotate whenever the unit is powered. This is because the mass of the system may require 10 to 30 seconds to reach proper rotational speed of approximately 3,600 rpm. A

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series of read/write heads—one for each magnetic surface—is mounted on an arm called a head actuator. The actuator moves the heads across the disk surfaces in unison. In most designs only one head is used at a time (drives used for digital video would be an exception), thus read/write circuitry can be shared among all the heads. Unlike floppy disk drives, in which the head contacts the medium, hard disk heads float over the magnetic surfaces on a thin cushion of air, typically 20 microns or less. The head must be aerodynamically designed to provide proper flying height yet negotiate disk surface warpage, which could cause azimuth errors. The same head is used for both reading and writing; precompensation equalization is used during writing. Erasing is performed by overwriting.

Several types of head actuator designs are employed; for example, a moving coil assembly may be used. The moving coil acts against a spring to position the head actuator on the disk surface. Alternatively, an electric motor and carriage arrangement, or mechanical leadscrew, could be used in the actuator.

Data on the disk surface is configured in concentric data tracks. Each track comprises one disk rotation for a given head position. Typically there are multiple disks—stacked in much the same way that records were once stacked on record changers, except that the read/write heads are located between the disks. The combination of all the tracks provided by the heads is known as a cylinder. Most drives segment data tracks into arcs known as sectors, with perhaps 17 sectors per track; and a cylinder, head and sector defines a particular physical address, known as a block, storing perhaps 512 bytes. While early hard disks used FM coding, this was replaced by MFM and other forms of coding, such as 2/3 and 2/7 run-limited-length codes, for greater storage density.

One disk surface in the pack acts as a servo surface, dedicated to non-user data. It is read by the head actuator to identify the assembly's location relative to the radial disk surface. The use of a servo surface maintains accurate tracking in spite of thermal expansion and contraction of platters—a deviation on the order of the track pitch itself for temperature extremes.

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In some cases, a servo system counts prerecorded patterns as they are crossed and generates a location signal, and outputs an error signal as well, to center the head on the desired track. Optical, variable reluctance, or eddy current sensors may be used for track sensing.

Many drives are equipped with a "park and lock" feature to protect disks and their data from mechanical shock. This withdraws the head actuator from the disk data area when the unit is not powered. In many cases, a special part of the disk is specially designed to serve as a retraction area where the heads may land safely. In some cases, park and lock is accessed through a software command. Many hard disk drives employ heat sinks to dissipate heat and prevent heat buildup from the internal motors. In some cases, the enclosure is charged with helium to facilitate heat dissipation and reduce disk drag.

Drives are assembled in a clean room. The atmosphere inside the drive housing is evacuated, and the unit is hermetically sealed (with a filtered vent to equalize pressure). This protects the media from contamination. Media errors are greatly reduced by the sealed disk environment, however an error-correction encoding scheme is still needed in most applications. Manufactured disk defects are logged at the factory, and their locations are mapped in firmware so the drive controller will never write data to those defective addresses.

Hard disk diameters of 3.5, 5.25 and 8 inches are commonly used. Data may be output either in serial or parallel; the latter provides faster data transfer rates. For faster access times, disk-based systems can be designed to write data in a logically organized fashion. A method known as spiraling can be used to minimize interruptions in data transfer by reducing sector seek times at a track boundary. Although removable hard disk systems are available, they are more expensive, and their capacity is less than non-removable drives.

An example of a contemporary hard disk design is the Toshiba MK-358FA 5.25-inch drive, providing 765 megabytes of unformatted data capacity, with 31,248 bytes per track, one head per surface, 15 data surfaces, and 1,632 cylinders per drive. Bit density is 32,200 BPI, and track density is 1,330 TPI. Data transfer rate (Mbits/second) is 15, track-to-track seek time is 4 milliseconds, random average seek time is 16 milliseconds, and maximum seek time is 40 milliseconds. An ESDI interface is used.

Without question, hard disks offer reliable storage of digital audio data and the opportunity for comprehensive editing of the data. But most hard disks suffer from non-removability—a fatal flaw for many audio applications. This obstacle can be overcome by a variety of recordable optical disc technologies. Already, dye-polymer, phase change and magneto-optical disc technologies have appeared in a large number of computer products, and have entered the audio industry, mainly in the form of write-once optical disc systems. Very shortly, recordable/erasable optical discs will appear in recording studios in a variety of applications. Fortunately, this revolution is still at least 30 days away, so we'll wait until next month to shed light on this latest advance. ■

Ken Pohlmann was recently voted the Board of Governors Award by the Audio Engineering Society, for chairing the International Conference on Digital Audio in Toronto.

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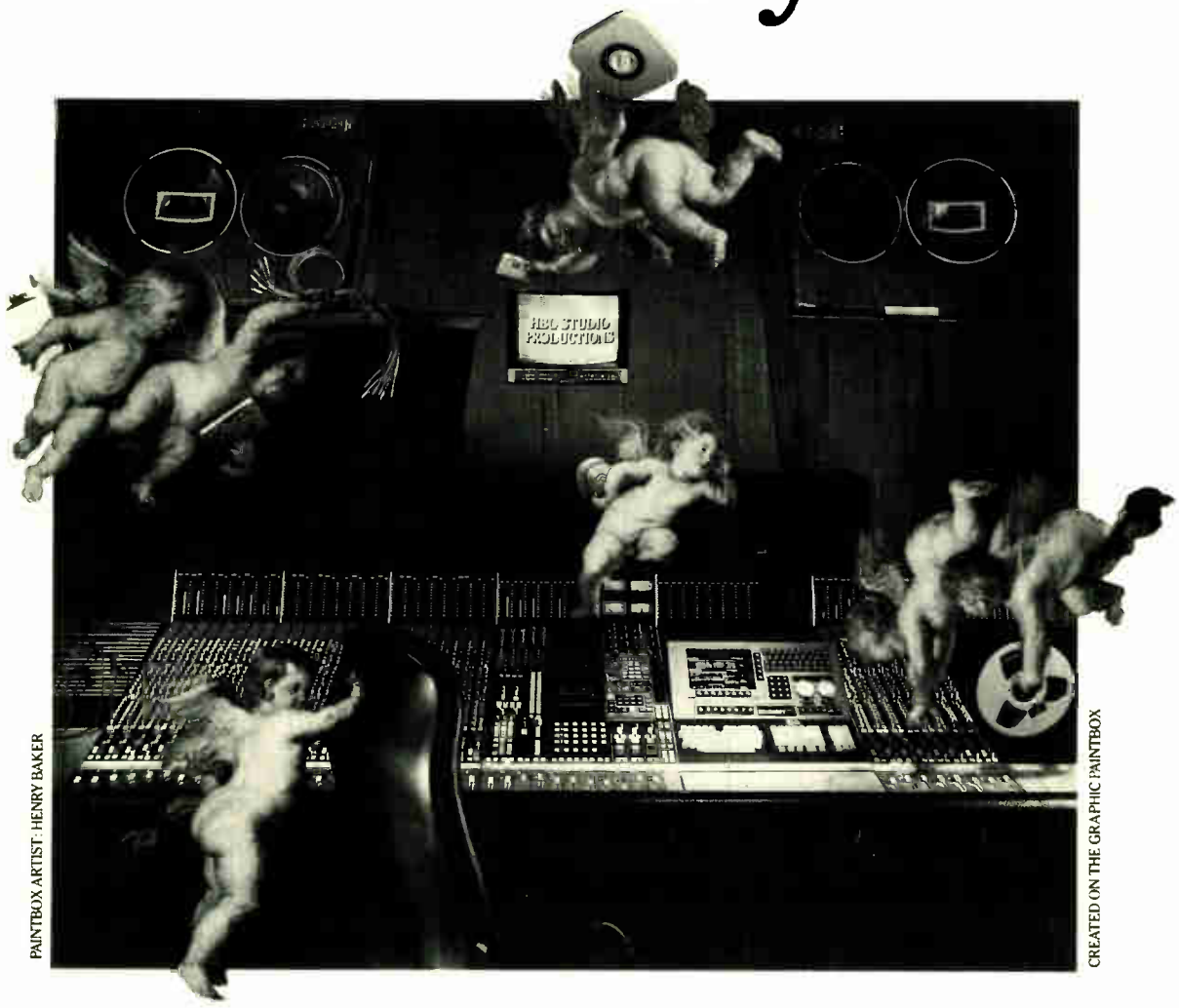

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World Radio History
Circle #043 on Reader Service Card

by Mel Lambert

AUDIO-FOR-VIDEO PRODUCTION

SELECTING THE APPROPRIATE TOOLS FOR THE JOB

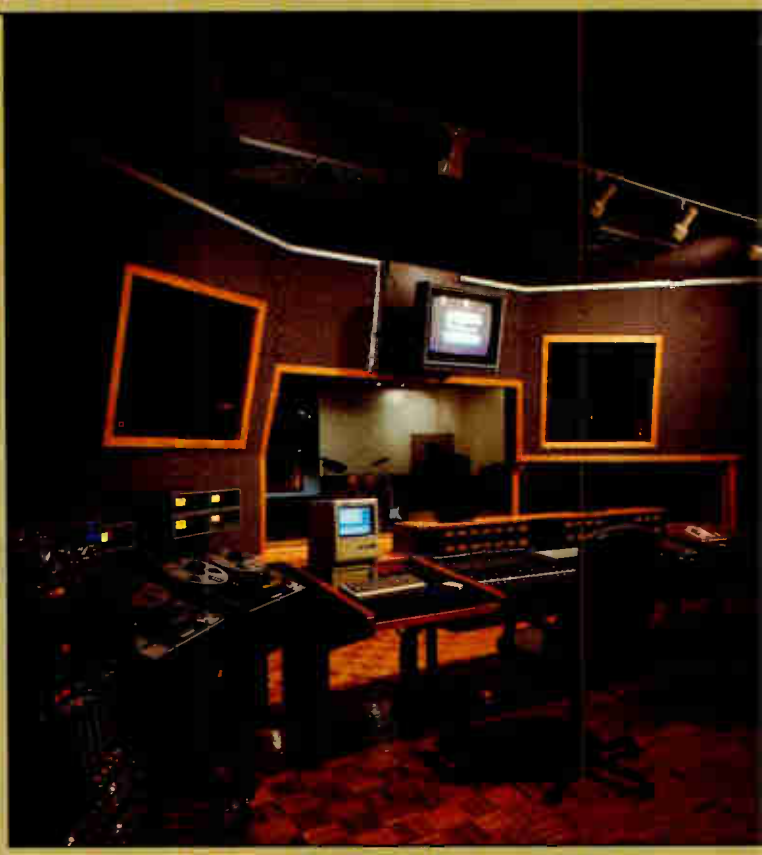
When you make a successful living from things audio, it's not too surprising that you learn very quickly how to *listen*. And not just to the technical quality. Once the particular signals are free from distortion and noise, attention turns to the internal textures and nuances of individual sounds—and how they blend with their companion elements. Very seldom, after all, do we work with sounds in isolation.

It is not so surprising then that such skills become almost instinctive. But deciding what parameters need to be altered to achieve the desired results is only half of the story; effecting those changes easily and efficiently means the difference between a final mono/stereo/multichannel balance that sounds *exactly* the way it should, and one that is, well, littered with obvious compromises.

Nowhere is this subjective and objective synergy more obvious than in the sophisticated field of audio-for-video, an area where functional, integrated hardware can make or break a project. Mixing audio to picture, be it 525-line NTSC, 1050/1125 HDTV, 35/70mm sprocketed film, or even a slide presentation, can place enormous creative demands upon the technology and the user. Which makes it all the more fortunate that some of the most innovative technical advances are currently being made in the area of audio-for-video post and sweetening.

SPECIALIST HARDWARE REQUIREMENTS

Audio post for film, video and multimedia has become more specialized over the past couple of years. Consider an "average" post session: Various production dialog, effects, music, ADR, Foley and other sound elements are pre-laid against a master time code track to one or more analog/digital multitrack(s), and then remixed to picture in one of a number of mono, stereo and surround sound formats. Simultaneously, various mono/stereo/surround music, dialog and effects submixes or stems might be recorded in sync to the same (or slaved) multitracks. (In this way, the same mix can be reconstructed without dialog to produce, say, a foreign language soundtrack, or to make it easier to substitute alternate music tracks when a network or independent series enters wider syndication.)



Designed for versatility (by Lakeside's Carl Yanchar) is TeleScene Productions, a 24-track facility in Salt Lake City.

PHOTO: GARY ECKBERT

World Radio History

It won't hurt your feelings.

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This, in a nutshell, is the problem: As rhythm machines have become increasingly more consistent, they've also become increasingly less "human." What you put in has feelings. What it puts out doesn't.

Which is why we're taking this opportunity to tell you about our remarkable new R-8 Human Rhythm Composer, so named because it makes the drumming as natural as you had intended.

The R-8 doesn't simply move beats around or "sloppy up" the groove. To the contrary, it gives you such incredible control that you can shift the timing in increments as small as 1/384 notes.

Even the drumsticks are more human.

You can also program pitch, velocity, decay and nuance to such an extent that you'll actually be able to hear the drumstick move from the edge of the ride cymbal over to the cup.

And you can do all of this in either a predetermined way, in which case you use the "Groove" mode. Or in an unexpected way, in which you use the "Random" mode. (Just because we call it "random" doesn't mean you take what it gives. Once again, you can control everything.)

Nor does the "human" touch end here. We've also made the 16 pads velocity- and pressure-sensitive, so that the sounds end up feeling vibrant instead of clinical.

The Roland R-8 has eight patches where these "Human Feel" settings can be stored, and each of these patches functions as an "overlay" for any of the patterns in the R-8.

Of course, all of this wizardry would be lost if the sound quality wasn't what it should be. It is. The R-8 features 16-bit drum and percussion sounds sampled at a CD-quality 44.1 kHz. And even better, both the eight individual outputs as well as the stereo outputs are available for routing those CD-quality sounds to a mixer for individual processing.

Approximately 2,600 notes, or 10 songs, can be stored in the R-8's internal memory. And up to 100 patterns with up to 99 measures each, can be programmed in the unit. The R-8 has 68 internal sounds. And when you combine these with the two ROM/RAM cards, each of which contains 26 sounds, you have a total of 120 different drum and percussion sounds.

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Of course, whatever the audio-for-video project, the one undeniable restraint is that the soundtrack elements match picture to an accuracy of a video or film subframe. Producing the correct sound balance, EQ changes, dynamics and other audio moves is one thing; ensuring that they occur at *precisely* the correct locations is quite another. Fortunately, a growing number of hardware manufacturers are responding to the challenge, offering equipment that is virtually revolutionizing the post industry.

Unlike relatively simple music recording sessions, today's post-production environment places a major emphasis on three fundamental parameters: speed, versatility and flexibility.

ENHANCED SPEED

In every audio sweetening project, or mix-to-picture session, time is money; last-minute picture editing or directorial changes result in the need to correct major sections of a mix. Edited or additional tracks might need to be pre-laid to the multitrack or spun in from a time-coded 2- or 4-track, new balances developed, and the sub and final mixes re-recorded.

Current-generation automation systems enable not only channel, subgroup and master fader levels to be memorized to a subframe accuracy, but also EQ and dynamics changes; some allow crossfade transitions between entire console configurations to be implemented via a single fader move. Also, a growing number of production consoles incorporate some form of assignment automation, which enables the same front panel topographies to be accessed on a routine basis. It's often surprising how long it can take to set up the input/output, EQ in/out and effects-bus assignments for a typical post session.

In the same way, current synchronization systems—particularly those built into a tape-machine transport—now offer radical improvements in search-to-cue speeds and enhanced lock-to-picture accuracy. Some of the newer console automation systems incorporate enhanced machine-control schemes, which enable direct serial control of audio and video transports using one of the more conventional protocols, including ESbus, P2 (Sony serial-compatible) and Ampex VPR-3 emulation. Employing these developments, we can issue commands quickly and efficiently, and have a complex audio/video lockup within just a few seconds.

IMPROVED VERSATILITY

Post sessions can range in complexity from a relatively "simple" 30-minute sitcom—where production dialog and audience applause might receive additional music, effects and laugh tracks—to a more complex miniseries, often requiring a series of highly edited effects, Foley and ADR treatment, as well as scored music. For the latter type of session, as many as 30 to 40 additional mono and stereo tracks of material might need to be pre-laid to multitrack and blended into a cohesive soundtrack.

Unlike relatively simple music recording sessions, today's post-production environment places a major emphasis on three fundamental parameters: speed, versatility and flexibility.

Again, memorized console assignments and fader/EQ automation systems can greatly simplify routine functions. Beyond the features provided on the majority of post-production consoles, many operators are looking for techniques that enable outboard and peripheral hardware control from the mix position. With the majority of digital signal processors now supporting external MIDI control, many facilities are exploring the possibility of incorporating a MIDI controller within the console itself, and/or adding computer-based memorization and recall of time-dependent or static MIDI data.

The day cannot be far off when MIDI information is stored by the automation system along with the digitized fader positions. Currently, a number of post facilities are using Macintosh-

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or PC-based sequencers locked to picture via SMPTE and MIDI time code to achieve the same results, albeit in a more cumbersome manner. The new Machine Control command set being contemplated for the MIDI spec will only enhance its usefulness within the post environment, and help provide cost-effective automated stop/start and triggering functions against time code.

Edit locations developed during video editing sessions can now be exported as a table of time code in/out points to a console automation system. Such information can greatly streamline the various conformation and pre-laying stages during the editing of audio to picture, and is now available in a number of standardized formats that can be read from floppy disk or a standard serial port.

In the same way, more audio consoles now offer ESAM-type audio-follows-video interfaces, which allow real-time scene transitions and other timing information from a video editor to be intercepted by a bank of VCA-controlled faders, and used to effect video-related audio dissolves and crossfades. Once again, having developed the frame-accurate information during a video offline session, it makes sense if the accompanying audio transitions can be triggered off existing time code in/out and duration timings, rather than having to re-enter them into the automation system.

EXTENDED FLEXIBILITY

These days, we are seeing an emphasis on stereo and surround sound techniques for multimedia. With widescreen HDTV just around the technology corner, some post houses are exploring the creative potential offered by matrixed and discrete multichannel playback formats. Conventional mono/stereo channels and subgroups are now being joined by optional surround sound modules, which offer panning and assignment between left, center and right forward-oriented outputs, plus a rear surround channel, with full monitoring and metering.

Just as the film-sound community has become used to monitoring through the Dolby Stereo matrix-encoding process, many post houses are investigating the newer generations of compact, audio-for-video consoles that can be supplied with optional surround sound input/output/monitor modules.

A DIGITAL FUTURE

The inevitable transition from analog to digital technology will affect speed, versatility and flexibility in a fundamental way. Already, digital editors, multitracks, hard disk recorders and workstations are increasing the speed of audio-for-video and sweetening projects.

Working from a set of time code locations—either accessed directly from an EDL, captured on the fly or typed in via a keyboard—we can assign sound files rapidly to various cue points, edit them to length, adjust levels to picture (and maybe EQ/dynamics) and simultaneously create a first-generation stereo/surround mix for layback to a pair of PCM tracks on the edited master videotape—all from one control surface. Add to these features the dramatically enhanced machine control and serial interface capabilities inherent with properly implemented digital architectures, and the future of the audio-for-video industry looks especially bright. ■

Mel Lambert heads Media&Marketing, a high-tech consulting and marketing service for pro audio firms and facilities.

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Studio: Ambience Recordings, Farmington Hills, MI

Photo: Jeff Pearl

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World Radio History

Todd-AO and the Film Sound Revolution

Mixing It Up With Buzz Knudson

BY JENNY BOONE

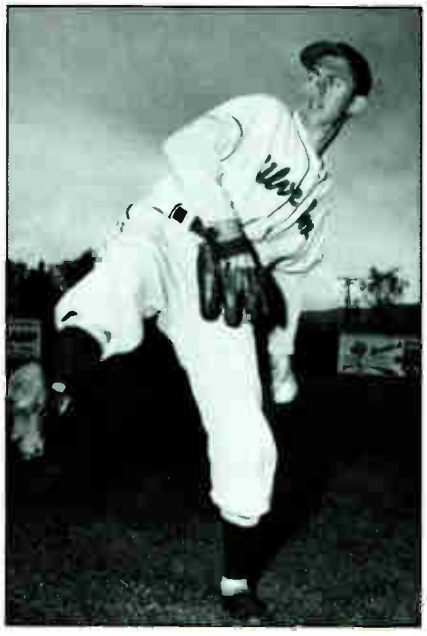
Imagine someone whose career has been devoted to creating perfect soundtracks, but who still believes the story is the most important part of a movie. "Let 'em hear the dialog and a good score, and you'll have a good movie," he says.

If you didn't know who Buzz Knudson was, you'd swear from his name that he's a baseball player. And you'd almost be right. Knudson was a "phenom" in high school ("scouted by everybody," he acknowledges sheepishly) and was recruited to pitch in the minor leagues in 1946. Six years later, after playing in Vancouver, Montana, Idaho and throughout the Midwest, he got married and opted for a job with regular hours. Soon, he proved himself a "phenom" in the field of sound mixing, and was winning Academy

PHOTO: SHEEDY AND LONG

(Left): Buzz holds the Oscar for Cabaret, 1972 as Eddie Albert smiles alongside.

(Below): Buzz Knudson throwing strikes in the Pioneer League, Idaho Falls, Idaho, 1950.



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But neither wide-screen cinema, 3-D nor even smell-o-vision could fight off the encroaching popularity of TV.

Awards for Todd-AO/Glen Glenn Studio in Los Angeles.

Over the years Knudson has been closely involved with many of the developments that have led to today's pristine-quality soundtracks. He is executive vice president of the Todd-AO Corp. and president of its West Coast operation (which merged with Glen Glenn Sound in 1986). Knudson is trying to retire—it's been five months and counting since he's mixed a feature—but it's not easy when you're on top and work with the best in the business.

Todd-AO was originally the trade name for a 65mm wide-screen film process pioneered by producer Mike Todd and the American Optical Co. in 1953. Todd, a flamboyant showman who later married Elizabeth Taylor, was determined to elevate moviegoing to the status of an event, like going to the opera. Wide-screen had been around for years, but only in a primitive form. Todd enlisted studios, manufacturers and theatrical distributors to support not only a large screen size, but improved image and sound quality from 65mm lenses, negatives that were four times the standard 35mm size, a 30 frames-per-second projection speed and a 6-channel magnetic soundtrack. Hollywood hoped that Todd-AO's superior presentation would pull in the large audiences that turned out for movies in the years before television.

Todd won the film rights to one of the biggest Broadway shows of all time, Rodgers & Hammerstein's *Oklahoma!*, and used it as a vehicle to introduce Todd-AO to the world. The film was an unqualified success, as was Todd-AO's next production, *Around the World in 80 Days*. But neither wide-screen cinema, 3-D nor even smell-o-vision could fight off the encroaching popularity of TV. When viewers' fascination wore off and the studios abandoned the costly process, Todd-AO switched its emphasis from

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presentation to sound post-production. Today, it is Los Angeles' largest sound mixing facility and the choice for many top directors with enough clout to post their pictures outside the film studio. Audiences, too, have come to appreciate the technical sophistication that goes into the filmmaking process at places like Todd-AO.

"Everybody's some kind of a buff now," Buzz Knudson says. "When they go to a movie, they know good sound from bad. They can tell what's the right gunshot sound for the right gun, and when a car, say a Ford, goes by on the screen, you've got to give them the sound of a Ford or else you'll get letters."

Knudson enjoys the challenge of giving us perfect gunshots and enabling us to decipher a Ford from a Chrysler. You could say that his own keen senses of sound and sight and the reflexes that made him a good baseball player are also what make him a good mixer. As he puts it, "There's kind of an eye-ear coordination you've got to have to do this. There are things that you hear in your everyday life that you have to recall when you look at the screen during the mix—and match what you hear with what you see."

Knudson joined Todd-AO in 1960 after working in RCA's sound department for eight years. "I finished up there on a Friday, July 31, and came to work for Todd-AO on Monday," he says, beginning as an optical recordist doing transfers under Fred Hynes, who developed the discrete 6-track stereo mixing process for Todd-AO. Eventually, he worked with the sound mixers, many of whom were getting on in years. When they retired, says Knudson, "they practically left me here all alone. So the timing was good, and I got a lot of breaks."

After cutting his teeth on commercials and TV shows, Knudson worked on features. He won two consecutive Academy Awards in 1972 and 1973 for his work as supervising dialog mixer on *Cabaret* and *The Exorcist*. The awards came at a good time. "Those 6-track, 70mm films like *The Sound of Music* and *West Side Story* weren't being made anymore. And when they went on the decline, our company started to decline. But fortunately, I was kind of getting up to speed myself with features when I got those awards. We got kind of busy and our business gradually improved."

Knudson is modest about his achievements at Todd-AO, but his record hardly needs to be amplified. During 30 years with the company, he's mixed more than 175 features, won a third Academy Award for *E.T.* (and received ten more nominations) and two British Academy Awards. He is a down-to-earth man who likes movies about underdogs who come out on top. Among his favorites are *Bound for Glory*, *Coming Home*, *The Color Purple* and *Witness*. Despite working on these and other great films, Knudson says that when he goes to rent a video, "I just can't think of a single thing that I want to see," and often leaves empty-handed.

Part of Knudson's skill is being able to please demanding directors. "If you want to be a success at mixing, you don't argue with them," he says. "There's a diplomatic way to get your point across. You can ask them to consider something, and they can throw it out if they don't like it. They've got the last word. You have to remember that they've been dealing with the film for a year and a half or more, and you've only been working on it for a few weeks."

When asked which of the directors he's worked with place the most importance on their soundtracks, Knudson is quick to answer: "Bill Friedkin probably is the most particu-

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lar about sound. He does lots of ADR [automatic dialog replacement], and it has to be just right. He spends hours and hours on footsteps. Billy's a real sound freak, and he wants everything to be of a certain quality. When you finish one of his jobs, you know it's pretty darn good."

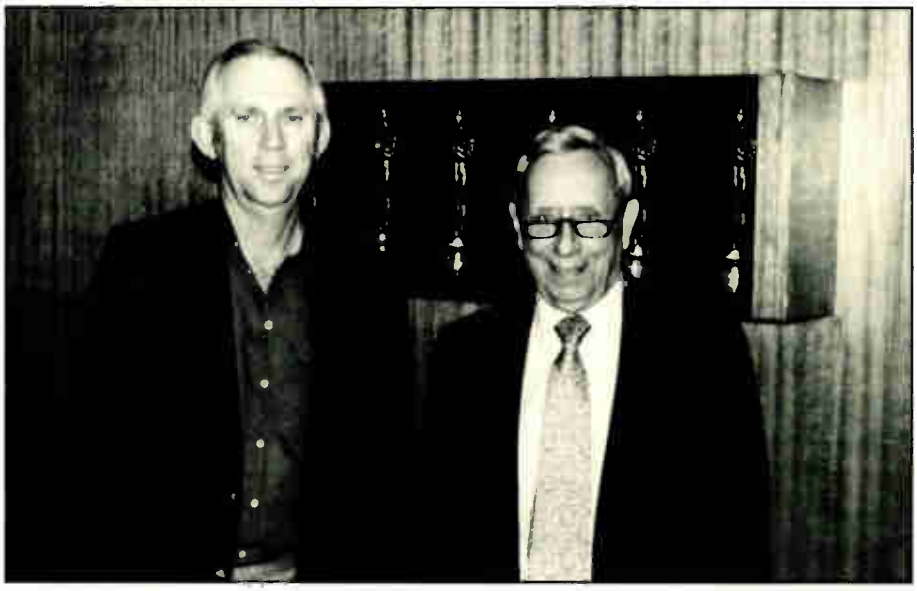
Friedkin had just finished *The French Connection* when he brought *The Exorcist* to Todd-AO. "*The Exorcist* was a difficult film," Knudson says. "It was strictly a sound movie—there was not a lot of dialog. There was one scene, in a marketplace or wherever they did the archaeological dig, and there needed to be an undercurrent of music to drive the scene. And Billy came up with this off-the-wall idea of using hand instruments [finger cymbals]. They made the whole scene work. Billy played with things in that picture, like the phone would ring very loud, just for shock value. He was one of the first to do that really well.

"Steven Spielberg," Knudson says, "is exceptionally bright, and he knows exactly what he wants. He doesn't spend a whole lot of time analyzing the sound. He looks at the picture, and if it works with what he hears, he accepts it. Friedkin is just the opposite. He's a perfectionist. Not that Steven isn't, but the two are perfectionists in their own areas."

After the picture, dialog and sound effects are edited, and the music has been scored, most films take four to five weeks for the sound mix. But directors like Friedkin and Spielberg command a longer dubbing schedule. "Steven takes from six to nine weeks. He's got more of a budget than the rest, his pictures have more action, generally, and they have a better chance of making money." As for Friedkin, "I'd say on *The Exorcist* it was 15 weeks, *Cabaret* was about eight to ten weeks."

Sound mixing has always been cumbersome, but back in 1981, during post-production of John Huston's *Victory*, Knudson and his effects mixer Bob Glass discovered something that would forever change the nature of sound post-production. At that time, Knudson says, "all the sound effects, dialog and music were recorded together, on four tracks of one piece of 4-channel magnetic film. That made it very difficult if you wanted to change any one of the three elements, because all three parts would have to be redone. You'd have to go back and you'd never get it quite as good as you originally had it on the first take."

Knudson and Glass "sat down together, and I brought up the idea, 'Would it be possible to have three recorders going so that we could record music, dialog and effects on their own "separate recorders?"' Adding new recorders, and redoing the wiring and the consoles to handle them, "was a major thing, but it really made life easier for everybody since we were able to dub faster."



Buzz Knudson with Fred Hynes and just a few of the Todd-AO Oscars. Hynes, one of the founders of Todd-AO, gave Buzz his start in the business.

Two other significant advances in sound mixing, according to Knudson, were high-speed forward and reverse, and technology like Dolby noise reduction that mitigated hiss and noise buildup.

Knudson sees some of these technical breakthroughs as double-edged swords: Now that directors and editors have the capability to perfect each noise on the track, many of them *will*, even if the sound is not perceptible to the audience.

"In the old days, when you go back 20 or 25 years or so, pictures were much more simple. They'd do a dialog track and very little ADR, and no Foley at all, probably," Knudson says. "Today there will be as many ADR and Foley tracks as sound effects tracks. ADR has become an industry unto itself. The ADR supervisors re-record the principal voices of the actors in the scene that need to be redone, as well as the people behind them and the people down the road who you never get to really hear anyway. You end up piling all this material in there somehow, and it just clutters up the soundtrack.

"The whole process is being condensed, and the product has suffered, in my estimation," Knudson adds. "I've spoken my piece as nicely as I can on a number of occasions. I've asked the editor, 'Why are we doing all of this? We've got a budget for four weeks, and now we have *eight* weeks of work.'" Somehow, Knudson hopes, a truce will be worked out between those wanting to fine-tune the tracks until they're flawless, and those who would rather spend more of their budgets on production than post-production.

Knudson says there is only one regret he has about his mixing career: "I would like very much to have worked on a good, solid Western, one with a lot of spurs jingling and horses running." If he had, you can be sure that he wouldn't have given us the sounds of just any spurs or horses, but the *exact* spurs and horses that we could see on the screen, and nothing cluttering up the soundtrack. Otherwise, we'd send him letters. ■

Jenny Boone is editor of Film/Tape World, *a Northern California monthly.*

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SOUND MIXING FOR EPCOT'S CRANIUM COMMAND

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John Reitz ordinarily can be found on one of the dubbing stages at Buena Vista Sound. With more than 100 feature and television films to his credit, including *Turner and Hooch*, *Honey, I Shrunk the Kids*, *The Princess Bride* and *Stand By Me*; Emmy Awards for *The Ordeal of Dr. Mudd* (1980) and *An Early Frost* (1985); an Oscar nomination for *Days of Heaven* (1978); and a British Academy Award for *Saturday Night Fever*, he is used to the often-hectic pace of a film re-recording mixer.

by · Robyn · Flans

World Radio History

(Photo at left) Buzzy, the tour guide through Bobby's brain in "Cranium Command." (Right) "The Wonders of Life" inside "Cranium Command." (Below right) Jerry Rees, John Reitz, Midori Barnes and Ken Lisi programming "Cranium Command." (Bottom left) A lone programmer inside the "Cranium" cockpit.

He wasn't quite prepared, however, for the adventure in store when he was invited to go on location to Walt Disney's EPCOT Center as part of the mixing team for "Cranium Command." "Cranium" is a production that puts the viewer into the body of 12-year-old Bobby for a day to experience his reactions. The tour guide is Buzzy, an audio animatronic

cranium commando in training. Produced by Walt Disney Imagineering (WDI) as part of the Wonders of Life Pavilion, the project uses four film screens and four video screens in a 200-seat theater designed specifically for the show.

"We like to mix to the theater when we can," says Ken Lisi, senior audio specialist for WDI. "It allows us to really tune the audio to take advantage of the speaker placement. Particularly with so many different screens and characters, we wanted to make sure we had optimum clarity and the right sound relationship for each one." Adds Reitz, "It was like mixing three features simultaneously."

Director Jerry Rees, who worked with Reitz on the feature-length cartoon *The Brave Little Toaster*, explains: "The theater was built with eight discrete tracks. I didn't have to deal with encoded tracks or trying to have mono surround. I could have stereo surround, I could have top center, bottom center, right and left, and separate channels for the audio

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animatronic figures in the room. So for once, here was a theater built that had all the latest technology installed. But we wouldn't just be amusing ourselves when we used all this great stuff during the mix. The audience can hear it the way it's supposed to be heard. That was real exciting going in, having the audience get the benefits."

Two of the film screens are Bobby's eyes, and the four video screens show images from his imagination. The top screen presents General Knowledge (an animated character) as well as Bobby's right brain and left brain, played by actors Jon Lovitz and Charles Grodin. The bottom screen shows the characters who act out Bobby's body parts. Dana Carvey and Kevin Neelan are the right and left ventricles of the heart, George Wendt is the stomach and Bob "Bobcat" Goldthwait is the adrenal gland. Top that off with Buzzy, who moves around through the set along with the robotic Hypothalamus, and you have a show that goes far beyond most definitions of multi-image production.

Lisi says the project's complexity is standard operational procedure for the Imagineering crew, but for Reitz it was a unique experience from the start. First, they premixed 170 effects tracks at EFX in Burbank to take advantage of its digital capabilities. Imagineering projects have used all-digital sound since 1980, while most feature films are produced in the analog domain. Then the three mixers—Lisi, Reitz and Midori Barnes (also from Imagineering)—flew to Florida with the director, where they worked upwards of 16 hours a day for six days.

"When it came to budgeting for sound, people were raising their eyebrows saying, 'Wait a minute, this is only a 12-minute film.'" says director Rees. "But each of the different screens has a complete soundtrack with it. The left brain has his environment sound and his dialog, and the right brain has his whole environment and all the different sound effects, Foley, etc., that go along with him. Plus, that's all going on at the same time as the point of view from the eyes.

"Then, when the stomach comes on, you hear the gurgling, but we don't cut away from that; it happens simultaneously in the theater. So for the point of view, we had to build a complete soundtrack like we would for any movie, and for the lower screen that showed the different characters in the body, we had to build a com-

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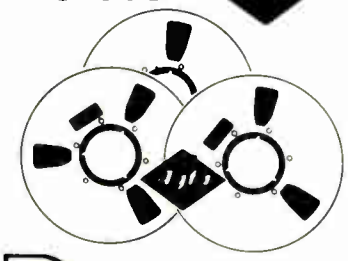

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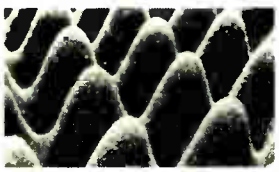

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plete soundtrack, like for any movie; for the top screen the same things, and then for the monitors, too.

"We had to go through the predubbing and dubbing process that turned out to be a lot more complicated, because, say, for the top monitor that just had left and right brain, we would have to predub as we normally would, and then we had to predub from the point of view of the eyes," Rees continues. "For the screen that has the heart and adrenalin and all the body-part characters, the process was repeated. Then we put them together and it was a whole new mixing game. If it were a one-screen movie, any one of those would have been a fine mix, but now we had to put all those mixes together. The danger was that it could all just become bedlam, so it was very complicated. Everyone I talked to said they had never worked on something so complicated, but it made a really fun challenge."

There were a few other complications as well. "While we were doing all this mixing, computer programmers were out front programming Buzzy and Hypothalamus. There was construction going on, carpet being laid and lights being set. At times it was like mixing in a bus station," Reitz laughs. "In comparison, a dubbing theater is pretty quiet."

Because the theater was new, it had to be EQ'ed and sound pressure levels had to be set. Also, the projectors in the theater were designed for exhibition—those usually found on a dubbing stage run forward and backward at high speed. The way the team got around this was to take all of the screens and transfer them to videotape. They put a video projector in one of the eyes and ran the tape there.

"What we would do was dub until we thought we had it right, and then we would lock it up to the picture and run the film and see if it needed adjustment," Lisi explains. "Things generally seemed to sound louder with picture. We'd go through the whole dub, lock it up with picture, look at it and go back to the video, make adjustments and look at it again with film."

The biggest problem was communication. "The remote truck was 100 feet away, down a flight of stairs in the parking lot," Reitz says. "We're all used to being able to grab the remote on the machine to do a punch-in, for example. In this case, I had to pick up the intercom and say, 'I want to do a punch-in between these two lines,' and the guys in the truck would say, 'Okay, let me listen to it a couple of times to get the punch right.' They were very good at it, but it did slow things down."

According to Reitz, director Rees knew what he wanted. "We did a lot of panning. There were certain times when Bobby is running through the bushes. He'd be heading toward the lawn mower, and the lawn mower would be pushed toward the right-hand side. Jerry would want to swing right and then out the rear. It would be like a phantom center, through the right and out the back, like the lawn mower being pushed passed Bobby's ear if you're in his head. We used quad panners to achieve that."

Initially, each mixer worked separately: Lisi mixed the music, Hypothalamus and Buzzy, Barnes mixed the effects, and Reitz handled the dialog. They spent three or four days premixing and breaking down the dialog and effects by screen and character. For example, there were 24 effects tracks just for the right brain. "Each of us premixed to a 6-track, except for the music, because that was just a normal record mix," Reitz explains.

Lisi described the advantage of doing the mix this way: "If you get through a section and the effects are perfect, but you've got to nudge one line of dialog, then you just go into the dialog track."

For the final dub, Reitz had his six tracks of dialog, Lisi had four tracks of music and two tracks of Buzzy and Hypothalamus and Barnes had her six tracks of effects. They all mixed at the same time, balancing the predubs against each other. "This was pretty straight-ahead film stuff, since a normal film dub is three mixers," Lisi comments.

Once everything was done, they ended up with a tape that had eight channels on it—left theater, center theater, right theater, Buzzy, Hypothalamus, body monitor, left surround, right surround—and those eight tracks were printed on videodisc, two tracks at a time.

By the next week, John Reitz was back in the dubbing theater working on the film *Blaze*. It was quiet, it was cool and he got to go home at a reasonable hour. Still, of the Cranium experience, Reitz says: "I'd do it again."■

Robyn Flans is a Los Angeles-based freelance writer who contributes frequently to Mix.

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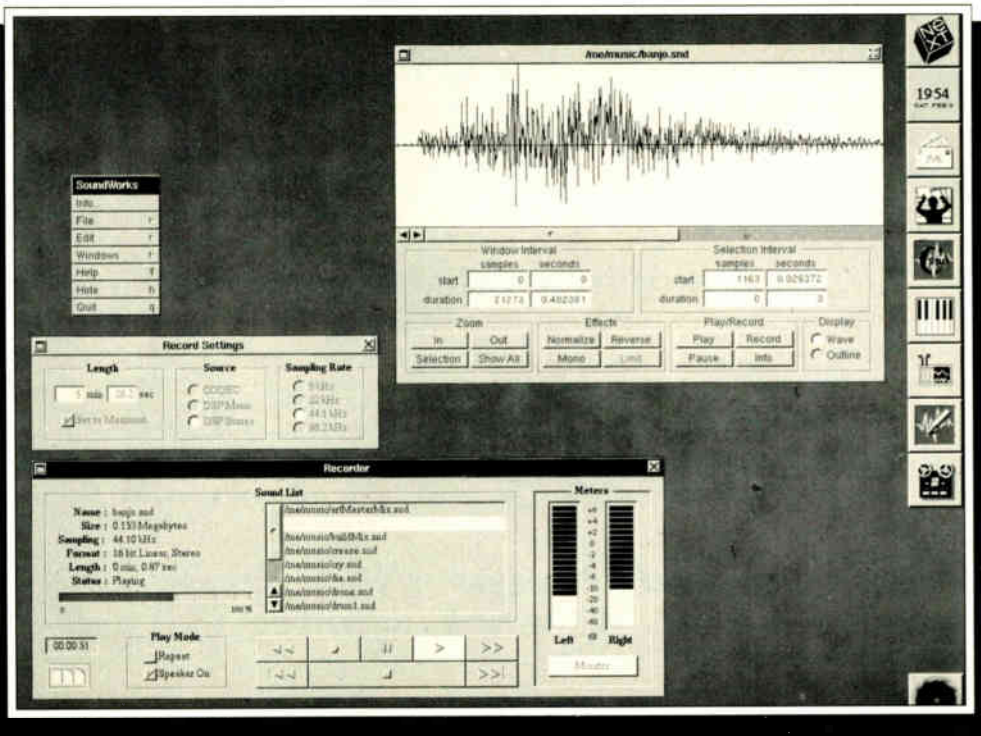
A LOOK IN NeXT DOOR

by Larry Oppenheimer

In "A Byte of Fresh Apple" (January 1990) I presented a view of computers as foundations on which third-party developers build the user environment. The decisions made by the computers' designers both empower and limit the developers' efforts, thus affecting the users' abilities to achieve their goals.

In no area of application is this more true or important than with sound and music (S&M...love that abbreviation). S&M place extremely stringent demands on a personal computer system, especially in its manipulation of large streams of data with precision timing.

With that in mind, I examined the mo-



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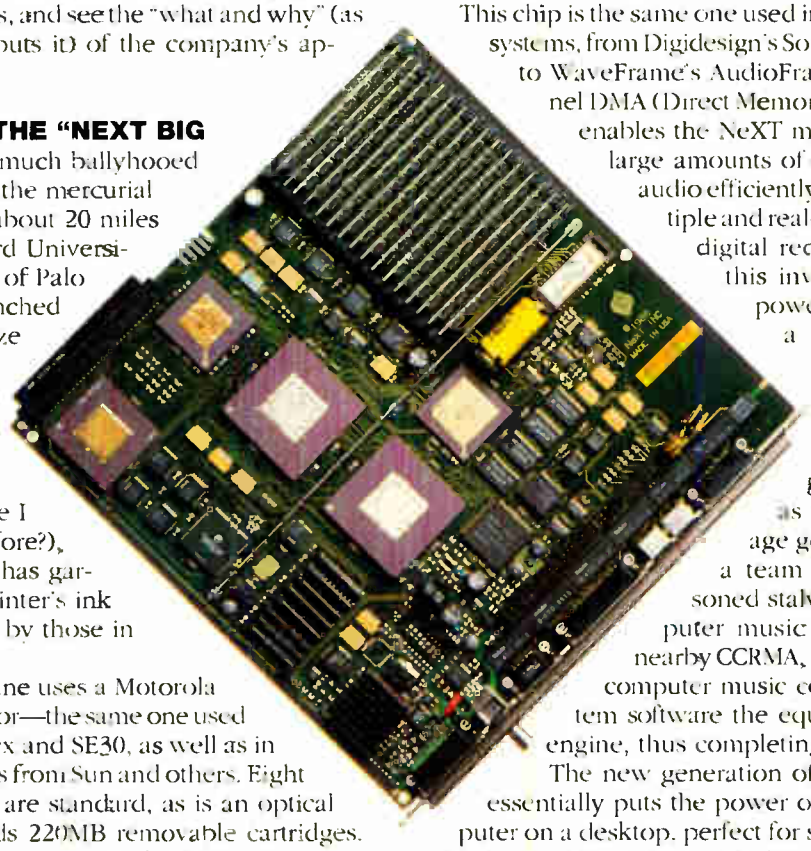
ALL PHOTOS AND SCREEN SHOTS COURTESY OF NeXT, INC.

tivations and innovations of Apple Computer, the makers of the Macintosh, currently the predominant machine in the U.S. for S&M. This month I'll take a look in the door of NeXT, Inc., the latest wunderkind to grab the headlines, and see the "what and why" (as NeXT's Bob Fraik puts it) of the company's approach to S&M.

THE START OF THE "NEXT BIG THING" After his much ballyhooed Waterloo at Apple, the mercurial Steve Jobs moved about 20 miles north to the Stanford University-dominated town of Palo Alto, where he launched NeXT, Inc., to realize his personal vision of what a computer should be. Despite considerable delays in its release (where have I heard this story before?), the NeXT machine has garnered gallons of printer's ink and a lot of debate by those in the industry.



The NeXT machine uses a Motorola 68030 microprocessor—the same one used in the Macintosh IIcx and SE30, as well as in several workstations from Sun and others. Eight megabytes of RAM are standard, as is an optical disk drive that holds 220MB removable cartridges. The sound hardware consists of: stereo 16-bit audio playback at a 22/44.1kHz sample rate through a pair of gold-plated RCA connectors, a stereo mini jack and a small monitor speaker; a speech-quality (8kHz sample rate) A/D converter; and a Motorola 56001 DSP chip. This chip is the same one used in many digital audio systems, from Digidesign's Sound Accelerator card to WaveFrame's AudioFrame. A fast 12-channel DMA (Direct Memory Access) controller enables the NeXT machine to move the large amounts of data used in digital audio efficiently, thus allowing multiple and real-time processes (like digital recording). Currently, this inventory is the most powerful to be found on a desktop computer system.

Of course, "A computer without software makes a great boat anchor," as the old industry adage goes. Jobs assembled a team of young but seasoned stalwarts from the computer music field (several from nearby CCRMA, Stanford's esteemed computer music center) to create system software the equal of the hardware engine, thus completing the platform.

The new generation of hardware in NeXT essentially puts the power of a mainframe computer on a desktop, perfect for supporting the trend toward more graphically and sonically oriented user

(Left): When coupled with an external A/D converter, such as Metaresearch's Digital Ears, the NeXT becomes a digital audio workstation capable of recording, playback and editing of CD-quality digital audio. (Top): The NeXT computer system. (Above): The motherboard in the NeXT computer, containing both the Motorola 56001 digital signal processing chip and the Motorola 68030 microprocessor.

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interfaces, as well as enables musicians access to tools formerly found only in academic computer music facilities.

Composer/programmer David Jaffe is one of the migrants to NeXT's S&M team from CCRMA. "Up until now, computer music has been partitioned into a couple of categories," Jaffe explains. "On the one hand, there's studio computer music [traditional academic computer music studios, which are primarily based around mainframe or minicomputers] in which you have all this control over the sound itself, but the gestural control is limited because of not being able to do things in real time. And you have the MIDI synthesizers with the gestural control, but the timbral fine-tuning is limited because the machines are hard-wired to do one thing, and they only bring out a few buttons. So putting it all in one computer enables you to get at both levels.

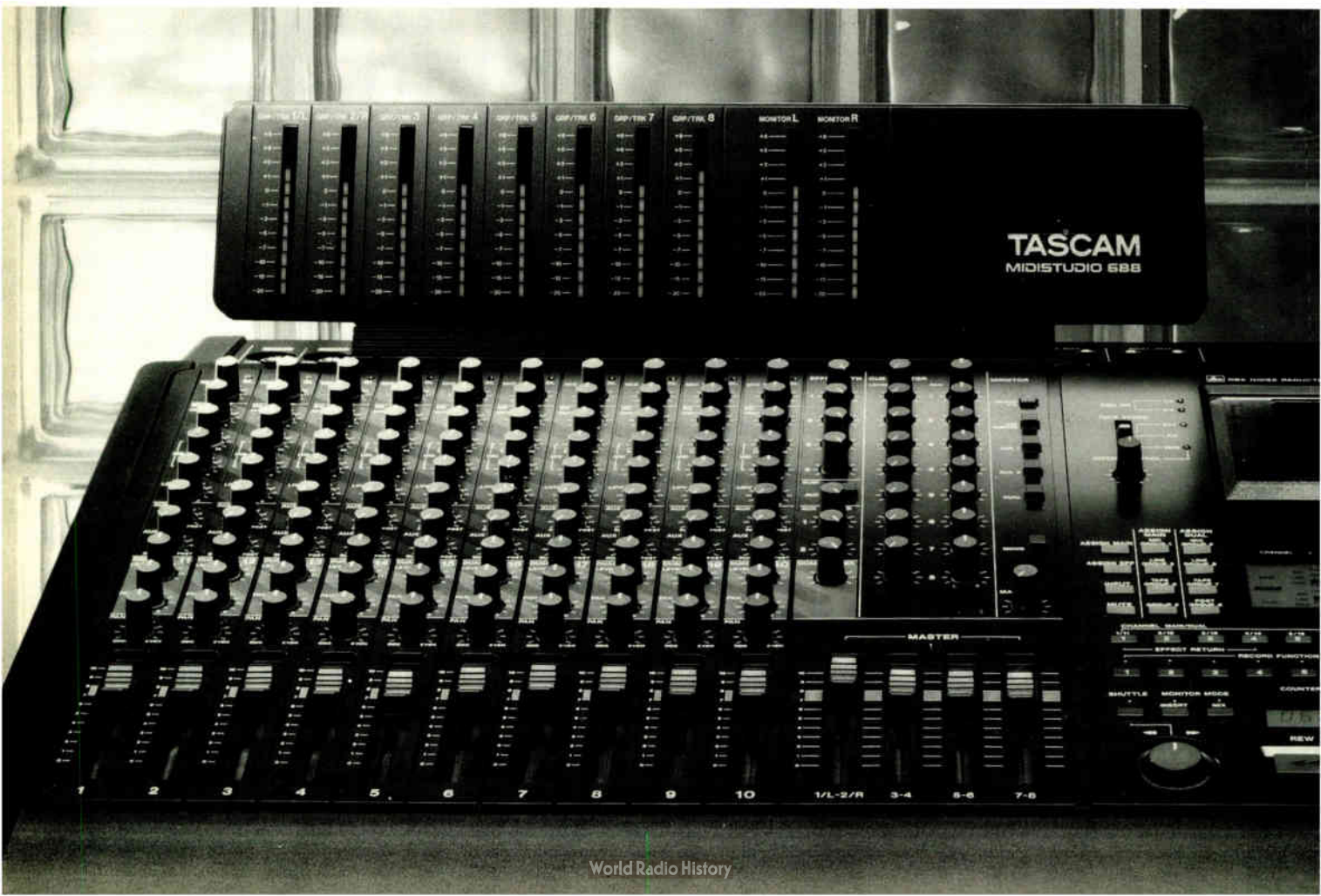
"Another division is between sampled sound (or concrète) and synthesis. In the industry, samplers are sort of hybrid things anyway. In a pure sampler you hit a key and it plays this recording, but now when you have a machine that can play Beethoven's *Fifth Symphony* or some sample of long duration, these distinctions break down even further. The way it is now, you have a synthesizer and it does one thing: One does FM, another does sampling. In the case of the NeXT computer, you can design your own algorithms, which used to be something you'd only do in a research facility. Now, experimenting with new algorithms can be an application in itself. We expect an explosion of invention of new algorithms."

Dana Massie, an original member of the S&M group now at E-mu Systems, says, "Visualization and audio are natural ways to communicate and express things, and this is a platform to help do that. I think that rock 'n' roll is information; it's a form of communication. We expect there will be a lot of very specific applications: voice mail, speech communications, playback of high-quality recordings, generating high-quality music from scratch, processing recorded music, archival recordings of famous people in history...There'll be applications in hypermedia, where you'll be able to have a songbook or a biography of a musician and see pictures of the musicians, or click on the song lyrics and hear individual phrases of the

Audio Add-Ons for the NeXT Computer

Already a few interesting third-party products have appeared for NeXT. Perhaps the most innovative is the DM-N digital microphone from Ariel Corp. of Highland Park, N.J. It contains a pair of Primo capsules (mounted in an X-Y cardioid configuration) that directly feed a Motorola 56ADC sigma-delta analog-to-digital converter. The DM-N's output connects to the NeXT's DSP port. Two mini-jacks on the back of the mic offer the option of substituting any line-level source for either or both of the microphone capsule outputs. The DM-N provides a signal to the NeXT that is already in the digital domain and theoretically suffers no degradation from the cable run connecting it to the computer.

Ariel is working on an AES/EBU format of the microphone, as well as plug-in DSP cards for NeXT and other devices that will connect to its DSP port. Ariel's BUG-56 symbolic DSP code debugger is already



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included with every NeXT system.

Pasadena, Calif.-based Singular Solutions manufactures a sigma-delta A/D converter, called the A/D 64x, which also plugs into the DSP port. The A/D 64x is loaded with features including: a high-quality microphone preamp, switchable low-cut filter, phantom powering, AES/EBU digital I/O, DC-coupled balanced and unbalanced line-level inputs, a true digital overload indicator (which actually looks at the A/D bitstream), 32, 44.1 and 48kHz sample rates (selectable from NeXT), as well as provision for an external sample clock. The A/D64x is also usable as a stand-alone A/D-to-AES/EBU converter.

Polysonic, Inc., of Berkeley, Calif., makes the Reson8 audio processor, a synthesis/DSP engine built from a set of eight of the same Motorola 56001 DSP chips that reside on the NeXT's CPU board. Reson 8 provides more than 100 MIPS of sound-processing power and is bundled with the HyperDSP software package as a development environment. Polysonic also modifies CD players to plug into NeXT's DSP port.

Digital Ears, from Metaresearch of Portland, Ore., is a 2-channel A/D converter that outputs 44.1kHz, 16-bit linear PCM data into the NeXT DSP port. The device features level controls for its unbalanced RCA inputs and can sample down to DC. Bundled with the Digital Ears is the *SoundWorks* software package, which allows recording multiple takes, editing and selective saving to files with onscreen VU meter animations. Metaresearch also has rewritten parts of NeXT's Sound Object to optimize it for faster operation, and bundles this improved object with the hardware. The company also make Digital Eyes, a video digitizer for NeXT that can store images in several popular file formats and offers a range of digitizing resolutions.

—Larry Oppenheimer

(Pictured here) The DM-N digital microphone from Ariel Corp. in relationship to the NeXT mouse.

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song played back. Ultimately, the distinctions of the machine as a recorder or processor or mixer or synthesizer are all going to blur."

"Music is something that we all have a big interest in," operating system programmer Gregg Kellogg states, "so perhaps we all focus on that in our designs, but we don't design in restrictions on programming for any applications. The computer is intended for the users out there to do with what they want, and we expect that will change the way we look at this thing in the long run. There's a bigger push toward visualization and being able to have the computer work in more ways than letting you read some text and sort through some things. Three-dimensional color graphics are ways for people to be able to solve problems without having to get into the details of problems themselves, and sound is a natural extension of that kind of idea as well. Sound and music is a lot broader than we really know. Having DSP on the CPU board, for example, means we start getting to a whole new class of speech generation or recognition software that we really couldn't do before."

The NeXT software team (including the S&M group) is using a two-pronged approach to maximizing the considerable capabilities of the hardware. First, the system software is designed to be as efficient as possible through teleological laziness, i.e., don't do any work that's not absolutely necessary.

Efficient execution is achieved by dynamic loading and scheduling. Given a limited amount of DSP memory, careful management is required to assure that the right sounds are there when the score calls for them. Dynamic loading means instruments that aren't being used at a given time will happily surrender their memory to an instrument that is about to be played and isn't already in memory. When necessary, sounds are shuffled to facilitate collecting fragments of unused memory into the largest chunks possible.

Since the DSP is usually able to outpace the CPU, a large buffer exists between the two to keep the DSP from constantly distracting the CPU with requests for something to do. The CPU can fill the buffer in one fell swoop with messages for the DSP that contain an action to be performed and a time at which it should be done. With this schedule in place, the DSP can compute samples as far ahead of the score as it wants and output each at its indicated time. The system can vary how far ahead of the real time the DSP runs to accommodate different circumstances: With real-time control input (such as MIDI controllers), the DSP must be kept from running so far ahead of real time that it has already computed samples that should be affected by the real-time controls. Real-time control and score events can be integrated in the schedule.

The operating system, Mach, is a key player in making sure that data is where it's needed at the time that it's needed. According to Kellogg, Mach "is a variant of Unix that provides much better messaging facilities [than Unix] and also control over virtual memory resources, which is a key in our strategy for dealing with a lot of sound files." Virtual memory is a system in which mass storage, such as disks, are treated by the computer as if it was onboard RAM.

"The key is that we don't do any more I/O than we need to," Kellogg points out. "We delay all the copying of data until we need it." Think of it like this: I want a peanut butter sandwich delivered to my house in San Francisco from my favorite restaurant in Boston, but I need to decide how I want the sandwich cut in half. I could have it sent by overnight express mail, examine it, and express it back for the chef to cut and express back to me, but by then the sandwich would get stale. A better approach, suggests DSP programmer Julius Smith, is to "fax pictures of the peanut butter sandwich and not actually grab it until you're going to eat it." The pictures of the sandwich are messages passed on the network that describe the file in question.

Musically speaking, you could decide to change the arrangement of a song from A-B-A to A-A-B, and the structure of the song will have been significantly altered. However, it is not until the song is actually played that any resources (in this case, a musician and instrument) are required to realize these alterations.

Lee Boynton is another key player on the S&M team, who has also done extensive music programming on the Macintosh at IRCAM (the renowned French computer music facility) and MIT. He places great importance on Mach for music and sound work for the reason that, "With enough work, anybody can build a tool that helps you build an application easier. But as far as basic operating system support, that's one of the things you can't really change. Having the basic functionality that Mach provides, [especially] in the virtual memory system, gives you a nice model. It makes a lot of things a lot more reasonable." Besides which, adds Boynton, "I like peanut butter."

The second prong of the approach is providing comprehensive mid-level tools for building applications. This is one place where Jobs' lessons learned from the Macintosh come into play. Although the Mac embodies a high degree of flexibility, it is a bear to program (and a grizzly at that), not because it does not offer good system support, but because the tools (Managers and Toolbox) are all at the lowest level. There is no inherent mechanism for creating "primitives" (although there is MacApp, a developer's toolkit available separately, which largely achieves this aim). Primitives can be thought of as system-level macros or batch files, or even extensions to the operating system, which create a level of control just above the lowest by executing a sequence of assembly language routines that accomplish an oft-needed, low-level task.

NeXT's system software is built in layers so engineers can quickly and easily create applications using mid-level tools without mitigating access to the lowest-level nuts and bolts for those situations that demand it. The layers look like this (going roughly from lowest level to highest): DSP software, Mach (the operating system), NeXT Step and the object-oriented toolkits.

The DSP software has two layers of its own. The unit generator layer is based on the model introduced in Music V, a language for programming music created in the 1960s by computer music pioneer Max Mathews and several colleagues at Bell Laboratories [see *Mix*, December 1984]. In that scheme, "instruments" are formed by configuring and connecting single-function software modules in an approach reminiscent of analog modular synthesis or, to give a more recent example, Digidesign's *Turbosynth* for the Macintosh. Module functions include oscillators, filters, mixers and basic arithmetic.

As with any modular system, flexibility is the byword, which means that virtually any synthesis algorithm can be implemented: additive, FM, Kar-

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NEVE at NAB

The first showing of a production version of a 66 Series console headlines Neve product news at NAB.

Specifically designed to fulfill the exacting requirements of television broadcast and production, the new 66 Series offers a number of important benefits, including an integral microprocessor-controlled reset system for switch status and input gain, with an optional system able to restore other rotary controls and fader settings.

Established products also appearing at the Neve booth (#4152) are: the VRP Post Production Console, the 51 Series Broadcast Console, the 542 Console and the Neve Prism Series.

Established Mitsubishi products at the show are: the X-880 32-track, the X-86 2-track and the X-86HS (high sampling) 2-track Digital Tape Recorders.

66 CONSOLE for ABC-TV NEWS

ABC-TV (NY) has purchased its first Neve on-air console.

The new Neve 66 Series console—which will be featured at NAB in Atlanta—is destined for ABC's newly designed TV3 studio, an entirely new environment specifically designed for news broadcast.

At present, ABC intends to use TV3 for both "World News Tonight" and "Nightline," now originating from TV2—which functions as a multi-purpose studio used for news as well as other programming.

Specific features the Neve 66 offers include: mix minus capabilities, electronic switching of audio signals, and storage and recall capabilities for console settings.

The 66's mix minus capabilities can be used for special events, such as the Presidential election coverage. With microprocessor-controlled input modules, the 66 Series console will greatly reduce the maintenance time and expense that are a necessity with manual switches and controls.

The Neve 66 is scheduled for delivery in late June.

Streeterville Studios (Chicago), one of the most sophisticated full—service facilities in the country, houses 2 Neve VR consoles, both with Flying Faders.

'SERIOUS AUDIO' at ABC-TV: 2 NEVE VRP's

As part of a program that will carry them into the 21st century, ABC-TV New York has purchased 2 Neve VRP consoles—the first, scheduled for installation in May, the second for early Fall.

The Neve VRP has 4 discrete stereo busses allowing, for example: dialogue on and dialogue off camera, and an alternate language as well as music and effects.

ABC's most recent purchases are an indicator of the vastly increased importance of audio for video over the past decade. The Neve consoles (and two 24-channel tape recorders with Dolby SR) make for some very serious audio.

5106 for "60 MINUTES"

The CBS Engineering and Development Department has selected a Neve 5106 24-input production and post production console for use in mixing the audio for "60 MINUTES."

All inputs and subgroups on the 5106 console are provided with a 4-band Formant Spectrum Equalizer, high and low pass filters and limiter/compressor. The equalizer of the 5106 in the individual channel strips are within easy reach of the operator.

The new console will be delivered before production begins for "60 MINUTES" 23rd season.

On the MOVE...

Neve has moved their Bethel corporate headquarters.

A big move. And a small one too.

After 19 years in the same building, we've relocated our North American headquarters to larger facilities—only a few hundred yards from our present location, within the same industrial park.

In order to accommodate the recent expansion of our marketing and accounting operations (among others), we've moved into a new space of some 10,600 square feet—more than double the size of the former facility—located at 7 Parklawn Drive, Bethel, CT. Our phone and fax numbers remain the same.

A new Mitsubishi tape machine tech area, in addition to a newly designed Neve tech area, are among the highlights of the new structure. Spacious offices, a large conference room, libraries—plus room for expansion—give us the advantages we need to serve our customer base. The move took place March 1st.

World Radio History

NEVE HEADLINE NEWS

'CAPTAIN PLANET' POSTS at DEVONSHIRE

Tom Cruise, Le Var Burton and Whoopi Goldberg are a few of the stars lending their voices to an unusual project—a cartoon show with an environmental theme—posting at Devonshire Audio & Video in North Hollywood, an all-Neve studio.

2 Neve V60 Consoles—the latest installed in mid-February—and an 8128 with 56 inputs handles all Devonshire's post work—including the ecology-conscious cartoon, "Captain Planet and the Planeteers"—as well as their numerous music recording projects.

Devonshire's new V, scheduled for the completely remodeled and enlarged Studio 1, was booked for a Feb. 20th date—*and* for the next 4 months after. Says Michael Mancini (studio chief engineer), who bought Devonshire's first 60-input Neve V about 3 years ago: "The room hasn't been down a day since."

"Captain Planet," the brain child of Ted Turner, is aimed at the 2 to 11 year old market. Nonetheless the show takes on the most complex and controversial environmental issues—acid rain, nuclear power and ozone depletion among them.

For more information about Devonshire call (818) 985-1945.

NEVE AROUND the WORLD

Recent sales achievements from Neve Electronics International include (among many others) the following...

• **London, U.K.**: West Side Studios (VR72 + Flying Faders), Parkgate Studios (V Series) • **Norwich, U.K.**: Anglia TV (6604/24) • **Copenhagen, Denmark**: Sweet Silence (VR72 + Flying Faders), Medley Studios (VR48) • **Paris, France**: Polygone (VR60); Le Voyageur (VR48 Remote Console) • **Milan, Italy**: Studio Look (VR36) • **Korea**: Hyunda Records (VR48), Shinsegea (VR60 + Flying Faders), Korean Broadcasting (2 x VR60 + Flying Faders), Buddhist Broadcasting (VR36) • **Taiwan**: ORTO Studios (VR36 + Flying Faders) • **Japan**: CBS/Sony (VR72 + Flying Faders), Asahi Studio (VR60 + Flying Faders), Hitokuchizaka (VR72 + Flying Faders).

'OPRAH' AIRS on NEVE. Beginning with the January 16th show, "Oprah Winfrey" has aired from her new Harpo Productions studio complex using a Neve 48-input 5106 console for audio production.

FLYING FADERS RETROFITS. Ronnie Milsaps' Groundstar Studio (Nashville) was one of the first studios in the country to retrofit a Flying Faders system into a pre-V Series console (an 8128). Marathon Recording's (NY) V Series console was recently fitted with Flying Faders. And in a different application, Todd-AO Studios East (NY) installed Flying Faders in their Quad Eight console, as part of a multi-million dollar upgrade of their facilities.

Alan Ramer and Robert Diez d'Aux, co-owners of "Power Packed" Soundworks West (West Hollywood), at one of their two 72-input VRP consoles, both with Flying Faders. Soundworks has also recently purchased their third Mitsubishi X-880, 2 X-86HS, an X-86C, 2 Neve Prisms, plus a Flying Faders system for their Neve 8078 console.

82 SERIES CONSOLES SELL. Paul Decorte's Southlake Recording in Meterie (a suburb of New Orleans) and Studio Masters (LA) have both added 48-input 82 series consoles to their facilities.

VR60 with FLYING FADERS for HOUSE of MUSIC. House of Music (West Orange, NJ) has upgraded from their Neve V Series console with a Neve VR60 and Flying Faders. Recent projects recorded on their V console include Eric Clapton's "Crossroads" (Polygram) and Warrant's "Dirty Rotten Filthy Stinking Rich" (Columbia). Bookings for the new VR include Baton Rouge, Beggars and Thieves and Gwen Guthrie.

'POWER PACKAGE' for CAPITAL RECORDS. Capital Records (Hollywood) has installed a Neve VR60 with Flying Faders and and an X-880. The Neve "Power Package" is part of a total renovation of Capital Records' Studio A.

STUDIO 56 EXPANDS. A VR60 with Flying Faders highlights an expansion project by Studio 56 (Hollywood). Upcoming projects include: John Purdell and Duane Barron (engineers on the multi-platinum Poison LP), Don Was (Was Not Was) and Booker T. & The MG's (a reunion LP), among others.

STREETERVILLE POSTS NATIONAL SPOTS on NEVE. Streeterville's 2 VR's have been kept busy in recent weeks with national commercial spots for: Budweiser, Bud Light, McDonalds, Hallmark and United Airlines.

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NEVE TECH TALK

GROUPING, the RIGHT WAY

by Morgan Martin

Anyone who has ever used traditional Master/Slave grouping knows about the "headroom" limits of the groups on non-moving fader automation systems.

This problem shows up when you pull down a Master and then try to push up a Slave. Since most of these systems have a 10dB headroom limit on the groups, you can't push the Slave level more than 10dB, even though you may be nowhere near the top on the Slave fader's scale.

This same sort of problem exists on *some moving fader systems* as well—but with a particularly tricky difference. In these systems, since the fader is *controlling the audio directly* (through the fader audio track, not a VCA), you can actually push the Slaves' level above their 10dB group headroom limit—all the way to the top of the fader, if you like. And you'll actually hear the move in the mix.

The problem is that what you hear is *not* the move that gets into the automation data—the automation won't record that part of the move that's above the group headroom limit, even though what you *heard* was above the limit. So on playback, that part of the move *won't be replayed*.

This can be a major hassle, especially in film and TV post where you're actually recording a live mix to tape or film. In this case, you'll *hear* the higher level as you record the mix to tape, but later on, when you set up to do fixes and rely on automation to recreate the mix, you'll get a big surprise—the automation's mix won't be able to play any moves that were over the limit.

What you'll hear in this case won't be the mix that you recorded on tape or film.

As you might have expected, when we designed the Flying Faders System, we solved this problem. With Flying Faders, groups have literally *hundreds of dB's of headroom*. This means that you can push up a Slave as much as you like and the automation will replay that same move, just as you did it. So when you go to do the fixes, the Flying Faders will give you back the same mix that you recorded to tape or film in the original session.

Because of this feature, with Flying Faders, what you hear is what you get. You can't expect this with any other automation system.

As always, happy mixing. . . with Neve Flying Faders.

Morgan Martin, a member of the Flying Faders' development team, is a design consultant for Neve.

The Hit Factory (NY), one of the most prestigious studios in the industry, features their new VR60 with Flying Faders and a Mitsubishi X-880 with Apogee filters, in studio A3 of their 54th Street complex.

PLACES and PEOPLE

Neve Canada. In order to serve our expanding customer base north of the border, Neve has opened its new Canadian office at The Esplanade in downtown Toronto. Joseph Naccarato has been appointed General Manager. Joseph comes from Studer Revox of Canada where he spent 9 years, most recently as Sales Manager for Eastern Canada. Alain Despatie, a native of Montreal, comes from Neve U.K. and is now Technical Services Manager. Clare Carvalhinho is now Sales Administrator. The office celebrated its grand opening at a well-attended gathering on Feb. 21st.

New York Office. Nigel Toates has moved from Hollywood to New York where he is now Eastern Regional Manager. Thor Thorsteinsson has moved from Neve Hollywood to New York where he is a Technical Services Engineer for Neve and Mitsubishi PCM Products.

Hollywood Office. Dave Clark and Joe Edwards are now Western Regional Technical Services Engineers. Dave comes from a position as Senior Technician for Village Recorders and Studio Ultimo. Joe comes from a position at Cherokee Recording in their technical services and development department. Dave will specialize in Neve consoles and automation systems, and Joe in Mitsubishi products.

Neve (Bethel.) Kurt Sturl is now Commercial Manager for Neve. Kurt has worked for Siemens (Vienna) for the past 15 years, most recently as Commercial Manager in the Service Dept. for Medical Products. Charles Conte is now Neve Public Relations Administrator for the North American market. Charles comes to Neve from Studer Revox America where he had been PR Manager since Oct. '87.

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PLAYBACK

MITSUBISHI DIGITAL PRO AUDIO

PRODIGI

TECH TALK

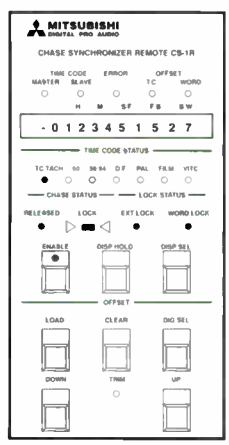
SAMPLE-ACCURATE SYNCHRONIZER from MITSUBISHI

By Steven Sergeant

64 tracks, recording as if they were on a single machine. . .

The CS-1 chase synchronizer module allows you to lock an X-880 to another X-880 (or an X-850) to the accuracy of an individual sample period—20 microseconds. Offsets can be adjusted in increments of a single sample.

Greatly simplifying multi-machine setups in post production situations, the CS-1 eliminates the need to interface third-party synchronizers to the X-880. An X-880 fitted with a CS-1 can chase and lock to any master transport—whether it provides only time code, or time code plus tach and direction pulses. You can achieve a tighter lock between an X-880 and a master machine than is possible using any external synchronizer. Accuracy is ±50 μ seconds, or one eighth of a sub-frame, due to the CS-1's unique ability to control internal clock signals within the X-880.



Indicators and control keys, CS-1 remote unit.

In addition, the CS-1 gives the X-880 several capabilities that no external synchronizer can. With two or more Mitsubishi 32-channel machines linked, synchronization remains accurate, even at variable speeds.

The CS-1 also refines electronic editing capability between two Mitsubishi tape recorders. Its ability to synchronize to a sample, combined with the powerful punch-in/out features of the X-880 autolocator, allows extremely precise electronic edits to be performed, again, even at variable speeds.

The CS-1 consists of three components: the CS-1 module which plugs into the X-880 chassis, a wiring harness which adds connectors to the back panel, and an external remote controller unit that can be mounted on the X-880 autolocator.

Available as an option, the CS-1 can be retrofitted to any X-880.

Steven Sergeant is Customer Support Engineer, PCM Products.

STRONG DEMAND for X-880

Dreamhire, a large pro-audio rental house, purchased an X-880 in October which has since been used by a number of artists at a variety of locations, including, Quad Recording (with Danger Zone and the Rolling Stones) and Marathon Studios (with Foreigner).

In other Mitsubishi sales, Sound Emporium (Nashville) owner, Gary Laney, lists bookings through April on the studio's new X-850:

Chicago Recording Company (CRC), one of the largest studio complexes in the country. "Power Package" Studio D, housing a Neve VR72 with Flying Faders and a Mitsubishi X-850: "an unqualified hit," says Hank Neuberger, CRC Operations Manager, with Chicago's largest ad agencies, recording music for national commercial spots.

RCA artists, Tim O'Brien from the bluegrass group "Hotrize" (his solo debut album) and Don Williams.

On the international recording scene, Studio Debs (on the island of Guadeloupe in the French West Indies) has taken delivery of 2 X-880's (with Apogee filters) as well as a 2-track X-86. Also, "Tear for Fears" and "Def Leppard" purchased 32-track Mitsubishi's, which they used on their latest recording projects.

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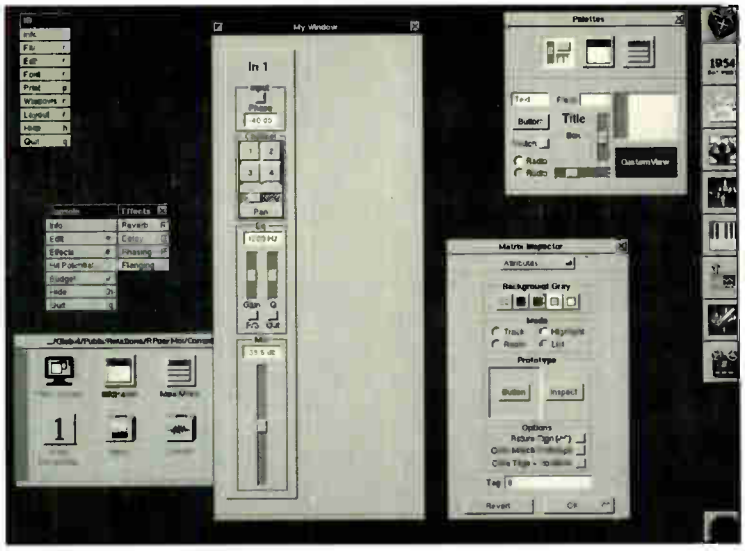
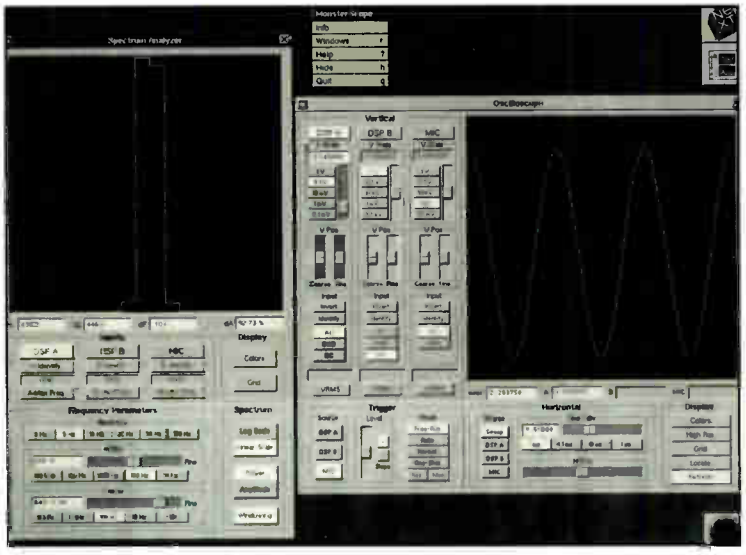
plus-Strong and many others. Unlike Music V, however, which chugged through the score computing one sample at a time, the unit generator software on the NeXT machine computes eight samples each pass. The down side is that envelope breakpoints are only computed at the beginning of each pass, but linear interpolation between breakpoints at the sample rate compensates; thus, true sampling-rate envelopes are produced. Also bundled with every NeXT system is Ariel Corporation's BUG-56, the first symbolic debugging software designed specifically for DSP. This package makes use of the NeXT's visual interface to simplify coding for the 56001.

NeXTStep is a set of programs—*Application Kit*, *Interface Builder*, *Objective C*, *Workspace Manager* and *Display PostScript*—that sit "on top" of Mach and allow an application to be built that encompasses DSP software, the Music and Sound Kits, and the user interface.



NeXT's Interface Builder being used to design a section of a 4 channel mixer.



Using the Motorola 56001 digital signal processing chip within the NeXT system, the MonsterScope application is displaying a 440Hz sine wave in Oscilloscope and Spectrum Analyzer formats.

NeXTStep, with the exception of the toolkits, has also been licensed by IBM, presumably for use in its future machines. In fact, future machines are as much the target of NeXTStep as the current NeXT machine, according to Massie. NeXTStep's programs, he asserts, "are based on many years of experience with graphical user interface programming languages. We tried to come up with the next generation [of system software] that might last on hardware platforms for the next ten or 15 years. Ten years is a pretty reasonable lifetime for a major computer [software] architecture." By this measure, the original IBM PC architecture has reached the end of the line, and the Macintosh architecture is about halfway through.

The NeXT architecture (i.e., NeXTStep), then, has not yet begun its lifetime and will offer significant advantages over previous software approaches to last well into the future—at least that's the fervent hope of NeXT's programmers. Perhaps the feature with the most promise of fulfilling this potential is NeXTStep's portability. An application written on the NeXT machine using NeXTStep can, theoretically, be ported to an IBM machine running NeXTStep, recompiled, and run with all its graphical interface features intact. Of course, applications that are heavily dependent on special-purpose hardware, such as sound and music software employing the NeXT machine's DSP chip, can't run without appropriate hardware and the requisite software interfaces to it.

Nonetheless, NeXTStep represents a significant step forward in simplifying the task of building a usable application. For example, Interface Builder allows a programmer to create a user interface by pulling graphic objects like buttons, sliders and fields off a palette and arranging and resizing them on the screen, and then linking them to the actual application code and defining how they should act. The "look and feel" of an application can be evaluated quickly before the actual code is written, thus shifting programming effort back to the specific code that accomplishes the application's purpose. "Interface Builder," Boynton says, "is like *HyperCard* squared or cubed."

Objective C is an object-oriented implementation of the powerful, popular C programming language. With this, programmers fluent in C can instantly begin using object-oriented programming techniques. Since Interface Builder is written in Objective C, it is extensible: You can design your own user-interface objects, say, a VU meter, then put them on a palette and use them in your applications.

Sound and Music Kits are libraries of Objective C routines from which sound and music applications will be built on NeXT. "The distinction is that

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sound is analogous to bitmaps in graphics or to samples (in sampling instruments), the kind of 'raw form.'" Jaffe explains. "You could say it has all the detail but not very much structure. The Sound Kit supports an object interface to the sound capabilities of the computer." Through Sound Kit routines, basic operations like recording, playback, display and editing are accomplished. Sounds can also be moved on and off the "pasteboard," NeXT's version of the Macintosh clipboard. Sound Kit even provides for viewing sounds in several different representations, including waveform display and spectrograms. In other words, the basic sound editing functions we expect from sample editing programs are present in the NeXT's system software, and, using Interface Builder's links to the Sound Kit, a basic recording/editing/playback application could be constructed without writing a single line of program code. Further, a NeXT sound file can even be instructions for the DSP to synthesize a sound, rather than making use of actual samples. And, since the sound file itself is an object that "knows" whether it is made up of samples or code, the application needn't make any distinction when addressing sound objects.

The Music Kit implements objects that embody concepts of musical structure, such as scores, parts and notes, as well as orchestrational elements like instruments, performers and conductors. It also provides access to the NeXT machine's DSP for doing virtually any kind of synthesis, from wavetable, FM and additive to other rarer, more exotic beasts. Fine control of sounds benefits immeasurably from the nature of object-oriented programming, which endows each object with a sort of "cultural" or "genetic" knowledge about its capabilities.

"There's a note object that is basically a package of parameters, as in Music V, where parameters are things like frequency and amplitude, but an application can design its own parameters that can be 'type of reed' or whatever," Music Kit author Jaffe states. "There's also the idea that the parameters themselves are just information, like a property list, and it's the consumer of that information that assigns the semantics to it. So, for example, to a wind instrument a brightness parameter might mean to blow harder, and to a stringed instrument it means to press harder on the bow, etc. The note object contains information that some interpreter will analyze somehow. That interpreter either responds to that message or not, and, if not, it just ignores it. If he doesn't know what brightness is, he just doesn't pay attention; if he's interested in it, he looks for it and does what he wants with it." Using this approach, a composition (or a sound effect) could be orchestrated by deciding on the sound's timbral evolution for a given part, then applying that to various instrument sounds until the most appealing choice is found.

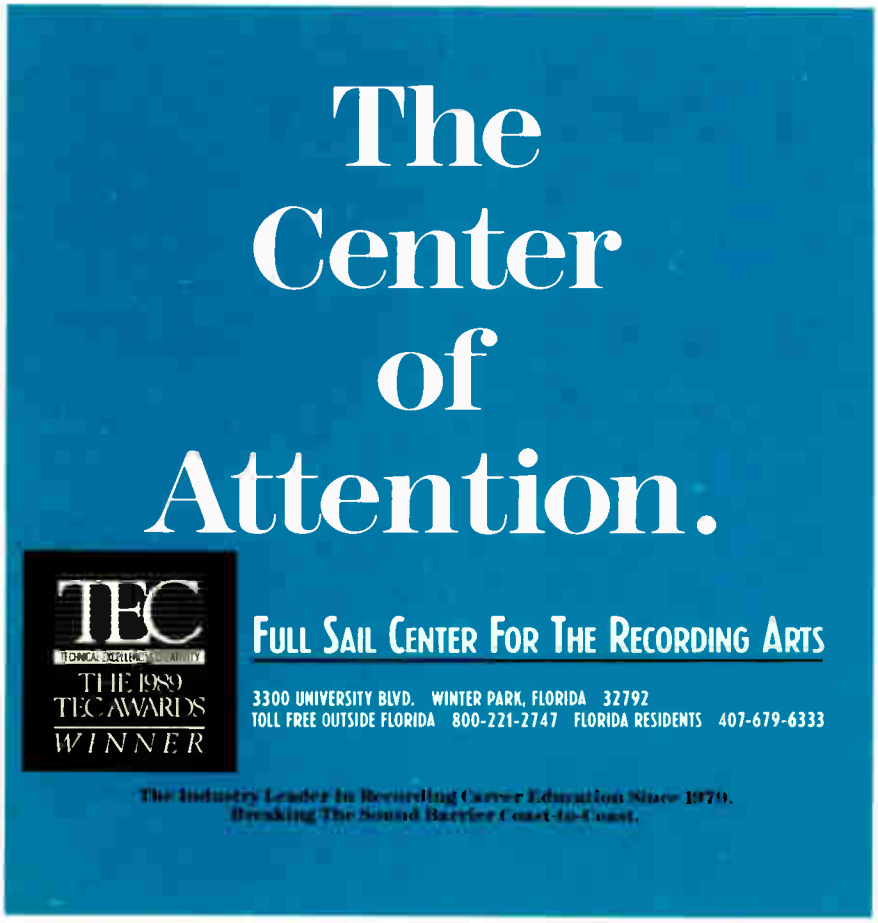
The Music Kit, of course, can deal expertly with MIDI via MIDI objects, providing a deeper and broader representation of performance that includes MIDI as a subset. There need be no distinction made between playing sounds generated by the onboard DSP and playing them on MIDI synthesizers. There is even a MIDI file object that allows the NeXT machine to read standard MIDI files as scores.

What the Music Kit doesn't encompass is notation and graphic representations, which, of course, is where Interface Builder comes in again. Clearly, the components of the NeXT machine's system software are intended to be highly integrated with each other.

GREAT. SO WHERE ARE WE IN ALL THIS?

Massie's analysis of computer lifetimes fits with the current state of affairs: As of this writing, Macintosh is in full flower and boasts many applications for music and sound, while NeXT has no off-the-shelf music and sound applications software available to speak of. But NeXT has a greater conception of how a computer should deal with music and sound, reflecting developments pioneered by the Mac. And one can confidently gamble that Apple is aware of this and is working on its next generation that will be introduced around the time the NeXT machine attains a level of maturity. The onboard capabilities of machines like these make them potent platforms for building a music and sound working environment sufficently complete to consider bestowing on it that now overused buzzword: WORKSTATION! ■

When not performing with Phoenyx, Larry Oppenheimer works as a consultant and sound engineer in the San Francisco Bay Area.



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RAM CONFIDENTIAL

Workstation Pioneers Tell What They Bought and Why

BY MIA AMATO

COMPOSERS, mixers and studio owners are quickly adapting to the benefits of "tapeless" editing in audio-for-picture applications. Television clients used to random access picture editing (on video edit controllers such as the Montage and Avid/1) are lining up to take advantage of RAM sound editing. Forty to 60 hours a week of solid bookings is not unusual for the tapeless suites profiled here.

Most users *Mix* talked to like the speed of these digital workstations. Projects that might have taken a week to edit now take a day or less—that is, once the analog or digital source material has been loaded into the workstation's storage system, typically a large, hard disk drive.

The time spent for load-in and backup is, most users feel, the only drawback to a tapeless digital edit system. Editors with an eye on the clock sorely miss the ability to quickly change reels between edit sessions for one client and the next. "Load up and backup time is not something the client wants to pay for," one studio owner points out.

But, like true pioneers, early workstation users seem confident that this stumbling block, like the system glitches they've endured to be first on their block, will pass. "Having a removable medium, like a magneto-optical disk, is the next step and would solve all these problems," says another studio owner. "The process will then be as quick again as a tape machine as far as startup—just change a disk like we used to change reels."

BEACHWOOD STUDIOS

Cleveland, Ohio

PostPro and PolyPro from NED

"We've just put in our second system," says Joel Solloway of Beachwood Studios, now online with both the PolyPro and PostPro workstations from New England Digital. "We had so much demand on the first room, we were forced to put in the second system for the spillover."

Beachwood is a full-service audio-and-video facility and Cleveland's only post house to offer "tapeless" sound editing. Much of the work done here is commercials and corporate video programming. Goodyear Tire & Rubber Company is a major client.

Solloway selected the NED workstations because, he says, like a Synclavier, they offer a proven RAM hard disk storage. "The system has a tremendous amount of storage," Solloway notes. "A 16-track configuration allows you 12 minutes and ten seconds per track; you can reconfigure to 8-track, which gives you 24 minutes and 41 seconds [per track]. External storage, on IBM streamer tape, is about six hours." Solloway also likes the customized late-model Macintosh as the edit controller: "Having a 19-inch color monitor

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PHOTO: JAMES COHRSSEN

The Lexicon Opus Digital Audio Workstation at Henninger Video.

is pretty wild."

The move to tapeless editing "has changed the whole way I do business," he points out. Scheduling, for example, "became critical" to accommodate non-billable time to load up the workstation memory prior to a session and the time to back up finished work onto streamer tape.

"We raised our rates to compensate for working in the digital world," Solloway explains. "We had no complaints and we were surprised—people are used to paying $50 to $100 for analog time in Cleveland, and we went to $200. In the long run it comes out cheaper for clients because there are no magnetic tape costs and they're out faster—we're 60 percent faster. The funny thing is that some people are actually staying longer, because their options are unlimited. They say, 'As long as we're here, let's try this.' "

Solloway also says he is impressed with New England Digital's support. When the PolyPro crashed earlier this year due to an electrical failure, "They flew someone in the next day with a kit to replace the cards that went bad.

"This is a complex machine," he warns, "and you either need a good tech in your studio—we sent ours to NED's school—or you will have to wait for support from Vermont. But I have to say this is the most responsive company I've ever worked with."

PACIFIC SOUND SERVICES
Hollywood, Calif.
Custom Workstation

When Pacific Video, pix post home for 16 ongoing television series (*The Wonder Years*, *thirtysomething*, *Tour of Duty* and *Young Riders*, to name a few), decided to revamp its audio post-production, there was no doubt the five editing rooms would be all-digital and tapeless. The edit workstations in the five rooms are a custom design developed by Chuck Grindstaff, the son of Doug Grindstaff, vice president of Pacific Sound Services.

The elder Grindstaff says one of the advantages of these custom units over off-the-shelf-models is bigger-than-average RAM storage, a necessity when

Dom Camardella in Sound Design Studios; Joel Solloway in session on Beachwood's NED system.

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The MIDI LAN* has Arrived...

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* MIDI LAN – MIDI Local Area Network

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editing long-form television and made-for-TV movies.

"We have two hours of hard disk storage on each system, which can be expanded up to 20 hours," he explains. "We load up each portion of a television show by act, or by the traditional 'reel' (if the project is a movie) to edit dialog and effects over a pre-layer of the scoring. Along with true random access editing—cut to the waveframe if you prefer it—some of the other features are the ability to lock in time code with a single keystroke, with automatic offset and automatic generation of cue sheets. These can be just printed out; it's not a separate operation." The units are also totally self-contained ("just stick a monitor in front of it and a video playback behind it") and user-friendly ("all my editors here edited on 35mm first and are computer people second").

Essentially, the facility is acting as a beta site for the workstations, which will be marketed this year under the name Cybermation. *[Editor's note: On January 22, Cybermation merged with WaveFrame. See "Current" in the March 1990* Mix *]*

"I doubt they will be used by other studios as we use them," Grindstaff says. "We put them not only in the edit bays but in the mixing room and dubbing stage and Foley stage as well. This is all part of what [Pacific Video president] Emory Cohen calls Electronical Laboratory. The sound department is linked to the video post facility using our proprietary electronic coding system. The Cybermation workstations can take the edit decision list from our Montage video editors and in turn conform to that list to assemble a finished program very quickly and easily, using a PCM digital track taken from the original quarter-inch tapes."

Ron Steele of MIDI Lab uses the ProDisk 464.

SOUND DESIGN

Santa Barbara, Calif.

D.A.R. Soundstation II

Producer Dom Camardella was an early convert to digital workstations. He has used the Digital Audio Research Soundstation II for several years at Sound Design, for record production, motion picture sound editing and jingle work.

"We have a heavy workload of voice-overs, and that's where the D.A.R. is used the most," Camardella notes, "and that's not just matching dialog to a music bed for commercials. We do a lot of seminar tapes, which are edited and prepared for mastering in the tapeless mode, and I use it for films." A recent post project is the feature *Ghosts Can't Do It*, which stars Bo Derek and has a soundtrack by composers Junior Homrich (*The Emerald Forest*) and Randy Tico—mixed and engineered by Camardella.

"The D.A.R. has found a very good niche with us in dialog editing and in spotting cues for film and TV," he says. "It's particularly good when you're making those final, little adjustments. For example, on the *Ghost* movie I took a really good cue, about a minute and a half, for closing credits that went on for minutes and minutes. Just through creative mixing and piecing, using subsections, I was able to build up the sound for the close of the film.

"I've even used the D.A.R. on an album project, a Maynard Ferguson big band album. I wanted a 12-minute medley that in fact was much longer, about 20 minutes. Through the magic of the D.A.R., it's now a tight, strong 12 minutes."

Camardella feels video post is the Soundstation's strongest suit. He praises the SMPTE chase features as responsive and fast in offline editing, and feels the digital interfaces (AES/EBU, Sony 1630 I/O, etc.) take the unit past its limited mixing functions. "It's four channels, but occasionally we will use our Sony 24-track digital recorders for additional tracks," he says. "And we back up on DAT." He and other engineers in the facility also enjoy doing edits with Soundstation's touchscreen.

He acknowledges that while Soundstation II has a large user base in Europe, there are some difficulties involved in owning a system not widely used in the U.S. at this time. "Sometimes I think I may have leapt too soon," he says.

And like other pioneers of the workstation era, Camardella finds the work required to transfer tracks in and out of the unit's disk drive memory an inconvenience. "People should be cautioned that this is part of the real cost of owning one of these devices," he says.

Doug Grindstaff of Pacific Sound Services.

World Radio History

MASTER SOUND ASTORIA
Long Island, N.Y.
WaveFrame AudioFrame

Mixer David Browning of Master Sound Astoria has worked on the WaveFrame AudioFrame long enough to consider the workstation as a tapeless accessory to the way he likes to edit audio-for-video: on tape.

"To me, it's a significant piece of outboard equipment, and one that I use every session," Browning explains. Lately, that's meant a lot of nature-type television: the *National Geographic Explorer* series, programs for the Discovery Channel, and an hour-long special that will air in April on the CBS network, *Dolphins, Whales and Us.*

"The AudioFrame has many applications, and in those shows we used it as a Foley machine, for effects and looped atmosphere," Browning explains. "Shows like *National Geographic* have certain requirements for sound effects—I can't have birds whistling in the background if the birds are not indigenous to where the film footage is from."

Browning says he turns to the multitrack capabilities of the AudioFrame to, in effect, overdub bird sounds sampled from the background

Bobby Giammarco at the helm of Soundtrack's ScreenSound.

sounds from other scenes in the same location. "One of the things I like about the AudioFrame is that it is a superior sampler, with few artifacts.

"It has its own technology for this, called 'fixed rate sampling.' [With] some workstations, when you sample something in the middle of the keyboard, at a specified CD sampling rate, then play lower in the keyboard, it will play back at a lower sampling rate. With the AudioFrame, no matter how far you change pitch, you get that CD-quality sampling rate, a purer sound."

He adds that re-pitching comes in handy when editing long-winded scientific interviews destined to be a part of the dialog tracks for the nature

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shows. "You want to end a sentence early but not have it sound like it's been cut off," he explains. "But it won't sound like the end because the inflection is wrong. With the RAM memory [about six minutes of sampling time] I can actually split words in two, and drop the pitch of the last one or two syllables to get the correct inflection, giving the illusion that it's the natural end of a sentence."

Browning says the AudioFrame is occasionally wheeled out of the post room into the large studio used for film scoring, "where we put it to use in some good musical applications. It's a MIDI-based device, so you can basically load in sounds, activate it through another MIDI keyboard or play it live as if it were any MIDI sequencer."

TRACKWORKS RECORDING
New York City
Fairlight CMI-III
Jonathan Helfand installed his Fairlight CMI-III two years ago specifically to do sound effects and dialog editing for advertising clients who do radio and TV commercials at the group of seven studios collectively known as Trackworks. Last year's controversial "Bill of Rights" spots for Phillip Morris, built around sound bites of Roosevelt, Truman and Kennedy, and the first of the American Express "Cardmember" TV campaign, a voiceless spot featuring Paul Newman onscreen and effects by Helfand, were all done with the Fairlight.

For dialog spots, he says the low-cost Fairlight excels in the subtractive editing: splitting dialog; removing pops, clicks and distortions; and cutting and pasting of syllables—once one gets used to a slight time lag. "For instance, after you've just recorded something, the disk digests it first; it takes about a second. When you use the RAM system for recording you have to wait a couple of seconds.

"It's really fast for effects editing. I did a spot that had 35 tennis racket hits—a Prince commercial," he recalls. "We'd finished it, had all the numbers locked in and everything looked great to picture, and the client turned to me and said, 'Gee, what else could we do with that tennis racket hit?' Well, since we had the edit list, it was very easy [on the Fairlight] to plug just one more sound in. The list is just 'play sound *x* at time code *y*.' So, backing up one tennis hit you hear a basketball. Two seconds later, backing up the tennis hit is a kick drum. [It's simple to have] a different sound for each of the 35 hits, and still have your sync-to-picture."

Helfand says one of the benefits of this workstation is its multitasking ability: "While I'm editing a voice-over, I can still be running a list of the rest of the commercial, showing the sound effects and the music to the client. It speeds up the work and the client entertainment factor is quite high."

Fun and games aside, Helfand says the Fairlight has changed his business drastically. "I have to deal with clients who don't want to be locked into a strange format," he explains.

"Certain clients would like to work on a spot someplace else, and you can't take the data tapes from a Fairlight and use them in another system, like a Synclavier, or indeed to another Fairlight that's revved as high as mine. Fortunately, there are seven other studios here, so I can lay off on conventional tape.

"The upside is that now I get all the tricky stuff. I now get clients who are seriously interested in how far we can go. And I get whole campaigns. Clients who get into this format suddenly find reasons to finish projects here."

SCREENMUSIC INTERNATIONAL
Studio City, Calif.
Studer Editech Dyaxis
Composer Robert J. Walsh purchased two Dyaxis workstations for film and TV post work at the large studio complex he finished building in 1989. Well known for his award-winning tracks for children's animation series (*Muppet Babies, Fraggle Rock, My Little Pony, Transformers*), Walsh is also the creator of a multivolume music library, The Hollywood Music Library. Dyaxis figures prominently in both sides of his music business.

"The best application for the Dyaxis is music editing," says Walsh. "We have one digital editing bay that's used strictly for music and using the music library. One Dyaxis is in there—along with a 32-channel console, a lot of DAT, multitracks, video recorders and CD players.

"In the studio next door, we have a separate Dyaxis unit, used mostly for cutting sound effects and dialog for shows. It's very handy for editing dialog. Every other day or so we have an animated show in there—*The California Raisins*, stuff for Spielberg's *Tiny Toons*, some Ralph Bakshi shows.

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We've also done some segments of a new Elliott Gould movie on it, called *Dead Men Don't Die.*

"I recently scored a 15-minute animated show for Nickelodeon, *The Ballad of Turkey Hill.* They gave us two days for the whole project, including the scoring. After I scored it, one of our editors just edited it very quickly on the Dyaxis."

Clients who come in for canned soundtrack services also benefit from the speed of the Dyaxis. "Budgets for that kind of soundtrack have fallen," Walsh notes. "This helps us offer a quality digital audio product within the constraints of a smaller budget."

HENNINGER VIDEO
Arlington, Va.
Lexicon Opus I
"Our Opus is fully booked; the biggest problem is trying to maintain a reasonable work day for Rich West, our primary operator," says Rob Henninger of Henninger Video. Both Henninger and West have a lot to say about Lexicon's Opus digital workstation, installed last year in this post house.

For Henninger, a digital workstation was a natural step for a video facility making the switch from Type C to digital D-2 and Beta SP formats.

"It was the quality of the digital audio tracks on those VTRs that really had me take the workstation concept seriously," he says. "With the D-2, our facility was moving rapidly into the digital domain. We looked at several schemes: Synclavier PostPro, the AMS AudioFile, the AudioFrame."

Henninger says he picked the Opus I because he felt it could be most easily integrated with video gear. "Opus was really the first to be able to handle the interchange and keep everything in the digital domain," he points out. "Having a good built-in mixer was a strong point. Opus also has a very powerful equalization section—really the best digital EQ."

Catering to Washington, D.C., producers, the job mix at the studio includes political advertising, PSAs and other commercials; programs for trade associations; and the occasional news segment for PBS, NBC and ABC. Even at a rate of around $200 an hour, it's a busy schedule for West.

"I'm impressed every time I use the Opus," he says. "The availability of a lot of tracks [12 in this configuration] is helpful because you can store all your elements and pull from that as a bank. For example, I did 87 different spots for the National Census: 15s, 10s, 30s,—same music underneath but a different voice-over for most, and a sound effect that went along with the graphic move at the end. The whole job took about ten hours.

"One of my producers likes to do a lot of takes [of dialog]. So I stack them up on different tracks in the Opus and can call up a phrase or a word instantly, by track number. We get the best take of every line; we've taken the compromising out of the selection process. It's no longer, 'We're running out of time, let's go with this.' I like the ability to store ten different previews of an edit within a cut function.

"Loading up and backing up and archiving on 8mm video has been very reliable, but we've had to change our thinking in terms of scheduling," West notes. "We have to look ahead more, and we schedule load-in time as well as the actual production time."

SOUNDTRACK
New York City
SSL ScreenSound
Chief engineer Bob Giammarco says it took less than a month to realize the potential of Solid State Logic's ScreenSound workstation.

"I did 90 spots for the Disney Channel in one day," he says. "It cut the time in half." Giammarco's also been cutting TV spots for McDonald's and Head N'Shoulders with ScreenSound at Soundtrack's East Side studios, where the clientele includes record producers as well as major advertising clients.

"Our facility is heavily SSL," says Giammarco. "We own five SSL consoles—four here, one in our Boston facility—so we would have been interested in any case. But," he points out, "we also own two NED PostPros. We own a Lexicon Opus. We bought the ScreenSound because it's great."

Giammarco says the unusual user interface of ScreenSound—a tablet with a stylus and accompanying menu screen—makes it easy to use and popular with TV commercial clients. "They've borrowed a lot from the Quantel *Harry* and *Paint Box*; like the pop-up menus," he explains. "So my clients that have worked on a Paint Box, which is virtually all of them, immediately get hooked."

The 8-reel format visible on the menu screen hides nearly unlimited multitrack edit functions, he notes. "I could work on eight tracks, mix them,

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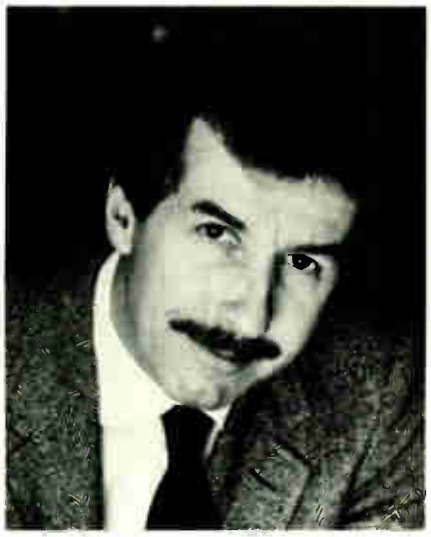

Composer Robert J. Walsh is a Dyaxis user.

bring up another eight, and mix them, and go on for quite some time before I used up the memory space on the unit," Giammarco says. The company's original package comes with 50 minutes of record time, "but we're expanding to three hours with the purchase of a second hard disk drive."

Giammarco has begun to use the workstation for music editing. "I've just sequenced an album on it, and did a bunch of 12-inch singles, including one for Jermaine Jackson," he says. "One of my other record clients doesn't want to leave the DAT format; they were blown away with ScreenSound."

Giammarco expects "some basic operating glitches" on the unit to disappear with an upcoming software revision. As for hardware, "True digital inputs and outputs would be wonderful, and they've slated that," he says. "My wish list of improvements are all things Solid State Logic has scheduled to happen. It's just a matter of time."

MIDI LAB

Chicago

Digital Dynamics ProDisk 464

"I auditioned a bunch of systems for almost a year and this one jumped out at me," says Ron Steele, founder of Chicago's MIDI Lab, of the ProDisk 464. "I really love it." A former owner of the famed Streeterville studio, now a teacher and producer of complex TV spots for national accounts like Alberto-Culver and Kroger, Steele launched MIDI Lab "as a boutique, a family operation. I'm back in business because of this technology," he points out. "I looked at workstations for a long time and couldn't afford it. This is affordable. It's a breakthrough."

Steele uses the ProDisk 464 in conjunction with another computer-based workstation, the Hybrid Arts ADAP. "The ADAP is perfect for sound design, to change the envelope, waveshapes and pitches," he explains. "I use the ProDisk for digital assembly and as a multitrack recorder for things designed on the ADAP." The configuration he has used since December comes with two hours of storage, which can be expanded. "Now I'm recording all dialog straight into the ProDisk. I'm down to one tape machine in my studio, which we use only if someone brings in a tape or wants a dub. We mix down to R-DAT."

The 464's most valuable editing feature is "instant lockup to any VCR in the house—a big reason why I bought it," Steele says. "The ProDisk gives me instant SMPTE lockup: that's a $6,000 advantage right there."

He also praises ProDisk's random access edit accuracy ("1/3,000 of a second") and its "transport" functions, emulated on the Mac screen with familiar icons, like tiny ATRs. "If you touch the reel on the right side, you go forward. Touch the left side, you

—CONTINUED ON PAGE 155

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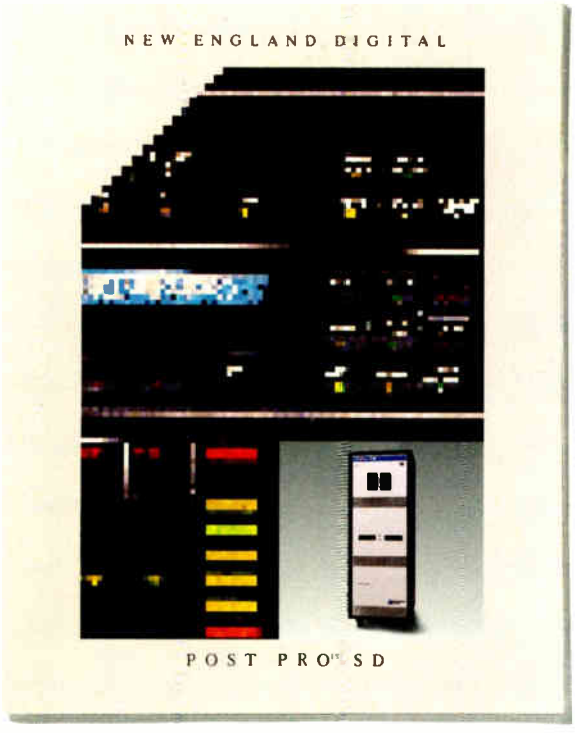

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by Paul Potyen

MUSIC SCORING
THE END ZONE IS IN SIGHT

My music production techniques have changed radically in the last five years, and I'll bet yours have, too. While I occasionally find myself working with a room full of actual musicians on a recording project, that scenario is far less common than it used to be. A more likely scenario is one in which an engineer and I overdub a vocalist or an instrumentalist to a composite of previously assembled MIDI tracks.

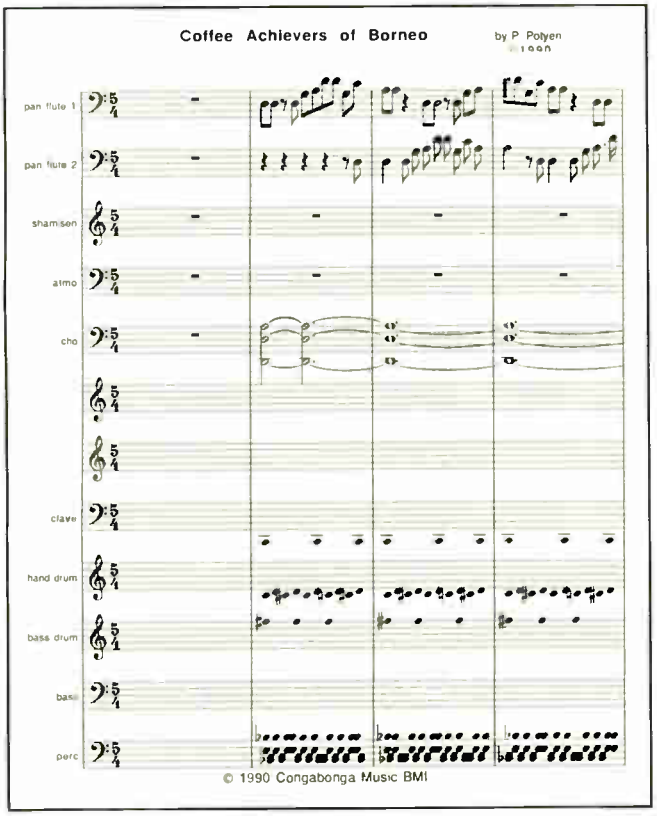

Fig. 1: Encore's printout of a partially edited score.

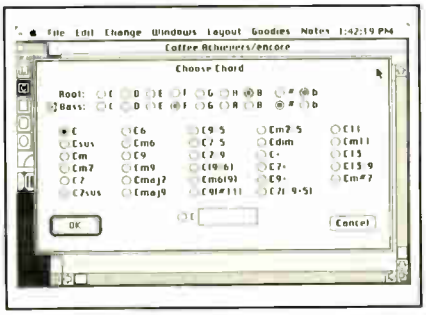

Fig. 2 (center left): Encore's Choose Chord window.

Even when my mandate is to record acoustic music requiring an orchestra, it's usually done only after considerable pre-production with MIDI in my home studio, and the task is to replace or enhance what I have created with my Mac and synths. MIDI is wonderful for that. I can easily try out several thematic ideas and instrumentations, and, as was the case in a recent series of radio commercials, I can accurately audition my musical ideas to the ad department *before* spending a lot of money in the studio.

The only significant bottleneck that remains is getting the notes in front of the studio musicians quickly. Translating MIDI data into musical notation is, at least in theory, an attractive alternative to writing out a score on paper and then handing it over to a copyist. It could be argued that if a program were well-written it might not only save time, but it would minimize copying errors by both the composer and the copyist. The perfect solution would be to hear what you're seeing *before* the musician plays it in the studio.

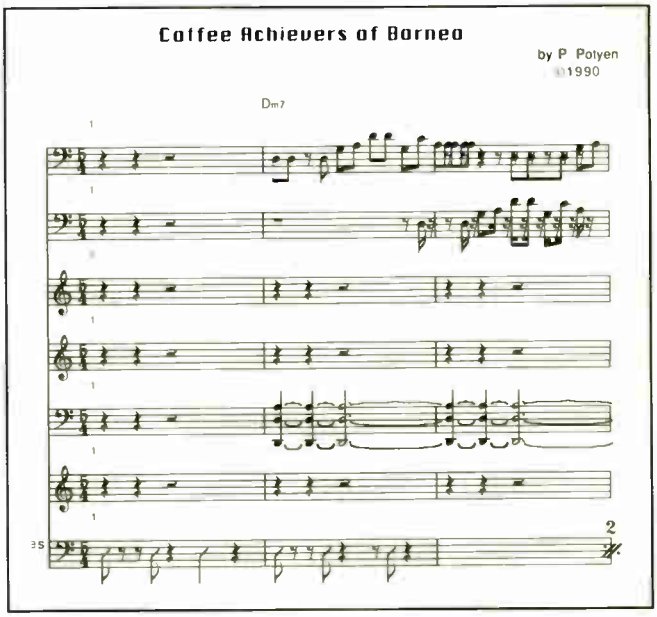

Fig. 3: Printout of a partially edited Music-Prose score.

Computerized scoring programs have been around for several years:

Mark of the Unicorn's *Professional Composer* and Electronic Arts' *Deluxe Music Construction Set* were two early entries. While music notation is conceptually similar to word processing, it's considerably more complex. And translating MIDI data into traditional music notation creates Excedrin headaches that only a programmer (or maybe a frustrated MIDI composer) can appreciate.

But I think we're getting there. At the January NAMM show, a number of music software companies were touting their latest attempts at wrestling with the music notation beast.

There was *MusicPrinter Plus for IBM*, from the company of the same name, *Pyware Music Writer* for both IBM and the Mac by Pygraphics, *QuickScore* modules for Atari and Amiga sequencers by Dr. T's Music Software, *Notator* for the Atari by C-Lab, and a few others. In this month's column I decided to do quickie evaluations of two such programs for the Mac that were creating some buzz at the show: *MusicProse 1.0* from Coda Music Software and Passport Designs' *Encore*.

If there's one thing I share with my colleagues in the music recording business, it's a lack of leisure time to explore the myriad options available in a software package. I'm from the "Load It and Beat On It" school. So I decided to spend four hours with each program and see how far I could get. The first part of the evaluation was to see what would happen when I imported a 35KB MIDI file I created in my sequencer. Assuming that the resulting file would not be without its problems, I could then see how easily and quickly I could fix inaccuracies, insert chord changes, perform other edits such as transposing and, finally, print out parts. I used a Mac SE and System 6.0.4, with 4 MB of RAM and a Microtech 45MB removable hard drive. Opcode's Studio 3 was the MIDI interface between my keyboard and the Mac.

ENCORE

Encore 1.1.3 for the Macintosh was shipping at the time of this evaluation, with plans to release versions for the IBM and Atari by April. The program supports Adobe Systems Sonata font and comes with the screen version of that font. Those interested in laser printouts of their music need to purchase the corresponding printer font from Adobe. Installation and launching was no problem, as the software is not copy-protected. However, mysterious maladies that appeared when I imported my MIDI file and the crashes that ensued when I tried to manipulate the data in Encore were traced to my use of MultiFinder. Passport claims that Encore works with MultiFinder, but I was unable to confirm this. I found the going much more pleasant using the Finder. (At press time I received version 1.1.6 of the program, and I was able to confirm that this new version was MultiFinder-compatible.)

The program's interface is quite friendly, and I was able to import my MIDI sequence consisting of 12 tracks easily. The 35KB file emerged 75 seconds later in a hybrid music notation that lacked stems, flags and other indications of duration. (See Fig. 1, lower staves.) The idea behind this allows the user to move around much more quickly in editing mode without waiting for the computer to spend a lot of time recalculating data and redrawing it on the screen. By selecting an area (from one measure up to the entire score) and choosing Guess

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Durations, you can ask Encore to calculate the values according to your quantization specifications. Guess Durations worked relatively well interpreting my MIDI file, with one obvious flaw: A held note in a 5/4 measure translated into a dotted whole note (Fig. 1, fifth staff, third and fourth measures). This discrepancy was easily fixed by editing on the screen (Fig. 1, fifth staff, second bar), but I'm hoping that future versions of Encore can be corrected to take care of this automatically.

Measures thus "guessed at" appear without beams, but a quick and flexible beaming system is available. Beaming of the top staff of Fig. 1 was accomplished in one operation. Also convenient are an array of computer keyboard tricks, like ⌘-a for the arrow tool, ⌘-e for the eraser, ⌘-n for the note palette, ⌘-1 for a whole note, and ⌘-1-r for a whole note rest. Click on the staff and there's your notation. Besides using this step-time method with a mouse, you can use step-time with your MIDI keyboard to enter single notes as well as chords, while the Mac keyboard lets you specify the corresponding note values. And for those who are most adept at entering via the MIDI keyboard in real time, your prayers have also been answered.

Encore imported the correct MIDI channels along with the other infor-

NAMM Nuggets

Nowhere was there more activity at the January NAMM show than in the software ghetto, and there were some intriguing developments of interest to pro audio people. Craig Anderton mentions a couple of them in his "MI Update" column. Here are some more.

Spectral Synthesis (Woodinville, Wash.) was showing its SynthCARD DSP system, which performs digital audio signal processing and sound generation under the control of software running on the PC. The basic system is a combination of two boards that plug into the computer slots—the SynthCARD DSP board and the FlyBy Bus controller board. These components, together with Spectral's *AudioCAD* series of software products, allow you to configure a flexible modular digital audio recording and editing system with as many as 16 tracks. It's expected to be shipping later this spring.

One of the most remarkable demos I saw came out of Intelligent Music's (Albany, N.Y.) booth. The result of a cooperative venture with IRCAM, *Max* is a program dedicated to bringing the simplicity and flexibility of Apple's *HyperCard* to real-time control of music hardware. It's a graphic programming environment in which applications can be built by linking together simple modules. Through MIDI, control voltage, RS-422, RS-232, SCSI or other mechanisms, Max can drive almost any hardware. I watched David Zicarelli design an application on the Mac screen that controls the playing of a specific section of a CD from the computer.

Another program demonstrated a custom-designed software control panel for a Fostex R8 recorder. The program, available later this year, will include templates for controlling a wide variety of hardware. You can edit these or create your own applications. Max is only one of several innovative new programs I encountered at that booth. More about those later.

Dr. T's Music Software (Chestnut Hill, Mass.) continues to roll out new products, including enhancements to its already powerful sequencer, *KCS* for the Amiga and Atari, and *Beyond*, a full-featured sequencer for the Macintosh.

Playroom Software (Charlotte, N.C.) showed IBM-based editor/librarians for the Yamaha SPX90 and Lexicon LXP-1. C-LAB (Menlo Park, Calif.) unveiled *Soft Link*, a multiprogram environment added to its sequencing and notation programs, *Creator* and *Notator* for the Atari ST. Digidesign (Menlo Park, Calif.) debuted its hard disk-based digital recording system Sound Tools for the Atari. The company also announced the development of *Master List*, a new utility program for Sound Tools on the Macintosh. Master List allows the user to assemble a master playlist of sound files, playlists or regions, even when located on different SCSI storage devices.

—*P. P.*

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mation, and it played back my edited file as accurately as a normal sequencer. The staff names as well as their MIDI channels can be changed, muted or soloed from the Staff Sheet window, and the names appear to the left of the correct staff on the screen and on hard copy.

Despite the fact that the beta manual I received had no index (I *hate* when that happens) and I could find no documentation regarding entering chord symbols, I was able to find its icon on the graphics palette. Clicking on it gives you a Choose Chord window (Fig. 2). This option allows for entering all but the most bizarre of chord names, and the resulting chord symbols can be adjusted, pasted and—yes, Virginia—automatically transposed along with their companion measures.

Text entry is also made from the graphics window, and you can use any of the fonts in your system. However, printing on the ImageWriter is not WYSIWYG, as the text blocks are displaced with regard to the music. In order to print a single part, it is necessary to select the part you want and save it as a separate file—an inelegant but workable solution.

Encore has all the features I would want in a program of this type, including a generous palette for entering dynamics, a separate way of handling lyrics, flexible page layout options and many others. In four hours it wasn't possible to examine all of them, but the designers of the interface did a good job of taking advantage of the Macintosh conventions, and I was surprised at how deep I was able to dig in that amount of time. The version I looked at was not free of bugs, but it has a whole lot of potential for users like myself.

MUSICPROSE

Released at the end of 1989, Coda Music Software's MusicProse 1.0 is the first spinoff of its original music notation software program, *Finale*. According to Coda, it is designed to include the most-used features of the original Finale and developed to answer the needs of the great majority of musicians who want a user-friendly package for the most common music notation chores.

Rather than make use of Adobe's Sonata font, Coda supplies two of its own. The fonts—Petrucci (the primary music font) and Seville (for guitar fingerboard notation)—support ImageWriter printers. Laser fonts are available separately from Coda.

To import a MIDI file into MusicProse, you must close any existing file (only one file can be open at a time) and choose Transcribe from the File menu. Using the same MIDI file consisting of 12 tracks, I discovered that the program took more than five minutes to accomplish its task. While waiting, I was able to examine the excellent manual, and one thing I discovered was that the maximum number of allowable tracks was eight. It was unclear to me why I got only seven—the remaining five tracks were ignored. However, everything was already beamed and quantized (Fig. 3).

While MusicProse has a lot going for it, speed is not its strong suit. In fact, that's its biggest drawback. The screen is redrawn every time you move the cursor, and on an SE with 4 megs that can take some time. And there are two ways to play back your file: on-the-spot playback and playback of a compiled file. It took 12 seconds to play back measures 1 to 3 of my 7-track MIDI file without first compiling a playback file. It took 3:20 to compile a playback file! Neither of these methods is too attractive if you want to do a lot of editing and hear what you edit.

Speaking of editing, information can be entered in various ways: Simple entry allows you to choose an entry from a palette and click it into place; speedy entry (either with or without a MIDI keyboard) is similar to step-time entry in Encore; and HyperScribe lets you enter music in real time from your MIDI keyboard. Referring again to Fig. 3, my translated MIDI file was quantized to 16th notes, and originally appeared as shown on the second staff. Editing the similar notation on the first staff proved a bit frustrating. (Obviously, my attempts were more successful on the second bar than on the third.)

As in other areas of the program, options abound, which make it more adaptable to individual tastes and more difficult to navigate. For example, a MIDI thru option allows the mapping of MIDI channels coming into MusicProse so they leave MusicProse on different MIDI channels. (A bug in this last feature caused some problems. Technical support advised me it would be corrected in an imminent update.)

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3. Can each edit have an individual crossfade time? How long can each crossfade be?

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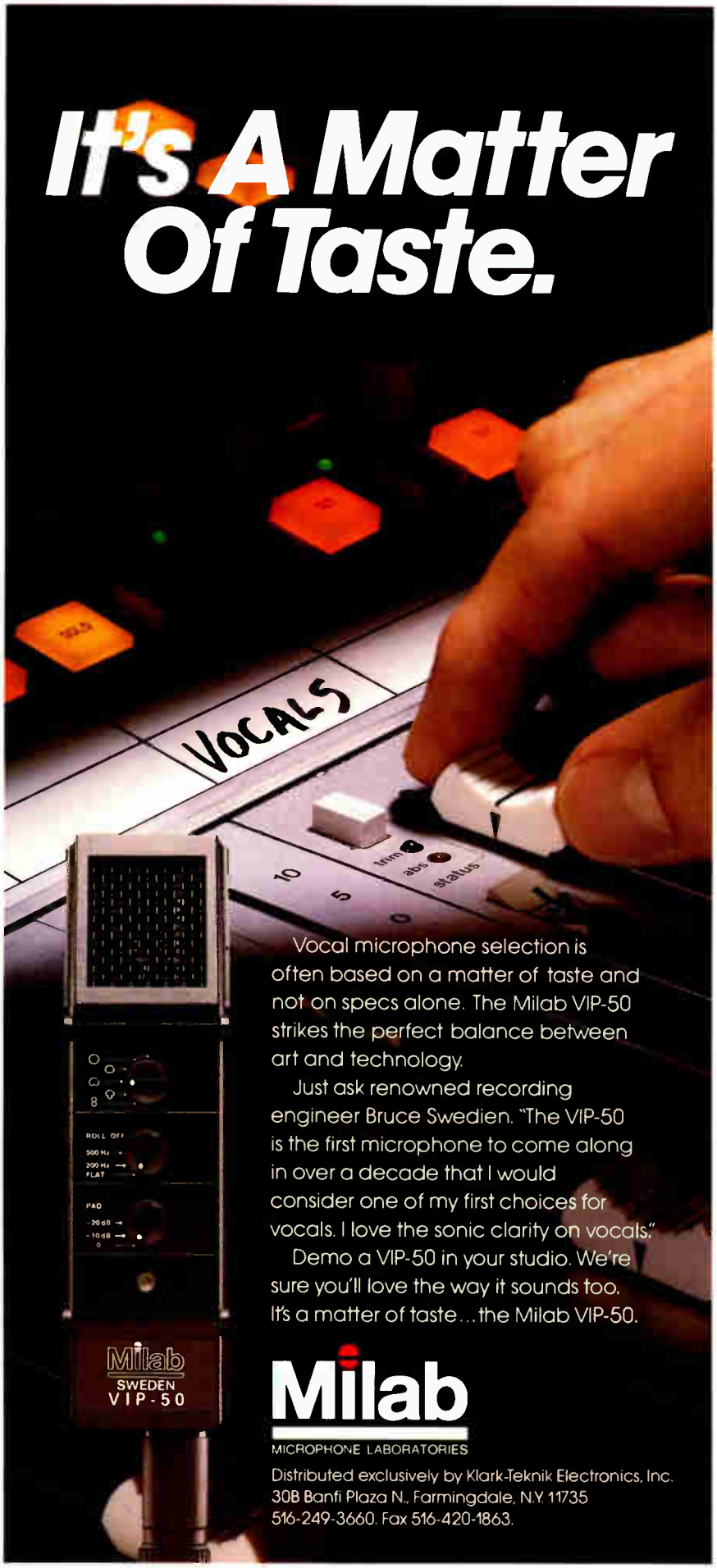

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In general, MusicProse does not take full advantage of Mac conventions. For example, to delete a staff you must click on a button attached to it to select it, and then press delete or backspace. You can't double click anywhere on the staff and use the edit menu to cut or clear.

MusicProse does have some very sophisticated options, however. One of my favorites was its ability to change normal notation into rhythmic notation, as in the clave part (Fig. 3, bottom staff). The repeat notation (bar 3) is also very handy, especially for rhythm parts. The chord suffix option allows you to name and identify your own chord clusters as well as the conventional ones, and it will do its best to identify any cluster you wish. Unlike Encore, MusicProse won't let you transpose more than one staff at a time, although like Encore, the chord symbols will transpose with the rest of the information. Its method of preparing and printing parts is even less elegant than Encore's: You must save a copy of the entire score and then delete all other parts.

Finally, I was curious to see how Finale's speed of operation compared to the other two programs, so I did a quick test and discovered it took more than 15 minutes to import my 35KB file. Once loaded into Finale, however, the data could be manipulated somewhat more efficiently than from MusicProse, although not as fast as Encore. Incidentally Finale Version 2.0 is mind-boggling in its complexity. The application is 1.3 megabytes, and it is shipped with more than 950 pages of documentation.

POSTSCRIPT

I concluded from my admittedly hasty evaluation that Encore is not without its problems, but it's better-suited for my purposes and my machine than either of Coda's products. Available for $595 for IBM and Atari ST as well as Mac, it's a package with a lot of potential. If you have a more souped-up Macintosh, if you work with small- to medium-sized scores, and if you are interested in really getting into the nitty-gritty of music notation, MusicProse is well worth considering at a suggested retail price of $249. ■

Mix associate editor Paul Potyen wears many hats, and, as a result, his head is very warm.

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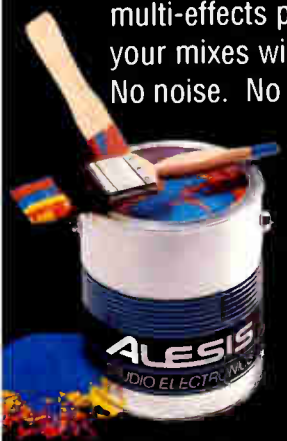

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by Mel Lambert

ALAN MEYERSON
REMIX MASTER

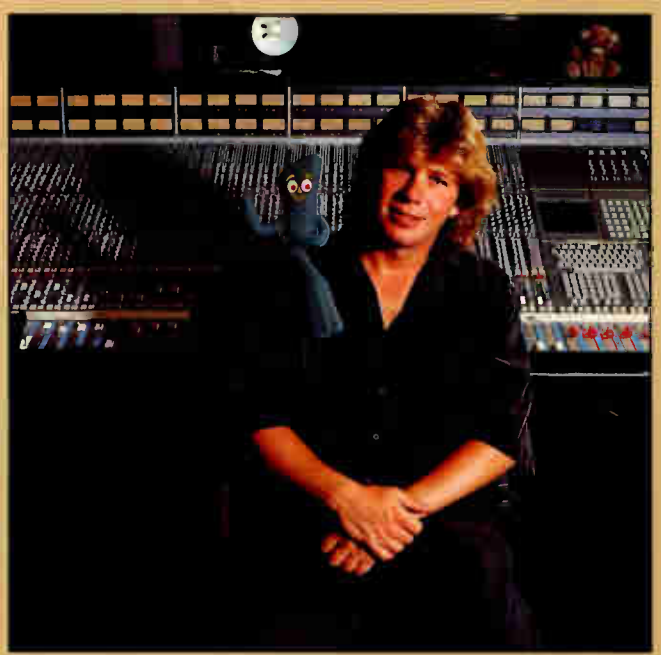
Remixing is one aspect of record production in which a personal touch plays as much a part as engineering talent. And not just because your ideas happen to be fresher or more appropriate than the person who recorded the project. For most of us, it's having the technical and artistic chops to interpret the material and produce a final stereo balance that carries all the musical textures and nuances (not to mention 12-inch dance remixes, radio mixes, extended mixes and other special products). Today's multitrack tapes may need to be remixed and even sonically "reinterpreted" as many as a dozen times during their brief, incandescent life.

But what constitutes a good mix these days? And what are the special skills required to join that elite cadre of engineers to whom the labels bring their product for remix? Who better to express an opinion than Alan Meyerson, one of the industry's busier remix engineers, who is also carving a very credible niche for himself as a talented engineer/producer. During the past five years Meyerson has remixed literally hundreds of single and album tracks, including projects with Dino's *24/7*, New Order's *Techniques*, Bryan Ferry's *Bete Noire*, Flesh for Lulu's *Long Live the New Flesh* and Book of Love's

Lullaby, plus sessions with Roy Thomas Baker, Deon Estus, Robbie Nevil, Cameo and others.

A self-described "frustrated trumpet player," Meyerson began his engineering career at Counterpoint Studios in New York. Moving to Hit Factory and then to A&R Recording, he started his freelance career in 1982 at what was then Wizard Recording. After a stint producing commercials, he began working with Arthur Baker on dance records. "Arthur was producing Bob Dylan, Carly Simon and a whole host of others," he enthuses, "and so I engineered a lot of those records. Plus I began working with a bunch of other New York producers on mixing dance records, which I love doing."

"My forte," he says, "is being able to develop sounds on a mix that work together *cohesively*. It's often a prob-



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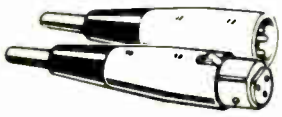

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lem for engineers, when they mix a song, because the tracks don't blend. Too often things sound *great* by themselves—wide dynamics and a 'huge' sound—but they will sound lousy in the mix when you add guitars, vocals and other instrumentation. They don't work together because no room has been left in the mix for other musical flavors."

There are lots of reasons why composite elements of a mix may not blend together as well as they should, Meyerson says. "Tapes pass through so many hands these days—the project may start in a MIDI room, where the performer becomes too focused on his synth and sampled sounds. And then it moves on for maybe more synth and guitar overdubs. All of these engineering hands influence the tracks in some way."

Meyerson says one reason the "session focus often becomes blurred" is because of multiple slave reels. "Because you aren't overdubbing against all your tracks—you're often hearing mono drums, without all the keyboards, and so on—it's very difficult to play one track against another and leave space for elements.

"During a recent Robbie Nevil song, 'Back On Holiday,' we had about seven slaves of backgrounds, vocals, keyboards, percussion and all the rest. Since I had been involved from the beginning of the project, I was able to keep an overview of where the song was going. Comes time to remix, we just put up the master and one slave of stereo submixes, and the whole mix dropped back together!"

Meyerson recalls that when he joined the Bryan Ferry *Bete Noire* project, "We had lots of material on tape. It was a matter of picking what worked best from the alternate takes of guitar, percussion and different drum patterns; it was just a matter of choosing what worked best during the mix. Bryan gave me a tremendous amount of freedom in picking the best material; he was open to a fresh ear."

But when working with less experienced artists, he cautions, "You really need to put down a vocal reference track as soon as possible. Then you can see how the track is working and evolve a direction. A new artist needs to think basic and then embellish.

"If I'm working with a new band, I prefer to go into a rehearsal studio and ask them: 'If you were going to do this live, what parts would you play?' Or: 'What's the most *important* part of this record?' And then refine and fine-tune that aspect until it is absolutely nailed down. *Then* we go in the studio and record it."

For Meyerson, the general rule during remixing is "Less *is* more." As he concedes, "I cannot think of a mix I've done over the last year when I didn't pull something out. You have to try lots of variations, and not all of them work in the final mix, or throughout an entire song."

Building toward a mix involves keeping accurate notes, he says. "I try to keep my session notes readable for anyone who might be mixing my tracks. I've been on the receiving end of some *very* funky notes, and so I know what's needed. I erase parts on the tapes that I know aren't going to be used—it's real important to keep clean tapes. You never know if someone is going to do a 12-inch mix from your tapes later, and you don't want them putting the horns on it. So you mark them—'This Isn't to be Used'—or even erase the tracks if they really aren't part of the song."

Meyerson concedes that on several remix projects that have come his way recently, "the parts were *badly* misrecorded. On one project I had some live drums, but they sounded like the tracking engineer had spent so much time in getting the sounds, he'd lost sight of the forest for the trees. The sound was unusable, so I ended up replacing kick, snare and, in most cases, the hi-hat and cymbals with samples. The only thing that was hard to replace were the toms, which I kept.

"From 14 original Deon tracks I ended up keeping maybe two. I used an Akai S1000 sampler and a box that converts audio triggers into MIDI. My sample collection comes from my ten years in business.

"Other tracks were full dynamic range: full of top, full of bottom, full of middle, full of 3 kHz, 300 Hz. Soloed, everything was right in your face! It was by far the hardest project I've ever done, in terms of taking what was on the tape and turning it into music. Remixing 12 songs took three weeks, after which I was pretty fried!"

Meyerson says that if he didn't record the parts, "it's often hard to work out which is the best track to use. But, just so long as the mix sounds great, you use your best judgment.

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After all, you cannot be inside a producer's head and know exactly what they wanted.

"Sometimes I'll move things around. Maybe a part isn't working in the chorus, but it'll sound cool in the verse. So I fly it off and move it to the verse. If a keyboard or a percussion part isn't working I'll call in a session musician and overdub it. If I think that it'll turn the record around, the label gives me the go-ahead. When you look at what they're spending on videos these days, the cost of a day's extra overdubs in the studio ain't gonna break the bank!"

In terms of choosing tools of his trade, Meyerson tends to call two L.A. studios his "home" base: Larrabee and Ground Control. "For recording, I'm an analog guy, particularly for rock 'n' roll. For softer, more lyrical projects, where the silence is important, I'll use Mitsubishi digital, which sounds more natural than other formats.

"But I'm very impressed with the sound of Dolby SR on a Studer A-800. With its separate sync and off-tape outputs, I can use the A-800's sync head for pretriggering my sampler. All samplers have MIDI processing delays, so I need a way of getting to the trigger ahead of the replay signal. With analog you can also flip the tape for backwards snare reverbs or special guitar effects.

"For consoles I like SSLs and the newer Neve V Series. The Neve is nice for ballads, because of its warmer, fatter low-end. I use outboard API EQ, Pultec tube EQ, a Neve stereo compressor for vocals and a Brooke-Siren System limiter that I bought in England while mixing the New Order album at Peter Gabriel's new studio, Real World.

"I try to keep my session notes readable for anyone who might be mixing my tracks. I've been on the receiving end of some very funky notes, and so I know what's needed."

"I use a lot of Lexicon equipment, because their delays and reverbs are rich-sounding with good high-end. I also like a lot of old gear—old MXR Flangers and Marshall Time Modulators. BBE Exciters sound good on vocals; they don't get too harsh. One problem with modern recordings is that a lot of them, for budget reasons, get recorded in substandard studios. I see a lot of tapes with poor-quality backgrounds, lead vocals, guitar solos, etc; I need a device that brings out the vocal. The BBE lets me add high-end without EQ."

Meyerson determines what works in a mix by the sense of left-to-right separation, as well as forward and backward dimensions. "I try to put everything in its own space. It might be in your face, or very distant in an ambient wash, but in my mixes *nothing* is just laid in haphazardly.

"I build up the mix from the rhythm section—drums and percussion with bass. For a dance mix the beat is *everything*; it's gotta slam! In my opinion, you could throw out most of the bullshit on a dance mix, and it would still work. Just give me a good bass drum, vocals and percussion, and one good keyboard part, and you've got a *great* record. But for some mixes, you have to hear all of the textures and nuances, because that's what the record is all about—small guitar parts and other subtleties."

A final question: What five landmark sessions would Meyerson like to have been involved with, either for artistic reasons or because he could have improved on the sound of the final mix?

Almost instantly Meyerson has an answer: "The song 'Avalon' by Roxy Music. Not because of anything that's wrong with the mix, but just to have gotten my hands on the tapes! Also 'Back Together Again' by Roberta Flack, which could benefit from a remix, plus recutting some of the tracks and embellishing a couple of overdubs. 'Crime of the Century' by Supertramp—I'd love to hear the multitrack elements and remix the sounds. Plus: 'Octopus' by Gentle Giant and 'Urban Renewal' by Tower of Power.

"But we each have to build our own reputation—I stand by my own projects. Although I'd maybe like to recut one or two mixes, I like to think that my mixes and production techniques took the artist's sounds from the merely good to beyond very special. Isn't that why we got into this business?" ■

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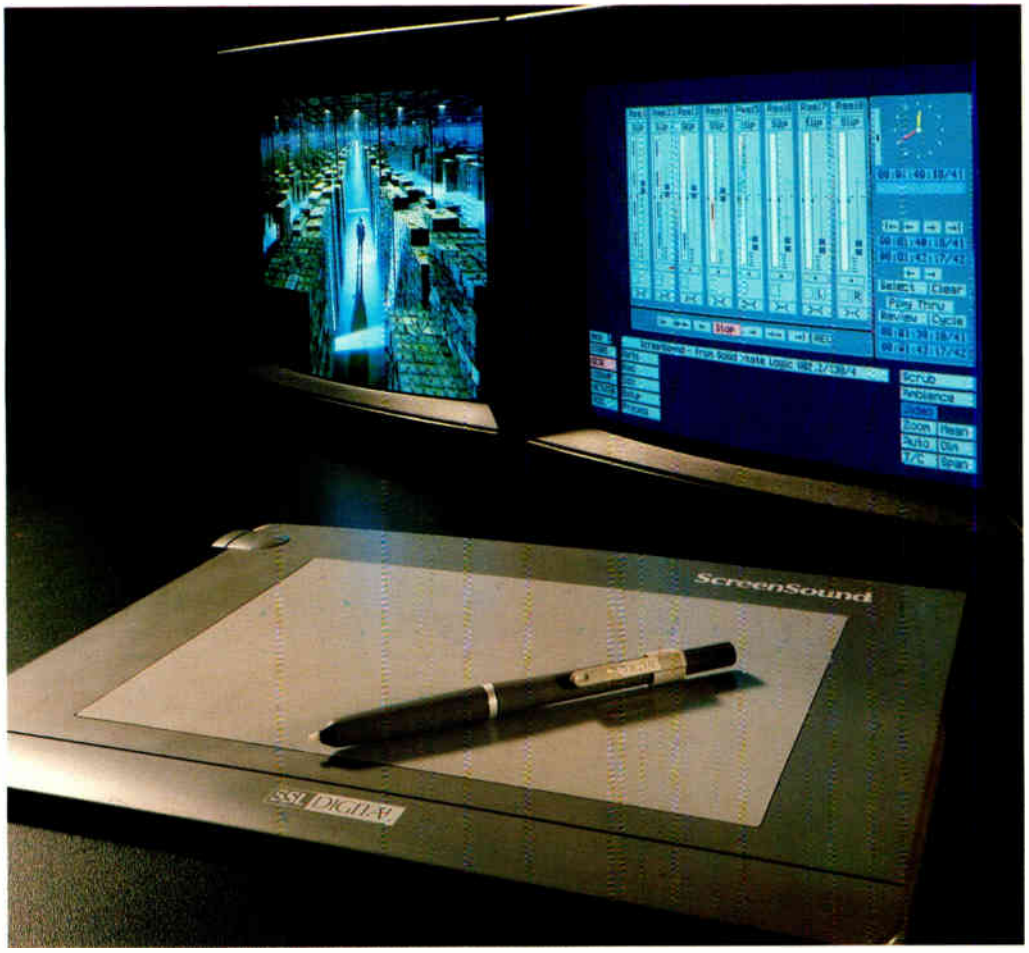

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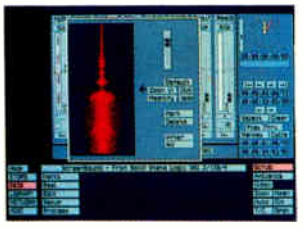

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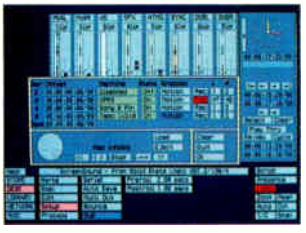

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"A typical day at The Bakery can be pretty demanding. We could begin with a jingle which uses twenty musicians and forty microphones. An afternoon of video sweetening and sound design with dozens of samples and synths can follow, and finally an evening record project mix will use every input on the console. The AMEK MOZART handles all of these assignments with ease and efficiency. With the AMEK/STEINBERG SUPERTRUE Automation System we can sell our clients an advanced computer-assisted mixing format competitive to consoles costing twice the price of MOZART. But to us, the most impressive aspect of this console is the sound – the mic preamps, the eq, the sonic integrity that is so apparent in the final product.

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World Radio History

by Tom Kenny

BELMONT MALL

JOHN COUGAR MELLENCAMP'S STUDIO IN THE WOODS

Over the years, John Cougar Mellencamp has lived the small-town image that his music suggests. When he tired of the recording scene in Miami, L.A. and New York and decided to build his own studio, he chose Belmont, Indiana, less than 45 minutes from his boyhood home of Seymour and 15 minutes from his adopted home of Bloomington. This is bluegrass country, the home of Beanblossom and Bill Monroe. This is Nashville (Ind.) country, home of the Little Nashville Opry. And now this is Cougar country, home of multi-guitar, big drums, straight-from-the-heart rock 'n' roll.

"The whole premise for having this studio here was to have a place dedicated to the kind of music we

(Left): Guitarist/producer Mike Wanchic at the Trident 80B. (Above): The view coming down the steps from the control room into the "big" room. Note the acoustical panels and vinyl-tile floor. The streaks of light come from skylights in the 16-foot ceilings.

PHOTOS: CHRIS DAY

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* The analog recorder referenced is the Studer A-80 1/2" with 3-track head nest; the price comparison is based on option (A) below and an average of published rates of major audio rental companies for the Studer.

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make, which is guitar-based, live-sounding music," says Mike Wanchic, a guitarist in Mellencamp's band who has used the studio frequently over the past year, producing Hearts & Minds (A&M), Sue Medley & The Goners (PolyGram) and James McMurtry (CBS). "We've recorded in a lot of studios over the years, but they're not your home. Ever since we started making records here, we finally started making the records we like."

The first project to come out of Belmont was Mellencamp's 1985 album *Scarecrow*, followed by R.E.M.'s *Life's Rich Pageant*, then back to Mellencamp's *Lonesome Jubilee* and *Big Daddy*. Add in the projects produced by Wanchic and Larry Crane (lead guitarist in Mellencamp's band), and a recent overdub session and video shoot with Bob Dylan, and you have quite a bit of output from what was in 1984 a run-down, hillside cabin.

The hill, strangely enough, figured prominently in the transformation from cabin to studio. Rather than raze the existing structure, Mellencamp and committee (which at various times included engineers Greg Edwards and Ross Hogarth, producer Don Gehman, technical designer and consultant Ross Alexander, and builder Keith Trump) decided to make a control room out of it. The studio was then built *down* the hill so that 16-foot cathedral ceilings could be maintained without breaking up the aesthetics of the house. The resulting elevated control room turned into an unintentional blessing.

"I like the raised control room because I think it helps you keep control over a session," Wanchic says. "It's not a power trip. It's just easier to direct from up top than it is staring people in the face."

The 20 x 20 control room is essentially a copy of Studio B at Rumbo Recorders in L.A., right down to the 32-input Trident 80B console and Fostex LS-4 monitors. According to engineer Hogarth, Mellencamp was in L.A. doing some work with The Blasters in Studio B. "He already had it in his mind to put together a room for himself in Indiana," Hogarth says, "so it was initially not even a sonic factor. It was a feel factor of the room."

Though not overly fond of the monitors, Hogarth does like to jump behind the Trident. "I'm a real fan of it," he says. "I just love the tough, aggressive sound that it has. It's not the clean, smooth, beautiful Neve, but that's where we have Neve modules, API EQs, Tube-Techs and Pultecs.

"You don't have compressors in every channel like an SSL," he continues. "You have this gritty, bright, tough Trident console. It's what it is.

"In this day and age you can still make a record on 24 tracks and mix it by hand. That's an important statement to make. No sampling. No sampled drum sounds. No synths on *Big Daddy*. We mixed it by hand. If you want to use one word, I would say it's refreshing."

Sound is then routed to either an Otari MTR-90 MkII 24-track recorder, an Ampex ATR-102 1/2- or 1/4-inch 2-track, or an Otari MTR-12 2-track. A wide assortment of outboard gear, placed to the side, *not* in an island behind the console, fills out the room. Recent purchases include Tube-Tech compressors and mic preamps, an Eventide H3000SE, a Brooke-Siren DPR-402 stereo compressor, and a Dolby 363 SR unit for 2-track mixing.

Ross Alexander of Synergetic Services in Miami was in on the initial construction of the studio and is still flown in at the top of each new project. He, too, found a problem with the

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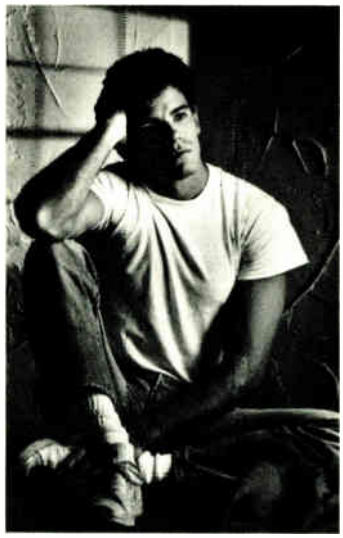

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Fostex monitors and felt it had mainly to do with definition on the bottom end. To compensate, he installed bass traps covering nearly the whole back wall of the control room, fiberglass batts and RPG Diffusors. To augment the main monitors, those in the control room can listen through Yamaha NS-10s, Auratones and JBL 4411s.

"Most of it is passive absorbers," he says. "We didn't get into any tuned Helmholtz resonators, which I guess would be the other way to go. I tend to stay away from those kind of things, because I don't like the way they sound in the final product. They're more efficient, but it's an active resonant component, which can introduce other oddities."

Down a short flight of stairs from the control room, through a heavy wooden door, is the live room, the big room, the reason Mike Wanchic loves tracking there. "Belmont Mall actually does have a sound," Wanchic says, "and it's almost hard not to get it. We wanted a live, big drum sound, so we went with a multifaced studio with cathedral ceilings and a rubberized tile floor. We use very little baffling."

"It is one of the best-sounding studios in terms of setting up a mic and getting a sound that I've ever worked in," Hogarth adds. "The rooms are open and airy, and you can get that air on tape without really having to search for the best part of the room. Kenny [Aronoff] hits the crap out of his drums—you know he's a beater—and he can really make the room breathe. On one of the songs off *Big Daddy*, John said to him, 'Play that part like you're shaking a bag of bones.'

"To me, the Belmont Mall sound is organic, unpretentious rock 'n' roll," he adds. "It's not slick. It's not anything to do with what people call L.A. or New York. It's definitely a straightforward sound."

To capture the room ambience, Hogarth likes to use either Neumann U49s or Telefunken KM56s in omni high in the room and a matched pair of 87s lower down. "The drum sound is a lot of the Mellencamp sound," Hogarth says. "People know when they hear that snare drum popping off the radio. I tip my hat to the player. It's hard to get a good drum sound without a player."

The whole studio setup, with its 22 x 18 big room and four iso rooms,

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MAGI II External System

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was tailored for the Mellencamp band and the recording of acoustic instruments. The tweaking of the rooms was done by ear and listening tests—hit a snare drum or sing a note; listen through different mics; add some acoustical treatment.

According to Alexander, producer Don Gehman came up with the idea of hanging acoustical tile squares in *all* the studio rooms. "It's like when you see pictures of 1960s radio stations," Alexander says. "It's high-frequency absorptive and pretty much cuts out as you get down to the low-middle, which works real well for a drum room because it brings down all the cymbals and splashy high end. But it still keeps a live feel.

> *"In this day and age you can still make a record on 24 tracks and mix it by hand. That's an important statement to make."*

"It's a pretty long reverb time in that big room," he continues, "I'd say a good .75 seconds. We made up big baffles to allow variability, and most of those sonic panels are made to be picture-hung. You can pick them up and put them out back to make it even longer. Or you can bring them all in and it shortens down to about .25 seconds."

Along the back wall of the main room are an 8 x 9 vocal booth and a 9 x 15 piano/guitar room, though Mellencamp is almost fanatically anti-keyboard. Both contain windows. An 11 x 14 side room can also be used for guitar. And a 4 x 6 bass room completes the design.

"That tiny bass amp room was one of the better ideas," Alexander says. "The whole ceiling is this big bass trap, so it's real dry. When you walk in, the ceiling feels like it's on your head, about six feet. There's two feet of trap between there and the real ceiling."

Because the Mellencamp band thrives on interaction and spontaneity, tieline capabilities between rooms was an important consideration. "We used a real low-capacitance cable for interconnecting electronic instruments from the control room to the studio, from the studio into each of the iso rooms, and so on," Alexander says. "It's actually like video cable. You can stand in the control room and play into the bass amp in the bass room, or the guitar amp in one of the other rooms. You can pretty much go from anywhere to anywhere."

"The whole point of this place is for comfort and ease of work," Wanchic adds. "That includes the producer, the engineer, the musicians, the people out working in the studio itself, the people out in the lounge watching TV. You know, I've spent so much time in studios where I didn't have any escape, no place to go. I mean, you *could* go out and stand on Fairfax [Avenue] in the middle of L.A.

"But people are usually coming here for a reason," he continues. "They're coming out to Belmont because they like the aura that surrounds this place. I try to give them something straight to the heart, which is the way I want to hear the song. Put all the peripheral nonsense aside and get to the heart of the song."

Belmont Mall is certainly comfortable. The place feels like home. Mellencamp's father maintains an office there, complete with all his son's gold and platinum albums. Accounting and management are handled by longtime friends Tim and Marcia. The second engineer and all-purpose assistant is Rick Fettig, a boyhood friend from Seymour. And as in most Indiana households, a basketball hoop stands above the driveway.

"I'm spoiled, you know," Hogarth says. "You work with a band like this, then you go out and work with session players—and they're all great players, amazing musicians—but there's nothing like a band. There is nothing like getting a band together in a room, in their hometown, out in this nice place in the country, playing rock 'n' roll music. That is the beauty of the whole place. It's a family thing." ■

Tom Kenny is a Mix *associate editor.*

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World Radio History

by Dan Daley

BILL SCREAM
GOING FULL CIRCLE

After years of being a potential thorn in the side of other established, for-hire studio owners in the Portland, Oregon, area, Bill Scream has little trouble dealing with the irony of running a project studio squarely headed down the road to status. "It's funny," he muses. "I find myself lately spending a lot of money buying gear to satisfy clients, and at the same time I realize that my creative competition is still working out of a basement somewhere." Not unlike the recording studio in a bedroom that Bill Scream Music began in 15 years ago.

Like most of the population of the United States over the age of 25, Scream (not his real name) was a player in a struggling band in the '70s, writing songs and spending money in local recording studios to make demos that he says always wound up garnering a "thanks-but-no-thanks" response from labels. In between these futile shots at the big time, Scream began picking up local studio gigs as a keyboard player on various sessions around town—here a record, there a jingle date.

Scream's frustration built at watching other people—specifically engineers—dictate the way things sounded. In what is developing as a classic profile of the foundation of project studio ownership (and the zeitgeist of a generation?), Scream wanted more control. Fifteen years ago, his equipment options were limited to a 2-track tape recorder and a microphone.

"I kept adding to that base," he recalls. "I would buy an equalizer next, then another piece of equipment, and so on until we had a studio. I guess about nine years ago I crossed over the line from a bedroom to a real studio."

At that point Scream went 4-track;

World Radio History

a year later he upgraded to 8-track. Two-and-a-half years ago the current Bill Scream Music opened in Portland in its present location, where he runs both an 8- and 16-track room. The vast majority of his clients are commercial, with the occasional band demo thrown in.

The equipment list at the new facility reflects the sort of newly affordable equipment that has made project studios a growth industry. A partial listing includes the Tascam MS-16 recorder with dbx, Tascam 520 console, Sony VO-5850 3/4-inch VCR, Akai S900, Lexicon PCM60, Alesis Microverb, Roland DEP-5, and UREI and Auratone monitors. Scream says the most recent upgrade ran him about $30,000, the bulk of it going for the new multitrack and an array of outboard gear.

Scream, like many other project studio owners, comes from a musician's background. He entered this business with an accumulation of equipment not only suitable for recording, but, in the case of keyboards, sources of virtual tracks. An auxiliary mixer is used almost exclusively to submix all the keyboards, keeping the Tascam 20 x 8 main console quite flexible.

"RAISIN" D'ETRE

Scream's core business, the one that allowed him to move out of the bedroom, is commercial music. After playing on jingles for so long, it was a fairly short hop to writing and ultimately producing them. Scream's clients include Fred Meyers Stores, a major Northwest variety and department store chain (and his largest single client); Nike running shoes, for which he does music beds for in-store promotional videos, corporate theme music and in-house promotionals; and perhaps most recognizable of all, Will Vinton, animator of those damned dancing raisins. Scream did the music on the Post Raisin Bran television spot featuring the claymation figures, and he also did parts of the more recent Michael Jackson raisin spot, as well as pre-production demos.

"One of our quotes around here is, 'You have to know when to turn the gear off.'"

"Music," he says, "is not just sitting at a piano and writing a song. Writing and recording and producing have become simultaneous events. I need the equipment to do this sort of work. And I can't afford to spend $100 an hour while I scratch my head at the keyboard. So, you see, it made lots of sense to do it this way."

Scream, like everyone else, has to contend with the matter of how far to let technology intrude on the process of making music. "One of our quotes around here is, 'You have to know when to turn the gear off,' " he says. "Just getting in there and doing it manually is a lot quicker and better sometimes. You have to strike the balance between what equipment can do and what it keeps you from doing,

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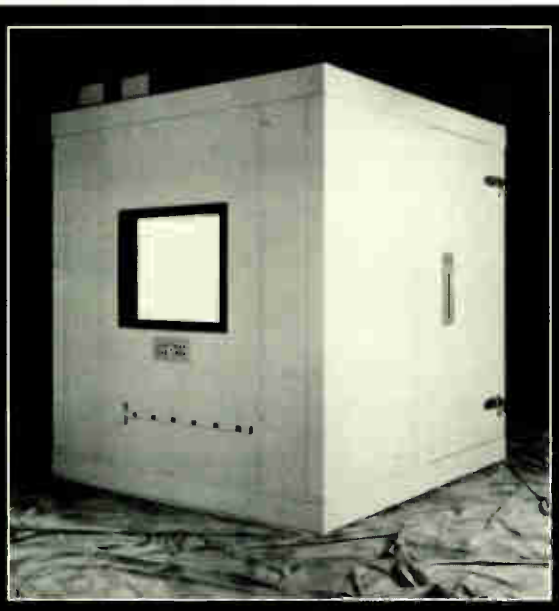

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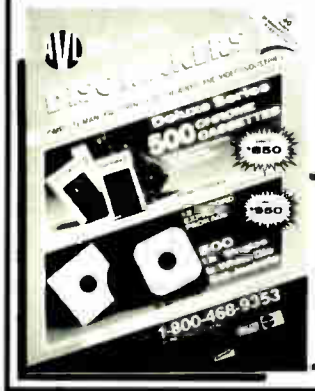

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although most of the time we find the equipment works in our favor."

Which brings up engineering. Scream has had one employee, Jeff Bobblestone, for about six years. Bobblestone works as an engineer/producer, and Scream is quick to characterize their association as a team effort.

Outside engineers are not strangers to the studio. Scream admits to being a seat-of-the-pants engineer himself, one who learned his craft in a fairly traditional manner: by looking over shoulders at Seattle West studios while working there as an assistant years ago. But he didn't get into the business to become an engineer, and he acknowledges his limitations. "I get in trouble sometimes because I don't know all the physics behind engineering concepts," he says.

Then there is the issue of the impact of the project studio on the commercial recording scene. It's remarkable how consistent the experiences and responses of project studio owners have been recently, and Scream proves no exception. "I feel I have to sneak around a bit when established studios [in the area] ask me what I'm doing," he admits. "A lot of gear that those studios bought for $50,000 five years ago we bought for $5,000 more recently, and we're both in the same place. The big studios still get plenty of work, but we're able to get in there and prove we can do as good a job as anyone else." As if to underline that last statement, Scream recently added 3/4-inch video equipment to the studio for laybacks, considerably enhancing the capabilities of the facility.

But back to the irony and back to the future. As the studio grows, Scream is finding it more attractive to simply rent time as opposed to time and talent. More clients are coming in to record radio spots in the 8-track room, using other producers at the $60 per hour rate. (The 16-track rooms lets for $75, and video sweetening goes for $105.) Will Bill Scream Music eventually transform itself into the very sort of studio it nettles by its presence? "Let's put it this way," Scream replies. "It started out as a pet project, and now it's an animal that needs to get fed every day." ■

Dan Daley is a Mix *contributing editor, as well as co-owner of a New York City recording studio.*

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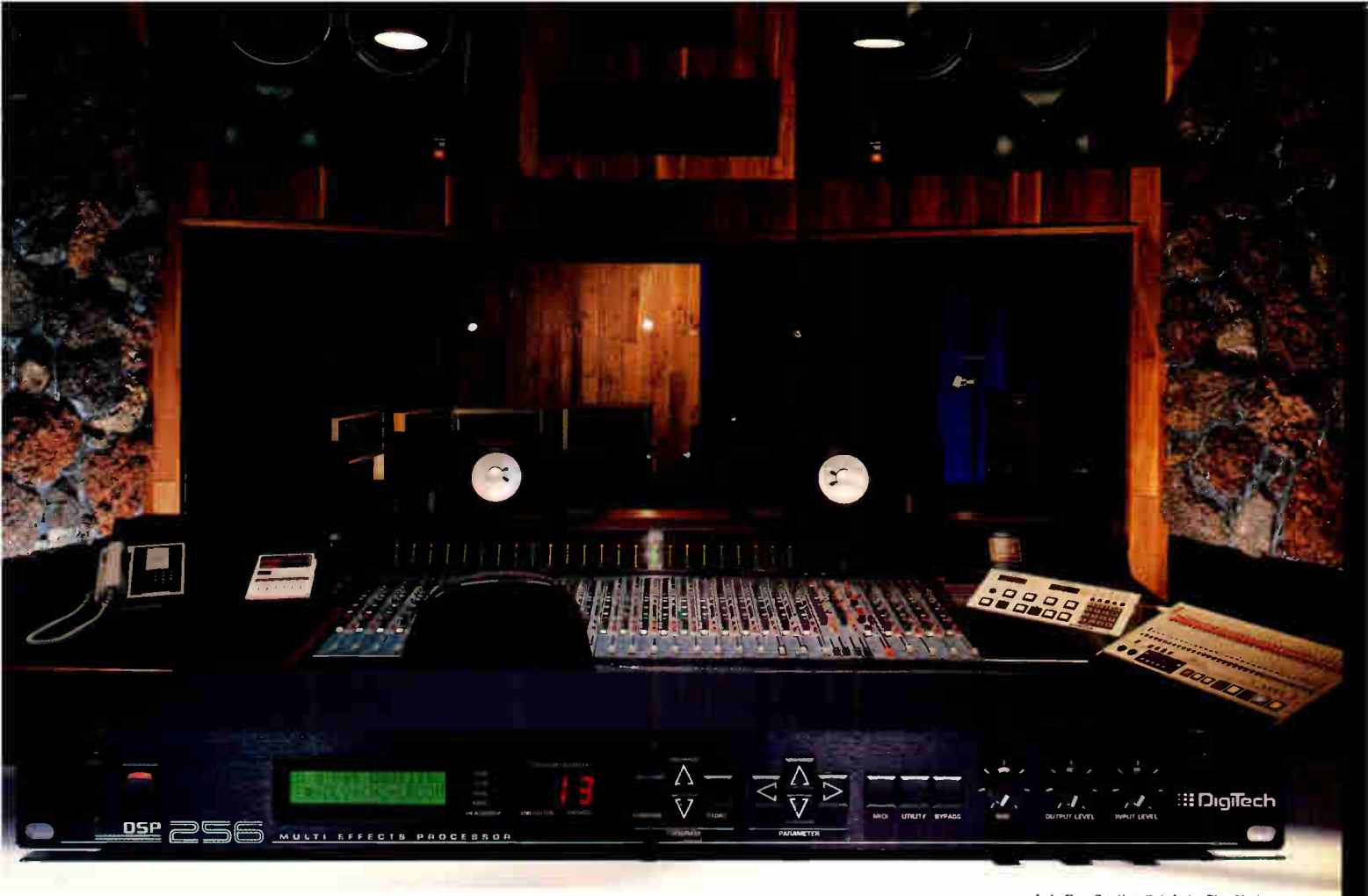

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NEWS
FROM AROUND THE WORLD

DIGITAL POST-PRODUCTION COMES TO AUSTRALIA

Geographical isolation has long been recognized as a factor inhibiting the growth of many Australian industries, but Pro-image Post in Sydney has bridged this tyranny of distance in audio recording with the installation of Sony's PCM-3348 1/2-inch 48-track—the first of its kind in the land Down Under.

Even before the 48-track arrived, Pro-image serviced world-class clients, producing concert specials and music videos for a variety of clients. Now the 48-track is attracting high-caliber clients who would have been forced previously to look beyond Australia's borders for a similar service. INXS guitarist Tim Farriss recently recorded an album using the 48-track, and edited a video movie at Pro-image, both tentatively titled *Fish in Space*.

"We've always had a dedication to serving the music industry," general manager Peter Skillman says, "and the more competitive rates we can offer for a world-class service make us an excellent choice for the recording requirements of both local and overseas artists."

—Renee Brack

LONDON'S CTS USES "BLACK BOX" SYSTEM IN STUDIO REDESIGN

CTS Studios, one of the most comprehensive music-to-picture recording facilities in the UK, has completed acoustic and aesthetic redesign of Studio 2 with the help of the consulting acoustic design firm Recording Architecture.

The plan involved installing Recording Architecture's Black Box Acoustic Conditioning system and ATC SCM 200A monitors; overhauling the Neve desk; fitting equipment racks with light oak cabinets; and redecorating.

While the planning stage began in May of last year, the actual building

Studio Spotlight:
ECLISSE STUDIOS

Eclisse (translated as "Eclipse"), the newest tapeless digital studio in Milan, is a subsidiary of Pixel Sound, a well-known Italian computer graphics firm. The main focus of the studio is audio/video post-production, with an emphasis on MIDI scoring and direct-to-hard disk recording.

Audio equipment at Eclisse includes a Sound Workshop Series 34 console, interfaced to a Lexicon Opus digital audio recording/editing system, a PPG HDU direct-to-hard disk recorder and a Technics DAT deck for mixdowns. Other goodies include Meyer 833 and Westlake BBSM-4 monitors and a large keyboard complement featuring a Fairlight Series III and E-mu Emulator III—along with a PPG Wave 2.3 with Waveterm, two Akai S900s and a Sequential Prophet 3000 sampler.

A large collection of digital and analog synths augments the sampler arsenal, and two Macs control the entire MIDI system, with a choice of popular sequencers to suit the individual preferences of clients and staff.

—Fiorella Terenzi

World Radio History

was completed in the space of three weeks in December. The redesign's speed and cost-effectiveness was due mainly to the use of the Black Box system, a range of de-mountable acoustic conditioning modules that radically improve sound performance without having to alter the building's basic structure.

Following the extensive pre-production stage, the Black Box modules were carefully positioned in Studio 2 to form an interactive system of absorbers, diffusers and hanging baffles that ensure an even distribution of sound and precise stereo image throughout the control room.

The monitoring system consists of a pair of freestanding ATC SCM 200A loudspeakers powered by C Audio 606 and 404 amplifiers.

FIRST 01 DIGITAL PRODUCTION CENTRE INSTALLED IN JAPAN

The first Solid State Logic 01 Digital Production Centre to leave the company's Oxford, UK, headquarters has been installed at Video Sunmall, one of Tokyo's leading audio/video post-production facilities.

The equipment, located in the studio's audio suite, is being used for CD mastering. The 01 Digital Production Centre is an integrated stereo digital mastering system that includes an edit suite, 8-channel mixer and hard disk recorder with two hours of stereo audio storage capacity. The system provides high-quality digital audio through all stages of mixing, signal processing and editing, and can operate in tandem with the studio's 48-channel SL 4048 G Series console.

SYPHA PUBLISHES "THE TAPELESS DIRECTORY"

SYPHA, a London-based independent digital audio consulting company, has completed *The Tapeless Directory*, a source for tapeless digital audio recording and editing systems.

The catalog provides data on all available systems as well as those planned for release during 1990. In

Around the World with David Lewiston

The Joys and Perils of Location Recording

by Hank Bordowitz

Chances are good that if you have dabbled in music from the Far East or from South America, you have tripped over the work of David Lewiston. Over the past 20-odd years, he has chronicled the native music of such exotic locales as (break out your atlas) Bali, Peru, Colombia, Hunza, the western Himalayas and India, making high-quality recordings in the field.

In 1966 Lewiston embarked on an odyssey that has resulted in 39 released recordings from all over the world, with particular emphasis on the traditional music of developing countries. It all began with a three-week recording tour of Bali and Java, at a time when battery-operated stereo recorders were practically unheard of.

"When I went to Indonesia, I couldn't find a battery-operated stereo machine," he recalls. "The [stereo] Nagra hadn't been invented at that time—only the mono. And the Stellavox was still four or five years down the road. So I had a little half-track, 7.5-ips mono machine. But when I was in Singapore on my way to Indonesia, I noticed something called a Concertone in one of the electronics stores, which looked like a piece of junk, but at least it was battery-operated and stereo. So I bought it for a couple hundred bucks and took it down to Bali. Luckily, it worked just long enough, before it expired, for me to record music first in Bali, then in Java."

These recordings allowed him to quit his day job as a financial editor, and he embarked on the first of his extended location recordings, spending well over a year in South America. During this time he gathered enough material for what became six albums for the BBC Sound Archives and Nonesuch Explorer labels. He also learned an important lesson.

"One of the basic lessons of recording in communities of this kind," Lewiston states, "is that you'd better take plenty of booze along, because when the booze runs out, the music stops. I quickly learned to pick up plenty of the local firewater before meeting the musicians."

Beyond making Lewiston an expert on local aperitifs, his travels have given him a remarkable reputation for hands-on experience in making high-quality field recordings. Indeed, the history of his rigs mirrors the history of portable, professional recording gear.

"Before I went off to the Himalayas in '72, I bought a Stellavox and a pair of Neumann 74 mics," Lewiston recalls. Now he has replaced the 9-volt 74s with a pair of 84s, but his setup hasn't changed. "I use them on a stand as a crossed pair for indoor recording. I've been using a pair of Electro-Voice RE50s ever since '72. You'd be astonished at how well this mic works. It's designed to be a handheld omni. When you look at the specs, it's nothing special, fairly flat only from 80 to 13,000 Hz.

"To my surprise, I found that this mic is fine for gamelan. I think the lesson there is that it may not be necessary to use a mic that's flat from 20 to 18,000 Hz to record this music successfully. Another point: Dynamic mics aren't supposed to be able to capture the transients of metal instruments. The conventional view is that only a condenser or ribbon mic is suitable. But I hear no deficiency in my gamelan recordings. These mics are very for-

— CONTINUED ON PAGE 100

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Mike Jones on Sony's DASH PCM-3348. "The sound stays true. The mix is easier."

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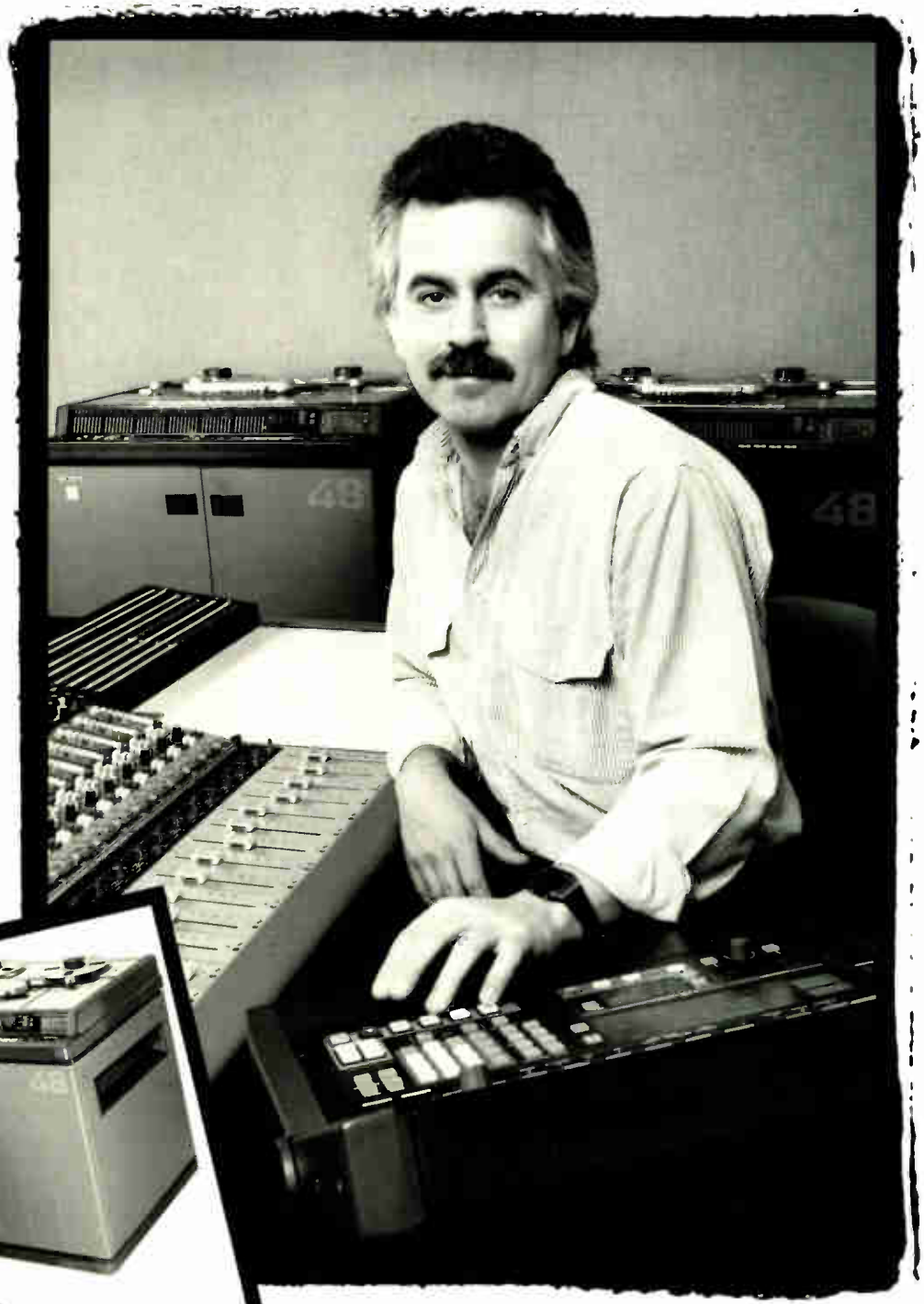

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addition, *The Tapeless Directory* furnishes background information on the technology and explains the terminology associated with products in this rapidly evolving aspect of the industry.

The Tapeless Directory is available for £25 (add £2 for shipping outside the UK) from SYPHA, 216A Gipsy Road, London SE27 9RB, UK. Telephone (01) 761-1042. Discounts are available for education and multiple orders.

INTERNATIONAL BITS & PIECES

Hilton Sound, one of Europe's leading pro audio rental companies, has introduced a new post-production service to support its studio and video facility customers. London-based Hilton's "Elephant Suite" is an acoustically treated shell in which rental customers can configure different products and systems, allowing them to select hardware solutions for their specific needs from Hilton's extensive rental fleet...Several French film and video post facilities have recently installed TimeLine's Lynx keyboard control unit and time code modules, including **Studios Philippe Sarde** in Paris, **L.T.C.** in St. Cloud and **Teletota** in Lavallois-Perret...**NRK**, the Norwegian Broadcasting Corporation, has taken delivery of an SSL 5000 M Series in its Radio Drama Studio in Oslo. Other recent sales of SSL systems have gone to Canadian studios **Le Tube** of Montreal and **Winfield Sound Studios** of Toronto, which both purchased SL 4000 Series consoles.

In news from Australia, Melbourne-based rental company **Clear System Pty. Ltd.** has taken delivery of an array of ARX Systems sound reinforcement equipment. An ARX concert system was also purchased by **Cahaya Audio & Lighting** in Malaysia...Back in the British Isles, Joe Elliot, lead singer of Def Leppard, has installed a 40-input Amek G2520 console for his private studio in Dublin...And **Scottish TV** has become the first independent television customer for Digital Audio Research following its purchase of a 16-channel SoundStation II disk-based audio editing system. The purchase is also the first to include DAR's recently announced *WordFit* dialog synchronization and replacement software, and erasable optical disk backup option. ■

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— *FROM PAGE 97, LEWISTON*

giving. They're well-protected against wind, as well as pops and blasts, and they don't get noisy in Bali's high humidity, a big problem with condenser mics."

When Dolby Cat 22 cards became available, an engineer friend built Lewiston a portable Dolby A box, an inch thick and the size of the Stellavox, so that it could be clamped directly to the bottom of the recorder. He started using that piece of equipment before his 1974 excursion to Ladakh, western Tibet. This rig lasted him until he went digital in 1986.

"My VCRs," he says, beginning to run down his current apparatus, "are a pair of Panasonic 8420s, which are fairly decent, commercial-grade, battery-operated machines. They weigh eight pounds apiece. I use a little Stellavox ALP-8 preamp because it can power condenser mics, and this is hooked into a PCM box, either an F1 or a 501."

With his new digital paraphernalia, Lewiston returned to India in 1987 to record Buddhist rituals at refugee Tibetan monasteries (one of his long-term projects) before moving on to Bali. From this field trip came his two most recent releases, Nonesuch's *Bali: Gamelan & Kecak* and Bridge Records' *Tibetan Buddhism: Shartse College of Ganden Monastery*.

As a producer/engineer, Lewiston tends to be more concerned with ends than means. His methods might make more staid engineers cringe, but this is field recording, and when you are out to capture a one-time event in a less than audio-friendly environment, instinct can be a lot more important than technique.

"When I want to record something happening in the middle of a crowd," he confides, "I put the recorder on my shoulders, don headphones with a tight seal, set the levels approximately where I know they should be with the music that loud, and then approach the musicians from a distance, with arms outstretched so I have a natural fade-in. I get right on top of the musicians, adjust balances by moving myself and the two mics, get as much as I think is worth having, and then gracefully back out again, producing a nice and natural fade at the end."

In many places, Lewiston is given a warm welcome. At the Kulu Festival in the western Himalayas, the performances of folk music and dance take place on the stage of an open-air amphitheater. "I put a couple of mics, separated by maybe 20 feet, up on the stage. I was given a privileged position in the pit, right under the stage, to set up my Stellavox and a second recorder. I've used several different recorders for the backup. Eventually I settled on a Sony 510, 5-inch, battery-powered portable; fairly good quality."

Although he has spent a great deal of time in the Himalayas, it had been 20 years since he had returned to Bali, the scene of his first set of recordings. In 1966, the time of his first jaunt, Indonesia had just gone through a political insurrection (the unsuccessful Communist coup, the setting for the film *The Year of Living Dangerously*) and things were quiet in the aftermath. This allowed Lewiston to record 13 styles of music in about three weeks. He came out of this trip with ten hours of material, from which came *Music from the Morning of the World* and *Golden Rain*.

Booking recording time was no problem. "On a typical day, one of my Balinese friends would join me and we'd rattle around the island in a car," Lewiston says. "We'd go from one village to another, meet the leaders of three groups and arrange recording sessions for later that day. At noon we would return to the first village to run a session, then we'd record the second group in the middle of the afternoon, and the third group in the evening. It was really incredible, being able to record so much so easily."

His most recent trip, while every bit as musically rewarding, was considerably more trying. What had taken three weeks in 1966 took five months in 1987. No longer slowed down by the aftermath of an aborted revolution, Bali is once again a tourist mecca, a place where those who can afford it bask in the sun on idyllic beaches. This is very good for the Balinese, but it thwarted Lewiston at every turn.

"People are much busier," he

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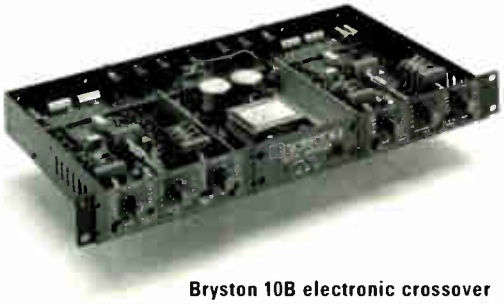

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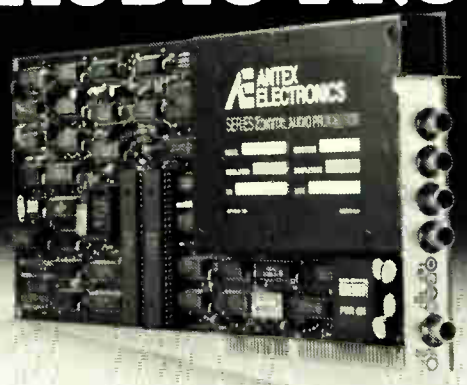

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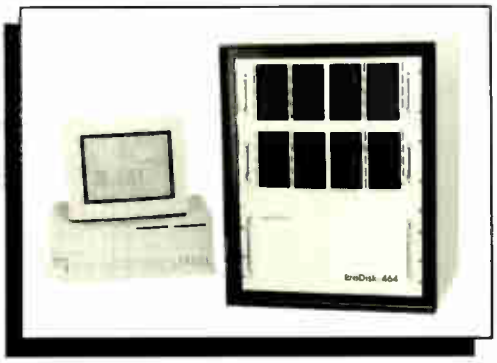

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INTERNATIONAL UPDATE

sighs. "They have a lot to do. They have their businesses to attend to. So it was harder to arrange sessions. We'd have to plan a week or two ahead of when we wanted to record a particular group.

"Also, the islands have become very noisy. There are motorbikes everywhere, even on the narrowest lanes. It's really difficult to find a peaceful place to record. There are packs of stray dogs throughout south Bali, and they render the night hideous with their howls."

Beyond these location problems, Lewiston had some difficulties with his gear. As his equipment becomes more complex, he finds there are more things that can go wrong.

"I wound up with intermittent dropouts in one channel in the portable PCM box," he recalls. "In Bali in '87, it got to the point where it was totally unreliable. I had to fly up to Singapore and call my dealer in the States to fly out a 501, which is a mains-operated PCM unit. Luckily, he got it to me in two days. It meant I was dependent on local power, which is extremely unreliable, and needed a stabilizer to correct the voltage. There were many problems in Bali. It was very, very difficult. All kinds of extraneous electronic garbage created difficulties with the recordings. This digital equipment is not designed to work in high-humidity environments."

Recording snafus notwithstanding, Lewiston enjoys what he does. He gets to see the world without indenturing himself to the Army. He can explore the things that interest him. And while there are inconveniences, like frequent stomach upset, the travel is stimulating.

"One thing travel does for me," Lewiston reflects, "is I learn a lot about myself—where I'm coming from, and that sort of thing."

And he winds up a teacher as well, exposing those who are unwilling or unable to travel to the far reaches of the world to some of the most exotic sounds on record. ■

Hank Bordowitz is a freelance writer based in the New York City area.

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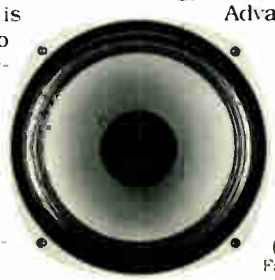

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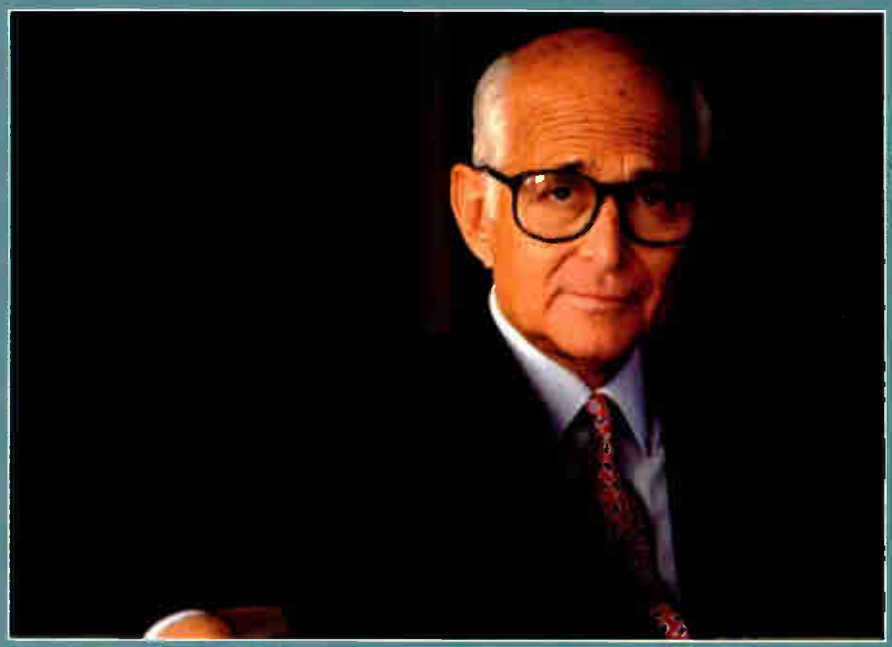
by Mr. Bonzai

NORMAN LEAR PRIME TIMES



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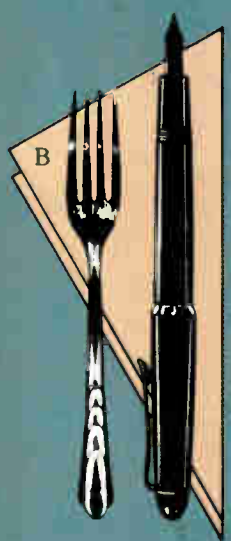

I consider myself a writer who loves to show real people in real conflict, with all their fears, doubts, hopes and ambitions, rubbing against their love for one another."

—Norman Lear

For those moved by humor with heart and brains, Norman Lear is a bright force in a dim world. It all started during his days as a comedy writer in the formative workshops of live television. He is best known as the developer and creative force behind *All in the Family*, *Sanford & Son*, *Mary Hartman*, *Mary Hartman* and a series of other hits that were taped before live audiences and created a groundswell of support and controversy. Two of his company's recent films, *Stand by Me* and *The Princess Bride*, have continued the spirit of gut-level laughter and colorful characters struggling for tomorrow.

After his journeyman's work and empire-building days, Lear, in 1986, formed Act III Communications, Inc. He oversees a growing corporation involved in motion picture and television production, publishing, broadcasting (TV stations) and theatrical exhibition (movie theaters). If we're talking about entertainment and communication, this man has it covered. And in an era of faceless corporate hijinks, last year *Mix* magazine became part of this organization, a

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Session Musician, "Rhythm Doctor"

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group with a real person at the helm.

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Bonzai: At the TEC Awards in New York last fall, you expressed appreciation for the technical people in the entertainment industry...

Lear: My ass has been saved time and again. A good example is a film I made called *The Night They Raided Minsky's.* Bert Lahr died two weeks into the shooting of the film, and I had to rewrite ahead of the camera to work without him and fill scenes differently. Then the director left the film ten days after the completion of principal photography. When the filming was completed, it could only have been saved technically.

The film didn't exist as a proper straight-line narrative, and the completion relied on all sorts of tricks with both the picture and the sound to make it come alive. It almost looked like a docudrama when it was completed. We took modern footage, aged it and then mixed it with ancient footage. When the modern footage came alive in full color you'd think that all of it was from the same period. We did the same with audio to make the sounds of yesterday metamorphose into today. It was a great collaboration with technical people. We saved it, and it became kind of a cult classic.

I don't know how many times we had bad sound that was corrected later. Something had gone wrong during the recording, and some genius came in and found a way to solve the problem. It's ongoing. If you are aware of the collaborative nature of production in film or television or music, then you are aware that it happens all the time. You are always being helped or saved—and enriched—by the collaboration of the technical people.

Bonzai: Do you cultivate long-term relationships with the support people?

Lear: Yes, absolutely.

Bonzai: What is the distinction between the technicians and the creative talent?

Lear: How this came about—you and I sitting here will never know. But unfortunately, the show biz culture has declared this group to be the "creative" group, this group to be the "technical" group, and this group to be the "business" group. Falling into the creative group are those who deal with sets, music, writing and acting. Then there's the technical group: the people who read this publication. Then there is the business group.

I don't know how long a career you must have before you realize that a lot of people in the creative group are hacks and technicians. Where you look at the technical group and expect to find technicians, you find a great number of people who are inordinately creative, who do some of your work for you, and make you look like you did it all. I found the same thing to be true in business. I was in business for many years with a fella by the name of Jerry Perenchio. He was as creative in business as I hoped I was in production.

It's a shame, but kids growing up in our culture think there are only certain places where one can find creativity. It's everywhere. You bring a vast degree of it, which is yours, to whatever you do in whatever field. And in this field of audio, there are creative geniuses, some of whom were honored the night we met.

Bonzai: How did you get involved with technical and communications publishing?

Lear: My interest in publishing began with Les Brown, who created *Channels* magazine. The publication had originally been financed by a foundation for a fixed period of three years. He came to me and asked if I wanted to be involved at a time when he had to take it commercial. I did it because I loved the publication and had great respect for him. A year after that, Perenchio and I sold Embassy Communications, and I was thinking about what to do next. Paul David Schaeffer, who is now president of Act III Publishing, was running *Channels* with Les and saw a wonderful field in trade publishing for the entertainment and communications businesses.

We were putting together a company to go into production, and I thought I would like, in this third act of my life, a better taste of those businesses that have existed alongside what I have known and find interesting. We went into publishing, then into theaters and exhibition, and then broadcasting. They're all part of the entertainment/communications environment, and they're all interesting businesses. Publishing is very much like that part of production represented by writing. It is entirely susceptible to brand new ideas and entrepre-

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"I found the (Beta mics') supercardioid pattern to be extremely consistent at all frequencies. The gain-before-feedback levels were impressive, and off axis coloration was minimal....All in all, the Beta Series mics proved to be excellent performers for vocals, snares, toms, congas....We may be witnessing the birth of a new Shure dynasty."

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neurial creativity.

Bonzai: How important is music in your work?

Lear: Music was not all that important in my television shows because we didn't use it in the interior of the show, but it was always important in introducing the shows. We were quite fortunate, because everybody knows the music that introduced *All in the Family*, *The Jeffersons*, *Maude*, even *One Day at a Time*, and *Mary Hartman, Mary Hartman*, which was very distinctive. So top and bottom, music was terribly important; we just didn't use it in the interior of the shows.

Bonzai: You go back quite a ways in television as a writer.

Lear: When you're 67 years old, you gotta go back quite a ways in something. [Laughs]

Bonzai: Where did you start?

Lear: My first job as a writer in television was for *The Jack Haley Ford Star Revue*.

Bonzai: Weren't you also a publicist?

Lear: Oh yeah, that was my first job. As a matter of fact, when I was a kid, all I wanted to be was a press agent, because my Uncle Jack was a press agent. He was the only uncle on two sides of my family that would flip a quarter to me every time he saw me. I was a kid of the Depression and Uncle Jack arriving with that new quarter was just—so, he was a press agent and that's what I wanted to be.

When I was in Italy in the middle of my tour of duty with the Fifteenth Air Force I stood over a little Italian printer in Foja, Italy, and picked out the typesetting letters myself, because I didn't speak sufficient Italian and he didn't speak English at all. We put together a "one sheet," my pitch for a job, which I sent to my Uncle Jack, and he sent it to four public relations firms in New York, two in Chicago and two in Los Angeles. By the time my tour of duty finished, I had two offers for interviews and one said that I had the job.

Bonzai: So it worked—your first pitch. Not bad.

Lear: And my first job was working for George and Dorothy Ross. They had a big office—no, actually it was a small office in New York, but they were important. My first assignments were the Broadway shows *Are You With It* and *The Red Mill*. I did press for them, and we young kids, a lot of us fresh out of the Army, were scattered around town working for these senior press agents. We were the ones who sometimes wrote full columns for Walter Winchell, Dorothy Killgallen, Danton Walker, Leonard Lyons, in exchange for the occasional mention of one of our clients in their columns. For instance, once a week, Walter Winchell would do "Man About Town," a literary look around New York. It was actually written by a bunch of kids like myself. [Laughs]

In *Are You With It*, there was an act called Buster Shaver and His Midgets. The lead midget was a lady named Olive, and I wrote a column item one day: "Buster Shaver was seen shopping on Fifth Avenue with his midget Olive, she on a Saint Bernard." Dorothy Killgallen printed it.

Bonzai: You made this up?

Lear: We made all these things up. So Killgallen printed this, and someone must have kidded her about it because she called and wanted me fired. I was making $40 a week and walked in to ask for a $5 raise on a day that George Ross was seriously considering asking me to take a $5 cut. He thought we were too far apart and figured maybe I should go look for

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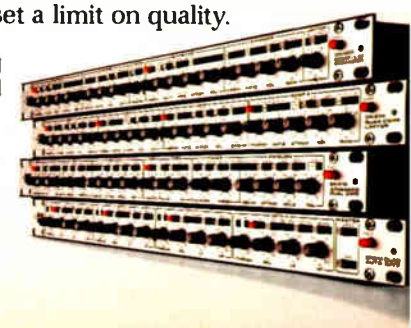

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To comply with the law and make life easier for the thousands of musicians and singers who work for many employers, the Recording Industry Association of America (RIAA) has created an industry-wide registration system. Once you are registered by RIAA, your employment eligibility information will be stored in a computerized central clearinghouse. **The card is free.** Your data will be accessible on a 24-hour basis to employers needing verification.

WHY A CARD?
If you are a musician or session artist, the IRCA registration system will make life easier for you. A current RIAA-issued IRCA card virtually cancels out all other paperwork necessary to complete the I-9 (Employment Eligibility Verification) form. You won't have to repeat the same tedious paper work each time you're hired — *all you need is the card.* For U.S. citizens, the card is effective for three years, and for all others, the expiration date corresponds with your INS card.

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Under the law, penalties for knowingly hiring an employee ineligible to work in the U.S. range from a fine of $250 to $10,000 and six months imprisonment.

HOW DO I REGISTER?
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New York, NY

New York City
April 20-22, 1990
The Roosevelt Hotel
45th and Madison
New York, NY

Los Angeles
March 13-18, 1990
The Hollywood Roosevelt Hotel
7000 Hollywood Blvd.
Los Angeles, CA

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If you are unable to attend a registration session near you or need more information, please contact RIAA: 1-800-JOB-IRCA.

HOW DO I PROVE MY EMPLOYMENT ELIGIBILITY?
Before you register, check the list below for the documentation you need.

One from **Group A:**

- U.S. passport, current or expired
- Certificate of U.S. Citizenship
- Certificate of Naturalization
- Foreign passport, if it is current and unexpired, and only if it contains an unexpired authorization for employment in the U.S. issued by the Attorney General
- Alien Registration Receipt Card with photo.
- Temporary Resident Card
- Employment Authorization Card
- Employment Authorization Document

or one from **Group B**, *plus* one from **Group C:**

- U.S. driver's license or permit, or state ID card
- A school identification card with photo
- A voter's registration card
- A U.S. military card or Selective Service Registration Card
- Military dependent's ID card

Group C:

- Official Social Security card
- Unexpired Permit to Reenter the United States
- Unexpired Refugee Travel Document
- Certification of Birth Abroad of a Citizen of the U.S. of America, Dept. of State Form DS-1350
- Official U.S. Birth Certificate
- U.S. Citizen ID Card
- ID Card for use of a resident citizen in the U.S.
- Native American tribal document

Your Ticket to Ride

A MESSAGE FROM THE RECORDING INDUSTRY ASSOCIATION OF AMERICA, INC.

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World Radio History

business elsewhere. So, I was canned.

Bonzai: How did this lead to television?

Lear: I decided to pack up and take my wife and 2-year-old daughter to California. My first work was selling baby pictures door-to-door. I didn't know anybody out here. One day I ran into Ed Simmons, the husband of a cousin of mine, who had moved to California to be a comedy writer. Our wives became fast friends, and one evening when they were at the movies, he asked me if I would spend the evening working on something with him. We wrote a parody of *The Sheik of Araby*, and when our wives came back from the movies, we went out. In those days there were a lot of nightclubs in California, and we went to Larry Potter's Supper Club where a woman was playing the piano and singing dirty ditties. We sold our material and got $35 dollars for our parody. My half of that was as much as I had made the previous two days selling baby pictures. We started to write together every night, and we would go out and sell the material. One day I had an idea for something that Danny Thomas might be able to use.

Bonzai: And how did you get Danny Thomas' phone number?

Lear: I had a friend when I was a little boy by the name of Merle Robinson. I would use his name any time I was in trouble. In the Army, if an MP stopped me or I didn't want to be talked to, I was Merle Robinson. So I called the William Morris office, which was Danny Thomas' agency, and said, "My name is Merle Robinson. I'm with *The New York Times*. I've been doing a story on Danny Thomas. I'm at the airport now, on my way back to New York. I want to write the story and file it when I get there, I only have two minutes left. I have a question for Mr. Thomas. I have to talk to him!"

I scared somebody to death so they gave me his number. I called Thomas, and he said, "How the hell'd you get this number?" Miraculously, on that day he happened to be working with his pianist, Wally Pop. He was trying to find something he could do just two nights later at a place called Ciro's. He said he was fascinated to know how I got his phone number, so I told him, which made him laugh, and he asked, "Whaddya got? I can't do anything that lasts more than six minutes!" I said, "Well, I've got something that's five-and-a-half minutes." And he said, "Get over here right away." I said, "I'll be over there in about three-and-a-half hours." He said, "You're in Hollywood, I'm in Beverly Hills, get over here now!" I said—I don't know what I said—you see, I hadn't written it yet! It took that long to write it, and Thomas had to wait. I got there, he gave me $500, and he used it the next night at Ciro's for a Friar's Club Dinner. The reason he needed something new was because it was a show biz crowd, and everybody had heard his routines.

The response was so good that two days later Ed and I were on a plane back to New York as television writers, which led to *The Colgate Comedy Hour* with Dean Martin and Jerry Lewis, *The George Gobel Show* and *The Martha Raye Show*. When the transcontinental television cable was laid, we returned to California and continued our work out here.

Bonzai: Why did you make the transition from writer to producer? More control?

Lear: No, I was asked early on to direct. Ed and I were doing *The Martha Raye Show*, and the director didn't get along with the cast, so I was asked to direct. It wasn't until *All in the Family* that I started to produce.

Bonzai: It must be more difficult now for someone to slide from writer to producer.

Lear: No, in television, if you are a successful writer you become a producer automatically. That's one of the absurdities of television. Agents who need to get more money for a writer feel that in the second year of a show that the writer must become the associate producer, executive producer, managing producer or supervising producer. The show is almost always produced by some young woman who will never get that credit. She'll be called the associate producer, but will actually do the physical production. Nine guys share some kind of a producing credit, because the people who are doing the show hire them as writers and can't pay them enough, so they get all these other credits to earn more money.

Bonzai: *All in the Family* wasn't an immediate success...

Lear: Initially, it was condemned. It didn't gather a rating; it went on in January against entrenched hits, so people didn't tune it in until it went into reruns. But it was also very badly

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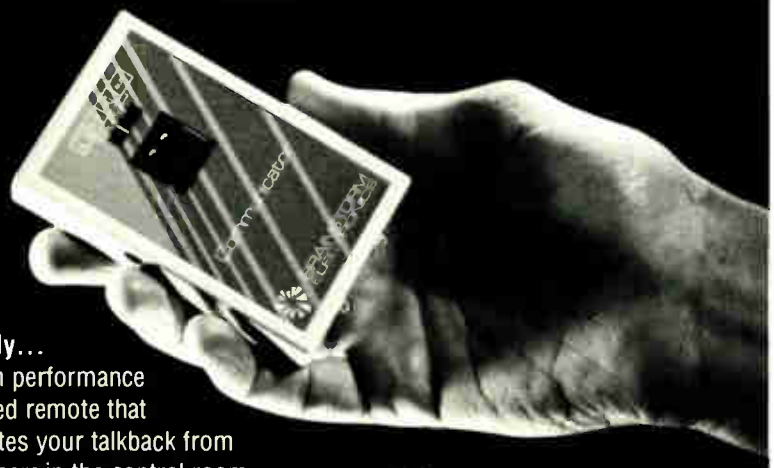

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reviewed, dismissed as bad for the country.

Bonzai: How can there be such a disparity between the initial reaction and such eventual success?

Lear: It took the critics a considerable amount of time to realize that the show didn't exist to exploit words that audiences might laugh at because it reflexively embarrassed them. Or they thought it was funny, and then were embarrassed, because they were laughing at a joke out of a bigot's mouth. All of those things complicated it, and it took a few months for people to realize the intention was not to exploit the bigotry, or the sound of these words on television for the first time. It was to make a greater point. The show had to become an acquired taste.

Bonzai: The show prevailed over the critics. Can the critics sometimes kill a project before it has a chance to prove itself?

Lear: No, I don't think so—not on television. They can on Broadway, but not on television. It's entirely the audience. I think critical praise might force a network to hold on a little longer than they otherwise might with a show that isn't rating highly. But even the critics won't save it if the ratings don't improve.

Bonzai: Do you have any predictions of how televison will differ in this decade? Are we going to see some big changes?

Lear: I don't see big changes.

Bonzai: Will the sitcom format continue?

Lear: Oh, sure—maybe it will evolve, I would hope so, but it hasn't evolved a great deal yet. The name of the game for television, like everything else in American business, is winning quickly. There must be a bigger success this month than last, as evidenced by the profits. As long as that's the name of the game, and not innovation and risk-taking to create something different that might catch on, I think television will stumble into new things, but will basically be the same.

Bonzai: Being able to watch 80 programs, and considering the average attention span, one might guess that there will be shorter programs.

Lear: I don't know if it's a question of short attention span. *Channels*, *Mix*'s sister publication, did a big study of how people watch television. They

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came up with a concept called "grazing," and found that instead of tuning in a particular show, people were grazing across the channels—in a sense, looking for greener pastures. That struck home with me because that's exactly what I do. I rarely tune in a show because I need to see it or very much want to see it. Most of the time, even if I start some place, I'll wind up going up and down the dial, hoping to get my attention arrested—and rarely having it happen. I go to sleep not all that unhappy, and the next night I will look forward with the same excitement to watching television that I had the night before and a thousand nights before that. I hope I am going to find something in this sea of signals, and I rarely do, but I'm not dissatisfied when I go to sleep. It's a television experience, and it's the way lots of people are using television—to graze.

Bonzai: What are the essential qualities of a great producer?

Lear: There isn't one kind of producer. There are producers who are extremely adept at raising money, and projects gravitate to them because they can find the money to do it. There are producers who have a very difficult time raising money but are terrific with material and can find an idea and shepherd it to screenplay, miniseries, whatever. And then there are producers who are a little of both. But producers vary a great deal. There are some producers who can do it all, but they are very rare. Sam Spiegel comes to mind, a producer who worked with a writer with the quality of a Robert Bolt to do *Lawrence of Arabia*, and who could raise the money, market it, sell it and everything else, too. But that's very rare, which is why you remember Sam Spiegel all these years later and not dozens of other producers.

Bonzai: As a producer you have more visibility than most. Why are you so prominent in the public eye?

Lear: Perhaps it's due to *All in the Family*, which had a very special impact. And because it was so controversial, I was asked to speak about it a great deal, and I did and so I was on the tube a lot. And perhaps it's because of my political activities with People for the American Way, and so forth.

Bonzai: Your interest in human rights, being a champion of free expression—why?

Lear: Why! [Laughs]

Bonzai: Why are you this way? Was there a special circumstance in your life that shaped your spirit and made you so outspoken?

Lear: I had a grandfather I lived with between the ages of 9 and 12. He was an inveterate letter writer to presidents. Whatever he had on his mind, he wrote to the president. I was a captive audience of one, and he used to read his letters to me. Every letter began, "My dearest darling Mr. President—Don't you listen to them when they say such and such." Even when he disagreed, he wrote: "My dearest darling Mr. President, I don't think you should *ever* have done such and such..."

I was also the only person in the family who could run down four flights of stairs for the mail. Every now and again there would appear a little white envelope from The White House addressed to *my* grandfather—I couldn't believe it! The White House answered my grandfather's letters, and

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somehow out of that experience and his *delight* in it, and his *feeling of mattering*. I bought it hook, line and sinker, and do to this minute. It's not a notion, it's a fact, that in this country we do matter and every vote matters. It doesn't trouble me in the slightest that the opposing votes could overwhelm me. My vote still matters. I am charged with the responsibility to deliver it, I do, and it matters. And that letter to the congressman, the phone call to your senator, and all those things matter.

I had lunch with a young fella recently, and I said, "Well, what do you do about the things you care about?" He answered, "What can I do, I don't have your resources." I said, "Can you appreciate how really insignificant we all are, that we are all grains of sand." This is something we say and we give lip service to—billions of years of planetary life, our short spans, the vastness of the universe, the multiplicity of universes. We give lip service to how tiny we are, but if you really appreciate it, you realize how little difference there is between you and me. We are both so tiny, so infinitesimal, and we matter so little. So, you write your senator, you do whatever you can do. Anytime you throw a pebble in the lake, it raises the level of the water. You'll never see it, you'll never taste it, but you have to believe it, and every scientist will tell you that it's true.

Bonzai: How can television improve the human condition?

Lear: By helping us understand these things, by stopping the constant preaching of, "You gotta win, or you lose. You gotta be number one, or you don't exist. You have to be in the top ten or you're no good." Television can help us to understand that life only has to do with succeeding at the level of doing your best. This is a lesson lost in this culture. You don't pick it up anywhere. Television, through commercials and such, teaches that you are only successful if you're number one, if you're in the top this or that. Television can go a long way, and business that supports television can go a long way, to help people understand what life is really about. ■

Though he lives in Hollywood, editor-at-large Mr. Bonzai has not "gone Hollywood" yet.

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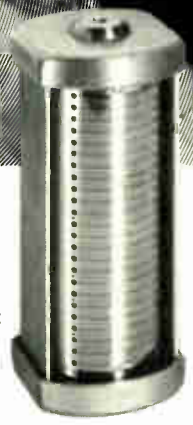

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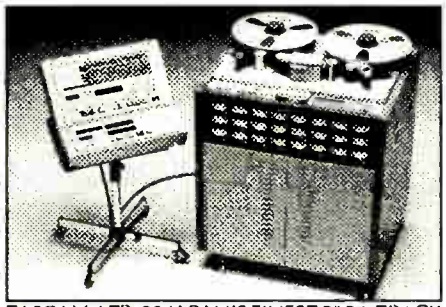

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ON THE LONG AND WINDING ROAD WITH Paul McCartney

BY BRUCE PILATO

It is a freezing Thursday in December, and the scene at Toronto's spectacular Skydome facility looks like an ant farm. Hundreds of crew members, technicians, security guards, food caterers, ushers and select members of the press are running around, each with a job to do. The occasion for all this activity is the appearance of Paul McCartney at the 60,000-seat arena, surely one of Toronto's most anticipated concert events since John Lennon and Yoko Ono appeared at The Peace Festival in 1969.

While the rest of the facility is in a state of controlled hyperactive energy, the scene backstage in the hospitality suite is totally relaxed. McCartney band members Hamish Stuart and Robbie McIntosh crack jokes over a friendly game of pool; McCartney's wife and keyboardist, Linda, is busy preparing a vegetarian meal; son James, age 11, is zapping foes on a video game machine.

In the doorway, Paul McCartney

Paul, Linda and bandmates (L to R): Chris Whitten (drums), Hamish Stuart (bass, guitar), Robbie McIntosh (guitar) and Paul Wickens (keys).

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stands adjusting a baseball cap on his head and a wool scarf around his neck. He has just completed a 45-minute soundcheck for the show, but before he can eat dinner, he has one more interview to conduct, his fourth today.

There is concern that tonight's show, only the fourth stop on the initial North American leg of McCartney's 1989-1990 world tour, may suffer from poor sound.

"I can't really tell you about that until tonight," says McCartney, who at age 47 still sports that unmistakable baby face he had during his years as a Beatle. "I know that I don't like going to shows of this size, normally. So, we'll have to see how we do in this. I haven't done one of these size halls in quite a while. The last one I did like this was the Seattle Kingdome [on the Wings tour of '76], which I think went down very well; nobody complained. I've got a suspicion that no one will complain tonight, but I'm not going to count my chickens.

"I saw Genesis in Wembley Stadium, and I couldn't tell whether Phil Collins was on the stage or not," he continues. "I think that's a problem. Then you come out and you realize you've been watching the telly all evening, when you thought you were watching a concert. I mean, you could have stayed at home and done this. That would have been warmer. We're trying to address those problems. We'll see. We're trying to make the show good wherever we are, whether it's in a pub

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or a venue this size. The idea is the music should be good enough to satisfy you. We'll see how you feel tomorrow. I hope no one feels ripped off."

He shouldn't worry. Ninety minutes later, the Skydome bursts into thunderous cheers and applause, as McCartney and his band stage a brilliant two-and-a-half-hour performance encompassing every phase of his musical career. The audience hears a crystal clear audio mix.

Featuring more than 17 Beatle songs, and only his best solo material, the show not only pays tribute to his rich musical history, but also firmly reestablishes McCartney as a contemporary pop music force.

Though "Maybe I'm Amazed," "Live and Let Die" (with a stunning display of laser lights and explosions) and "My Brave Face" are enthusiastically received, it is clearly the wide selection of Beatles material that most people came to hear. And when he closes the show with the line, "And in the end, the love you take is equal to the love you make," from *Abbey Road*'s side two medley, there isn't a dry eye in the house.

"You see grown men crying," McCartney says. "There is a lot of emotion, because I think it reminds people of a better time, or when they were first courting each other. That's what these songs do. They take people back."

In early 1989 McCartney decided to launch the tour. Rehearsals began in March of last year and stretched over five months. The big question for Paul and the band at the outset was, "Which songs should the show include?"

"It was pretty democratic," says guitarist Robbie McIntosh of the decision-making process for the set list. "We had a big list of 70 songs—all the Beatles ones, all the Wings ones, all the solo ones—and we just went through and said 'maybe,' 'yes,' 'definitely,' 'no.' There were a few that we did that didn't make it for one reason or another, that didn't fit in the set very well: 'We Can Work It Out,' 'Lady Madonna.' I really wanted to do 'Paperback Writer,' but that got cut."

Because McCartney moves around the stage so much, playing acoustic and electric guitars, piano, synthesizers and, of course, bass, the hardest part of putting the show together was working around the instruments he plays on each song.

McIntosh, who was only 7 when the Beatles had their first Number One hit in the UK, says he was concerned about how his and the other musicians' interpretations of the Beatles and McCartney classics would be accepted by audiences.

"I worried about that for a while," he says. "It crossed my mind. You have to just get on with it. You do have to try and be faithful to the parts of the record that are important, and also have fun with it. A lot of guitar parts, especially on Beatles songs, were conceived when the record was conceived. They're just as important as the lyrics or the melodies. You don't mess with them.

"You've got to have the right amount of respect," he continues. "But you can't just paraphrase it, either. Like in 'Let It Be' I play a different solo every night; I just wing it. Whereas in 'Can't Buy Me Love,' Paul and I do the solo together as it is on the record."

The show is also heavy with material from *Flowers in the Dirt*, McCartney's critically acclaimed "comeback" album, which features his current band and songwriting collaborations with Elvis Costello. Although the album has sold more than 1 million copies worldwide, McCartney is clearly disappointed with the response in America. He felt so strongly about the album,

he decided to tour for the first time in 13 years to promote it.

The album is McCartney's most consistent work in years, and features not only strong material but an array of producers, including Neil Dorfsman (known for his work on Bruce Springsteen's *The River* and Dire Straits' *Brothers in Arms*); Trevor Horn (from Frankie Goes To Hollywood fame); Capitol Records house producer Mitchell Froom; Chris Hughes (Tears For Fears); and finally, longtime associate and Beatles producer George Martin.

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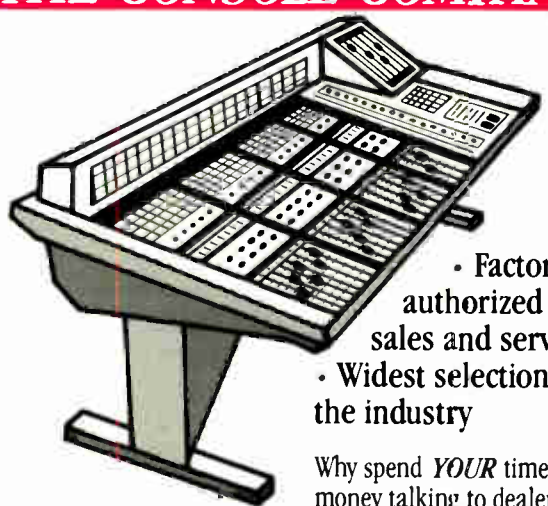

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Martin, McCartney offers with a hearty laugh, "Well, I know his address!

"No, really. I love George Martin. He's a marvelous man and we get on very well. I've known him a long time, so we can sit down, and in half an hour we can do something that is very constructive. I don't have to go through meeting him and getting to know him and checking out his chemistry. Plus, he's a great musician."

McIntosh, who played many of the intricate guitar parts on the *Flowers* album, says that even though McCartney used several producers on the album and that he worked well with each of them, he never relinquished control of the project.

"No, he doesn't leave it to the producer," he says. "He's got a lot more clout. If he's not happy with something, he's not going to let it out. He's really the producer, even if he's got a producer. But he uses their ideas. He's very open to their ideas. He's not dictatorial or anything.

"He tries things out, moves things around," McIntosh continues. "He's got the time; I think that's why. In the old days you didn't have open-ended budgets and you didn't have 24 tracks. I mean, all those limitations kind of forced you to come up with the goods a lot quicker."

But it is the old days of recording that McCartney says he wants to "get back" to. His 1989 album, *Back in the USSR*, a collection of 1950s rock 'n' roll chestnuts released only in the Soviet Union, was recorded in one day—as was the first Beatles album, *Please, Please Me*, 26 years ago.

"One of the main differences between then and now is it used to be a lot quicker to record," McCartney says. "We recorded the first Beatles album in a day: 10 o'clock in the morning to 10 o'clock at night. And we did "Twist & Shout" last, because if we had done it first, we couldn't have done any of the other songs—John's voice would have gone.

"One day for an album—that was pretty fast," McCartney says. "Now it takes one day to switch on the machines, load the computer and find out where the 'on' switch is. That's the main difference. It just takes forever now to record one song.

"On that Russian album, we did 18 songs in a day, and it was really good. I think it's more fun to record that way; very spontaneous and immediate. The other way—God, it's terrible! You get all this computer downtime. It's like, 'Take five hours guys, while we fix the computer.' And the computer, you know, was introduced to make things cheaper and quicker," he notes with a boyish chuckle.

McCartney attempted to bring back some of that spontaneity to *Flowers*. For example, he limited producer Trevor Horn to only two days to record and mix "Rough Ride," one of the hottest tracks on the LP.

Most of *Flowers in the Dirt* was done in the time-consuming, meticulous fashion of McCartney's other solo ventures, however. The time put in paid off—it is unquestionably one of his best records, sonically. It is also his most musically adventurous project in some time. With the help of Elvis Costello on a few tracks, he was able to re-create the "two-way conversation" approach to lyrics that was a Lennon-McCartney trademark. Though that wasn't the intention, McCartney acknowledges the material he wrote with Costello is closer in spirit to some Beatles songs than most of what he's written since the Fab Four fell apart.

"He's a Beatles fan and, I suspect, a John fan," McCartney says of Costello. "Because, you know, often guys who wear glasses identify with other guys who wear glasses," he laughs. "He's similar to John in a number of ways, and it wasn't a deterrent. It was good to work with him, mainly because he's a good writer and he's got a very strong opinion."

McCartney is confident the album will stand out in time as one of his best. But *Flowers in the Dirt* isn't the only reason for the tour. The McCartneys are also using the tour as a vehicle to help promote Friends of the Earth, a small but vocal organization dedicated to a number of pressing environmental issues. "I have a platform with my concerts and press conferences and interviews, where I can actually talk to radio, TV and journalists and press on the fact that Friends of the Earth do want [the planet] cleaned up," McCartney comments. "It's not for me that I'm doing it. It's for us all."

McCartney's tour, like many other big rock treks these days, is being sponsored by a large corporation, Visa, which is using McCartney's likeness to plug its charge card. For his services, Visa has underwritten the travel expenses of the entire tour and made a large cash contribution to Friends of the Earth.

"A big tour of this size has got to be sponsored by someone," McCartney

World Radio History

says. "What we were doing was sticking out for a sponsor that we could keep our integrity with, so I didn't actually have to hold up anything and say 'Go out and buy this!'

"Someone said to me the other day that the Beatles were anti-commercial. We weren't. It's as if we never got paid in the '60s or we never acccepted any money! We never did commercials, but this is not really me doing a commercial. This is a commerical about the tour. I've been offered a lot of money to hold up a whiskey bottle in Japan. That I don't want to do. That is what I call a commercial."

No matter what is said, the fact remains: Paul and Linda McCartney will never need to do anything for the money. With a net worth estimated at nearly $500 million, they remain the richest musicians in the history of show business.

Inside the hospitality suite at the Skydome, the evening news is being shown on a big-screen TV. The news this night is dominated by the story of a mentally disturbed young man who shot 14 college women in Montreal. Tomorrow, the McCartney tour heads to that city. Ironically, that day is also the ninth anniversary of John Lennon's assassination.

The mood, to say the least, is a bit eerie.

As showtime approaches, Paul, Linda and the band begin what has become the daily ritual of grabbing a vegetarian meal, getting dressed for the show and, finally, walking out in front of thousands for over two hours of musical magic.

"I'm really enjoying this," says McIntosh, about to hit the stage. "I'm playing some of my favorite songs. It's a boyhood dream come true."

Having endured 25 years at the top of the rock 'n' roll heap, McCartney is finally asked what the next decade will be all about. Surprisingly, his response has nothing to do with music, show biz, fame or the like. It is, instead, a hope that the world can finally be a better—and cleaner—place to live.

"The '90s is finally going to be the time when people realize we've got to clean this world up, and we're going to do it in order to have a clean 21st century. Well, that's my wish, anyway." ■

Bruce Pilato is a contributing editor for Mix *who lives with his wife and three children in upstate New York. He is currently writing his first book.*

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NEW PRODUCTS

SONY VSP-8000 DIGITAL MIXER

New from Sony Pro Audio (Teaneck, NJ) is the VSP-8000, a digital audio mixer designed for the digital video suite, providing control of the 4 channels of PCM audio from the DVTR. Features include 16 input channels (each with assignable control of EQ, dynamics and delay), standard 16 x 16 routing switcher of AES/EBU digital signals (expandable to 32 x 2), serial control capability from the Sony BVE-9000 for audio-follows-video, and snapshot storage of mixer settings on a 3.5-inch floppy disk.

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DIGITAL DIALOG EDITING SYSTEM

Specifically designed for dialog, the Audiflex digital workstation from Cinedco (Glendale, CA) is the only sound editing system that lets the editor input any compatible CMX, ISC or EDL list and accomplish manual or automatic assembly. The PC-based system displays sound in separate windows for bit-resolution editing, "shaving" or "scraping." The standard Audiflex comes with 4 to 8 channels (with 30- to 120-minute capacity per track), offering speed and flexibility along with 16-bit quality. A built-in sampler and "fill bin" allows the creation and storage of effects and fills from existing takes or wild recordings, and a recent system update involves a move/trim feature for inserting frame offsets.

Circle # 002 on Reader Service Card

CELESTION MODEL 3 ▲

The Model 3 speakers from Celestion Industries (Holliston, MA) are compact studio monitors designed for near-field and reference listening. The Celestion 3 is a 2-way design with a frequency response of 75 to 20k Hz (-3dB) and a power rating of 10 to 60 watts. Each has a 5-inch felted-fiber cone mid/bass driver and a 1-inch, titanium dome tweeter, similar to that used in Celestion's higher-priced DL Series. The speakers are available in walnut or black ash vinyl finishes and retail at $280/pair.

Circle # 003 on Reader Service Card

TC MAXI AND TC MIX TIME CODE READERS ▲

Distributed by Denecke of North Hollywood, CA, are the TC Maxi and TC Mix readers, which display SMPTE/EBU time code with large, 4-inch LED numerals. The TC Maxi is 32.5 inches wide and displays time in hours/minutes/seconds/frames, while the compact (16.25 inches wide) TC Mix displays minutes and seconds only. Both read longitudinal time codes from 1/20th to 50-times speed, and include a remote intensity control with time code input and TC/user-select switch.

Circle # 004 on Reader Service Card

APOGEE AD1000/ DA1000 CONVERTERS

The AD1000 from Apogee Electronics (Santa Monica, CA) is a freestanding, high-quality analog-to-digital converter designed for a variety of applications. The AD1000 includes both AES/EBU and SPDIF digital ports, with SDIF, Yamaha, Digidesign and Mitsubishi interfaces to be added soon. The DA1000 complements the AD1000 unit, with similar interfacing and a unique oversampling conversion system and filter, along with time correction for EIAJ (F1-type) processors. According to Apogee, a new dither system allows the equivalent of three additional bits of information to be encoded into the 16-bit stream in such a way that it will be decoded by any replay system, from studio playback to a CD listener at home. The converters are priced at under $900 per stereo unit.

Circle # 005 on Reader Service Card

LUCASFILM SFX LIBRARY

A co-production between Lucasfilm and Sound Ideas (Richmond Hill, Ont., Canada) has resulted in the release of a six-CD sound effects library, all digitally recorded in stereo. Three discs produced by Skywalker Sound—the elite post-production group at Lucasfilm—feature industry, jungle animals and the sounds of the Earth's elements. The Sound Ideas portion of the library offers aircraft, a U.S. Navy aircraft carrier and high-performance vehicle effects. The set marks the first of a series of releases from the co-production team, and is exclusively marketed by Sound Ideas.

Circle # 006 on Reader Service Card

AKG C1000S

Designed for studio, stage and location recording applications is the C1000S from AKG Acoustics, Inc. (San Francisco, CA). Retailing at $325, the C1000S is a multipattern electret condenser mic that can be powered either from phantom power or via an internal 9-VDC battery. The C1000S includes a polar pattern converter that can change the mic's pickup from cardioid to hypercardioid in a matter of moments.

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SENNHEISER HD 25 PRO HEADPHONES

The HD 25 Professional Dynamic Headphones from Sennheiser (Old Lyme, CT) utilize a closed-back, supraural design. Built for professionals who spend a lot of time wearing phones, the HD 25s are lightweight (5 oz.), comfortable, and feature a swivel mounting that allows one driver to rotate off the ear to accommodate those who prefer single-muff monitoring.

Circle # 008 on Reader Service Card

▲

NP PORTABLE MIXER

Originally developed for Danish Radio, the np Portable is an on-location mixer manufactured by np Elektroakustic and distributed in the U.S. by Aurora Productions of Bowie, MD. The fully modular mixer features four transformer-balanced input channels (two units can be chained for 8 inputs), Penny & Giles faders, stereo monitoring with dual PPMs and a phase indicator, 12/48 VDC phantom powering and 1k/10k oscillators. Also standard are dual limiters (stereo-linkable) and a built-in matrix for M-S miking. The np Portable can be powered for up to 30 hours on 16 "C" batteries and carries a list price of $6,995.

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MASTERING LAB MODEL 10 CROSSOVER

The Model 10 from The Mastering Lab Studio Products Division (Los Angeles, CA) is a retrofit crossover for the Tannoy SGM-10B studio monitor. Priced at $650/pair (installed), the crossover features an infinitely variable balance control, along with hand-selected components and air-core inductors, and is said to offer greatly enhanced resolution from 10-inch Tannoy speakers.

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TANNOY SGM-15B MONITORS

Tannoy Inc. (Kitchener, Ont., Canada) has unveiled the SGM-15B, a compact (26.5 x 19.75 x 18.5-inch) monitor housing a 15-inch, K-3809 dual-concentric driver, providing high SPL performance with a frequency response of 40 (±4dB) to 20k Hz. The enclosure is medite with a black finish, and the crossover utilizes the same hard-wired construction and high-current EQ switches as the other models in the Super Gold Series.

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World Radio History

by George Petersen

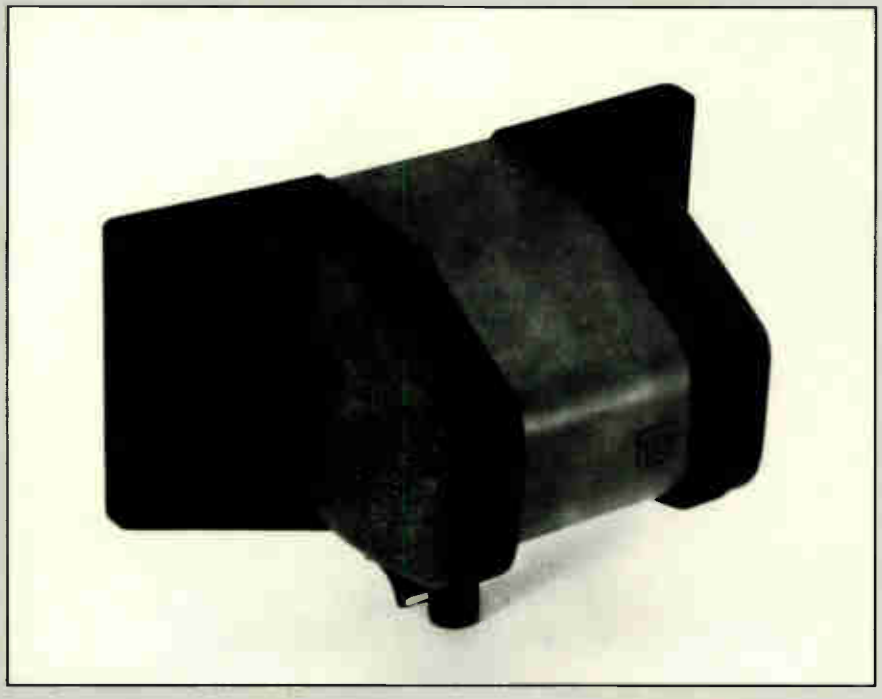
PRODUCT
CRITIQUES AND COMMENTS

CROWN SASS MICROPHONES

The art of stereo microphone placement is infinitely more complex than capturing a monaural signal. Of course, there are well-established procedures for stereo mic placement. These techniques include X-Y (crossed pair), A-B (spaced pair with capsules facing forward), ORTF (closely spaced pair with capsules pointing outward at 110 degrees), M-S (mid-side) and binaural (with mics placed within the "ears" of a dummy head). Each method has its peculiar advantages and disadvantages, ranging from spaciousness of the stereo field, to various degrees of compatibility when played back over headphones, stereo speakers or mono systems.

When other factors, such as exact placement angles and distances, and the selection of the style and pickup pattern and type of the mics used, are considered, the stereo miking process gets real complicated, real fast.

The latest mic product from Crown International offers a simple solution to the dilemma of stereo miking. Known as SASS™ (Stereo Ambient Sampling System), this new approach uses two high-quality, electret condenser Pressure Zone Microphones™ mounted on boundaries to increase directionality (these mics normally exhibit a hemispheric-pickup pattern).



Crown SASS-P Microphone

The two mic capsules are separated by a distance approximately that of a human head, for a natural, stereo image. A foam divider placed between the capsules reduces the possibility of phase cancellation, which can occur when the output of a stereo mic pair is summed to mono.

SASS is available in two versions. The SASS-P, priced at $849, uses PZM capsules as described above; SASS-B ($799) has a similar housing, *sans* transducers, and is designed to accommodate Bruel & Kjaer's superb Model 4003/4006 microphones.

Although the SASS-P is fairly siz-

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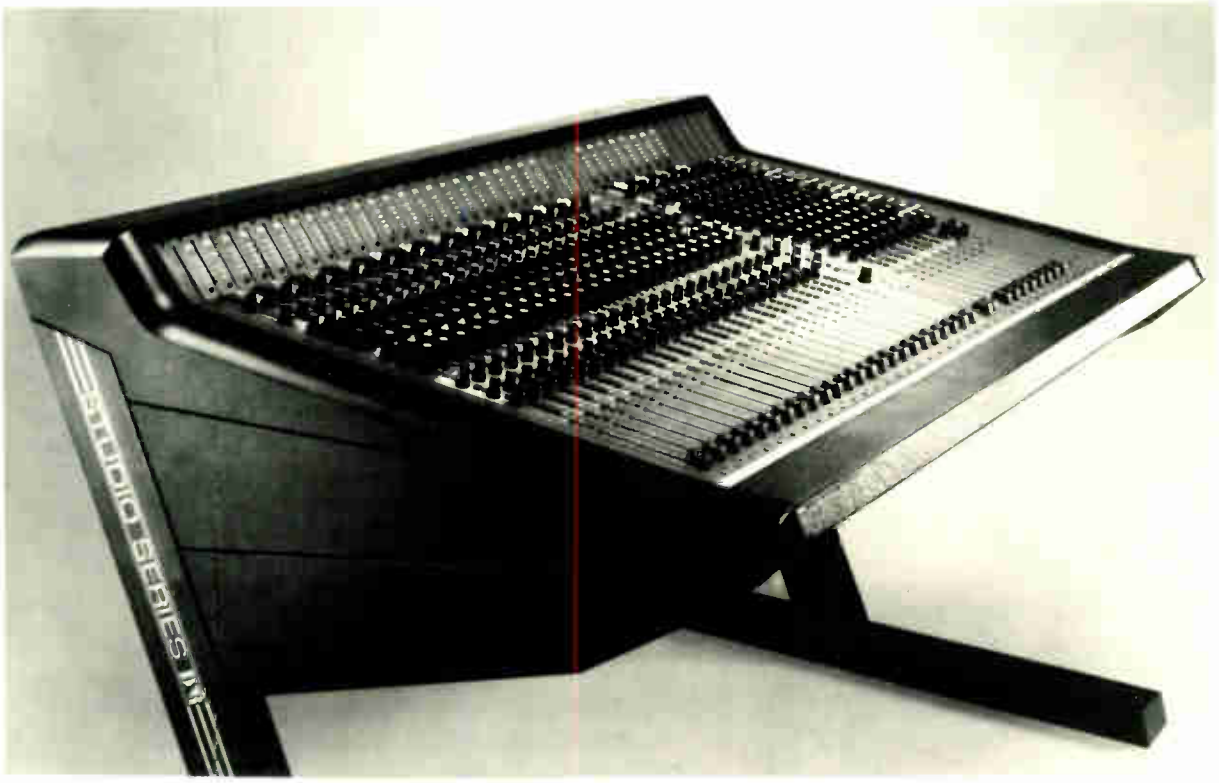
The Bottom Line.



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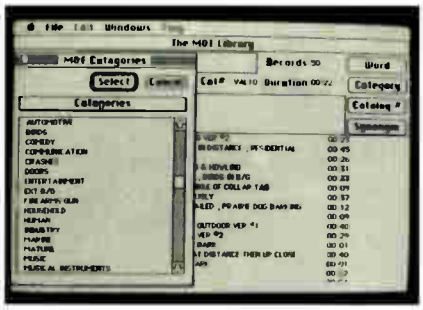

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able at 11.5 inches across, it is much lighter than it looks, weighing in at a mere 17 ounces. Along its rear panel are two balanced XLR outputs for the low-impedance mic capsules, a rotary switch that allows the user to select either "flat" or a 100Hz bass roll-off frequency response, and another switch that offers a choice of external phantom power or internal batteries. Two onboard, 9-volt batteries supply the required juice; this is especially convenient in field recording/sampling applications, where phantom power is usually unavailable.

Another appreciated touch is its flexible mounting system. The mic swivel mount can be attached to a standard mic stand (using either conventional or European threading) or a comfortable hand grip (included with the mic), and a 1/4-inch by 20-threaded adapter accommodates either photographic tripods or cymbal stands. The SASS-P mic also includes a sturdy carrying case, nylon windscreen and two highly effective foam wind protectors.

The SASS-P's strongest point may be its versatility, as it is equally well-suited to handle any number of production tasks, ranging from orchestral and choral miking to sound effects gathering, sampling and stereo ENG/broadcasting applications. In addition to its uses as a primary mic, SASS provides natural stereo reproduction in ambience recording situations, whether in the studio (mounted on a high stand for the distant miking of drums, piano, strings, etc.) or on location. As one example of the latter, a SASS could supply stereo ambience at a news event, while a lavalier or close mic picks up a reporter or interview subject.

I found the SASS-P extremely easy to use, providing excellent (and mono-compatible) stereo imaging in nearly all cases, whether the recordings were played back over headphones or speaker systems. Imaging was tight and localization was good. I would, however, advise users to keep the mic at least three feet away from the sound source to avoid the "hole in the middle" effect, since the center baffle interferes with the proper imaging of stereo sounds at this range. However, this otherwise detrimental effect can also be used to distinct advantage in some cases. For example, as a drum overhead mic, use of the SASS-P can eliminate pickup of a snare drum directly below.

I was impressed with both the mic's smooth frequency response and ability to handle sound pressure levels in excess of 140 dB, which certainly came in useful for some aircraft and helicopter effects I recorded. At $849, the Crown SASS-P is a reasonably priced and useful addition to the toolbox of any serious recordist.

Crown International, 1718 W. Mishawaka Road, Elkhart, IN 46517; (219) 294-8000.

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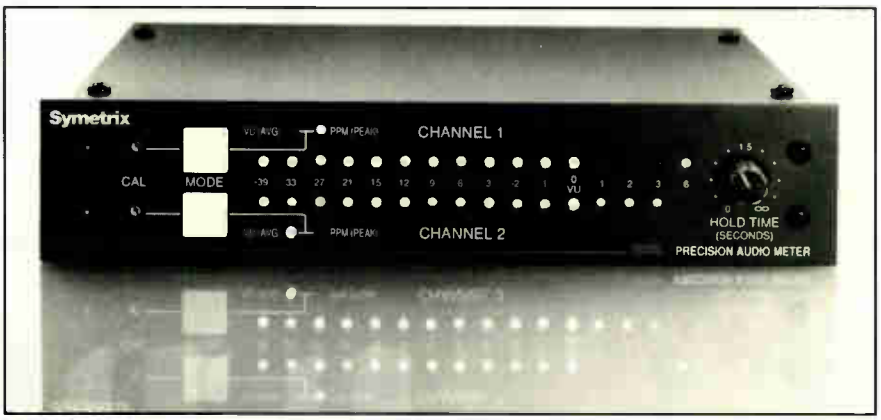

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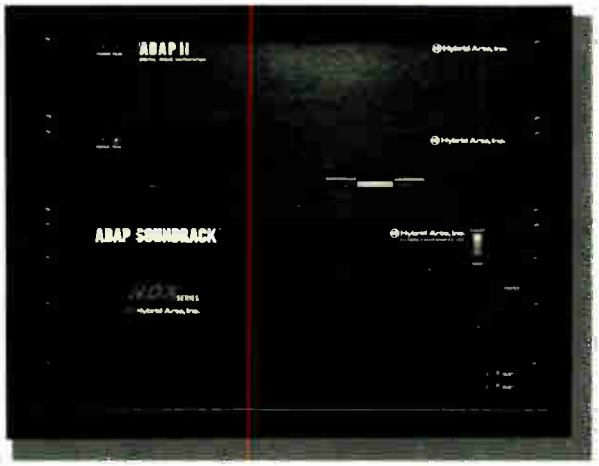

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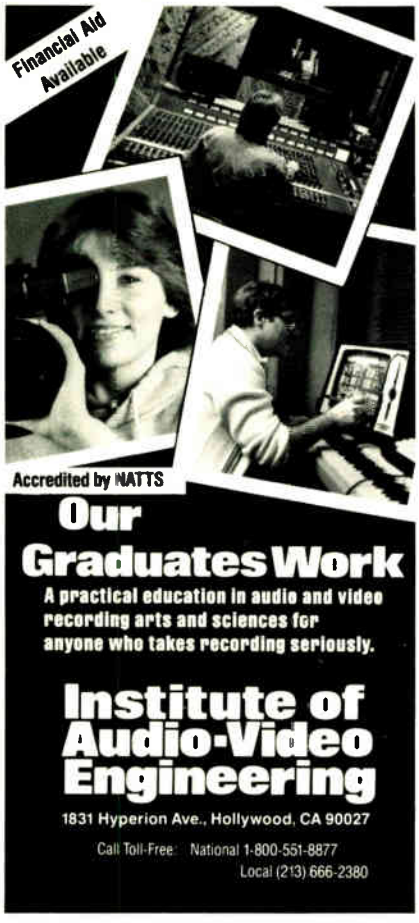

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the signal; if levels are too high, the result is overload distortion, a sound best described as horrible, particularly in the digital domain.

One solution to this problem is the Symetrix SX205, a microprocessor-controlled level display that measures both voltage (VU) and power (expressed in 0 to 100 or 0 to 1,000 watt ranges, referenced to 2-, 4- or 8-ohm loads). The unit's intelligent driver display allows users to select either bar graph or single-dot formats, with variable peak-hold times from instantaneous to infinite. Other features include 16-segment LED displays; selectable peak/averaging meter "ballistics"; barrier strip amplifier inputs; and 1/4-inch TRS connectors that accept balanced or unbalanced +4dBm line inputs.

The SX205 also includes a built-in 1kHz oscillator, and by following the simple calibration procedure in the manual, the user is assured of accurate metering. The unit's convenient half-rack size provides for numerous mounting possibilities; thanks to its compact dimensions, the SX205 can be used on a console top, in a cassette dubbing rack, in a crowded production van or edit suite—just about anywhere.

I was impressed with the SX205's performance, especially with its +/-0.5dB accuracy over the entire audio bandwidth. The multicolored LED level displays are large, bright and easy to read. Even on its own, this feature makes the SX205 an extremely worthwhile investment. Have you ever tried reading the meters on a VCR from even a few feet away, let alone from across the room? The adjustable hold time and the ability to instantly change from VU (average reading) to PPM (peak reading) modes—combined with the unit's fast and highly accurate response—make the Symetrix SX205 one flexible and useful studio accessory. While $339 may seem like a lot to pay for "just a meter," this is an indispensable device for anyone who is serious about audio.

Symetrix, 4211 24th Avenue West, Seattle, WA, 98199; (206) 282-2555.

TUBE-TECH PE1B PROGRAM EQUALIZER

Maybe I'm getting old, but I often run into engineers who are unfamiliar with the pleasures of well-designed, vacuum tube-based signal processors. Too bad, because this genre of equipment has much to offer the harsh, digitized tracks in this last decade of the millennium. Fortunately, there is a resurgence of high-quality tube gear, such as Tube-Tech's studio processors.

Tube-Tech PE1B Program Equalizer

Manufactured in Denmark by Lydkraft and distributed in the U.S. by Audio Techniques of New York City, the Tube-Tech line includes the CL1A compressor, MP1A microphone preamp, ME1A midrange equalizer and the PE1B program equalizer. All exhibit handcrafted excellence and a feeling for old-time excellence. In fact, the Tube-Tech PE1B bears a remarkable similarity to the Pultec EQP-1A3, which, while no longer manufactured, is a much-sought-after tube program equalizer among studiophiles.

The PE1B combines a 3-band filter section, followed by a tube-based, push-pull preamplifier. The latter compensates for any gain reduction caused by the passive circuitry, and its tube design accentuates even harmonics, providing a smooth, warm sound.

Low-frequency equalization consists of independent boost and attenuate shelving controls (+14, -18 dB), switchable to 20/30/60/100 Hz. The high-frequency section offers up to -18 dB of shelving attenuation at 5/10/20 kHz and boosting (with variable bandwidth) at a choice of ten frequencies, from 1 kHz to 16 kHz. A large,

World Radio History

front panel toggle allows clickless switching of EQ in/out, a nice feature when you're bringing the equalizer in and out of the mix, such as adding equalization to a bridge or solo.

The PE1B doesn't include a manual, as the operation couldn't be much simpler: Just plug into the transformer-balanced XLR input and output jacks and start tweaking. If you've never used tube processors before, you're in for a nice surprise; and those fans of Pultec EQs are sure to appreciate using a new unit, free of noisy switches, crackling pots, leaky capacitors and other such problems common to vintage equipment.

Obviously, one of the main applications for tube equalization is vocal processing. Using the PE1B on a couple of tunes on a recent album mix, it proved well-suited to the task. On several lead vocal tracks, the combination of the tube equalization with a modern, large-diaphragm condenser yielded a pleasant tube mic sound.

I also used the unit to cut some crunch rhythm guitar tracks, adding a huge, broadband mid-boost (with hiss-cutting HF attenuation) while feeding the PE1B directly from a fuzz box. While this is hardly the use for which the unit was designed, the result was just what I was looking for. On a slightly more sane application, a gentle 3kHz mid boost was just the right amount of equalization on a solo passage by guitar wizard Ronnie Montrose on a session I mixed, providing a smooth, subtle effect, free of any harshness or phasing problems.

In short, the Tube-Tech PE1B is a winner all around: It sounds great, and at a suggested list of $1,495 is reasonably priced, considering its flexibility and superb, solid construction. Like the Pultec EQ it imitates, I have no doubt that the PE1B will be a prized studio possession for years to come.

Tube-Tech is distributed in the U.S. by Audio Techniques, 1619 Broadway, 4th Floor, New York, NY 10019; (212) 586-5989.

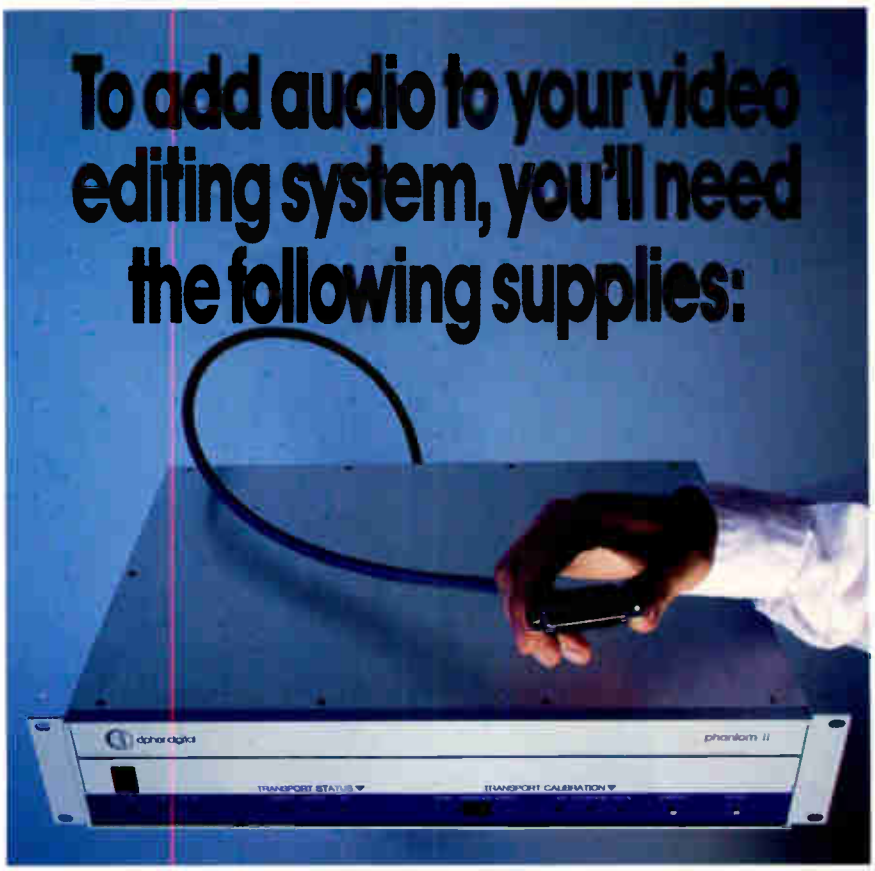
KLARK-TEKNIK DN510 ADVANCED DUAL NOISE GATE

Over the years, British manufacturer Klark-Teknik has built a reputation for delivering first-rate signal processing gear (particularly equalizers, digital delays and digital reverbs) for studio and sound reinforcement applications. It's a tough market with plenty of competition and a lot of "me-too" products. However, the DN510 Advanced Noise Gate, a recent entry in K-T's line, is a truly unique device that does what no other product can do.

Klark-Teknik DN510 Advanced Dual Noise Gate

The DN510 is a 2-channel noise gate that can operate in stereo or dual-mono modes. Packed onto its single rack-space front panel are two sets of controls for range (up to -90dB of gating attenuation), LF and HF filtering, masking and threshold, and an envelope section with individual controls for delay (up to two seconds),

—CONTINUED ON PAGE 194



The only equipment you'll need to add audio to your video editing system is the Phantom II VTR Emulator from Cipher Digital. The Phantom II can interface any video editing system that uses Ampex, Sony, or CMX protocol with 77 different tape machines — even older VTRs like the VPR-2.

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by George Petersen

HYBRID ARTS ADAP II

The ADAP name should be familiar to anyone who's had even the slightest involvement in the audio or music industries over the last five years. The first incarnation of the system—ADAP I—was unveiled to the public at the summer 1986 NAMM show in Chicago, and shipments began some nine months later.

Basically, ADAP I (which is still in production and continues to sell well) proved the suitability of the Atari ST's 68000-based microprocessor for digital audio recording purposes. However, the RAM-based ADAP I system (with a maximum stereo record time of 22 seconds at 44.1 kHz using a Mega 4 computer) had obvious limitations, and Hybrid Arts began working on a system that could read from and write directly to hard disk in real time. After several years of development, Hybrid Arts began delivering ADAP II one year ago, although the company continues to upgrade and expand the capabilities of the system with regular software updates (we tested Version 2.1).

Perhaps we should start with the basics. ADAP is an acronym for Analog to Digital Audio Processor, and besides direct-to-hard disk recording—with a maximum stereo recording time of more than 50 minutes at 44.1 kHz—ADAP II offers comprehensive editing facilities, SMPTE chase lock capability, 16-bit stereo sampling and multievent playlist triggering. The system can operate at 48/44.1/32/31/22 kHz (with each smaller sampling time providing more recording time at a reduced bandwidth); ADC's are 64-times oversampling, and outputs use 8-times oversampling with dual 18-bit DACs.

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long-term storage/archival use; additional hard drives (from 96 to 760 MB) for system expansion; and the *MIDI Performer*. The latter is a software upgrade allowing use of ADAP II as a MIDI sampler module with four stereo/eight mono voices, and assignment of up to 128 samples to MIDI note values.

While ADAP was originally offered as an add-on peripheral for the Atari Mega/ST computers, Hybrid Arts decided to market the ADAP II system as a complete turnkey package. In fact, all the components are mounted in a 19-inch rack housing. Unpack the boxes, plug in the computer keyboard, mouse and color monitor, connect your audio, SMPTE and MIDI lines, and you're ready to go. Well, sort of. You see, the four components in the rack must be powered up in the proper order, with the CPU (Hybrid Art's custom rack-mount version of the Atari Mega) turned on last, after placing the boot disk into the floppy drive. According to the manual, it is normal to "occasionally" boot the CPU twice when starting the system, and a front panel "reset" button is provided for this purpose. The system I tested NEVER booted on first try, but, fortunately, this was the only system quirk I encountered.

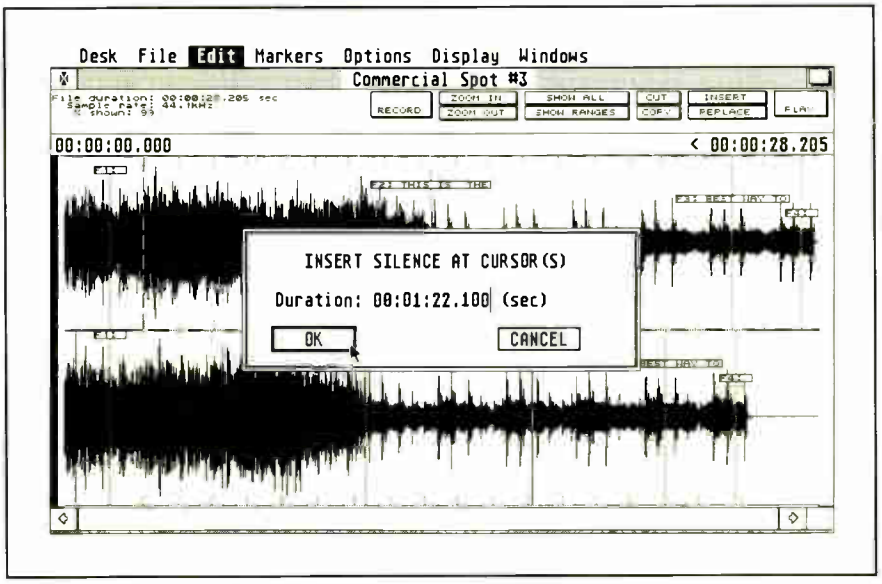

Figure 1: ADAP II Edit Screen

Since a user rarely needs to access or use any controls on the rack components during a session, ADAP II is ideally suited for mounting outside the control room. This conserves valuable studio space (fairly deep and eight rack-spaces tall, the rack is sizable) and cuts down on noise from the disk drives, which is not objectionable, but noticeable. A monitor extension cable (available through many third-party sources) greatly simplifies the task of system placement.

The manual does a decent job of getting the user up and running in a short span of time, although a few screen displays printed among the text would make things easier. (Note: At press time, Hybrid Arts began delivering an all-new manual—complete with extensive graphics—to all registered ADAP II owners.) Once in the system, operation is straightforward and fairly intuitive. "Help" displays are available, and the use of multiple pull-down menus should be a familiar sight to most computer users. In short, the system does not require any special knowledge of the Atari ST for any of the usual operations.

Many commands can be selected by either point-and-click mouse movements or from computer keyboard commands. Once familiar with the system, the latter are much faster. Certain commands, such as "P" for playing back an entire recording or "L" to play a looped section are simple, while others, such as "Alt-L" to rename the current file,are far less obvious. A small reference chart of keyboard equivalent commands—such as the stick-on "cheat sheets" available for most word processors—would be useful; perhaps Hybrid Arts could consider releasing something like this in the future.

ADAP II's software is divided into three separate programs. *DRE* is the Digital Recording Environment, where

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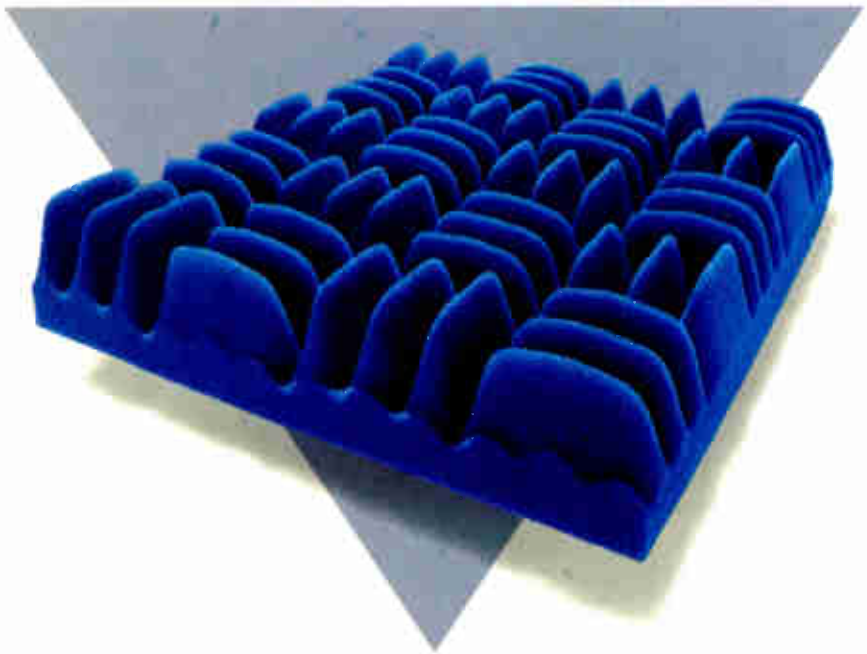

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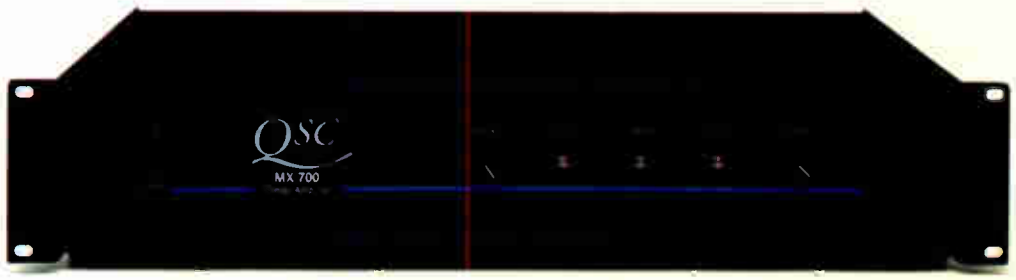

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most of the basic record/edit functions take place. The *EDIT* program is a RAM-based editor—similar to ADAP I—that allows the importation of short sound segments to be manipulated precisely and quickly and then transferred back into DRE. The *Cue* program is a SMPTE-driven edit decision list for building sequential lists of sounds for playback at specified SMPTE times.

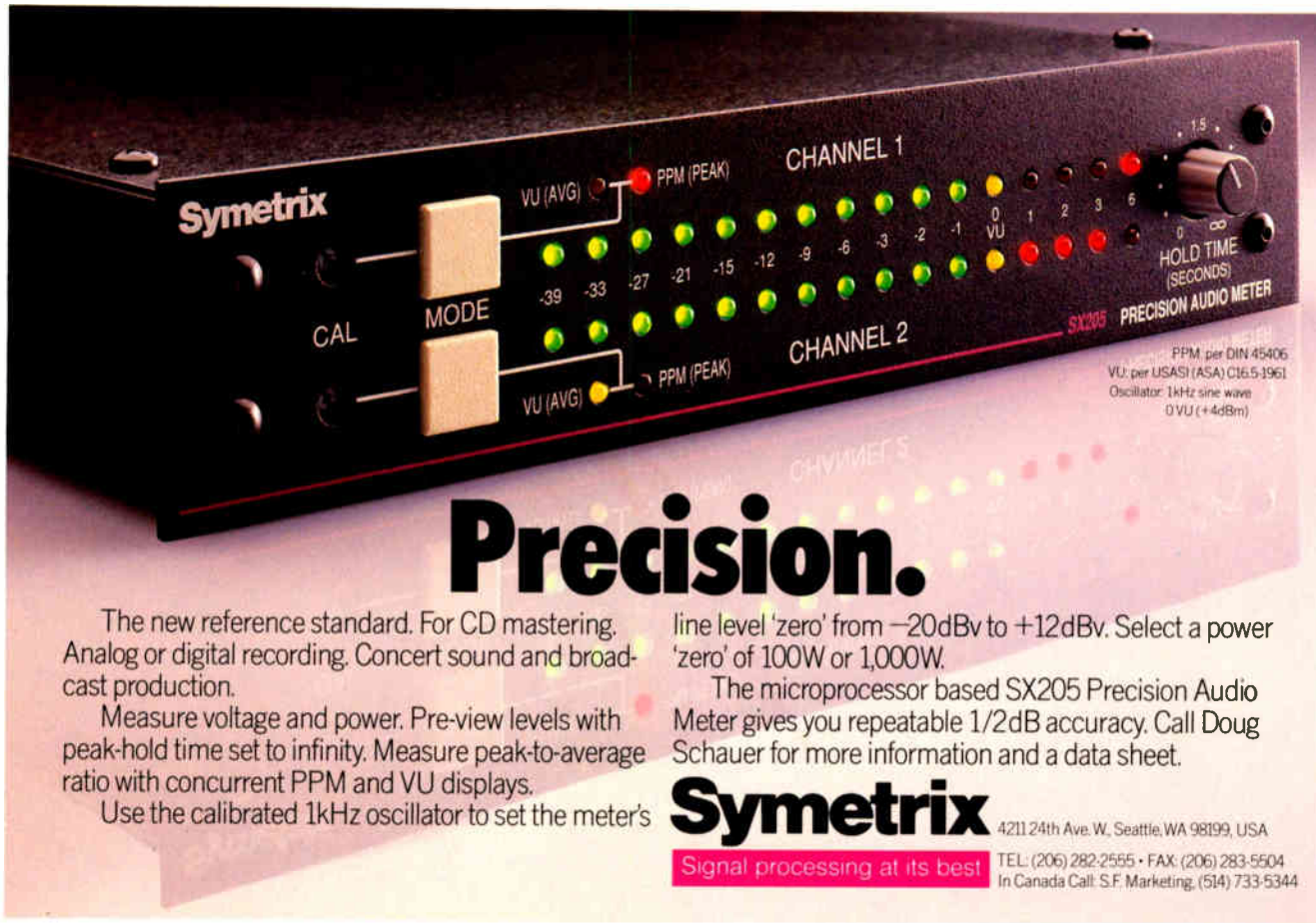
Once sounds are recorded into DRE (a simple series of windows and menus guide you throughout this process), editing and file manipulation can begin. The sound file can be displayed in a variety of ways; among them are: full wave (shown in Fig. 1, this gives an oscilloscope-type display of the two channels); amplitude, which shows the sum of the positive and negative portions of the waves, with the results displayed as positive-only waves; and quick display. The latter shows the file as a 1/4-inch piece of tape, and, while unglamorous, allows the user to scan through a long file without having to wait for the system to make the complex and tedious calculations of redrawing the wave display of an entire piece. Once you find the section you want to work on, simply highlight that "range" with a mouse movement, and a click on the "show ranges" box fills the screen with a waveform display of that portion.

Most of ADAP II's operations—such as inserting, looping, cutting, copying and crossfading—can be carried out by merely highlighting ranges and mouse-clicking on the command you wish to perform. If more precision is required, then ADAP II allows the placement of up to 200 user markers in a file. These can be used for autolocation purposes, to flag edit points, create ranges and make user notations of up to 20 characters—such as typing words above a dialog file or short phrases, like "jet engine start." Deleting unused or unnecessary files happens simply by clicking on the desired item and dragging it into a "trash can" icon.

Sounds can be triggered for playback from any specified SMPTE start time, or manually by a mouse click or keyboard command. SMPTE triggering is available from any of the operating programs: DRE, Edit or Cue. Another important feature of the ADAP II system is that the two channels can be manipulated, edited and altered either separately, or simultaneously as a stereo pair.

My first assignment was creating a long ambience track from a short sound effect clip of an audience waiting as an orchestra tunes up and then begins. What I had was 20 seconds. What I needed was three minutes. Once the SFX was in ADAP's DRE, the entire process took under ten minutes, which was impressive for creating a heavily edited, three-minute sound file. I began by copying a range of clean ambience (without any tuning noise) onto a "clipboard" memory section, and then inserting this section into various points on the file, and using the "cut with crossfade" feature to merge the inserts seamlessly.

Several types of cuts can be selected, ranging from a straight cut ("butt splice") to crossfades using linear, logarithmic or inverse log slopes. Crossfades can be any length, up to one-half of the region on either side of the cut, an especially useful feature when using ADAP as an editing/premastering system for preparing tapes for album releases. Program material can be dumped into ADAP II through its analog or digital inputs,



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merged, sequenced and crossfaded (if desired). Once any edit function—cuts, crossfades, inserts, etc.—is made, the result can be auditioned and checked, and if you're not pleased with the results, pressing the "undo" key restores the file.

The 2.1 software release of ADAP II supports "scrub" editing, which uses the mouse as a means of simulating the age-old analog method of rocking tape reels back and forth to locate a specific edit point. The mouse is well suited to this task, and the ADAP's scrubbing implementation is simple and fast.

The most basic ADAP II turnkey system—with a 96MB hard disk for storing more than six minutes of stereo, 44.1kHz recording—is $9,995, while a system with a 760MB drive (over 48 minutes of record time) is $14,995. And the latest software release includes a multidevice formatting feature allowing the hookup of up to seven additional drives that the system sees as a single, large drive. Therefore, a facility could start out with a modest system, say with a 380MB (24-plus minute record time) and later add a second 380MB drive, and be able to handle 48-minute files. Along the same lines, Hybrid Arts also offers an upgrade path, so owners of an ADAP I can expand to an ADAP II system.

Operationally, the Hybrid Arts ADAP II is a well-thought-out system that did everything it claimed to do and performed its tasks admirably. Yet, after five years, ADAP is still unfinished. As an open-ended, software-driven system, Hybrid Arts is committed to continuing development of new features and functions—such as CMX and VITC support—to meet the future needs and directions of the professional audio market. Perhaps one of the system's strongest points is that it's adaptable (no pun intended) to handle a wide variety of studio tasks, including DAT editing, CD premastering/tape prep, stereo sampling, dance mix production, sound design, SFX looping, dialog manipulation, electronic Foley, or flying instrumental solos or effects into a mix using SMPTE chase lock. With its impressive sound quality, expandability and straightforward operation, ADAP II is a versatile and flexible tool for audio production in the 1990s.

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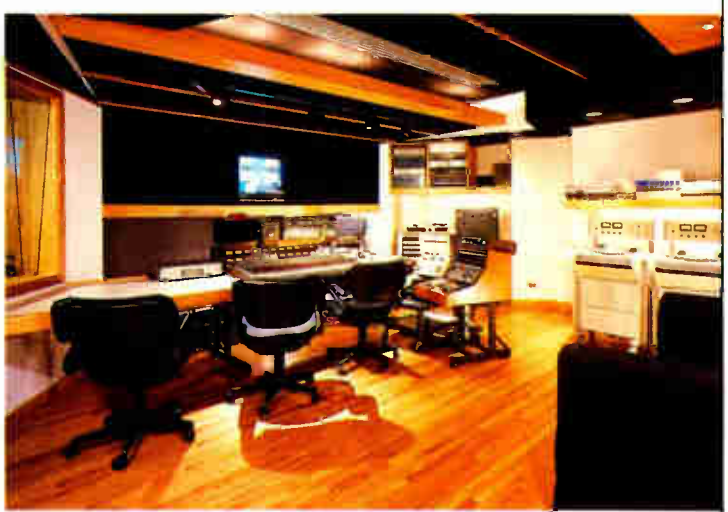

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by Mel Lambert

SSL SCREENSOUND

DIGITAL AUDIO-FOR-VIDEO EDITING SUITE

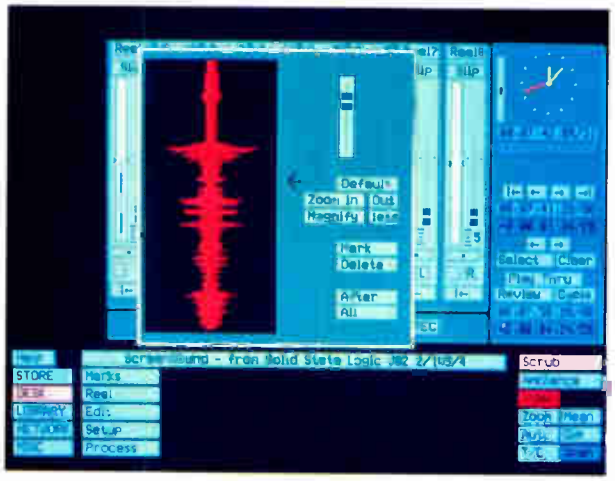
As digital technology continues its evolution, one word strikes terror into the hearts of producers and facility owners alike: workstation! Not all current designs are equal—or even comparable—as users are anxiously discovering. A NuBus card that plugs into a Mac IIci, and handles stereo recording and editing of bitstreams sampled at 44.1 or 48 kHz, simply can *not* be referred to as a workstation.

For me, that accolade belongs more properly to a multifunction device that provides the following:

1. Real-time multitrack recording and playback, with at least four (preferably eight) tracks of simultaneous input and/or output to allow real-time mixing and processing.

2. Real-time, non-destructive editing and program assembly. Without this ability, the workstation is little more than a digital recorder.

3. Real-time mixing and signal processing. Future systems should offer full-function, multiband parametric EQ, compression, limiting and expansion/gating, in addition to ambience and reverberation programs.



The pop-up Scrub Edit window provides more precise control of edit point location, and includes a modulation display on the left, as well as zoom in/out and "edit pointer" icons.

The basic elements of SSL's ScreenSound system, including cordless pen controller, graphics tablet, color computer monitor and full-size QWERTY keyboard. Not shown are the rack-mount processors with I/O boards, hard disk, machine interfaces and backup drives.

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4. A dedicated operator work surface with familiar controls. In addition to a large-screen VDU, mouse or trackball, a truly innovative workstation design *must* incorporate a control surface equipped with the types of fader, switch and pushbutton elements production engineers currently use.

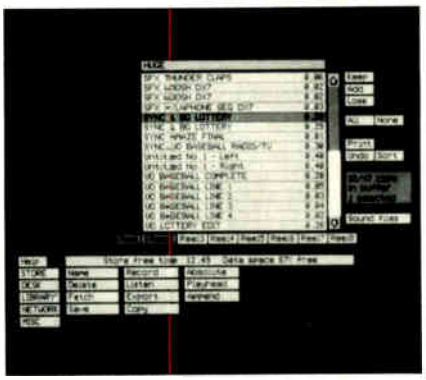
5. Synchronization to SMPTE/EBU time code and VITC. Systems designed for post-production applications must accurately lock to picture and provide multistandard time code for external devices.

6. High-speed program backup and archiving. The efficient management of sound files, EDLs and system data in and out of the system is a necessity.

7. Advanced communications with audio and video recorders. Within the post-production studio of the near future, digital systems should be able to control external ATRs, VTRs and other peripheral hardware, using conventional serial/parallel protocols.

Against this background, the new Solid State Logic ScreenSound Digital Audio-for-Video Editing Suite comes very close to fulfilling just about every function I might ask of a workstation. The system features eight digital channels of simultaneous audio data (with an additional eight available for submixing); hard disk recording with full-feature fader and pan automation; non-destructive editing of up to 60 track-minutes of audio (more disk space is also available); two simultaneous inputs and eight simultaneous direct, post-fader outputs (analog as standard; 44.1/48kHz digital AES/EBU-format as an option); an innovative user interface comprising a color VDU and graphics tablet; full subframe sync with any standard 24/25/30 fps plus drop-frame time code source; 2.5-times real-time archiving and reload from a built-in, 8-hour, 8mm Exabyte drive; and onboard machine control capabilities for virtually any audio or video recorder, plus laserdisc transports and mag film dubbers.

A base ScreenSound system, made up of a 6U rack housing the processor, I/O boards, a 330MB hard disk and external machine interfaces, a second 2U rack holding the Exabyte backup drive and WORM optical drive for sound libraries, plus a full-sized QWERTY keyboard and graphics tablet, sells for $105,000. The optional stereo-in/8-output digital I/O board costs $5,200, while extra CDC 1.3-gigabyte hard disks, capable of storing three more hours of audio sound files, will set you back another $18,000.



The Store screen: a scrolling list of sound files and running times.

These large-capacity, add-on drives can also be shared by multiple ScreenSound systems, the primary restraint being that only one user can access a particular drive at a time. Thus, facilities requiring large amounts of online storage can opt for one or more large hard disks, or expand storage capacity as the need arises. Furthermore, such a configuration opens up the possibility of centralized sound effects libraries stored to hard disk and accessible from a variety of controller workstations.

In essence, ScreenSound is the digital equivalent of an 8/16-in by stereo-out mixer with eight post-fader direct outputs; an 8-channel multitrack with full drop-in and track-bouncing across 60 track-minutes of audio; a full-function, non-destructive editor; and an extremely sophisticated time code synchronizer and transport remote controller. The post-fader outputs allow submixes or stems to be laid off to analog/digital multitrack, for example, or to provide automated mix sends into a non-automated companion mixer.

Given the amount of conventional hardware that it replaces in a music recording, broadcast production or video post facility—not to mention the enhanced creativity and sonic quality offered by digital recording and processing—the asking price seems extremely reasonable. Derived from HarrySound, a dedicated add-on audio editor/recorder for the Quantel Harry video editing and effects system, the current system shares a common ancestry with video-based technology, both in terms of screen displays and elegant machine interfaces.

INTERLINKED SCREEN DISPLAYS

The system is controlled via a series of interlinked, high-resolution, full-color screen displays. Primary screens include: The Store, which controls recording of individual sound files to hard disk, their transfer to additional hard drives and/or removable WORM optical discs, plus auditioning and subsequent assignment to individual tape tracks; The Library, which allows manual and automatic searches of the sound files stored on hard disk(s) and archived to ScreenSound's WORM optical drive; and The Desk, which includes the 8/16-channel mixer panel, time code controller and clock displays, with pop-up machine control and scrub edit windows.

A master controller on The Desk screen is laid out like the front panel of a conventional-looking 8-channel mixer, with a narrow tape window to the left of each channel gain control that graphically displays the audio passing through the corresponding channel/track.

Across the center of each channel strip is a "now line," used for marking edit points or pasting the beginning or end of a sound file to a specific time code location; audio moves through the display window from bottom (early/unplayed) to top (late/played). Default scaling for the Tape window is eight seconds of audio (four either side of the now line), although this can be zoomed in either direction to provide macro or micro views of the audio material.

Each track element can be "grabbed" with the graphics pen and moved across the now-line position to slide an individual section in relative sync with the rest of the material, or the entire mix plus video against a time code reference. The now line, in effect, represents the replay head of each data track; material below the line has yet to play, while the line above represents material already heard.

Above each channel strip is a five-digit label bar for naming inputs—it defaults to "Reel1" through "Reel8"—and below is a "slip" button that lets each track be unlocked from the rest and shifted in time. The user can also toggle forward single hours, minutes, seconds and video subframes using one of the analog or digital time code controller windows. In this way, tight and repeatable offsets can be made between tracks by stepping through discrete values. On the other hand,

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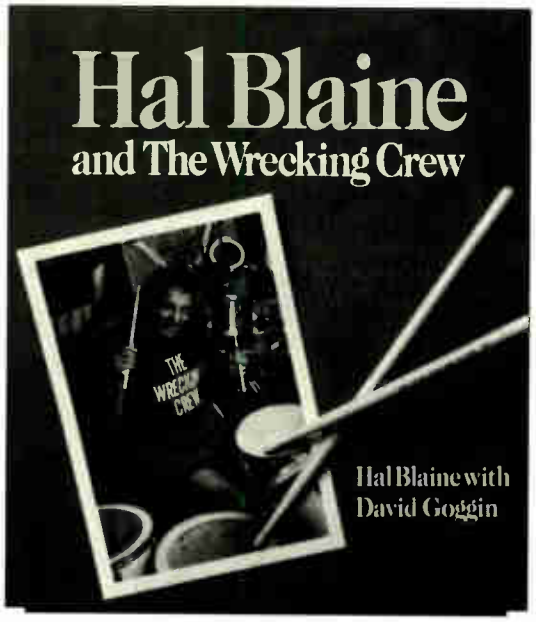

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simply grabbing the hands of the analog clock face with the graphics pen lets you move rapidly forward and backward through a mix file, with the video following in perfect sync, if that's the mode you've selected.

Below the track displays are individual L/R Pan windows, "solo" icons and large "mark" icons that allow timing references to be placed on individual channels for editing and location purposes, either in Stop mode or while the audio is playing.

In addition to providing individual channel control, the onscreen faders can be grouped together in any combination. Up to eight discrete groups can be created on The Desk by selecting the "group" or "thumbwheel" icon provided at the bottom of each reel. Obviously, stereo files can be easily created in this way by grouping together pairs of tracks.

Having touched the graphics pen above either fader in a group, any up/down motion of the pen on the control surface causes the levels of each channel in that group to be increased or lowered together; side-to-side movement allows crossfades between odd and even groups in pairs (1/2, 3/4, 5/6, 7/8). If only one group from each group pair is used—for example only group #1 and not group #2—then sideways motion causes crossfades between two files in the same group. Clicking onto each fader also activates a pop-up window for entering specific values for accurately matching levels across different channels, for example, or for entering stepped gain changes across an interior/exterior picture cut.

It is also possible to assign commands to the QWERTY keyboard. A macro window enables the "P" key, for example, to represent "play." According to SSL, a set of default macros and dedicated keycaps will soon be available.

DYNAMIC FADER AND PAN AUTOMATION

Real-time fader and pan information can be stored to a half-frame accuracy in one of two automation modes. In Snap mode, the system provides channel-fader moves that mimic the types of fast fades and resets available on conventional moving-fader systems. The user can select and move up/down the chosen fader during a section while the material is replaying, and then release it to snap back to the previously stored value. In the more conventional Store Data mode, ScreenSound stores fader moves forward of the current now-line position, with automatic update as the material is rewound and replayed. In other words, the system is always updating.

As reels become filled with sound files and edited material, it's easy to reach a stage where eight tracks just aren't enough to complete, let's say, a music submix or to record a series of ADR or Foley takes before checkerboarding them into an acceptable composite. It's at this stage that ScreenSound's "switch" function opens a new dimension of mixing and editing potential. Behind each reel is another set of tape tracks—labeled "bins"—which can now be used to provide additional mix space. Of course, you might need to leave one or two reels on the mix panel for monitoring a bounced mono or stereo guide mix, but that still leaves six or seven new tracks.

Having recorded new material across as many bins as you need, a mix can be recorded back onto the front layer of reels and then, mixed with the original material. With a little prior planning, ScreenSound can offer some astonishing capabilities.

PRECISE EDITING FUNCTIONS

The Scrub pop-up window provides more precise control of edit location, and contains a modulation display on the "left" and "zoom in/out" icons for enlarging and shrinking the vertical time axis, plus other functions. A large arrow in the center can be grabbed with the pen and used to rock and roll over the audio, which graphically resembles the type of modulation envelope produced by variable-area optical soundtracks.

The operation is reasonably intuitive, and the audio quality, aside from a few aliasing artifacts, is more than acceptable. Time code information can be extracted from the selected data by clicking on the "mark" button, for either entering into a time code window, or for relocating precise edit points to the now line. A dedicated "after" icon enables the audio to be auditioned from the edit point, while "all" selects the entire envelope section. You even have a "react" button, allowing you to set a personal "on-the-fly" reaction time while listening for edit points; the default value is four

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frames (120 ms).

ScreenSound's editing functions are easy to master. Having selected an edit location, the user is presented with various auditioning options, including "preview" (output muting automatically at the mark) and "postview" (listening from the mark). A companion window offers "remove" icons (these remove audio between two adjacent marks shown on the Tape window); "copy" selects a section between marks or entire tracks; "move" shifts a selected section of audio to a different location on the same or different reels; "shift" moves a selected section of audio to the same time code location on a different reel; "join to head" or "join to tail" attaches a selected audio section to another section, or a blank section; and "Xfade" selects the crossfade time, zero to 999 frames (approximately 30 seconds), defaulting to one frame for any of these last operations.

Although all tracks are selected, marked, edited and moved one channel at a time, each composite track—left and right music, let's say—can be laid back in perfect sync at selected locations across the Mix window. In addition, having selected all eight tracks to a single master group, highly accurate audio conformations can be made at a picture edit simply by implementing a single mark, remove and move sequence on one reel. All other reels in the group will be affected in a similar fashion, including level adjustment.

A pop-up Machine Control window controls the assignment of individual video and tape machines to ScreenSound's four available RS-232/422 serial control ports. Each port can be set up to handle one of three control protocols, comprising Sony 9-pin P2 (for BVU-950 U-Matics with internal time code resolvers), TEAC LV-210 laser videodisc player and VPR-3. The system I used was equipped with a TEAC LV-210P player, which replays standard NTSC pictures in Constant Angular Velocity mode, thereby providing needle-sharp still frame, and virtually instant access to any frame on each side of the 30-minute WORM laserdiscs using time code.

This window also controls the record/ready status of any or all four audio or video transports hooked up to the system, for layback and/or analog/digital mastering via the XLR or AES/EBU-format outputs. At the bottom is a series of "rev," "shuttle," "stop," "play" and "ffw" icons, plus a large jog wheel that functions like its analog equivalent. By rolling the videodisc player or VCR, video locations can be captured into the system's various time code windows.

ACCESSING STORED SOUND FILES

To configure ScreenSound for a new session, you need to first access the Store window, which displays a scrolling list of sound files recorded onto the internal hard drive. Each file has a 27-character legend, plus a MIN:SEC duration tag. You can sort and/or search through the material to find sound effect files, for example, and then load them into selected channels or reels using a series of icons. The files can be transferred into the Tape window with their start markers at the now line, appended to a current track, or placed at a time code marker stored with the file. In this way, a series of pre-tagged files making up a mix can be laid back into the Tape window in perfect sync with the companion videodisc loaded into any video source with time code.

The Store window features a pop-up area controlling the manual recording of sound files, using familiar transport controls, a gain-control fader and a level meter; other icons control the selection of multiple takes and the labeling of different files. Files can be recorded blind or with accompanying time code start/end/duration tags.

On most sessions, the operator will be working with a mixture of new material entered into the system along with audio cuts already stored on the hard disk from the last session, plus regularly used effects and music cuts from the WORM drive. The Library utility holds a special version of the search software used in the "store" function, except the operator can access and audition two hours of material stored in each of the facility's removable, double-sided WORM discs. Because of the limited off-load speeds offered by current WORM drives, it is not possible to use them for real-time sound file editing—only for auditioning.

Sound files stored on the library WORM disc can be auditioned in exactly the same way as those held on the main hard disk store. During a mixing session, ScreenSound accesses sound files directly from the working disk. If a library sound is required—that is, you selected it during the auditioning process, while searching for suitable effects, sound bites of music cues, etc.—it must be copied from the library WORM to the main disk at 2.5-times real time prior to the session. No problems in that respect.

The librarian software is adequate, although not as powerful as some of the stand-alone programs currently available for Mac and IBM computer. You have to already know how the files have been entered—their shorthand mnemonics, for example, and you soon run out of unique descriptor fields with only 27 characters—and cannot subsearch very easily. With online access to six hours of material in a fully configured system, finding just the right file can be a touch cumbersome. In its defense, the ScreenSound software contains powerful keep/add/lose/sort search routines, whose results can be output to an external PC or Mac, where dedicated librarian software could perform more refined searches.

SAVING SYSTEM PARAMETERS

There are two distinct ways in which mix and edit information can be saved from one session and used subsequently. In the first mode, Saving Sound Files, any sound file or "clip" being used on The Desk can be saved to hard disk (and then transferred to the WORM drive as a permanent addition to an effects or music library), along with its current starting position. The file can also be named prior to the save process, allowing a variety of different cues to be accessed quickly and effortlessly.

The second technique, Saving the Desk, allows an entire desk configuration to be scanned and stored to hard disk within a few seconds. This includes information about each of the files currently being used, all markings, relative positions on the reels and bins, fader and pan automation, machine selections, time code offsets, desk time code offset, group selections, crossfade and reaction times, as well as pre/post-roll times for the companion video transports.

Because the storage of mix/edit data represents only about 5% of the total disk capacity—the remainder being occupied by first-generation sound files—numerous desk configurations can be saved to disk without taking up excessive amounts of space.

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All in all, the automation and recall functions of ScreenSound are staggering and would radically streamline the resetting of a complex editing and mixing session to just a few seconds.

TYPICAL SESSION REACTIONS

Having selected the necessary sound files from a WORM library or larger hard drive, transferred them to hard disk for real-time access by the system, and then assigned them to appropriate channels, I found ScreenSound very intuitive. While it took awhile to get used to working with a graphics tablet and pen combination (which, by the way, is destined to be replaced with a slick, cordless model by the time you read this), I had little trouble mastering the basic operations. Eye-hand coordination develops rapidly as you become familiar with the scaling factors and windowing environments.

Used with a TEAC laserdisc player—the only audio-video configuration available during my evaluations—ScreenSound screams along. You can move to any section virtually instantly, with audio lockup within milliseconds. Editing controls are laid out very well, and the mix window is simple to follow.

ScreenSound is already equipped with one of the most elegant and truly transparent machine-control capabilities I've come across. Once the appropriate audio and video machines have been put online, offsets adjusted, and then links established to the mix panel, everything runs like clockwork. Selecting a new position for everything to play from—either using the analog clock, digital time code readouts or simply grabbing the audio modulation—results in the same thing: Just cut and/or mix audio, with no waiting for rewind or time code synchronizers to issue transport and pre-roll commands.

I was surprised at how quickly I became used to this new way of working. Despite the system's outstanding time code functions, I never needed to enter an absolute value during my edit and mix sessions. Resetting the internal time code clock against the countdown on the videodisc zeroed the screen displays and counters. Then it was just a matter of placing sound files to the now line or tape head, selecting in/out edit points using markers, and assembling the different sync and non-sync sound elements to picture.

Fine-tuning of audio-video sync and levels was done on the fly, using the cut-and-paste edit and crossfade functions, and the stereo mix came together effortlessly as each file was added and adjusted. Local marks were used repeatedly to ensure that the start of one cue coincided with the beginning of the next, and that transitions under picture cuts and dissolves coordinated with one another.

The level/pan automation system never missed a move and was elegant in operation. The entire system behaves, in fact, like the mixing equivalent of a rather sophisticated word processor. You choose events to be layered across tracks, and can design macro sequences to perform repetitive tasks during a session.

Although the ScreenSound system is designed primarily for mix-to-picture assignments, a variety of other applications immediately suggest themselves, either in the analog or digital domain. These include conventional music editing; album sequencing and/or compact disc premastering; the compilation of various vocal takes prior to a mix; slipping vocals and solos along the length of a multitrack master; and so on—in fact, just about any time code-based mixing and editing function can be streamlined greatly by using ScreenSound.

The limited listening tests I did with the system would suggest that the A/D and D/A converters (the former equipped with Apogee 944S filters) produce clean, smooth transitions into and out of the digital domain. All in all, I was more than impressed with the power available in such a small package. Systems like ScreenSound, with interlinked features allowing a variety of recording, editing, mixing and machine-control functions to be effected from a central location, are the definitive way of the future. Analog will never be the same again. ■

[Editor's Note: At the time of writing (late-January), SSL had delivered some 35 ScreenSound systems around the world, 18 of which are being used with Harry video editors. Also, a 20-minute video demo outlining ScreenSound's primary features is now available for free loan though any SSL sales office worldwide.]

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THE THREE WORLDS OF RAY CYMOSZINSKI

A Top Sound Recordist Talks About Working In TV, Film And Commercials

By Gregory DeTogne

Given his present position within the professional audio community, it's hard to embrace the notion that Ray Cymoszinski started along his career path almost by accident. A Lancashire, England, native, he was intrigued by sound at an early age, when he began tinkering with old tube amplifiers.

He never perceived audio as anything more than a hobby, however, so as a young adult he studied physics at the University of Illinois in Chicago. When these academic efforts failed to bear fruit, his background in theater and photography landed him a job producing a 16mm documentary about a bicycle race held in Chicago's Lincoln Park. It was here that he realized the need for serious sound professionals.

While organizing personnel for the shoot, Cymoszinski found that there were 50 camera operators for every sound technician. "I had a hard time just locating one person to do the sound properly," he recalls. "I decided then and there that sound for picture was something I should do. At a glance, it looked like a job where you could walk onto a set or location, do your work in a simple fashion and be done with it. It didn't take me long to find out that wasn't true, but the difficulties certainly weren't insurmountable, either."

Today, well over a decade later, Cymoszinski has logged countless hours doing sound for motion pictures, TV and commercials. His working credits include NBC's late, great *Crime Story*, an Oprah Winfrey special, plus films such as *My Bodyguard* and *Lucas*, to name just a few. He's also gained wide recognition for his commercial work, including spots for Ford Motor Co. and McDonald's.

From the beginning, Cymoszinski has operated on a freelance basis. A recent move from the Chicago Loop landed him just north of the city limits, along the shores of Lake Michigan in Evanston, where his office/repair shop/equipment storage area occupies the upper level of a modest townhouse shared with his family.

Mix: Your work finds you handling the audio production chores for film, television and commercial spots. How do you approach each medium?

Cymoszinski: The basic differences between the three center around the time involved and the equipment you need. As far as time is concerned, with film you often have the luxury of being able to use an extra day to set up to do one page of dialog, so you have a very good idea of what's going to happen and what kind of equipment it will take. Conversely, television production moves at a much faster rate. If you're working on a series, it's not uncommon to shoot 12 pages of script in a 12-hour day. Moving at that pace, you have to be extremely flexible and set up each shot to plan for every possibility. You never know until the last moment what equipment will work best for the scene, so you have to be ready for anything. In terms of equipment and time, commercials are predictable, and very rarely do they have dialog where more than two people are talking.

Mix: I understand that when you worked on the 17 episodes of *Crime Story*, filmed here in Chicago, you were indeed going at quite a breakneck speed.

Cymoszinski: That's quite true. We started shooting in midsummer and finished all the episodes right before the bad weather hit in November.

Mix: Given the time frame you found yourself working in, were you satisfied with the outcome?

Cymoszinski: Yes, I was. Before *Crime Story*, I felt that a lot of what was on television had lost perspective with regard to sound. Every show that I watched sounded like everyone was on a microphone, the distinction between background and foreground was blurred.

Mix: How did you deal with this problem during the production of *Crime Story*?

Cymoszinski: I minimized the use of wireless microphones, and concentrated on boom or shotgun varieties instead. During the production of *Crime Story*, I also had to deal with a lot of background noise as well. Almost

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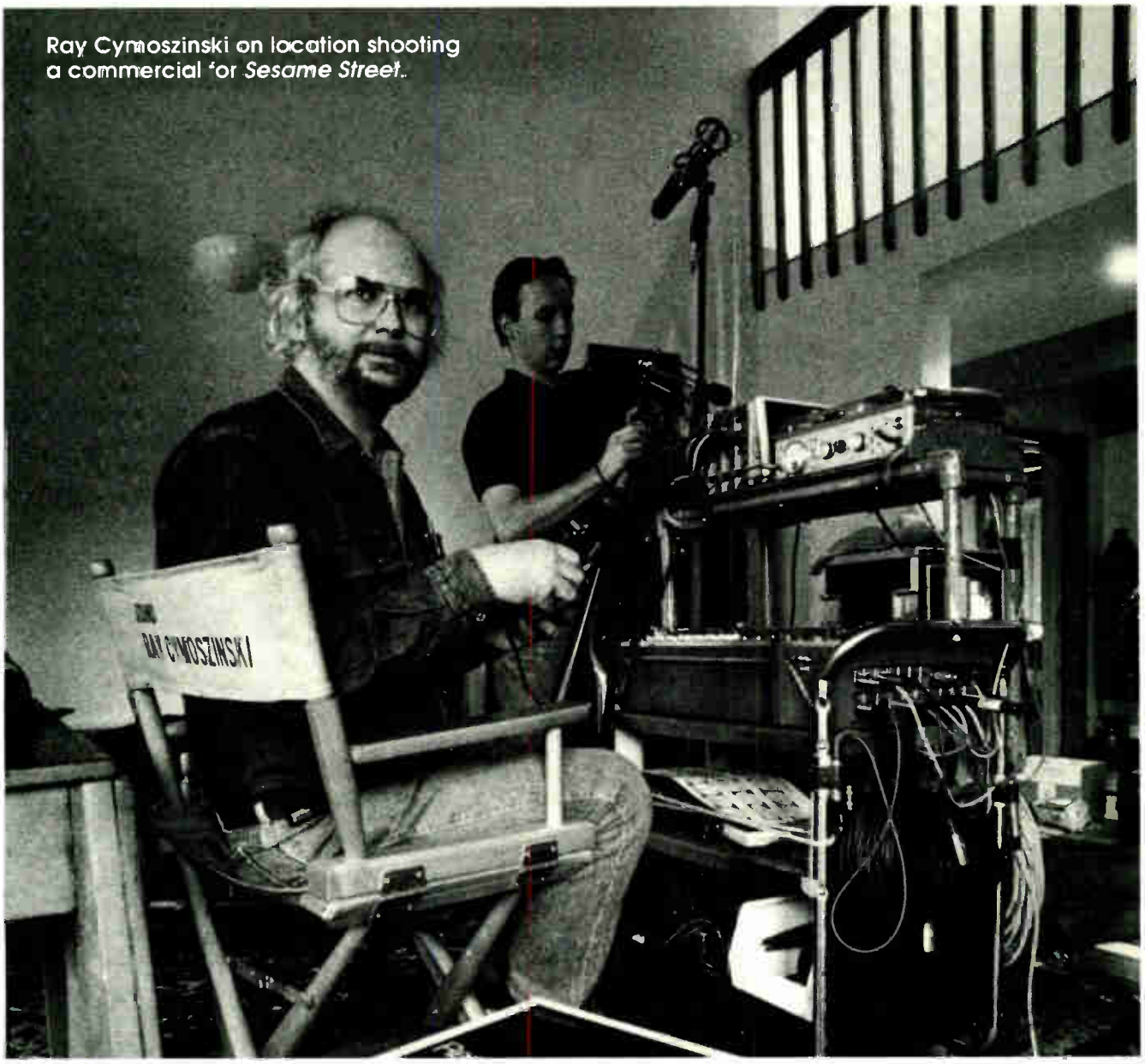

Ray Cymoszinski on location shooting a commercial for *Sesame Street*.

everything was shot on location, so there was traffic noise, gunshots, explosions and so forth.

Against this backdrop, my prime responsibility was to capture the dialog, which is obviously difficult in these kinds of situations. To make perspective work for me, I hid mics wherever I could—behind cars, in the talent's clothing, whatever. A large part of what I did in each scene depended upon how it would appear in the finished product. Usually, a scene would be shot with one master that incorporated all of the talent, then we'd go back and do close-ups of everyone. Ultimately, when the project goes through editing, the editor can only use some segments from each of these shots. From my standpoint, the trick was to make the master good enough to intercut with the close-ups and the close-ups not so overpoweringly great that they stood out and sounded out of place.

Mix: In other words, you're telling me that sometimes you can have tracks that are too good, especially when it comes to close-ups?

Cymoszinski: That's right. My job is to keep the production audio as *workable* as possible, so that editing can take place and all the audio can be used without lots of enhancement and still sound natural.

Mix: Let's go back to this notion of flexibility for a moment. On the one hand, it sounds like it gives you more alternatives on the set, yet on the other, it appears to be a time-consuming process requiring that you plan for virtually everything that may occur.

Cymoszinski: The whole issue of flexibility revolves around the fact that when you're shooting 12 pages of dialog in a single day, there's not a lot of time for rehearsals. Therefore, when I'm working on a TV show, I spend most of my time putting wireless mics on people and planting mics around the set that I think may work. I want to have every option available to me once it gets down to the time when I have to make a final decision. That's why I work with a suitcase mixer that has eight inputs. As far as portable mixers go, it's rather large at 44 pounds, but it enables me to have a large number of microphones plugged in and ready to go, which frees me

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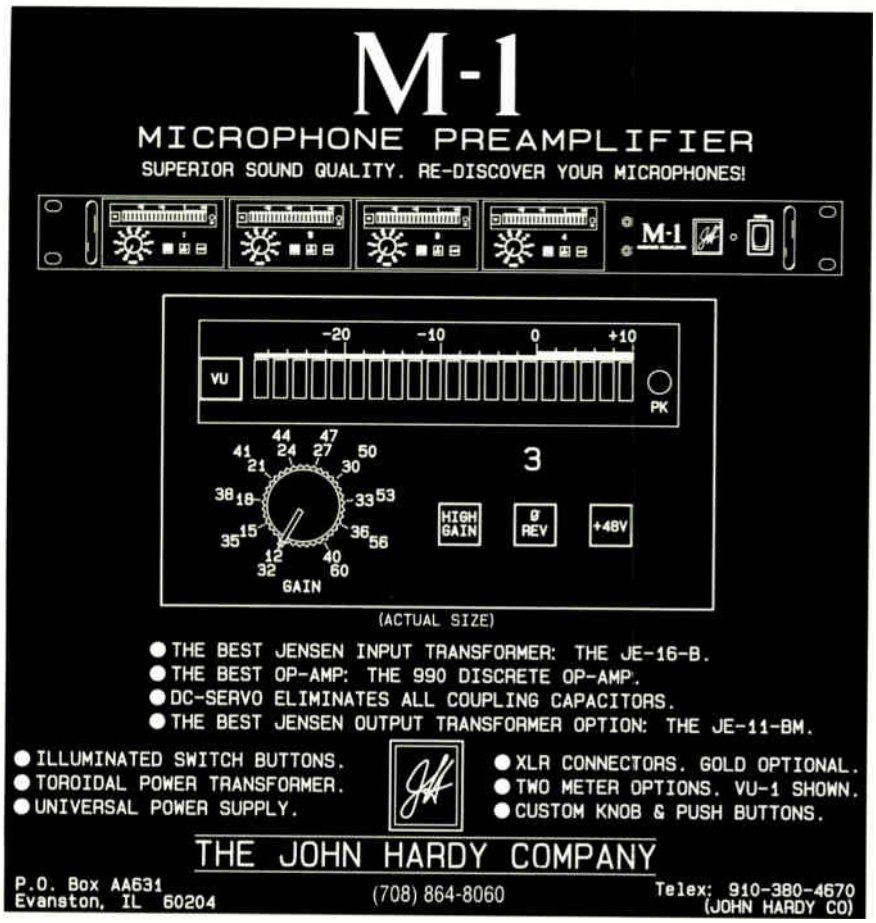

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from the worry of having to change my setup during a mix.

Mix: For all the technoids out there, now may be as good a time as any to talk about the gear you surround yourself with.

Cymoszinski: For most of my work, I use a stereo Nagra with built-in time code. I use the stereo model not so much for its stereo ability, but simply because it has two tracks. Usually, I'll put dialog on one track and background on the other, especially if I'm in a situation where I'm using a lot of wireless mics. The time code feature is especially nice because it allows my work to be turned around quickly during the editing process. When I handled the sound production for part of an Oprah Winfrey special, we shot on Friday, and the videotape transfer was done on the following Monday. My 1/4-inch tape was transferred directly to videotape using our production time code and a smart slate with time code.

Mix: Do you have a favorite among audio tapes?

Cymoszinski: 3M's 808. It's been available in the Midwest now for around two years, and its a big improvement over other tape in that it performs with less print-through. I can't describe how annoying it is to go to the dailies on a film project, for example, and hear a car door slam six times in a row. Most of the time, print-through like that can be fixed, but it's irritating for all concerned to have to deal with it in the first place. The tape is much lower in distortion, too.

Mix: That covers the recording end of your gear, what about microphones?

Cymoszinski: I use both the long and short Neumann interference tubes, KMR81, 82; Sennheiser models 816, 416 and 406; Beyer MCE5; and the Schoeps CMC5 with an MK41 capsule. The latter are especially useful because they are outfitted with swivels, so you can tape them down and move them toward the source. They're also easy to conceal.

Mix: Portability has got to be a factor with all this gear. How do you haul it from place to place on location or on a set?

Cymoszinski: I have my own "production cart," which is a custom-built item. It started life as a stainless steel

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tea cart, but I modified it so I can put two Nagras and various microphone receivers on the highest shelf. It also holds my mixer as well as batteries, microphones, fish poles and various other pieces of support gear. To enable it to roll over large cables and other obstacles, I added lawn mower wheels.

Mix: We haven't said much about commercial production yet. Perhaps it's time.

Cymoszinski: There are very few commercials that are shot like a normal scene for television or film. In spots, everything is upbeat and very clean. The problem I run into with commercials is that more and more of them are being shot on location. It used to be that you did them on a set. Someone would spend a few days building a set—kitchens were always big, or a laundry room—but now I increasingly find myself on a location that, as a rule, is filled with all sorts of noise-producing contrivances that can't be turned off and is right by an airport. If the location isn't right by an airport, air traffic controllers somewhere will rearrange their flight patterns so everything is going right overhead. Okay, so I'm not painting an entirely accurate picture here, but sometimes this is what it feels like.

Mix: What are you trying to achieve when you work on a spot?

Cymoszinski: I'm really thinking about the editors when it comes to commercials. The quality of the work I provide should make the editor want to use it without enhancement. No matter how well you can use dialog replacement, once you go that route, it's not reality anymore.

Mix: Switching gears a bit, what do you think the future will hold for sound production? With the advent of R-DAT, your Nagra may be on its way out.

Cymoszinski: Digital technology will eventually replace the traditional Nagra—even Nagra will admit that. In fact, I believe they've got a digital product in the works. While R-DAT does seem interesting, I really don't know what the best format will be for production. It's true that R-DAT is small and portable, but it's also more fragile right now than it has to be. There's also no history or track-record, and you can't monitor off of the tape as it goes by. A truly usable digital machine will have to address these problems of function.

Mix: What is the hardest thing you have to deal with in production, whether it's TV, film or spot work?

Cymoszinski: The hardest thing I confront on a regular basis is when I'm working on a set and dialog goes from a whisper to a scream, or vice versa. What I can do in these situations is set up my gain and preset my levels to accommodate the loudest part of the program without distortion, and yet provide boost to get the whisper on the tape at the same time. I have to be right at the mixer and know in advance how loud and how quiet my signals are going to be. This is definitely a tough task, and when I work with drama, I can count on having to cope with it. Probably the second biggest difficulty a sound man can confront is a growling stomach, but that's a different story. ■

Gregory DeTogne is a longtime Mix *correspondent based in the Chicago area.*

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by Craig Anderton

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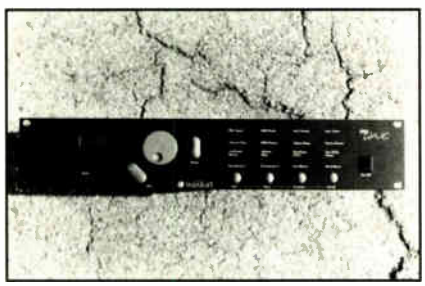
After last summer's gloomy Chicago expo, the winter show of the National Association of Music Merchants, held January 19 to 21 in Anaheim, Calif., marked a significant turnaround—attendance was up, faces were smiling and there were plenty of new products, albeit few startling innovations. The latter may have been one reason for the smiling faces; we weren't obligated to learn a bunch of new stuff, or to feel that everything purchased in the last year was now obsolete.

PHOTO: GEORGE PETERSEN



As always, there were too many products and not enough time, so I'm going to have to apologize in advance for leaving descriptions of many products on the cutting room floor. Fortunately, Paul Potyen looks at software developments in this month's "The Byte Beat" column, which frees up a little more space here for hardware developments. Ready? Let's rock.

In synthesizers, there were several refinements and a few comebacks. Yamaha's SY77 ($2,995), initially greeted with perhaps a bit of a "ho-hum, another synth" attitude, has now proven itself to be a *hot* machine with an astonishing amount of depth, sophistication and expressiveness. The "advanced FM" is truly that—not just hype—and the samples are good enough to have already created an all-sample budget spin-off, the SY55 ($1,595). Finally, the 1U rack-mount TG55 tone generator

Among the more interesting items at the winter NAMM show were (clockwise from top left): Korg's WS Wavestation synthesizer; Intone's does-just-about-everything MIDI Master; Waldorf's Micro Wave, a PPG-type synth module; and even a surprise appearance by international superstar Godzilla at the Ibanez booth.

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($995) is designed to compete with E-mu's Proteus. It resembles an SY55 without a keyboard.

Speaking of E-mu, the Proteus/2 ($1,495) is a virtual "orchestra in a box," offering a new set of great-sounding orchestral instruments (drawn from the Emulator III library) crammed into 8 megabytes of ROM. Proteus/1 owners need not feel left out; E-mu will be offering a 4-meg ROM expansion set that adds selected Proteus/2 sounds to the original Proteus/1 samples. And with all this rack-mount expander module action, who ya gonna call for a controller? Kawai's K4000 provides 88 keys (with K4 sounds) for under $2,000.

Some familiar faces, long thought extinct, have returned. Now that Gibson has bought Oberheim electronics, the near-legendary Xpander and Matrix-12 are back in circulation—good news for players demanding the ultimate in analog synthesis. Those who feared that Sequential Circuits' Vector Synthesis technique went down with the company were pleasantly surprised by the Korg WS Wavestation Synthesizer, a 32-voice, 16-bit machine that improves on the original Vector Synthesis technology and includes over 500 multisampled waveforms. And the MicroWave synth ($1,995) from Waldorf Electronics (distributed by Steinberg/Jones, Northridge, Calif.) revives the famous PPG 2.2 and 2.3 synthesizers in a 2U rack unit.

Roland introduced the D-70, an advanced L/A synthesizer. Major differences compared to the D-50 are new multisampled PCM sounds, 76-note keyboard, multitimbral operation, response to (but not generation of) polyphonic aftertouch, and simplified parameter editing well-suited to tweaking sounds in real time. But what really grabbed the headlines was the announcement at a pre-NAMM dealer conference of the DM-80, an under-$5,000 hard disk recording system designed in conjunction with industry heavyweights Tom Oberheim and Chris Meyer. Slated for introduction at the fall AES, this 4-track recorder offers a little over four minutes of recording time. However, silence doesn't use up memory, which means compositions can actually last substantially longer.

Hard disk recording was a topic at other places besides the Roland conference. Digidesign and Opcode have banded together to produce Audio Vision, which mates the digital recording of Sound Tools with the sequencing of *Vision* to create a system that sequences audio as well as MIDI data, within a standard Macintosh environment. Audio data shows up in tracks as waveforms and can be subjected to the same cut-and-paste data manipulation as standard MIDI data.

Meanwhile, Turtle Beach Softworks (York, Pa.) exhibited a $3,984 hard disk recording system that, when added to an IBM PC, creates a turnkey 2-track digital audio editing system; Spectral Synthesis of Woodinville, Wash., showed a digital workstation (also based on the PC) that offers sampling, hard disk recording and synthesis. It's only a matter of time before the main drawback in MIDI studios—the inability to record acoustic sounds without the use of tape—will be overcome.

In signal processing, DigiTech's GSP-21 (approx. $800) provides 21 effects for guitarists, of which ten can play simultaneously. Featuring 128 memory slots and a footcontroller, this is the logical successor to DigiTech's GSP-5. Not to be outdone, ART

— CONTINUED ON PAGE 154

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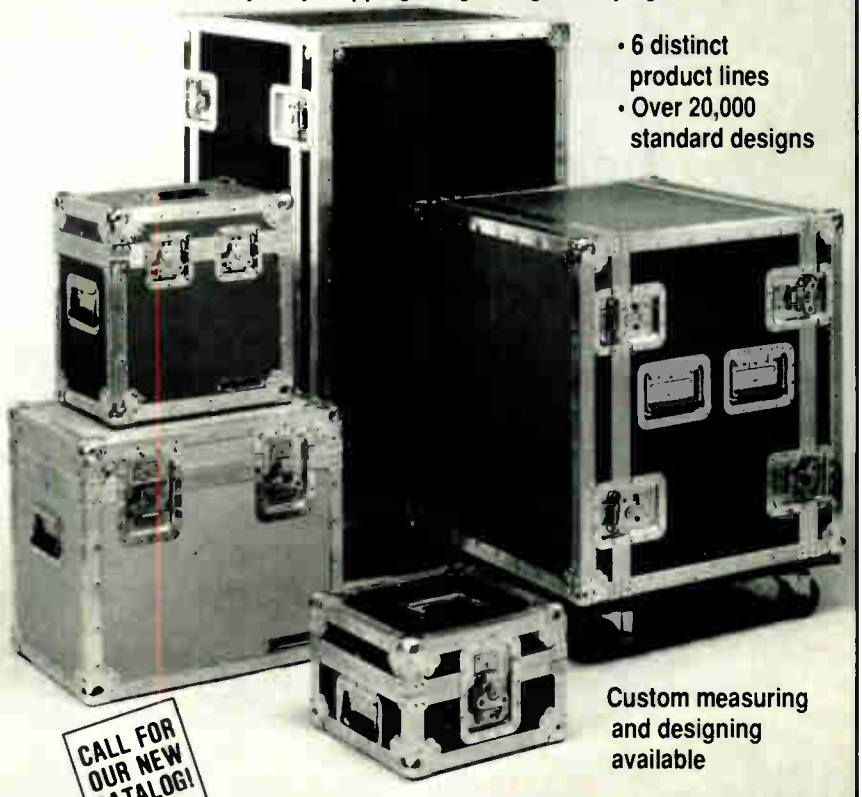

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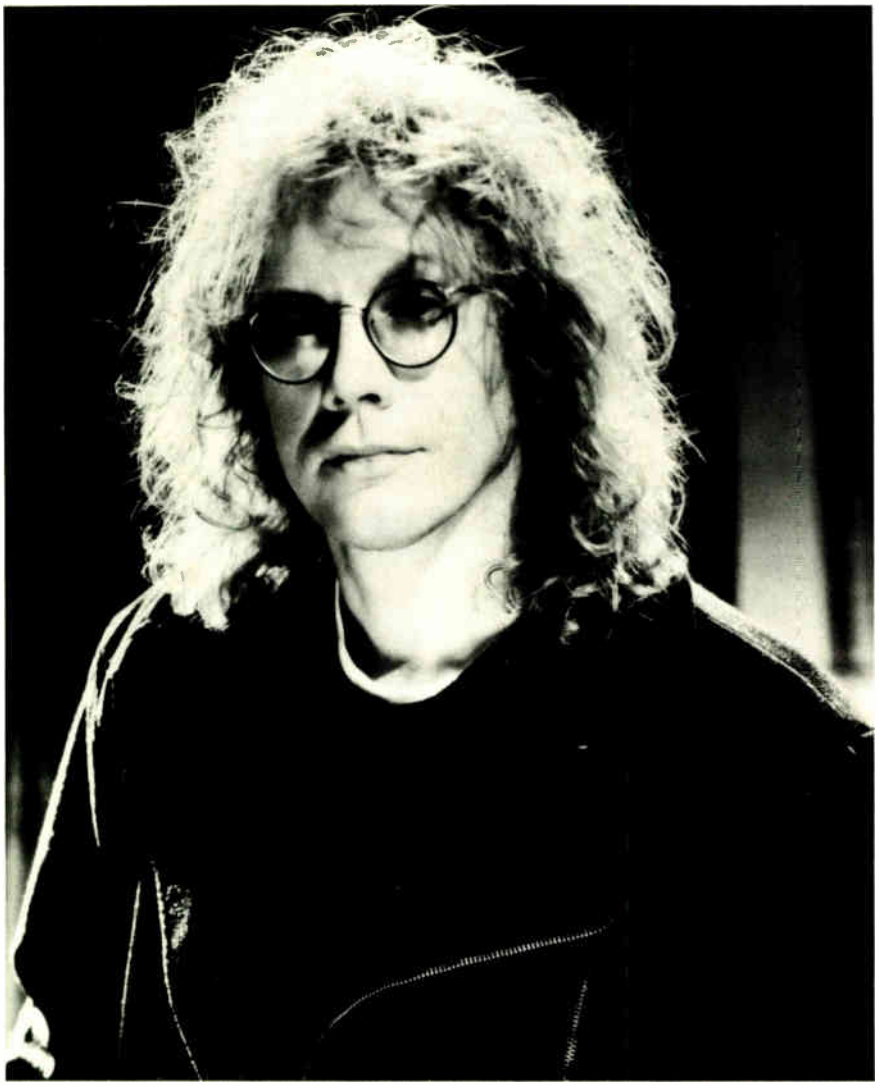

PHOTO: NELS ISRAELSON

WARREN ZEVON IN A NEW "CITY"

When Warren Zevon began writing the songs for his recent album, *Transverse City*, he decided that they should add up to some comment on the 1980s, something that wouldn't exactly celebrate an era widely credited with enthroning self-interest and granting technology a gleefully long leash. "I didn't feel exactly like a romantic hero writing and singing some of these songs," Zevon says. "But I admitted to myself that I spent a lot more time in the mall than in the Third World in 1988. I wanted to do something different. I wanted *not* to accuse myself of playing it as safely as I could."

"An overdub record" is what Zevon originally planned. "I think when he started out," says Andrew Slater, Zevon's manager, who co-produced *Transverse City* with him and producer/engineer Duncan Aldrich, "Warren would have made it like a Prince record. But I think he saw that that wasn't entirely going to swing."

Zevon remembers the album's year-and-a-half evolution as follows: "A lot of the songs I'd written and arranged on a 4-track at home, on a cheap cassette. When we started out, we recorded the track I had done at home, or even while in the back of the bus. And in some cases that seemed successful. In other cases...you know, when you take something that's real small and make it real big, it doesn't always work."

At the studio, Zevon showed up with keyboard parts, skeletal percussion and "some kind of bass" from home. He and Aldrich re-recorded the keyboards, sometimes adding Zevon's guitar as well. Richie Hayward played drums and Bob Glaub was the bassist. "That was the format when we began," Zevon recalls. "In one case, it just didn't get or stay right when it got big. So we recut the song, which was 'Down in the Mall.' And then the process just got more elaborate." As many songs underwent substantial changes and overhauls—"Splendid Isolation," for example, began life sprawling and European and ended up trim and Southwestern—*Transverse City*'s list of guest musicians swelled to include Jerry Garcia, Neil Young, Jack Cassady, Chick Corea and others.

When Chick Corea came in to play piano on "The Long Arm of the Law," Zevon asked for dissonant bebop instead of rock. When I hear it now," Zevon says, "I kind of visualize days: me and Duncan sitting back in the booth, and Chick out there playing this spectacular piano—I was too awed even to make a suggestion—and his saying, 'Guys, is there anything you like here? Let me know if you hear something you like.' "

Still, Zevon didn't arbitrarily choose to concentrate on textures and ponder nuances and parts and players. On this project, overdubbing procedures arose out of composition methods. "I wasn't writing with a pencil and paper and guitar," Zevon says. "I was writing with a 4-track—which means that one day I get up, and I can't think of the lyrics, so I work on a bass line. What a 4-track enables me to do is keep busy while I'm trying to write the lyrics—which, fortunately or unfortunately, I perceive as my primary job."

"Mainly," Aldrich says, "when you don't have a band—and it doesn't sit and rehearse and play—

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and you have a songwriter who writes a song, you've got to come up with something that fits the song. And the obvious Hollywood-type production things don't work for Warren's stuff. It's different. Zeroing in on that is a combing process. You're casting parts, and when you're casting you have to go through all the possibilities. It took some time.

"If you have a band," he continues, "you go in, and they're all worked up, then you put on bits of extra colors, the frosting decoration on top, and you're done. You mix it and that's it. In this case, it was a lot of brushstrokes. And some repainting."

On a budget that Aldrich says was "moderate," Zevon and his co-producers made most of *Transverse City* in Los Angeles at Mad Hatter and Red Zone studios; ancillary recording—such as guitarist David Gilmour's contribution on a track, for which a slave track went to Abbey Road—was done at A&M, Paisley Park and elsewhere. In the San Fernando Valley at Red Zone, described by Slater as a "real quiet, out-of-the-way place," Aldrich worked at a Trident 8018 and Amek Angela. At Mad Hatter, he sat behind a Trident Series 80 board and used a Studer A800 24-track tape machine. Neve modules were pulled out of an old 8078 (brought west from New York's Electric Lady Studios) and used for recording the drums.

"I wasn't going through the board as much as through these modules, plus a pair of Focusrites," Aldrich says. "They seem to do whatever you want, and you can get radical without sounding weird. You're closer to what you want to begin with." For Zevon's vocals, Aldrich used AKG C-12s and C-24s through the Focusrites. "I had to go back and match sounds," he says, "just because on any given day, someone's voice is different. I did that pretty easily, given how I used the same stuff all the time."

Zevon shrugs off critics of the sound of the particular sort of craggy rock that rampages and drones throughout most of *Transverse City*. "That's just a matter of taste," he says, "a certain kind of hard-edged rock that Neil Young typifies, that Rolling Stones records I have always loved sound like to me." For symmetry, the album contains a couple of ballads—"Nobody's in Love This Year" and "They Moved the Moon," slow rock songs that Zevon finds technically hard to sing. "We deliberately put ballads at the ends of both sides—which is saying, 'We want you to be depressed, but we want you to have a good time being depressed,' like the Cure do," Zevon says. "I find them very, very cheerful."

The sound of *Transverse City*'s uncheerful observations and saddened conclusions, though, are consistent with the straightforward rock that marked Zevon's recordings from his 1976 debut through 1982's *The Envoy*, his last album before *Sentimental Hygiene*. But naughty modernism has always been in his background, and this sheds some light on the songwriting and production methods Zevon chose for *Transverse City*. It's why, for example, he felt at home with a procedure that let him think about the shape of a bass line all day.

While still in his early teens, Zevon started out in classical music. "It was interest more than education, passion more than technique," he says. He found he could play several different instruments. "I took piano lessons, briefly anyway," he says, "and I studied contemporary music. And I learned how to compose serial music. I started making connections with composers and people, but it never amounted to a formal education."

"Sometimes I think that if starting out in classical music and being self-taught on the guitar has any kind of effect on my approach to rock, it's that the exact notes in the chord are really important to me. By teaching myself to play guitar, I play a lot of chords that I observe nobody else plays—a lot of chords without any thirds in them. Someone once said if you want to be a composer, you have to be madly in love with intervals, endlessly entranced by the sound of a perfect fifth."

But of most attempts to yank modern concert practice to rock, Zevon has stayed fairly gladly in the dark. "I used to think my destiny was somehow to create a fusion of classical music and rock songs," he says. "As the years go by, I think that not only do I not do it, but that it can't be done. Because you end up with some kind of bad hybrid operetta." These days, it's just Elliott Carter on the one hand and the Stones' "Start Me Up" ("That's a record with the most eloquent silences of any record ever made, I think") on the other—where each stays put—usually. "I mean, when the time came," Zevon says of the Shostakovichian score he wrote for the miniseries, "I was also grabbing for the guitar and adding lead."

—James Hunter

THE ROCHES "SPEAK" OUT

Nearly 15 years after singer Paul Simon introduced them to the world, The Roches remain one of the most interesting pop vocal ensembles around. Their intricate three-part harmonies, mixed together within the group's slightly off-centered lyrics of mismatched relationships and lives altered by fate, have built them a loyal following, if not outright stardom.

After a five-year absence from their own material, Suzzy, Terre and Maggie Roche have returned with *Speak* (Paradox/MCA Records), a record that many, including The Roches themselves, see as the best album of their career. Featuring 14 concise songs, the cuts range from accessible pop ("Everyone Is Good," "Person with a Past") to quirky *a cappella* exercises ("The Anti-Sex Backlash of the '80s") to beautiful, haunting ballads ("Losing Our Job"). All three sisters contributed to the writing, arranging and performances on the record.

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"I would not discredit any of the other albums, because I like them all for what they are," Suzzy says, "but I would say this is the album that we were trying to hear in all of them."

The Roches credit much of the success of *Speak* to Jeffery Lesser, a New York-based producer/engineer who co-produced the album with the three sisters. "This is a human album," says Lesser, who has produced and/or engineered such diverse artists as Lou Reed, Barbra Streisand, Timbuk3, Alice Cooper and Kool & The Gang. "We were dealing with people and personalities. They've had difficulties in the past capturing the reality of what they were about."

"A lot of our problem in the past was that we didn't know how to communicate what we wanted," Suzzy says. "In addition, we always had a tendency to be very receptive to other people's ideas, at least more than we should have. With Jeffery, we came on like gangbusters, and as it turned out, we didn't have to. He's one of the few people in the business that I've met who knows how to listen. That's a real talent. The man never waivered; he never had the slightest hint of a mood. He was completely fair throughout the entire process."

"He was very professional and easy to work with," Maggie adds. "It got to the point where he could even make suggestions to us about vocal parts, which we felt was something that no one else could do. He came up with some great parts on this record."

One of Lesser's production ideas was to record the vocals first, as the basic track. He also spent considerable time seeing the group perform live before they entered the studio, looking for the best way to capture the magic of their live show in a studio environment.

"The Roches are great because there are three incredible voices there," he says. "When you've got brothers or sisters, such as the Everly Brothers or the Bee Gees, when two of them sing the same note, it sounds like double tracking. When I saw The Roches live, I was just blown away by their vocal harmonies."

According to Lesser, the group had a definite idea of what they wanted on this record. "They had been in the studio before on a couple of albums where they felt overpowered by the backing tracks, and where they felt the vocals had been produced as an afterthought."

"We wanted to set up in the studio the same we way that we set up onstage," Suzzy says. "And that included having our own separate mixes in our phones. What we wanted was to have the vocal performances be live. We had been on the road and performed these

The Roches (l to r): Terre, Maggie, Suzzy.

PHOTO: TIMOTHY WHITE

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songs a lot live."

"We had two lucky occurrences that I only wish would happen on every record that I do," Lesser says. "One was the first day of rehearsals. We were going over material, and it was just one of those special days when everything seemed to be clicking together. It was apparent that we all wanted to make the same record.

"The other was the first day in the studio. It was just a great day. Usually the first day is a heavy struggle day—everyone is getting used to the new environment, everyone is a little nervous, no one has ever worked together. It's like an arranged marriage. No one knows what it's going to be like. However, we had a great first day. We wound up cutting two or three tracks with vocals that we ended up using on the album. That is unheard of."

Speak was recorded and mixed during a five-week period at RPM Studios in the heart of New York City. The studio, which has been used by acts such as the Rolling Stones and Living Colour, sports an old Neve board, which Lesser says played a crucial role in the quality of the record.

Lesser had specific ideas on how he wanted to record the vocals. "Generally, most records have a tendency to lump vocals in the center and surround it with stereo drums, and various other sounds pop out from the sides, left and right," he says. "I wanted a very definite stereo split on the voices.

I wanted the listener to be able to close his or her eyes and see Terre on the left, Suzzy in the center and Maggie on the right. It's most apparent on the song "Speak," where lines are split in the middle of sentences."

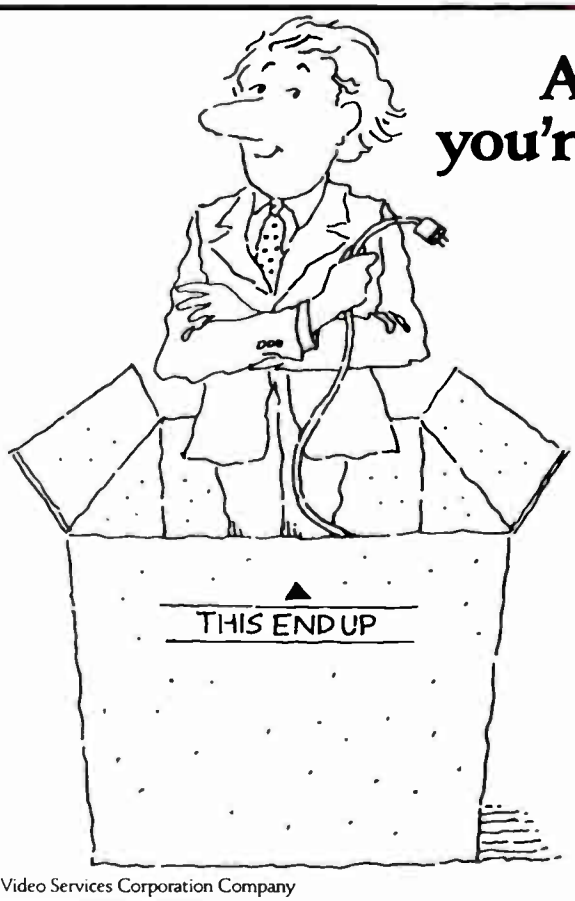
Lesser says the warmth of their voices could only be recorded effectively with old, tube microphones. "It's funny. The same way the Neve board captures the warm sound, it's enhanced by some of the old tube microphones, and RPM had an amazing collection of tube mics."

Lesser and the group felt so comfortable at RPM that a decision was made to mix the album there as well. Although such a practice was common in the older days of recording, lately it has become rare that albums are both recorded and mixed in the same facility.

"We followed the Lou Reed position," Lesser says. "He doesn't like to move from studio to studio. He doesn't like getting used to a new studio halfway through an album. We continued mixing at RPM after we finished recording. RPM isn't really set up for mixing, but some of the rough mixes we were taking home were inspiring in themselves. So we made the decision to mix there, and it worked out great."

Ever since their classic Brian Eno-produced debut album came out, The Roches have been earmarked for success. So far, though, the Big Time has eluded them. They remain critics' darlings and cult favorites. But they haven't compromised their art, either. The niche they've carved in pop vocal music is unmistakably their own.

"We would love to have a gold record and a hit," says Suzzy candidly, "but at the same time we



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have no idea how to go about doing that, except by doing what we do." Leaning back into her chair, she smiles and adds, "To thine own self, be true."

—Bruce C. Pilato

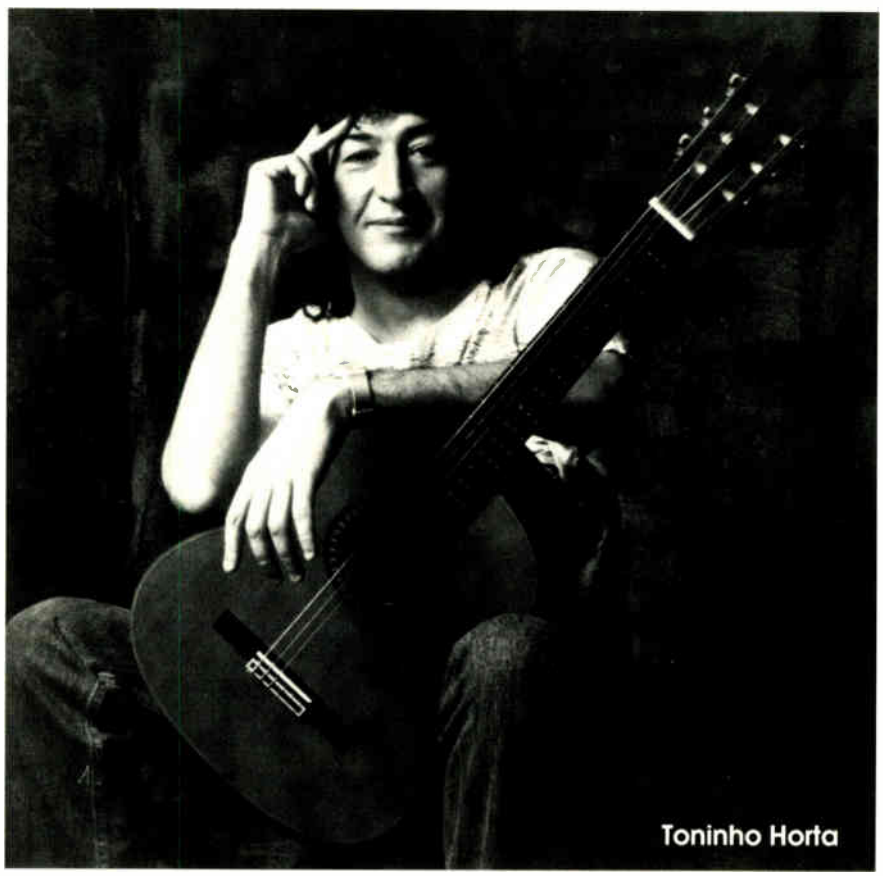
Toninho Horta's International Message

The music of Brazilian composer/guitarist Toninho Horta is reaching new ears after many years of acclaim in his native country. His most recent album, *Moonstone* (on Verve Forecast, a subsidiary of PolyGram), was an international effort, not only in terms of musicians, but recording venues. Three of the basic tracks ("Yarabela," Spirit" and "Bicycle Ride") were recorded at Transamerica studios in Rio de Janeiro. Seven of the remaining basics, as well as some overdubs, were recorded at Studio 900 in New York City, and additional overdubs took place at Slam Shack Studios and Mad Hatter Studios in Southern California.

The resulting music is original and eclectic, with disparate influences, and it makes for a mix that seems to agree with both North and South American listeners. The title track is a duet between Toninho and fellow guitarist and friend Pat Metheny, who says of Horta, "He is one of the most harmonically sophisticated and melodically satisfying Brazilian composers." The remaining lineup of talent on this effort is also impressive, including flugelhornist Randy Brecker, Russell Ferrante of the Yellowjackets, the gifted Brazilian pianist Eliane Elias, bassist Mark Egan and drummer Danny Gottlieb.

There is an abundance of South American talent as well. One of the most effective of many elegant touches found on this release is the inclusion of the vocal group Boca Libre. This quartet of Brazilian singers adds a warm, lush bed to the three Transamerica tracks. *Moonstone* was produced by Ricardo Silveira, another Brazilian composer/guitar player who, according to Horta, "made some very creative contributions to this album."

The material on the album is not



Toninho Horta

PHOTO: BUCKMASTER

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easily categorized. (Horta says, "Brazilians don't bother to categorize their music. They just play it.") But above all, it is lyrical and harmonically rich.

While this is only his second U.S. effort (the other, *Diamond Land*, was also released on the Verve Forecast), he earlier recorded and released two albums under his own name in Brazil: *Terra Dos Passos* (released in 1980) and *Toninho Horta*, and they have helped to make him one of Brazil's most popular composer/performers.

I caught up with Horta at the end of a U.S. tour in San Francisco's Great American Music Hall, and asked him if he had done anything different on this release, knowing it would be for the U.S. market?

"My musical conception has remained constant for the last ten or 15 years. In the past my recorded music has been more jazzy than pop, but I don't want to think of myself as a jazz musician, so I'm trying to write more popular songs. This album has good energy, and that's partly because we were all given the time to relax and play the music. Too often in the past I've had to do one or two takes and [claps his hands] that's it, you go on to the next. This album features more of the guitar player, where the other album features more of the composer.

Rather than describe himself as a composer or a guitarist, he prefers to think of himself simply as a musician. "I can't sing too good or play guitar or piano very fast. But I like what I do. I think I have courage, good taste, and I'm not lazy. I have what I need to play my music. Also, I listen to all kinds of music: classical, standards, jazz, bossa novas. I was lucky because I always played with very good musicians.

"I'm glad to be here. I appreciate the opportunity to make a career in the U.S. I know I'm a good musician and one day I would have an opportunity to do this. For many years I waited and waited, not changing my music in order to get it played on the radio. Now in the United States I have permission to do the music I want to do without concessions. For that I am very grateful."

–Paul Potyen

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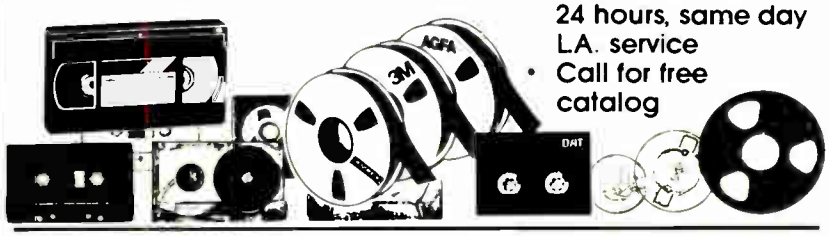

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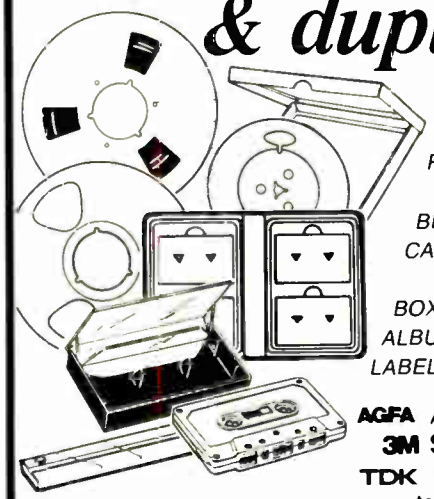

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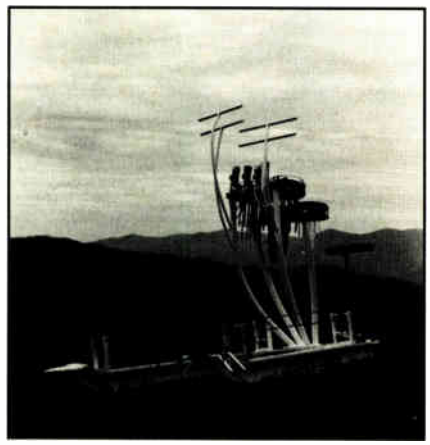
— *FROM PAGE 147*

showed the SGE Mach II, an update of the best-selling SGE. The Mach II adds more memory, sampling, MIDI data monitoring and 12 simultaneous effects.

Newcomer Zoom is a Japanese company that has many of the people who designed some of Korg's hottest products on board. Zoom (U.S. offices are in Redwood City, Calif.) grabbed a lot of attention with its 9010 signal processor. This multi-effects unit can split into four independent sections; some of the available effects include



The Perlini Controller

reverb, pitch shift, chorusing and compression. The 9010 comes in a single-space rack unit, but the 9002 packs much of the same technology into a Walkman-type package designed to clip onto your belt.

No NAMM show is complete without a couple of clever "surprise" products. At $175/set, the Micro-Monitors from Ambrose Enterprises (distributed by Key Clique, Studio City, Calif.) replace onstage monitor speakers with small earpieces that give excellent sound (in stereo, no less, with hear-it-to-believe-it bass response) and solve the feedback problem once and for all. Another product, the Russian Dragon ($495, rackmount), from Jeanius Electronics of San Antonio, Texas, monitors timing visually with a tuner-like display. It compares your playing to that of a rhythmic reference, and indicates whether you're "rushin'" or "draggin'" (hence the name), the degree of which is indicated by a 25-LED meter.

Those running up against the limits of MIDI found relief in two booths. Lone Wolf's MIDItap network (covered previously in these pages) is close to shipping; Mark of the Unicorn's MIDI Time Piece, which provides 128 MIDI channels (!) from a single Macintosh port, is already available. If you're a hot-rod MIDI-type who thinks 128 channels isn't enough, then network four MTPs for a total of 512 channels. *That* should take care of all your multitimbral synths.

There was much more, of course—the VLP, a $189 wireless system from Samson; Nady's WML-50 wireless MIDI link; a line of MIDI music data from Passport; Tascam's wonderful DA-30 DAT recorder ($1,899), designed for pro mastering applications (digital I/O and three sampling frequencies); seven new switching/routing/interfacing accessories from J.L. Cooper; and a bunch of percussion controllers, from Kat's low-cost MIDI-Kiti to Roland's SPD-8 (basically an Octapad II with built-in sounds) to John Perlini's custom percussion controller. There were even MIDI accordions from Farfisa, and an incredible new MIDI box from Lawndale, California-based Intone: $895 gets you programmable control of 16-channel audio patching; 6 x 8 MIDI patching (with merging functions and data-filtering on each channel); sync-to-SMPTE, song pointer or MTC; 50 memory slots; and a large, easy-to-read display.

Somewhat lost among all the product news was a political tidbit of interest: NAMM has taken criticisms of the past few summer shows to heart and has introduced some major changes. The accent of the summer show will be more on business and retailing, with Anaheim retaining its "new product" orientation. Ironically, when the music industry is in a slump, NAMM gets a lot of the blame because it's such an easy target; yet when there's a strong show, the industry as a whole, not NAMM, tends to get the credit. In any event, NAMM is making a sincere attempt to steer the summer show into a new direction that will please the greatest number of members, and I hope it works out well for all concerned.

Well, columns have a pretty limited word bandwidth, and we're out of space already. Oh well, see you next month. ■

Craig Anderton composes music, produces albums, designs technogizmos, writes books and edits Electronic Musician, *our sister publication.*

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—FROM PAGE 67, RAM CONFIDENTIAL
rewind. Hit the reel and you rock. Hit zero, you're back to the beginning." Another plus for Steele is the single-button automatic backup at two-thirds real time. "It's a well-thought-out machine," he says. "Support is good, and the company has delivered what it said it would."

CHICAGO RECORDING COMPANY
Chicago
AMS AudioFile
Anyone with a question about the AMS AudioFile should listen to Tim Butler, commercial production engineer for the Chicago Recording Company.

"Last year I did 1,138 sessions, and 90 percent of those were on the AudioFile," Butler says. "I'm using the AudioFile a minimum of 40 hours a week." He has cut spots on the AudioFile for most of the major agencies in Chicago; recent national spots include TV ads for Cheetos, Michelob Dry and Busch Light. "Lots of beer and huge amounts of Sears," he jokes.

AudioFile's speed is no joke to Butler: "On this end of the business, clients don't question audio integrity or sound quality; they're looking at how they can move sound through time," he stresses, "how quickly they can finish a spot, or redo it, or experiment with an alternative line. AudioFile is the fastest.

"You can't be competitive in Chicago unless you are disk-based; producers are very aware of the advantages," he says. "We charge a hefty premium; the room I'm sitting in now is $220 an hour with the AudioFile. Payback on the system has been real quick, ahead of schedule."

Each of the four AudioFiles in the studio is configured for two hours of hard disk storage—enough to store several sessions' worth of spots. Listing disadvantages, Butler notes there is no built-in mixer on the AudioFile, so he uses an MCI 500 Series console. "It's not as good a tool for manipulation of sound as a Synclavier or a Fairlight," he adds.

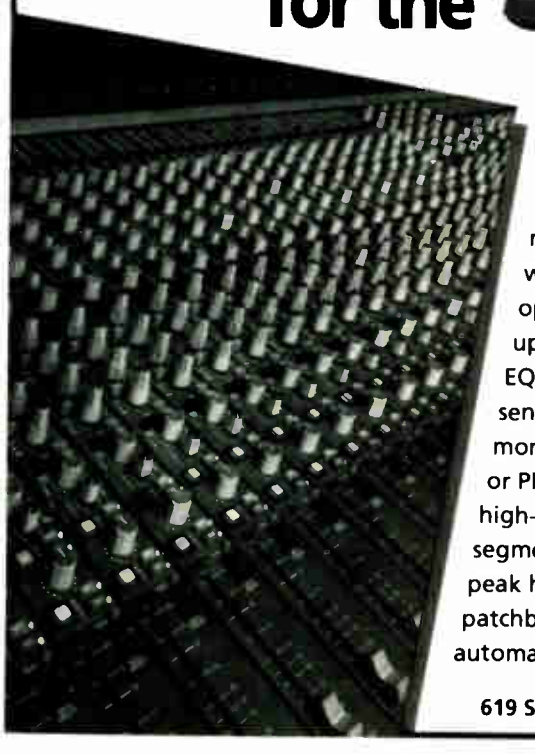
Backing up on the AudioFile is in real time. Butler has devised ways to solve rep and backup in a busy work day. "I'm convinced you can't run AudioFile without an assistant," he says. "At night, before my assistant and I go through the next day's schedule and put together what I call a battle plan on what to upload for the sessions, I run them back-to-back.

"It's our practice to back up as soon as physically possible, on PCM-format, within minutes after the session is over. But we'll also keep the spot on the disk as long as possible, maybe as long as two or three days, assuming the client will return for a remix. With national commercials, it's very rare the client doesn't come back for some revision. Also, just to be on the safe side, I run a 24-track analog backup."

Wise words from a reluctant beta-user. "We installed the second AudioFile in the United States, and the first six months were hell," Butler recalls. "Three years later, of course, we have four of them. There's a saying that if you live on the cutting edge of technology, you get cut. We accepted the idea we would have a certain amount of downtime, and we got our share. Now, if I couldn't edit on AudioFile, I think I'd go get a job flipping hamburgers." ■

Mia Amato writes on video technology and does a lot of gardening on both coasts.

Get in Gear for the 90's



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by Mark Herman

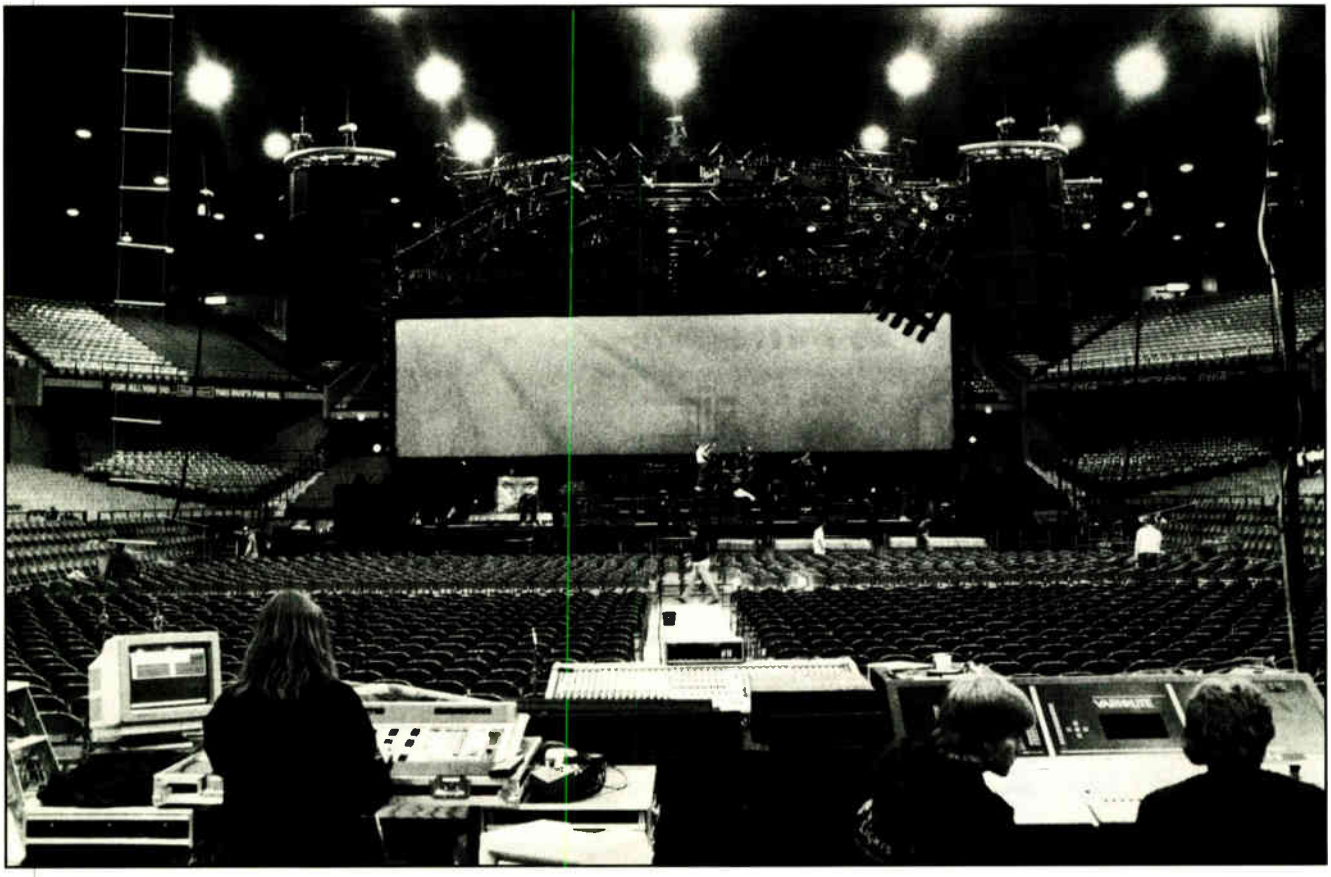
SOUND REINFORCEMENT NEWS

Burns Audio (Sun Valley, Calif.) has become one of the premier sound reinforcement companies specializing in live television work. The company provides high-quality presentations in demanding situations. Burns Audio works high-visibility events such as the Golden Globe Awards, Grammy Awards, Academy Awards, White House presentations, political conventions and made-for-TV musical specials. Burns also has an office in Las Vegas that primarily handles concert production.

Techs set up for the Paul McCartney world tour stop at the Rosemont Horizon, near Chicago. Showco provided P.A. for the USA dates, featuring a huge Prism speaker system using JBL components.

Chief engineer **Pat Baltzell** explains some of the differences between TV audio events and regular concert production. "Everything moves faster. There is no room for feedback—the volume levels must be kept lower. We typically use three or four house mixing consoles and two foldback consoles for every show. For example, the usual Grammy Awards show might have five completely different acts perform live; one could be a symphony, followed by a heavy metal band and then maybe a country-western group. So you have to use a lot of inputs, and be able to control handheld mics, lavaliers, as well as podiums and playback clips. There are three mixers in the recording truck, three house mixers, two stage engineers, plus a sweetener engineer in a separate truck for things such as crowd applause and laughter."

Burns Audio stocks the entire Apogee speaker line in an inventory that includes over 30 3 x 3s and 30 of the smaller AE-5 cabinets. Additional JBL cabinets are used for special occasions.



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Two types of proprietary monitor wedges are loaded with either an E-V 12-inch M12L with a JBL 1-inch 2420, or an E-V 15-inch M15L with a 2-inch JBL 2445. Amplification is exclusively through Crest 8001, 4000 and 2501 units. Yamaha PM3000 and Ramsa WR-S840 40-channel consoles handle mixing chores, with smaller consoles available for spot work. Signal processing is composed almost entirely of Klark-Teknik parametric and third-octave filter sets, gates, limiters and digital delays. Burns carries a large inventory of wireless microphones, including 75 Vega Diversity wireless systems and a large selection of Sennheisers for UHF work.

Lester Audio Labs, headquartered in Dallas, will unveil its 64-channel digital audio fiber optic transmission system (DAS-64) at this month's NSCA show in Las Vegas. The system is rack-mounted, fully modular and expandable in groups of eight channels. Features contained on the remote control include a complete "soft patch," 48-volt

Detail of the Showco Prism system on the McCartney tour: two 32-cabinet, flying arrays provide even coverage throughout the venue.

ON THE ROAD

SOUND COMPANIES, EQUIPMENT, ARTISTS & PERSONNEL ON TOUR

Artist Sound Company Tour Dates Region	House Console #1 House Console #2 Monitor Console #1 Monitor Console #2 House Crossover	Main Speakers Main Speakers Subwoofers Monitor Speakers Monitor Speakers	Main Amplifiers Main Amplifiers Sub Amplifiers Monitor Amplifiers Monitor Amplifiers	Engineers: (B) = band (H) = house (M) = monitor (T) = tech (a) = assistant (C) = crew chief
Lee Greenwood Eighth Day Sound Ongoing U.S.	Soundcraft Series 4 40x16x2 - Ramsa WR-S840 40x18 - -	(16) Turbosound TMS-3 - - EDS 1x15, Apogee 3x3	Crown MA2400/IQ - - Carver 1.5	Mark Swift (B, H) Mike Thamann (B, M) Mike Pasquale (aH)
Psychedelic Furs Scorpio Sound Nov. 28 - Jan. 20 U.S. March - May U.S.	Soundcraft Series 4 40x16x2 - Soundcraft 800B 40x12 - BSS FDS 360	(18) EAW KF550 - - Scorpio Custom 215	Crest 8001 - - Crest 7001, 6001, 4801	Brad Madix (B, H) Carl Gagnon (M) Jeff Scornavacca (B, M) (1st leg only)
Miguel Mateos Philadelphia P.A. Inc. January - February U.S.	Soundcraft Series 4 40x16x2 Yamaha PM2000 32x8x8 Soundtracs MC 32x12 - BSS FDS 340	(16) Turbosound TMS-3 - (8) Cerwin-Vega Jr. Earthquakes PPA Custom MW4	Crest 8001 Sound Code Systems 2600A Crest 8001 Hill TX800, TX1000	Lee Pepper (H) John Schumacher (M) Dave Stevens (C)
George Strait Dallas Backup Ongoing North America	Yamaha PM3000 40x8x2 - Yamaha PM2800 40x14 - BSS FDS 360	(24) EAW KF850 - (8) Custom DB S 218 Custom DB M 15H	Crest 5000, 4000 Crest 3501, 3000 Crest 5000 Yamaha 2200	Paul Rogers (H, B) David McConnell (M, C) Allan Miller (aH, R)
Testament Air Motion Productions October - March North America	Ramsa WR-S840 40x8x2 - Soundcraft 500 40x12 - Electro-Voice MTX-4	(12) EV MTH-4 (12) EV MTL-4 - Air Motion 212	Crest 8001, 7001 Crest 8001 - Crown MA1200	David Pigg (B, H) Rick Decing (M) Lorenzo Banda (aH)
Fleetwood Mac Clair Brothers April - May Australia	Clair Custom 32x12x6 - Harrison SM-5 32x16 - Clair Custom	(48) Clair S-4 Series II - - Clair 12AM	Carver/Clair 2.0 - - Carver/Clair 2.0	Jim Devenney (H) Robert Miller (M) Chris Fulton

World Radio History

phantom power and a six-step gain control. The DAS-64 can be ordered with up to three optical outputs, driving three receivers/output mainframes (i.e., microphone splitting to three consoles). Specs include 18-bit input/output design with 8-times oversampling, dynamic range of 98 dB with a flat frequency response of 10 to 22k Hz. The system will replace not only your snake but patch bays and transformer splits, too.

Dallas Backup (Dallas) is a production company with complete audio, lighting and staging capabilities. Currently, the company provides full-time audio and lighting tour support for entertainer **George Strait** (see "On the Road"), works many conventions, and handles national one-off concerts thoughout Texas, Arkansas, Oklahoma and Louisiana. Other work includes occasional regional mini tours, local clubs, the **Dallas Symphony Orchestra**, **Louise Mandrell** and corporate/industrial clients. Dallas Backup's **Russ Purdue** says the firm stays busy most of the year. "Since we do so much outdoor work with our staging, we pick up near the end of March and kick till November." Last year Dallas Backup did over 250 shows for Strait.

Originally started in 1978 by **Charles** and **Vickie Belcher** as a provider of small P.A. and backline gear, Dallas Backup now has three complete concert systems with a complete EAW KF850 rig, and two custom-designed systems featuring tri-amped, JBL-loaded cabinets. Each custom cabinet has four 15-inch, four 10-inch, two horns and two tweeter components. All the house cabinets are powered by Crest amplifiers, while proprietary JBL-loaded wedges are powered by Yamaha 2200s. Yamaha PM3000, PM2000 and Soundcraft 400B consoles work the house, and Yamaha PM2800 and Soundcraft 400Bs handle the stage. Purdue comments on the new Yamaha PM2800 monitor console. "Because it is so similar to the PM3000—which we have—walking up to the PM2800 is like going home again. Everything is almost identical; it is a great mate to the PM3000."

Now hear this!...The **U.S. Navy** awarded Electro-Voice the contract to provide loudspeakers aboard the aircraft carrier **U.S.S. Independence**. E-V model 926 and 927 loudspeakers installed by Computer Science Corp. (San Diego) replaced the older naval craft loudspeakers developed by E-V in the 1950s. The new speakers use E-V's Manifold technology for increased output. Just 12 speaker arrays provide sound for the ship's P.A., which requires at least 110 dB of sound to effectively communicate instructions to the flight deck crew. A similar version of this P.A. is scheduled to be installed at a land-based naval munitions storage area.

Crest Audio announced that a short-frame Gamble Series EX house console will be available this spring. Purchasers desiring a

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custom configuration will be able to specify the number of input channels and subgroups needed. Crest is also unveiling the new Gamble Series EX monitor console configured with 48 inputs (in 16 mono mix groups) into a 16 x 16 matrix, and 16 outputs with independent 5-band full parametric EQ. Buyers will have the option to equip the lower input modules with or without faders.

Altec Lansing-Europe hosted international pro sound clinics in Frankfurt, West Germany, and Zagreb, Yugoslavia, attracting over 200 distributors, consultants, engineers and contractors from companies representing 16 different countries. The programs were translated from English into Russian, German and Serbo-Croatian. Altec Lansing president **Dave Merrey** says, "The Frankfurt [seminar] was the first full-scale clinic Altec ever conducted in Western Europe, and the one in Zagreb was the first sound clinic any major pro sound company has ever held in the eastern part of Europe." The topics and demonstrations at the clinics ranged from architectural acoustics, sound system design, computer-aided acoustical and electronic engineering, and understanding pro audio products. Special seminars focused on the recently released AcoustaCADD sound system and an acoustic design assistance program for IBM PC-compatibles, featuring high-resolution 3-D graphics.

In the last two years **Air Motion Productions** has evolved from a New Mexico-based regional sound company working one-off concerts into one that tours nationally. Owner **Lorenzo Banda** started Air Motion in 1983 and began touring several years ago with Windham Hill acts such as **Michael Hedges** and **Montreux**. Other tours include **Dwight Yoakam**, **John Butcher** and **Hiroshima**. The company recently completed a tour with metal monsters **Testament** (see "On the Road") using an E-V MT-4 system rented from Electronic Ear Productions. Air Motion's regular main sound system includes 24 Meyer MSL-3s and 12 Meyer 650 subs powered by AB 1200 amps, a Ramsa WR-S840 for the house mix, and a Soundcraft 500 40 x 12 monitor desk. Air Motion-designed monitor wedges are loaded with either dual 12-inch JBL 120s and a 2-inch JBL 2445, or a single E-V 15-inch speaker and a 2-inch 3301 Renkus-Heinz horn. Signal processing features the Eventide H3000 SE harmonizer, Yamaha REV5, Lexicon PCM70 and PCM42, Valley People Gatex units and dbx 900 racks.

Contractor news...The sound system at **Yankee Stadium** was upgraded once again with Altec 817B weatherized LF horns and Altec 8551B programmable EQs. Altec 1715A and 2271 units replaced existing press and luxury box systems.

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Norcon Electronics was the contractor...The **Chicago White Sox** training camp in Sarasota, Fla., used **Ferguson Electronics** (Venice, Fla.) to install a distributed system featuring University horns and drivers and various Altec Lansing components...**Advance Sound and Electronics** (Sacramento, Calif.) put in a sound system for the St. Philomene Church...**AMT Systems** (Canyon Country, Calif.) recently completed the sound system for the new Marriott Hotel in San Francisco.

Catch-a-Thief...Electronic Ear Productions (Lubbock, Texas) had a 48-ft. trailer partially full of audio and lighting equipment stolen early this year out of its Nashville, Tenn., facility. If anyone has information concerning the missing gear call EEP at (806) 763-9794. Watch for the following serial numbers on these mixing consoles: Ramsa WR-S840 40-channel monitor console #8720082; Yamaha PM3000 40C #1168; and Avolite QM500 90-channel lighting console #1006501. Major consoles like these are big-ticket items and easily recognizable at gigs, so be on the lookout for them.

On the brighter side...Electronic Ear has gained national exposure by touring with country music singing star **Reba McEntire** for the past three years. The company was formed in 1979 as an MI retail store, but has since evolved into a complete audio, lighting, trucking and staging production company. President and primary owner is **Tom Prather**. EEP opened a Nashville office last year since most of its clients are country music acts based in that area.

Even in the wake of the theft, EEP still boasts two different kinds of main P.A. systems: One is based on the Electro-Voice MT-4 Manifold system, the other is a 40-box Meyer rig. Smaller E-V DeltaMax cabinets are used for additional equipment support and sidefills. Meyer UM-1 and UPA-1s are for stage monitoring. A new Yamaha PM3000 console is on the way, a Soundcraft 8001B is available for house use, and another Ramsa 840 remains for monitor mixing. Crest 8001s and 6001s provide house amplification, while the stage uses Carver PM 1.5 and 2.0s.

What did you say?...Synergetic Audio Concepts (more commonly known as Syn-Aud-Con) will soon conduct the Intelligibility Workshop II at Bloomington, Ind., May 24-26. **Dr. Larry Humes** of Indiana University will supervise the workshop, which will deal with speech intelligibility measurement, focusing on planning sound reinforcement systems with acceptable intelligibility characteristics. Attendance will be limited. For further information call Syn-Aud-Con at (812) 995-8212.

Classical audio engineer **Joseph Magee** has designed a quality outdoor orchestral sound system for the **Pacific Symphony** at Irvine Meadows, Calif. A new Ramsa WR-C900 theater mixing console is featured along with a Lexicon 480 processor. The system makes extensive use of the Ramsa's pan-able, discrete left-center-right output assignments. Magee states, "Summing mono to the center cluster is the accepted practice, but with the Ramsa WR-C900m console, all information to center is panned specifically to copy the acoustic image of the orchestra onstage."

Bits and pieces...Florida Sound Engineering Co. installed a 24-channel Soundcraft 500 house console and JBL speakers for the North Jacksonville Baptist Church (Jacksonville, Fla.)...**Clearwing Audio** (Brookfield, Wis.) recently purchased a 20-box Martin F2 sound system. The Martin F2, a 2-box system, allows the upper cabinet to be configured in several different horn and driver combinations. Clearwing works with the World Wrestling Federation's Wrestlemania productions and the annual Milwaukee Summerfest music festival...**QSC** unveiled its powerful MX4000 amplifier at the winter NAMM show...North

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Hollywood rehearsal studio **Leeds/Le Mobile** installed pro touring sound systems purchased from Audio Analysts in all three of its practice rooms. Leeds often plays host to well-known national touring artists...**Clair Brothers'** new audio installation company headed by **Gene Pelland** reported having bids out on 20 different projects... Hughes Aviation outfitted its corporate Boeing 727 jet with QSC amps for use in various lounge and conference areas.

Philadelphia P.A. Inc. (Riverside, Calif.) recently completed a U.S. tour with rocker **Miguel Mateos** (see "On the Road"). **Kevin Kelly** reported that PPA finished three complete sound system installations for the Disneyland Corporation at the **Queen Mary/Spruce Goose** attraction in Long Beach, Calif. One system was installed in the large geodesic dome that houses the Spruce Goose. This concert sound system is composed of Cerwin-Vega CVX 253 main and CVX subwoofer cabinets, custom Cerwin-Vega-loaded monitor wedges, extensive signal processing, Crest amplifiers, Sony UHF wireless microphones and a Soundtracs MX 24 x 8 x 2 house console. PPA installed special fiberglass-coated enclosures designed for all-weather use on two smaller stages; one on the retired Queen Mary ocean liner and the other in Propeller Park (located between the dome and the Queen Mary).

Gross...A recent Pollstar survey of the 1989 North American concert industry's top money-making tours showed the **Rolling Stones** (Showco) coming out on top with an incredible $98 million for 60 shows in 33 cities. **The Who** (Clair Bros.) followed with $41.7 million with 39 shows in 27 cities. **Bon Jovi** (Clair Bros.) snared $36.7 million doing 143 shows in 129 cities. Hovering near the top, as usual, with $28.6 million was the everlasting **Grateful Dead** (Ultra Sound) with 73 shows in 33 cities. Industry newcomers **New Kids on the Block** rounded out the top five with $23.9 million for 143 shows in 112 cities...Concert ticket sales for 1989 were in excess of $1 billion—up about 3% over 1988. That sounds good, but nearly 10% of the total went to the Stones. Two-thirds of 1988's top acts did not even tour last year. Overall, major arena headliners grossed around 67% of the '89 total.

[Note: Some of the data in this column and in "On the Road" is based on information provided by the companies. Address all correspondence and photos to Mix Publications, Sound Reinforcement Editor, 6400 Hollis Street, Suite 12, Emeryville, CA 94608.] ■

When not writing for Mix, *Mark Herman operates a rental company specializing in sound reinforcement consoles.*

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SAFE RIGGING:

BASIC PRINCIPLES FOR SUSPENDING LOUDSPEAKER SYSTEMS

PART 1:

ROPES, LOADS AND SLINGS

[Editor's Note: The following article is adapted from JBL Technical Notes, Volume 1, Number 14, and used with the permission of JBL Professional. This material is intended for informational purposes, and none of the enclosed information should be used without first obtaining competent advice with respect to its applicability to a given situation. None of the material is intended as a representation or warranty on the part of JBL, and anyone making use of this information assumes all liability arising from such use.]

Contractors and sound installers hang loudspeaker equipment in public meeting places and performing arts facilities as a matter of routine. This article details rigging practices appropriate for the sound industry and is meant to familiarize readers with the proper hardware and techniques for hanging installations. To ensure a safe installation, this work should be undertaken only by those with knowledge of proper hardware and safe rigging practices.

This article contains data for rated capacity for various pieces of hardware, based upon manufacturer's specifications for products in new condition and free from defects, either apparent or hidden. All rated load values, unless otherwise noted, are for in-line pull—along the centerline of the item. It is the responsibility of the installer to inspect and determine the actual condition of the equipment used, and to incorporate design factors appropriate to the local job conditions. Where doubt exists as to the actual condition or ratings of hardware, it should not be used.

Load ratings shown herein are based upon *usual* environmental conditions. All products used for hanging purposes are subject to wear, misuse, overloading, corrosion and other usage factors that may necessitate a reduction in the products' capacity rating or a reduction in its design factor. It is recommended that all

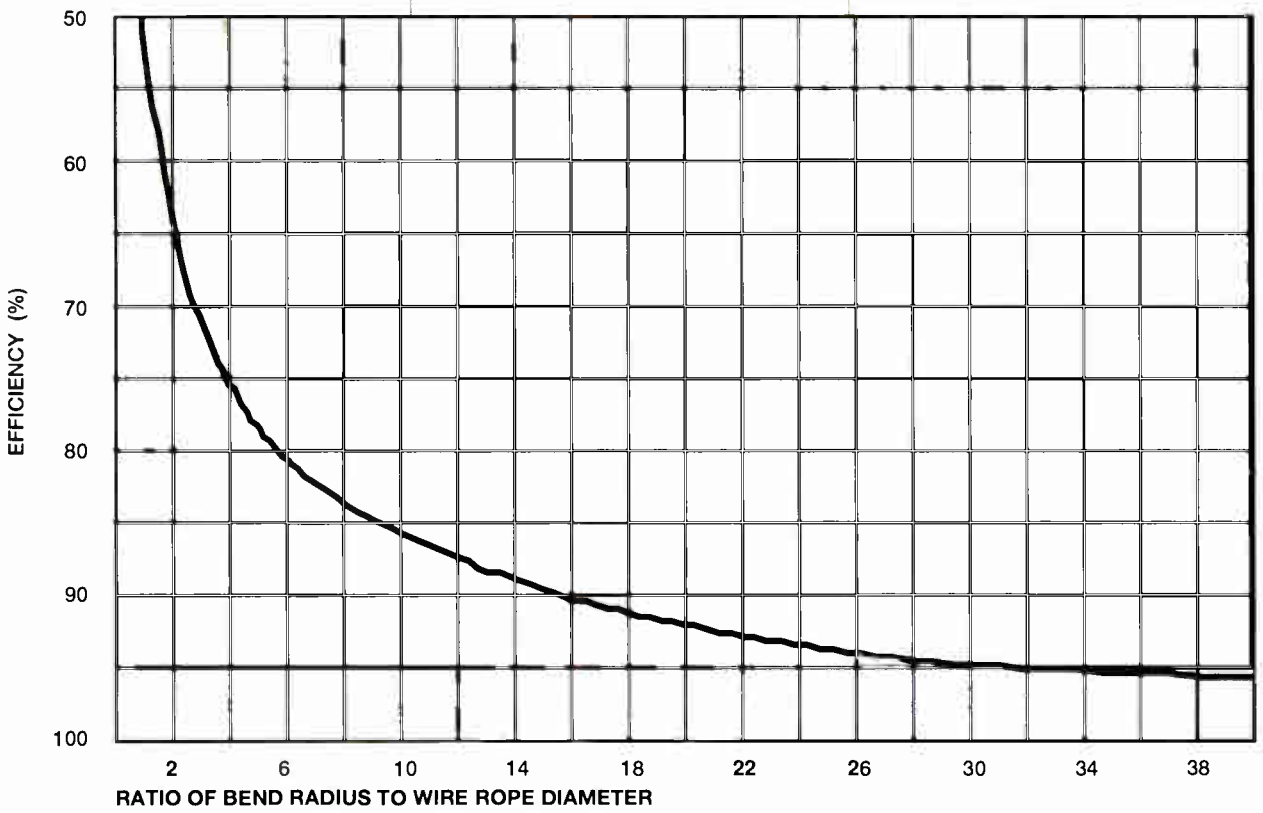

FIGURE 1: WIRE ROPE BEND EFFICIENCY

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products used for rigging and hanging purposes be inspected prior to each use.

Welding or loading of supporting parts and structure can weaken the part or structure, and should be performed only by people with knowledge of metallurgy and the intended use of the materials being welded.

DESIGN FACTOR

Design factor is a term used by the rigging industry to denote theoretical reserve capability. The rated capacity of all lifting and hanging equipment is based upon the nominal strength of the equipment divided by the design factor:

rated capacity = nominal strength/design factor

For example, if the design factor is 5, then the rated capacity of equipment is only one-fifth of its nominal strength.

Minimum design factors vary according to the application, and may be regulated from location to location. No design factor discussed here should be assumed to represent a recommendation on the part of JBL. Users must assume all responsibility for the determination of design factors suitable for local conditions.

SHOCK LOADING

When a load is suddenly moved or stopped, its weight may be magnified many times the original value. This is known as shock loading and should be avoided at all times.

Shock loads will usually be instantaneous and may go undetected unless equipment is visibly damaged. Safe working practices demand that these limitations be known and fully understood. A 900-lb. loudspeaker cluster dropped four inches could cause a shock load of 4,500 lbs. if the rigging is attached to rigid structures and of a material that won't stretch. However, because all rigging will stretch under shock loading, the exact shock load on a piece of equipment isn't easily predicted.

Although shock loading of equipment and structure is usually confined to lifting and installation, it should also be recognized that other forces (such as earthquakes) can impose shock loads upon structures many times that of the static load. It is therefore imperative that hardware and structures be capable of supporting several times the weight of the equipment being hung.

CENTER OF GRAVITY

The center of gravity of an object is the point at which the weight of the object acts as though it were concentrated. It is the point at which the object may be completely supported or balanced by a single force.

The center of gravity of a regularly shaped object may be estimated fairly accurately by determining its approximate center. Finding the center of gravity of irregularly shaped objects can be

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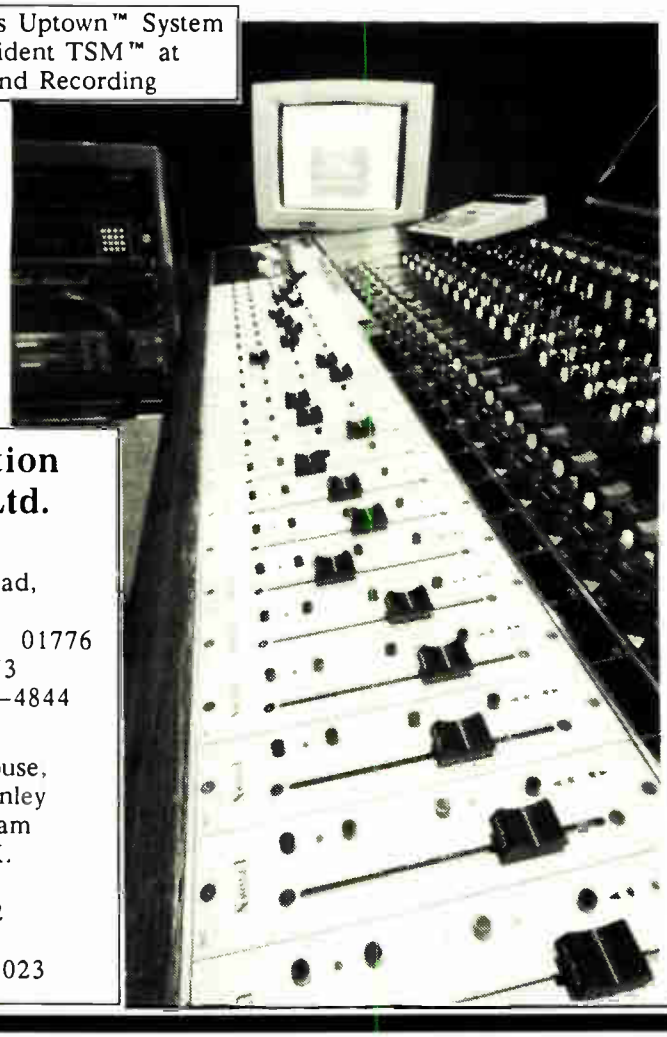

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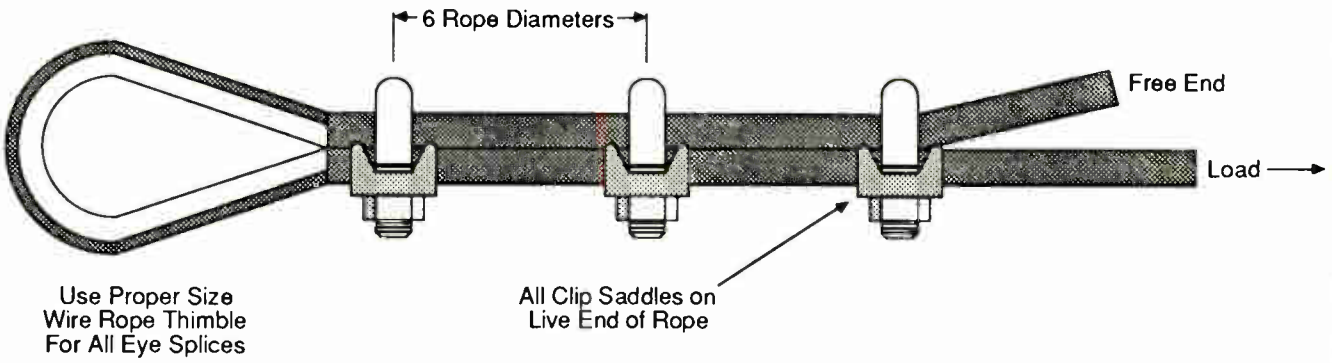

FIGURE 2: WIRE ROPE CLIP INSTALLATION

more difficult, but it's necessary, nevertheless. A load will always hang from its attachment point through the center of gravity. It is important to visualize this before making a lift.

All loads to be lifted should be rigged above the center of gravity in order to prevent tipping and possible hazards to equipment and workers. The lifting force should always be located above the center of gravity and exert a straight vertical pull to prevent swinging of the load.

ROPES

Before discussing actual rigging hardware and systems, it is appropriate to examine ropes and their proper use. Although synthetic ropes of great strength are available, most codes prohibit their permanent use in rigging for a variety of good reasons. Nevertheless, ropes are necessary to lift approved cables, fixtures, tools and equipment into position.

Knot efficiency is the approximate strength of a rope with a knot as compared to the full strength of the rope. It is expressed as a percentage of the rope's rated capacity and refers to the stresses that the knot imposes on the rope. When a knot is tied in a good rope,

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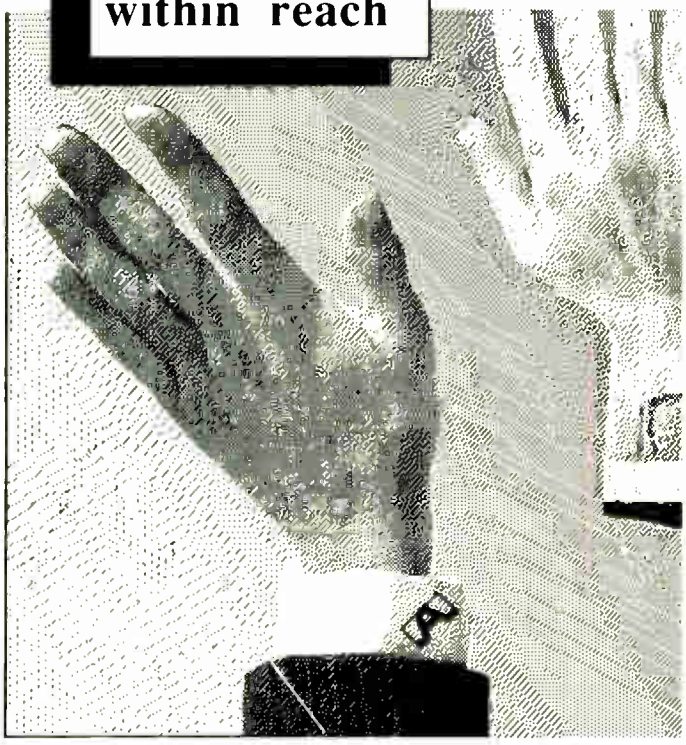

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failure under stress is certain to occur at the knot. This is because bends result in uneven stresses upon the fibers, with the outsides of the bends taking a greater share of the load. The tighter the knot, the greater the percentage of the total load that is carried on fewer fibers.

Bends are used to join two pieces of rope, usually temporarily. Typical knot efficiency is 50%. Bends offer some advantage over binding knots, as they resist untying when slackened or jerked.

Binding knots are used to join two pieces of rope. In general, binding knots have a knot efficiency of 50%, but can untie easily when a free end is jerked. In the square knot, the end and the standing part of each line lie together through the bight of the other. In the untrustworthy granny knot, the end and the standing part are separated by the bight. The granny knot is particularly treacherous in that it will appear to be secure—only to slip under load. The thief knot is deceptively similar to the square knot, but has the two loose ends coming out of opposite sides, instead of from the same side as in the square knot. This knot is almost certain to fail under load.

Loop knots are used to hold objects where security is of paramount importance. The bowline, widely used in rigging, won't slip, yet is easily tied and untied. It may be tied in the hand or used as a hitch and tied around an object, usually for lifting purposes. The bowline has a knot efficiency of approximately 60%.

Hitches are used for temporary fastenings that untie readily. They are generally tied directly around the object—instead of first being tied in the hand and then placed over the object. Hitches must be drawn up tight, as they have a tendency to slip if loose. The clove hitch consists of two underhand loops, which may be tied in the hand and slipped over an object at any point along the length of a rope. Knot efficiency is 60%.

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WIRE ROPE

Most wire ropes are constructed from plow steel, improved plow steel or extra-improved plow steel wire. The wires are woven into strands, which are woven to form the wire rope. Typical wire rope may consist of six strands wound around a central core. The central core supports the outer strands and helps prevent the rope from crunching under stress. Wire rope core materials may be fiber (FC), independent wire rope (IWRC) or wire strand (WSC).

Wire rope is classified by diameter, number of strands, number of wires making up each strand and core material construction. Rope diameter is measured at its widest dimension. Wire rope is also classified according to the direction the strands and wires are twisted. The distance along the rope required for a strand to make one full revolution is one *lay*.

In *right regular lay* construction, strands twist to the right, wires twist to the left. *Right lang lay* construction finds both strands and wires twisting to the right. *Left regular lay* ropes are constructed with strands twisted left and wires twisted right. The *left lang lay* configuration twists both strands and wires left.

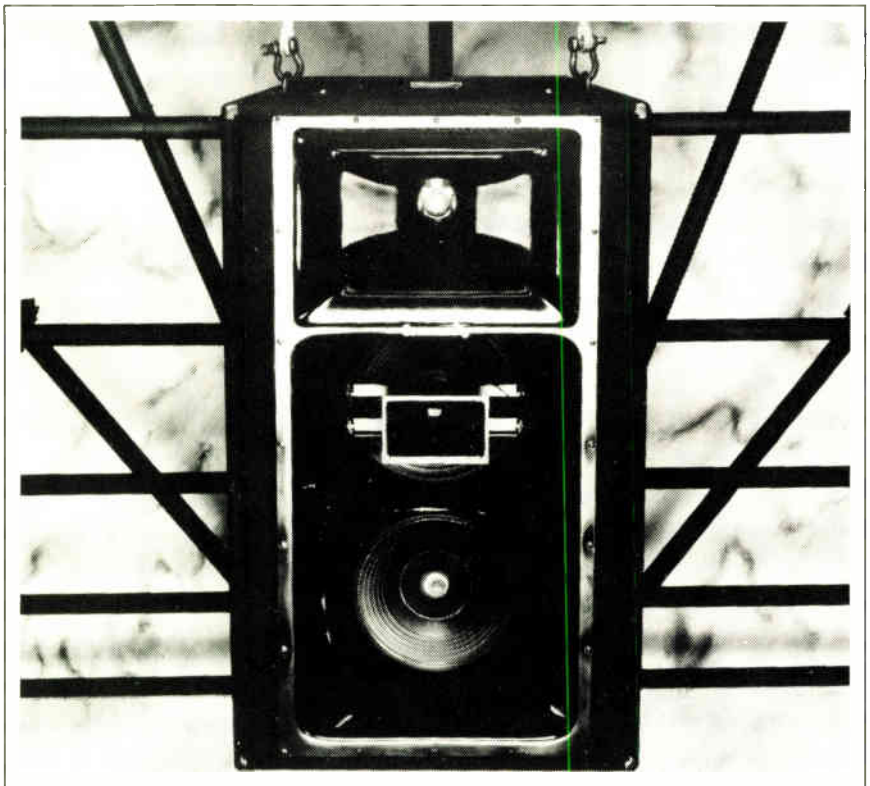
Regular lay ropes are less susceptible to crushing and deformation because the wires lie nearly parallel to the rope. Land lay ropes twist the wires across the direction of the rope, and are therefore more flexible and resistant to abrasion damage. If both ends of a lang lay rope are not fixed, however, it will rotate severely when under load.

Most sound and stage rigging requirements are easily handled by two wire ropes: 3/8-inch and 1/2-inch, 6 x 19 IWRC classification. These ropes in improved plow steel have a nominal strength of 13,120 lbs. and 23,000 lbs., respectively. If we assume a design factor of 5, rated capacities become 2,600 lbs. and 4,600 lbs.

Just as knotting a fiber rope reduces the nominal strength of the rope, bending of a wire rope also results in a reduction in its nominal strength. The tighter the radius of the bend in the rope, the greater percentage of the load is concentrated on fewer wires and strands. This results in a reduction in the rope's nominal strength and rated capacity.

Fig. 1 shows the relationship between wire rope efficiency and the ratio of bend radius to rope diameter. The chart is for 6 x 19-class wire ropes. Note that the chart is nearly asymptotic as the bend radius approaches the rope diameter—such as might occur in wrapping a beam with a basket sling. Overloading of a cable under these conditions could result in irreparable damage to the wire rope, or a possible failure.

Experienced riggers always pad beam edges with softeners before wrapping the beam with a sling, and avoid sharp or jagged edges that could possibly injure the wire rope or sling. Heavy burlap or thick polyester



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When a load is suddenly moved or stopped, its weight may be many times the original value. This is known as shock loading and should be avoided at all times.

is usually used for this purpose.

WIRE ROPE CONNECTIONS

In the touring business, wire rope is employed for slings, usually in lengths of five, ten, 20, 30 and 50 feet. Each end of the sling is terminated in a swaged or zinc-cast eye, which yields a connection that is at least as strong as the wire rope itself. This type of connection is rated as 100% efficient—the strength of the entire cable assembly is that of the wire rope. These slings are also clean in appearance, won't tear flesh or clothing in the process of handling, and do not require periodic re-torquing. Custom-length slings are easily obtained for permanent installations.

Clips are used when eyes must be fabricated to wire rope in the field. Two types of clips are available for this purpose: U-bolt or Crosby clips, and J-bolt or fist-grip clips. Only forged clips should be used. Correctly used, clips result in a connection efficiency of 80% (e.g., if the wire rope has a rated capacity of 4,600 lbs. and clips are used to fabricate an eye, the rated capacity of the assembly would be 3,680 lbs.).

It is important that clips be properly installed. Failure to do so could result in a reduction of rated capacity. U-bolt clips can be installed incorrectly. The clip saddle must be installed over the live end of the rope to prevent damage to the load-bearing component. J-bolt clips cannot be installed backward. Always use the proper size clip and thimbles for the wire rope (Fig. 2).

Failure to periodically check and retorque as recommended will result in reduction in efficiency rating. This requirement makes swaged or zinc-cast eyes an attractive alternative for permanent installations.

SLINGS

A sling is a looped line used to hoist, lower or carry something. Slings in sound system rigging are generally made from wire rope or polyester fiber and are used to hitch loads to various parts in the chain of rigging components.

Polyester or synthetic fiber slings enjoy considerable popularity for the rigging of portable sound and stage equipment. They offer advantages in that they are light, easy to handle, will not damage delicate and unusually shaped materials, and, depending on the individual sling, are stronger than wire rope. They also are better than wire rope for working tight-radius bends. SpanSet™ products (available from West Coast Wire Rope & Rigging, Oakland, Calif.) are typical of the range of synthetic fiber slings available for this purpose. Refer to the manufacturer's data for capacity rating information, as it can vary from product to product. Polyester fabric is relatively poor in its fire ratings—consult local building-code authorities before installing. ■

[Next month our discussion of safe rigging continues with mounting and system hardware.]

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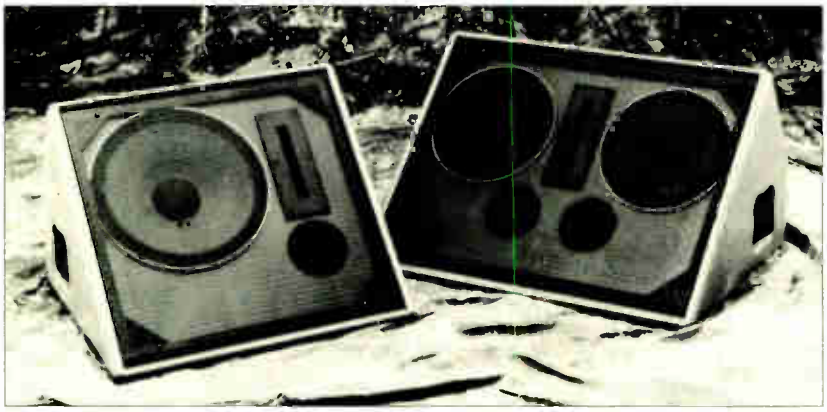

JBL CONCERT ▲ SERIES MONITORS

New 2-way wedge monitors from JBL Professional (Northridge, Calif.) incorporate Vented Gap Cooling LF transducers and the 2450J (2-inch throat) neodymium compression driver coupled to a 2396 diffraction horn. The horn's wide 160° horizontal pattern provides freedom of artist movement, even on large stages. The 4802A employs two 12-inch 2206H VGC transducers, while LF on the 4805A is handled by a single 15-inch 2226H VGC woofer. Both monitors are packaged in rugged, fiberglass-coated, birch-ply enclosures.

Reader Service #101

AUDIOPRO POWER AMPS

The Audiopro 3000 from Yorkville Sound (Niagara Falls, N.Y.) delivers 1,200 watts per channel at 2Ω (2,400W into 4Ω, mono-bridged), from a two-rack-space unit weighing just 40 pounds. Features include a MOSFET design, toroidal power transformer, ultraquiet, variable-speed cooling fans, and an "energy management system" that regulates AC line consumption to avoid tripping house circuit breakers. Like the 3000, the Audiopro 1200 (625W/ch) and 500 (250W/ch) models also offer low-distortion specs with full DC load and thermal protection. All include a two-year, unlimited, transferable warranty.

Reader Service #102

YAMAHA DDL3

Designed for commercial audio applications, the DDL3 from Yamaha Pro Audio (Buena Park, Calif.) is a 1-input, 3-output unit, with up to 1.3 seconds of delay settable in 20µs increments. Configurable as a delay (with individual digital EQ on each of the three outputs) or as a 3-way crossover (with programmable levels, filter slopes, x-over points and delay settings), the DDL3's 15 memory settings can be recalled over MIDI or remote contact closures, while a rear switch can disable the front panel to prevent tampering.

Reader Service #103

BEYER HM 560 ▲

A headworn, dynamic ribbon microphone for drummers, keyboardists and other musicians has been introduced to the U.S. market by Beyer Dynamic of Hicksville, N.Y. The HM 560 features an adjustable boom and can be worn on the performer's right or left side, or mounted on Beyer's DT 100 headphones for monitoring or broadcasting use.

Reader Service #104

RENKUS-HEINZ CM81

The CM81 from Renkus-Heinz (Irvine, Calif.) is a compact, full-range speaker system with an 8-inch woofer and R-H 1800 compression driver on a CBH 1600 horn. Designed for high-SPL (114dB max) installations, such as theaters, clubs and churches, the CM81 can be wall-, tripod-, ceiling- or under balcony-mounted (internal nut plates to fit Omnimount Series 50 mounts are standard), and the speaker comes in horizontal and vertical versions. Connections are terminal strip or Neutrik NL4; options include Dynaguard processing and a subwoofer.

Reader Service #105

ELECTRO-VOICE MTS-1 ▲

Utilizing patented designs and components derived from the MT-4 Manifold Technology™ concert system is the MTS-1, a bi-amped, 2-way, main speaker from Electro-Voice (Buchanan, Mich.). Ideal for situations where high SPLs and wide coverage are required from a compact enclosure, the MTS-1 uses two DL15X woofers in a vented-box design, while highs are handled by two manifolded DH1A compression drivers on a 90 x 40-degree, constant-directivity horn. High-current Neutrik Speakon™ connectors are standard.

Reader Service #106

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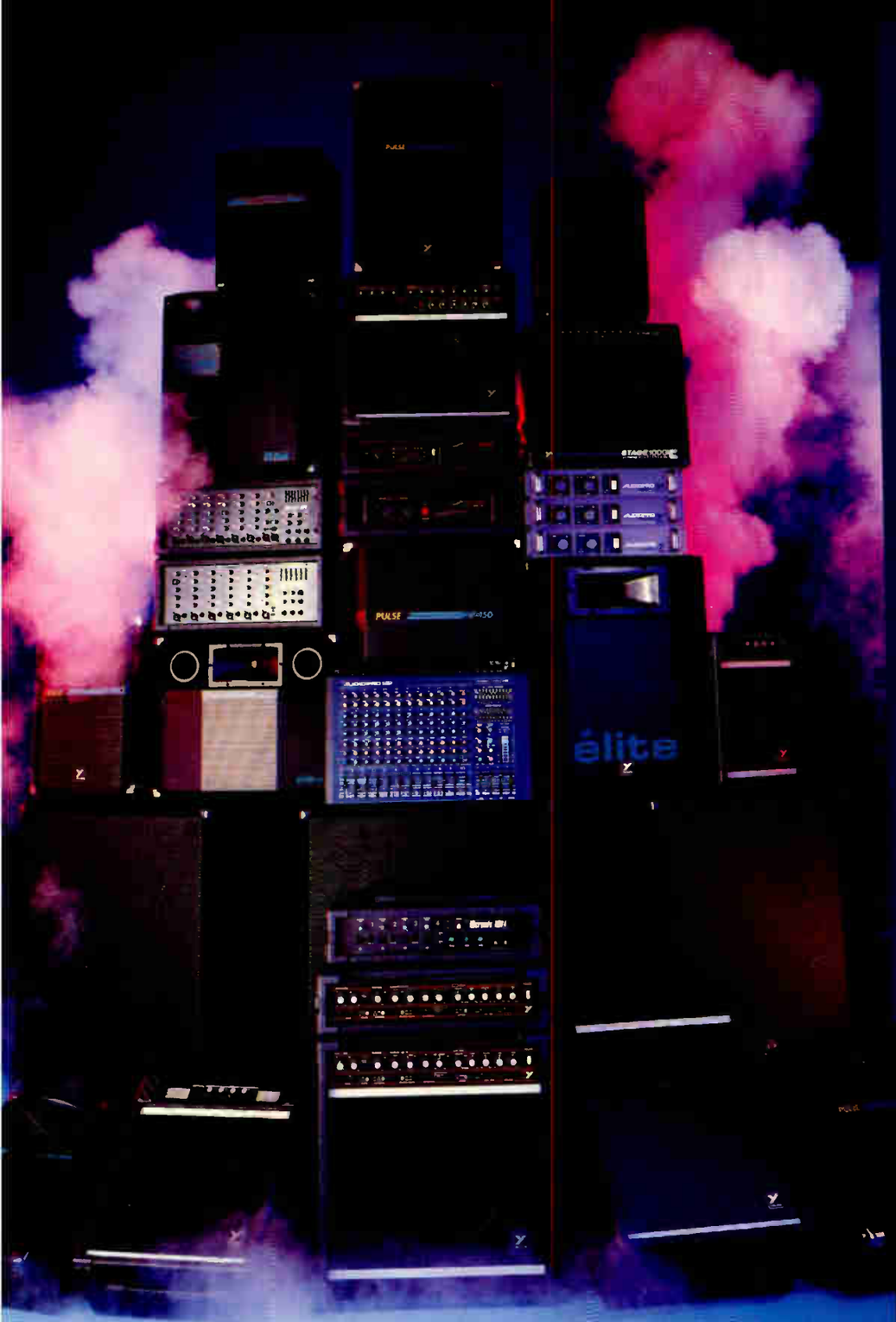

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by Philip De Lancie

OPTICAL MEDIA IN THE '90S

Music is information. While not a particularly new or original thought, it's an idea that can't be ignored when trying to anticipate the dramatic changes in store for the audio field over the coming decade. In the past, specialized technologies were developed to handle a variety of tasks that were largely unique to the audio industry. The basic electronic components used may be common to other fields, but from the level of circuits on up, hardware has been shaped by the peculiar requirements of generating, storing and reproducing sound. The advent of digitization has changed that.

Once converted to digital, sound can be handled, along with a wide variety of other types of information, as generic data by generic data processing devices. Specialized user interfaces may continue to be used in certain situations, and hardware requirements will vary according to the amount and complexity of data. But overall, the '90s will bring acceleration of a trend in which those who create, convey and use all sorts of information will be increasingly dependent on tools coming from the computer industry.

In the production and manufacturing of information products, that trend is already well-established. CD-Audio destined for music consumers is replicated in the same plants as CD-ROM for business and academic users. And drive transports designed for CD-ROM can play audio discs as well. In production, an audio editing workstation, with different software and peripherals, may double as a desktop publishing setup for album graphics, with traditional word processing, accounting and mailing list (database) functions thrown in.

To mastering, duplication and replication firms, the implications of these changes are profound. In manufacturing, continued erosion of boundaries between audio and computer products will affect which prerecorded and blank storage configurations are made, and for what application. The capabilities of production tools, meanwhile, will be defined largely by the speed, capacity and cost of available data

	CD-ROM	WO ablative disc	Rewrite MO disc	DAT cassette tape	1/2 inch open tape	1/2 inch cartridge tape	1/4 inch cartridge tape	Compact cassette tape	Magnetic rigid disk	Magnetic flexible disk	Optical card
Capacity	A	A	A	A	C	C	C	D	B	D	D
Density	A	A	A	A	C	B	C	D	B	C	A
Transfer speed	C	C	C	C	B	B	B	C	A	B	D
Random access	B	B	B	C	D	D	D	D	A	B	B
Rewritability	E	E	A	A	A	A	A	A	A	A	A
Exchangeability	A	A	A	A	A	A	A	A	E	A	A
Bit cost	B	B	B	A	B	B	B	B	C	D	C
Hardware cost	C	D	D	B	D	C	B	A	B	A	D
Storage space	B	B	B	A	D	C	B	B	D	C	C
Handling	B	C	C	A	D	A	A	B	D	D	D
Durability	A	A	A	B	B	B	B	C	B	C	A
Reliability	A	B	C	B	A	B	B	C	A	C	C
Compatibility	E	E	E	A	A	A	A	A	A	A	E

A = Superior, B = Good, C = Fair, D = Poor, E = Inferior

Fig. 1: Characteristics of Optical Media Compared with Other Media

World Radio History

processing and storage methods. Since audio will be just one of many fields for which these methods will be used, enhanced features may come at the expense of some loss of control over hardware design. To those in the field, getting an early idea of which technologies are likely to thrive in the new environment is crucial.

Does the success of CD-Audio mean that optical systems will go on to dominate information storage and distribution by the turn of the century? Or will cassettes, floppies, hard disks and DAT keep magnetic media on top until solid-state memory becomes sufficiently attractive in price? Each has its merits (see Fig. 1), but which characteristics will prove most important to the information markets of the future? As with all significant questions of this nature, the would-be prognosticator turns to MOMS, the Magnetic and Optical Media Symposium.

Co-sponsored by the International Tape/Disc Association and Knowledge Industry Publications, MOMS is devoted to the exchange of information—and speculation—on storage media. Papers are delivered by representatives of companies having a significant stake in one or more of the markets under discussion. The opinions expressed, therefore, may be colored by a bit of self-interest, but the participants are directly involved with the technology they describe. Day Two of the most recent symposium focused on optical media and the outlook for its continued development.

PASSIVE MEDIA

CD-Audio, by far the most established member of the optical family, was discussed primarily by Bob Wray, marketing VP at replicator Philips and Du Pont Optical (PDO). Wray projected a 30% growth in sales for the configuration in 1990 to over 300 million units, while warning that continued demands for reduced disc prices tax replicators' abilities to maintain both quality and profitability. To illustrate his point, Wray outlined the differences between current manufacturing processes and those in use when

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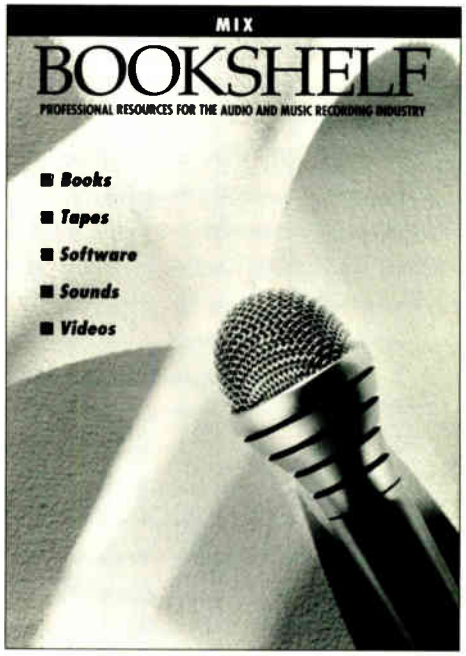

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the format was first introduced (see Fig. 2, page 177). In the early '80s, manufacturing was "designed as a high-precision, fairly slow system with discontinuous batch steps, and quality-control checks at almost every step." As replicators worked on increasing throughput, "process changes that increase capacity have often reduced in-line testing frequency." At PDO, where manufacturing time has been cut from 38 to 19 seconds, every offline CD goes through an individual QC protocol, but the number of in-line QC points is fewer than before. Wray believes that plants that use "monoline" techniques—continuous-flow, roboticized production lines—are unlikely to incorporate individual testing of every CD, and "may show lower end-quality."

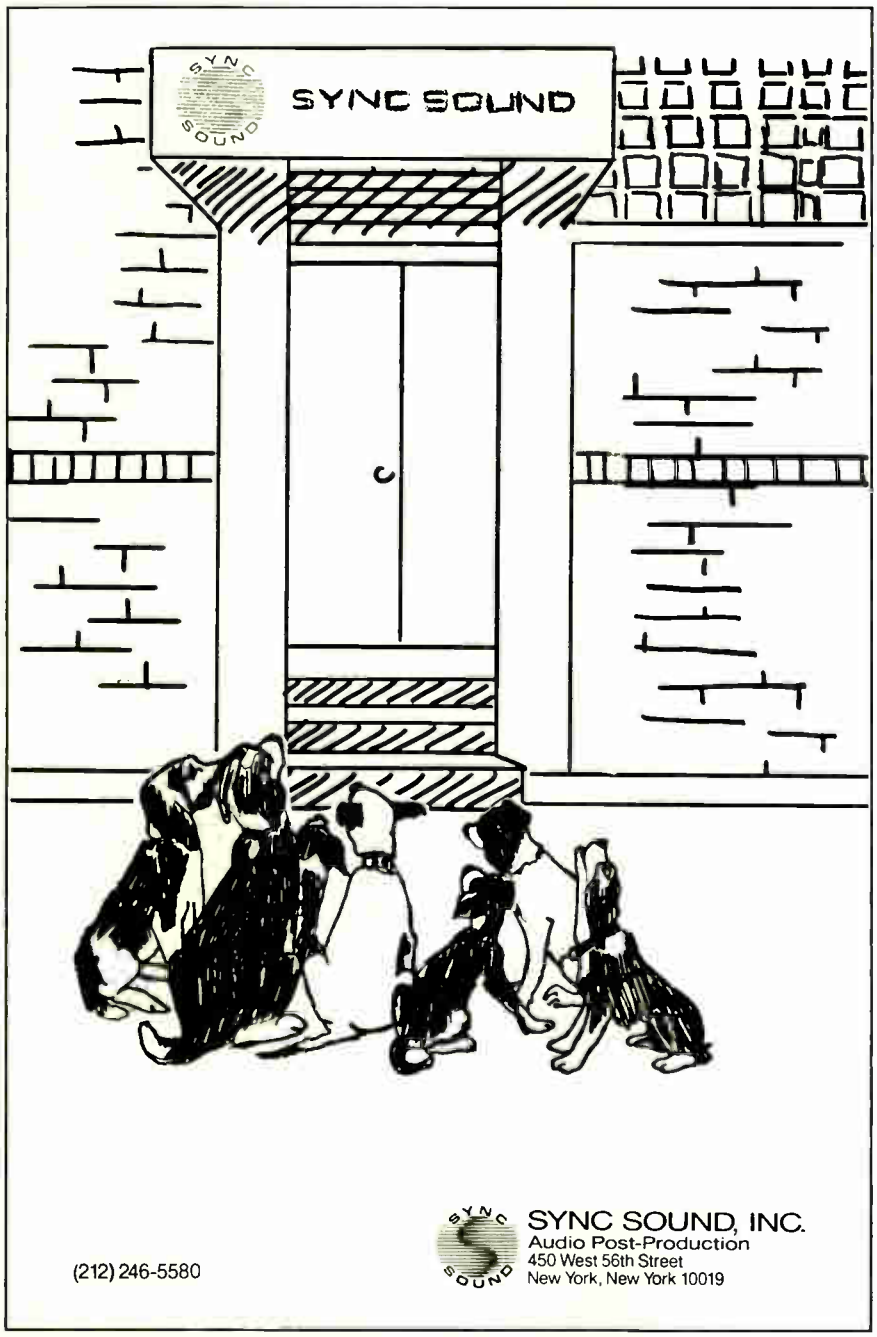
The issue of quality, obviously important for CD-Audio, is even more critical for CD-ROM. As Wray notes, "The absolute need for digitized data has little or no forgiveness after reading. A CD-ROM disc, therefore, will fail in-use where the same error count will play on most CD-Audio systems." Wray maintains that "partially discontinuous" production lines such as those used by PDO are best for CD-ROM. But with the market for CD-ROM remaining minuscule compared to its audio cousin, one might wonder how important the configuration is to any but a few specialized replicators.

John Stevens, a PDO product manager, addressed this question in his presentation on the future of optical technology in the information management marketplace. Stevens characterized the '80s as a decade of orderly progress, which set the stage for broad acceptance in the '90s. "The major players in the computer industry," he believes, "are committed to the future of optical technology."

Stevens' assessment is apparently shared by PDO co-parent Philips, which recently purchased Head-Start Technologies, a computer manufacturer. According to computer columnist Bob Schwabach, Head-Start is set to market an IBM-compatible for less than $2,000 that features both a conventional hard drive and a built-in optical drive for CD-ROM and CD-Audio. Schwabach notes that up to now sales of stand-alone optical drives—which have recently come down to the $700 range—have been too slow to generate much activity on the software side. Even so, Stevens reports more than 2,500 CD-ROM titles are currently available, and claims that the company's CD-ROM business is more than doubling annually. PDO forecasts a growth in drives from 120,000 units worldwide in 1990 to 400,000 in 1992, with media expanding from 360,000 to 1.2 million units over the same period.

The primary appeal expected to fuel this CD-ROM growth is the format's enormous data storage capacity. A 5.25-inch disc holds 680 megabytes, equivalent to 1,500 floppy disks or 250,000 pages of text. But CD-ROM—a sequential rather than random-access medium—is not without its drawbacks, even in settings where recordability is not required.

As outlined at MOMS by Larry Boden of Nimbus Information Systems, access to data stored on CD-ROM is much slower than with a



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magnetic hard drive. Three factors account for the difference: Seek Time (time to position the read laser over the general data area), Latency (time to spin the data under the read laser) and Transfer Rate (bytes per second passed from drive to computer).

To address CD-ROM's limitations in these areas, Nimbus is floating the idea of a "Quad-Density" CD-ROM standard involving changes in both pit geometry and drive hardware. Reductions in pit length and width would allow more spiral tracks with more pits per linear unit, boosting capacity to a massive 2.4 gigabytes. Transfer rate would be doubled by doubling the current Yellow Book standard platter speed (200 to 500 rpm). Boden believes CD-ROM could then store full-motion video "if proper image compression techniques are incorporated." To reduce pickup travel, and thus cut seek time, discs would be divided into multiple read sections, each with their own read laser. Boden hopes that a standard for a SCSI quad-density drive, one that is downwardly compatible with existing CD-ROM, can be agreed upon soon.

Bob Wray of PDO

Even if an improved system is developed, CD-ROM seems to be viewed mainly as a first step toward more versatile optical information products. In the words of PDO's Stevens, "Today's CD-ROM applications will probably be viewed as rather primitive by future standards." CD-Interactive and Digital Video Interactive are among the interactivity and multimedia approaches vying to establish themselves in training and educational markets. Computer-controlled videodisc drives, over 120,000 of which were estimated to be in use in 1989, are another variant serving these markets, and are showing up in "point-of-information" installations as well. Stevens predicts that "once a base has been established in professional markets, inevitable reductions in cost will enable full penetration of consumer markets by interactive systems."

OPTICAL RECORDING

In most of the major information storage applications, aside from audio and video entertainment programs, users generate data as they work or play. Lack of recordability has so far relegated optical systems like CD-ROM to supplementing rather than replacing magnetic hard drives. The ability of optical formats to challenge magnetic recording media depends on developing products that offer practical advantages to a wide range of users. Stevens, reflecting PDO's optical orientation, believes that both WORM (Write Once, Read Many) and rewritable discs, with their "tremendous data density, represent the foundation upon which the computer industry places its hope for optical in the 1990s."

Stevens concedes that the absence of a worldwide standard enabling interchangeability has slowed the acceptance of WORM. Some systems are built around 12-inch glass discs, while others are based on plastic CDs, including the Yamaha PDS system. At MOMS, Stevens noted that WORM systems are ideal for archiving large amounts of information, such as financial or medical records, "where permanence and an audit trail is desired," because "recorded data cannot be altered in any way without detection."

This point was echoed by Fuji Film's Minoru Ishikawa, who brought up the fact that "one need have no fear of erasing irreplaceable data by accident." Fuji is Yamaha's supplier of blank CDs for the PDS system, primarily designed to allow the creation of proof or ref-

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World Radio History

erence CDs before manufacturing. Fuji's figures show that 47% of Japanese owners of the system use it in CD-ROM applications, 21% for CD-I and 14% for CD-Audio. The remainder are used in research.

In applications where rewritability presents no great advantage, Ishikawa believes that WORM CDs can continue to compete even as erasable systems become more widely available. One reason is the stability of the media after recording, which Fuji claims may be up to 100 years under "office conditions," compared to 25 years for magneto-optical (MO) systems, the initial contender in the rewritable field. That's a great advantage for archival users. Additionally, the cost of both media and drives should be lower for WORM than MO. That's because the discs have a simpler structure, higher usable yields in manufacturing and require smaller, cooler write lasers. An "Orange Book" standard for WORM CDs, based on the CD-R developed by START LABS, a joint venture of Sony and Taiyo Yuden, is in the draft stage.

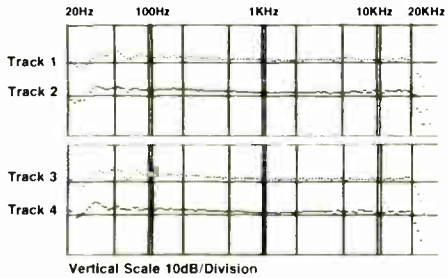
Whatever demand may develop for WORM, however, the potential market for a rewritable optical system is likely to be much greater. According to Kenjirou Watanabe of Sony's Opto-Electronics Research Department, a variety of technologies have been explored in this area. Phase change and dye polymer media have each shown promise, but are hampered by technical obstacles. In his MOMS presentation, he said that phase change may be looked at again in the future in the context of optical tape. And dye polymer may be of interest when multiple-wavelength diode lasers become available. For the time being, Sony is apparently convinced that the future of erasable optical discs lies with MO systems.

Magneto-Optical, as the name suggests, uses a combination of magnetic and optical processes to achieve rewritability. An MO disc contains a layer of vertically oriented magnetic particles between a pre-grooved substrate and a protective coating. The vertical orientation allows a much greater particle density than possible in longitudinally oriented media like magnetic tape. In recording, a highly focused laser, tracking the groove, heats a few particles above their Curie point, the temperature above which they become thermally excited. A mild magnetic field is then applied, sufficient to orient the excited particles, but not enough to affect their cooler neighbors. As the beam moves on along the track, the temperature of the just-oriented particles drops below their Curie point, and their new orientation is frozen in place. Differences in orientation are detectable by the way they reflect light, which allows the recorded disc to be read during playback. Because the process of orienting the particles involves no permanent transformation of disc materials, re-recording is a matter of reapplying the laser/magnetic field combination.

Watanabe's enthusiasm for MO is shared by Stevens at PDO, whose faith has been bolstered by the recent agreement of the ISO to a world standard on the 5.25-inch form factor for MO discs. PDO currently produces discs that may be

EXCEPTIONAL FREQUENCY RESPONSE

AT 1⅞ IPS (REAL TIME)



TEST METHOD A 40KHz to 20Hz sweep at -20dB from a Sound Technology 1510-A was recorded at 1⅞ ips in a KABA slave deck on TDK SA tape. The tape was played back at 1⅞ ips in the KABA master control deck and the output displayed on the Sound Technology. The curves represent the **SUM** of the record and playback response of the KABA system at 1⅞ ips.

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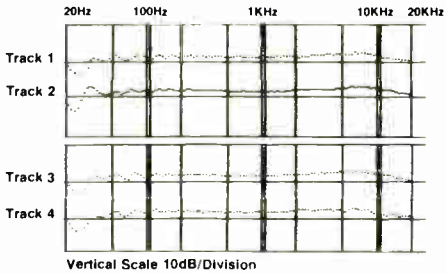
EXCEPTIONAL FREQUENCY RESPONSE

AT 3¾ IPS (DOUBLE TIME)

TEST METHOD Same as above except the sweep was recorded at 3¾ ips on the KABA slave deck and played back at 1⅞ ips on the master control deck. Highest frequency on playback was 20KHz so there is no response beyond 20KHz.



RTDS-4TM MASTER CONTROL DECK

RTDS-4TS DUAL TRANSPORT DECK

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CD MANUFACTURING STEPS	(Original Process) Approximate Time	% Cost	(Current/New) Approximate Time	% Cost
Pre-Manufacturing/Digital Tape Prep	(Not part of replication costs for this discussion)			
Pre-Manufacturing, Laser Master and Stamper Forming		5%		7%
Molding Disc (includes materials, labor)	20 sec	30%	6-12 sec 8 avg	15%
Metallizing	4 sec	5%	2 sec	3%
Lacquer Coat	4 sec	5%	2 sec	3%
Label Print (Note 1)	4-15 sec 4 avg	10%	3-10 sec 6 avg	3-10% 8 avg
Final QC (Note 2)	5 sec	2%	1 sec	1%
Pre-Packaging (Subtotal)	38 sec	57%	19 sec	37%
Packaging	(var)	43%	(var)	63%
Total		100%		100%

Note 1: Original 1-color labels are now typically 2 or more.
Note 2: Original 100% full-check is, in many processes, only periodic and partial quality check.

Fig. 2: Comparing present CD manufacturing times, costs and processes to those when the format was originally introduced. Costs are based on 100% of the price paid by the record label.

used interchangeably in Sony, Ricoh and Maxoptix drives, and carry a 25-year read/write warranty, which the company hopes will lay to rest any reservations about media reliability. Three-and-a-half-inch discs offering greater data density are already on the horizon.

At this point, MO looks like the best hope for a rewritable CD-Audio-compatible recording system, which should become available to consumers over the next two to four years. At the same time, if drive developers incorporate speed enhancements along the lines suggested by Boden of Nimbus, MO drives, with their removable discs and immense per-disc storage capacity, might emerge as viable competition to magnetic hard drives. That would certainly be welcome news to users of digital audio workstations, for whom loading projects on and off of comparatively limited-capacity magnetic drives can be a real production bottleneck.

Despite upbeat views at PDO and Sony about MO's potential, some at MOMS were skeptical that optical systems would develop into a major market force at any level other than as passive information distribution media. Laurence Lueck, head of Magnetic Media Information Services, foresees continued dominance by magnetic systems throughout the '90s. When such devices are eclipsed around the turn of the century, Lueck predicts it will be by solid-state rather than optical recording. But though solid-state has the advantage of not requiring any moving mechanisms, its cost per unit of storage capacity is extremely high. Bringing that down significantly would require major breakthroughs that aren't generally foreseen in the near future.

The uncertainty involved in waiting for breakthroughs points up the difficulty of predicting which media will thrive and which will fall by the wayside as the new millennium approaches. Hopefully, further progress will be made in the standardization of interfacing, enabling devices to communicate with greater ease regardless of what form of memory they use. If the past is any guide, a variety of storage media will proliferate and coexist for a long, long time before any trend toward one single system emerges.

That doesn't mean that all systems will flourish. Some, like Betamax video, fail to take root for reasons that may have little to do with their technical merits. Others, like the phonograph record, simply become obsolete. But new variations will spring up to replace those that pass away, and competing financial interests make it unlikely that everybody will just sit down and agree on one storage medium for all applications, even if that were a technically sensible thing to do. So the future promises to be just as disorderly—and interesting—as the past, and optical systems seem destined to play a prominent role in the information technology of the future. ■

Many thanks to the ITA and Knowledge Industry Publications for providing materials used in the preparation of this article.

World Radio History

by Philip De Lancie

TAPE & DISC NEWS

From the Winter Consumer Electronics Show comes word that the consumer DAT dam is about to break. Sony plans the U.S. introduction of home DAT recorders within the first half of this year, and Technics will offer a $1,200 to $1,300 model this summer. The units will include SCMS (Serial Copy Management System), the digital copy-inhibitor agreed upon by record industry and electronics firms last summer, which has been denounced hotly by publishing and songwriters' organizations. Those groups advocate imposition of levies on recorders and blank tapes to compensate for royalties allegedly lost through home taping.

The levy approach, which has a long history of failed attempts to win congressional approval, was assailed at CES in an overview speech by Leonard Feldman of Feldman Electronic Laboratories. Citing portions of the Office of Technology Assessment's home taping study, Feldman said that record industry claims of $1.5 billion in lost revenue "can now be put to rest once and for all, and talk of royalties can be permanently eliminated" from future hardware/software industry discussions. He predicted that if record companies make prerecorded DAT software widely available, sales of automotive DAT players, both factory-installed and after-market, "will begin in earnest, and profits for both segments of the industry will follow."

In another address to the convention, Electronics Industries Association vice president Frank Myers revealed record-setting consumer electronics sales in 1989. Estimated sales rose 6% over 1988 to a wholesale value of $32.2 billion. The audio segment, fueled by a 30% rise in CD player sales, accounted for $9.25 billion of the total, while blank media and accessories brought in $2.4 billion.

PHOTO: COURTESY EIA/CONSUMER ELECTRONICS GROUP

DAT was a hot topic at the Winter Consumer Electronics Show.

. . .

Nimbus Records has announced plans to boost CD production capacity at both U.S. and UK plants by 40% in 1990. The expansion, which the company hopes to have online by the end of summer, will bring UK capacity to over 30 million CDs a year. In the U.S., Nimbus' Charlottesville, Va., operation will be able to produce more than 20 million units annually. The move follows record CD activity for Nimbus in 1989, and reflects the company's expectation that demand will continue to grow.

. . .

International CD manufacturer Disctronics joined forces awhile back with Woodland Hills, California-based Design Science in the development of a line of PC-based optical disc analyzers. According to Design Science president Gordon Rudd, the systems are the only analyzers on the market designed to verify quality specifications for CD-Video, as well as CD-Audio, CD-ROM and LaserVision. The company has announced an agreement with Disctronics whereby Design Science will be responsible for all marketing, manufacture and customer service, while Disctronics will license its proprietary technology. At the low end of the product line, around $12,000, is a unit targeted for record companies, producers and studios who wish to independently test the quality of CDs. Systems designed for in-plant use by replicators are priced at up to $35,000.

. . .

The Society of Vacuum Coaters will hold its 33rd Annual Technical Conference April 29-May 4 in New Orleans. Of particular interest to replicators will be the May 2 series of technical sessions on CD media and technology, including presentations on equipment and methodology by representatives of Balzers, Leybold, Nestal and Automatic Inspection Devices. CDs will also be the focus of a one-day course on May 1 exploring the effect of vari-

—CONTINUED ON PAGE 194

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Like all Orban products, the 290RX is built to work the same hours that you do, and is backed by a company-wide commitment to customer service. We employ unique and proprietary designs to bring you products that are worth listening to. Contact your dealer and arrange to try out the 290RX on your problem audio situations. Or call us. We will be happy to provide you with the name of one of the top quality dealers carrying Orban products worldwide.

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1990 MIX DIRECTORY

VIDEO PRODUCTION *and* POST-PRODUCTION

Information in the following directory section is based on questionnaires mailed earlier this year and was supplied by those facilities listed. *Mix* claims no responsibility for the accuracy of this information. Personnel, equipment, locations and rates may change, so please verify critical information with the companies directly.

Completed last October, Rocky Mountain Recorders is the newest studio in Denver, and was designed by co-owners Gannon Kashiwa and Paul Vastola with consultant Alan Burnham. Shown here is Studio B, the smaller of two control rooms, both of which feature 36-input Trident 24 consoles. Other equipment includes an Otari MX-80 24-track, Zeta synchronizers, and 1", 3/4" and 1/2" video capability, making it well-suited to the facility's specialty, and scoring and video sweetening. Photo by Mark Dickey.

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Mix listings procedure: Every month, *Mix* mails questionnaires to recording studios and/or other vital facilities and services for the recording, sound and video production industries. There is a nominal charge to list a Boldface Listing (name, address, contact) and an Extended Listing (equipment, credits, specialization and photo or logo). If you would like to be listed in a *Mix* Directory, write or call the *Mix* Directories Department, 6400 Hollis Street #12 Emeryville, CA 94608; toll free 800-344-LIST!

Upcoming Directory Deadlines:
Recording Schools, Seminars & Programs: **April 17, 1990**
Pacific Rim Facilities: **April 17, 1990**
Studio Designers & Suppliers: **May 17, 1990**
Southern California & Southwest Studios: **June 15, 1990**

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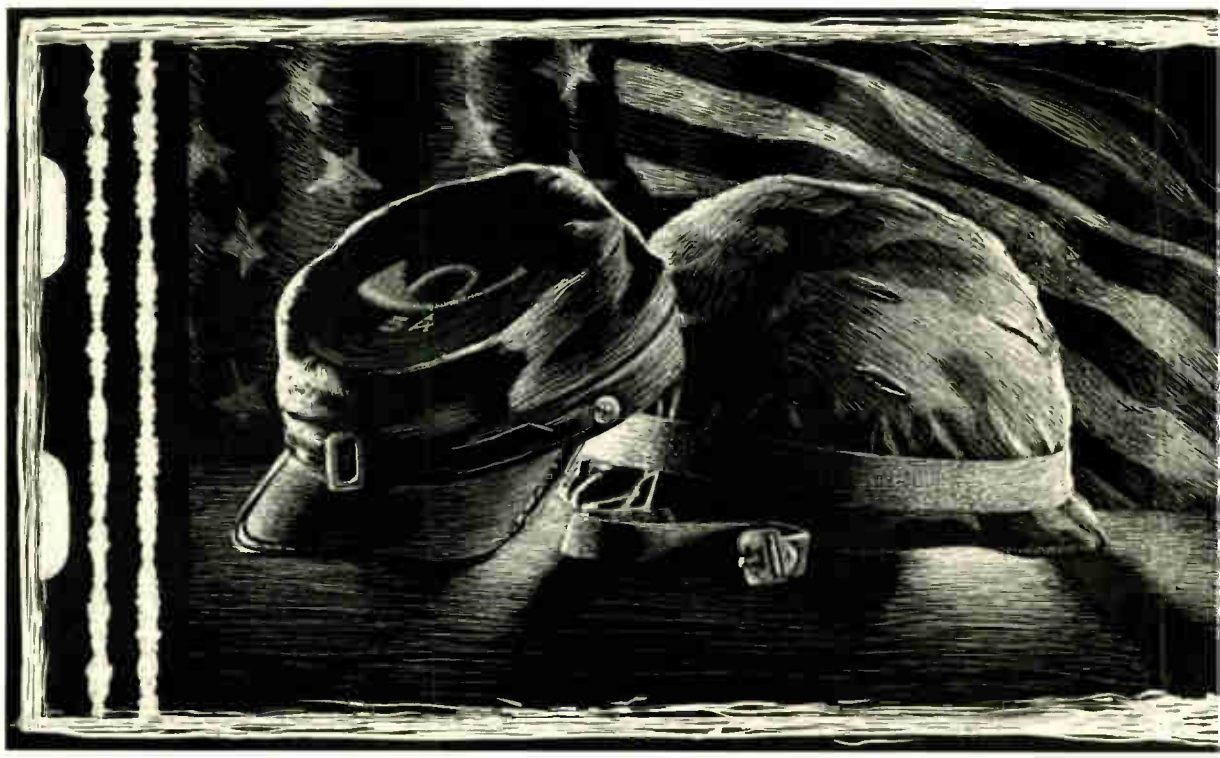
"WaveFrame At War"



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VIDEO PRODUCTION

F A C I L I T I E S

In the following listings each facility's particular capabilities are indicated after its name using the following initials: *VPF* (Video Production Facility); *OLVP* (On-Location Video Production); *VPP/E* (Video Post-Production/Editing); *APPV* (Audio Post-Production for Video).

NORTHEAST

Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Washington, D.C.

ACTION VIDEO PRODUCTIONS; *VPF, VPP/E, OLVP, APPV;* 2466 Lititz Pike; Lancaster, PA 17601; (717) 560-0605. Owner: Ian K. Harrower. Manager: Gordon J. Harrower.

ACTIVE INC.; *APPV;* 270 Lafayette St., Ste. 1203; New York, NY 10012; (212) 925-8150. Owner: Active Inc. Manager: Stephen Tjaden.

ALL AMERICAN COMPOSERS LIBRARY c/o D.S.M. PRODUCERS; *APPV;* 161 W. 54th St.; New York, NY 10019; (212) 245-0006; (212) 247-4707. Owner: Suzan Bader. Manager: Doris Kaufman, VP national sales.

ASCENSION VIDEO; *VPP/E, OLVP, APPV;* 48 A St.; Northumberland, PA 17857; (717) 473-9733. Owner: Ascension, Inc. Manager: Robert W. Spangler, Jr. **Video Tape Recorders:** Panasonic AG7400 S-VHS, JVC BR-S810U S-VHS, (2) JVC BR-S610U S-VHS. **Video Monitors:** Panasonic BT-M1310Y, (2) JVC TM-91SU. **Switchers/editors:** Paltex Abner A/B roll editor, Crosspoint Latch 6119YC switcher. **Video Cameras:** Panasonic 300-CLE. **Synchronizers:** (2) TimeLine Lynx. **Video Effects Devices:** Pinnacle Super V-1000. **Audio Recorders:** Otari MTR-90 24-track, Otari MX-8032-track, Sony PCM-2500. **Audio Mixers:** Auditronics "Memphis Machine" automated, Allen and Heath SR-16. **Other Major Equipment:** Fully equipped 24/32-track studio w/automation, spacious studio room, 32 tracks Dolby SR noise reduction.

AUDIO VISUAL ARTS, INC.; *VPP/E, OLVP, APPV;* 146 W. 57th St., Ste. 51F; New York, NY 10019; (212) 397-3733; FAX: (212) 397-1953. Owner: Jim Tripp. Manager: Jim Tripp.

AUDIO-IMAGES, INC.; *OLVP;* 200 James Pl.; Monroeville, PA 15146; (412) 863-8849. Owner: David J. Stana, president. Manager: Stephen G. Miller, general manager.

AUDIO-VISUAL RESEARCH (AVR); *APPV;* 78 5th Ave., 10th Fl.; New York, NY 10011; (212) 627-1144. Owner: Alexandros. Manager: Joe Berger.

AV3 INCORPORATED; *VPF, VPP/E, OLVP;* 53 McCullough Dr., Southgate Center; New Castle, DE 19720; (302) 324-5300. Owner: Joseph R. Tuckosh. Manager: Joseph R. Tuckosh. **Video Tape Recorders:** (3) Sony DVR-1000 (D1), Sony DVR-10 (D2), (6) Sony Betacam SP, (2) Sony 3100 1" Type C. **Switchers/editors:** (2) Grass Valley Kadenza switchers, Grass Valley 100 CV switchers, (2) Grass Valley 151 editor, Convergence 900+ editor. **Video Cameras:** Sony BVW-30, Sony BVW-70. **Video Effects Devices:** (2) Grass Valley Kaleidoscope, Wavefront 3-D animation, DFX/200 paint system, Cubicomp 3-D animation, Chyron Superscribe. **Soundstages:** 50 x 80 x 18 to grid, 3 wall hard CYC; 30 x 35 x 18 to grid, 3 wall hard CYC. **Rates:** Upon request.

BAY FARM SOUND STUDIO; *APPV;* PO Box 2821; Duxbury, MA 02364; (617) 585-9470. Owner: Paul Caruso. Manager: Paul Caruso.

BLANK PRODUCTION; *APPV;* 1597 Hope St.; Stamford, CT 06907; (800) 969-LOLA. Owner: Bob and Lola Blank. Manager: Bob Blank.

C&C VISUAL, LTD.; *VPP/E;* 1500 Broadway, Ste. 400; New York, NY 10036; (212) 869-4900. Owner: Christopher Cohen, Ernie Schultz. Manager: Ernie Schultz.

COMMUNICATIONS PLUS VIDEO; *VPF, VPP/E, OLVP, APPV;* 102 Madison Ave.; New York, NY 10016; (212) 686-9570. Manager: Bob Cherry, Geoffrey Fraize.

EDITEL NEW YORK; *VPP/E, APPV;* 222 E. 44th St.; New York, NY 10017; (212) 867-4600. Owner: Scanline Communications. Manager: Jill Debin Cohen. **Switchers/editors:** (5) online edit room, (2) offline edit room, multiformat edit suite, (2) digital edit suite w/Paint Box, Harry, Encore, (3) Telecine room w/(2) Sunburst, Dubner w/manual and electronic

EDITEL NEW YORK
New York, NY

pin registration and Ultimatte 5. **Video Cameras:** (2) Warren Smith animation stand w/Ikegami HL-79EA, full animatics capacity, ADO, Kaleidoscope, Mirage, Quantel 3-D animation suites (Alias and Wavefront). **Other Major Equipment:** Sound room equipped w/SSL 6000 console, Studer multitrack machines, Dolby stereo capacity, Sony multitrack digital audio, sprocketed film facility, 1", 3/4", VHS, Beta duplication.

THE EDITORIUM; *VPP/E, APPV;* 100 Ross St., 3rd Fl.; Pittsburgh, PA 15219; (412) 765-3500. Owner: C.C.A. Financial, Inc. Manager: Dan Ferraro.

GARRETT FILMS INTERNATIONAL; *OLVP, APPV;* Rd. #3 Plum Creek Rd.; Bernville, PA 19506; (215) 488-7552. Owner: R.E. Garrett. Manager: C. Garrett.

GROUP TWO PRODUCTIONS, INC.; *VPF, OLVP, APPV;* One East 24th St.; Baltimore, MD 21218; (301) 467-9000. Owner: Dan O'Toole. Manager: Maurine Martin.

HELIOTROPE STUDIOS LTD.; *VPF, VPP/E, OLVP;* 21 Erie St.; Cambridge, MA 02139; (617) 868-0171. Owner: Boyd Estus, James Griebsch.

IMAGE PRODUCTIONS; *VPF, VPP/E;* 50 Water St.; South Norwalk, CT 06854; (203) 853-3486. Manager: Kenneth Coffelt.

INFINITY FOUR VIDEO, INC.; *OLVP;* 846 Riverside Ave., Ste. 205; Lyndhurst, NJ 07071; (201) 507-1227. Owner: John T. Chow, Gregg Foster. Manager: Rick Lavon, Roy Isen.

LION AND FOX RECORDING, INC.; *APPV;* 1905 Fairview Ave. NE; Washington, DC 20002; (202) 832-7883. Owner: Hal Lion, Jim Fox, Sally Lion. Manager: Rick Starkweather.

MODERN TELECOMMUNICATIONS, INC.; One Dag Hammarskjold Plaza: 885 Second Ave.; New York, NY 10017; (212) 355-0510. Manager: Deirdre Gentry.

MICHAEL MOSER/MEDIA; *VPP/E, OLVP;* 2000 P St. NW, Ste. 301; Washington, DC 20036; (202) 293-1780; FAX: (202) 775-2443. Owner: Michael Moser. **Video Tape Recorders:** Ampex CVR-35 Betacam, Sony BVW-5 Betacam, (2) Sony 5800-5850 U-matic editing system, Sony BVU-110 U-matic, JVC CR5000U. **Video Monitors:** (3) Sony 5"/8"/8" high-pitch, Hitachi BW, Hitachi portable waveform (w/battery). **Switchers/editors:** RM-440 system (listed above). **Video Cameras:** Sony BVP-70, Ikegami HL-79EAL, JVC KY-2000. **Video Effects Devices:** Laird Telemedia character generator (in edit system). **Audio Recorders:** B&O cassette play/recorder (in edit system), TEAC 1/4" stereo reel-to-reel. **Audio Mixers:** Shure M267, TEAC mixer w/equalization (in edit system). **Other Major Equipment:** Full set of location lighting including Mole & Pepper Fresnels, lanero open-faced quartz, softlights, booms, flags and stands, lavaliers and shotgun mics by Tram, Sony, Electro-Voice and Sennheiser. **Rates:** Field production $800/day; offline editing $55/hr w/operator; $35 w/o operator.

MOYSE & ASSOCIATES, INC.; *VPF, VPP/E, OLVP, APPV;* PO Box 831, 724B3 Watervliet-Shaker Rd.; Latham, NY 12110; (518) 783-6221. Owner: Claude Moyse, Peter Quackenbush. Manager: Claude Moyse, Peter Quackenbush.

MUSIVISION, INC.; 185 E. 85th St.; New York, NY 10028; (212) 860-4420. Owner: Fred Kessler.

NATIONAL VIDEO CENTER/RECORDING STUDIOS, INC.
New York, NY

NATIONAL VIDEO CENTER/RECORDING STUDIOS, INC.; *VPF, VPP/E, OLVP, APPV;* 460 W. 42nd St.; New York, NY 10036; (212) 279-2000. Manager: Andrew Lustig. **Video Tape Recorders:** Over 50, including Ampex VPR-3 and VPR-6 1", Ampex VPR-300 D-2, Ampex CVR-75, Sony BVW-40 1/2", Sony Betacam SP and BVU-SP, Sony BVU-850 and BVU-820 3/4", Sony BVU-800 3/4". **Switchers/editors:** (10) Grass Valley 300, Grass Valley 1600, Grass Valley 200, (7) Paltex Esprit Plus controller, CMX 3400A controllers. **Synchronizers:** (3) Adams-Smith video/audio SMPTE interlock. **Video Effects Devices:** Alias 3-D computer graphics, Digital F/X Composium, Quantel Mirage, (3) Quantel Paint Box, Abekas A-60 and A-62 digital disk recorder, Grass Valley Kaleidoscope digital effects, Ampex ADCs, Ampex Concentrator w/Infinity, Ampex ESS-3 still store, Chyron 4100 EXB, (4) Aston character generator, RIG computer-controlled video animation stand w/color camera, Ampex Zeus TBC/framestore. **Audio Recorders:** (10) Otari and Studer 24/16/8/4/2-track recorders, broadcast audio cart machines. **Audio Mixers:** SSL 6000 56-channel Total Recall, MCI stereo audio console. **Soundstages:** TV-1 60 x 80 x 21, TV-2 40 x 50 x 21, TV-3 17 x 28 x 10. **Other Major Equipment:** (2) SMPTE interlock audio-for-video studio, Dolby noise reduction, Lexicon 2400 time compression/expansion, 3M videodisc cue inserter, color tilting cameras, Sony BVX-30 video image enhancement/noise reduction; Bosch FDL 60B for negative and positive transfers w/Super Sync center-track time code for scene-to-scene color correction. Custom sound effects and music, newly recorded stereo digital sound effects, synthesizers w/digital sampling, Sony PCM-1630 digital audio processor, Adams-Smith 2600 A/V synchronizer. **Specialization & Credits:** National's music studio, "The Edison," (60 x 60 x 24) with SSL 6000E 56-channel Total Recall console, 48-track recording with Dolby SR, video/audio interlock, all outboard equipment, microphones, etc. This studio is ideal for acoustic recording. Also, two interlock video sweetening rooms, five voice studios, time compression, reel-to-reel and cassette duplication, transfers, scoring and soundtrack design. Video: three shooting stages, seven online computer editing suites, two offline/interformat suites, remote production, computer graphics, animation stands, duplication—all formats, satellite transmission/reception. The National Group of Companies includes: Telezign Computer Animation/Design—Alias 3-D graphics and special effects; FourScore Productions—original music and digital SFX scoring; Napoleon Videographics—test and on-air spots; Delmonte Casting & Productions; West End Editorial; Ed Rasp Associates—healthcare productions; and National Corporate Communications.

World Radio History

COMING SEPTEMBER 1

1990-91

MIX MASTER DIRECTORY

OF THE

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Master The Business

The largest, most comprehensive directory of the pro audio industry ever published is coming from *Mix* this fall. The 1990-91 Mix Master Directory will include completely NEW and updated information on thousands of companies.

♦**Detailed Listings for North American Audio Production Facilities and Services.** Includes: recording studios; video production and post-production houses; facility designers and suppliers; mastering, pressing and duplication facilities; location recording services; sound reinforcement companies; lighting, staging and audio/video equipment rental firms; recording schools and programs; independent producers, engineers and technicians.

♦**Easy-To-Use Services Key to Nearly Two-Dozen Business Categories.** A handy system of codes will show the range of services offered by all companies and individuals listed in the Master Directory—a feature never before offered by a single-source pro audio industry directory.

♦**Comprehensive Directory of Manufacturers with Product Cross-Reference.** The 1990-91 Mix Master Directory will include detailed listings of audio/video and musical manufacturers, cross-referenced to a directory of more than 50 product categories.

♦**The Industry's First Professional Services Directory.** A brand new section including hundreds of listings for legal and financial services, business consultants, ad agencies, public relations firms and others offering specialized services to the pro audio and music industries. PLUS—Directory of industry and industry-related trade organizations and complete 1991 Events Calendar!

♦**Don't Miss Your Free Listing in the 1990-91 Mix Master Directory!** To ensure the most comprehensive pro audio directory, all listings in the Master Directory are absolutely FREE! If you have not received a questionnaire for your free listing, call the *Mix* Directories toll-free at (800) 344-LIST, or (415) 653-3307 today. Deadline for returning listing questionnaires is April 20, 1990.

♦**Reach the Professionals With a Display Ad in the Master Directory.** Over 30,000 copies of the 1990-91 Master Directory will be distributed FREE to production professionals throughout the U.S., Canada and Mexico. Your display ad is the most effective way to reach these proven buyers of equipment, supplies and services. And display advertisers will receive a specially highlighted listing as well. To be released at the fall AES Convention, the Master Directory is a must-buy for audio marketers. Call (415) 653-3307 today for display advertising rates and information.

Questionnaire Deadline: April 20, 1990
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World Radio History

NORTHEAST

VIDEO PRODUCTION FACILITIES

In the following listings each facility's particular capabilities are indicated after its name using the following initials: *VPF* (Video Production Facility); *OLVP* (On-Location Video Production); *VPP/E* (Video Post-Production/Editing); *APPV* (Audio Post-Production for Video).

NOT JUST JINGLES/PARADISE STUDIOS; *APPV;* 420 W. 45th St., 5th Fl.; New York, NY 10036; (212) 246-6468. **Owner:** Scott Schreer. **Manager:** Bill McSorley

PHOTOMAGNETIC SOUND STUDIOS; *APPV;* 222 E. 44th St.; New York, NY 10017; (212) 687-9030. **Manager:** Beverly Dichter.

POST PERFECT/THE DAILY NEWS BUILDING; *VPP/E;* 220 E 42nd St., 2nd Fl. South; New York, NY 10017; (212) 972-3400. **Owner:** Carlton Communications. **Manager:** Keith Gordon, dir. of operations. **Video Tape Recorders:** (20) NTSC 1" w/Dolby, (20) 3/4", (4) Pal 1", (5) D-2, Pal 3/4", (10) 3/4" SP, (4) Betacam, D-1. **Switchers/editors:** (3) online edit suite w/ Grass Valley 300 switcher, Abekas A-62, CMX 3600 edit system, Chyron Superscribe or 4100, 3/4" offline edit suite w/(5) BVU VCR, interformat edit suite w/GVG 200 switcher and system 41 editor, Pal 1" edit suite. **Video Cameras:** Ikegami HL-79 motion control, (12) Ikegami ITC-550 B&W high-resolution title. **Synchronizers:** (4) Tektronix 110S frame synchronizer. **Video Effects Devices:** Grass Valley Kaleidoscope w/Kurl 4 channels. **Audio Recorders:** (4) Studer ATR 1/4", Otari 24-track, Nagra T, (5) Nakamichi cassette. **Audio Mixers:** (3) Neve custom 16 x 4, (4) Neve custom 8 x 2, GVG AMX 170S. **Other Major Equipment:** Digital production suite w/Quantel Paint Box/Harry/Kaleidoscope, paintbox suite w/Quantel Paint Box, (3) Wavefront 3-D graphic system, (2) color correction suite w/DaVinci color corrector and Rank Cintel Telecine, IMC motion-control animation stand. **Rates:** Call for rates.

POWERHOUSE STUDIOS, INC.; *VPF, APPV;* 1155 21st St. NW; Washington, DC 20036; (202) 331-9600. **Owner:** Joe Fries. **Manager:** Joe Fries.

PRODUCTION MASTERS, INC. (PMI); *VPF, VPP/E, OLVP, APPV;* 321 First Ave.; Pittsburgh, PA 15222; (412) 281-8500. **Owner:** David Case. **Manager:** David Case.

RBY RECORDING AND VIDEO; *VPF, VPP/E, OLVP, APPV;* 920 North Main St.; Southbury, CT 06488; (203) 264-3666. **Owner:** Jack Jones. **Manager:** Evan Jones.

RESCO; 99 Draper Ave.; Meriden, CT 06450; (203) 238-9633.

RESOLUTION VIDEO AUDIO & FILM PRODUCTION; *VPF, VPP/E, OLVP, APPV.* 19 Gregory Dr.; S. Burlington, VT 05403; (802) 862-8881; FAX: (802) 865-2308. **Manager:** Susan Henry, Richard Eyre.

HOWARD SCHWARTZ RECORDING, INC.; *APPV;* 420 Lexington Ave. #1934; New York, NY 10170; (212) 687-4180. **Owner:** Howard Schwartz. **Manager:** Beth Levy. **Video Tape Recorders:** (6) Sony VP-2000 and VP-3000 1", (12) Sony JVC 3/4", (6) JVC Super VHS. **Video Monitors:** (6) Sony 25", (6) Videotek 21". **Synchronizers:** (4) Adams-Smith AV-2600, (3) ECCO MQS-103. **Audio Recorders:** (2) Sony 3348 multitrack digital, (5) Sony 3324 multitrack digital, (7) Studer/Otari 824 MTR-90 24-track, (4) Sony/Panasonic DAT. **Audio Mixers:** (2) SSL 6000G, (6) Sony MXP-3000 automated. **Other Major Equipment:** Center-channel T/C, Magna-Tech dubbers and PU recorders 6-track Dolby, Dolby SR, satellite digital uplink/downlink stereo, SFX libraries and Foley room, (12) stock music libraries, Sound Design.

SERVISOUND, INC.; *APPV;* 35 W. 45th St.; New York, NY 10036; (212) 921-0555; FAX: (212) 869-4296. **Owner:** Michael J. Shapiro, Diane Ehrlichman, Christopher M. Nelson. **Manager:** Lisa Wytrval.

SKEHAN TELEVIDEO SERVICE, INC.; *OLVP;* 316 F St. NE; Washington, DC 20002; (202) 543-2323; (800) 426-9083. **Owner:** Mike Skehan. **Manager:** Brian Redfield. **Specialization & Credits:** STS specializes in Electronic Field Production. We can provide crews and equipment for single- or multi-camera location or studio shoots. Our equipment complement consists of Ikegami HL-55 and HL-79EAL cameras, Sony Betacam-SP, U-matic SP, D-2 and portable 1-inch VTRs. We utilize Grass Valley switchers configured as roll-in or mobile control room packages. These are available with Pinnacle digital effects and a Chyron RGU-2 CG. Our crews have worked all kinds of events, including sports, industrial shows, news events, religious conferences, political events, TV movies and much more. STS also does mobile Ku-Band uplinking with our 23' Ku truck. We can provide anything from audio-only to full two-way video and audio teleconferencing. STS also has the area's most diverse EFP rental department.

SMA VIDEO, INC.; *OLVP;* 84 Wooster St.; New York, NY 10012; (212) 226-7474. **Owner:** Michael Morrissey, David Satin. **Manager:** Syndia Lieljuris.

SOUND CONCEPTS; *VPF, VPP/E, OLVP, APPV;* 80 Great Hill Rd.; Seymour, CT 06483; (203) 888-6712. **Owner:** James E. Lush, president. **Manager:** Paul J. Gregory, VP/production services.

SOUND LAB STUDIOS LTD.; *APPV;* 4760 Bedford Ave.; Brooklyn, NY 11235; (718) 934-8585. **Owner:** Peter C. Diorio. **Manager:** Mike Potash.

SOUND ON SOUND RECORDING, INC.; *APPV;* 322 W. 45th St.; New York, NY 10036; (212) 439-4997. **Owner:** David Amlen, Seymour Amlen. **Manager:** Zack Davis.

SOUNDWAVE INC.; *APPV,* 2000 P St. NW; Washington, DC 20036; (202) 861-0560. **Owner:** Jim Harmon. **Manager:** Sabina Emerson.

SYNC SOUND, INC.; *APPV;* 450 W. 56th St.; New York, NY 10019; (212) 246-5580. **Owner:** Bill Marino, Ken Hahn. **Manager:** Sherri Tantleff. **Video Tape Recorders:** Sony BVH-2000 1" w/Dolby, Sony BVH-2830, Sony D-2, Sony BVU-850SP, VHS Hi-fi, Betacam SP. **Video Monitors:** (2) Panasonic 100" video projection system, Sony. **Switchers/editors:** (3) AMS AudioFiles w/4-hour memory. **Synchronizers:** Proprietary edit system allowing lockup, edit rehearsal and editing to subframe accuracy of all audio, video and digital machines, CMX-compatible auto conform. **Audio Recorders:** Sony PCM-3324 24-track digital, Sony PCM-1630 2-track digital, F1 and R-DAT digital, Otari MTR-90 w/24/16/8-track heads, Otari MTR-20 4-track, center-track TC, stereo and mono Nagras, MTM 16/35mm magnetic film recorder, cart machines, Nakamichi audio cassettes. **Audio Mixers:** SSL 6000 G Series automated w/stereo modules, SSL 4000 E Series automated. **Other Major Equipment:** Lexicon 224X w/LARC, Dolby SP 24, Dolby CAT 43, Dolby SR, Dolby Surround mixing, Neve stereo limiter, dbx subharmonizer synthesizer, Tube-Tech PE-1B, Sontec EQ, AMS 15-80, Yamaha DX7, Roland EQ. **Rates:** Call for information. **Specialization & Credits:** Sync Sound is a full-service audio post-production house, ready to meet your audio needs with experience and enthusiasm. Our facilities are specifically designed to accommodate editing and mixing to picture (digital or analog), dialog replacement, Foley, overdubs to picture, sound effects design, audience sweetening and Dolby Surround mixing. Sync Sound also provides technical consultation, Nagra and Mag dubs, an extensive SFX library and videotape laybacks.

SYNERGETIC; *VPF, VPP/E, OLVP, APPV;* 6518 Basile Rowe; East Syracuse, NY 13057; (315) 437-7533; FAX: (315) 437-0324. **Owner:** Ronald A. Friedman. **Video Tape Recorders:** Sony DVR-10 D-2, (2) Sony BVH-2000 1", Sony BVH-1100A 1", Sony BVW-75 Beta SP, Sony BVW-35 Beta SP, JVC CR-850U 3/4", Sony VO-5600 3/4", (2) JVC BR-8600U VHS, (2) JVC BR-7700U VHS, Panasonic AG-6300 VHS. **Video Monitors:** Ikegami, Sony, Tektronix. **Switchers/editors:** Grass Valley GVG-200 switcher w/E-Mem, Sony BVE-900 edit controller. **Video Cameras:** Ikegami HL-79EAL, Sony M-7, Ikegami HL-735. **Synchronizers:** Digital Video Systems DPS-165A. **Video Effects Devices:** NEC System 10 3-D digital effects, Videotek VDP-8000. **Audio Recorders:** Technics 1500. **Audio Mixers:** Yamaha 1204. **Soundstages:** 3000 sq.ft. w/ curved corner cyclorama. **Other Major Equipment:** Quantafont QCG-500 character generator, Barber Baby Boom, Colortran crab dolly, Genigraphics and Amiga 3-D animation systems, extensive grip and lighting package. **Rates:** Upon request.

TANGENT PRODUCTIONS; *APPV;* 7020 Saybrook Ave.; Philadelphia, PA 19142; (215) 724-9671. **Owner:** Alexandra Scott, Jeffrey Coulter. **Manager:** Alexandra Scott.

TEL-E-VUE PRODUCTIONS; *VPF, VPP/E, OLVP, APPV;* Box 217; Ferndale, NY 12734; (914) 292-5965. **Owner:** Paul Gerry. **Manager:** Patricia Gerry.

TOWNHOUSE POST-PRODUCTION; *VPF, VPP/E;* 1449 N St. NW; Washington, DC 20005; (202) 462-EDIT. **Owner:** John J. Prescott, president. **Manager:** Judy A.K. Peizer. **Video Tape Recorders:** Sony BVH-1100, (3) Sony BVH-2000, Sony BVW-65SP, Sony BVW-75SP, Sony BVU-900, Sony BVU-950SP. **Switchers/editors:** Grass Valley GVG-200, Grass Valley GVG-100, Sony BVE-900, Grass Valley GVG-141. **Video Cameras:** Sony DXC-3000. **Video Effects Devices:** Ampex ADO-1000. **Audio Recorders:** Otari MX-5050 2-track, Otari MX-50504-track. **Audio Mixers:** Grass Valley GVG-AMX170S. **Other Major Equipment:** Chyron Super Scribe, QuantaFont Q8, Ultimatte NewsMatte II, Tascam CD-501 compact disc player. **Rates:** Online—$195 and up. Offline—$50 and up.

VIDEO ONE, INC.; *VPF, VPP/E, OLVP, APPV;* 100 Massachusetts Ave.; Boston, MA 02115; (617) 266-8200. **Owner:** Yale Marc, Jim Herzig. **Manager:** Chris Cavalier.

VIDEOMIX; *APPV;* 123 W. 18th St., 7th Fl.; New York, NY 10011; (212) 627-7700. **Owner:** Steve Dwork, Dick Maitland. **Manager:** Steve Dwork.

VISUAL MUSIC PRODUCTION SERVICES; *APPV;* 235 E. 13th St. #3-D; New York, NY 10003; (212) 505-9281. **Owner:** Visual Music. **Manager:** Brigita.

WAVE INC.; *VPF, VPP/E, OLVP, APPV;* 72 Cambridge St.; Worcester, MA 01603; (508) 795-7100. **Owner:** Dennis T. Allen, Walter M. Henritze, Charles H. Glatkin. **Manager:** John W. Sherrer.

SOUTHEAST

Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia

ALLEN-MARTIN PRODUCTIONS, INC.; *VPF, VPP/E, OLVP, APPV;* 9701 Taylorsville Rd.; Louisville, KY 40299; (502) 267-9658. **Owner:** Ray Allen, Hardy Martin. **Manager:** Bill Porter.

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ALPHA AUDIO MUSIC AND RECORDING SERVICES
Richmond, VA

ALPHA AUDIO MUSIC AND RECORDING SERVICES; *APPV;* 2049 W. Broad St.; Richmond, VA 23220; (804) 358-3852; FAX: (804) 358-9496. **Owner:** Alpha Recording Corporation. **Manager:** Gay Chafin. **Video Tape Recorders:** Ampex VPR-80, (2) JVC 8250, JVC CR-850. **Video Monitors:** (2) Sony, NEC, (3) Zenith. **Switchers/editors:** (2) Alpha Automation The Boss/2. **Synchronizers:** (2) Adams-Smith 2600 Series, TimeLine Lynx, Cipher Digital Phantom. **Audio Recorders:** (3) New England Digital PostPro, Studer A800, Otari MTR-90, (2) Alpha Automation DR-2. **Audio Mixers:** DDA 56-input, Sphere 40-input. **Other Major Equipment:** Standard complement of digital effects, compressors, filters, equalizers and noise gates. **Specialization & Credits:** To offer the film, video and radio production community cutting-edge, creative music composition, state-of-the-art audio production facilities and new inventions to improve audio post-production capabilities and practices. We feature a staff of award-winning writers and arrangers as well as freelance support to cover a wide range of requests from our various clients. This year we have produced the music for USAir's merger television and radio, Wrangler Jeans, Welches Fruit Bars, Wendy's, USA Today, Jefferson Pilot Financial and others. We wrote and produced the theme song for a 20th Century Fox film, *Gleaming the Cube,* and scored the PBS special "Anarctica & Mars" with guest star Carl Sagan. We are also the inventors of THE BOSS automated audio editor and DR2 digital disk-based recorder. Our automation division has installed THE BOSS in over 50 facilities worldwide including Lorimar Teleproductions, Walt Disney studios and LucusFilm.

ARDENT TELEPRODUCTIONS, INC.; *VPF, VPP/E, OLVP, APPV;* 2000 Madison Ave.; Memphis, TN 38104; (901) 725-0855. **Owner:** John Fry, Robert Williams. **Manager:** Joe R. Dyer, VP. **Video Tape Recorders:** (3) Hitachi HR200B 1", (3) Sony DVT-10 D2, Ampex CVR-75 Beta SP, Sony BVV-5 Beta SP. **Switchers/editors:** Grass Valley Group 200-2 production switcher, CMX 3600 edit controller. **Video Cameras:** (2) Hitachi SK-91, Ikegami EC-35, Sony BVP-50, Arriflex SRIIE. **Synchronizers:** Adams-Smith Zeta-3, TimeLine Lynx. **Video Effects Devices:** NEC System 10 3-axis DVE. **Audio Recorders:** Mitsubishi X-850 digital, (2) Mitsubishi X-800 digital, (3) Mitsubishi X-80 digital, Mitsubishi X-86 digital, (2) MCI JH-24 analog, (3) MCI JH-110 analog. **Audio Mixers:** Mitsubishi Westar 44 x 24, Solid State Logic 6040E 40 x 32, Neve V 40 x48. **Other Major Equipment:** Vertigo 3-D animation and Paint system, Fairlight Series III computer music instrument, Studer Dyaxis audio workstation.

ATLANTA VIDEO PRODUCTION CENTER, INC.; *VPF, VPP/E, OLVP;* 1570 Northside Dr. NW, Ste. 240; Atlanta, GA 30318; (404) 355-3398. **Owner:** Joe Gora. **Manager:** Lloyd Horton.

BROADCAST QUALITY, INC.; *VPF, VPP/E, OLVP;* The Bakery Centre; 5701 Sunset Dr. #316; S. Miami, FL 33143; (305) 665-5416. **Manager:** Diana Udel, president. **Video Tape Recorders:** (9) Sony VO-5850, (4) Sony VO-9600, (45)

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World Radio History

SOUTHEAST

VIDEO PRODUCTION FACILITIES

In the following listings each facility's particular capabilities are indicated after its name using the following initials: *VPF* (Video Production Facility); *OLVP* (On-Location Video Production); *VPP/E* (Video Post-Production/Editing); *APPV* (Audio Post-Production for Video).

Panasonic 1950, (2) Sony BVH-3100. **Video Monitors:** Sony BVM-1310 broadcast, (2) Sony PVM-2030, (8) Sony PVM-8220 broadcast. **Switchers/editors:** Grass Valley 100, (2) JVC KM-2000. **Video Cameras:** (2) Sony DXC-M-7, Sharp XCA-1. **Synchronizers:** JVC KM-F250 frame storer, (2) Alta Cygnus. **Video Effects Devices:** Ampex ADO-100. **Audio Recorders:** Technics 1500 2-track, Sony TC-FX110 cassette, TEAC C-2. **Audio Mixers:** Sony MPX-29, Shure M267. **Soundstages:** 20' x 24'. **Other Major Equipment:** Dubner 10K Series w/ presentation graphics.

CENTURY III AT UNIVERSAL STUDIOS; *VPP/E, APPV;* 2000 Universal Studios Plaza; Orlando, FL 32819-7606; (407) 297-1000. **Owner:** Ross M. Cibella. **Manager:** Pam Lapp, sales mgr.

CRAWFORD POST PRODUCTION; *VPP/E, APPV;* 535 Plasamour Dr. NE; Atlanta, GA 30324; (404) 876-7149. **Owner:** Jesse Crawford. **Manager:** scheduling department.

DIGITAL MULTI-MEDIA POST, INC.; *VPF, VPP/E, OLVP, APPV;* 502 N. Hudson St.; Orlando, FL 32811; (407) 293-3390; **FAX:** (407) 293-4265. **Owner:** Robert Storen. **Manager:** Marie Hamlin.

DOPPLER STUDIOS; *APPV;* 1922 Piedmont Cir.; Atlanta, GA 30324; (404) 873-6941. **Owner:** Pete Caldwell. **Manager:** Bill Quinn.

ESSEX CORP.; *VPP/E;* 8300 Boone Blvd., Ste. 440; Vienna, VA 22182-2626; (703) 556-0006. **Manager:** Martin Every. **Specialization & Credits:** Essex's post-production facility is designed for producing cost-effective video products of the highest quality in both the videotape and interactive videodisc format. We have the versatility to handle a wide range of post-production requirements from graphics and titling to full productions with special effects and music. Our equipment includes: 1" Sony BVH-2500 VTR, Betacam, 3/4" SP and VHS edit and source decks, Calaway DEC+ editor, Grass Valley 100 SEG switcher, Abekas A53D digital effects, Quanta 2500 Paint Box graphics, Quanta font character generation, Sony 8-channel audio mixer, Otari 4-channel audio recorder as well as time base correction and still-frame video storage capability. Full field production capability. We have produced numerous linear and interactive video products for the U.S. Army, Navy, DOE, NASA and commercial clients. Located minutes from Washington, DC.

CHARLES HIX STUDIOS; *VPF, VPP/E, OLVP, APPV;* 2901 Hwy. 70 West; Hickory, NC 28602; (704) 328-2487. **Owner:** Charles Hicks. **Manager:** Gordon Hicks.

HOLBROOK MEDIA PRODUCTIONS; *VPF, VPP/E, OLVP, APPV;* 201 N. Mannering Ave. (mailing only); Lafayette, LA 70508; (318) 276-6267; (318) 232-7351. **Owner:** Bob Holbrook. **Manager:** Bob Holbrook.

KNOWLES VIDEO, INC.; *VPF, VPP/E, OLVP;* 2003 Apalachee Pkwy., Ste. 206B; Tallahassee, FL 32301; (904) 878-2298. **Owner:** Karl Knowles. **Manager:** Guy Kathe.

MEDIA PRODUCTIONS INC.; *VPF, VPP/E, OLVP;* 2095 N. Andrews Ave. Ext.; Pompano Beach, FL 33069; (305) 979-6467. **Manager:** James C. Haney. **Video Tape Recorders:** (6) Sony 1", (3) Sony HDTV, (4) Sony 3/4", (2) Sony Betacam. **Video Monitors:** (2) Ikegami 20" color, (4) JVC 14" color. **Switchers/editors:** Paltex Esprit, Grass Valley 300, Sony HDS1000T HDTV1. **Video Cameras:** (4) Ikegami L79EAL, Ikegami HL1125 high-definition. **Video Effects Devices:** NEC System 10. **Audio Recorders:** (2) Otari 2-track, Otari 8-track. **Audio Mixers:** Soundcraft Series 600, Yamaha PM Series. **Soundstages:** 62 x 64 x 20. **Other Major Equipment:** Rank Cintel MkIII HD high-definition Telecine.

MORRISOUND RECORDING, INC.; *APPV;* 12111 N. 56th St.; Tampa, FL 33617; (813) 989-2108. **Owner:** Morrisound Recording, Inc. **Manager:** Tom Morris.

MUSIFEX, INC.; *VPP/E, OLVP, APPV;* 2701-C Wilson Blvd.; Arlington, VA 22201; (703) 525-6476. **Owner:** Frank Maniglia, Jr., president. **Manager:** Guinevere (Gwen) Meyer.

MUVIES; *VPF;* 1918 Harrison St., Ste. 108; Hollywood, FL 33020-5018; (305) 925-6805. **Owner:** Cinema Ex Machina Production Systems, Inc. **Manager:** Turk Harley.

NASHVILLE TELEPRODUCTIONS INC.; *VPF, VPP/E, OLVP, APPV;* 105 Oak Valley Dr.; Nashville, TN 37207; (615) 262-2600. **Owner:** Kevin T. McManus, Chris White. **Manager:** Kevin McManus.

NATIONAL TELEPRODUCTIONS INC.; *VPF, OLVP;* 5022 50th Way; W. Palm Beach, FL 33409; (407) 689-9271. **Owner:** R.M. Peterson. **Manager:** Mary F. Eddy.

NEW RIVER STUDIOS, INC.; *APPV;* 408 S. Andrews Ave.; Fort Lauderdale, FL 33301; (305) 524-4000. **Owner:** New River Productions, Inc. **Manager:** Virginia Cayia.

O'CONNELL PRODUCTIONS, INC.; *APPV;* 3954 Peachtree Rd.; Atlanta, GA 30319; (404) 266-0020. **Owner:** Kevin O'Connell, pres. **Manager:** Neal Franks.

PLATINUM POST; *VPF, VPP/E, OLVP, APPV;* 3300 University Blvd.; Winter Park, FL 32792; (407) 671-1111. **Manager:** Donna Walker, sales director. **Video Tape Recorders:** (3) Ampex VPR-6 1", Ampex CVR-75 Betacam SP, Sony VO-9800 3/4" U-matic SP. **Video Monitors:** Ikegami TM20-9, (3) Ikegami TM14-9, (8) Ikegami PM9. **Switchers/editors:** CMX 330A, Ampex Vista. **Video Cameras:** (2) Sony DXC-325 CCD, (4) Ikegami 730A, Ampex CVR-507 Betacam CCD. **Synchronizers:** Adams-Smith Zeta-3, (3) TimeLine Lynx. **Video Effects Devices:** DSC Illusion, Chyron RGU2. **Audio Recorders:** (2) Otari MX-55 2-track w/center SMPTE, Otari MTR-12 4-track, (2) Otari MTR-100 24-track. **Audio Mixers:** Neve VR-60, Sony 2000. **Soundstages:** 30 x 35. **Other Major Equipment:** NED 8-track Direct-to-Disk recording system, NED Synclavier System w/32 polyphonic/32 FM voices and 32MB RAM, NED Synclavier System w/32 polyphonic/16 FM voices.

ROLAND HOUSE, INC.; *VPP/E;* 2020 N. 14th St.; Arlington, VA 22201; (703) 525-7000. **Owner:** Fritz Roland.

VAUGHN BROADCAST RENTALS; 5414 Beaumont Center Dr., Ste. 202; Tampa, FL 33634; (813) 887-3141. **Manager:** Ric Everett.

VIDEO IDEAS PRODUCTIONS, INC.; *VPF, VPP/E, OLVP;* 4762 Hwy. 58, Ste. G; Chattanooga, TN 37416; (615) 894-2677. **Owner:** Jerry Waddell, Martha Knight. **Manager:** Jerry Waddell, Martha Knight.

VIDEO TAPE ASSOCIATES; *VPP/E, APPV;* 1575 Sheridan Rd. NE; Atlanta, GA 30324; (404) 634-6181; (800) 554-8273. **Owner:** W.K. Chambliss. **Manager:** Mike McNally.

NORTH CENTRAL

Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin

ADMARK, INC.; *VPF, VPP/E, OLVP, APPV;* 3630 SW Burlingame Rd.; Topeka, KS 66611; (913) 267-4712. **Owner:** Sondra and Barry Busch. **Manager:** John Kuefler, Dale Hammer.

ALLIANCE RECORDING CO. INC.; *APPV;* 8449 Parshallville Rd.; Fenton, MI 48430; (313) 632-5653. **Owner:** Al Hurschman, Dee Hurschman. **Manager:** Al Hurschman.

ANGEL FILMS COMPANY; *VPF, VPP/E, OLVP, APPV;* Rt. 1, Box 69; New Franklin, MO 65274-9998; (314) 698-3900. **Owner:** William H. Hoehne, Jr. **Manager:** Linda Grotzinger.

AUDIO ART RECORDING STUDIOS, INC.; *APPV;* 403 SW 8th St.; Des Moines, IA 50309; (515) 282-3223. **Owner:** Dr. James Skinner, Patrick McManus. **Manager:** Patrick McManus.

BEACHWOOD STUDIOS; *VPF, VPP/E, OLVP, APPV;* 23330 Commerce Park Rd.; Beachwood, OH 44122; (216) 292-7300; **FAX:** (216) 292-0545. **Owner:** Pete Vrettas.

BIG DOG STUDIOS; *APPV;* 412 1/2 E. Douglas; Wichita, KS 67202; (316) 263-4464. **Owner:** Sheldon Coleman. **Manager:** Steve Falke.

BUSBY PRODUCTIONS, INC.; *VPF, VPP/E, OLVP, APPV;* 1430 Locust St.; Des Moines, IA 50309; (515) 244-0404. **Owner:** Busby Burnell. **Manager:** Busby Burnell.

CHAPMAN RECORDING STUDIOS; *APPV;* 228 W. 5th St.; Kansas City, MO 64105; (816) 842-6854. **Owner:** Chuck Chapman. **Manager:** Gary Sutton.

EDIT EXPRESS; *VPP/E;* 727 N. Hudson; Chicago, IL 60610; (312) 943-1375. **Owner:** Neal Kesler. **Manager:** Mike O'Neill.

GENERAL TELEVISION NETWORK; *VPF, VPP/E, OLVP, APPV;* 13225 Capital; Oak Park, MI 48237; (313) 548-2500. **Owner:** Joan C. Binkow. **Manager:** Ronald S. Herman, VP mktg. **Video Tape Recorders:** Sony BVU-950 3/4" SP, (4) Sony BVU-800 3/4", (6) Ampex AVR-2 2", (2) Sony DVR-10 D2, (13) Sony BVH-3000 1", (6) Sony BVH-2000 1", (2) Sony BVW-75 Betacam SP, (3) Sony BVW-40 Betacam, Sony BVW-10 Betacam, **Video Monitors:** (6) Sony BVM-1900, (2) Sony BVM-1910, (8) Ikegami TM20-9. **Switchers/editors:** (3) GVG 200, GVG 100, (4) CMX 3600. **Video Cameras:** (2) Sony BVP-3A, (2) Ikegami HL-79EAL, Sony DXC-3000. **Synchronizers:** (4) TimeLine Lynx, TimeLine Lynx keyboard controller. **Video Effects Devices:** Abekas A52, Abekas A62 digital disk recorder, (2) Abekas A53D w/combine and key channels, Ampex ADO-3000. **Audio Recorders:** (2) Otari MTR-12 2-track center-track time code, Otari MTR-12 4-track, (3) Otari MX-5050 2-track, Otari MX-55 2-track. **Audio Mixers:** Lexicon Opus digital workstation, (2) Shure FP2. **Soundstages:** Studio A 40 x 80, studio B 20 x 40. **Other Major Equipment:** Bosch FDL-60B2 telecine w/DaVinci color corrector, (2) Symbolics 3650 3-D graphics and paint system, 2-channel VidiFont V character generator, VidiText 2-channel character generator. **Specialization & Credits:** Remote services—Betacam, 3/4" BVU, 1" packages. Duplication center—1", 2" quad, Beta, VHS, 3/4". Dolby SR processing available for all in-house tapes.

HEYWOOD FORMATICS AND SYNDICATION; *VPP/E, APPV;* 1103 Colonial Blvd.; Canton, OH 44714; (216) 456-2592. **Owner:** Max Heywood. **Manager:** Jon Russell.

INNERVISION PRODUCTIONS, INC.
St. Louis, MO

INNERVISION PRODUCTIONS, INC.; 11783 Borman Dr.; St. Louis, MO 63146; (314) 569-2500. **Manager:** Mike Stroot, VP, general manager. **Specialization & Credits:** Innervision's audio sweetening room I is based around a four-hour AMS AudioFile, Sony 3000 automated console, Ampex ACE-200 editor and Otari MTR-90 24-track. Tielines are to all VTRs in the building via Utah routing, which makes finishing audio-for-video extremely fast, convenient and foolproof. Audio II includes an Allen and Heath console, 1" 8-track, Sony 2-track and booth, also music library and SFX. Microphones: Neumann, AKG, Sony, Shure, Beyer, Sennheiser.

INSIDEOUT POST PRODUCTION; *APPV;* 3840 Broadway; Rockford, IL 61108; (815) 398-0579. **Owner:** Mark David Peabody. **Manager:** Mark David Peabody.

JOR-DAN RECORDING, INC.; *APPV;* 1100 Wheaton Oaks Ct.; Wheaton (Chicago), IL 60187; (708) 653-1919; **FAX:** (708) 665-4966. **Owner:** Corporation. **Manager:** Mal Davis.

MARX PRODUCTION CENTER; *VPF, VPP/E, OLVP, APPV;* 3100 W. Vera Ave.; Milwaukee, WI 53209; (414) 351-5060. **Owner:** Robert Marx. **Manager:** Tom Deming.

MIAMI STREET STUDIOS; *APPV;* 1619 Miami St.; South Bend, IN 46613; (219) 288-TAPE. **Owner:** John Nuner, Jackie Nuner, Jack Burke. **Manager:** Earl Scott.

MOBILE IMAGES CORP.; *VPF;* 21775 Melrose Ave.; Southfield, MI 48075; (313) 350-9300; **FAX:** (313) 350-0667. **Owner:** Irwin Danto. **Manager:** Tom Hardy.

MOTION PICTURE SOUND, INC.; *APPV;* 3026 E. Grand Ave.; Detroit, MI 48202; (313) 873-4655. **Owner:** Jerrell L. Frederick. **Manager:** John W. Keeber.

MVP COMMUNICATIONS, INC.; *VPF, VPP/E, OLVP, APPV;* 1075 Rankin; Troy, MI 48083; (313) 588-7600. **Owner:** Dick Hanson. **Manager:** Tom Hanson, gen. mgr.

NORTHWEST TELEPRODUCTIONS, INC.; *VPF, VPP/E, OLVP, APPV;* 4455 W. 77th St.; Minneapolis, MN 55435; (612) 835-4455. **Manager:** Robert Mitchell, president.

OPTIMUS, INC.; *VPP/E, APPV;* 161 E. Grand Ave.; Chicago, IL 60611; (312) 321-0880. **Owner:** Busch Creative Services. **Manager:** Scott Kane. **Video Tape Recorders:** (12) Ampex VPR-3, (8) Sony BVW-75, (2) Sony DVR-1000, (12) Sony BVU-800 and 950/SP, Sony BVH-35. **Video Monitors:** (11) Sony BVM-1900, (2) Sony BVM-1300, (5) Sony BVM-1201. **Switchers/editors:** (3) CMX 3400 editor w/Grass Valley switching, Ampex Ace editor w/Ampex AVC-33 switching, (2) CMX 6000 random-access laser disc editing system. **Video Cameras:** (2) Ikegami HL-79EAL, Ikegami HL-95B. **Synchronizers:** Time Logic TLC, Adams-Smith System 2600. **Video Effects**

World Radio History

Devices: (2) Ampex ADO 2000 w/concentrator, Grass Valley Group Kaleidoscope. **Audio Recorders:** AMS AudioFile, Nagra T, (3) Nagra 3 and 4. **Audio Mixers:** (8) Neve 8 x 2. **Soundstages:** 50 x 50 w/2-wall hard cyc. **Other Major Equipment:** Quantel Harry, (2) Symbolic 3650 Paint and 3-D animation system, Rank Cintel Mklllc enhanced Digiscan 4:2:2 film-to-tape transfer unit w/EPR Electronic Pin Registration, (2) Bosch FDL-60B Telecine, (2) Corporate Sunburst color corrector, Quantel Paint Box, Abekas A-62 and A-60 digital disk recorder, (2) Chyron Scribe CG system, (2) Chyron 4100 EX CG system, dual-mode closed captioning system, IMC Motion Control stand.

PANDEMIC RECORDING INC.; *APPV;* **161 Ottawa NW, Waters Bldg., Ste. B-102; Grand Rapids, MI 49503; (616) 458-4359. Owner:** Frederick C. Baker. **Manager:** Rick Steele Vaida.

POSTIQUE, INC.; *VPP/E;* **23475 Northwestern Hwy.; Southfield, MI 48075; (313) 352-2610; FAX: (313) 352-3708. Owner:** Bernie Green, president. **Manager:** Mary Suzanne Patek, VP.

RW VIDEO; *VPF, VPP/E, OLVP, APPV;* **4902 Hammersley Rd.; Madison, WI 53711; (608) 274-4000; (414) 524-8760 (Milwaukee). Owner:** Robert Wickhem. **Manager:** Mini Murphy.

SILVER OAKS; *VPF, VPP/E, OLVP, APPV;* **PO Box 8440; Moline, IL; (309) 797-9898. Owner:** Corporation. **Video Tape Recorders:** (3) Ampex VPR-80 1", (2) Ampex CVR-70 Betacam SP, (2) Ampex CVR-65 Betacam SP, (2) Ampex CVR-35 Betacam SP. **Video Monitors:** Sony. **Switchers/editors:** (2) Ampex Vista, (2) Ampex Ace. **Video Cameras:** (2) Ampex CVC-7. **Synchronizers:** (3) TimeLine Lynx, Fostex. **Video Effects Devices:** Ampex ADO 1000 w/digimatte-digitrail. **Audio Recorders:** MCI JH-24 and J-100, Studer A820. **Audio Mixers:** Amek/TAC Matchless, Dyaxis workstation. **Soundstages:** 40 x 50, 30 x 35, 12 x 20. **Other Major Equipment:** Chyron Scribe, 3-D computer animator.

SKYVIEW FILM & VIDEO; *VPP/E, APPV;* **541 N. Fairbanks, 22nd Fl.; Chicago, IL 60611; (312) 670-2020. Owner:** Jack Tohtz. **Manager:** Vivian Marie Craig.

SOLID SOUND, INC.; *APPV;* **PO Box 7611; Ann Arbor, MI 48107-7611; (313) 662-0667. Owner:** Robert G. Martens, James W. Spencer. **Manager:** Robert G. Martens, James W. Spencer.

STOKES SOUND AND VIDEO; *OLVP, APPV;* **100 Stokes Ln., PO Box 398; Hudson, OH 44236; (216) 650-1669. Owner:** A.J. Stokes. **Manager:** A.J. Stokes.

STUDIO M
Saint Paul, MN

STUDIO M/WORLD THEATER; *APPV;* **45 E. 7th St./10 E. Exchange; Saint Paul, MN 55101; (612) 290-1500; (612) 290-1453. Owner:** Minnesota Public Radio. **Manager:** Craig Thorson. **Video Tape Recorders:** JVC 8350 U-matic. **Video Monitors:** JVC. **Switchers/editors:** Panasonic. **Video Cameras:** JVC GXS9U. **Synchronizers:** Cipher Digital Softouch, Cipher Digital Shadow. **Audio Recorders:** 3M 32-track digital mastering system, Otari MTR-90II, Otari MTR-12 w/SMPTE center stripe, MCI 110B 4-track 1/2", (4) Otari MTR-10, (3) Studer 810. **Audio Mixers:** Neve V Series 36 x 36 x 36, Neve 51 Series 36 x 12. **Soundstages:** World Theater stage 36 x 35, house seats 916. **Other Major Equipment:** Lexicon 480L, Lexicon 224X LARC, Lexicon 200, EMT 140, Ecoplate I, Ecoplate II, ADR Scamp Major rack, (2) UREI LA-4 limiter, (2) Eventide 969 Harmonizer, (2) Lexicon PCM42, (2) Marshall time modulator, Trident parametric EQ, B&K, Neumann, Schoeps, AKG and other quality microphones. The World Theater lighting consists of a Strand Century Mini Light Palette, a Colortran Scenemaster with focus remote and more than 400 lighting instruments. **Rates:** Analog $125/hr., digital $140/hr., video/audio interlock and World Theater rates upon request. **Specialization & Credits:** As host location for the Disney Channel's *A Prairie Home Companion* cable series, Studio M/World

WORLD THEATER
Saint Paul, MN

Theater has earned a reputation as a state-of-the-art facility for live performance video, simultaneous multitrack recording, synchronized audio post-production and live national satellite distribution of radio and television in a uniquely inspiring facility. The World Theater, opened in 1910 as a "two-balcony dramatic house," was completely renovated in 1986 to its original elegance. The interior offers a sense of intimacy, with no seat further than 87 feet from the stage. The fully-staffed theater is complemented by an exceptional sound reinforcement system and a dedicated audio recording/broadcast control room having direct hardwire multitrack interconnect to Studio M. In addition to six dressing rooms, a green room and a rehearsal room, the theater includes a sufficient lighting system to accomplish demanding video lighting designs.

TRIO VIDEO; Chicago, IL; (312) 421-7060. Specialization & Credits: Complete concert packages including 24-track soundtrack recording, giant screen video support and lighting. 1", Beta SP and 3/4" videotape formats. Cranes/dollies (Chapman, Ariflex, Fisher) and Steadycam systems also available. Three state-of-the-art mobile production units available with and without crew. For further information, contact Jack Walsh or Rick Godwin.

UNIVERSAL RECORDING CORPORATION
Chicago, IL

UNIVERSAL RECORDING CORPORATION; *APPV;* **46 E. Walton; Chicago, IL 60611; 32 W. Randolph; Chicago, IL 60601; (312) 642-6465; FAX: (312) 642-7126. Owner:** Murray R. Allen. **Manager:** Foote Kirkpatrick. **Video Tape Recorders:** (10) JVC 8250 3/4", (2) Sony 2800 1". **Video Monitors:** (14) Sony. **Switchers/editors:** (3) Synclavier, (3) Direct-to-Disk, AMS AudioFile. **Synchronizers:** (20) BTX Softouch, (2) TimeLine. **Audio Recorders:** (37) Magna-Tech dubbers, (20) 2/32-track digital, (55) analog. **Audio Mixers:** Neve, SSL, Sony, ADM, Ramsa, Harrison. **Soundstages:** Studio A 68,000 cubic ft. **Other Major Equipment:** Sony video projectors, ADR, (2) optical disc—optional transfer. **Rates:** $200-$500/hour. **Specialization & Credits:** Omnimax Production "The Great Barrier Reef," Mannheim Steamroller, Manowar, *Top Gun*, *Hoosiers*, Grammy Lifetime Achievement Award.

VAUGHN BROADCAST RENTALS; 7951 Computer Ave. S.; Minneapolis, MN 55435; (612) 832-3131. Manager: Clint Townsend.

DAN YESSIAN MUSIC; *APPV;* **33117 Hamilton Ct., Ste. 175; Farmington Hills, MI 48018; (313) 553-4044. Owner:** Dan Yessian. **Manager:** Dan Yessian. **Specialization & Credits:** Dan Yessian Music strives to give you the best in jingle work and audio post-production. Here at our 24-track recording facility, we offer advertisers and video post houses custom music, special effects and multitrack recording for all types of projects. Credits include: Whirlpool, National Chevrolet, Oldsmobile, A.C. Delco, Chrysler/Plymouth, Mr. Turkey, as well as music for Sesame Street, Hanna-Barbera Productions and Hot Fudge. We arrange taxi and limo service from Detroit Metro Airport as well as hotel accommodations. Our recording facility, added with our talented and courteous staff, places Dan Yessian Music in the forefront for your jingle and audio post needs of the future.

SOUTHWEST

Arizona, Arkansas, Las Vegas, Mexico, New Mexico, Oklahoma, Texas

AMS PRODUCTIONS INC.; *VPF, VPP/E, OLVP;* **6221 N. O'Connor, Ste. 109; Irving, TX 75039; (214) 869-4911. Owner:** Andrew M. Streitfeld. **Manager:** Alicia Harris.

JIM BRADY RECORDING STUDIOS; *APPV;* **25 E. Glenn St.; Tucson, AZ 85705; (602) 791-3884. Owner:** F. James Brady. **Manager:** Diane King.

CEREUS RECORDING, INC.; *APPV;* **1733 E. McKellips #7; Tempe, AZ 85281; (602) 990-8163. Owner:** Allen Moore. **Manager:** Eric Graf.

DEL SOL PRODUCTIONS; *VPP/E, OLVP, APPV;* **3028 N. Jackson; Tucson, AZ 85719; (602) 795-0214. Owner:** Ruben Ruiz. **Manager:** Terence Babb.

DUKE CITY STUDIO; *VPF, VPP/E, OLVP;* **4121 Cutler NE; Albuquerque, NM 87110; (505) 884-5151; (800) 225-6185. Owner:** H. Jay Lefkovitz, president. **Manager:** H. Jay Lefkovitz. **Video Tape Recorders:** Sony BVW-60, Sony BVW-65, Sony BVW-75, Sony BVW-25, Sony BVW-35, Sony BVH-3100, Sony BVH-500, Sony BVU-110, Sony BVU-950, Sony BVU-5, Sony BVU-1. **Video Monitors:** (3) Ikegami TM 19-9, (5) Videotek 13" color, (15) Panasonic 9" B&W. **Switchers/editors:** Intergroup 902, Grass Valley 100CVN, Grass Valley 51EM. **Video Cameras:** (2) Ikegami HL-79EAL, (2) Ikegami HL-79DAL, Ikegami HL-95B. **Video Effects Devices:** (3) Abekas A-53D w/WARP, Abekas A-62, Abekas A-72, Abekas A-42. **Audio Recorders:** Nagra, Tascam 4-track. **Soundstages:** 60 x 40, 18' ceiling, 400-amp power, dressing room, makeup room, prop room, production offices. **Other Major Equipment:** Chyron 4200WMGM/CCM dual-channel, 16' 4-cam remote truck, RTS intercoms, Arriflex film equipment, CCTA VTVA wireless intercom, grip trucks, Fisher camera dollies, Tulip Crane, generators.

FUTURE AUDIO; *APPV;* **7700 Carpenter Freeway, Ste. 1000; Dallas, TX 75247; (214) 630-8889. Owner:** Marcos Rodriguez. **Manager:** Randy Adams.

OMEGA AUDIO AND PRODUCTIONS, INC.
Dallas, TX

OMEGA AUDIO AND PRODUCTIONS, INC.; *APPV;* **8036 Aviation Pl.; Dallas, TX 75235; (214) 350-9066. Owner:** Paul A. Christensen, Charles R. Billings. **Manager:** Donna Christensen. **Video Tape Recorders:** D1, D2, 1", Beta SP, 3/4", 1/2", S-VHS, VHS, (11) RCA TH-200/2000/2500. **Video Monitors:** RCA 26". **Switchers/editors:** (2) Grass Valley, (2) CMX 3400A. **Video Cameras:** RCA/CEI. **Synchronizers:** CMX Cass 1, 5-machine audio-for-video/film editor w/CMX 8" disk reader and CMX disk-based mixing automation. **Video Effects Devices:** ADO, Abekas A-62, ADO 2 channels, NEC E-Flex 2 channels. **Audio Recorders:** (3) Otari MTR-90 24/46-track, (3) Otari MTR-10 2/4-track w/CSTC, Otari 5050B, Mitsubishi X-80 digital. **Audio Mixers:** Amek M2500 36 x 24 w/CMX automation, API 32 x 24, custom 24 x 24. **Other Major Equipment:** Full Scamp rack, Harmonizer, (5) DeltaLab Super TimeLine, Yamaha SPX90, DDL-1 digital delays, Lexicon 224XL,

—continued on next page

World Radio History

SOUTHWEST

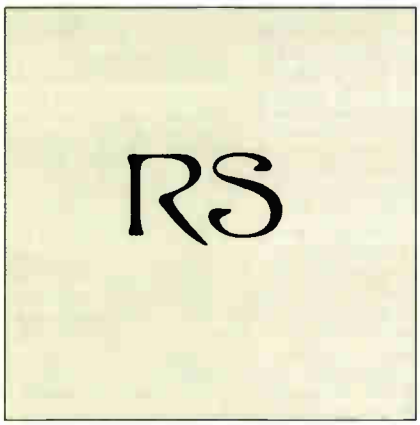
VIDEO PRODUCTION FACILITIES

In the following listings each facility's particular capabilities are indicated after its name using the following initials. *VPF* (Video Production Facility); *OLVP* (On-Location Video Production); *VPP/E* (Video Post-Production/Editing); *APPV* (Audio Post-Production for Video).

—continued from previous page

MXR, O1a digital reverbs, Master-Room MR11, Audicon plates, UREI Little Dipper, stereo synth, EXR Exciter, dbx program processors, Aphex Compellor, BBE Aural Exciter. **Rates:** 24-track interlock w/picture $150/hr., 46-track w/picture $200/hr. **Specialization & Credits:** Co-located with Video Post & Transfer, Inc., at Dallas Love Field. Recent music specials mixed/sweetened: Fats & Friends for HBO, Texas 150 for ABC, Johnny Cash for CBS, Bob Hope for NBC, Joe Bob Briggs, Gingerbrook Faire, Cotton Patch Gospel, Prince, Quarterflash, Carl Perkins, Jerry Jeff Walker, PBS—Van Cliburn International Piano Competition and Handel's Messiah, Joe Ely, Eddie Rabbitt, Oak Ridge Boys, Commodores, Helen Reddy. Omega also maintains a 46-track remote-recording facility with full SMPTE interlock.

PRODUCTION MASTERS, INC. (PMI); *VPF, VPP/E, OLVP, APPV;* **834 N. 7th Ave.; Phoenix, AZ 85007; (602) 254-1600. Owner:** David Case. **Manager:** Bruce Reid.



SCOTTSDALE CONFERENCE RESORT
Scottsdale, AZ

SCOTTSDALE CONFERENCE RESORT; *VPF, VPP/E, APPV;* **7700 E. McCormick Pkwy.; Scottsdale, AZ 85258; (602) 991-9000. Owner:** Scottsdale Conference Resort. **Manager:** Brian Court. **Video Tape Recorders:** Sony BVU-950, Sony BVU-920, (4) JVC CR-850U, (3) Sony VO-5850. **Video Monitors:** Sony PVM-1220, (10) JVC TM-R9U, (2) Sony PVM-5310. **Switchers/editors:** Grass Valley 1600-IL, Grass Valley Model 100, Convergence 204 editor. **Video Cameras:** (3) Sony DXC-M7, Ikegami HL-79 DAL, Ikegami ITC-730. **Synchronizers:** (2) Adams-Smith System 2600. **Video Effects Devices:** Grass Valley DPM-100 w/recursive memory and E-mem. **Audio Recorders:** Otari MX-70 16-track, Otari MTR-12CT w/center-track time code, (2) Otari MX-5050 BQII 4-track. **Audio Mixers:** TAC Scorpion 24 x 16, Soundcraft 600 16 x 8. **Soundstages:** 17 x 21 x 14, 76 x 76 x 14. **Other Major Equipment:** Complete dark room, multi-image staging and production, laser light shows. **Rates:** Call. **Specialization & Credits:** Specializing in video production, post-production audio-for-video, sound effects, audio production and original music composition. Located in luxurious resort setting with golf, tennis, complete health spa and fitness center with easy access to Sunbelt activities.

TELE-IMAGE; 6305 N. O'Connor LB 6, Bldg. 4 Ste. 103; Irving, TX 75039-3510; (214) 869-0060; FAX: (214) 869-2039. **Owner:** Robert Schiff. **Manager:** Diane Barnard. **Video Tape Recorders:** (3) Sony DVR-10, (10) Sony BVH-2000/2500, (7) Sony BVU-800/820, (3) Ampex CVR-75, Ampex CVR-35, Ampex CVR-5 camcorder, Sony BVU-110. **Video Monitors:** (9) Sony BVM-1900. **Switchers/editors:** GVG 300, GVG 1680, GVG 100, GVG 51, (2) GVG 41. **Video Cameras:** (2) Ikegami 357A, (2) Ikegami 79EAL, Ampex CVC-50 w/ccu, (2) Sony CCD DXC-3000. **Synchronizers:** (4) TimeLine Lynx, (3) Cipher Digital/BTX Shadow, Alpha Boss Audio controller. **Video Effects Devices:** Abekas A-62, Abekas A-53D w/WARP and key channel, (2) ADO (2 channels w/Concentrator and Infinity), Abekas A-42, Sony BVX-30 digital noise redux, (3) Chyron Scribe CG. **Audio Recorders:** Studer A800 24-track, (2) Studer A800 8-track, (3) Studer A810 2-center time code, Studer A820 2-center time code, (2) Technics 2-track, (2) Otari 2-track. **Audio Mixers:** SSL 4000E 34 x 32, Sony/MCI 618, Studer 169, Graham Patten 612. **Soundstages:** Audio control room 25 x 27, audio stage (adjacent to audio control) 28 x 35, video soundstage 29 x 29 x 30 x 36. **Other Major Equipment:** Graphics: Quantel Paint Box, Wavefront 3-D animation; audio: Studer A725 CD player, (2) Dynamax DTR-100 broadcast cart, Foley SFX setups, Magna-Tech 600 16/35mm mag dubber, 1- to 4-track; production: 20' bobtail remote diesel truck w/GVG 16001L switcher, Chyron 4100EX CG (1 channel), GVG processing, Yamaha RM916 audio console, dbx noise redux, full RTS intercom/IFB, teleprompter. **Rates:** Available upon request.

VIDEOACTIVE; *VPF, VPP/E, APPV;* **PO Box 29222; Las Vegas, NV 89126; (702) 365-6467; (702) 378-2256 (eves and weekends). Owner:** Leanna Bakken, Harvey Caplan. **Manager:** Leanna Bakken, Harvey Caplan. **Video Tape Recorders:** Ampex VPR-80 1" C, JVC CR-8250U 3/4", JVC CR-6650U 3/4", JVC CR-4900U 3/4". **Video Monitors:** Sony PVM-1340, (2) Panasonic CT-110M, (5) assorted. **Switchers/editors:** Alta Group, Inc. Pyxis-E dual-channel freeze-frame, United Media Comm-Ete A-B roll. **Synchronizers:** Tascam ES-50. **Video Effects Devices:** DSC Eclipse, Alta Group, Inc., Cygnus. **Audio Recorders:** Tascam TSR-8, Yamaha MT44D. **Audio Mixers:** TEAC M-3. **Other Major Equipment:** Chyron VP-1SG character generator, Tektronix TSG-100 test signal generator, ESE 261 time code generator, Electro-Voice PL-20 microphone. **Rates:** Upon request.

VIDEO MEDIA PRODUCTIONS; *VPF, VPP/E, OLVP;* **2727 N. Southern Ave.; Tempe, AZ 85282; (602) 966-6545. Owner:** Visual Communications, Inc. **Manager:** Ann V. Bonanno.

VIDEO POST & TRANSFER, INC.; *VPP/E, APPV;* **8036 Aviation Pl., Box 53; Love Field Terminal; Dallas, TX 75235; (214) 350-2676; FAX: (214) 350-8342. Owner:** Neil Feldman. **Manager:** Jaxie Bryan. **Specialization & Credits:** Our digital video masters, conveniently located in Dallas' Love Field Airport, offer superior post-production capability using new, affordable, digital technology. VP&T telecine features Rank Cintel's MkIII-C w/Digiscan 4, 4:2:2 "Matchbox" still storage, Accom D1 noise reduction, full-feature DaVinci color correction w/EP, Steadifilm, Nagra T-audio sync-up and Ultimatte 5. Transfers direct to all formats. Offline/pre-edit: Montage. Graphics/paint/animation: 5 suites, DF/X "Composium" digital paint/production and Vertigo Series 9 workstation-based 3-D rendering. Online suites feature CMX 3600 editors, Grass Valley 200 and 300 switchers, 2-channel GVG Kaleidoscope w/KURL and Combiner, 2-channel ADO w/Concentrator and Infinity, proprietary "dream" computer-based, all-digital audio editing/mixing/sweetening/processing system directly compatible w/both D1 and D2 digital audio format(s), Dubner Texta CGs, (2) Abekas A-60, Abekas A-62, (5) Sony DVR-10/18 D2 deck, Sony DVR-1000 (D1), (9) Sony 1" deck, (4) BVW-75, (2) BVU-850/SP, graphics and matte cameras and Grass Valley Horizon system routing.

SO. CAL/HAWAII

ABBA DABBA VIDEO; *VPF, VPP/E, OLVP, APPV;* **3293 Cahuenga Blvd. W. 101; Hollywood, CA 90068; (213) 969-0910. Owner:** Joseph F. Pyles. **Manager:** Lezlie J. Hoskins.

ACTION VIDEO, INC.; *VPP/E;* **6616 Lexington Ave.; Hollywood, CA 90088; (213) 461-3611. Owner:** Sam Holtz, Joe Benadon. **Manager:** Alana Ireland.

ALLIES RECORDING STUDIO (ARS); 711 E. Cypress Ave.; Redlands, CA 92374; (714) 798-7375. Owner: Randy Thomas, Fred Tedesco. **Manager:** Randy Thomas, Fred Tedesco.

ASSOCIATED PRODUCTION MUSIC; *APPV;* **6255 Sunset Blvd., Ste. 820; Hollywood, CA 90028; (213) 461-3211. Owner:** APM. **Manager:** Georgia Robertson, music director.

AUDIO RESOURCE HONOLULU; *APPV;* **1750 Kalakaua; Honolulu, HI 96826; (808) 944-9400. Owner:** Tony Hugar, Milan Bertosa.

WALLY BURR RECORDING; 1126 Hollywood Way; Burbank, CA 91505; (818) 845-0500. Owner: Wally Burr. **Manager:** Ellen Burr.

C.A.V.E. PRODUCTIONS; *VPF, VPP/E, OLVP, APPV;* **14511 Delano St.; Van Nuys, CA 91411; (818) 909-0011. Owner:** Craig W. Durst.

CHACE POST SOUND; *APPV;* **7080 Hollywood Blvd., Ste. 515; Hollywood, CA 90028; (213) 466-3946. Owner:** Rick Chace. **Manager:** David Gibbar. **Video Tape Recorders:** (5) 1" C recorders. **Synchronizers:** (3) Synchro vari-speed. **Audio Recorders:** (2) Sony PCM-1610 digital, (2) dbx 700 digital, (2) 24-track analog, plus many more formats. **Audio Mixers:** Sony 28-channel automated, (6) Tascam 16-channel. **Other Major Equipment:** (3) Chace optical sound processor (proprietary), (8) Chace surround stereo processor (proprietary). **Specialization & Credits:** Very active in sound preservation and restoration of film sound tracks: *Gone With the Wind, Wizard of Oz, Streetcar Named Desire* and hundreds of others. Proprietary equipment for creating true directional stereo sound from

CHACE POST SOUND
Hollywood, CA

mono. Current releases include *Bambi, The Godfather, The Graduate, Dirty Harry.*

CREATIVE MEDIA RECORDING; *APPV;* **11105 Knott Ave., Ste. G; Cypress, CA 90630; (714) 892-9469. Owner:** Tim Keenan. **Manager:** Tim Keenan.

EFX SYSTEMS; *APPV;* **919 N. Victory Blvd.; Burbank, CA 91502-1633; (818) 843-4762; (213) 460-4472; FAX: (818) 848-0706. Manager:** Paul Rodriguez. **Specialization & Credits:** Digital audio post-production for television and film. The most comprehensive and advanced digital audio equipment from New England Digital and Sony. Award-winning mixers and editors fluent in sprockets and electronics. Facilities include edit and pre-lay; ADR/Foley; television mixing and a fully digital, THX-approved film dubbing stage. Recent credits: features *Talk Radio, Torch Song Trilogy, Heart Condition, Waiting for the Light, To Sleep With Anger.* Television: *Thirtysomething, Freddy's Nightmare.* Non-theatrical: SR-71 film being shown at the Smithsonian; Cranium Command for Disney World, Universal Studios Tour—Florida.

THE ENTERPRISE
Burbank, CA

THE ENTERPRISE; *VPP/E, APPV;* **4620 W. Magnolia Blvd.; Burbank, CA 91505; (818) 505-6000; FAX: (818) 505-6006. Owner:** Craig Huxley. **Manager:** Thom Brown. **Video Tape Recorders:** Sony BVH-3000 1", (3) Sony XBR 25", Sony BVU-850 3/4". **Synchronizers:** (15) TimeLine Lynx, (2) TimeLine Lynx controller head. **Audio Recorders:** (3) Mitsubishi X850 32-track, (5) Studer A820 24-track, (6) Otari MTR-90 MkII 24-track, (2) Studer A820 2-track, (7) MTR-12 2-track 1/4" w/center-track time code. **Audio Mixers:** Neve VR 72-channel w/Total Recall and Flying Faders, (2) SSL G Series 4000 72-channel. **Other Major Equipment:** (2) Synclavier 9600 w/optical, (2) NED 16-track Direct-to-Disk Post Pro w/edit view and time compression. **Rates:** $125-$250/hr.

FACE BROADCAST PRODUCTIONS; *VPP/E;* **115 N. Hollywood Way, Ste. 102; Burbank, CA 91505; (818) 842-9081. Owner:** Ron and Jamie Malvin.

FANFARE STUDIOS; *APPV;* **120 E. Main St.; El Cajon, CA 92020; (619) 447-2555. Owner:** Ron Compton. **Manager:** Carol Compton.

FILMCORE POST PRODUCTION & AUDIO SERVICES; *VPP/E, APPV;* **849 N. Seward St.; Hollywood, CA 90038; (213) 464-7303. Owner:** Steve McCoy.

World Radio History

FUTURE POST
Burbank, CA

FUTURE POST; *APPV;* **2414 W. Olive Ave.; Burbank, CA 91506; (818) 843-8200. Manager:** Jim McIntosh sales. **Video Tape Recorders:** Ampex 1", Sony BVU-800 3/4", JVC 850 3/4", VHS Hi-fi. **Video Monitors:** All sizes as required. **Synchronizers:** Lynx, Cipher Digital Softouch, BTX Shadow. **Audio Recorders:** Otari MTR-90 MkII 24/16-track 2", Otari MX-70 16-track 1", Ampex ATR-100 4/2-track, Otari MX-5050 MkIII 8/4-track 1/2", Fostex center time code. **Audio Mixers:** Soundcraft 2400 28 x 24, Neotek Series II 28 x 8. **Other Major Equipment:** Digital sound effects library and a full complement of outboard equipment, 24-track MIDI sequencing w/variety of digital samplers and keyboards. Studios: (2) sweetening room w/separate vocal booths for voice-over, ADR looping, Foley sequencing, MIDI sequencing. **Rates:** On request. **Specialization & Credits:** Future Post specializes in audio post-production for film and video. Our services include audio sweetening, mixing, video laydowns, laybacks and tape transfers in all formats. We have the capability of locking up to four audio or video machines as well as an event controller configured to provide preprogrammed sound effects from CD, ATR or cart machine. Our newest room features an IBM PC-based MIDI studio with 24-track sequencing software. Our selection of synthesizers, drum machines and effects provides a very flexible MIDI system.

GROUP IV RECORDING, INC.; *APPV;* **1541 N. Wilcox Ave.; Hollywood, CA 90028; (213) 466-6444; FAX: (213) 466-6714. Owner:** Angel L. Balestier. **Manager:** Lisa Burrowes. **Specialization & Credits:** Long recognized as one of Hollywood's leading film and TV scoring studios, Group IV has established itself in the area of audio post-production and film/TV sound packaging. While continuing to contribute to the scores of such box office hits as *Back to the Future I* and *II* and *Roger Rabbit*, Group IV handles many types of post-production needs for a wide variety of projects, from features and series to radio/TV spots. A new computer-based MIDI room is available for customized digital sound effects, as well as for writing and assembling music. Group IV is also equipped for ADR, Foley, dubbing, video sweetening (1" video capability), telecine, streamering, and transfers to and from any format.

INTERLOK STUDIOS; *APPV;* **1522 Crossroads of the World; Hollywood, CA 90028; (213) 469-3986. Owner:** Jim Mandell, Mike Perricone. **Manager:** Edie Petracri.

INTERSOUND, INC.; *APPV;* **8746 Sunset Blvd.; Los Angeles, CA 90069; (213) 652-3741. Owner:** Ahmed Agrama. **Manager:** Ken Harrison Hayes.

STEVE MICHELSON PROD.; 1749 14th St.; Santa Monica, CA 90404; (213) 452-1511. Owner: Steve Michelson. **Manager:** Beverly Chunoff.

MODERN VIDEOFILM; *VPP/E, APPV;* **7165 Sunset Blvd.; Hollywood, CA 90046; (213) 851-8070. Owner:** Moshe Barkat. **Manager:** Richard E. Greenberg. **Specialization & Credits:** Modern Videofilm offers high-quality videotape and sound post-production facilities. Film-to-tape mastering/dailies: (5) Rank Cintel MkIIIs w/Digiscan IV, Amigo and secondary color correction and Faroudja encoders as well as transfer and sync of dailies (16 or 35) using Nagra T for direct time-coded 1/4" audio transfers. Offline editing/montage: (3) CMX 3400 offline edit suites with 3/4" BVU-800 playback and BVU-850SP or 950SP for record. Other offline systems available are Montage in custom-designed and well-maintained edit rooms. Online editing/assemblies/opticals: online recording is either BVH-2000, D2 or D1 record or playback. Switchers are Grass Valley 300 or 100x, w/2-ch. DVE. 2-ch. ADO, 2-ch. Chyron, Scribe and BVX available in all suites. B&W or color cameras available for mattes and inserts. Programmable Graham patten audio consoles make stereo editing easy. Abekas A42 still-store and Abekas A-62 DDR also available. Call for more information.

MTC PRODUCTION CENTER; *VPF, VPP/E, OLVP, APPV;* **4150 Glencoe Ave.; Marina Del Rey, CA 90292; (213) 823-8000. Owner:** Michael Thompson. **Manager:** Peter C. Young.

SCREENMUSIC STUDIOS; *VPF, VPP/E, OLVP, APPV;* **11700 Ventura Blvd.; Studio City, CA 91604; (818) 985-0900. Owner:** Robert J. Walsh, J.E. Lewis. **Manager:** Richard (Denny) Densmore.

THE STAGG STREET STUDIO; *APPV;* **15147 Stagg St.; Van Nuys, CA 91405; (818) 989-0511. Owner:** Gary Denton. **Manager:** Melody Carpenter.

STUDIO 56 PRODUCTIONS; *VPF, VPP/E, OLVP, APPV;* **7000 Santa Monica Blvd.; Los Angeles, CA 90038; (213) 464-7747. Owner:** Paul Schwartz. **Manager:** Jack Snyder.

STUDIO M PRODUCTIONS UNLTD.; *VPF, OLVP, APPV;* **8715 Waikiki Station; Honolulu, HI 96830; (808) 734-3345; FAX: (808) 734-3299. Owner:** Mike Michaels. **Manager:** Mike Michaels, Hugo Buehring.

STUDIO MASTERS; *APPV;* **8312 Beverly Blvd.; Los Angeles, CA 90048; (213) 653-1988. Owner:** Randolph C. Wood. **Manager:** Larry Wood.

TOPANGA SKYLINE RECORDING; *APPV;* **1402 Old Topanga Canyon Rd.; Topanga Park, CA 90290; (213) 455-2044; FAX: (213) 455-2774. Owner:** Britt Bacon, John Eden. **Manager:** Britt Bacon, John Eden.

VIDEO-IT, INC.; *VPP/E, OLVP;* **5000 Overland Ave., Ste. 6; Culver City, CA 90232; (213) 280-0505. Owner:** John Kohan-Matlick. **Manager:** Felisa Kohan-Matlick.

VOICE OVER L.A.; *APPV;* **1717 N. Highland Ave., Ste. 620; Hollywood, CA 90028; (213) 463-8652. Owner:** Evelyn Williams. **Manager:** Pat Torres. **Video Tape Recorders:** JVC CR-850U, JVC CR-8250U. **Video Monitors:** (2) Sony KK-1901. **Synchronizers:** Alpha Audio Boss II. **Audio Recorders:** Otari MTR-90 24-track, (2) MCI JH-110 2-track, Otari MX-5050II 8-track. **Audio Mixers:** Soundcraft 1600 24 x 16 x 2, TAC Scorpion 24 x 16 x 2. **Other Major Equipment:** Eventide H3000 Ultra-Harmonizer, Aphex Compellor compressor/limiter, Lexicon PCM70 effects processor.

WAVES

WAVES SOUND RECORDERS
Hollywood, CA

WAVES SOUND RECORDERS; 1956 N. Cahuenga Blvd.; **Hollywood, CA 90068; (213) 466-6141; FAX: (213) 466-3751. Manager:** Maurice Leach. **Video Tape Recorders:** Sony BVH-3000 1" w/Tektronix Waveform/Vector monitor, (2) Sony BVU-800 3/4", (3) Sony VO-7600 3/4", (3) Sony VO-5600 3/4", Panasonic AG1950 1/2" VHS, Sony SL-HF8600 1/2" Beta. **Video Monitors:** Barco CVM-51, (5) Sony. **Synchronizers:** TimeLine Lynx, Audio Kinetics Q-Lock 4.10, Audio Kinetics Q-Lock 3.10. **Audio Recorders:** (2) AMS AudioFile digital system, Studer A810 TC-PIL-FM, Sony/MCI JH-24 24-track, (2) Sony/MCI JH-110C 8-track, (2) Sony/MCI JH-110C 4-track, (7) Sony/MCI JH-110C 2-track, (5) Sony R-DAT. **Audio Mixers:** Sony MXP-3000, Sony MXP-2000, Soundcraft 6000, Audioarts Wheatstone 8X. **Other Major Equipment:** Magna-Tech MR-10036-4 4-stripe 35mm recorder, (6) Magna-Tech MD-2036 single-stripe 35mm dubber, Sigma CSG-455 color sync generator, (4) Dolby A 361 NR unit, Sony, Lexicon, Yamaha, UREI, JBL, Neumann, AKG, Sennheiser, dbx, Orban, Alesis, Akai, Technics, Crown, Hafler, Symetrix, Denon, Dorrough, Sontec, E-V, Revox, Shure, Loftech; sound effects libraries: Sound Ideas, FX, BBC, Elektra, Audio Fidelity, Network, Valentino, Bainbridge (in CD format), Hanna Barbera, Elektra, Network, Audio Fidelity, BBC (in LP format); music libraries: KPM, Bruton, Sonotone, Themes, JW, Koka, Soundstage, Capital, Dewolf, Network, Cavendish, Fows, Parry, Selected Sound, Major, Valentino, Airforce, Conroy, Boosey Hawkes; (13) sound effects library/8 in CD format, (18) music library/14 in CD format.

WEBSTER COMMUNICATIONS; *VPF, VPP/E, OLVP, APPV;* **607 N. Ave. 64; Los Angeles, CA 90042; (213) 258-6741. Owner:** Van Webster. **Video Tape Recorders:** (3) Ampex 60/65/70 Betacam SP, (2) Sony BVU-800 3/4", Sony BVU-850 3/4", Sony BVU-110 3/4". **Video Monitors:** Ikegami 14",

WEBSTER COMMUNICATIONS
Los Angeles, CA

Panasonic 19", (6) Panasonic 8". **Switchers/editors:** A.C.E. Arena, EECO EMME. **Video Cameras:** Hitachi Z-31. **Synchronizers:** Adams-Smith 2600. **Video Effects Devices:** DSC Illusion DVE. **Audio Recorders:** 3M 79 24-track, Sony 1610 2-track digital, Studer B67. **Audio Mixers:** MCI 428B, Interface Electronics 100 8 x 4. **Soundstages:** 40 x 20 x 12 plus grip package. **Other Major Equipment:** 3M 3600 character generator, CMX compatible edit list, digital audio services, CD sound effects library. **Specialization & Credits:** Webster Communications is a full-service video and audio production company serving the entertainment industry for more than 21 years. Experience ranges from corporate video to entertainment programs to broadcast commercials. Clients include WEA Corp., Warner Bros. Records, Cema Distribution, Elektra Entertainment, NARM, VSDA, The Compact Disc Group and RIAA.

West Productions Inc.

WEST PRODUCTIONS, INCORPORATED
Burbank, CA

WEST PRODUCTIONS, INCORPORATED; *APPV;* **2921 W. Olive Ave.; Burbank, CA 91505; (818) 841-4500. Owner:** George (Ray) West, David West. **Manager:** David Rawlinson. **Specialization & Credits:** West Productions is a full-service audio post-production facility dedicated to delivering top-quality product at a competitive price. The latest in sound technology is fully utilized, be it digital (Waveframe digital workstations), analog (with Dolby SR), or a combination (computer-controlled ADR assembly systems). Our talented staff includes Oscar and Emmy winners and nominees. Currently in post-production at our facility are the following series: *The Wonder Years* (New World/ABC), *Alien Nation* (FOX), *Mancuso, F.B.I.* (NBC Productions). Theatrical: *Forgotten Heroes, Sleeping Car* M.O.W.: *Death of the Incredible Hulk, Girl of the Limber-Lost* (PBS), *Dead Reckoning* (USA Network).

WILDCAT STUDIOS; *APPV;* **2700 S. LaCienega Blvd.; Los Angeles, CA 90034; (213) 931-3411. Owner:** John Ross. **Manager:** Nancy Ross.

NORTHWEST

Alaska, California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming

AVALANCHE RECORDING STUDIOS; *APPV;* **10650 Irma Dr. #27; Northglenn, CO 80233; (303) 452-0498. Owner:** Avalanche Recording Studio. **Manager:** Linda Warman.

World Radio History

NORTHWEST

VIDEO PRODUCTION

FACILITIES

In the following listings each facility's particular capabilities are indicated after its name using the following initials: *VPF* (Video Production Facility); *OLVP* (On-Location Video Production); *VPP/E* (Video Post-Production/Editing); *APPV* (Audio Post-Production for Video)

AVID PRODUCTIONS
San Mateo, CA

AVID PRODUCTIONS; *VPF, VPP/E, OLVP, APPV;* **235 E. 3rd Ave.; San Mateo, CA 94401; (415) 347-3417. Owner:** Henry Bilbao. **Manager:** Chris Craig. **Video Tape Recorders:** Sony DVR-10 (D2), Sony BVW-75 SP, Sony BVW-65 SP, Sony BVU-950 SP. **Video Monitors:** Sharp XM-1300, (2) JVC TMR-9J. **Switchers/editors:** Grass Valley GVG-100, Convergence ECS-195+. **Video Cameras:** Sony BVW-505, Ikegami 730-A. **Synchronizers:** BTX Shadow Pad, Studer Dyaxis 320. **Video Effects Devices:** Pinnacle 2040. **Audio Recorders:** Otari MTR-90 II, (2) Otari MX-5050B. **Audio Mixers:** Sound Workshop Series 34B, Soundcraft 200 Delta. **Soundstages:** 20 x 20 video, 12 x 17 audio. **Other Major Equipment:** Pinnacle 2040 paint and 3-D animation, Studer Dyaxis 320 disk-based audio editing system. **Rates:** $150 to $200. **Specialization & Credits:** AVID Productions specializes in audio and video, including corporate productions, commercial work and music videos. AVID is designed to handle any project regardless of size and scope. For audio: multitrack analog and digital recording with disk-based editing system, together with SMPTE lockup to Betacam's and D-2's four channels of audio provide maximum flexibility and quality in audio-for-video recording. For video: Betacam to D-2 editing provides top-quality video masters with multilayering and without any generation loss. Special effects, transitions, graphics and 3-D animation are all part of a complete and powerful video program. AVID does it all. Our client list includes: Coakley Heagerty, Opcode Systems, Nikon, the U.S. Postal Service, US Sprint, Woodward & McDowell. Give AVID a call and set up a free consultation to discuss your project and arrive at the best solution and budget on time and within budget.

BEAR CREEK RECORDING AND MUSIC PRODUCTION; *APPV;* **6313 Maltby Rd.; Woodinville, WA 98072; (206) 481-4100. Owner:** Joe Hadlock, producer. **Manager:** Vickielee Wohlbach.

ROBERT BERKE SOUND; *APPV;* **50 Mendell St. #11; San Francisco, CA 94124; (415) 285-8800. Owner:** Robert Berke. **Manager:** Mark Escott. **Video Tape Recorders:** Sony BVH-1100 1", (4) Sony BVU-800 3/4". **Video Monitors:** (17) Sony. **Synchronizers:** (4) Cipher Digital Shadow, (2) Otari EC-101. **Audio Recorders:** (3) Otari MTR-90, (9) Otari MTR-10, (2) Otari MX-5050. **Audio Mixers:** Auditronics 700, Sound Workshop 34B, (2) Soundcraft 600. **Specialization & Credits:** Robert Berke Sound Production & Recording specializes in post-production audio for TV, radio and multi-image. Our new state-of-the-art facility features one of the most versatile and sophisticated audio-for-video computer systems in Northern California and includes multimachine synchronization, event control and electronic audio editing. Our thousands of music and sound effects selections, digital reverb and effects devices, and our highly experienced and creative staff make us a valuable production resource.

COMMUNICREATIONS, INC.; *VPP/E;* **2130 S. Bellaire St.; Denver, CO 80222; (303) 759-1155. Owner:** Don Spencer. **Manager:** Don Spencer. **Video Tape Recorders:** (2) Ampex CVR-40 Betacam, Ampex CVR-10 Betacam, Sony DVR-10 D-2 digital, JVC 850 3/4", JVC 600 3/4", Ampex VPR-2B 1". **Video Monitors:** (3) JVC TM-13U color, JVC VM-R1905U color, (4) Panasonic B&W Status. **Switchers/editors:** Ampex Ace micro editor, Grass Valley GVG-100C switcher. **Video Cameras:** Sony BVP-3A Betacam, Hitachi Z-31, Sharp ZC-B20P. **Synchronizers:** Adams-Smith 2600. **Video Effects Devices:** Microtime Genesis Act III, Abekas A-52, Dubner 10K character generator. **Audio Recorders:** Otari MX-90, Otari MX-70, (3) Otari MX-55, (3) Ampex ATR-100. **Audio Mixers:** Neotek Elite, Allen and Heath 1616. **Soundstages:** 20 x 30 Cyclorama, fully sound treated. **Other Major Equipment:** Arriflex 16SRII 16mm camera w/Zeiss Prime lenses. **Rates:** $75 per hr. 2-track and edit audio, $195 per hr. video edit, $95 per hr. multitrack audio.

FOCUSED AUDIO
San Francisco, CA

FOCUSED AUDIO; *APPV;* **544 Natoma; San Francisco, CA 94103; (415) 777-3108. Owner:** Rob Grace, Jeff Roth. **Manager:** Laredo Heddens. **Video Tape Recorders:** JVC CR-850 3/4" w/time code, (2) JVC BR-8600U VHS w/Jog Knob. **Video Monitors:** (2) Sharp, (2) NEC, (2) JVC, (3) Sony, (2) Mitsubishi 35". **Synchronizers:** (4) IBM computer w/Kelly Quan software, (6) Cipher Digital Shadow. **Audio Recorders:** Otari MX-80 24-track, Otari MTR-10 2-track center-track time code, (2) Fostex B-16 16-track, Fostex E-22 2-track CTC, Fostex DAT w/SMPTE. **Audio Mixers:** Neotek Series III 40 x 32, Allen and Heath 16 x 16. **Other Major Equipment:** Dolby SR x 24 for 24-track, (5) Dolby SR 361 rack and cards, Waveframe disk-based digital workstation, Mac II w/Sound Tools w/280MB HD. **Specialization & Credits:** Focused Audio continues to be a leader in the development and application of creative audio-for-video technology. Having recently produced 65 half-hour soundtracks for Lorimar Telepictures, 26 for the A&E cable channel and numerous documentaries, Focused has moved into the '90s with a brand new facility. Four control rooms and three recording spaces have been carefully designed and equipped with the best audio tools available today. All rooms are SMPTE-locked-to-picture and can access any of our available recording formats: 24-track w/Dolby SR, 16-track or hard disk digital multitrack. Through our machine room, the appropriate control room recording space and recording format for your project and budget can be configured easily. Engineers with expertise in feature films, television sound, multimedia production, music and radio work are on staff to put this facility to work for you.

LIGHTHOUSE MUSIC GROUP; *APPV;* **15514 79th Ave. NE; Bothell, WA 98011; (206) 488-6022. Owner:** Greg Bartlett. **Manager:** Jeff Berglund.

MEDIA WORKS, INC.; *VPF;* **1250 Huff Ln.; Jackson Hole, WY 83001; (307) 733-1300. Owner:** Jeff McDonald, Mark Rohde. **Manager:** Jeff McDonald.

MUSIC ANNEX, INC. AUDIO POST-PRODUCTION DIVISION; *APPV;* **69 Green St.; San Francisco, CA 94111; (415) 421-6622. Owner:** Music Annex, Inc. **Manager:** Angela Goodison. **Video Tape Recorders:** Sony DVR-10 D2, Sony BVH-1100 1" C format, (3) JVC CR850U 3/4" U-matic, JVC CR8250 3/4" U-matic. **Video Monitors:** (2) Sony 27", (7) Sony 13". **Synchronizers:** (3) Audio Kinetics Q-Lock 4.10. **Audio Recorders:** Otari MTR-90 24-track 2", MCI JH-114 24-track 2", (3) Otari MTR-12 2-track 1/4" w/center-track time code, Otari MTR-10 4-track 1/2", (7) Otari MX-5050B 2-track 1/4", Studer Revox PR99 2-track 1/4", (6) TEAC 122B cassette, MTM 35mm Mag, Sony TCD-D10 DAT, NED Post-Pro 16-track Direct-to-Disk, NED Synclavier 9600, (2) E-mu E3, Macintosh II digital workstation, Otari MX-5050 MkIII 8 8-track 1/2". **Audio Mixers:** (2) Amek 2500 36 x 24 w/Master Mix automation, Amek/TAC Scorpion 16 x 8.

NORTHWEST VIDEO WORKS, INC.; *VPP/E, APPV;* **1631 SW Columbia St.; Portland, OR 97201; (503) 227-7202. Owner:** Wayne Ahrendt, Diane Ahrendt, Ken Ahrendt. **Manager:** Doug Barry.

ON SIGHT VIDEO; *OLVP;* **1079 Tennessee St.; San Francisco, CA 94107; (415) 824-5555. Owner:** T. Robin Hirsh. **Video Tape Recorders:** Sony BVP-35 Betacam SP. **Video Cameras:** Sony BVP-70. **Audio Mixers:** Shure FP-32 stereo. **Other Major Equipment:** Van w/full location production package, lighting and GMP, wide-angle Nikon lenses, Sachtler tripod, matte box, Schoeps mics, Lectrosonics wireless.

PACIFIC VIDEO RESOURCES; *VPF, VPP/E, OLVP;* **2339 Third St., Ste. M-4; San Francisco, CA 94107; (415) 864-5679; FAX: (415) 864-2059. Owner:** Jim Farney, Steve Kotton, John Zimmerman. **Manager:** Mike McRoberts, sales/client services.

THE PLANT RECORDING STUDIOS
Sausalito, CA

THE PLANT RECORDING STUDIOS; *OLVP, APPV;* **2200 Bridgeway; Sausalito, CA 94965; (415) 332-6100. Owner:** Bob Skye, Arne Frager. **Manager:** Rose Greenway. **Video Tape Recorders:** JVC CR-850U, Sony 5850, Sony 9600. Video Monitors: (2) Sony PVM-2530 Trinitron 25", Mitsubishi 25", Sony 13" (Rover), Panasonic CT-7711 9". **Synchronizers:** (5) Adams-Smith Zeta-3 w/remote. **Audio Recorders:** (5) Otari MTR-100 and 90II 24-track, Tascam ATR-60 4-track, (2) Sony APR-5003 3-track, (4) Ampex ATR-102 2-track. **Audio Mixers:** SSL 4064 G Series w/total recall, (2) DDA AMR-24 36 x 24 w/84 total inputs, Sound Workshop Series 30 32 x 24 ("Rover"). **Other Major Equipment:** "Rover" for large-scale location recording w/full monitoring and synchronization, up to 48 tracks w/sync to video, New England Digital Synclavier 9600 w/16-track Direct-to-Disk Post Pro. **Specialization & Credits:** California Milk Advisory Board, Supercuts, Pac Bell, Taco Bell, California Raisins, Earthquake Relief, Levis, Safeway, Wesson Oil, Agree Shampoo, MJB Coffee, Manwich, White Cloud, Washington Apples, Bill Graham Presents, Hewlett-Packard, Gumby, KRON-TV, KQED, NBC, MTV, McCann-Erickson, Foote, Cone & Belding, Ketchum Communications, Young & Rubicam, Hal Riney & Partners, Saatchi & Saatchi/DFS.

PRODUCTION WEST; *VPF, VPP/E, OLVP, APPV;* **1001 S. 24th St. West; Billings, MT 59102; (406) 656-9417. Manager:** Jim Abel.

RUSSIAN HILL RECORDING/RUSSIAN HILL FILM-TO-TAPE; *APPV;* **1520 Pacific Ave.; San Francisco, CA 94109; (415) 474-4520. Owner:** Jack Leahy, Bob Shotland. **Manager:** Gail Nord.

SAN FRANCISCO PRODUCTION GROUP; *VPP/E, APPV;* **550 Bryant St.; San Francisco, CA 94107; (415) 495-5595. Owner:** Joel Skidmore, Jeff Cretcher. **Specialization & Credits:** San Francisco Production Group (SFPG) specializes in providing high-quality video post-production and computer graphics services, using the Vertigo and Wavefront 3-D animation systems, the Quantel Paint Box, Ultimatte IV, IMC motion control system and effects editing using Ampex ADO, Abekas Digital Disk Recorder, Grass Valley switchers and CMX controllers. Audio capabilities include sweetening, layback, voice-over recording, library music, digital sound effects and custom tracks, with Otari MTR-90 8-track 1" audio recorder. MIDI-equipped sound production room features Yamaha DX, Sequential Circuits, Linn, Passport, Pro software.

SOUNDWARE AND VIDEO PRODUCTIONS; 1211 Park Ave., Ste. 102; San Jose, CA 95126; (408) 287-8066. Owner: Robert M. Lopes. **Manager:** Brian Godula.

STARSOUND AUDIO, INC.; *VPF, OLVP, APPV;* **2679 Oddie Blvd.; Reno, NV 89512; (702) 331-1010. Owner:** Scott Bergstrom. **Manager:** Lee Taggart. **Video Tape Recorders:** Sony VO-6800, (2) JVC CR-8250U, (2) JVC CP-5550U, (2) Panasonic AG-6500. **Video Monitors:** (3) Sony Trinitron, Panasonic. **Switchers/editors:** Sony SEG-2000, JVC RM-86U, Panasonic AG-A650. **Video Cameras:** Sony DCK-3A, (2) Hitachi FP-21. **Audio Recorders:** Studer A80-24, Otari 5050 MkIII-2, Tascam 52. **Audio Mixers:** Amek Angela 28/24. **Other Major Equipment:** (3) JBL 6810 video projection system, full 24-track recording studio, full concert sound and lighting packages—in-house. **Rates:** Call for project needs.

World Radio History

STUDIO CENTER SAN JOSE; *VPF, VPP/E, OLVP, APPV;* **434 S. First St.; San Jose, CA 95113; (408) 993-1040; FAX: (408) 993-1056. Owner:** Corporation—Centerpoint Communications Group. **Manager:** Jerry McReynolds—audio, Robin Knutson—video. **Video Tape Recorders:** (3) Sony BVU-950SP 3/4" U-matic, Sony BVU-920 D.T. SP 3/4" U-matic, Sony BVU-150 SP 3/4" U-matic, Sony VO-5850 3/4" U-matic, Sony VO-7020 player 3/4" U-matic. **Video Monitors:** Sony PVM-1211 12" color, Sony PVM-1271Q 13" color, (6) Panasonic TR-930U 9" B&W. **Switchers/editors:** Sony BVE-900 edit controller, Sony SEG-2550/2551 automated, Video Media Mickey offline system. **Video Cameras:** (3) Ikegami 730A. **Synchronizers:** Audio Kinetics Pacer. **Audio Recorders:** Otari MX-7016-track, Otari MX-5050 MkIII 2-track, (2) TEAC 3340S/2340SX 4-track. **Audio Mixers:** Sound Workshop Series 30 26 x 24 w/automation and DiskMix, Tascam M208 8 x 4 x 2 8-channel. **Soundstages:** 1,200 sq.ft. w/hard Cyclorama 40 x 30 x 24. **Other Major Equipment:** Lumena 2-D custom computer graphics system, Fairlight CVI digital effects, (4) IBM computers for automation, edit list management, MIDI studio, recording studio, grand piano. **Rates:** Call for rates and free brochure.

ZEN PLANNING, U.S.A., INC.; *VPF, VPP/E, OLVP;* **944 Market St., Ste. 712; San Francisco, CA 94102; (415) 433-7145. Owner:** Masanori Oba. **Manager:** Shingo Kohara.

OUTSIDE U.S.

COMMERCIAL ELECTRONICS LTD.; *VPP/E, OLVP;* **1335 Burrard St.; Vancouver, BC, V6Z 1Z7 Canada; (604) 669-5525; FAX: (604) 669-6347. Owner:** H.H. von Tiesenhausen. **Manager:** David Van Buskirk.

GROUPE ANDRE PERRY, INC.; *VPP/E, APPV;* **201 Perry St.; Morin Heights, Quebec, J0R 1H0 Canada; (514) 226-3831. Owner:** Pierre Raymond. **Manager:** Mario Rachiele.

MASTERTRACK LTD.; *APPV;* **35A Hazelton Ave.; Toronto, Ontario, M5R 2E3 Canada; (416) 922-4004. Owner:** Ken Burgess. **Manager:** Andy Condon.

MCCLEAR PLACE RECORDING AND POST-PRODUCTION STUDIOS; *APPV;* **225 Mutual St.; Toronto, Ontario, M4M 1T4 Canada; (416) 977-9740; FAX: (416) 977-7147. Owner:** Robert K. Richards. **Manager:** Jane Rowan, contact.

MEDIA HOUSE PRODUCTIONS, INC.; *VPP/E;* **1174 Winnipeg St.; Regina, Saskatchewan, S4R 1J6 Canada: (306) 359-0977; FAX: (306) 569-2240. Owner:** Bruce A. Solilo. **Manager:** Bruce A. Solilo.

SOUNDS INTERCHANGE; *APPV;* **506 Adelaide St. E.; Toronto, Ontario, M5A 1N6 Canada; (416) 364-8512. Owner:** Supercorp. **Manager:** Peter Mann.

STUDIO PLACE ROYALE, INC.
Montreal, Quebec, Canada

STUDIO PLACE ROYALE, INC.; *APPV;* **640 St. Paul W. (6th Floor); Montreal, Quebec, H3C 1L9 Canada; (514) 866-6074. Owner:** S. Brown, N. Rodrigue. **Manager:** S. Brown. **Video Tape Recorders:** Sony/MCI JH-110 1" layback, JVC 3/4" VCR, (3) JVC 1/2" VCR, Sony Betacam-SP. **Video Monitors:** (2) JVC, (4) Sony, (2) Hitachi. **Switchers/editors:** (2) Soundmaster. **Synchronizers:** (2) Soundmaster w/CMX. **Audio Recorders:** (2) Otari MTR-90, MX-80 24-track, Otari MX-70 8-track, (3) Otari MTR-12 1/4" CTTC. **Audio Mixers:** (2) Amek Angela 32 i/p, A&H Syncon 24 i/p. **Soundstages:** 25 x 15 Foley. **Other Major Equipment:** Samplers, sound editing and signal processing, all SFX CDs, over 20,000 cuts production music. **Rates:** $80 to $150/hr.

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STUDIO SAINT-CHARLES; *APPV;* **85 Grant; Longueuil, Quebec, J4H 3H4 Canada; (514) 674-4927. Owner:** Tele Metropole, Inc. **Manager:** Yves E. Senecal.

STUDIO TEMPO INC.; *APPV;* **0707 Charlevoix St.; Montreal, Quebec, H3K 2Y1 Canada; (514) 937-9571. Owner:** Yves Lapierre, president. **Manager:** Dawn Corbett.

STUDIO 306; *APPV;* **306 Seaton St.; Toronto, Ontario, M5A 2T7 Canada; (416) 968-2306. Owner:** Brian Mitchell. **Manager:** Ann Barrett.

SUNDAE SOUND STUDIO LTD.; *VPP/E, APPV;* **3516 1st St. NE; Calgary, Alberta, T2E 3C9 Canada; (403) 230-2331; FAX: (403) 276-8187. Owner:** Doug Wong. **Manager:** Lana Tsung.

VTR/EASTERN SOUND; *VPF, VPP/E, APPV;* **48 Yorkville Ave.; Toronto, Ontario, M4W 1L4 Canada; (416) 968-1855; FAX: (416) 924-9973. Owner:** Standard Broadcasting. **Manager:** Kevin Evans.

WEST 11TH AUDIO; *APPV;* **822 11th Ave. SW; Calgary, Alberta, T2R 0E5 Canada; (403) 265-0258. Owner:** Lanny Williamson. **Manager:** Chris McIntosh.

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MIX THE RECORDING INDUSTRY MAGAZINE

—FROM PAGE 6, CURRENT

commercial insurance plan, which includes major medical and such unique options as comprehensive master tape coverage and business interruption coverage. Mandell also outlined HARP's exploration of group equipment purchase and evaluation plans, and a centralized database of personnel, equipment and parts.

Discussion of the home studio controversy was limited to discussion of the Home Occupations Ordinance, currently under review by the mayor's office. HARP favors a draft similar to one currently in effect in Long Beach, Calif. Public hearings are expected to begin in early April. For dates and times, contact the Los Angeles City Planning Commission at (213) 485-5071.

For more information on HARP, call (213) 655-2452.

—*Guy DeFazio*

HOME STUDIO UPDATE

Terry Williams, owner of Lion Share Studios and president of HARP, has been involved in what has become known as the home studio controversy since Day One (see *Mix*, September 1989). Because of pressure from HARP and organizations representing home studio owners, the City of Los Angeles is now reviewing a Home Occupations Ordinance, which, in theory, will cover painters, screenwriters, composers, doctors, lawyers—anyone working at home. "It's not the Home *Audio* Ordinance," Williams cautions, "it's the Home Occupations Ordinance."

Mix asked, "Why did it take the audio community to bring the issue to a head? And why L.A.?"

"First of all," Williams says, "the zoning issue is a very old issue for the City of Los Angeles. In the past, those violations have been a horse where it's not supposed to be or a five-story building where there's supposed to be a two-story building. Well, now there is a tremendous loss in tax revenue to the city from specific studios that operate commercial facilities out of their homes.

"Maybe more importantly," he continues, "is the loss of incentive to pay those taxes by those businesses which do adhere to their civic responsibilities. What [HARP] is saying, is, 'Either make them pay taxes, or take ours away.' "

Williams maintains that HARP has no quarrel with the wealthy producers who want to set up a studio and mix at home. That's their right. But once the home facility begins to charge by the hour or by the day, they must be held to the same commercial and civic responsibilities as everyone else.

"We're very aware that there is a transition period from being a home studio to becoming a commercial studio," Williams says. "Nobody got together ten years ago to form a group of home studios to wipe out commercial facilities. I know that. We also all know how they got started: You get an artist who wants a studio to do writing and composing, and next thing you know there's not enough work to keep it going, so you bring somebody else in, and it begins to snowball.

"There are not so many home studios that they are taking away my business. What they do, by not having to pay for many of the things that we do, is set up price precedents with the record companies that make it virtually impossible for a facility that adheres to its responsibilities to justify its rates. I can't possibly compete with a home studio that offers $65 an hour for a Neve VR and Studers. No way. And very few commercial facilities can. That's what HARP is saying: fair competition.

"On the surface it looks so simple," Williams concludes. "HARP is just big bad studio guys. The reality is that we are the only people fighting for everybody's rights, even those guys who are yelling and screaming at us, because they don't realize that in an R1 residential zone nothing is legal. Nothing.

"The irony of this is that I'm going in to fight to pay more taxes. It's ridiculous. I should be saying, 'You tell me these [home] guys are right, and I'll sell my 22,000 square feet and go buy a home in Woodland Hills, and I'll be a lot happier guy. With a lot bigger profit margin.' And I'd venture to say that the rest of the HARP membership feels the same way." ■

World Radio History

FEEDBACK

DIAPHRAGM DEBATE

I read your recent articles regarding microphones by Stephen Paul with great interest, and I feel compelled to make some comments. First, let me say that I have known Stephen for many years, and he is the most knowledgeable microphone technician I have ever been acquainted with. I have never even seen or heard of an AKG C-2!

However, I have always differed philosophically with him as to his modification of the diaphragms of tube-type mics. I want an M49 to be an M49, and a C-12 to be a C-12—not someone's idea of what they should be. The fact is that after Stephen reworks an old diaphragm, it can never be returned to its original condition. Whether a thinner mylar diaphragm is a sonic improvement remains a matter of debate in the industry, and there are some very discerning engineers who would never agree to have their wonderful old mics rebuilt in Stephen's vision.

In the meantime, if Stephen wants to give away those old CK-12 diaphragms, we could use them to provide a few more systems for you audio maniacs out there!

Dan Alexander
D.A. Audio
Berkeley, Calif.

Stephen Paul Replies:

First a historical note: The C-2 did indeed exist and was the earliest incarnation of the C-12. This information came directly from AKG in Vienna through the most kind agency of Mr. Norbert Sobol.

In regards to your remarks about how you personally would like an M49 or a C-12 to be, may I say that you are certainly welcome to have them this way. I have never forced anyone to come to us with a microphone and have it rebuilt. Our customers come to us because they have heard the results of our work and want their own mics to sound the same way.

In addition, if you did have an M49 done here and wanted it back the way it was, we can certainly accommodate you with a factory capsule, as we are an authorized Neumann service agency and dealer. This was partially a result of our being visited by Stephan Peus, the head of microphone development at Neumann. I believe it is safe to say that he approved of what he saw.

As far as the AKG products are concerned, I think it is general knowledge that original-style parts are no longer available from the factory, and a stock capsule replacement will result in a sound that is a lot further from the original than anything we are likely to do in my lab!

Addressing the debate in the industry over whether or not what we have done is an improvement, anyone who wishes us to restore a mic to original specs (i.e., a 6-micron diaphragm) may certainly make that request, and if one is willing to wait until we make a gold coating run, we will be happy to comply. No one to date has asked us for this. Neither has anyone to date asked us to restore a microphone we have modified to its original sound.

Giving away "those old diaphragms" would not do anyone much good, as it is rare that a mic comes in with the diaphragms in great shape at rebuild time. Except in some cases where a client absolutely wants our sound regardless of the condition of his capsule (and many clients will tell you we are careful to inform them if their capsule doesn't require a rebuild based on condition), or in those cases where someone orders a new Neumann with a mod, most of the stuff we see has been punctured or has lost its coating integrity along the way, owing to some overzealous technician with a Q-Tip in hand.

I hope this clears up your concerns, and if we can ever be of service to you, please let me know.

THIEVES ON THE LOOSE

As a studio owner and designer of many large rooms, I would like to bring up an issue that seriously endangers live recording.

I have gotten phone calls recently from keyboard players wanting to sample drums in our room for four hours and leave to go to a MIDI studio to do several weeks of work for a major artist's album. These people make a living being hired by producers to rent them their services, equipment and sound library. Both of these people were told, "No!" We have a tremendous investment in our large room, and we are not about to watch our hard work end up on a floppy disk that will be sold for $5.

Imagine a future where all the previously recorded samples form the entire basis for new music. I'm not just talking about drums, but vocals and all instruments. You hard-working studio owners, engineers and assistants who have spent time learning your profession and mic technique, who want to see your name on albums, and who want to have a future in this business, may some day be out of a job. Unless you think seriously about what you are going to allow and what you are going to recommend to your customers regarding sampling, you might be better off learning a new trade such as welding.

As a drummer, I must admit I resent hearing the same drums over and over on hit records, and it isn't limited to drums. I can't do anything about it when I hear it on the radio. But I can do this: I will offer a reward for information leading to the arrest and successful prosecution of anyone bootlegging the sound of our studio or selling samples of our room without our permission (which they will never get).

Alan Fierstein
Sorcerer Sound
New York City

World Radio History

—FROM PAGE 178, TAPE & DISC NEWS

ous manufacturing processes on ultimate disc quality. The SVC Equipment Exhibit on May 2-3 will feature gear from more than 70 participating companies. Further information is available from SVC at (505) 298-7624.

SPLICES

American Helix of Lancaster, PA, has developed an educational series for those interested in CD-ROM optical publishing. Conducted in Alexandria, VA, the workshops will include "Implementing Laserdisc Technology" on April 18-19, and "Implementing Interactive Video Technology" on May 14-18. Call (717) 392-7840 for details...**Optical Disc Corporation**, recently relocated to a new 45,000-sq.ft. facility in Santa Fe Springs, CA, has begun shipment of the 534 EFM Digital Audio Processor. The company claims that the ODC 534 is the only system of its kind to offer digital sound processing for videodiscs in addition to CDs. The unit, priced at $25,000, is designed to work with any available videodisc or CD mastering system, and transfers directly from AES, D1 or D2 formats without requiring SDIF equipment...A conversion service from any videotape format to "permanent" videodiscs is now being offered by **Modern Telecommunications Inc.** of New York, NY. The company employs a "combination of chemical and electronic methodology" to salvage and enhance aging masters...**Cassette Productions Unlimited** has opened a new manufacturing facility in Arden, NC. The plant currently uses 20,000 square feet and plans call for rapid addition of another 26,500 square feet. Combined with the company's existing Irwindale, CA, facility, the new operation brings Cassette Productions' daily audio cassette capacity up to 75,000. President Jeff Baker predicts the move will allow the firm's business to expand from primarily spoken word into serving the music market...**WEA** has approved a custom system developed by **Concept Designs** of Graham, NC, to simplify quality control auditioning. The QC Panel allows monitor selection from a variety of sources in stereo, single-channel or mono modes without level readjustment. Manufacture has begun on units for placement worldwide in WEA facilities...**JVC Professional Products** has reported two large sales of its BR-7030U tri-deck video recorders. **EMC Productions** (St. Paul, MN), a corporate/educational duplicator turning out 100,000 tapes per month, has taken delivery of 180 of the units, which house three transports each. In Fairfax, VA, meanwhile, **Media Associates** has purchased more than 75 of the machines as part of a move into the consumer video duping market...**Agfa** has presented its Pancake Award for video duplication to **Premiere Video** of Livonia, MI, for "pioneering efforts in the use of ultra-thin base videotape formulations" for home video release of *The Last Emperor*. Use of the thin-base-tapes enables programs of up to 167 minutes to be offered in one standard-sized VHS cassette. ■

—FROM PAGE 129

attack, hold and release. Thirty-five (!) LEDs indicate operational status at a glance, and ten switches on each channel provide for the selection of gate and filter in/out, masking, trigger signal monitoring, key/external input select, fixed envelope triggering, stereo link operation and MIDI velocity.

If you're wondering about that last parameter control, maybe it's because I left something out: MIDI. Besides offering a wealth of the usual gating functions, the DN510 allows the user to trigger MIDI sources (such as samples or drum machine notes) from an audio input.

This provides the opportunity for a lot of slick tricks. In live performance, any audio source, such as a miked snare, can trigger a drum machine voice for doubling effects; or the unit can be triggered from taped tracks in the studio for percussion replacement. But the DN510's MIDI fun doesn't end there. Its delay controls can be used to offset the MIDI event for flam effects—more subtly, to layer a special effect, such as a metallic clank—to the end of the original sound's decay. The unit's "mask" control also offers some creative potential: It allows the unit to ignore triggers (adjustable for up to four seconds) and can be tuned so that MIDI events occur every other beat, every other measure, etc.

The DN510's rear panel includes electronically balanced XLR audio inputs, unbalanced XLR audio outputs, balanced 1/4-inch key inputs and 1/4-inch trigger inputs/outputs (for interfacing to pre-MIDI control voltage gear or for remote triggering applications). MIDI parameters, such as channel (1 to 16), note number (0 to 127) and velocity range are set via inset DIP switches on the DN510's back panel. While this is not as convenient as front panel control, it provides a compact way of dealing with the MIDI settings (thus reducing both the size and cost of the unit) and is highly tamper-resistant. The latter point is especially important in live sound situations, where you can avoid accidentally changing a setting during a performance.

The DN510 is straightforward and easy to use. The MIDI data defaults to channel 1, with the gate's left input triggering note 36, the right to note 38, which correspond to the kick and snare note numbers on many drum machines. If you plan to change the settings of the MIDI DIP switches frequently, it's wise to keep a copy of the switch settings chart from the manual on hand. A monitor switch that lets the user hear the external input and the -12dB/octave, 2-band filter section simplifies the job of tailoring an input signal for triggering. From an audio standpoint, the DN510 handled standard studio gating and ducking chores effortlessly, with transparent, distortion-free audio performance and smooth gating action.

The Klark-Teknik DN510 is a flexible and useful device with much to offer the creative audio professional. At a list price of $1,100, it is well worth checking out.

Klark-Teknik Electronics, Inc., 30B Banfi Plaza, North, Farmingdale, NY 11735; (516) 249-3660. ■

When not writing and testing products for Mix, *George Petersen can usually be found pushing a fader or stacking a bass bin somewhere in California.*

World Radio History

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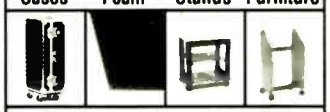

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