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THE RECORDING INDUSTRY MAGAZINE

# Mix

Interview: Laurie Anderson

**Studio Design Issue**

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**Chips Davis**  
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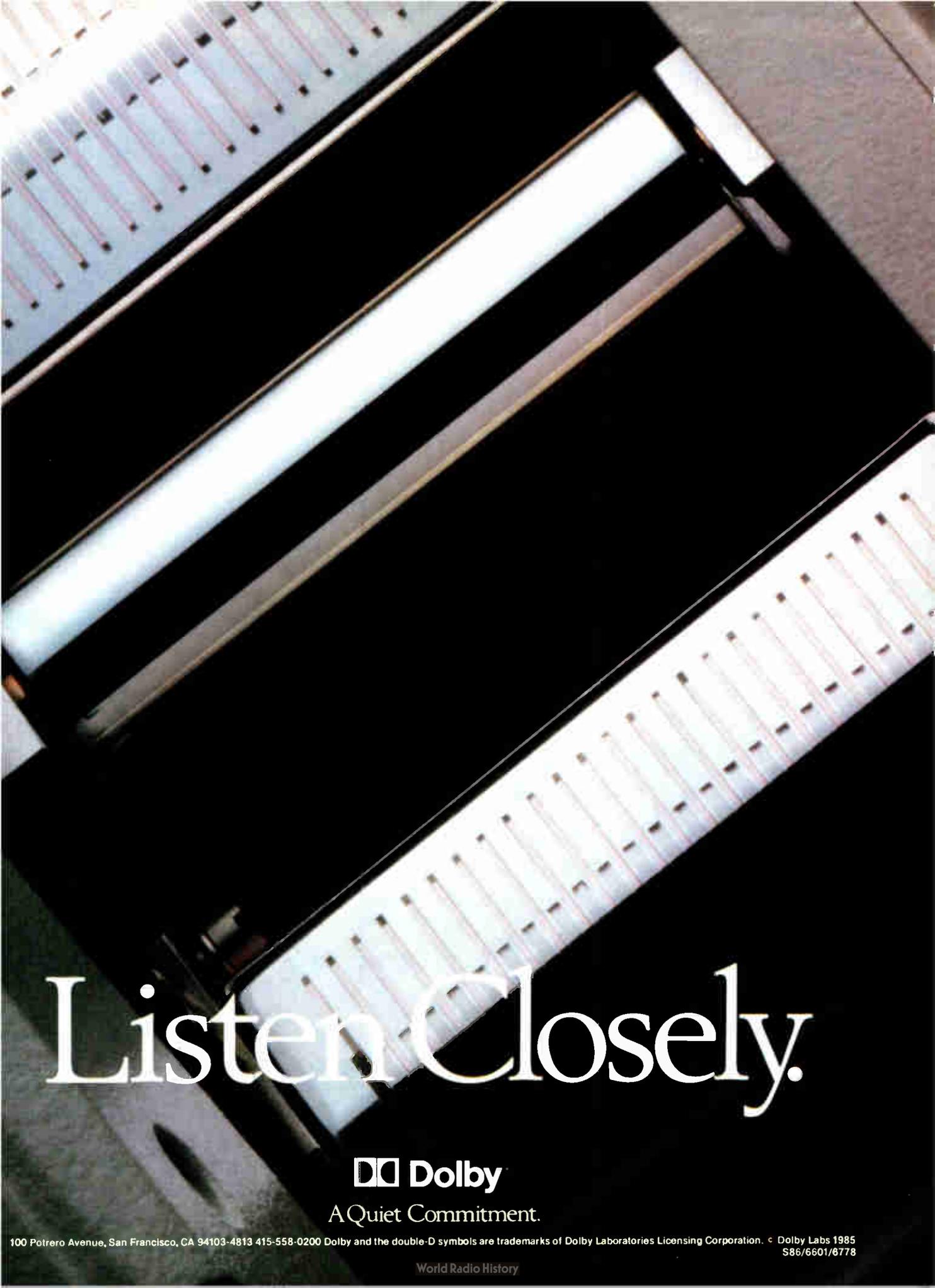
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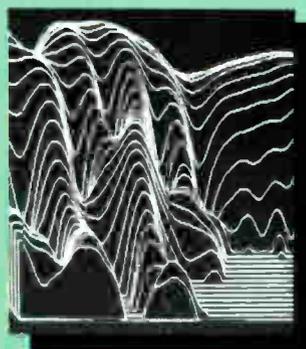
World Radio History



Page 83



Page 24



Page 30



Page 117

## FEATURES

- 10 STUDIO NEWS:** Class of '86  
*A photo special of new rooms and redesigns.*
- 24 JEAN-MICHEL JARRE:**  
Rendezvous with the Future  
by Iain Blair *An interview with the French composer/synthesist behind Houston's multimedia extravaganza.*
- 30 FORUM** by George Petersen  
*Studio designers talk about how computers have changed their approach to the craft.*
- 70 LUNCHING WITH BONZAI:** Tom Hidley  
by Mr. Bonzai *The "granddaddy" of studio design speaks openly about his remarkable successes and his greatest failures.*
- 99 LAURIE ANDERSON GETS THE MOVIE BUG**  
by David Gans and Bonnie Simmons  
*The noted musician/performance artist tells how she moved offstage and onto the silver screen.*
- 131 PLAYBACK:** Meadowlark Records  
by Tony Thomas *A new label sends New Age music on a spiritual flight.*

## AUDIO

- 18 INSIDER AUDIO:** BVH-2800, CD-I and Other Topix by Ken Pohlmann
- 26 BASICS:** Stereo Mic Math by John Woram
- 40 INSTALLING THE STUDIO:**  
A Guide to Getting It All Together  
by Greg Hanks
- 60 FIELD TEST:** Roland SRV-2000 Digital Reverb  
by Larry Oppenheimer
- 66 FIELD TEST:** Soundtracs MR-Series Console  
by David P. Ruttenberg
- 78 ARTIST STUDIO:**  
Suzanne Ciani's C/M Studios  
by Brooke Sheffield Comer
- 83 SOUND ON STAGE:** Behind the scenes at Disney World's Magic Kingdom.  
by Mark A. Drury
- 88 TAPE HEADS:** An Introduction  
by John French
- 134 AFTERMIX** by Philip De Lancie
- 150 CHIPS DAVIS ON "LIVE-END, DEAD-END"**  
by Linda Jacobson

## VIDEO

- 138 VIDEO NEWS** by Elizabeth Rollins
- 140 MVP:** The Intelligent Studio  
by Lou CasaBianca

## MUSIC

- 90 IN SYNC:** Megatracking at Home  
by Bruce Nazarian
- 96 M.I. UPDATE:** On the NAMM Beat  
by Craig Anderton
- 105 MUSIC NOTES:** • Leon Redbone • Wax  
• George Howard • The Bangles • Bill Laswell

## DEPARTMENTS

- |                         |                        |
|-------------------------|------------------------|
| <b>6</b> CURRENT        | <b>189</b> MIX WORDS   |
| <b>8</b> INDUSTRY NOTES | <b>190</b> CLASSIFIEDS |
| <b>10</b> SESSIONS      | <b>194</b> AD INDEX    |
| <b>56</b> PREVIEW       |                        |

# FROM THE EDITOR

## DIRECTORY

STUDIO DESIGNERS AND SUPPLIERS

- 155** DIRECTORY CONTENTS
- 156** NORTHEAST STATES
- 164** SOUTHEAST STATES
- 168** NORTH CENTRAL STATES
- 175** SOUTHERN CALIFORNIA
- 173** SOUTHWEST STATES
- 180** NORTHWEST STATES & HAWAII
- 185** OUTSIDE U.S.



This month's cover: Omega Recording Studios in Rockville, MD. This 12,000 sq. ft. studio complex is capable of handling everything from jingle sessions to orchestras. Its three studios are equipped with Studer, MCI and Ampex recorders, and consoles by API, Studer and Audiotronics. And of course, it is completely equipped for video lock-up work. Owner Bob Yesbek was the principal designer. Photo by: Robert Wolsch. Corner photo of Laurie Anderson: by George Holz



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**P**erhaps you noticed a TEC Awards voting ballot on the cover of this issue. This is our second year of presenting Technical Excellence and Creativity Awards to the people, products and institutions that have contributed in a special way to the quality and advancement of our industry. More precisely, the TEC Awards are made by you, the readers, who nominate and vote in 19 categories of achievement.

So why do we need another awards program? For the most part, we are an invisible industry. We stand behind the scenes, happy to let the stars hold the spotlight and sell the records. Our recognition is more subtle, though it's no less important. The TEC Awards are a salute to our special peers and one more way to encourage and reward excellence and high levels of effort.

Our industry was built on the contributions made by a relatively small group of engineers, artists and craftsmen who took the extra steps beyond the standard approach or the easy out. Our future depends on this same spirit, to push a little further and to reach a little higher. As long as there are people who are willing to settle for nothing less than their very best, we will continue to work in an industry that makes people happy and adds richness to our life and times.

Please be a part of the TEC Awards by taking a minute to vote; and if you plan to be in Los Angeles in November during the AES Convention, make a reservation to attend the TEC Awards ceremony. We'll tell you more about that later in the issue.

Keep reading,

David M. Schwartz  
Editor/Publisher

# CURRENT

## TEAC Chooses DASH Format

TEAC has sided with the Digital Audio Stationary Head (DASH) proponents for their line of digital multi- and 2-track audio recorders, the first of which is scheduled to reach the market in the spring of 1987. TEAC, which chose the DASH system because of their feeling that it was the major contender in the digital race, has not released any further information regarding specific products they plan to produce. With the announcement, TEAC joins Sony, Studer and Matsushita in producing digital recorders in the three-year-old DASH format.

## Home Taping Bill Update

The Senate Judiciary Subcommittee on Patents, Copyrights and Trademarks has approved legislation, in a six to one vote, that would place a five percent royalty tax on consumer audio tape recorders and a 25 percent tax on "dual-bay" equipment "to compensate American creators and producers of music for a portion of the income they lose due to home taping." This bill eliminates the original proposal, S.1739 sponsored by Maryland Senator Charles Mathias, that a royalty be levied on blank audio recording tapes and outlines a system for distribution of the royalties collected. The measure also forbids the importation or manufacture of audio recording machines with three or more wells. The bill now goes before the full Senate Judiciary Committee.

## CD-I Conference Planned

Online International has announced plans for a CD-I (Interactive Compact Disc) conference and exhibition to be held at Moscone Center in San Francisco May 11 through 13, 1987. The event will include a discussion of standards by major industry figures as well as production details and instructions offered by applications experts. The exhibition will feature a showcase of

## Mix Expands Southern California Offices

Mix Publications, Inc. has moved its Southern California advertising offices to larger quarters at 19725 Sherman Way, Canoga Park, CA 91306. Heading up the operation is Ken Rose, who joins *Mix* as Southern California/Southwest Advertising Manager, after four years with *Radio & Records* as national account executive. Prior to *Radio & Records*, Ken was a staff producer for the Westwood One Radio Network. Assisting Ken is Randy Alberts, formerly traffic manager with *Radio & Records*. The new phone number for the Southern California offices are (818) 709-4662.

major products, services and developments in the growing CD-I and CD-ROM industries. Online is currently inviting potential speakers, panelists and exhibitors to get in contact with them by calling Peter Shaw at (212) 279-8890, or writing to him at Online International, 989 Avenue of the Americas, New York, NY 10018.

## SMPTE Conference Set for October

The Society of Motion Picture and Television Engineers (SMPTE) will hold its 128th Technical Conference and Equipment Exhibit October 24 through 29, 1986 at the Jacob Javits Convention Center in New York City. Estimates are that 275 to 300 companies will be exhibiting equipment and services to a projected attendance of 17,500 representing television stations, cable TV, production and post-production facilities, educational institutions and other governmental departments. Technical paper presentations will begin on Sunday, October 26. For more information, contact Society Headquarters, 595 West Hartsdale Ave., White Plains, NY 10607.

## CD-I Specifications Published

Philips and Sony have published the provisional specifications, also known as the "Green Book" that provides the detailed information on the CD-Interactive Media System (CD-I). Both companies will be reviewing the specifications with their licensees in Tokyo and New York this summer, prior to issuing the final specification, expected by the end of the year.

This development follows the "Yellow Book" issued in May which described the physical format specification for CD-ROM and laid the groundwork for storing character and graphic information on optical disks.

According to Rockville Press' June issue of the *Digital Recording Report*, the "Yellow Book" explains how the CD-ROM standard "is derived from the CD-Audio standard, but defines the physical format for the storage of up to 600 megabytes of digital data on a Compact Disc. Information is stored in physically sequential blocks of 2,352 bytes. In the Mode 1 format, 2,048 bytes are for user data, the remainder for sync, address, error detection/correction, etc. Mode 2 allows 2,336 bytes of user data, but has not yet been implemented in media or equipment.

"Unlike CD-Audio, the CD-ROM standard is not linked to any application. It defines *only* the physical format for storing digital data on a Compact Disc."

The "Green Book" defines CD-I parameters including:

- The hardware configuration for reading and decoding discs.
- How to identify stored data as text, software, graphics, video, and/or audio.
- How each data type is to be encoded. This will include low-, medium- and high-resolution graphics, data compression, etc.
- How logical file layout will be handled.

# GET ON TRACK!

Whether you're recording original music scores, layering up sound effects, or synchronizing to video or film for audio-post sweetening, you need a tape recorder that's built especially for your new and exciting business. The MX-70 is the perfect multitrack for the synthesizer oriented studio tied together with MIDI.

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So if synthesizers with MIDI, or SMPTE with film and video, is part of your business, check the specs and don't settle for less than the MX-70. Call your nearest Otari dealer for "Technology You Can Trust".

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# INDUSTRY NOTES

**Panasonic Industrial Company** has shifted the headquarters of **RAMSA**, its professional audio operation, from its Secaucus, NJ, headquarters to the Western Region offices in Cypress, CA. . . . **Peavey Electronics Corp.** has opened a manufacturing and distribution facility in Corby, England. . . . **DOD Electronics** has secured exclusive marketing and distribution rights for the **IVL** line of pitch recognition devices now to be marketed under the **Digitech** name by **DOD**. . . . **Lou Dollenger**, formerly marketing manager for **Mitsubishi's** digital audio products, has formed **Dollenger Associates** to provide marketing communications services to the music and professional audio-video industries. The new firm can be contacted at 112 Charles St., Annapolis, MD 21401, (301) 267-8765. . . . **William H. Butler** has been appointed president of **The Droid Works**, the San Rafael, CA-based manufacturer of the **EditDroid** and the **SoundDroid**. . . . The **British Virgin Group** has announced that **Nick Alexander** has been named managing director of **SynthAxe Ltd.** **Bill Aitken**, the originator and developer of the **SynthAxe**, has left the company to rejoin **Solid State Logic** after his four year absence. . . . **Apogee Electronics Corp.** has moved to new quarters at 1517 20th St., Santa Monica, CA 90404, (213) 828-1930, the former location of **Soundcraft USA** which has joined **JBL Professional** at 8500 Balboa Blvd., Northridge, CA 91329. Meanwhile, **Wayne D. Freeman**, former vice president of **Soundcraft U.S.A.** has been appointed president of **Trident U.S.A.**, and is stationed in the L.A. office. . . . The **National Academy of Recording Arts and Sciences Board of Trustees** unanimously re-elected **Michael Greene** as their national president and board chairman at its recent board meeting in Jamaica. . . . **Audioforce Nashville, Inc.**, a new firm specializing in renting high end audio equipment to the southern and central U.S., has been formed by **Thomas C. Behrens** and **Sid Zimet** at 279 Wilson Pike Circle, Brentwood, TN 37027, (615) 373-2625. . . . **Audio Kinetics** has added **J-Mar Electronics**, in Toronto, and **Sonotechnique**, in Montreal, to their list of international representatives. . . . At **Crawford Post Production, Inc.**, in Atlanta, GA, **Charles A. Eaton** has joined as director of engineering, **Mary Richter** has been added as director of instructional design services and **Charlie Willis** has come on as account representative. . . . The **Record Group** has named **Marc Blank** to the posi-

tion of supervising producer, to work exclusively on Compact Disc Interactive (CD-I) software development projects. . . . **Alpha Audio** of Richmond, VA, has promoted **Carlos Chafin** and **Rober Tulloh** to vice presidents of the organization. . . . **San Francisco Production Group** has expanded, adding **Mark Raupach** to the editing staff, **Fred Meyers** as chief engineer, **Alexandra Tana** as computer graphics artist, and assistant editors **Ernie Camacho**, **Bruce Cyra** and **Mary Holland**. . . . **RPG Diffuser Systems, Inc.** has recently doubled its manufacturing/warehousing space and named **Doug Morgan** production manager. . . . **American Interactive Media, Inc. (AIM)**, a joint CD-I development venture of **Polygram B.V. International** and the Corporate Group Home Interactive Systems division of **Philips International**, has named **Beverly Copeland** vice president, administration and planning. . . . The **Rocky Mountain Film and Video Expo**, featuring over 100 distributors and manufacturers exhibiting, is scheduled for September 29 and 30 at the Regency Hotel in Denver. Call (303) 534-4040 for details. . . . **Tom Martin** has been named manager-production services at **Producers Color Service, Inc.** in Southfield, MI. . . . **Peavey Electronics Corp.** has received the Excellence in Exporting Award for the second time from Governor Bill Allain of Mississippi. . . . **Jim Lautz** has been elected president of the Northern California chapter of the **National Academy of Television Arts and Sciences**. . . . **April Palmer** has been appointed to the post of operation manager at **Douglas I. Sheer & Associates**, marketing consultants to professional audio/video manufacturers in New York City. . . . **Pristine Systems, Inc.** has expanded the distribution network for their recording studio management software to include **Westec Audio/Video Ltd.** in New York City and **Editron** in Melbourne, Australia. . . . The **Bay Area Video Coalition** has announced a call for entries for the 1986 James D. Phelan Award in Video. For information on how native Californians can win the three \$2,500 prizes, call (415) 861-3282. . . . **Steve Sattler** has joined **Penfield Productions, Ltd.**, in Agawam, MA, as chief editor. . . . **Paso Sound Products** of Pelham, NY, has appointed **Ken O'Brien** to the position of product manager. . . . **Amek Systems and Controls**, which has added **Simaen Skofield** to the sales team, was a recipient of the **Queen's Award for Exports 1986**, for the second year in a row. . . .

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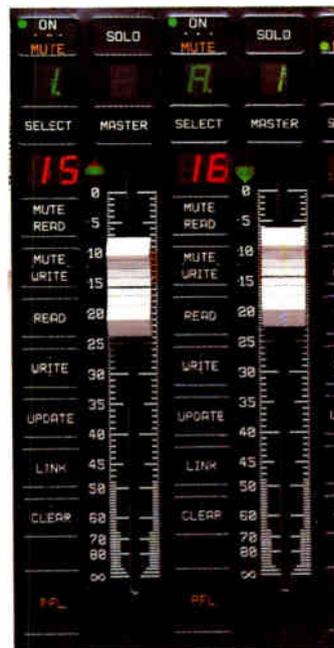
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# S E S S I O N S

## SOUTHWEST

*Planet Dallas Studio's* engineer **Rick Rooney** has been busy with several album projects including *Donnie Ray & The Honky-tonkers* and *Tropix*. . . In *Dallas Sound Lab's* Studio A, General Dynamics produced a multi-screen audio-visual presentation based on the F-16 fighter jet. The music score for *Star Performer* was recorded on the 3324 and mixed to F-1 for later assembly with DSL's **Ron Coté** engineering the scoring dates. . . *White Rose Studio* in Edmond, OK, recently finished a new single for **Felix Linden**, two demos for songs co-written by **Craig White**, and **Mike Summers** and **Felix Linden** were recently picked up for further consideration at the Los Angeles Songwriters Showcase. . . *About Nine Times* was in at *Crystal Clear Sound* in Dallas working on its second LP with engineer/producer **Keith Rust**. *Three On A Hill* completed an EP for Deep Ellum Records produced by **Jeff Liles** and engineered by **Keith Rust**. Fort Worth's own **J.B. Strut Band** worked on their first LP, and Dal-

las-based **Very, Very** finished an extensive demo session. . . Joseph Cates Films of New York, hired Dallas-based **Omega Audio's** 46-track remote truck to provide all the audio recording for the recent *Texas 150—A Celebration* ABC Television Network Special. The program, recorded live and aired nationwide, featured over 50 major celebrities and recording artists from Texas. . . The Austin-based **Reelsound's** mobile truck recorded **Black Sabbath** for Westwood One, **Barry Freeman** producing. Reelsound's recording crew included **Mason Harlow**, **Gordon Garrison** and **Malcolm Harper**. . .

## SOUTHEAST

At *Cheshire Sound Studios* in Atlanta, **Little Redd Cottel** cut tracks for his debut album for RCA Records with **Charlie Singleton** and **Ed Howard** producing, **Lewis Turner Padgett** engineering, assisted by **Michael White**. . . At *New River Studios* in Ft. Lauderdale, the **James Last Band** was in mixing their current Polygram release. The

project was produced by **James** and **Ron Last**, mixed by **Ted Stein**, assisted by **Teresa Verplanck**. . . **Don Sampson** finished mixing his latest album project with engineer **Donivan Cowart** at *Creative Workshop* in Nashville. . . At *Higher Skys Recording* in West Columbia, SC, Christian rock group **Alliance** has been in recording and mixing their second EP entitled *Spiritual Battle*. . . At the *Terminal Recording Studios* in Jackson, MS, **The Windbreakers** have been busy recording songs with **Randy Everett** and **Tim Lee** producing the sessions. . . At *Treasure Isle* in Nashville, CBS artist **Ricky Skaggs** added the final overdubs to his new album, *Ed Seay* engineering; and **24 Karat** mixed their new single with **Tom Harding** and **Tom Gregory** producing and **Ed Seay** engineering. . . Veteran R&B artist **Clarence Carter** visited *Disc Mating Inc.* in Nashville for the mastering of his new single "If You Let Me Take You Home" and album *Dr. C.C.* for the Atlanta-based **Ichiban** label. . . At *Sounds Unreel* in Memphis, **Good Question** completed their debut album for SUR Records, produced and recorded by **Jack Holder** and **Don Smith**, with **Evan Rush** assisting. . .

## NORTHEAST

At the *Sound Cottage*, (Port Jefferson, NY) **Primetime** completed a demo project with producers **Jim Black** and **Tom Casey**. . . **Scott Billington** was in *Northeastern Digital Recording* doing editing on the Sony PCM-1610 of a live recording of the **Dirty Dozen Live at Montreaux**. It's a new Compact Disc release for the **Rounder** label. . . **Christine Lavin** has been recording her next LP at *Giant Sound* in NYC. She is co-producing with **Robin Batteau**; **Dave Brown** engineering, **Jeff Cox** assisting. . . At *Sound Heights*, Brooklyn, NY, **Al Baptiste** finalized keyboard tracks for artist **Bernard Liburd's** cut on a compilation of reggae and soca tunes. Engineers and mixing duties were handled by **Vince Traina**, with **Wayne Koehler**. . . **Joe Ferry** and **Andy Bloch** co-produced **The Roches** at *Golden Apple Media* in Mamaroneck, NY. **Bloch** engineered. . . **Westrax Recording** in NYC completed taping two **Bantam Publishing** **Louis L'Amour** novels for **David Rapkin Audio Productions**. Sessions were directed by **Charles Potter** and engineered by **Jesse Plumley**. . . **Phil Austin** of **Trutone Records Disk Mastering Labs** (Haworth, NJ) has been working on several projects by acts like **Tyree**, **White Night** and **Chip E. Barney**. . . At *Kajem* in Philly an LP is being mixed for **Atlantic Records' The Ladder** pro-

—CONTINUED ON PAGE 188

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## THE TASCAM MS-16: FOR THOSE WHO'VE HEARD IT ALL BEFORE.

We designed our new 1" 16-track especially for the skeptics. Those who have heard all the other 16 tracks... and all the other claims. Hearing is believing, and the MS-16 delivers enough audio quality to convince the most critical ears. But that's just part of the story. The fact is, the closer you look into the MS-16, the better it gets.

The MS-16's superlative performance begins with our new micro-radii heads. They virtually eliminate "head bumps" and ensure flat frequency response. Put this together with direct-coupled amplifiers throughout, plus ultra-quiet FETs, and you get exceptional transient and low frequency response with extremely low distortion.

Unlike most tape machines, the record/sync and playback heads on the MS-16 are identical in performance, so you can make critical EQ and processing decisions on overdubs or punch-ins without having to

go back and listen a second time. You get what you want sooner and with fewer headaches.

Record/Function switches for each track allow effortless, one-button punch-ins. Input Enable allows instant talkback during rewinds. With the MS-16, you're free to concentrate on the project at hand... rather than on your tape machine.

The MS-16 takes the grief out of locking up with other audio and video machines as well. The 38-pin standard SMPTE/EBU interface affords speedy, single-cable connection with most popular synchronizers and editing systems. And the MS-16's new Omega Drive transport stands up to continual shuttling while handling tape with kid-glove kindness.

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THE TASCAM MS-16 SIXTEEN TRACK

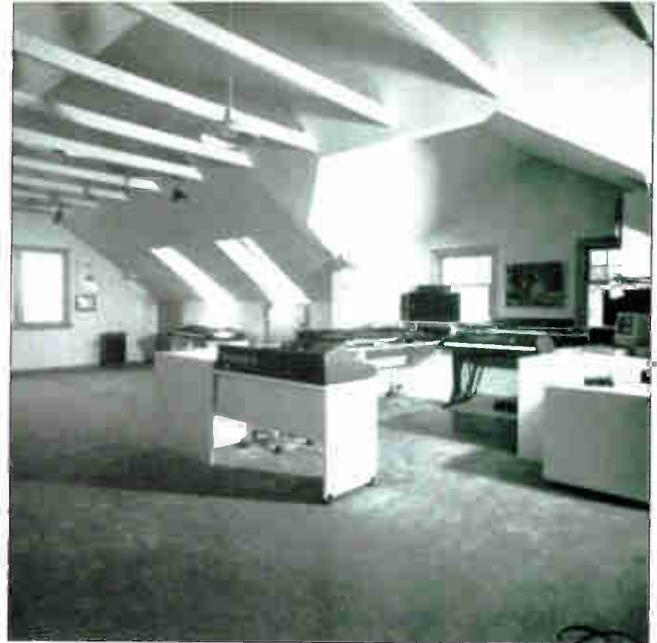


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PHOTO: BENVAS KAUFMAN

Studio A in Dearborn, MI, was designed by John Storyk of New York City and completed about a year ago. It claims to be the only facility in the area built from the ground up to be a recording studio. The 600 sq. ft. control room, equipped by Hy James, Milam Audio and Arnoldt Williams Music, features an MCI JH-528 console, Mitsubishi digital and MCI recorders, and UREI and Yamaha monitors. A 2000 sq. ft. lower level is wired for use as a live chamber.



Live Oak Studio of Berkeley, CA recently opened The Attic, a fully equipped pre-production and electronic music facility, designed by Live Oak's Jim Gardiner. The 20 x 50 room overlooking S.F. Bay is equipped with a Kurzweil 250 system, the Yamaha TX816 rack with eight DX7 modules, Macintosh and IBM computers for recording, sequencing and music notation, the Publison Infernal Machine 90. Tie lines and video monitors tie The Attic to the main studio below.

# Class of '86

## A Sampling of New Rooms for 1986

Meridian Design Associates of NYC, working with acoustical engineer Al Fierstein, put in this dazzling new control room at the Institute of Audio Research in Greenwich Village. Equipment includes an MCI 636 console, MCI 24-track and Studer 2-track recorders, and a host of outboard gear. The room went into operation in January of this year. The principals of Meridian are Bice Wilson and Antonio Argibay.

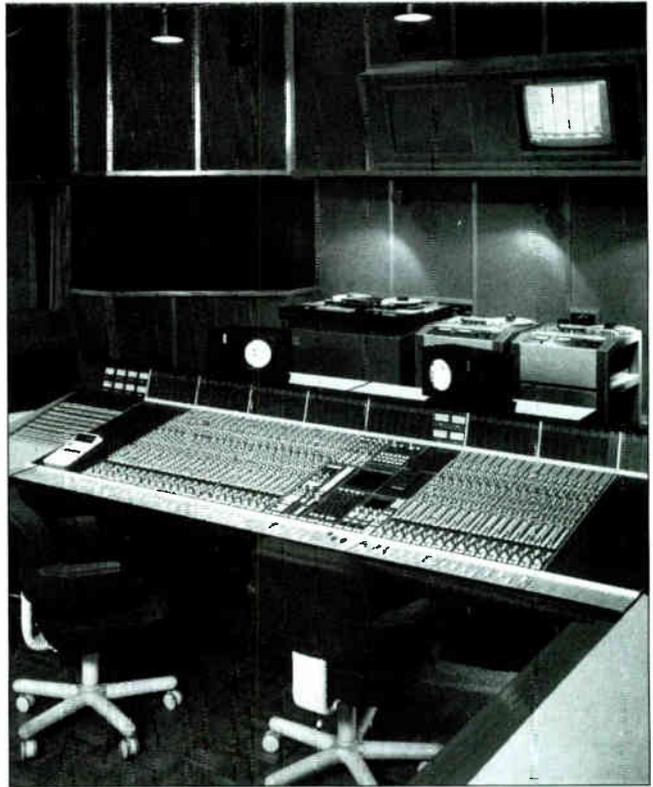


The new 56-track SSL room at NYC's Quad Recording was designed by the studio's own Lou Gonzales. The control room is built to accommodate the increased demands of today's musicians, and will hold synth racks, engineers, producers, several musicians and their friends. In addition, the room has 48-track lock-up, digital equipment and a comprehensive outboard package.





A phantom engineer captures Atlanta session players and members of the Atlanta Symphony in Studio E of that city's Doppler Studios. With acoustic design by George Augspurger and equipment such as the SSL 4000E console and two Otari 24-track and 2-track recorders, it's no wonder Doppler has become one of Atlanta's busiest studios.



Ardent Recordings of Memphis is the largest studio in Tennessee, and with the addition of Studio B, it's easily one of the best equipped, too. Studio B boasts an SSL 6000E, a Mitsubishi X-850 32-track recorder, and a massive complement of outboard gear.



Lakeside Associates of Irvine, CA, designed and built Chartmaker, the private studio of super-producer David Foster in just 11 weeks. It has a comprehensive MIDI interface system, an SSL 4000E console previously owned by the Record Plant, Studer recorders and extensive outboard and video gear. The main monitors are 3-way JBL cabinets designed by Lakeside. Shown here is Humberto Gatica at the console.



PHOTO: BOB DION

(Above) Producer's Color Service of Southfield, MI opened its Audio Post II in early June. Designed by Jim Vittie of Producer's Color, the room features a 32-input SSL 6000E console. All machines can be synchronized to a one-inch Sony BVH 2000 and monitored through a Sony 6-foot projection system.



(Left) Cotton Row in Memphis recently re-designed its control room with the addition of a Trident Series 80 console for its 24-track studio. It features a separate monitor section which allows a total of 56 tracks during mixdown. A new, advanced headphone system was also installed by Mark Rives of Nexus Systems in Mississippi.



The Big Mo Recording Truck, based in Wheaton, MD, was designed by Ed Casey of Entertainment Sound Production (Washington D.C.) and features a custom 40-input console specifically laid out for remote applications, a Soundcraft sub mixer, two MCI 24-tracks, UREI and Yamaha monitors and a flexible assortment of outboard gear. The control room was built by Bill Hill and Ed Eastridge of Pro Audio, Inc. in Wheaton.



Studio 3 at Manta Sound in Toronto, Ont. represents a typical installation by Manta Electronics Group. The room features an MCI 24 channel console and a Studer reel-to-reel recorder, and was developed to meet exact monitoring requirements.



Pictured here is Unique Recording's new "MIDI City" room featuring a 32-channel Neve 8068 Mk II, UREI 813s and a slew of outboard gear. It's adjacent to a small acoustic recording area (through glass) perfect for vocals, percussion, guitar and the like. The room was designed by the Manhattan studio's own Bobby and Joanne Nathan, with acoustical consultation by Bruce Freeman, and equipment supplied by Martin Audio/Video, Manny's Music, Sam Ash Music and Audiotechniques, all NYC businesses.



Chicago Trax's new control room "A" utilizes a number of novel design approaches. The only absorption in the room is that used to control reflections from the loudspeakers. As a result, the room has a live sound, yet when energized by the loudspeakers the mixer hears the sound from the speakers and then a late, very diffuse ambience. The room was also fine tuned using LEDE to optimize it for stereo imaging. An RPG low frequency diffuser (pictured) covers the back wall. The room was built by Bob Boland, acoustician Douglas Jones (ESAI), and the studio's Reid Hyams and Al Ursini. Mike Bednarz of Infinity Audio designed the wiring.



(Left) Gate Five Studios, a new 16-track recording, pre-production and rehearsal facility in Sausalito, CA, features a Ramsa board and Otari MX70 with autolocator. The building itself was completely renovated and rebuilt from the ground up. Acoustical consulting and design was by Dr. Richie Moore. Equipment was supplied by Bananas at Large of San Rafael and Sound Genesis of San Francisco.

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World Radio History



The recently completed Control Room A at Megaphone in Portland, ME has a Reflection Free Zone (RFZ), LEDE™ type design. Steve Blake of Lake Systems designed the new room, and the facility also has a one-inch 8-track control room and an extensive MIDI room.



Image Recording in Olcott Beach, NY, has become one of the most popular studios in western New York State. It was designed by owner Mitch Metzler and equipped by CSE Audio of Rochester. The studio has five floating rooms built around the control room, which is highlighted by MCI, Otari, Ampex and Nakamichi recorders, an Amek Angela board and an extensive array of outboard equipment.



Millbrook Sound Studio (in Millbrook, NY) became the first studio in the state to install Tannoy's 15-inch FSM rock monitors powered by Tannoy's SR840 hi-current MOS-FET amp. It was installed by Richard Rose of Hot House Productions of Highland, NY. Recorders in the studio include an Ampex MM1200, Otari MTR-10 and MTR-12. The console pictured is a NEOTEK Series III.



Formerly known as Arthur Smith Studios, Studioeast in Charlotte, North Carolina was completely redesigned this past January by Steve Durr. Supplied by Showcase Audio in Atlanta, Durr installed an Amek Angela 36 x 24 with a pair of Tannoy FSM monitors in conjunction with a Studer A-80.

(Left) State of the Art Elektronik in Ottawa has just completed the acoustical redesign of control room 2 at Sounds Interchange, the five-studio complex in Toronto. The new design utilizes a pair of CF-2000, four-way active all cone monitors by State of the Art Elektronik. Also included in the redesign are wall-mounted RPG quadratic residue diffusers.

—CONTINUED ON PAGE 128

# The digital effects.

|                                      |                                      |                                    |
|--------------------------------------|--------------------------------------|------------------------------------|
| COMPRESSOR<br>RELEASE = 525ms        | PARAMETRIC EQ.<br>MID FRQ = 500 Hz   | AUTO PAN<br>DIRECTION = L ↔ R      |
| TRIGGERED PAN<br>PANNING = 525ms     | FREEZE A<br>REC MODE = AUTO          | FREEZE B<br>OVER DUB               |
| PITCH CHANGE A<br>BASE KEY = C 3     | PITCH CHANGE B<br>1 FINE = + 8       | PITCH CHANGE C<br>L DLY = 0.1ms    |
| PITCH CHANGE D<br>F.B. GAIN = 10 %   | ADR-NOISE GATE<br>TRG. MSK = 5ms     | SYMPHONIC<br>MOD. DEPTH = 50 %     |
| STEREO PHASING<br>MOD. DLY = 3.0ms   | CHORUS A<br>DM DEPTH = 50 %          | CHORUS B<br>AM DEPTH = 10 %        |
| REV 1 HALL<br>REV TIME = 2.6s        | REV 2 ROOM<br>DELAY = 20.0ms         | REV 3 VOCAL<br>LPF = 8.0 kHz       |
| REV 4 PLATE<br>HIGH = 0.7            | EARLY REF. 1<br>TYPE = RANDOM        | EARLY REF. 2<br>ROOM SIZE = 2.0    |
| STEREO FLANGE A<br>MOD. DEPTH = 50 % | STEREO FLANGE B<br>MOD. FRQ = 0.5 Hz | STEREO ECHO<br>Rch F.B. = +58 %    |
| DELAY L-R<br>Lch DLY = 100.0ms       | TREMOLO<br>MOD. FRQ = 6.0 Hz         | DELAY VIBRATO<br>VIB RISE = 1400ms |
| GATE REVERB<br>LIVENESS = 5          | REVERSE GATE<br>TYPE = REVERSE       | REVERB & GATE<br>TRG. LEVEL = 65   |

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# INSIDER · AUDIO

## BVH-2800 CD-I and other Topix

by Ken Pohlmann

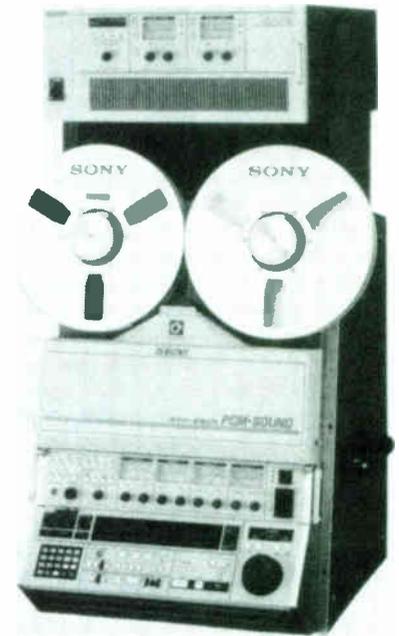
Digital audio has been ripping off video technology for years. The PCM-F1, Model 700, PCM-1610 and all the rest have trampled all over video's sacred right to record pictures. Well, now the sync pulses have come home to roost. Video is ripping off digital audio for a change. This month, we'll audition this increasingly incestuous technological relationship, explore a cost-effective way to carve out a piece of the potentially enormous CD-ROM market, check out the latest in CD-I, and of course, wallow in the mud of industry scuttlebutt with Audio Rumor Central.

Video has always searched for better audio. Apparently it was difficult to find. Half-inch consumer VCR formats adopted Hi-Fi audio recording. Dual systems were developed with separate reels for audio and video; dubbing

houses used two VTRs locked in sync, one playing video, and the other playing back digital audio recorded on a video format. Sooner or later, in its quest for high fidelity sound, video technology was bound to discover digital audio for itself.

Sony has at last placed serious audio in the hands of serious video with introduction of a one-inch recorder with digital audio capability. Two channels of digital audio accompany all of the audio (and video) channels regularly found in type-C, for a total of five audio channels: two digital audio PCM channels, two analog channels, and one longitudinal time code channel. The BVH-2800 provides three hours of recording, the BVH-2830 provides three hours. The extra processing circuits required for PCM audio are contained in the BKH-2801 processor, compatible with both the BVH-2800 and BVH-2830. The system is configured similarly to a PCM-1610/1630 system in that the processor contains A/D, encoder/modulator, demodulator/decoder, and D/A, while the video recorder is used for storage. Of course, with the new BVH recorders, both digital audio and video are simultaneously recorded.

Figure 1 shows the complete footprint of the new one-inch format. All



Sony BVH-2800

video and longitudinal audio-control tracks are recorded according to the normal type-C specifications. The secret of digital audio is located in the sync track, as shown in Figure 2. The digital audio tracks are recorded in the sync channel. By virtue of azimuth

BVH-2800 Tape Format

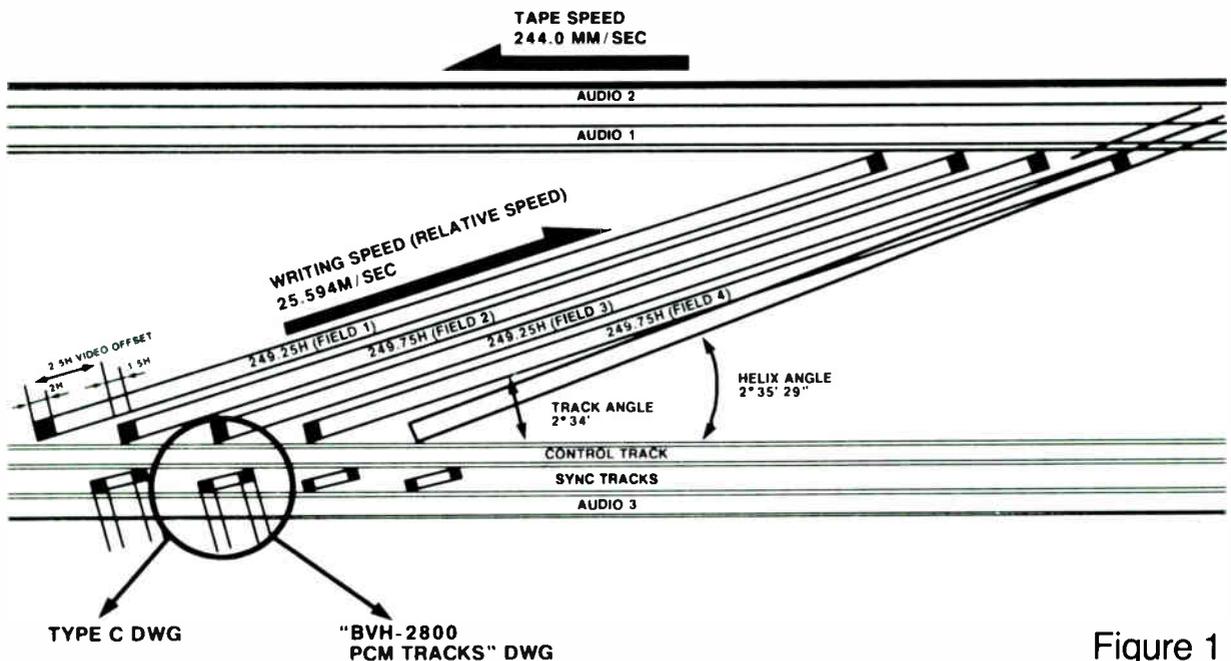


Figure 1

# On tour with P.P.A. Inc. & Henry Austin



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recording, full BVH compatibility is achieved. The two PCM audio channels are directly recorded onto three tracks per one video track. In recording, a set of three record heads receives the channel data at the appropriate time. Confidence playback engages the three respective playback heads. In normal playback mode, the three pre-read heads are used to read the helical digital audio tracks one field before the video track. Thus digital audio processing delays can be compensated for and audio will maintain sync with video. Simultaneous playback is also possible when recording or editing.

For each audio channel, there are 800 16-bit samples per video field.

These 3,200 8-bit bytes are mapped into 192 blocks of 20 bytes each. Encoding then adds parity and redundancy (using Cross-Interleave Reed-Solomon code) to increase mapping of each block to 32 bytes, for a total of 6,144 bytes. Eight-to-ten encoding is used for data optimization. The data writing rate is 24.5 Mbit/second. The sampling frequency is selectable between 44.056, 44.1, and 48 kHz. Emphasis is on/off selectable.

The audio specifications should be adequate for the audio electronics and 3-inch speakers found in most consumer TVs: frequency response +0.5/-1.0 dB from 20 Hz to 20 kHz, THD 0.05 percent, Crosstalk -85 dB, Dynamic range >90 dB, Headroom 20

dB, PCM channel phase difference of 0 degrees.

A minimum system consists of a BVH-2800 or BVH-2830 VTR, and BKH-2801 PCM processor. All inputs and outputs to and from the processor are analog. Simultaneous analog and digital recording can be achieved by adding an optional D/A board (BKH-2805) which also has an analog L + R signal. An optional BKH-2804 PCM audio I/O interface provides AES/EBU input and output. Single cable and two cable mono configurations can be accommodated; this allows for digital communications between the BVH-2800 and existing and future products supporting the AES/EBU protocol.

Importantly, the new system eliminates the need for dual digital audio/video systems. Basic or assembled master audio can be laid down onto two PCM tracks to preserve audio quality during post-production thus saving further generation loss. In multi-track mixdowns, the final mix can be laid onto the BVH-2800's PCM tracks. Assemble and insert editing of the PCM channels is possible, just as it is with the analog channels.

But really, do you need five audio tracks? Of course you do: the two digital tracks hold left and right audio program, the first analog audio track holds a second program, the second analog audio track holds a mono mix or professional channel, and the third analog track is for time code. I'm surprised you managed without them. Incidentally, you video cassette users won't be left in the dust; stay tuned for the Sony DVR-1000/DVPC-1000 component digital VTR with four channels of digital audio for the 525/60 and 625/50 studio and broadcast environments.

Meanwhile, the CD-ROM crystal ball shows that market's future growing increasingly less cloudy. Numerous manufacturers have stepped in to provide hardware, software, and services. Because of its close ties to the music CD (manufacturers have introduced combination audio CD and CD-ROM players), many audio entrepreneurs are looking for a toehold in the potentially vast market of CD-ROM. As we've previously discussed, whether or not it has a beat, data is data, and some music types should be able to apply their expertise to CD-ROM. Hitherto, one problem has been the size of capital expenditure required to participate. That's changing.

Optical Media International, and Quantum Leap Technologies, Inc., in cooperation with JVC have introduced a CD-ROM data premastering system called TOPIX. Essentially, this is a complete turnkey optical media data premastering system based on the

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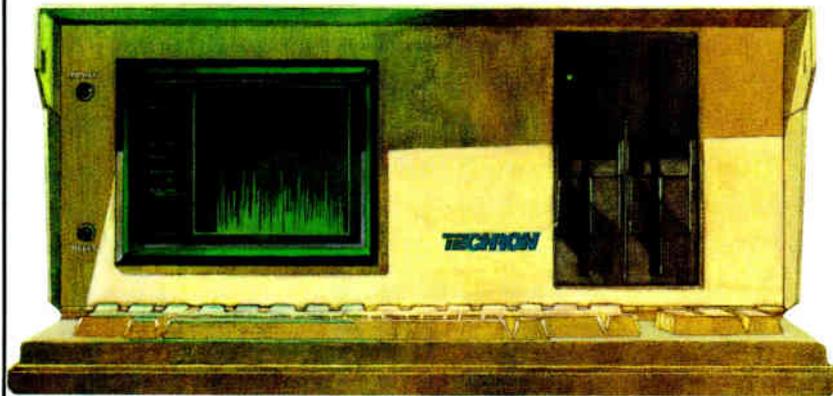
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existing PCM processing techniques used in music CDs. Of course, data appropriate for CD-ROM is substituted for music. The system uses a proprietary interface and software which allows digital data to be recorded onto half-inch VHS tape (or 3/4-inch) and interfaced to an IBM PC/AT. Your angle is this: you provide the data transfer/processing service for clients. Your advantage: the TOPIX system is considerably cheaper than existing mastering systems.

The TOPIX encoding system is shown in Figure 3. It is comprised of an IBM PC/AT, JVC VP-900 PCM processor, IBM-to-JVC interface, JVC editing half-inch VHS VTR (BR-8600U) or 3/4-inch VTR (CR-8250), 9-track mag

tape drive, up to 1.8 gigabytes worth of hard disk, CD-ROM data structure encoder, and software. Using TOPIX, the data program is fully encoded and stored on video cassette using CD-ROM format: each data block contains 12 sync bytes, three address bytes, one mode byte, 2,048 user data bytes in mode 1 or 2,336 bytes in mode 2, and an additional layer of error detection and correction code. The system calculates the CD-ROM data encoding of the sync bytes, address bytes, mode byte, block sizes the program data, and calculates the error detection and correction in near real time. The final premaster tape generated by TOPIX is in the exact format required for all CD audio premasters, except

for the difference in program material. The CD factory (with its own TOPIX) handles the replication from there.

With the right options, TOPIX can be expanded to numerous other applications. With multi-sample rate audio processors, multi-bandwidth filters, and ADPCM (Adaptive Delta Pulse Code Modulation) encoding, the system could be used for CD-I premastering. Data input could be accomplished through keyboard, mag tape, video camera, floppy disk, or PCM digital audio recorder with video and digital audio inputs. PQ code can also be edited. The hard disk can be used for on-line digital audio editing; complete waveform control and editing of 16 bit PCM is accomplished on a Macintosh interfaced to the IBM PC/AT through a SCSI interface.

TOPIX is priced at one-third that of a comparable DEC VAX premastering system. For the cost of a basic system, \$123,000, you can grab a slice of the CD-ROM pie.

Although we checked out CD-I (Compact Disc-Interactive) some readers have expressed some confusion over the new format. Let's quickly review the facts, and get an update on this rapidly developing situation. Although CD-ROM will have extensive applications including widely useful data bases such as textbooks, medical records, and phone books, most applications will shy away from directly consumer markets. CD-I is a mass market version of CD-ROM, featuring full color graphics, digital audio, and text files and programs. Data will be prepared via premastering systems such as the TOPIX, and disks will be manufactured by audio CD and CD-ROM factories. The consumer will use dedicated players with both video, audio and software output. The user would interact with the controller software from a keyboard, and the program would access the required data for retrieval. All of this is brought to you by the co-inventors of the original CD, Philips and Sony.

Some of the basic standards of the CD-I format are easily summarized: up to 16 channels of audio and more than 16 hours of audio/video, up to 7,000 pictures, limited full-motion video possible, up to 300,000 equivalent typed pages, up to equivalent 1,000 floppy disks. Since 16 bit linear PCM audio obviously occupies one full CD, the audio program on CD-I will use data reduction advantages of 8 or 4 bit ADPCM for longer playing times, and to provide room for video program. Five audio quality levels are possible, each occupying smaller percentages of disc space: CD Audio Mode, Hi-Fi Music Mode, Mid-Fi Mu-

—CONTINUED ON PAGE 48

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# JEAN-MICHEL JARRE:

## RENDEZVOUS WITH THE FUTURE

by Iain Blair

Even the state of Texas, where “bigger is better” is a way of life and where most things *are* larger than life, had never seen anything like *this* before. Renowned French composer and synthesist Jean-Michel Jarre literally

turned Houston’s space-age downtown skyline into a mammoth backdrop for his American debut concert entitled “Rendez-Vous Houston: A City In Concert,” making it one of the most truly spectacular multi-media shows to be staged here—or anywhere.

The 90-minute, multi-million dollar

free event featured computer-controlled lasers, mega-projection systems that used the city’s skyscrapers as giant video screens, and some 15,000 synchronized pyrotechnic special effects. Add to that the participation of virtually the entire population of Houston—over one and a half *million* enthusiastic locals showed up to witness the event—and you begin to get some idea of what must surely be one of the largest, most complex multi-media extravaganzas ever staged.

But then the Frenchman is no stranger to such sound and light spectacles, having organized similar events in Paris in 1979, and then in Peking and Shanghai in 1981. In between staging such shows, Jarre has also recorded a series of globally successful albums, including *Oxygene*, *Equinoxe* and last year’s *Zoolook* which also featured contributions from the likes of Laurie Anderson and Adrian Belew.

Exhausted but triumphant over his Houston debut, Jarre talked eagerly about the show, his production and recording methods, and his ambitious plans for the future.

*Were you pleased with results of “Rendez-Vous Houston?”*

Are you kidding?! It was unbelievable. First, after all the rain the night before, I was afraid we might not be able to go ahead, but the weather behaved perfectly, and in fact, having those clouds skimming past over the tops of the skyscrapers during the show made all the lighting effects better than ever. Then, as this was my first ever American performance, I really didn’t know how many people would turn up to see it, and they now tell me that over a million and a half showed up, so I feel it was a great success. The whole thing went very smoothly, and was a dream come true for me—it’s something I’d been wanting to do for a long time now.



*Jarre awash in laser light. His Houston concert was one of the biggest extravaganzas ever staged.*

**“We’ve had generations of acoustic instruments, and now we’re seeing the same process in electronic instruments.”**

*It seems that the event was a culmination of a lot of your earlier work and influences. Can you talk about those a little?*

Well, I’m very lucky in that I’ve been exposed to a wide range of music and influences from an early age. A lot of people assume that my father [renowned composer Maurice Jarre] was the main one, but that’s not really the case, as my parents divorced when I was five and he moved to Hollywood, while I grew up in Europe. I started off studying classical piano at the Conservatoire de Paris, but at the same time, my mother started also introducing me to jazz. We used to go to all these great clubs, and I saw people like John Coltrane and Don Cherry. And then later, in my teens, I got into rock and roll bands, and that was a whole other education.

Probably one of the most important influences was Pierre Schaeffer of the Group de Recherches Musicale. He was the man who really created *musique concrete* or analog sampling

way back in 1948, and it was quite amazing to meet someone who was talking about music not just in terms of notes and harmonies, but in terms of sounds, timbres and colors—more like a painter than a musician. It was through him that I first met other like-minded people like Pierre Boulez and Stockhausen, and suddenly realized that you could escape from the more rigid, traditional ways of considering music. In fact, Paris in the late ‘60s, when I first joined that group of experimenters, was a very fertile, creative time, and that’s when I really got into electronic music. I also feel that all my other musical interests, like rock and jazz and classical and ethnic music, also helped form my style.

*How do you go about composing? Do you use the same working methods or do you vary them a lot?*

It all really depends on what instrument I’m using at any given point. Using the Fairlight or Emulator 2 is obviously a lot different from writing

on a piano, say. First, you start with a musical idea, and then you try to experiment with it and expand on it using different approaches and instruments, whether it’s an old Moog or the latest hi-tech synthesizer. Sometimes, if I have a particular idea for a harmony or melody, I might write it down, but usually I’ll just record it directly into the computer. What I really like the best is to start building an idea by trapping myself—by that, I mean using an unfamiliar or unlikely choice of instrument for the piece. I find that’s the best way to avoid repeating yourself and routine approaches.

*Do you engineer for yourself in the studio?*

Again it depends. I’m lucky enough to have my own studio at home, and I like recording both ways. For instance, sometimes at three or four in the morning I’ll leap out of bed with an idea, and then I can just run downstairs, switch on the gear, and record any-

—CONTINUED ON PAGE 50

*Houston’s skyline lights up for the debut of Jarre’s “Rendez-Vous Houston.”*



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# B A S I C S

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by John Woram

When planning a stereo recording, the most obvious technique is to put up two mics, one for the left and the other for the right. That's the easy part. The big problem is deciding which two mics, and where to put them. There seem to be about as many different solutions to this as there are stereo recording fans. And with most of them, what you hear is what you get; there's no mix-fixing that can be done later on. Left is left and right is right, and if you don't like what you hear, tough.

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## STEREO MIC MATH

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*“The big problem is deciding which two mics, and where to put them. There seem to be as many different solutions to this as there are stereo recording fans. And with most of them, what you hear is what you get; there's no mix-fixing that can be done later on.”*

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Unless you've used the so-called M-S technique. M-S stands for Middle-Side or Mono-Stereo, depending on who you ask. In either case, it begins with a single forward-pointing uni-directional microphone, placed front-and-center. Its output is fed to both left and right speakers.

The other mic is a bi-directional type with one of its dead sides also pointing forward. That means the front of the mic is pointing towards the left side of the room, and the back is pointing towards the right side. In this position, the mic favors sounds arriving from both extreme sides of the group being recorded, while sounds originating at the center are cancelled out (since that's where the dead side of this mic is pointing). It certainly doesn't look (or sound) very promising . . . yet.

When the two mic outputs are combined, the signal picked up by the front of the bi-directional mic is added to the uni-directional output, while the signal arriving towards the rear is subtracted. That's because the front-arriving signal has the same polarity, and the rear-arriving signal has the opposite polarity, as the uni-directional mic output.

Since the front of the bi-directional mic favors the left side, the combined signal is now left-heavy. Of course, if the bi-directional mic has been pointing right-left instead of left-right, the combined signal would be right-heavy instead.

—CONTINUED ON PAGE 28



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**Soundcraft**

Now let's split the bi-directional output to two faders (panned left and right) before combining it with the uni-directional mic, whose output is panned center. Combine the left-panned fader with the center fader and you've got that left-heavy signal coming out of the left speaker. Do the same with the right-panned fader for the same thing coming out of the right speaker. Presto, instant mono. Oh well.

But now press the polarity-reversal switch on the right-panned module. That's the electrical equivalent of reversing the physical orientation of the bi-directional mic, and it produces a right-heavy signal at the right speaker. In other words, stereo. And you can balance the center fader against the left-and right-panned pair to achieve just the amount of stereo-spread you want.

### Why Use the M-S Technique?

Assuming the room acoustics permit a decent-sounding stereo signal, there are a couple of great production bonuses to the M-S technique. First, you can put up the two mics and then "move" them from the control room to achieve just the right balance of sound. Also, you don't have to do the

combining while recording. Just record the M mic on one track and the S mic on the other and you can experiment later on. This allows the advantages of both real stereo and mix-fixing, all on the same tape. You can also provide a mono version simply by using the M track only.

Taken a step further, M-S recording allows the soloist on a multi-track mono production to sound almost like he/she/it was recorded in something a bit larger than a shoe box (provided the producer can cope with lavishing two tracks on something as insignificant as the album's star).

Once the outputs of the M and S microphones have been combined as described above, the resultant left and right signals are the same as those that might have been created by a matched pair of directional microphones, pointed left and right of center. Now all we need to do is figure out what kind of directional microphones, and what the angle is.

Fortunately for those who'd like to probe a bit further, the mic math that was discussed last month can be used to determine both the effective polar patterns and the angle for each one.

Fortunately for everyone else, it would take up too much room to completely do so here. However, a few general comments can be made, just

to give an idea of what's involved.

Remember that in the M-S pair, the front of the M mic is pointing straight ahead (0 degrees) and the S mic is pointed sideways (90 degrees). So the resultant angle is going to be somewhere between 0 and 90 degrees.

Obviously, if the S mic output is turned off, thereby contributing nothing to the combination, both outputs are going to be the same: that of a uni-directional mic angled at 0 degrees. And vice versa: with the M mic off, one output will be the bi-directional mic at +90 degrees, the other at -90 degrees. So we can sweep the two outputs in and out between 0,0 and +90,-90, creating a varying stereo field that ranges between pure mono (0,0) and an unnatural "hyper-stereo" (?) at +90,-90. The ideal sound field will of course be somewhere in between.

Let's see what needs to be done to create resultant patterns that are angled at 45 degrees left and right of center. This can be achieved if the sensitivity of the M mic is arbitrarily considered to be at 1.0 and that of the S mic is at 0.5 (that is, 6 dB below the M mic). In this case, the angle is determined by the directional component contributed to the combination by each mic; that is, the B component in each of the following equations:

$$\begin{array}{l} A + B \\ \text{M mic} \quad 0.5 + 0.5\cos \\ \text{the Uni-directional equation} \end{array}$$

$$\begin{array}{l} S \text{ mic} \quad 0.0 + 1.0\cos \\ \text{the Bi-directional equation} \end{array}$$

But since the sensitivity of the S mic was set at 0.5, its contribution becomes:

$$S \text{ mic} \quad 0.0 + 0.5\cos$$

We can see that the two directional components are equal, and so, since the angle between the mics is 90 degrees, the resultant angle will be 45 degrees. To find the A and B components in the resultant polar pattern:

$$\begin{array}{r} A \quad B \\ 0.5 + 0.5\cos 45 = 0.5 + 0.5 * 0.707 \\ 0.0 + 0.5\cos 45 = 0.0 + 0.5 * 0.707 \\ \hline 0.5 + 0.707 = 1.207 \end{array}$$

Since the resultant sensitivity (the sum of A and B) is greater than 1, we can normalize the equation by dividing each by the sum of 1.207, giving us:

$$\begin{array}{l} A + B \\ 0.414 + 0.586 = 1 \end{array}$$

The reason for doing this is simply to create a set of values whose sum

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equals 1, which lets us compare the new pattern with other better-known

patterns, such as the five popular mics that were listed last month as:

| A     | + | B     | Description                                     | Polar Pattern looks like this         |
|-------|---|-------|---|---------------------------------------|
| 0.000 | + | 1.000 | bi-directional                                  | a figure-8                            |
| 0.250 | + | 0.750 | hyper-cardioid                                  | narrow front lobe, large rear lobe    |
| 0.375 | + | 0.625 | super-cardioid                                  | wider front lobe, smaller rear lobe   |
| 0.414 | + | 0.586 | about midway between super and regular cardioid |                                       |
| 0.500 | + | 0.500 | cardioid  | heart-shape pattern with no rear lobe |
| 1.000 | + | 0.000 | omni-directional                                | perfect circle                        |

### Summary

As mentioned in the June column, the very earliest cardioid microphones were often constructed by placing an omni-directional element and a bi-directional element in the same housing and combining their outputs to produce a single cardioid polar pattern.

Some of today's dual-diaphragm mics consist of two cardioid elements, placed back-to-back. A three-position switch allows the following combinations.

1. Uni-directional. Front element on, back element off.
2. Omni-directional. Front and back elements combined.
3. Bi-directional. Same as 2, but polarity of rear element is reversed.

With a little more trouble, a potentiometer could make the pattern continuously variable from bi-directional, through the cardioid family, to omni-

directional.

The Calrec Soundfield Microphone goes many steps further. It consists of four cardioid elements, one on each surface of a regular tetrahedron; that is, the base and three sides of a small pyramid. Imagine that the pyramid is at the center of a sphere. By matrixing the four outputs into one omni-directional and three bi-directional outputs, it's possible to pan a stereo output left and right and up and down as well.

The angle of the stereo output can also be adjusted.

How is it possible to rotate the stereo output in all directions? Very simple

Of course there's nothing magic about making sure the M and S mic combination produces patterns angled at 45 degrees. The ideal mix of M and S will be the one that creates the best sounding recording, not the one that creates a known angle and/or polar pattern. However, it can be helpful to know what to expect when various M and S mixes are tried.

(it says here): the fixed figure-eight outputs are combined to produce a new figure-eight pattern oriented in whatever direction is required. Then that's combined with the omni-directional output to create a cardioid pattern pointed in the same direction.

The left and right control provides the desired stereo spread, with the added bonus that the up and down control can be used to pick up a little more (or less) room reverberation.

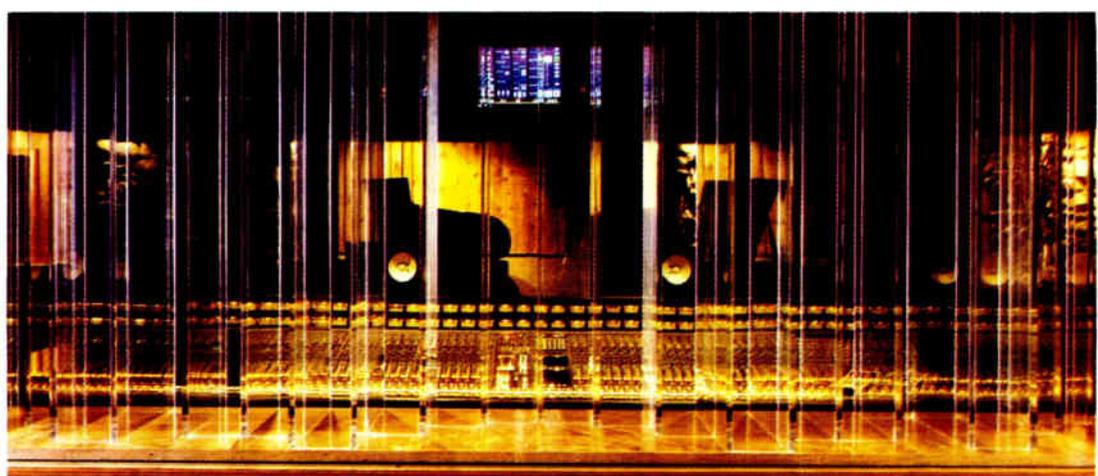
It's a long way—both in elegance and in bucks—between a jury-rigged M-S combination created by trying to cram a uni-directional and a bi-directional mic into the same space, and the Soundfield Microphone. But the former will give you a feel for what can be done, while the latter will let you try just about any combination you can dream up, and a few more besides. ■

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# TOWARDS A NEW AGE OF ACOUSTICS

## Designers Talk About Computers

by George Petersen

The art and science of studio design has made enormous strides over the past 20 years, and advancements in acoustics have brought the recording industry to a new age of studio design, where truly flat response in control rooms is no longer a dream, but an expected criterion. Along similar lines, today's monitoring systems are more exact than ever, in no small part due to the fusion of computer design with acoustics, electronics and transducer technology.

Certainly this computer influx has also had strong repercussions among studio designers, architects and acousticians, who now have the power of computer-based measurement devices along with computer aided design (CAD) programs literally at their fingertips. We talked to a number of designers on the topic of whether computers have affected their approach to the craft. As expected, the responses were quite varied and most informative.

### Acoustilog, New York City

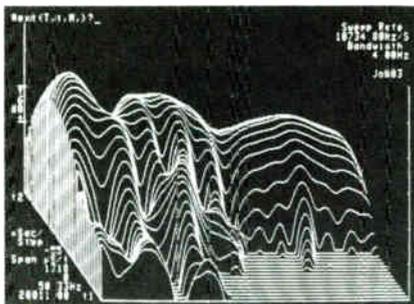
Recent projects at Acoustilog include a third room for Clinton Recording, in New York City (Acoustilog also designed their other two rooms); George Benson's home studio in New Jersey; Ciani Musica in New York City (featured on page 78); and White Crow Studio in Burlington, VT.

**Al Fierstein:** "Computers haven't changed my approach to studio design. Most of the work I do is redesign: I'm usually called into rooms to cor-

PHOTO: MARK ROSS



*The spacious Sound Room at Editel/NY features a Sony 3324 digital 24-track, Studer analog recorders, Solid State Logic SL-6000 console, UREI 813 speakers and Audio Kinetics Q.Lock and Adams-Smith synchronization. Room design: Vin Gizzi; acoustical design: Carl Yanchar; interior design: Ralph Potente.*



*Techron TEF system display: 31 TDS (Time Delay Spectrometry) sweeps over a selected time window show Time-Energy-Frequency relationships.*

rect problems. When I go into a room, I use a lot of experience and some simple tests to check parameters, rather than tests that require on-the-spot or later computer analysis. I make measurements of the impulse response of the room, third octave response, reflections, and sine wave sweeps—looking for problems such as buzzes and rattles, resonances, hard rear wall slaps and distortion.

"A lot of the equipment I use is made by our company: the Acoustilog Impulser, the Acoustilog reverberation timer (fed into an oscilloscope to look at decays on a logarithmic output); I also use an Ivie [RTA] with a B&K mi-

you to the cheery conclusion that all we have to do is type in a few parameters—say floor space available, type of clients, desired annual profit, color of the receptionist's hair—stand back briefly, and walk away with the plans for a new studio. That dream is down the road a bit—bits in this case being measured in decades, I'm afraid.

There are, however, four areas  
—CONTINUED ON PAGE 38

## Computers and Studio Design

by Vin Gizzi, Benchmark Associates

About a year ago, Demos Christos, noted Washington, D.C. composer/producer, decided it was time to build his own studio, Premier Recording, in the fast developing

north Georgetown area. He hired us, Benchmark Associates, to design it for him. Naturally the first thing we did was turn on the PC.

The title of this article may lead



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There was one obvious concern. When you are investing the kind of money it takes to develop a studio of

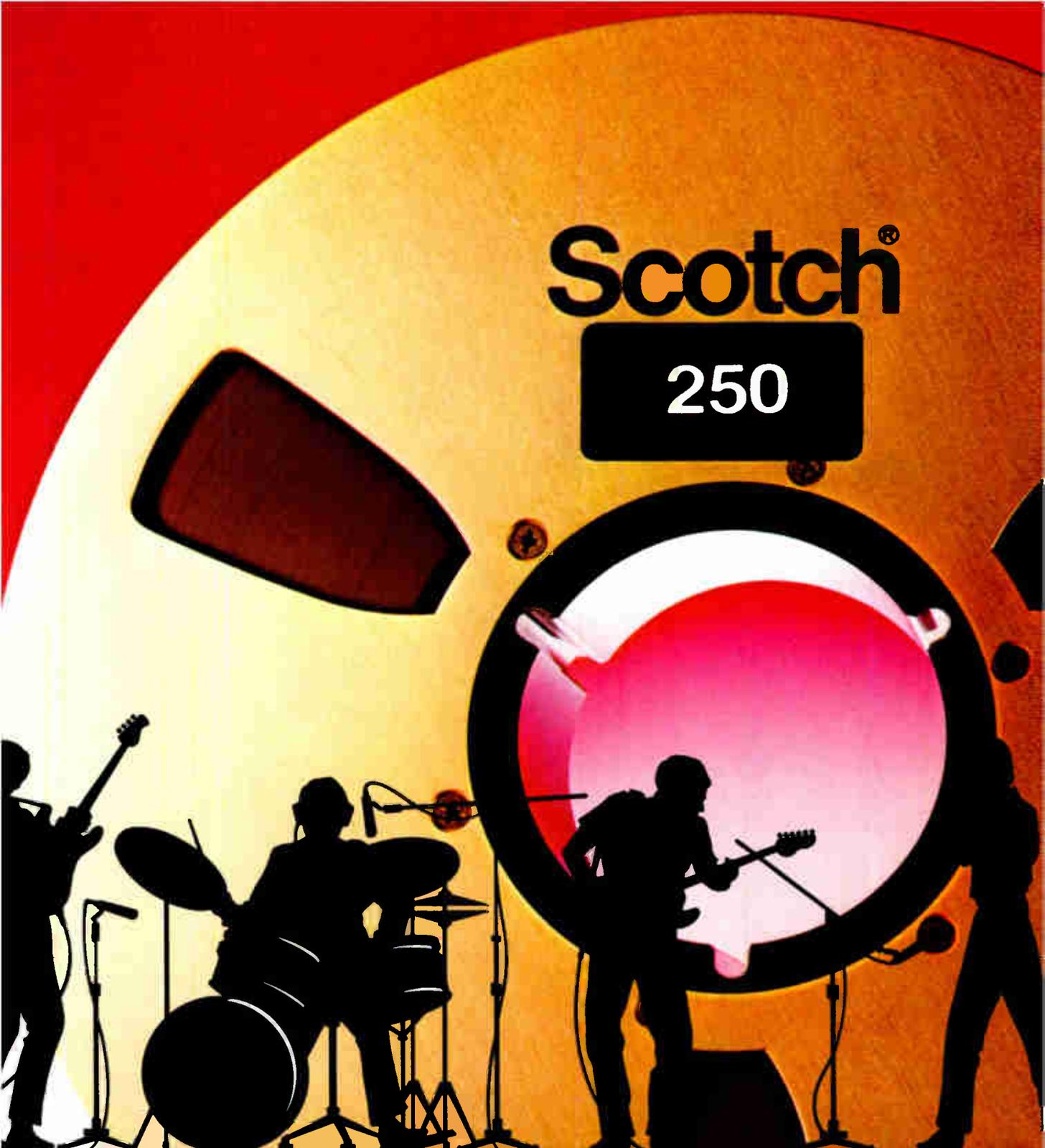
this caliber, there is no room for error. You need the confidence that the design and construction is done right the first time. The Joiner-Rose Group, Inc., consultants in acoustics, blended sound scientific principles with a keen sense of practical application to render a design which was totally compatible with Tele-Image's unique philosophy. Their 25 years of experience in environmental noise control, architectural acoustics, video systems, electro-acoustics, vibration isolation, and facilitation provided Tele-Image with the quiet confidence which they were seeking.

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Quite simply, creativity starts with the Bel BDE Series.

And for those who like to be in control at all times, the optional Remote Control unit gives you instant access to all the main delay and editing features and comes in a handy size that's perfectly at home on your mixing console.

crophone for third-octave analysis and various accelerometers for vibration and wall absorption tests.

"I have a TDS system, but I don't feel it's relevant in the field: I have a problem with using a device like that in a control room. It's essentially a research tool, and using it in the control room is basically funding research and education using the client's money. It doesn't give an efficient analysis of the room for the purpose of correcting that room's problems, it gives an abundance of data that can be interpreted any way you want to interpret it."

#### Jim Falconer, New York City

Recent projects from independent designer Jim Falconer include New York City's Platinum Island (featured on page 42 of this issue); the new Soundtrack Studio in Manhattan; and some studio remodeling work for Atlantic Records.

Jim Falconer: "I have yet to use computers as a design tool—at this point I'm building rooms based on experience. What I'm primarily doing is repeating things that have been successful. Although I foresee computers as being tremendously useful, I haven't had the time to do it, since I'm also involved in the building aspect as well. Actually I've used computers not for



PHOTO: PHIL BRAY

*Main theater at Steve Dobbins Productions, San Francisco. Design by Randy Sparks. The 200-seat facility (part of a large complex including two sound stages, video insert stage, and conference/office areas) is the first theater in the U.S. to use RPG Quadratic Residue Diffusers, shown along wall at right.*

final designs, but as a schematic sort of presentation showing routings in

rooms, cable layouts, and as a graphic drawing which people can relate



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to in a direct way—to communicate the potential and variations available. The computer makes these things easier for the client to relate to, especially when I'm working on a re-do of a room. It's more tangible than a quick sketch, and it can explain things easily.

"Ira Kemp, who's involved in a lot of video installations, has been using computers for documenting wiring—a pretty neat way of keeping tabs on things. My experience has been that the documentation of wiring systems, maintenance, and modifications has always been one of the weakest areas of studio work. Computers are really a godsend for these tasks: they're a great way of making sure you know what the wires are doing—there's no

way of forgetting things."

#### The Joiner-Rose Group, Dallas

Recent projects at The Joiner-Rose Group include three soundstages, three editing suites, and an audio room for Limelight Video in Miami; Spectrum, a five-studio complex in Portland; a live performance studio and five control rooms for Newark public radio station WBGO; and a remodel of 39th Street Music Productions in New York City.

Russ Berger: "Computers didn't come up with the necessary mathematical formulas and calculations—people did. Like anything else, computers won't solve any new problems: they just speed up the process by which you

obtain and process data. We are now able to acquire more detailed data, which has definitely changed our approach. It's changed our results, our goals, and we've found that some of the things we once thought were important aren't, and some of the things we felt had no effect are apparently significant.

"At one time, reverb time in control rooms was thought to be extremely important, but the actual measurement and plotting of reverb time in small rooms is really kind of futile, although how a small room decays is important. Another way we've changed is where and how we apply finishes, which applies directly to the TEF machine. It showed us the importance of where the finishes are placed and the

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"Like anything else, computers won't solve new problems: they just speed up the process by which you obtain and process data."

type of finishes used. We found out that some of the materials thought to be good absorbers are actually reflective at high angles of incidence. Research is expensive and time-consuming and, many times, there are budget restraints that don't allow as much research time as we'd like. This is one of the advantages that computers have given us: we can quickly get a lot of detailed and better information, which saves the client money.

"Besides the TEF, we're also using the Genrad 1995 (an integrated real time analyzer), some hand-held sound level meters for doing noise measurement, a narrow-band FFT for measuring vibration and mechanical undulation, and two computers we carry in the field for crunching data and doing STC (sound transmission loss tests). We are also using CAD, which is really significant if you have a lot of repetitive details, schematic diagrams and things like that, but for most of the architectural details, we're doing it manually. We're not ready to convert over to the 'big rubber stamp' yet."



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**Lakeside Associates,  
Irvine, California**

Recent projects at Lakeside Associates include Chartmaker Studio for producer David Foster; a home studio for Bruce Sedano and Donna Summer; a remodel of Royal Recorders (formerly Sound Summit), Lake Geneva, WI, (which is now fitted with a 72-input SSL console, said to be the world's largest); an isolated room addition to Universal Studio's soundstage number 10, and the acoustic design for the sound mixing suite at Editel in New York City.

**Carl Yanchar:** "Computers haven't necessarily changed my approach to studio design, but they've made things easier—your calculations are certainly easier, and you can check out more options with reasonable success. You can predict things with more reliability, which is really what computers are all about: no earthshaking discoveries, but a lot of paperwork.

"We developed most of the software we're using. The software runs the gamut of everything from calculating resonant modes to transmission losses. Obviously computers are ideal for loudspeaker design: we can simulate anything in the system and come up with a response curve for it. We're also using adaptations of some of the newer programs for sound reinforcement, such as VAMP and PHD; they're designed for large speaker arrays, but they can be applied to simulate the same conditions for control rooms.

"Of course the human factor is still very important—none of that has really changed. A large percentage of studio design is as much aesthetic as it is technical, and that's difficult to computerize."

**Paoletti/Lewitz & Associates,  
San Francisco**

Projects at Paoletti/Lewitz have included a number of large halls recently, such as the University of Idaho, where Quadratic Residue Diffusors were incorporated with much success, and the new Orange County Performing Arts Center in Irvine, California.

**Kurt Gaffy:** "We do a lot of our functional, single line diagrams on CAD machines, which has certainly changed the way we lay out sound systems, by making it more efficient. The software is an MS-DOS system put out by Cadvance: it has all the features you'd expect—multiple layers and a 3-D option—and we use the program a lot for the details. We also have a lot of our design programs—reverberation time, HVAC, open plan office, room modes—already written into programs we've generated internally. The impact is we can consis-

tently do more accurate work.

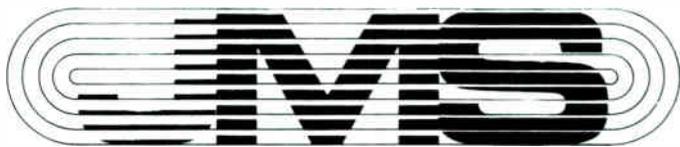
"Bose has a new program out for room modeling and sound system cluster design, and we're just starting to get involved with it. Its sound system coverage is a nice feature, but they've also incorporated some first reflection information in rooms. We're interested in this for concert hall modeling, where you want to bring in reflective surfaces and actually set up a cohesive field for listening.

"The Techron TEF machine is a great unit: it's not only an FFT, an energy/time machine, anechoic frequency response, phase response, and can even measure complex impedance if you rig it up as a constant current source—all in one machine for \$10,000. It's a

software-driven, do-anything machine: we've used it for cluster work in large halls, for RT (reverb time measurement), for ratios of early-to-late energy, looking for reflections or intelligibility problems. We had the facility to do this before, using say, pulsed sine waves and echograms to find echoes, but TEF is much faster.

"The real problem I see with any of these tools, including the TEF and Bose programs, is that there tends to be an idea that the results must be right since you can see them on a computer screen or printout. All of these are only as good as the initial engineering that went into the program and an understanding of information and the

—CONTINUED ON PAGE 39



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—CONT'D FROM PG. 30, COMPUTERS

where we at Benchmark Associates find computers invaluable in the design of recording studios. These are Modal Analysis; Decay Time calculations; Computer Aided Design (CAD); and TEF measurements.

One of the toughest hurdles down the path of studio design is verifying the acoustic behavior of a room before it is built. The advantages of being able to do this, especially in the reduction of limbs torn off hapless designers, are enormous; money need not be wasted in rebuilding, and construction schedules may be maintained.

Computers can be very helpful in one of the endlessly difficult areas of acoustic performance—room modes. Room modes, often called *standing waves*, are a condition of every room, and are controlled primarily by the room's proportions. Getting the room's proportions, and modes, correct means you will have a good sounding room.

In small rooms (and even your absolutely enormous control room C is small in architectural acoustics terms), low frequency response will be affected tremendously by the room modes. Now a computer, even a handy-dandy HP-41C, can do nice room mode calculations for you, with the condition that the room is rectangular. We developed a modes program that calculates axial, tangential and oblique modes, groups them in third-octave bands, and plots the results.

So, if you are designing a rectangular room, even a small computer can give you useful information about where those modes are piling up, or leaving a hole. Another invaluable predictive aid, though not necessarily falling under this article's title, is scale modeling. Models can be very revealing and do not require wildly expensive or extensive instrumentation. Eventually a program may appear that can do the same thing without all that messy sawdust and wires and chart recorders. But not this week, that we know of.

Decay Time calculations, which you may call reverberation time, or RT60 (though not in reference to small rooms that do not have true reverberant fields) are another natural for computers. The program we developed can figure decay times in octave bands using any of the three accepted formulas: Sabine, Fitzroy or Norris-Eyring. It's also ex-



PHOTO: JOSEPH GORDON PHOTOGRAPHY

*Premier Recording: designer, Vin Gizzi of Benchmark Associates; equipment supplier, TekCom of Philadelphia, PA.*

tremely convenient to have the computer determine the true absorption coefficient for each room surface taken from a menu we've assembled of many surface treatments.

In those rooms that are too small to generate reverberant fields, the sound does die away, however, and how it does is both approximately predictable and hence controllable. There are a number of ways of dealing with this, varying in degree of automation, but they all boil down to determining how much of what kind of material needs to be put where in a room to influence its decay time. Be forewarned, however, that even plain fuzzy stuff affects a lot of other things too. And, conversely, other factors like early reflections have a big effect on what we have commonly perceived as liveness or deadness. So doing some figuring about decay time is useful, but don't conclude that that is all there is to predicting how live or dead your studio will be.

Let's mention Computer Aided Design briefly. Most professionals in this business, whether writing music on Macintosh computers or storing complex mixes on disk, have come to depend on computers to expand their capabilities and save them time. CAD programs, such as Autocad, are equally powerful tools, and we have the booming architecture/engineering/con-

struction industries to thank for making the developmental investments necessary to have produced these sophisticated systems. If you have ever had to redraw and rotate an entire and complex monitor wall by hand, you can appreciate the tremendous advantage of computer graphics systems that can do this sort of operation in seconds.

Lastly, we can only be eternally grateful for the TEF system that finally allows us to relate what we hear to what we are measuring. Many designers now rely heavily on TEF to measure the absorptive/reflective qualities of surface materials and to aid in placing these materials with great precision in studios and control rooms. They can also be used analytically to locate or quantify problems in rooms with a degree of precision never before possible.

So having told you that computers can help you figure some things out, let us conclude with the cautionary note that all the results of your computations will eventually be judged by another "computer"—the one keeping your ears apart. As Lord Rayleigh said in his "Theory of Sound," first published in 1877: "Directly or indirectly, all questions connected with this subject must come for decision to the ear, as the organ of hearing; and from it there can be no appeal." ■

—CONTINUED FROM PAGE 37, DESIGNERS usage by the operator. It's really a matter of not being fooled: it could be that you're only looking at the first 50ms when trying to examine room reverberation. You can't get a trend from 50ms—your choice of parameters wasn't correct, yet the machine will give you a readout for the information that's in there. This holds true for any measurement system: misuse of technique can cause problems."

**RLS Acoustics, San Francisco**

Recent projects at RLS Acoustics include a new studio addition to OTR Studios in Belmont, CA; Breene-Kerr Video Productions in Palo Alto, CA; and a partial facility design for the new 6.3 million dollar media arts facility for Pacific Gas & Electric.

**Randy Sparks:** "Actually I'm sitting in front of the computer right now, programming it with transmission loss value approximations. We couldn't do the types of things we do without computers—both microprocessor-based test situations in the field and automated engineering calculations.

"We've automated everything we do—we don't even have a typewriter—we have computers, laser printers, and CAD drafting systems. We use Autocad to do all our CAD drafting and we've got project management software, called Super Project, that integrates with the spreadsheet program and our accounting package, so it is really entirely automated.

"The general flow of things is: we'll go out and do field sound level measurements, and depending on the complexity, we'll be using either an Ivie Systems real time analyzer, with a microprocessor doing calculations for reverberation time, signal delay, time delay, and things like that. We are also starting to use a TEF analyzer, which is the piece of test equipment that's going to make the biggest impact on design technology and research in general. It already has.

"TEF is basically a computer-based test system, and anything you can write in BASIC that will run on a CP/M will pretty much run on a TEF system. A lot of people are starting to write applications programs that manipulate the data you obtain with the TEF, to be able to look at that data in different ways.

"At this point, I can't see anyone not using a computer in engineering or architectural applications. We try to do all our drawings on a CAD system. It's very rare that we don't do it."

**James M. Stitt & Associates, Cincinnati**

Recent projects at James M. Stitt & Associates include two LEDE 24-track

rooms for Cincinnati jingle/ad studio Sound Images (which opened last month); Tanglewood Studios in Chicago; radio studios for WIRE, WGUC, and WLLT; as well as working on the Metropolis Studio complex in New York City.

**Jim Stitt:** "The two most significant new areas in studio design are the CAD systems and the Techron TEF machine. For the first time ever, you can actually see what's happening in a room with the TEF machine. We've been able to see all the things we were doing wrong in the past, and have corrected them and tried them out in a laboratory-type environment. There's an inside joke in the industry

that we keep building all these full-scale models and keep testing them, but we've gotten to the point now where it's not hocus-pocus anymore. It's boiled down to a very scientific approach with very predictable results.

"It used to be that all the larger companies had a fixed design and they would take their room and build it in a shell. They wouldn't deviate from that, because after a long time, they'd finally found one that worked for them. But with the new formulas, Live End-Dead End designs, and the TEF machine to verify the results, we can take different sizes and shapes, try innovative ideas, and actually predict the results, which has been a significant advance." ■



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# INSTALLING THE STUDIO

## A Guide to Getting It All Together

by Greg Hanks

After months of intensive labor, and many thousands of dollars spent, it seems that someone is going to have to hook up all of the equipment that is sitting in the control room. Do you have the wire? Where the heck are all of those parts bags that came with this stuff? Steve?? Greg?? HELP! This not-so-pretty scenario actually happens. Nowadays, though, only the foolhardy would approach such an expensive undertaking in this manner, or so it would seem. There should be as much preparation given to the inter-connection of the facility equipment as there is to any other facet of the operation. The installation of a studio is not a little project to be taken lightly. Part and parcel to the placement and hook-up of the equipment is the care and planning thereof. We approach such an endeavor with a little different viewpoint. A recording studio is a system, and not a collection of systems tied together with wire. Therefore, the people responsible for the integration of the various components that comprise the recording studio are in effect responsible for the design of a system. This approach implies involvement with the overall planning of the room(s). The areas of interest to the designer are as follows:

### Outline of Current Needs

The equipment necessary and the optimum layout thereof is mostly the result of the type of business the studio is to service. An example would be the synchronizer that ties the VTR as a slave to the multi-track recorder in a video post-environment. It would have little application in an 8-track demo studio. Therefore, put a lot of thought and care into the equipment selection and where it will live. We will explore this in more detail a little later.

### Electrical Power

Once the equipment choices have been made, and the equipment locations have been established, it is necessary to determine what type of demands will be made upon the power

A recording studio is a system, and not just a collection of systems tied together with wire.

lines. It is also necessary to know whether or not the equipment is sensitive to line fluctuations and spikes, whether this condition occurs on the power available, and if so what size and type of power conditioning is necessary. Having made these determinations, it is necessary to specify the type of electrical wiring and the location of the concurrent breaker boxes, power conditioners and all of the associated outlets. Take care, for a power line that has a high current demand generates a significant magnetic field, which translates directly to hum and electrical noise. Any large power lines should be located well away from the console summing buses and the multi-track.

### Lighting

Have you ever had to walk through a room full of obstacles in the dark in order to turn on the light switch? Silly, isn't it? Well, where are you going to locate the control room lighting dimmers/switches, how much light is there going to be for maintenance,

and how do you adjust the lighting for the studio area? These are some of the questions that impact the installation design, because SCR type dimmers can have a very nasty effect on the sound of the system, and all of the low level wiring should be placed as far as possible from both lighting and power wiring.

### Air Conditioning: Control Room and Studio

The air conditioning sizing, duct location and specification is not really the realm of the installer, but can impact the project in that it is "really swell" to be able to get an air conditioning drop to the multi-track recorder alcove (if there is one), the amplifier and console power supply racks, and the computer closet (again, if one exists). The location of the ducting can affect where one decides to run wires or locate wall panels. These points should be addressed as the room design is being put on paper.

### Pragmatic Overview of Available Resources

Whenever the studio design considerations are contemplated, the realistic available resources must first be determined. These resources include available real estate, floor space, time, money and manpower. These are inter-related contributions to the net available resource pool. The amount of individual contribution must be wisely allocated. Let's look at how some of the resources affect the installation:

### Time

The time budget is probably the toughest to estimate with any true degree of accuracy. The reasons for this are fairly obvious, and some of the questions that must be asked are:

1. Now that we have a full materials list, how much is in stock, what has to be ordered, and how long will it take for it to come in?
2. How long does it take to cut, number and prep the wiring?
3. Who is going to do the panel design, and machining, anodizing and

## CASE:

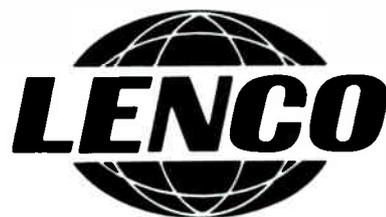
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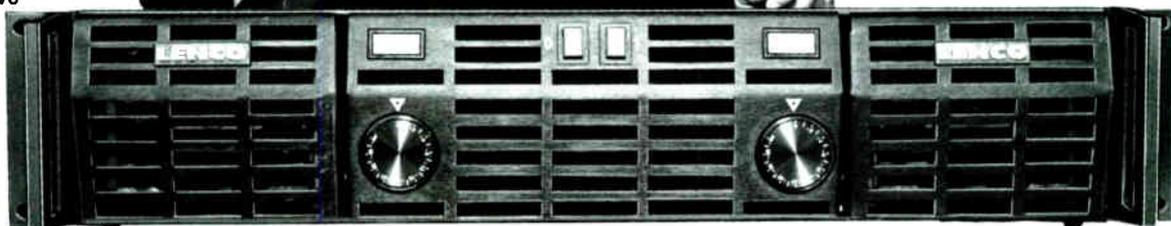
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engraving? By the way, how long will it take?

4. Which tasks affect others, are work schedules in a proper chronological sequence, and can concurrent tasks be handled so that they reach completion at the correct times?

Obviously, there are many factors to consider when allocating time, not the least of which is money. All too often the entire crew works a few 'all-nighters' in order to get the job done in time. Overtime is expensive, and the work performed after surviving a previous 36 hours of intense labor is less effective than it could be. The installation planning should start with the project plan, and the work should

start as soon as there is definite and reliable information available about what will be needed.

### Space

The proposed facility has an overall floor plan. Is there a place for the maintenance area in this plan? Where are you going to put acoustically-sensitive mechanical reverb devices? How about spare parts, client tapes or the mundane items such as stationery and office supplies? These are some of the many ways that space must be budgeted for the new operation.

### Money and the Available Budget

Construction, equipment and instal-

lation have a percentile relationship to each other: the hook-up and installation are often shortchanged, and this article attempts to curtail that onerous practice. When establishing a budget for the work, a good rule of thumb figure is about ten percent of the capital equipment budget. This is not cast in concrete, and should not be used when an initial modest equipment complement is to be superseded with a more sophisticated setup. The basis of any good control room and studio wiring scheme is planning. The direct costs can be established using a relatively simple formula: \$15 per signal cable, which includes termination at each end and the cost of the wire itself. In order to use this calculation method, it must be understood that a signal cable has two ends, and this expense must be doubled whenever a connector is inserted between the source and destination of the signal run. When multi-pair cable is utilized, each pair is calculated separately. Add to this amount the expenses incurred by custom interface circuitry, panel work, and miscellaneous costs such as relay racks, power supplies and the like, and you have a pretty good idea of what it will cost to implement your studio design.

Something else to keep in mind is the question of future expansion when calculating the budget. Whenever a near future increase in equipment sophistication is a possibility, it makes economic sense to allow for new requirements in the wiring.

It is far less expensive to put the cables required in place, than to rewire the facility. Let's look at this in more detail.

### Projections of Future Expansion

When your business starts to grow and your clientele demands increase in terms of equipment and facility versatility, your future planning done during the installation pays off. This can be as simple as having the lines in place to upgrade from 16- to 24-track, or as complex as having the control lines and audio facility in place to accommodate a new digital 32-track with synchronization and disk-based automation. There are basically two different avenues of preparation to explore. They are as follows:

### Change of Business Service Area

If the proposed new studio is a start-up business, then it is difficult to determine which of your potential client bases will prove to be the most successful or profitable. Therefore it is a good idea to be prepared for whatever your clients may throw at you. This

## There's a "Monster" on the Loose at Platinum Island

by Jim Bessman

When Richie Kessler decided to move and expand his Little Big Horn Studio, his key concern was flexibility.

"I didn't want to specialize in one thing, but instead cover all the bases," says Kessler of the new facility, now located in a Greenwich Village loft and renamed Platinum Island. "That way, if rock is slow, there's always jingles or vocal/piano demos that are happening. The idea was to have versatility as well as create an acoustically correct monitoring environment."

For Kessler, this required both a top-notch acoustic design and the best possible circuitry. For the former, he waited three months for the heavily booked studio designer/builder Jim Falconer to become available. For the latter, he relied entirely on Monster Cable.

Falconer, who previously had helped rebuild both the Record Plant and Atlantic Recording Studio before designing rooms for Reeves Teletape's Sound Shop as well as remote control rooms on album projects for such artists as Aerosmith and Joe Jackson, demanded the cleanest possible sound as well as the utmost in user flexibility. To ensure listening accuracy in the medium-sized control rooms, he went with the Live-End, Dead-End format, and emphasized ergonomics in allowing for multiple location of modular outboard equipment racks.

In the studio room itself, Falconer further promoted flexibility through diffusion elements hanging from the ceiling, and wall treatments that utilize

removable fiberglass absorption panels to allow fine tuning of the room sound. But the real innovation of the two-studio Platinum Island facility (Platinum East and Platinum West) involved the wiring of Monster Cable Prolink, a feat that legitimates Platinum's self-billing as the "only" Gotham studio to be totally wired with the high performance cable.

"I'd seen the ads for this new kind of cable and the endorsements of engineers saying how amazing it was, how it could 'lift the fog off the sound,' or whatever, and kept them in mind," recalls Kessler. "While we were putting together the ideas for the new studio, we went to the AES show and met up with Ian Eales at the Monster Cable booth. He engineered for Jay Graydon at Garden Rake on Graydon's productions for Al Jarreau's *High Crime* and DeBarge's *Rhythm Of The Night* albums, among others. We discussed the way they used Monster Cable in recording, and Ian pointed out which of *High Crime's* songs were recorded with it and which ones weren't, and I could hear the difference."

Creative Sound Techniques' Joe Finelli, who served as wiring systems designer throughout the Monster Cable installation at Platinum Island, also spoke with Eales. "He'd been using it for years for his speaker wire and said that he'd also gone so far as to remove the XLR connector off the multi-track machine and wire Prolink directly to the amp card as an experiment. He said that it was incredible, that by eliminating connections in the signal path he could hear veils being lifted off the sound!"

Convinced that Monster Cable offered a dramatic difference in the sound obtained through standard wires, Kessler and Finelli were determ-

—CONTINUED ON PAGE 94



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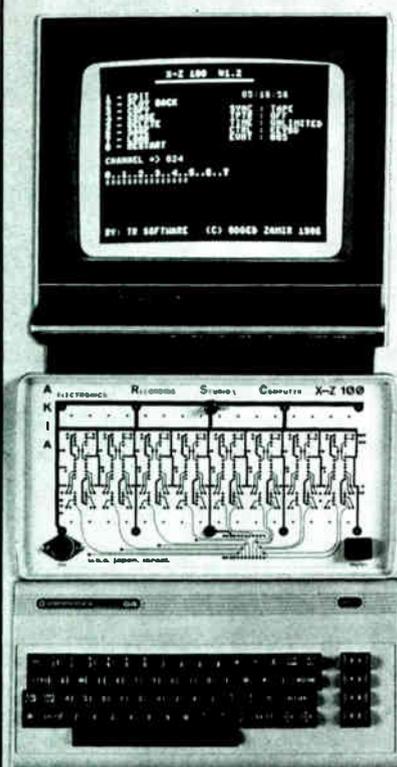
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could mean tying together a VTR to the multi-track via a synchronizer, or installing a multitude of synthesizers in the control room and running them via a MIDI sequencer. It is obvious that you won't be purchasing everything you would need for any contingency, but will rent the items needed, and install them on a temporary basis until they have proven themselves as viable financial investments. However, if the prime business target is the advertising or video field, then it makes perfect sense to anticipate the requirements that are concurrent with that field when planning the "install." Placing a couple of runs of RG-58U for video between the front wall and the rack that the synchronizer and VTR may live, and bringing in some extra control wiring between the multi and the same rack is far less painful in the initial construction stage of the studio than it is later on. If the rock and roll market is your main target, then those lines are not absolutely necessary, but headphone feeds and direct inputs in the control room absolutely are! Similarly, if the studio is a large one, and you anticipate that you will be doing a large number of string dates, then a conductor's podium, with some control wiring for communications is essential.

The previous paragraph is intended to illustrate what may happen, and what some of the wiring requirements may be. It is an easier task as a manager to see what all of the possible options are and then eliminate those that are the least likely to occur. Future business direction, or change in direction should be accounted for in your plans, both financial and technical.

**Expansion of Current Service Area**

It is a much simpler task to look ahead at what your current client base is, and make arrangements in the installation to accommodate the future. This is most obvious in a smaller studio where you are most likely going from 16- to 24-track, or from one 24-track to two. It is also easier to see what the requirements of the equipment you anticipate using are. Avail yourself of this insight and plan as much as possible.

**Guidelines for Successful Wiring**

We have been engaging in some rather abstract intercourse about the necessity of planning, budget and time allocations. For those of you whom have braved the above, we herein offer a few morsels of hands-on info. In a sequential manner, we will attempt to outline the method we use. After all of the preliminary planning is through,

you should have two very important items: (1) a floor plan, indicating the positions of all the equipment that will be used. This includes the rack layouts and locations. (2) a complete equipment list, also including the terminations of all of the equipment on the list. With these two items in hand, you are prepared to start designing. The first thing to attend to is getting a handle on how wires are going to run in the studio.

**Floorplans and Run Schedules**

Starting with the floorplan that has all of the equipment situated upon it, begin a list of cables that run to and from each piece. Organize this list by physical end location. This means that each "group" of wires that starts at one place and ends at another is an organizational entity. When there are cables going to many different places from the same piece of gear, then each separate run is documented individually. We organize these bundles as "schedules." A schedule is composed of whatever wires are going from point A to point B. We like to maintain two separate run schedules, one for low and line level audio, the other for high level audio (speaker level), video, control wiring and MIDI cables. Reasoning that computer information whizzing by at any reasonable baud rate sounds bad, we try to isolate audio from things that sound bad. Therefore we organize audio separately from everything else. Anyway, we should now be accumulating a list of schedules. These we can identify by placing circles on the floorplan at the approximate location of the wire(s) end(s). To differentiate circles, put a number in the circles that identify that group of cables (schedule). Sounds a lot more difficult than it is. Now, in the documentation on the individual schedules, we should include the following information:

- Schedule #**
- Number of wires**
- Wire #'s in grouping**
- Type of wire**
- Wire color**
- Circuit description**

We would call this documentation the "Wire Run Schedule." We also need a "Wire Run List." This is a list of all of the wire numbers used. By the way, wire numbers are a good thing, and should be used whenever there is more than one wire in an assembly of equipment!

**Wire Numbers**

It is good practice to identify each separate wire in any design by those in the know. Firstly, it is much easier to keep track of what is what when the harnesses are being constructed. Sec-

only, it is much easier to fix a system that is understandable. Many different identification methods are available, but one of the least expensive while being very expeditious is the use of wire numbers. Each wire is given a discrete number in our design scheme, but this is not necessary. What is important is that each wire is identified in some manner. Our preference is to assign a group of numbers to a function, and then to conform the sequence to the appropriate track numbers. As an example, the sends to the multi-track are numbers 200-299. It would follow that the numbers assigned to multi-track #1 line inputs 1-24 would be 201-224, with the second machine being 225-248.

Along with the wire run schedule, a wire run list must be generated. This is a sequential listing of all of the wire numbers used. Included on this document should be:

- Wire #s
- Source
- Source termination type and diagram
- Destination
- Destination termination type and diagram
- Circuit description
- Notes

When doing an installation, it behooves us all to avail ourselves of the

services of the "wire-person." It is a double edged sword to enlist the aid of "outside" personnel; the advantage of being able to accomplish more is offset to some degree by the requirement of supervision. But the supervision requirement may be minimized by proper documentation, and the paperwork that results is a more thorough reference work than would otherwise be required if only the service department were doing the work. Some of the documents required when using less technical helpers include:

- Wire # summary
- Connector summary
- Wire # allocation table
- Standard connector pin-out guide
- Color code standard

Only when the job is done are these planning tasks appreciated. We have found a little respite from the tedium involved in the above through the use of the computer. Surprisingly, there are common business programs on the market that simplify this task. The everyday spreadsheet with operating macros will accomplish most of the above by entering the primary data only once. The actual programming necessary in the construction of macros, and the entering of data will take a bit longer than doing it all on paper

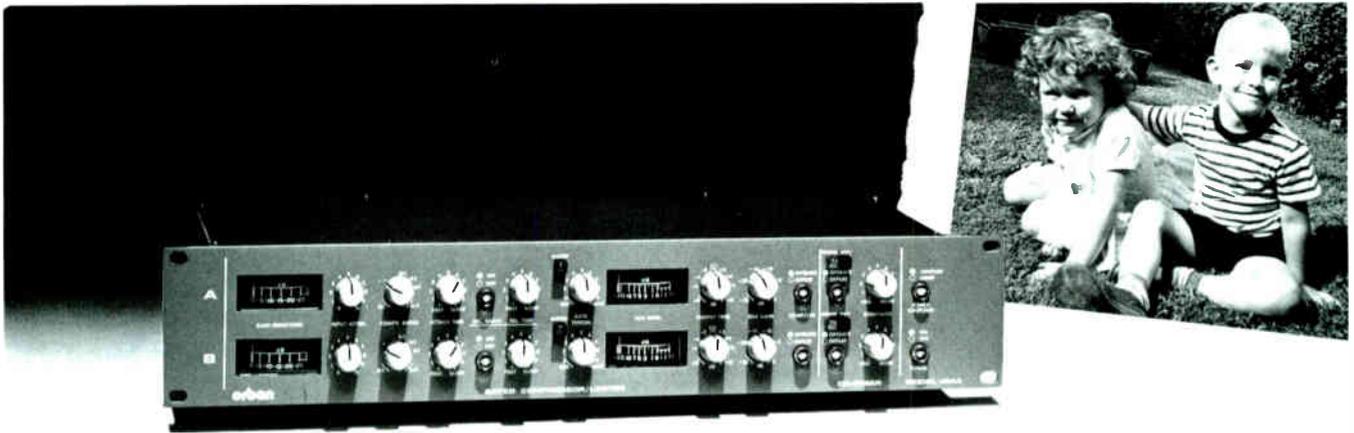
with a pencil, but making changes and corrections is much, much faster.

### Wire Run Location Considerations

As mentioned earlier, MIDI and computer information can sound bad. We should never hear the types of signals that originate in these devices. Meant to control musical devices, these signals are anything but musical! Electrostatic and electro-magnetic fields have a nasty habit of intruding themselves upon signals that should remain separate and isolated. In order to minimize these difficulties, we must keep the physical isolation between these two different signal types. This can be realized through separate conduit runs, or a shielding division within a common trough.

### Troughs and Conduit

Throughout this discourse, I have been referring to cables going from one place to another, without mention of the manner in which this is accomplished. We wish to route cables in a manner that will allow future wires to be installed or current wires to be removed. This cable routing should be accessible with a minimum of fuss and bother. We also wish to penetrate all sound barriers a minimum number of times and in as few places as possible.



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Wiring within the control room itself is much easier to accommodate, and this is what we will address, as your studio designer knows best how to get from the control room to the outside world. Within the control room there should be cable troughs accessing each and every equipment location. These troughs should remain accessible through either floor panels that can be raised, or wall panels that may be unscrewed. Your particular location and application will determine the dimensions and physical structure of the troughs, but keep in mind that it is good to pick up a little extra shielding in the troughs to reduce both EMI and RFI. The construction should be of metal, however wood troughs lined with a thin lead sheeting work very well. When lining a trough in lead, or constructing it out of steel, remember that in order for this shielding to be effective, it must be brought to ground. The trough locations for the control wiring have a little different route requirement than the audio lines. Some problems come with the fact that there are also audio lines associated with VTRs and MIDI devices, and it is much easier (though more costly) in sonic purity to place these lines in the same location. At any rate, the control and MIDI lines should somehow be physically isolated from the audio lines. There is another group of cables that should also be isolated from the low level wiring, and those are the speaker and cue lines, (at speaker level). It is not uncommon for the headphone wiring to be run in the same trough as the studio mic lines. It is also not unusual to find unnecessarily high levels of high frequency cross-talk and cue power amplifier instability in these installations! If it is really necessary to run these lines together, then shield the high level lines, and face the instability problems with build out resistors or other applicable means.

#### Floorplan Ergonomics

We went over it before, but really, we should talk a wee bit more about the location of the multi-track. . . If the multi-track(s) is going to be put in a soffit (which is a good idea because of the improvement available in acoustic noise from the fans as well as the air conditioning drop availability), then can the inputs and outputs be accessed without having to remove the machines from the soffits? Can the noise reduction system be installed/bypassed easily and are the record firing lines accessible to find any errant signals?

#### Outboard Rack(s)

There are basically four different

types of outboard racks in common use, and these are:

#### 1. Roll-around racks—

A roll-around rack is usually between three and five feet in height and houses most of the equipment that the mixer will be requiring at his fingertips most of the time. This design offers a great deal of operation flexibility: when the units are not in use, they may be easily moved out of the way to afford greater use of the floor space. There are also some difficulties associated with interconnecting these devils with the rest of the system so they can withstand abuse. The methods readily available are hard-wired umbilical cables and floor mounted multi-pin connectors, or some mix of the two. Consider this when laying out the outboard racks.

#### 2. Built-ins in the producer's desk—

This is a method that provides a space for a few pieces of equipment the engineers believe will always be needed within "arms reach." The hook-up advantages are obvious, but take care with the grounding and the possibility of the hum fields that can develop from the location of the various power supply transformers in relation to the console summing buses and pre-amplifiers. Remember, a transformer is nothing but a mis-classified hum pick-up or generator!

#### 3. Half height racks placed behind the mixing position—

When you pick up one of those glossy, thick industry magazines and see the multi mega-buck control rooms with consoles that seem to go on to eternity, you'll usually spy a "behind the mix position" complement of outboard equipment. One of the reasons for the apparent proliferation of this design is most of these click new installs are designed for audio-for-video post-production work! In this type of work, a producer, director, sound editor and a couple of other people are in the control room, all offering direction, doing paperwork, and sitting above and behind the mixer. This people placement is functional in that environment and the "behind the mix position" layout of outboard equipment offers a large desk space, while at the same time provides needed isolation between the aforementioned personnel and the mixer. Not heeding the requirement of listening while an adjustment is being performed, a stiff neck is not uncommon among the engineering staff. The choice of equipment allocated to these racks is a very sensitive issue.

4. Stationary racks, (wall-mounted, monitor and console power supply, six-foot relay rack stuck in the corner, etc.)—

While economy favors this layout, as well as being blessed with a simpler wiring task, this choice of outboard equipment mounting for anything other than room equalizers, noise reduction, and the like is a very tasteless choice. This becomes an ungainly and unmoving rock of electronics you have to retreat to in order to modify the sounds. After working a room that employs this form of ergonomic consideration for a few short hours, most people are looking for a new environment in which to create. Ease of use is of paramount importance in all designs.

### Monitor Rack

There are a few different pieces of equipment that fit well together in the same rack area. Console power supplies, monitor power amplifiers, alternate speaker selector system, alternate function power supplies, room equalizers and sometimes the noise reduction rack all fit well within the same enclosure. While not necessarily functionally linked, these items all share the attribute that they do not need frequent attention. When you do not need to get to something, there is no need to keep it within that valuable floor space within easy reach. Care must be taken when installing items of this type in the rack in terms of grounding. Power amplifiers mounted in a rack require care that the signal output minus of the power amplifier is not tied (through the rack chassis mounting) to other devices. When contemplating a location for the monitor rack, keep in mind the desirability of putting the rack in a closet, close to the control room speaker location. There are usually a few fans associated with the console power supply or the monitor power amplifiers, and the acoustic isolation that a closet provides is nice. It is also easier to put an air conditioning drop in a closet than putting this same drop within the control room proper. Two items we are delighted to find associated with a monitor rack are lighting behind the rack and enough room to move around behind the system.

### Rack Wiring Considerations

With the assembly of all of the above, a number of factors must be kept in mind. The proper assembly of a rack can make this humble carrier of equipment a thing of beauty. The common shortcomings of rack wiring are the lack of harness strain relief and the lack of available 110 VAC. It is our contention that all rack equipment should be interfaced with a "standard" connector. Any local equipment requirement deviations from this stand-

—CONTINUED ON PAGE 95

# Wire Physics 101

### "Bandwidth Balanced" Construction

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### Standard Construction

The outdated view of wire only looked at it as a path to move electrons around. To do a good job with audio, it must be much more than that. We have found that most of the smearing that happens in ordinary wire is due to the magnetic fields that the signal sets up around the conductors.

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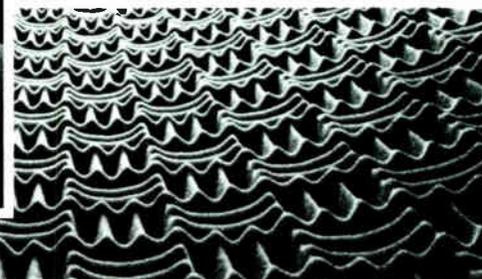


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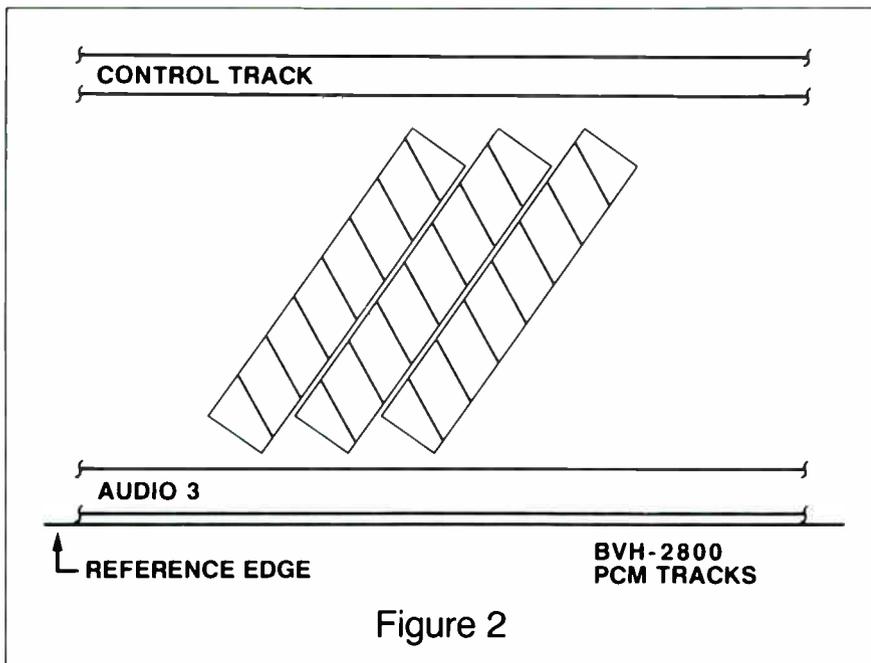


Figure 2

fate worse than digital. Dolby press releases already show a beaming Phil Ramone grooving to his SR. Will Telcom ads feature testimonials from Thomas Dolby? Telcom has relocated outside Washington, DC, and is gearing up. . . Chip of the Month: The Sony CXD 1079 Real Time DSP chip. Real potential. Error Correction Department: Earlier widespread rumors of Otari's lawsuit loss have been denied. The suit was still pending at press time. Persisting Speculation: That the aging DASH format is undergoing widespread reappraisal in Atsugi. Fact or Fiction?: The Mitsubishi 96 kHz sampling rate recorder. Sneak Preview: R-DAT is looking more and more solid for the pro market. For example, note that this consumer format contains two tracks for SMPTE time code. A transport in every I/O module? "Here—take your part and don't come back 'til you get it right"? New Product of the Month: The Final Technology Laser Turntable. That's right—laser playback of LPs. Closed-loop servo-tracking and micro-positioning mirrors keep the beams in the groove, bouncing light off both faces, for never before-heard channel separation. R.I.P. Department: The final inventories of the Sony Syncmaster have been literally crushed. If you bought one, you now have a numbered, limited edition, collectors item. And you thought it was a white elephant.

—CONTINUED FROM PAGE 22, *INSIDER* sic Mode, Speech Mode, and Phone-Line Mode. Video information is provided with two resolution modes (Normal and High), and three picture quality levels: Natural, RGB Graphics, and CLUT (Color Look Up Table) Graphics.

CD-I is thus a multi-purpose, real time medium for entertainment and education, with consumer, professional and industrial applications. Perhaps the biggest challenge in the endeavor is the identification of material suitable for dissemination via CD-I, and preparation of that material. Only careful design, development, and production of original, marketable titles will promote CD-I. To attack this problem, and make a buck too, Philips and PolyGram have formed American Interactive Media, Inc., (AIM), a new company to develop software for CD-I.

AIM's purpose is to establish joint venture relationships with companies such as publishers that will provide CD-I software. AIM will provide technical expertise and access to production facilities and distribution channels. Of course, consumer perception will be key in the acceptance of CD-I. AIM will promote the CD-I system as an upscale Compact Disc player that will play existing audio CDs, as well as other forms of expanded CD software incorporating video and text/data functions.

As the established leader in the Compact Disc success story, the audio/music industry is thus centrally placed to participate in CD-I. Along with other market sectors such as the computer, publishing, computer game and entertainment industries, the audio industry could establish an entirely new market segment. However, the creative

possibility is both an opportunity and a problem. A book of pictures and text transferred to CD-I would probably not enjoy acceptance, and certainly would under utilize the medium. The real opportunity is the creation of a wholly new interactive medium. Hopefully, such a creative challenge to build a mass market medium from scratch will encourage significant results. Better get working on it. CD-I will be introduced in 1987.

**Audio Rumor Central**

King Kong Versus Godzilla Versus Smog Monster Department: Look for thrilling exchanges as Dolby SR, dbx, and Telcom vie for market share, all contending that only their system can rescue your analog multi-track from a

Do you have information or rumor for *Insider Audio*? Each month's hottest tip wins a *Mix* prize. Come on—embarrass your fellow employees and get your boss fired—send it in. Contact Ken Pohlmann, University of Miami, P.O. Box 248165, Coral Gables, FL 33124, telex 519308, or *Mix* at (415) 843-7901. ■

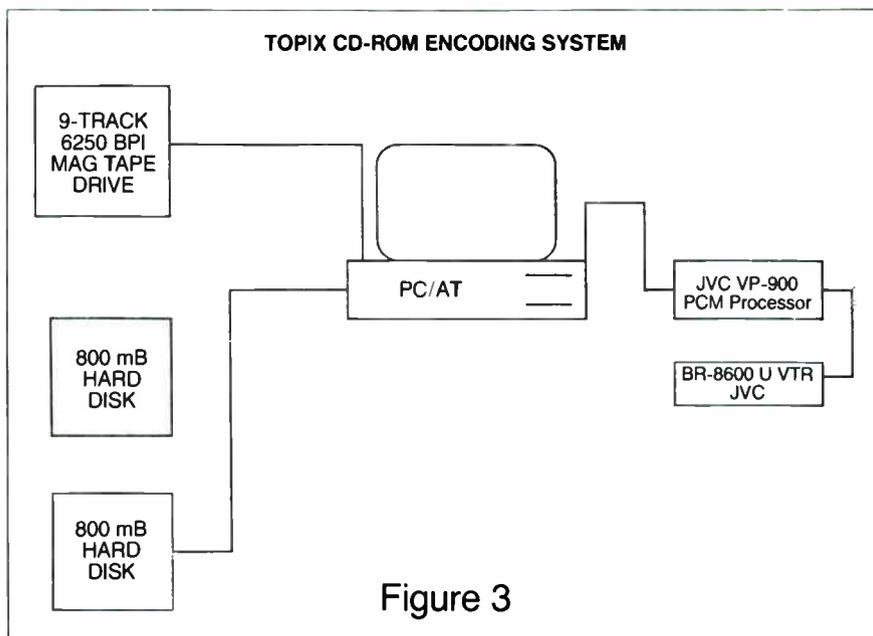


Figure 3

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\* CF 2000 anechoic response measured at 2 m on axis in the chamber of the National Research Council of Canada



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**“My music is already extremely visual. The images are very important to me and I always wanted to combine the two . . .”**

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—CONTINUED FROM PAGE 25, JARRE

thing I want. On the other hand, it's obviously a lot easier having an engineer around most of the time, but he's got to be the right guy, and not only a good engineer technically, but someone who's discreet and sympathetic enough to hang around while you're struggling to achieve something. For me, it's got to be someone I can really trust, or it just makes me nervous, and I find it very difficult to work and be in the process of creating a piece when there's a lot of action going on.

*How long have you had your own studio?*

Oh, for many years now. When it started, I only had a couple of old Revox machines and an AKS, the old English monophonic synthesizer. Now, it's full of equipment, MCI mainly. It's got an MCI 24-track with a GH 36 automated console—one of the best in my opinion—and two MCI 2-tracks, a 1/4-inch and a half-inch. I've also got a lot of outboard gear, like AMS, EMT acoustic chambers, Lexicon digital reverb, etc. The thing is that I really look at all the outboard equipment not just as effects, but as part of the music-making process itself. I'd have to say that they're more like instruments to me than just aids to mixing.

*What about your keyboards and synthesizers—you must have quite a collection.*

Yes, I have a lot. I also really consider electronic instruments to be just like acoustic instruments now. Over the centuries, we've had generations of acoustic instruments, and now we're seeing the same process in electronic instruments. In fact, I have everything from the old Moog 55 modular system to the latest Fairlight—and everything in between. I have a Mellotron—I'm a big fan of that—and I still have the old AKS VCs, an old Oberheim system, the Prophets, Oberheim systems, in addition to tons of old drum machines. And they all have their unique sounds and uses, that's the interesting thing for me. I also have a very peculiar old Italian synthesizer called a Syntex which is a bit like a Prophet 5 or an OBX, but it has its own special characteristics and sound that's very Latin, a very different flavor, very moving, and naturally the strings are just so intense on it!

*Are you always on the lookout for a new piece of equipment?*

Well, I'm not always trying to find the latest gadget in that sense, but I am interested in any new development or technology. For instance, on my last trip to Japan, I met with the Seiko peo-

ple because I'm also planning to do a similar event to the Houston "Rendez-Vous" in Tokyo, and I was meeting potential sponsors, and they gave me some special instruments they had that are quite interesting. I think that Seiko missed the point with their DS 250 which was a synthesizer for the mass market and very cheap, but it did allow the user to do additive synthesis—and that was the interesting part for me, because the process is very fast. So I used that system quite a lot on my new album, and I now own two of them. Of course, I still have my favorites like the Arp 2600, which is still the best when you want to get one specific sound in my opinion. I also use the DX7 and all those sort of things, but what I don't like about them so much is that everyone uses it, and when it comes time to change one parameter or one thing in the sound, it's a real nightmare—a real pain in the ass!

*Because of our ability to create so many new sounds today, do you think that interferes with the time spent actually composing?*

Not really. It's all part of it to me, and I'm not obsessed with always finding totally new sounds just to be original. And the music is automatically different anyway. Take last year's *Zoolook*

and this year's *Rendez-vous* albums. There's no particular link. Each time it's a different story, a different concept, working with different musicians. Long before I did *Oxygene*, I was writing and producing songs for other artists, and each song is different, with different lyrics, and yet part of your overall style, assuming you have one. I think it's exactly the same thing with sounds.

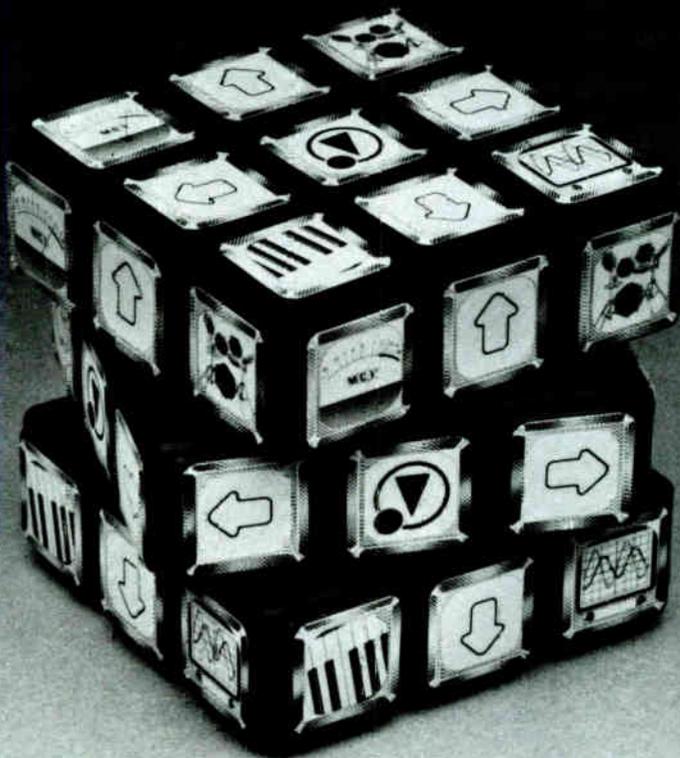
*Since the advent of sampling, it's been suggested that it could replace synthesizers. How do you feel about that?* Well, when I recorded *Zoolook*, I used sampling techniques almost exclusively, because it was something I'd been waiting for for years. So sampling was the culmination of all the early work with Pierre Schaeffer and the others, and suddenly, instead of being bored with recording just one sound, and then reversing the tape and splicing it, you could do all that and so much more with sampling. So here's this fantastic new tool.

And at the beginning, sampling was hailed as this new generation of synthesizers and as a technique that would completely outmode them. But I think it's totally untrue. I think it's something else completely, and when I did *Zoolook*, I was able to use things like vocals as pure sounds by sampling them like instruments, and push the entire concept to the ultimate. But when I'd finished that project, I realized that sampling can in no way replace the analog or digital synthesizer—they're *totally* different. When you sample, you more or less start with reality, whether it's a breaking glass or the sound of water, and the result is necessarily more realistic than anything you can do with synthesizers. Anyway, after working with a lot of sampling techniques, involving Fairlight or the Synclavier etc., and using Kepex and noise gates with drums to explore all the possibilities, I just wanted to stand back a little from it all.

*So you've gone back more to synthesizers?*

Well, I still think that the great thing about them—and what really attracted me to them in the first place—is the way you can create sounds from scratch, and mold and shape them to your own vision. It makes me think of Fellini and what he said about the filming of *Roma* and the critics' accusations that his description of the Via Veneto wasn't very accurate: "I don't care how the street *really* looks, what's important is how *I* see it." And it's the same thing with synthesizers to me. When I'm trying to find a string sound,

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# "I think a multi-media event like the Houston show may well be the norm by the end of the century."

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I'm looking for an ideal sound that'll fit a particular piece of music, and at that point I don't care how a real orchestra sounds. And if I take a sampled string sound, to me it's awful, *dead*.

*On the subject of film, how come you haven't done many soundtracks?*

Good question! A lot of people think my music's a natural choice for film and I've been asked to do a lot of soundtracks. But at the same time, I'm in a rather unusual position. I'm not a singer and I'm lucky enough to have a rather successful recording career doing just instrumental music, without needing someone breathing down my neck telling me what to write for a

particular scene. I also think that my music is already extremely visual. The images are very important to me, and I always wanted to combine the two, as in the Houston show. In fact, I feel that what I'm doing is the reverse of a soundtrack, and that the visual connections we make are more interesting than a regular soundtrack.

Of course, if a director who really has a feel for music and a highly developed sense of sound, like a Kubrick or Coppola, calls me up tomorrow, I'm sure it'd be an unusual and stimulating project to do. But I think most of the time soundtracks are unfair in that the director's spent one or two years making his film and then they want

you to write the whole soundtrack in a matter of weeks. That's the nature of the business, but I'd rather be involved in a project from the very beginning.

*In the past, you've worked with American artists like Laurie Anderson, Adrian Belew from King Crimson, Yogi Horton from Talking Heads and bassist Marcus Miller. Do you feel musically closer to them than your European counterparts like Kraftwerk and Vangelis?*

Yes, definitely. It's funny because in the German bands like Tangerine Dream and Kraftwerk there's a kind of apology of the machine—it's a caricature, but true I think. They were also far more important in the '70s than today, although I don't know why. At the same time, I recognize how very difficult it is to make successful instrumental music. So, yes, I'm a lot closer to someone like Laurie Anderson than Vangelis, who's far more involved in soundtracks than me. Anderson's approach to multi-media shows is far closer to what I did in Houston and in China, and she's probably one of my favorite American artists. I'm a big fan and I think she's brilliant, not only in terms of her music, but in her conception and style and eclecticism—the way she combines music and painting and video, she's a true artist of the '80s for me.

*What about the future? Do you plan to take the "Rendez-Vous" show elsewhere in America?*

I'd really like to, perhaps San Francisco or Century City in L.A. The great thing is that now I've built up a good technical and artistic team, and it makes sense to take it other places, although not necessarily in the U.S. I'd love to do something in Tokyo or London or Berlin—but *not* a tour. We have to recognize that touring as a regular format is a dying artform. Let's face it, the traditional rock format hasn't really changed since the '50s. The music has, the sounds, the look, the people are different, but not the format. And things like video and MTV have also changed the way audiences react today. They're more and more difficult to excite, because you're now competing with all the visual stimulation of Star Wars and commercials. So I think that a multi-media extravaganza like the Houston show may well be the norm by the end of the century. In the meantime I've been asked to do the Statue of Liberty celebrations, but there's such a political mess surrounding that I don't know. . . . Right now, I'm also thinking about doing something at Ayer's Rock in the Australian desert, or the Grand Canyon, or even Moscow—that'd be fantastic, no? ■

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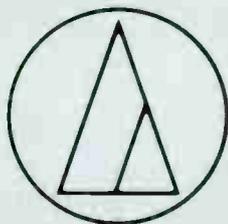
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# P R E V I E W



## Brooke-Siren FDS 360 Crossover

Brooke-Siren Systems has introduced the FDS 360 integrated frequency divider and limiter system, which can operate as either a 2-way stereo or 3- or 4-way mono crossover. The front panel includes separate level and mute controls for each of the four sections, and an LED display indicating signal present, limiter threshold, and over-limit conditions. The FDS 360 includes two controls for correcting signal misalignment due to speaker placement: a 0-180 degree phase control and a polarity reverse switch. For true time correction, a rear panel barrier strip provides patching points into each of the four sections. Each section also includes an integral mid-filter limiter for amplifier and speaker protection. The attack and release times for the limiter are determined by the appropriate plug-in frequency card and as such, are optimized for each section.

The FDS 360 continues the BSS tradition of utilizing the Linkwitz-Riley 24db/octave filters, with frequencies being specified by the customer at the time of order. Other slopes are available upon request at no extra charge. Options include the FDS 300 output transformer balancing unit and the SC360 security cover.

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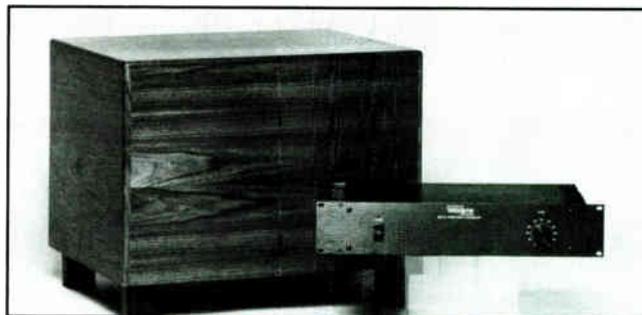


## Audio Kinetics Pacer Synchronizer

Pacer, from Audio Kinetics, is a low-cost chase synchronizer, with integral time code generator and resolve capability. Pacer is a single-space rack mounting unit, containing all the electronics to interface one slave machine to a master, while an optional unit, (the Pacer Pad) allows extra facilities such as "GOTO" commands and a multi-function display.

In its simplest form, Pacer has controls for offset and generator set-up, plus selection of type of lock. Input from the master may be time code only, or time code + tach/direction, and cables can be supplied for most popular VTRs and ATRs. Pacer also features a serial control input, which may be used in conjunction with an external computer or console automation system. All transport functions of the slave machine may be accessed through this port.

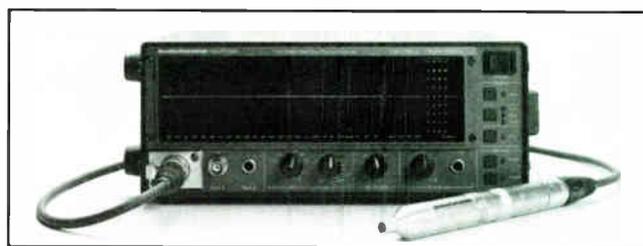
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## Velodyne ULD-15 Subwoofer

Velodyne Acoustics, Santa Clara, CA, has introduced the ULD-15 (Ultra-Low Distortion, 15-inch driver) subwoofer system, which includes the speaker unit, 350 watt power amp, and 85 Hz electronic crossover in its \$1,195 price. The system is servo controlled, employing an accelerometer to provide motional feedback to a comparator circuit within the rack mounted amp/controller. Erroneous cone motion is corrected at a rate of 3,500 times per second. Frequency response is stated at 20 to 100 Hz with a 12 dB/octave slope; THD at full power rarely exceeds one percent. The ULD-15 systems are available in walnut, oak, and black finishes.

Circle #031 on Reader Service Card

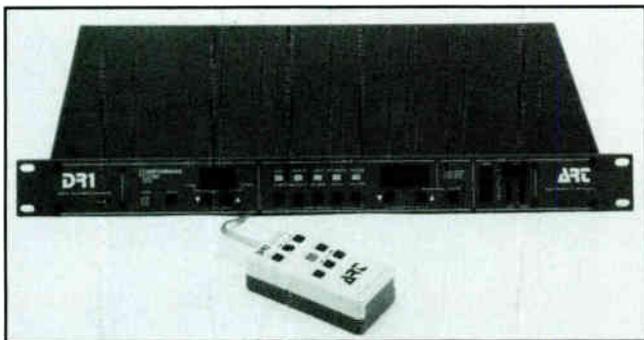


## Audio Control RTA

Audio Control Industrial, (Lynnwood, WA) is now shipping their affordable, fully professional, third octave spectrum analyzer, real time program monitor with memory. This model, the SA-3050, meets or exceeds ANSI Class II standards utilizing fourth order filters for excellent accuracy. The unit's 30-band display uses an easy-to-read, large format 270 dot matrix grid. Controls for this display include resolution of 1, 2, 3, and 4 dB per step, SPL on-off, and fast, medium and slow decay integration.

Other standard features are six memories with read, write, freeze, and RTA-memory comparison functions. Three signal inputs are standard; a phantom powered balanced XLR input, a FET instrumentation BNC input, and a balanced bridging 1/4-inch line level input. The SA-3050 includes a precision digital pink noise generator with adjustable output that has the power to drive a speaker directly. Also included in the (\$675) package is a calibrated phantom powered 1/4-inch pressure gradient condenser measurement microphone. Options include a battery pack, parallel printer interface, expansion port and rack mounting adapters.

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## DR1 Performance MIDI Update

Applied Research & Technology (Rochester, NY) have introduced their Performance MIDI software Version 1.2, which brings total control to users of the DR1 digital reverb. The update allows any two DR1 parameters to be adjusted via MIDI controls, such as key velocity or modwheel; as well as being able to operate two DR1s together, save all program preset information, and record changes on a MIDI recorder. Other features are flanger/chorus functions, preset sequencing, and ten new factory presets.

The software is included on all DR1 units shipped after May 1, 1986, and owners of earlier units can purchase the software from any ART dealer for \$50.

Circle #033 on Reader Service Card

## Studio Design Software

Data Base Design, Inc., of Tuckahoe, NY has introduced "Studio A," an IBM-PC-based software program for modeling simple studio and control rooms. The system provides: graphic display of axial mode resonances; detection of

coincident resonances; recommendations of inexpensive acoustical treatment; display of absorption calculations; and an external (user-adaptable) file of absorption coefficients. The program operation is straightforward: users merely enter different combinations of room dimensions, and choices of wall materials (such as carpet, drywall, and suspended ceiling tile, and the computer does all the required calculations and displays the axial mode resonance frequencies for each room entered. A hard copy of all important specifications, charts and parameters can be made via a standard dot matrix printer. The Studio A program is priced at \$149.95, and requires an IBM Personal Computer (or equivalent) with at least 128k of RAM.

Circle #034 on Reader Service Card



## Klipsch HIP-2

Klipsch & Associates has made major modification to one of its more popular speaker systems for professional use, the Klipsch HIP. The new version, known as the HIP-2, remains a three-way vented system with a 12-inch (30.5

—CONTINUED ON NEXT PAGE

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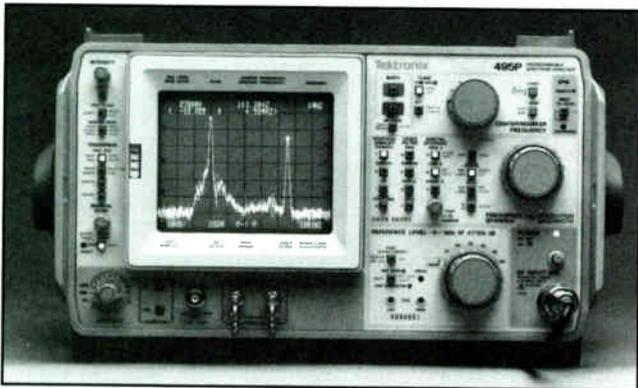
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cm) woofer and horn loaded treble section. Outward physical appearance of the new HIP-2 is quite similar to that of its predecessor. The new system is, however, substantially improved from a performance standpoint with a new crossover and HF horn. The new HIP-2 has smoother response, a more extended high frequency response, and improved polar response due to front mounting of drive components.

System sensitivity is 100 dB one watt one meter. Maximum output is 122 dB at one meter at the maximum continuous power handling level of 150 watts. Overall system response is 65 Hz-20 kHz  $\pm$  4 dB. Other new features include a recessed handle mounted on top of the cabinet for ease of handling, a heavy duty cloth grille reinforced with a metal insert for protection of woofer cone, and driver input protection fusing. The cabinet is sturdily constructed of 3/4-inch plywood with a heavy black textured finish, with a total weight of 48.5 pounds.

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## New Tek Spectrum Analyzers

Now available from Tektronix (Beaverton, OR), the 495 and 495P spectrum analyzers provide lab features and top performance in a portable package. This new pair of units cover frequencies ranging from 100 to 1.8G Hz, with -130 dBm sensitivity. With option 05 Macro Programming Capability, users can download frequently used programs into non-volatile memory, simplifying measurements. This option also provides internal center and dot marker frequency accuracy to one part in  $10^9$ , as well as built-in signal counter capacity.

The 495 and 495P can store nine front panel settings and nine waveforms, and both have direct plot capability. The 495P is the fully programmable and GPIB compatible version of the 495 (which can be upgraded later to 495P status). The programmability allows operation under program control, changing front panel settings, reading data from the CRT display and sending spectral waveforms from internal memory to other GPIB devices.

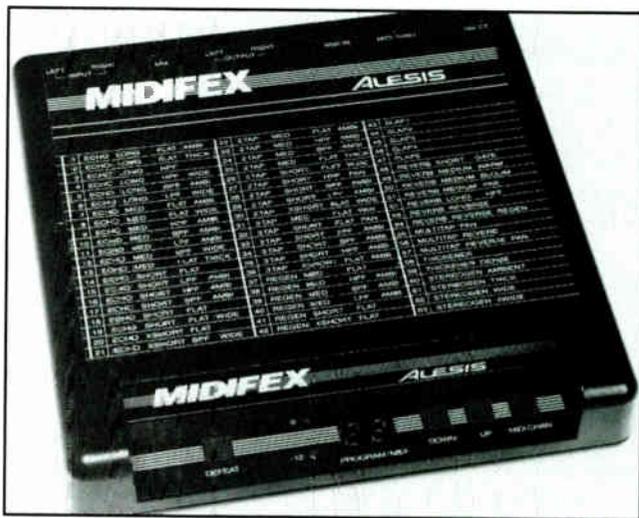
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## Sound Technology Audio Test Software

Sound Technology, of Campbell, CA, has introduced new audio test software for controlling the company's Model 1500A or 1510A audio test systems via IBM compatible computers. The menu-driven software measures two-channel AC volts; azimuth; second, third and total harmonic distortion; frequency response; weighted and flat noise; maximum operating level and channel separation. Measurement results appear on the monitor as they occur, or they can be stored to disk and printed out in either tabular form or as graphs. Other features include the user-definition of acceptable limits for pass/fail reports,

and two- or three-dimensional graphs with comment field and user-defined scales. An optional tape test module performs an automatic pass/fail testing sequence for two- or three-head tape recorders.

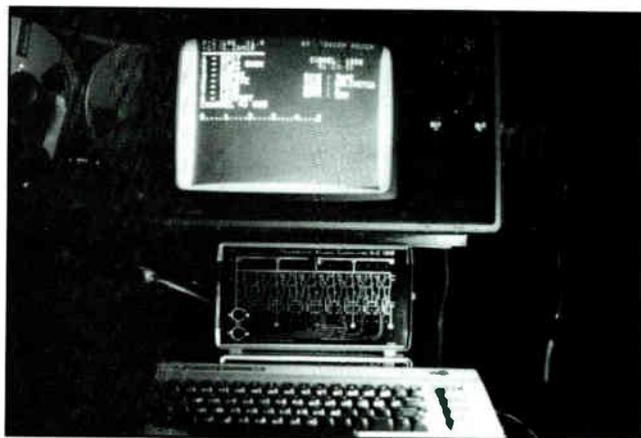
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## Alesis MIDIfex

Alesis, of Los Angeles, has unveiled MIDIfex, a low-cost, MIDI controllable digital multi-effects processor priced at \$399. Through the touch of a button, (or via MIDI) 63 different programs can be recalled, including: single, double, and triple tap delays; ambience and echo effects; stereo synthesis; and a variety of other programs ranging from gated and blooming reverb to reverse regenerative sounds. A back panel effect/dry mix control is provided, as are stereo phono jack inputs/outputs and an LED numerical display of program selected.

Circle #038 on Reader Service Card



## AKIA Console Automation

AKIA Electronics/O & Z Industries, of Homestead, FL, have introduced the X-Z 100, a computerized automation system which can operate with any mixing console. The X-Z 100 reads a sync track recorded on one track of the tape recorder and is inserted either between the deck and the mixer or to the send/return loops if the mixer is so equipped. The computer's audio inputs/outputs are RCA pin jack-type, and each \$1,499 computer module handles up to 16 channels, and a total of eight units can be controlled, for up to 128 tracks of gain control. Other features include built-in gating/muting, programmable compression effects, and the ability to edit gain control parameters.

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put into any of five operational modes: Reverb, Non-Linear, EQ, MIDI, or Further Level. Most work is done in Reverb or Non-Linear modes, with the others being selected to make specific adjustments. Four lines of graphics under the parameter display windows indicate the functions of the keys and display for each of the first four of these modes, with the active mode being indicated by one of the four mode indicator LEDs associated with the graphics. Further level is a hidden mode which identifies itself, when called, by showing "FT LEVEL" in the parameter display windows. The keys are marked with the Reverb mode functions: memory number, pre delay, reverb time, HF damping, reverb (program) select, and (reverb) output (level).

This is a fairly standard assortment of parameters, however the SRV offers considerably more with its Further Level mode. Further Level allows adjustment of another five reverb parameters: reverb density (sometimes called "diffusion"), and four parameters affecting only the early reflections portion of the processed sound (attack time, attack level, density, and level). Attack time and attack level are a bit subtle in function, but quite powerful. Attack time determines how long the

early reflections take to build to their maximum level, while attack level determines how long the early reflections take to build to their maximum level, while attack level determines the level that the first reflection starts at. Thought of in acoustics terms, a small tiled bathroom will have very strong reflections immediately following a sound because of the short distance the sound travels before encountering a boundary, and the reflective nature of the tile. In a large concert hall, reflections will build slowly to a peak and then decay. The SRV allows this behavior to be simulated by setting the attack time to 0 and the level to 8 or 9 (full scale) for the bathroom, and values of 7 or 8 for attack time and 3 or 4 for attack level of the concert hall. Non-linear mode does not offer quite the same plethora of adjustments, but it does have two significant features of its own: a gate time parameter for gated reverb effects, and the ability to set negative decay times for reverse reverb effects. The term "non-linear" refers to the fact that the density of the reverb is constant over time, rather than building up over time and in Reverb mode (and natural reverb).

As if this weren't enough, Roland has included a three band digital

equalizer (LF shelving, MF and HF fully parametric) before the reverb processor. This is extremely useful in that it allows the timbre of the sound to be tailored before reverberating it instead of doctoring the reverb with console EQ after the fact (which, of course, is still possible). Furthermore, EQ settings are stored with all the other parameters.

The rear panel jacks marked "Effect On/Off" are effectively reverb input and output mute switches. A footswitch inserted into the "Infinite" jack can enable infinite reverb effects, while the first "Effect On/Off" can be used to "punch in" to the infinite reverb to add more sound. The gain boost switch selects a nominal level of +4 dBm or -20 dBm for the input and outputs. The SRV's MIDI implementation allows it to recognize program change commands (which can be mapped to memory numbers in "MIDI" mode), and System Exclusive information, which can operate any programmable feature of the unit (parameters, modes, etc.).

The SRV-2000 has 32 user memories in battery-backed RAM, the first 16 of which come loaded with factory presets. Once these memories are written over, the factory presets can be recalled only by loading them from

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ROM into RAM, a simple procedure which unfortunately erases user memories in RAM at the time. Each memory can contain a different setting for Reverb and Non-Linear modes, each with its own EQ.

I found the SRV-2000 to be generally easy to learn and use, with only a few exceptions. To point up the subjectivity of these things, however, a colleague stated to me in a conversation about the SRV that he found it confusing and preferred the Yamaha REV7 user interface. Now, I like the REV7 a great deal, but on the SRV it is much easier for me to quickly get the sound I want and be able to view the appropriate parameters. I like the multiple window display and did not have any problem relating the graphic to the keys, mostly because of the mode LED that would remind me at a glance which line of the graphic to read. Although it seems trivial, I also like the large size of all the keys; pressing tiny buttons while mixing live sound can be frustrating.

However, Roland did make one compromise that could be a serious impediment to using the unit live, particularly as a performer. This is the placement of the balance knob on the rear panel. An onstage, rack-mounted SRV could not have the mix of dry and reverberated sound changed in performance, especially since there is no provision for external control of this basic function. In a setting where the unit's outputs can be returned into their own input channels of a mixer this is no problem, but it could be for a player onstage. And while we're picking nits, it is a wonderful thing to have a gain switch on the rear panel, but I found the fact that it switched both the input and output levels somewhat inconvenient. It is easier for me to accommodate units that offer separate gain setting for input and outputs, or even input gain only. It is far better, though, to have this gain switch than none.

In general, the SRV is used by selecting a reverb mode (Reverb, Non-linear, or Room Simulate), choosing a program and variation with the Rev Sel key, then adjusting parameters as desired, calling other modes (MIDI, EQ, Further Level) if necessary. I very quickly became comfortable with tweaking the SRV, and was rarely confused about what was going on, even using some of the more exotic features. It is quite straightforward to store, copy, and recall memories with the Copy, Write, and Memory No. keys, respectively. It is also easy to select four of the five modes by pressing appropriate front panel keys. Unfortunately, getting to Further Level is

rather involved. To do this, you must actually power the unit down and then back up while depressing two buttons. Now you're in the right mode, but you can't get to the parameters of that mode until you press the same two buttons again. To get out of this mode, you have to go through the same power down/up with keypress cycle. Although most people do not bother to adjust early reflections parameters very often (if at all), I, for one, tweak reverb density with regularity. It is a real drag that getting to it is such a rigamarole, but I'm thankful for two things anyway: that the SRV employs relays on its outputs so that there are no pops in the speakers during power down/up, and that the Further Level

mode exists at all on an instrument in this class.

The MIDI implementation brings forth the same feelings. The SRV cannot transmit MIDI at all, but it can recognize System Exclusive information that would burn your ears off. Every little detail of the unit can be varied from a source of the appropriate MIDI codes. Unfortunately, at this writing there are none. Presumably, Roland intends to offer software that will allow remote manipulation of the SRV from a personal computer. When that appears, it will solve the problem of remote control, and even off-line storage of setups—as long as you do all your setups from the computer.

—CONTINUED ON PAGE 65

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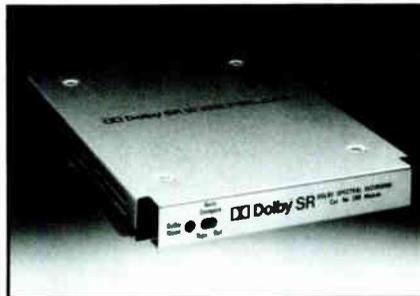
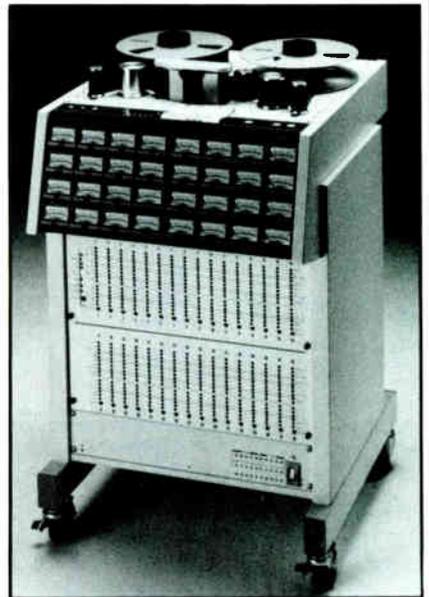
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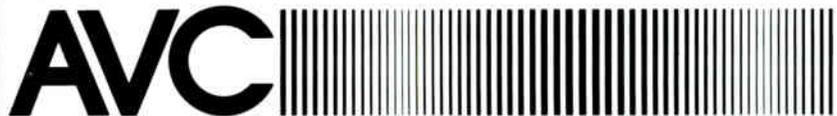
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### Checking Out the MIDlverb

Some achievements, such as the four-minute mile or landing on the moon, seem to be unattainable—that is, until some famed pioneer does the impossible. This is certainly the case with the Alesis MIDlverb, the first under-\$400 digital reverb. However, the folks at Alesis were not merely content with producing a "bare-bones" machine: the unit offers stereo inputs/outputs, some useful effects voicings and, as its name implies, MIDI control.

The name "MIDlverb" may be somewhat misleading, as one might assume that the device is designed *only* for keyboard applications, especially due to its unconventional appearance. Fortunately, program changes on the unit can be controlled by either MIDI commands or via pushbuttons that can scroll through its 63 diverse factory presets in a matter of seconds.

Through an R.I.S.C. (Reduced Instruction Set Computer) process, MIDlverb performs reverb computations that are more complex than one would expect from such a simple circuit. In any case, the inner secrets of the R.I.S.C. process are

not as important as the fact that it *works*, and works well. A selection of rich and quite dense sounding reverb programs are available, with decay times of 0.2 to 20 seconds. Room sizes range from closets to coliseums and seemingly just about everything in between. High frequency tailoring is another choice—defined as "bright," "warm"



or "dark," depending on the program selected, and another bonus is the inclusion of nine gated reverb and four reverse reverb programs, which are ideal for percussive synth patches or drum machine applications.

The MIDlverb's MIDI control capability is simple, yet serviceable, offering only program selection.

Users shouldn't expect dynamic control of reverb parameters in a unit of this cost, although with the money saved in buying this over other units, one could certainly consider adding other accessories (such as the Alesis MIDlflex) for increasing versatility to any setup, without mortgaging the farm.

Obviously, producing a reverb of this quality for such a low price involved some compromises, such as the unit's limited (10 kHz) bandwidth. Other considerations, such as the small size of the case required an external power transformer (supplied) as well as RCA-type pin jack input/output connectors, which are rarely found on synths and other MIDI equipment.

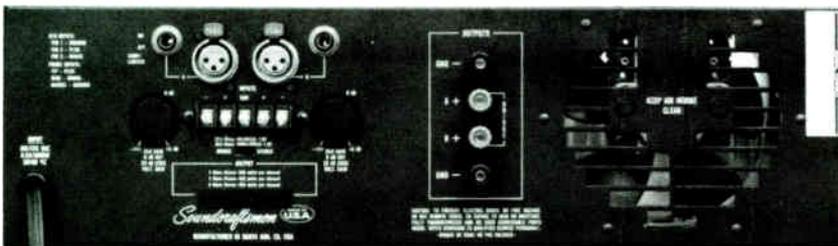
All in all, the Alesis MIDlverb is an excellent value at \$399, with a variety of good-sounding rooms, MIDI control, and some effects thrown in as well. It is well worth looking into as an affordable alternative, whether for sweetening your synths at a live gig, as a main reverb for the recording hobbyist, or as a second (third?) ambience processor for the medium-sized studio.

—George Petersen

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—CONTINUED FROM PAGE 63, SRV-2000

Without MIDI Out, there is no provision for dumping setups created in the SRV to off-line storage. There is, however, room on the rear panel to add a MIDI Out jack next to the other MIDI jacks. Hmmm...

Perhaps this makes me weird, but I read owner's manuals. As with many products imported from non-English-speaking countries, Roland's owner's manuals have, over the years, garnered a reputation for awkward and unclear phrasing. However, the SRV manual rarely left me scratching my head, perhaps partially due to the large number of diagrams and graphs. When you get your SRV, you should also pick up a copy of the SRV brochure, as it contains all the parameter data for the factory presets, which the manual does not.

Although Roland's advertising claim that the SRV embodies "every conceivable parameter" is arguable, there is no doubt that the machine offers more useful and detailed control of the sound than anything else even close to its price. Do you need all of this control? Maybe yes, maybe no. If you are a "button puncher" and just need one or two basic sounds, you may never use most of what this machine offers. On the other hand, I believe that the quality of reverb/ambience on a sound is almost as important as the quality of the sound itself; hence I always optimize a reverb setting for the particular sound and desired context. Oddly, one of my favorite features, separate high and low frequency decay times, is not available on the SRV.

I haven't talked about the sound of the thing yet, but before I do, I should give a small caveat: this is part of the review that would seem to be the easiest, as it is largely subjective, but in fact, it is the most difficult for exactly the same reason. Digital reverbs vary widely in their sound, due to design differences. Based on my work and tastes, I like the SRV-2000. In almost all situations, it sounded very full and rich, with very high density (especially noticeable in Non-linear mode) and a smooth decay. At its price point, it sounds quite credible, although I would not say that it is the most "natural" or "airy" sounding digital reverb available at any price. The SRV's limits became apparent at the extremes of decay times: small rooms and large halls. The only time that this was a real problem is with small rooms, which simply sound like tuned resonances. I found these only useful for special effects. Perhaps there is not enough randomization in the algorithms, causing the resonances to be more pronounced. In any event, it sounded far more pleasing than another popular unit in its

price class to which I compared it, and, in some situations, it even topped a reverb/effects unit costing twice as much. The plate and hall programs, along with medium to large rooms, sounded great on just about all the source material I tried: digital and analog synthesizers, drum machines, and sampled sounds of all varieties.

The Roland SRV-2000 is a very flexible and easy-to-use digital reverberator with a pleasing sound, many features, and an excellent price/performance relationship. Although there were some minor quibbles in my evaluation of the unit, they are certainly not significant enough to keep me

from recommending this unit highly, or purchasing it myself, should the opportunity arise. ■

**Editor's note:** One interesting feature of the SRV-2000, not noted in the instruction manual, is that the unit can be used as a digital delay device, offering up to 450 ms of time delay. To do so, simultaneously depress the Reverb/Non-linear, Write, and Room Simulate buttons and then turn the AC power on. The front panel display parameters will change to indicate feedback rate in window two, delay time in window four, and output level in number six. Parameter values can be changed when the Non-linear LED is on, and the appropriate parameter adjust key is pressed. Delay parameters cannot be entered into memory, and the unit automatically returns to reverb functions if the AC is turned off, then on. —G.P.

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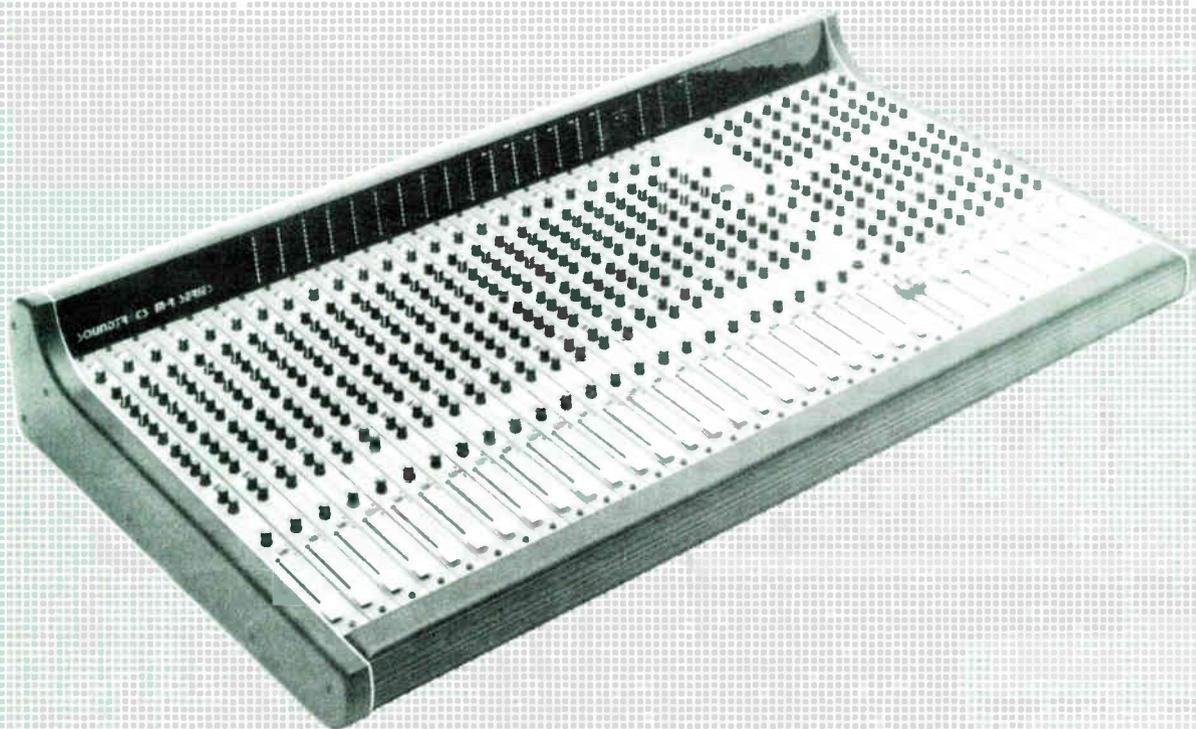
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## Soundtracs MR-Series Mixing Console

by David P. Ruttenberg

How often do you read about a rather complex audio component that claims to do this function or that function easily . . . with no muss or fuss? If you have ever tried to weed through the manuals of these devices, you may approach retirement before you master half of their capabilities. Wasn't technology supposed to make our lives and jobs much more simple?

Enter the MR-Series from Soundtracs. This system incorporates the most up-to-date in design technology for a moderately-priced mixing console and is available in two frame sizes: 24 inputs into eight sub-groups or 32 inputs into eight sub-groups, each with 16-track tape returns. The MR-

Series' careful design and layout enables the engineer to anticipate and easily react to most any mixing situation, whether sound reinforcement, video sweetening, or in a 16-track recording studio. A closer examination of the Soundtracs MR 24-8 proves this to be true and sheds much more light on the thoughtful design that went into making this console quite user friendly.

We'll begin from the very onset of signal, at the console's extensive rear patching section: input channels accept either XLR-type balanced microphones or high level, high impedance direct inputs. Forty-eight volt phantom power is selectable at each module, as are individual line/mic switches. The console's rear connecting panel also has blank panels designed to ac-

cept 56 pin sockets for connecting snakes and is available as an option from the factory. A pi-pad provides 20dB of attenuation enabling input gain adjustments to range between 0 and +40 dB.

Optimal signal-to-noise ratio is achieved via each module's gain control. This potentiometer allows the gain to be varied between +20dB and +60dB. A phase reversal switch on each channel controls either the microphone or line signal, which is handy for correcting phase cancellation anomalies or when using mid-side microphone techniques.

The input EQ design includes a  $\pm 15$ dB low frequency shelving filter that is fixed at 50 Hz, and a two element, 50-1k Hz quasi-parametric bell filter with a fixed Q-response of 1.5 enables  $\pm 15$ dB control. Similarly, higher mid-range frequencies are controlled by another quasi-parametric filter affecting the 500 to 10k Hz range. A high frequency shelving filter ( $\pm 15$ dB at 12k Hz) is also included, as is an EQ bypass switch. Finally, a high

pass filter, with a slope of 12 dB per octave below 100 Hz, is selectable and operates regardless of the main equalizer setup. All gain selectors are colored gray while each frequency selector is white; moreover, each potentiometer has a raised pointer which can be used to "feel" the position of the knob, particularly useful in low lighting conditions.

Both MR-Series consoles have six auxiliary sends per input channel. A wide variety of pre/post fader and pre/post equalization combinations are achievable and are completely variable. For example, sends number one and two are both factory set in the pre-fader signal path position; however, either send could be set at pre- or post-EQ via internal jumper links. Sends number three and four are selectable as a pair with regard to pre/post fader and are factory set (with jumpers) in the post-EQ mode. Identical in operation to sends three and four are sends five and six which can be selected pre- or post-fader from the front panel pushbutton switch. Again, by using jumper links internal to each module, alternative signal paths can be user-defined. For example, if one wishes to have a digital reverb receive both equalized and unequalized signals at its input, sends number three and four could be used, one with jumper links providing pre-equalization signal, the other providing post-EQ. Moreover, users have the luxury to enable pre- or post-fader signal to outboard gear since this is selectable on these sends. Each send's gain is controlled by an individual potentiometer and are color coded green for easy identification.

Channel assignments are easily determined via routing switches located directly beneath the input auxiliaries. Each input can be assigned to any of the eight subgroups and/or to the left-right stereo master. The channel's pan pot not only places the signal in the stereo field, but it also assigns the input signal to the actual sub-group. All odd numbered sub-groups are selectable by routing signals to hard left while all even numbered sub-groups are routed by turning the pan pot hard right.

Finally, four controls nearest the engineer allow for soloing and muting the channel output, detecting peak level inputs and adjusting level control. The soloed signal is pre-fader and, while engaged, does not affect the mix outputs. A green LED illuminates when the solo button is depressed, the mute switch is accompanied by a red LED, and a separate red clipping LED lights at 5 dB below the onset of signal overload.

The group section of the MR-Series

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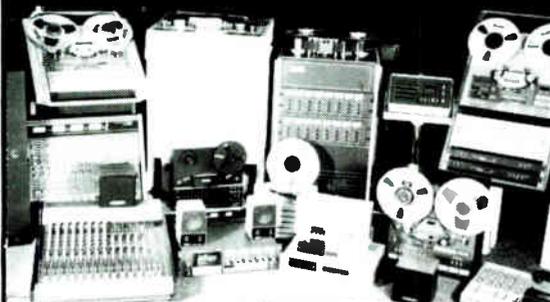
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console contains auxiliary masters, equalization and monitor selection/level control. The master section is adjacent to the sub-group/tape-return section. Unlike the individual channel input modules, this section is one complete module; thus simple removal of one sub-group or master control is not possible. Any channel assignment to one of the eight sub-groups automatically displays signal level on the appropriate ten element LED bar meter.

Six auxiliary masters control overall level to the sends. Each master has a pot for level and solo for post-fader monitoring. Simple assignments of either 2-track tape machines or the master mixing bus is accomplished by pressing the mix/return switch. When depressed, the tape machines are enabled and can be individually monitored via the appropriate selection button. The level is controlled by twin 100mm master faders.

Special consideration has been given to the master auxiliary send meters which operate by a separate push-button shared by tape returns numbered 11 through 16. For example, when depressing the monitor 11 switch, visual monitoring of aux send number one is now made possible. It is, therefore, impossible to "meter" tape returns 11 through 16 and auxiliary send inputs number one through six simultaneously.

The internal oscillator section in the MR-Series has two selectable frequencies: 30Hz and 1kHz. The oscillator's signal level is variable via a potentiometer that also controls the level of the talkback signal. Either talkback (from the provided XLR-F jack) or oscillator signal can be routed to the sends or group bus one through eight.

To activate the tape machine returns, merely depress the tape return push-button for the appropriate channel, which lights an accompanying red LED. The tape returns of the 16 monitor channels are quite similar to each other: all are capable of providing a pre-monitor, group send to aux buses one and two via two separate gain controls. Sends three and four are selectable pre- or post-monitor level via a single pushbutton and can be routed to send buses five and six by a separate switch.

Each tape return input and effects return utilize a pan pot which feeds the stereo mix bus. The tape or effects return inputs are either +4 or -10 dB and are easily variable up to 20dB by an adjacent level control. All tape return channels can be easily muted, and while muted or unmuted, each can be visually monitored via the appropriate LED display. Another con-

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"The Soundtracs console not only performed well in many unrelated audio applications, but its variable design considerations enabled tailoring the console to adapt to the situation at hand..."

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venient feature is the ability to solo any particular tape return.

Of notable difference between tape returns is that numbers one through eight employ a three-band EQ section: 10kHz shelving filter,  $\pm 15$ dB; 1kHz bell filter,  $\pm 10$ dB; and a 100Hz shelving-type filter,  $\pm 15$ dB.

A stereo output signal is available to headphones via a quarter-inch stereo jack. A gain control on the front panel provides monitoring levels of the solo, masters and/or the stereo return to the headphone output. A monitor level knob controls the output level to the main monitor speakers and a dim switch provides an instant 15dB of attenuation at the main monitor and headphone outputs. This circuit is automatically engaged whenever the talkback button is depressed and reduces the possibility of feedback. Monophonic signal monitoring is easily accomplished by depressing the nearby mono pushbutton. The overall level of any soloed signal may be controlled by the solo gain control; hence, any signal on the solo bus can be varied in level before it is introduced to the monitor section.

The console has an extensive rear panel section: all microphone inputs are XLR-type connectors while the rest of the jacks are quarter-inch. Additional tip-ring-sleeve jacks provide post-equalization, pre-fader break points. Lastly, a direct output of the channel which is post-fader is available at another jack. A balanced transformer option is available from the factory for the group outputs. A nice addition to the sub-group section is the availability of inserting a signal pre-fader on any of the eight groups or the master mix via a jack similar to the input modules. The master section outputs include the connections of two separate 2-track tape machines via two sets of jacks. These returns are wired at +4 dBm at the tip and -10dBv

at the ring with the ground at the body. The left-right stereo masters appear at the console's rear and are preset at +4dBv. This connection is also available as a balanced configuration option. The connection for the external, non-rack-mountable power supply is made through a six pin XLR jack, and a six foot cord is provided with the supply.

There are many applications for this versatile console. Studios with 8- or 16-track machines will find that the Soundtracs performs quite well in recording, overdubbing and remix situations. This process is accomplished in a straightforward manner using the MR-Series console. There exists, however, a few additional benefits that set the MR-Series design apart from the competition. Each input channel, sub-group and master output, for example, has an insertion point enabling the connection of outboard gear to the signal path, thus eliminating the need for a patchbay. Since the insertion is post-EQ, tone adjustments will appear in any outboard components. For recording studios with multi-track tape machines, depressing the tape return button on the appropriate channel enables tape monitoring. Up to two mix-down machines can be monitored. Six sends provide extensive cue feeds or, while mixing, an ample amount of effects sends. The eight sub-groups provide mixing onto individual tracks.

For live sound, each send or sub-group could provide six to eight separate monitor mixes. Of special interest is the flexibility involved in connecting many inputs to the console for 2-track stereo mixing. An additional 16 tape returns can be connected to the monitor section by plugging the returns into the 16 monitor inputs.

For those multi-keyboardists/electronic musicians, this desk is well suited for sound sampling of various inputs as well as applying considerable signal processing to your multi-instrument setup.

After experimenting with a variety of mixing situations, I decided that it was time to have a look at the internal workings of this console. The engineers at Soundtracs, I found, had even simplified the process of disassembling their console for service. After removing a few front panel screws, I noticed that all the input module circuit boards were interconnected with computer ribbon cables and attached to two multi-pin terminals, the first of which is a 40-pin double locking type connector used for signal routing, soloing and sub-group assignments. The second connector has 12 pins for input and output signal connections. There is one circuit board per input

module; I found them to be of the utmost quality in soldering, design and workmanship. Circuit components were of good quality and included 100mm faders and pushbutton switches manufactured by ALPS, Philips capacitors, Omeg potentiometers and high quality, audio ICs from Texas Instruments.

Having no published specifications to verify the console's performance, I generated my own measurements with hopes to satisfy my own curiosity. Input test signals were sent through the console using normal signal paths; specifically, test tones were sent through a microphone input then assigned to a sub-master group and finally through the output master section. Faders were at unity gain for all line level stages.

Frequency response was  $\pm 3$ dB from 20 Hz to 20 kHz. Worst case Total Harmonic Distortion measured out at 0.014 percent for a 1kHz test signal, while a 20 kHz tone provided a 0.007 percent reading. The user could expect quite respectable THD results for normal frequency signal inputs and nominal operating levels. Clipping was measured at +21 dBv, giving a headroom measurement of 17 dB above operating level.

Under normal operating conditions,

the signal-to-noise ratio was 80 dB. Equivalent Input Noise measured -125.4 dBv using a 150 ohm source and was only 5.4 dB from the theoretical ideal measurement. Crosstalk measurements were performed by using two identical and physically adjacent signal paths in order to simulate a worst case situation. While monitoring the right channel output, -44 dB of crosstalk occurred and proved to be independent of any frequency deviations. By directly routing signal around the pan pots, the engineer can expect improved crosstalk measurements on the order of 30dB.

The manual that accompanies the MR-Series console is extremely well designed and easy to read. By dividing all topics into 11 discrete sections such as recording applications, operation, maintenance and repair, etc., the user can easily locate and discover the desired information rather quickly and efficiently. Of special note is the maintenance and repair section which includes a flow chart and schematic diagrams of every circuit found in the console's design. The eight block diagrams are very intelligible and are accompanied by an extensive, ten page parts list that describes every circuit component per block. This is an invaluable tool should the console

ever require maintenance.

I was pleased with the simplicity involved in operating the 24-8 configuration after only having briefly acquainted myself with its manual. I was very satisfied with the adaptability of this console as it performed quite admirably under a variety of situations.

Let me go one step further by stating that the Soundtracs console not only performed well in many unrelated audio applications; but its variable design considerations enabled me to easily create and implement many variations of the initial console setup, thus tailoring the console to adapt to the situation at hand rather than compromising the audio requirements. I found the flexibility, design and reliability involved in operating the MR-Series Console to be most impressive. My tasks were easily accomplished in record time; moreover, I had fun completing them.

Perhaps the most surprising feature of the Soundtracs MR-Series Mixing Console is not a function of its faders or pushbuttons. The price of the unit tested (24 input configuration) is only \$10,995. With a one year limited warranty on all parts and workmanship, this console deserves the recognition of those desks costing twice as much money. ■

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# TOM HIDLEY

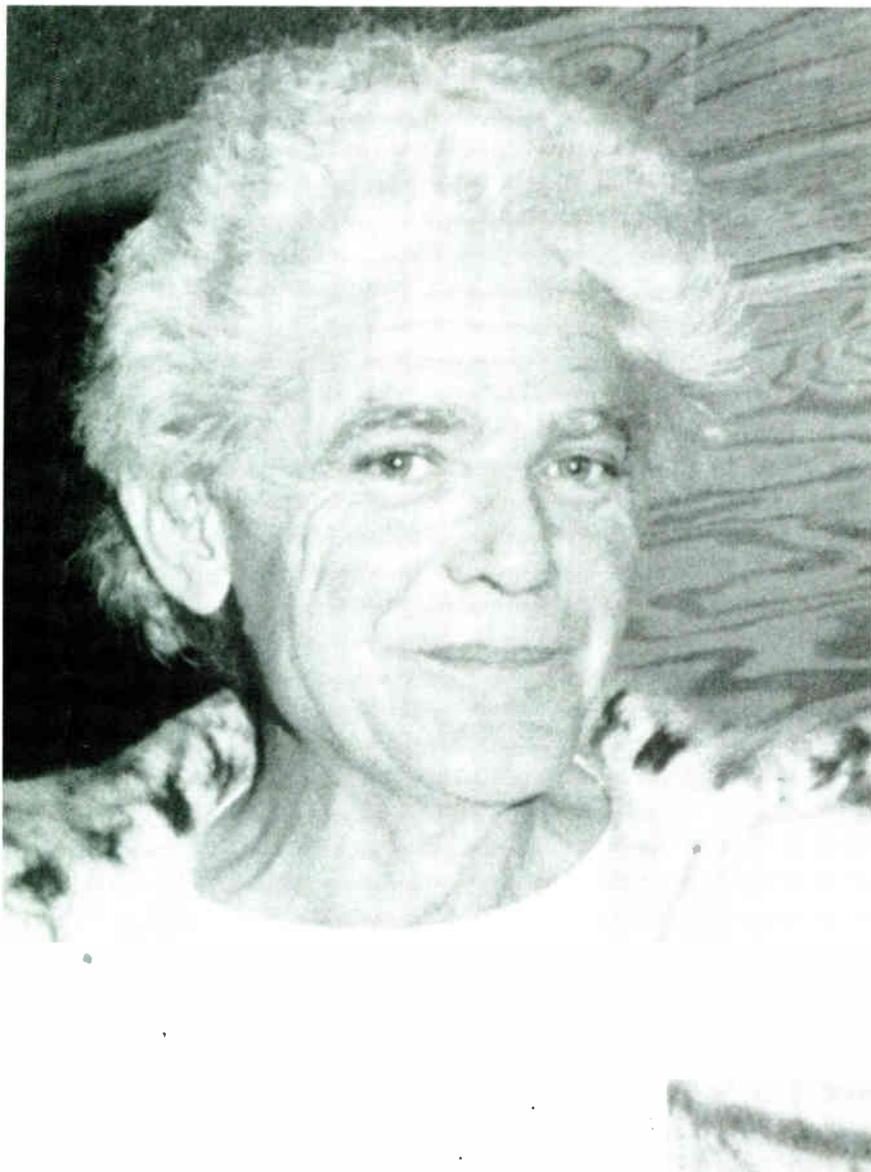


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scramble for. Lots of people are very satisfied, but Tom is still scratching his head and itchin' for a new fight.

We had lunch recently in Los Angeles, where Tom had flown to check out the new L.A. Record Plant. The studio holds a special place in Hidley's design—he started out in '69 with the old Plant. The bespectacled, white-haired puckish master speaks unashamedly about his success, but he speaks as openly about his failures. He is loud and proud of his new TH/Kinoshita monitors, designed with Shozo Kinoshita and built of the incredibly dense Apitong wood from Borneo. As he meticulously dismantled a perfectly symmetrical wheel of endive, he chatted casually about design—but there was a fiery twinkle in his eye.

**Bonzai:** Why did you retire in '79?

**Hidley:** I was just burned out physically. In 1978, my operation had designed 50 rooms in 52 weeks, and 35 of them were built that year. I was having a few chest pains and my doctor told me to take it easy. Money wasn't a problem, so I just cut all the strings and moved to Hawaii.

After a while I started getting bored with island life and started dabbling a bit, consulting, taking trips to Japan and Europe. This year I decided to move back to Switzerland and really get back into the business of studio design. I've currently got 34 rooms in various stages of design and construction in Europe, America, Africa and Asia.

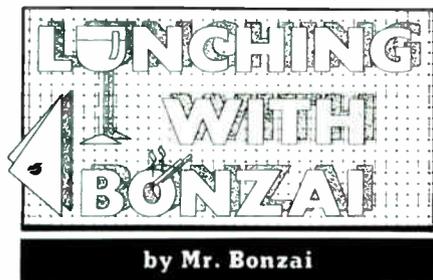
**Bonzai:** How did you get started as a designer?

**Hidley:** The first commercial studio that I was asked to design was The Record Plant, in 1969. I had done some experimentation, but my design for Chris Stone and Gary Kellgren was the first serious effort. I decided to work for them full time, and they were good enough to let me do outside designs. Business picked up quickly and while I was at the Plant, I designed studios for MGM and Warner Bros. here in Los Angeles, the Sausalito Record Plant, Caribou Ranch in Colorado, and a few East Coast jobs. It was during the transition period from '69 to '71 that I started Westlake Audio.

**Bonzai:** Were there any indications in your youth that you would be in this business?

**Hidley:** It was really an outgrowth of

## Right Between the Ears



ley is the softspoken, yet irascible, granddaddy of studio design. Like an enchanted crusader, he is on a quest for the holy grail of recording: the perfect space and the perfect place. He has designs on building a studio that can perfectly recreate the total perceived dimensions of sound in an environment that inspires musicians to enjoy the best.

Those who have an inkling of acoustic obstacles in the real world, wish him luck. Yet, with nearly 400 rooms under his belt, Tom has slugged it out and materialized studios that musicians

People think of recording studios as places. Actually, they should be spaces first, and places second. Tom Hid-



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my involvement in the music business. As a teenager, I studied saxophone, clarinet and flute, and by 13 I was playing in bands for dances and weekend concerts. This was in L.A., and by 15 I quit school and music took over my life. I am an extremist—sometimes I carry things too far. Having no real maturity, I was burning the candle at both ends and had a physical breakdown when I was 21.

I decided to quit the life of a musician, but I was still interested in the business of sounds. I started working in the equipment side of things—at tape recorder factories and loudspeaker facilities. In 1959, Earl Muntz asked me to join him and we built the first car stereo system. We had a little duplication system using 8-track cartridges and I stayed with him for about a year getting the business going.

In that period, I had met a man named Val Valentine, who was put in charge of MGM/Verve Records in New York. He asked me to come along and set up his studios. I told him I didn't have the slightest idea how to do it, but he said he'd show me. "You'll figure it out," he said. So, I joined him and went back East in '62 and worked with Val for two years—16 hours a day, six days a week.

At that time, MGM was cutting back on their record operation because of financial problems with some big films. My hours and salary went down and Phil Ramone came into the picture. He walked into MGM with Quincy Jones and said he'd double whatever my present salary was. So I moved over to 48th Street and stayed for a year. It was a great learning experience—good training. By 1965, I decided I wanted to move back to L.A. and got involved with Ami Hadani and his little TTG studio. That led to my meeting Chris and Gary and the offer to design the new Record Plant.

In '71, I started Westlake, with Chris' blessing. I couldn't have done it without him, because I didn't have the capital to start a company—let alone open an office on Wilshire Boulevard. You get your knocks, but it fell together nicely. You learn what not to do and try to stay above water while you're learning. I learned a few things from Chris along those lines.

**Bonzai:** How do you evaluate new projects?

**Hidley:** Well, I address every new room as a brand new problem—and I'm always cautious about the site. I ask lots of questions, do a lot of research and take time before committing to a project. If I don't feel that the end result will be complimentary to the client and to myself, I pass. I turned down

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**“You should be able to walk on a studio floor and feel like you're almost in heaven.”**

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three jobs this year.

In the early years, I didn't always know what would work. There were no textbooks to study—it was trial and error. I took almost anything that came my way and I took some pretty hard knocks. You must thoroughly understand the project and the budget framework.

**Bonzai:** Is there an element of luck, chance, and good fortune?

**Hidley:** There certainly is with any new designer. The element of luck decreases and becomes less of a factor as experience is gained. In the beginning, it's the right time, the right place and some good luck.

I won't mention any names, but there have been situations where other designers completed their designs and construction was about to begin when I was contacted by the new owners. People have misrepresented themselves as having Hidley designs and the clients have inadvertently called me, asking about blueprint details. They've expressed their fears and I've been called to fix things.

**Bonzai:** Can you describe one of your big design challenges?

**Hidley:** The CBS/Sony studio complex in Tokyo. It was the first time that I had to design 12 music rooms in one building with isolation required in all directions. Studios 1 and 2 were to be built over a basement where heavy trucks were coming and going and vibrating the entire structure. The studios were ground level in front, but excavated underneath. Structural pillars went straight down to the basement creating direct transmission paths, and there were elevators coming up right through the studio complex. We worked carefully, but we had to build all 12 rooms in four months.

There were 80 workers on the site in the last month. I spent a long time in the design phase, and prior experience helped me in finishing the job successfully. We had absolutely no isolation problems.

**Bonzai:** Can you recall any major goofs in your career?

**Hidley:** I made a beauty in the early days—when I make a goof, I do a good one. It was for Kaye Smith Studios in Seattle. This was early in my career and I did not understand the principles of isolation when the room was designed. I had ideas about controlling sounds within the room, but they weren't totally proven. They had been successfully developed at The Record Plant in '69, and at a few other places. The ideas worked—people said that the technology was way beyond the familiar grey walls and asphalt tiles. The rooms sounded good, so they were accepted by the industry.

But the Kaye Smith job was finished with bad isolation problems. You could hear Studio 1 in Studio 2. You could hear Control Room 1 in Studio 2. Sound was travelling back and forth like on a common telephone line.

There were hidden problems I had overlooked that ended up as mass chaos. It started with the floor. Before it was a studio, the building was a warehouse. I was unaware of the importance of soil compaction and fill, and years before, the site had been a city dump. The compaction was poorly done and there was a big heavy slab with cracks in it. We had two studios with a four-foot hallway down the middle. We had floated separate slabs for both studios and control rooms and the hallway, but we didn't have a solid foundation. As it turned out, we discovered pipes in the debris causing sound transmission between the rooms, and air pockets as well. Mistake #1: floating our slabs over this mess.

We then built our isolation walls—but, as we had done in previous studios, we simply tied them to the roof above, which was a dome that crossed between the studios. We learned from this mistake, and when we built Sausalito, we cut the damn roof, divided it and put a lip over the top to shed the rain to both sides. But with Kaye Smith—we had a continuous roof and whatever motion occurred on the wall connected to the roof and transferred across because we had no isolation cap. These factors hadn't caused problems previously, but with this studio everything added up and cost me \$30,000 to rectify. It almost put us out of business. I was very green in those years, and it's the lack of experience you will encounter with any new de-

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signer. You just can't imagine the potential problems until you've made the mistakes—and then, you never make them again.

**Bonzai:** What are some recent challenges?

**Hidley:** There is a request to create a facility with 80 to 90dB isolation from the outside world, specifically designed to satisfy digital recording requirements. It's for MCA in Nashville, and we also have to accommodate frequencies within the rooms going well below 50Hz (20Hz to be exact). I've designed nearly 400 studios, but this is a tough order. I've spent over 12 hours on the isolation problems alone and usually I can come up with the right figures in about 20 minutes—(isolation, containment). The new digital requirements demand extreme performance specifications. It's expensive, time consuming, and we are exploring entirely new areas.

**Bonzai:** Is construction a problem in the outlying areas of the world?

**Hidley:** It's very difficult, because they are not familiar with what the western world is up to. It's an educational process and you have to consider many factors that will affect a project way

down the road. On top of that, the style and methods vary considerably from L.A. to London, to Tokyo and New York. For the Nashville installation, the request is entirely different from the other centers, even as far as the specific rhythm layout that they want.

**Bonzai:** But don't you have to design a studio that can work in a number of situations?

**Hidley:** Well, they're not limited to working in one particular way, but the basic layout has to satisfy the Nashville musicians. If the pickers don't like it, they have no studio.

To get back to the problems of construction in the Third World—in Africa and South America—the high humidity requires specialized packaging and shipping of materials. If you ship from a cold climate to a place with temperatures running 80 to 90 degrees Fahrenheit with 80 to 90 percent humidity, your 2 x 4s are good for about four hours. You've got to put them in a controlled environment and put them up before they begin to twist. It's the only way to build in that situation.

**Bonzai:** Are you finding more and more trouble finding good craftsmen?

**Hidley:** Lots of trouble. After all, you may have the finest design in the world, but if you don't have someone to build it accurately, you have no room when it's done. You have an unpredictable situation and when it's done you discover unpleasant surprises. If you have good, dedicated craftsmen who really care, the end result is amazingly different.

**Bonzai:** Is there an area in the world that is especially advanced?

**Hidley:** Different areas are doing different types of work. "Better" in the music business is a very subjective term. In Japan, they excel in certain areas—especially in the technical expertise and maintenance of the equipment. The equipment is absolutely letter perfect ten years after its delivery. There is absolute technical excellence and precision. On the production side, they emulate a lot of what is done in Los Angeles studios. In California, you have a wonderful group of studio musicians, the likes of which can't be matched in any big orchestral settings. In Nashville, you have a certain type of rhythm style. They feel they have the best rhythm in the world, and maybe they do for their type of music. And they certainly record it differently. New

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# The Secret To Perfect

York is a world of its own, different in operation, evaluation of product, and entirely different from California.

**Bonzai:** You seem to be particularly sensitive to the music—

**Hidley:** At the end of the day, if it doesn't sound right, it's all a waste of time. You should be able to walk on a studio floor and feel like you're almost in heaven. You must be able to transfer the magnificence of the studio to the control room. We've worked very hard in developing proper monitoring, and especially the control of the room's first reflections. While in retirement, I dreamed of a control room that had no equalization at all. I think I've found the answers, but it was only after a few years of getting away from the business. The most important element to consider is the control of first reflections. You have to deal with the ceiling, the walls, and the floor. If you don't have control of the first reflection, you will never have naturalness. You may use brute force equalizers for a power balance at a certain point in the room that would be called a flat response—but as you begin to move around, things begin to change. And after a few hours, your ears begin to hurt. Ear fatigue sets in early when

there is a high acoustic phase distortion caused by poor first reflections. You get tired, your mind begins to turn off. The power levels have to be kept more restrictive when you have first reflection problems. In these new rooms we're building you can sit and listen with 120 SPL at the mixing desk and know it's loud, but it doesn't kill your ears. In older rooms, 112 SPL is ear shattering, painful. It's because of new designs—85 percent is the room itself and 15 percent is in the monitors.

**Bonzai:** How is the new Record Plant different from earlier designs?

**Hidley:** It's more musical. It sounds in the control room like it does in the studio. It's pretty to listen to for long periods of time, and at higher levels than the old Plant could ever operate at. The rooms are comfortable—your ears don't get crucified.

**Bonzai:** Would you consider this project a showcase of all your accumulated experience?

**Hidley:** Yes, but each job has a different performance requirement upon completion, depending on the type of music to be recorded and the people who will operate the facility. Isolation requirements will differ from client to

client, depending on the positions of the individual rooms, their relationship to each other and to the outside world. For its requirements, the geometry and the monitoring of the Record Plant is superb.

**Bonzai:** Psychoacoustics—what does it mean to you?

**Hidley:** Psychoacoustics is something that affects your decision making process, which means it affects your mind—subconsciously perhaps. It can include air conditioning, lighting, the noise of tape machines—anything that affects the human perspective and judgement as related to acoustics. If you walk into a room that has a seven-second reverberation time—a big hall, like a basketball gym—you will say to yourself, "This room is really live." You haven't done any measurements to verify it, but you have an impression from your ear, how your voice sounds, and from your mind. Your impression would be affected if the lights were bright, maybe flickering fluorescent light. There are many factors that affect the mood and effectiveness of a studio. Bad lighting can make musicians uncomfortable and it will immediately affect their performance.

—CONTINUED ON NEXT PAGE

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—CONTINUED FROM PAGE 75, HIDLEY

**Bonzai:** Can you make any predictions about the future of recording environments?

**Hidley:** They will certainly be more flexible than today. Variable acoustics have been moderately effective, but it will become a more and more desirable factor. We've built a room in Copenhagen that can be varied from .35 to one second reverb time in one minute with motorized control of the ceiling and walls. It's an expensive kind of construction, but it allows the engineer to sit at the desk with 30 strings playing and push a button and hear the character of those instruments change, without changing the console settings. This will become a more common design element, and engineers will need to understand how it functions.

The problem with variable acoustics is designing a system that works throughout the degrees of variation, not one that develops such things as flutter echo at certain points. You might have a large panel that can lay flat against the wall or be swung out 180 degrees. Parallelisms and unwanted reflections can occur and cause problems as it is being swung out. It's the job of the designer to allow for all the variations—otherwise you'll find that

the system only works in limited ways and is detrimental at times. When you have variable acoustics that really work, you have a great tool that remains acoustically compatible at any reverberation time setting. Variable acoustics have been around a long time—you find it in old radio stations of the '30s. They were wonderful in their day, but we've come a long way since then.

**Bonzai:** Drummers are especially critical of the way they are recorded. Some of them have told me they would rather take a synth kit into the studio because they can be sure of the results. What do you think of such trends?

**Hidley:** It's a shame—a step backwards. Creativity comes from the human side, not the machine side, and this is a creative business. It's not to say that drum machines aren't valuable, but as an overall industry trend, I think it is awful that such bad studios are still in existence.

**Bonzai:** For those who are thinking of building a studio—or perhaps renovating—what advice can you offer?

**Hidley:** Be careful, really careful. Choose a professional. Unfortunately, there are no cut and dried rules, and

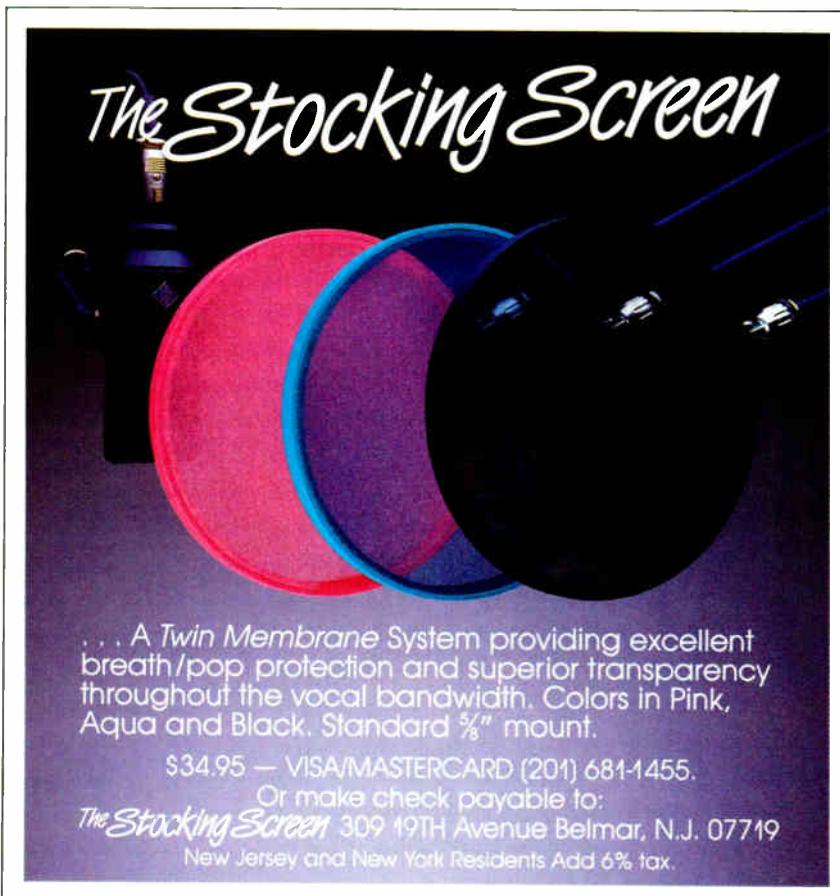
no truly comprehensive texts dealing with traps, and geometry, etc., as it applies to today's technology. You are handing over your money to a stranger and asking for something to be done effectively. Look at the designer's track record—how consistently good is it?

**Bonzai:** What is your long range view of the recording industry?

**Hidley:** I see very encouraging signs on the horizon for the industry. I see much pressure for the little independent operations, as the majors—the big money folks—are coming back with a vengeance and initiating designs and unbelievably large projects. The quantity of projects is not what it used to be, but many projects are much larger these days.

Digital is now a big consideration, and being prepared for. The implications of lower frequencies—30Hz, 20Hz—and the feelings of these sensations in the final mix are making people think again, and institute new projects of great magnitude with very elevated specifications. Rooms that are going online this year indicate a new era. It's in part due to the digital transition and the emergence of such advances as digital consoles. Once people realize how the end product is affected, and the importance of the lower frequencies, the changes will have to come. We are seeing a great increase in synthesizer work and if the producer is sitting in an old control room with monitors that can only go down to 40Hz—and saying it sounds pretty good—well, he really is being fooled by the room and its monitors. When it's put on a proper playback system, one that goes down to 20Hz, his whole balance is gone. He builds from the rhythm and isn't really hearing the fundamental—he's hearing harmonics and balancing his mix on that. The mixing process will change as we gear for the increased ranges. We already know how important the higher frequencies are, but the bottom end is going to be a rude surprise to a lot of people. Forty Hz is not good enough any more, and studios that don't realize this will be out of date in five years. The rooms of today must be built with this in mind, and we're talking about frequencies that can literally shake the nails out of the walls. We must have reverb times that are consistent and smooth down to 20Hz in the control room.

The changes have already begun and as word gets around we are going to see major transitions in the philosophy of designers—and the loudspeaker manufacturers better get off their duffs and start building proper systems. ■

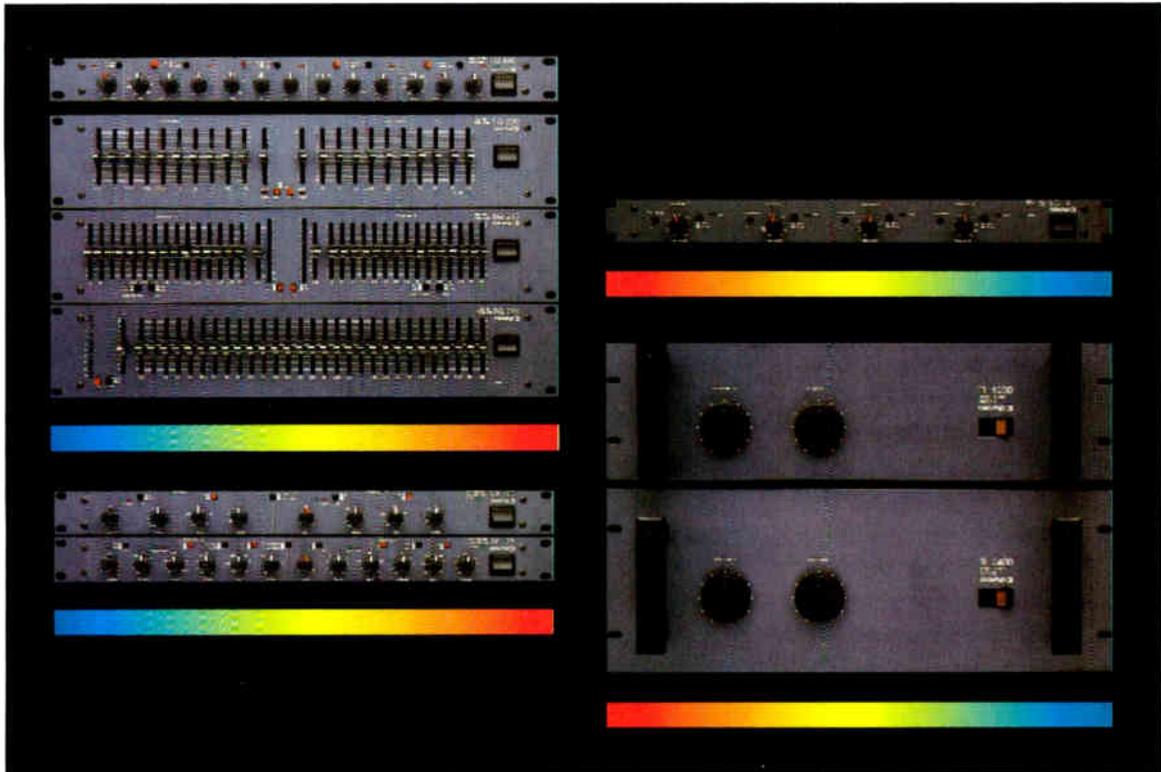


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# ARTIST · STUDIOS

## Suzanne Ciani's C/M Studios



PHOTO: HOWARD SHERMAN

*Suzanne Ciani poses at the board of the Amek automated mixing console recently installed at the new C/M Studios, an electronic recording facility. Pictured behind the console are C/M electronic creative associates Rob Zantay (left), Robert Kahn (center) and studio manager Brian Lee.*



PHOTO: JOHN FARRELL

*View through the floor-to-ceiling glass walls separating the client lounge from the C/M Studio 48-track electronic control room (center) and the 8 x 10 acoustic sound booth.*

by Brooke Sheffield Comer

Though composers are a major force in the trend toward home studios, Suzanne Ciani has packed up her synths and moved her studio out of the living room of her Park Avenue apartment and into C/M Studios. A facility for referral-only clients and Ciani herself, C/M marks a departure from the norm, both in the custom design and in the move itself.

"We've always done our own pub-

lishing," explains Ciani, "and now that electronic music is coming into vogue, we're getting requests from people who want us to handle *their* publishing. We're also in increasing demand from manufacturers calling on us to do Beta testing." To accommodate her burgeoning business, Ciani had to expand her work area. "People often needed access to the studio when it wasn't convenient to have them in my home. But part of the allure of the original room was homelike. So when

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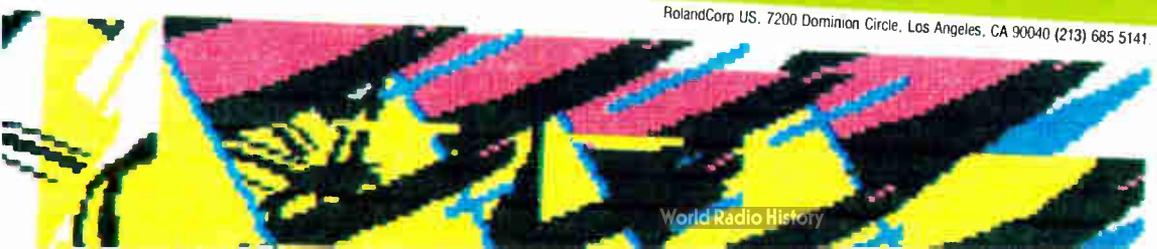
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we moved, we kept many of those special features: windows that open, a view, and special interiors. Our color scheme is intended to give the same feel as my albums, *Seven Waves* (Atlantic/Finndor) and *The Velocity of Love* (RCA Red Seal), a calm, floating sensation. It has a Caribbean sailboat feel."

Pastels and pink silk curtains were chosen to evoke a specific ambience, and like her music, the room helps foster an environment conducive to creative work.

There is, Ciani notes, a price to pay to maintain such pristine working conditions. "You can't smoke in the studio, or eat greasy foods," she notes. "I have a little speech that I give every client when they come in, asking them not to bang their equipment cases against the walls, or spill beer on the floor. But you can keep your shoes on here." (Shoes were forbidden in the Ciani apartment to preserve the white shine of her floors.) "We had one R&B act in and I thought 'these guys are really in the wrong place,' but they loved it, and treated the room well."

Behavior control via soundwaves is a Ciani trademark. She designs both her music and her recording areas from a special vision, and the studio's raw environment gave her a lot to work with. "The place was gutted when I first began to picture the shape that the room would take. We started with nothing but four walls, 2500 square feet and risers that determined where the kitchen and bathroom had to be." Renowned acoustic consultant Al Firestein and architects Bice Wilson and Tony Argibay of Meridian Design helped transform Ciani's vision and crystallize it into a reality.

Because the control room is also the studio, Ciani planned a client lounge, separated by sculptured glass, for observers. "We call it 'clients under glass.' The idea was to give clients full visual access, and a sense of participation without creating a distraction in the workspace. They can listen on the Yamahas, watch their own monitor, and communicate over an intercom, or simply read, eat and talk on the phone. Some of the productions go deep into the night, and we want everybody to be comfortable."

Since C/M was stripped down to the bare walls when Ciani moved in, she was able to insulate from scratch. The building is the tallest on its end of the block, and "so far, no one has built on either side of us," she notes. "So the main insulation has gone into the floor and ceiling. We insulated the ceiling and raised the floor for MIDI wiring. After taking the measurements, we were pleased to find we didn't have to float the ceiling. This was fine with me,

—CONTINUED ON PAGE 122



Edit 2 - San Francisco Production Group



Live Oak Studio

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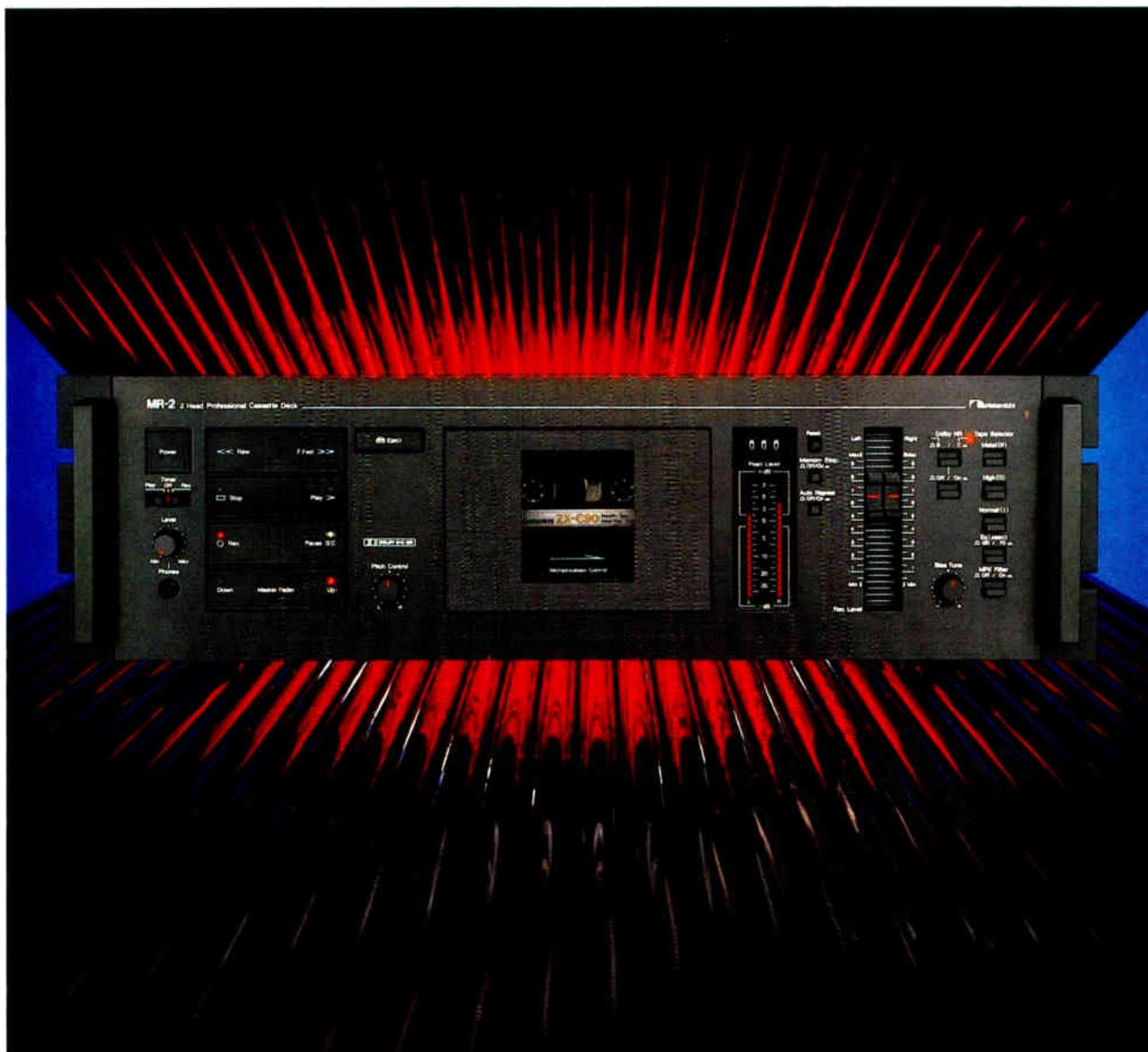
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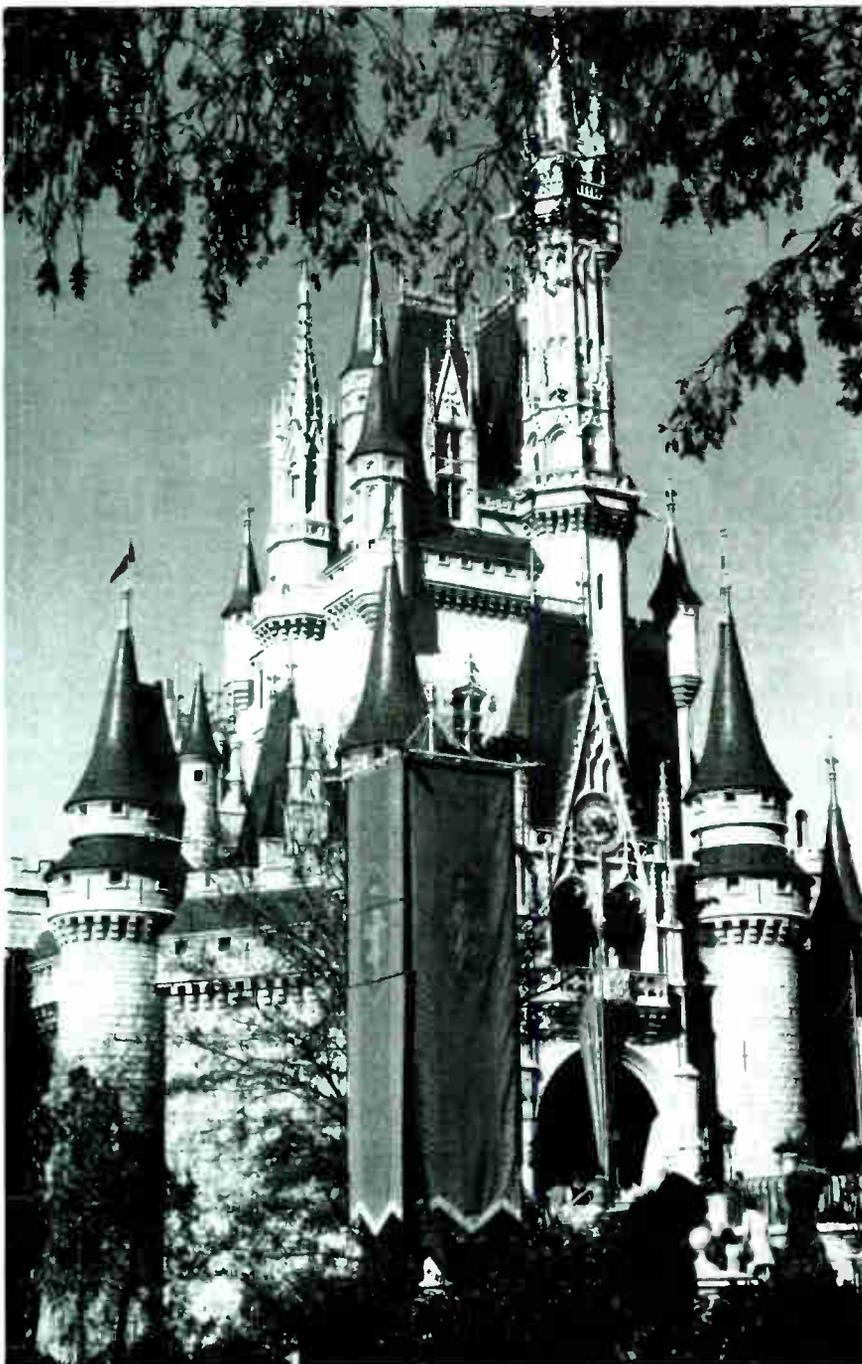
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# SOUND ON STAGE



*Banners flanking the entrance to Cinderella's Castle disguise 3-way speaker systems used for live outdoor shows.*

by Mark A. Drury

**I**f one word could be used to describe the many products of The Walt Disney Company through the years, from animated film classics to theme parks, the word would be **QUALITY**. This emphasis has long been a Disney tradition, and is greatly responsible for the company's continued success. One of the best ongoing examples of this is Walt Disney World's Magic Kingdom in Orlando, Florida. With an excess of 20 million guests expected to attend Walt Disney World this year, a primary concern of the company continues to be the "show quality" of the many attractions in the Magic Kingdom. A key factor of show quality is audio. Therefore, in designing the park, the Disney sound design engineers had to create an audio system that would meet the artistic and creative demands of the attractions while adhering to certain design and engineering requirements; optimizing both the aesthetic and technical aspects of show quality. According to Bill Tomlinson, supervisor of audio/electronics for the Magic Kingdom, "the design and concept was to provide quality audio to the thousands of guests seated in a day in all aspects: from a 4-inch figure speaker (inside an 'Audio-Animatronics' figure) to a multi-cluster theater system."

Ninety-nine percent of all audio in the Magic Kingdom originates from Audio Central located within the Digital Animation Control Systems (DACs) room beneath the park. The Magic Kingdom is actually built in two levels: the top level being the park itself (what the guests see), and the lower level consisting of a tunnel system for employee, maintenance, and distribution access to all areas and attractions, as well as rooms for control and support systems. DACs contains both Computer Central, for all automation/anima-

PHOTO MARK A. DRURY

## Audio Distribution at Disney World's Magic Kingdom

tion in the park, and Audio Central. Audio Central is responsible for all show (attractions) audio, area background music (BGM), parade audio (float music and supporting BGM) and various other support audio for the Entertainment Department (i.e. special BGM for Grad Nite for New Years Eve, support for live radio and TV broadcasts, etc.). Live shows throughout the park have independent, self-contained systems at the sites that are supervised by the Entertainment Department, and except for a common maintenance support group, are unrelated to Audio Central.

Almost all components used for the audio applications in the park, from electronics to speakers, are standard brand name professional products that are assembled and modified to Disney's own specifications and requirements. These specifications are determined by Walt Disney Imagineering, the design and engineering branch of The Walt Disney Company in California. Many prospective manufacturers may be sent spec requirements for a single component, and after reporting back how well their product can meet the spec, each product is then field tested for performance and endurance. The endurance test is especially necessary since most equipment at the Magic Kingdom operates 15 hours per day, every day, continuously! Even the beefiest of equipment might pass out under these conditions. Once a certain product is selected, any necessary modifications may be performed by either the manufacturer or Disney engineers. Typically, this merely involves installing a special harness at the output of a component to connect with Disney's cable system in DACS, or simply changing RCA output jacks to XLRs. Although most of the audio equipment used for the Magic Kingdom was designed and installed prior to the park's opening in 1971, the addition of new attractions, "rehab" of existing attractions, and changeovers to more efficient formats, keeps Disney engineers busy scouting out new technologies and equipment. (As part of company policy, Disney does not publicly endorse any of the product brands it uses and therefore no specific brand names will be mentioned in this article).

A brief layout of sound distribution from Audio Central throughout the park begins with the source tapes. Source material for main show audio originates from Disney in California and is in the form of either one-inch 14-track tape (a custom format used by Disney for 15 years) or 35mm 6-channel full-coat mag film. These are configured in endless loops and used

in special bin loop playback machines. Other source material used as additional show audio or sound effects is derived from printing masters from Disney Studios in California and is dubbed and loaded into 2-track endless loop NAB cartridges (carts) at the Magic Kingdom. Also derived from these printing masters is all area BGM used in 1/4-inch mono bi-directional open reel format. All signal processing (EQ) is done to tape, reducing the necessity of extra components and possible failure in the signal chain.

Running continuously, the 12, one-inch 14-track machines have tape storage bins capable of holding 20 minutes of endless loop tape running at 7 1/2 ips. For shows where two or more machines are needed, they are locked together using SMPTE time code recorded on one of the 14 tracks of each machine. As an example, for the It's a Small World attraction, four one-inch machines are used. With each machine having one track of time code, leaving 13 program tracks (52 total), one machine is designated the master and the other three follow it as slaves. Time code is also recorded on program tracks of some of the one-inch and 35mm mediums for the purpose of show synchronization. The code is read at the machine and sent to a Show Control Unit (computer) that draws memory off of a hard disk. For the Audio-Animatronics figures, the commands from the hard disk are used to trigger appropriate relays in the figures' hydraulic system facilitating all body movements, from subtle hand gestures to standing up. In addition to animated figures, an entire show—including curtain opening and lighting—can be synchronized to a self-resolving master audio machine, with time code being the "heartbeat" of the show.

The 35mm format, as expected, is used in conjunction with projected film attractions. This would include movie feature attractions, such as CircleVision 360 and The Disney Story, as well as film segments of other attractions such as The Haunted Mansion and The Hall of Presidents. Special film cabinets consisting of multiple rows of sprocketed pulleys, forming six-foot columns of endless film path and accommodating up to 2086 feet (23 minutes) of mag film, are used in connection with standard 6-track 35mm playback machines. Synching between projectors at the attractions and the mag machines in DACS is accomplished using a standard three-phase, sel-syn interlock system. A total of 13 playback machines are used.

The 2-track cart machines are housed in groups of five, called "five-

stacks," with a common capstan shaft for all five units. Each player within the stack is independently triggered to start/stop, or run continuously, according to its application. The 320 separate cart machines used throughout the kingdom are extremely versatile: depending on the application, the carts' two tracks can represent a stereo audio program, two discrete/unrelated audio tracks, or a related program with audio on one track and corresponding control tones for movement of animated figures on the other. The control tones are primarily for simple mouth movements of a figure, not the complex full-body movements handled by the time code/hard disk combination. In this case, analog tones of different frequencies are used such that each tone corresponds to a particular movement. When a given frequency is seen at the tape head, a corresponding relay in a figure's hydraulic system is triggered causing the desired movement. Thus, in an attraction like Pirates of the Caribbean, a single cart can be used to synchronize a pirate's yo-ho-hoing (audio track) with his mouth movements (control tone track).

All background music at Walt Disney World including the resort hotels, employee and backstage areas, all guest areas of the Magic Kingdom, and neighboring Disney Village, is handled by 16, 1/4-inch mono bi-directional open reel machines within Audio Central running continuously at 3 3/4 or 7 1/2 ips. The programs can be either theme BGM (music supporting a particular theme or area in the park) or general BGM (generic, "non-Disney" material). For the most part, theme BGM is played in all guest areas of the park, while general BGM is played in all employee areas and resort hotels.

Digital audio is also represented at the Magic Kingdom in the form of Compact Disc players (17) and solid-state (PROM) storage tracks (60), the latest additions to Audio Central's equipment arsenal. These were implemented two years ago to more efficiently handle the myriad short duration sound effects in the Big Thunder Shooting Arcade. While each of the solid state tracks is limited to five seconds of sound duration, with no real duration limitations for the CDs, Bill Tomlinson reports that both formats were installed as an experiment to see which would prove most reliable and efficient in considering future digital audio applications. The major advantages of reliability and low maintenance for these digital formats is backed up by the impressive fact that there has not been a single failure, either with equipment or discs (specially fabricated for Disney), during the entire two years of



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their almost constant use. In addition, most all of the effects in the arcade, from the plinking of a bottle to the sound of an actual rattlesnake (what those Disney engineers won't do for a realistic effect!), were digitally sampled.

After leaving the source machines, the multitude of audio signals pass through a patch field in DACS, enabling monitoring of individual machine outputs at the origin—one of two reference points in tracing back any output failures at an attraction. Next, the signals are routed to one of nine equipment rooms located throughout the service tunnel system. This is accomplished using 200-pair plant cables (large telephone communications cables containing 200 twisted-pair wires in a common jacket), pressurized to maintain dryness and lightning protected at both ends to avoid power surges, with two cables per equipment room. The 200-pair cables operate as "dry pairs"; the signal is direct from the source machines at a transmission level of approximately 600mV into 150 ohms. Even with small 24 gauge wire pairs, and cable runs of up to 2,500 feet, the cable plant is transparent; it meets the same frequency response specs as the source machines.

The equipment rooms are where the individual audio signals are amplified to a useable level. Upon arriving at the equipment room nearest their final destination, a dry pair is routed to one of 100 to 250 rack-mounted mono amplifiers, depending on the particular equipment rooms, each with 50W, 70.7V outputs. With all nine equipment rooms, over 1400 amplifiers are used. As the second reference point in the signal path for tracing output failures, the output of each amplifier has a special voltage dividing network from which a line level signal can be tapped off, selected via a shift relay, and routed back to DACS. This is accomplished at each equipment room by two wire pairs: one used to 'call up' a particular amplifier from DACS, with the other pair used to send the corresponding output signal back to DACS—both pairs contained in a 200-pair cable. A control/monitor panel with built-in amplifier and speaker in Audio Central is used to call up a particular amplifier in a particular equipment room by punching in a four digit code, the first digit corresponding to the equipment room number and the other three to the amplifier number. With the amplifier output and the previously mentioned source output (via DACS patch field) as reference points, an effective and expedient system exists for pinpointing equipment failures. As an example, if during operating hours it is

discovered that a frog has stopped its croaking at an attraction, a trouble call is radioed by walkie-talkie to DACS where someone punches up the corresponding four digit code on the monitor panel to listen to the output of the amplifier handling the signal. If the signal is present (sound of frog croaking over the monitor speaker), the problem must be with the speaker after the amp. If no output from amp, the source machine can be patched in and monitored. Signal output here would indicate the amp is bad, with zero output indicating the fault is with the source machine. Because of this signal path checking ability, the typical turnaround time, from when a trouble call is received to when a technician is on the problem, is one minute!

After amplification, the high level signals pass through sound distribution boxes that route the signals via ten-pair cables to the attraction. At the attractions, signals are distributed through high level cross-connects (basically a permanent hard-wired patch field) to sound break-out boxes located near the desired speaker(s). Before finally arriving at a speaker, a signal from the break-out boxes passes through an impedance matching transformer with switchable taps for load impedance and output level adjustments.

Three different speaker configurations are used in the attractions, depending on the application. For proscenium (above stage) and behind-screen theater type uses, two-way horn and woofer clusters are used. All multi-driver speaker systems in attractions at the Magic Kingdom are two-way (some three- and four-way systems used in live show setups), and use passive cross-over networks. Another type of speaker configuration is the "set" speaker: a speaker placed in the set of a scene or stage. For sounds needed from the set itself, say a living room scene in an attraction, speakers can be placed in the set wall disguised as a bookshelf. Speakers used in these cases can be two-way clusters or single coax speakers, depending on sound quality desired, space limitations, and application. "Figure" speakers, the most innovative of all the configurations, involve the mounting of speakers in the chest or head of an animated figure. This is used when a realistic, "up-front" sound is desired from a figure as opposed to the more background sound of a set speaker. A small two-way enclosure or single full-range 4-inch speaker may be employed, with the criteria being the same as for the set speakers: sound quality, space, and application. The Magic Kingdom utilizes approximate-

ly 4500 sound transducers throughout the park and employee areas.

Within DACS and adjacent to Audio Central is Studio D—a production studio supporting the Magic Kingdom. While the majority of production work in Studio D involves the dubbing of all attraction and BGM tapes and carts, it is also a fully functional 24-track recording studio, including 16-, 8-, 4-, 3-, 2-track formats. Therefore, it is capable of complete show production; the recording of all instruments, character and singing voices, and sound effects for any live shows in the park. (Most all live "production" shows in the park use a combination of show tape and live sound for the music, vocals, and effects depending on the complexity of the show). Approximately 50 percent of the show tapes used in the park are produced by Studio D, the rest produced in California. Other functions performed by Studio D include parade audio support, recording of radio commercials, sweetening of video spots, and production of audio tracks for slide shows—all in support of various aspects of the Magic Kingdom.

All audio for parades in the Magic Kingdom, including music from floats and outdoor BGM systems, originates from Parade Central within DACS. This consists of a small room containing video monitors, open reel and cart machines, FM transmission controls, and a 24 x 8 mixing board. Audio for parades is handled in two ways: parade theme music transmitted via VHF-range FM signals (13 separate channels available) to tuned receivers within individual floats with built-in amp/speaker systems, and identical theme music or synched BGM distributed through Audio Central to outdoor area BGM systems along the parade route. The relationship between audio programs for float and BGM systems varies according to the type and complexity of the parade and the music involved. Tape formats from two to 24 tracks can be used, with the many different float programs and corresponding BGM program recorded repeatedly on the tape. The parade route is divided into six zones that are monitored by spotters who walk along with the parade and radio in to Parade Central as floats approach/leave a zone. In the event radio contact is lost, the engineer in Parade Central can rely on images from three stationary video cameras each covering two zones of the parade route. Thus, with each of the eight output buses from the board corresponding to one of the six zones (with two backups), cross-fading of beginning/ending announcements, musical fanfares, and appropriate theme music over the BGM sys-

tems is possible as the floats pass by.

As for the future of audio in the Magic Kingdom, while no immediate audio format changes are planned (i.e. to digital), Gordon Cordell, Senior Audio Engineer for Walt Disney World states that all future audio formats are being "aggressively addressed" and involve a "very intense pooling of all of the company's talents in discussion of future mediums." By staying abreast of the latest trends and innovations in the audio field, the Disney audio engineers can implement new technologies that more practically serve the company when situations arise, as in the case of the application of digital audio in the Big Thunder Shooting

Arcade. From his viewpoint, Bill Tomlinson sees "the focus changing from maintaining source material to maintaining other areas of the show" as digital audio technologies, with their already proven reliability and low maintenance, are implemented at the Magic Kingdom. With the ability to focus more on quality, future systems can be optimized to produce even better audio, and consequently better show quality. And the Disney tradition continues. . . ■

*Author Mark A. Drury is a student majoring in Music Engineering Technology at the University of Miami in Coral Gables, Florida.*

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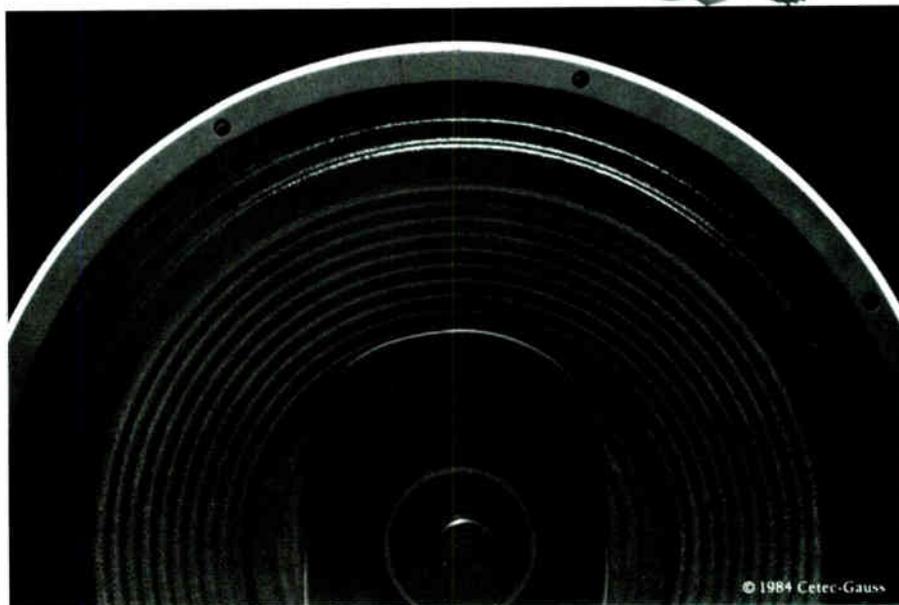
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# Tape Heads

## An Introduction

by John French

Magnetic heads: ah yes, those small blocks of metal with a million wires sticking out the back are probably, inch for inch, the most expensive real estate on your tape recorder. Why are they so expensive? Why do they wear? How long do they last? And a question often asked, What are they?

In order to appreciate and understand the answers to these and other questions concerning magnetic heads, one must recognize the intricate role these components play in the overall recording process. Considering how many different tape machines and track formats are involved throughout the entire analog production process (from the studio to the finished dupli-

cate product), it is obvious that a periodic head maintenance program is essential to insure quality recordings.

Magnetic head design and manufacturing has become a science in tightening tolerances, extending performance capabilities and developing new products and materials, while attempting to meet the current production requirements at both the equipment manufacturing and end user (replacement) levels.

A majority of multi-track and mastering recorders today utilize a form of laminated Mu-metal core construction for record and playback heads (see diagram A). Erase heads, and an overwhelming majority of high speed tape duplicator heads, are manufactured of various formulations of ferrite ma-

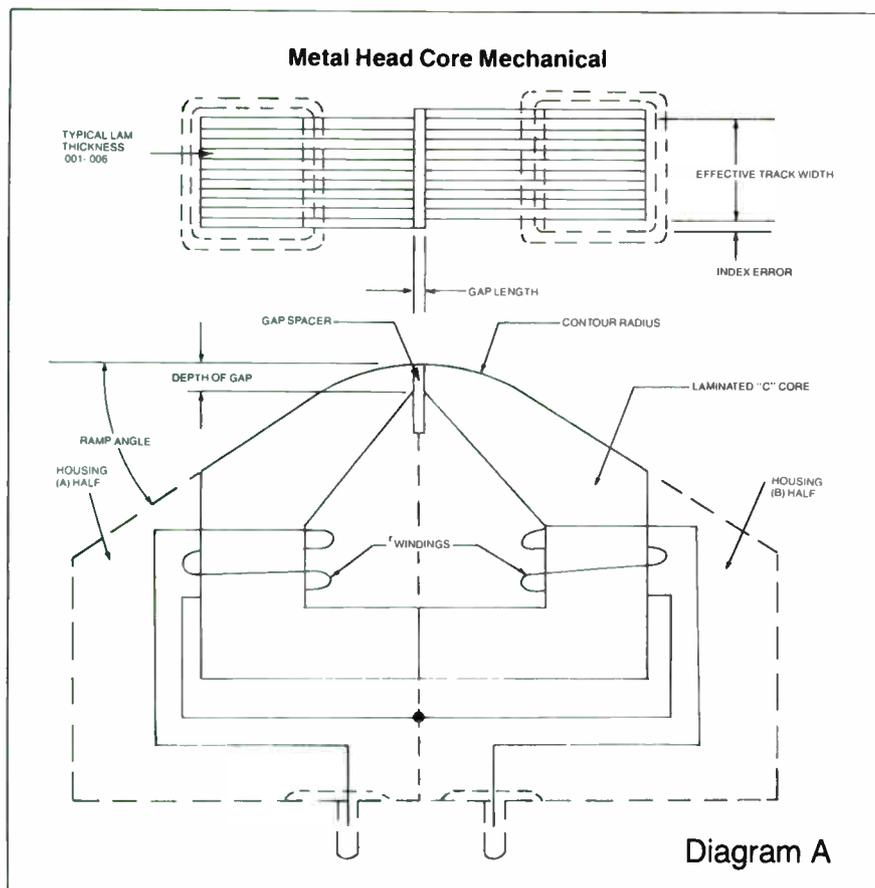
terial, often referred to as glass heads (diagram B).

Mechanical uniformity and operational consistence—both track-to-track (within the head), and head-to-head (for replacement compatibility)—is extremely important. Precision tolerances must be maintained throughout the entire manufacturing and eventual refurbishing process. Because of the close relationship between core geometry, head contour, wavelength, and EQ design characteristics of the electronics, variations or alterations to the original head contour will usually result in changes to the low-end response curve of the tape machine.

In both metal and ferrite head design, careful consideration is given to the choice of materials that comprise the critical tape contact area. Considering that this area of a metal head consists of laminated mu-metal cores, laminated shields, gap, epoxy and housing materials, equal hardness and abrasive resistance is of major importance to insure even wear characteristics.

To aid in even and consistent wear (edge-to-edge), all metal heads manufactured today incorporate edge relief slots. These machined slots are located outside the edge tracks and within the minimum width tolerances of magnetic tape specifications. In practical theory, magnetic heads with edge relief slots are far less susceptible to uneven edge wear problems caused by variations in tape widths and the razor sharp edges generated in the tape slitting processes. Edge relief slots are rarely used in ferrite head construction due to the long wear characteristics, hardness, and edge chipping susceptibility of the material.

As illustrated in diagram A, metal heads are constructed in two (mirror image) halves, each containing "C" laminated cores. The mating inner surfaces of the two halves must be lapped and polished flat to insure consistency in gap length, inductance and, particularly in multi-channel stacks, gap scatter and phase. Great care is exercised in this process to not work, hard-



en or destroy the surface permeability of the cores within the mating surfaces. Poor handling at this stage can effectively make a head assembled with a 100 micro-inch gap perform electrically as if it had a 200 micro-inch or greater mechanical gap. In general, most quality heads manufactured today exhibit about ten to 20 micro-inches of work hardening within their mating surfaces, and this figure is calculated into the size of gap spacer specified in the head design.

Assembly of the two halves, particularly core registration of indexing alignment (i.e. left of gap core alignment with right of gap core) is very important. While exact alignment is ideal, most quality heads fall to within a .001 index error. (Refer to diagram A).

As evidenced by diagram B, ferrite head design and construction techniques are totally different from that of metal heads. Due to its extreme hardness and composition, ferrite material is very brittle, and great care must be taken in the choice of mating materials, glass bonding, assembling, machining and the finishing processes so as not to incur stressing. Since ferrite does not flex, problems such as cracking and chipping are a result of material stressing and usually appear during manufacturing.

One of the most misunderstood terms is that of glass bonded ferrite. Glass bonding is a critical timing, temperature, and atmospheric control process that forms the gap and bonds the two "L" cores together. In this procedure, the two "L" cores are shimmed apart by the gap length desired. Temperature is brought up slowly to in excess of the melting point of the glass and held for about an hour. During this peak temperature period, liquid glass flows into the shimmed gap cavity area and bonding takes place. The entire process, including the cooling period, takes between six and eight hours.

Much like magnetic tape, many different compositions of ferrite material are used in a wide variety of magnetic head applications. Most of the heads manufactured for audio recording utilize a composition of manganese-zinc, which possesses the highest permeability and greatest stability characteristics.

Head manufacturing is a complex balance of machining delicate materials while keeping the alteration of their electrical properties to a minimum. Equipment manufacturers specify exacting electrical and mechanical parameters to which heads are produced. Finished tolerances in magnetic heads vary from manufacturer to manufacturer.

—CONTINUED ON PAGE 124



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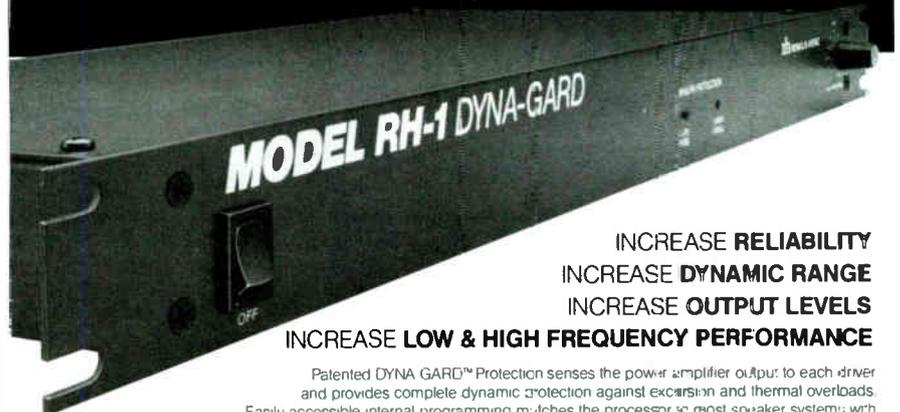
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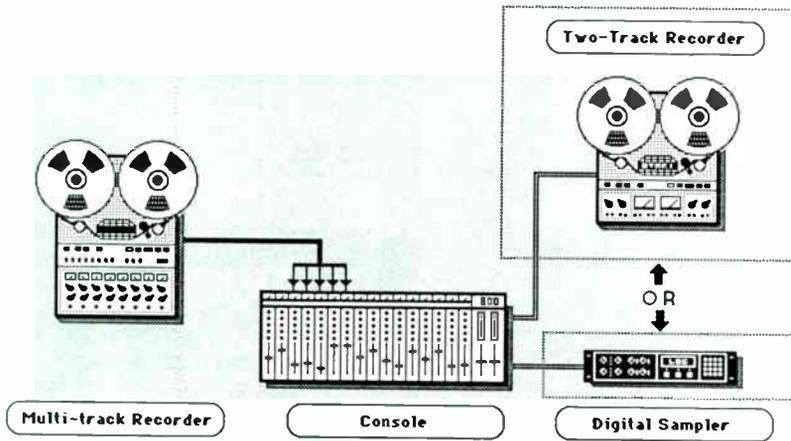
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**Fig. 1—Mixing a Stereo Composite**

Prior to "flying in" a part, a mono or stereo composite must be created. This may be in analog format, as on the 2-track above, or in a digital sampler, below.

## Megatracking at Home

by Bruce Nazarian

### Intro and Recap

Last month, we took a close look at the various uses for multiple multi-track recording (megatracking). Those readers who may not have had much experience in megatracking may be skeptical about how those techniques can be adapted to home recording, but read on... as promised, I will show you how to use some of these same techniques in your own studio, whether 8-, 16-, or 24-track.

### Do It Yourself Megatracking

To better understand how we adapt these techniques, let's take a closer look at what we really use them for. Megatracking involves the use of multiple tape tracks to create thick layers of sound, or to allow more parts to be recorded than you would ordinarily have tracks for. Back in the *April Mix*, we covered the "live sync" technique that uses MIDI sequencers and drum machines to mix parts in live, simulating the effect of having additional tape tracks. "Live sync" is not possible with vocal tracks, guitars, live horns or other real acoustical instruments that cannot be sequenced. We can, however, use the power of MIDI and se-

quencers to get the same end result as the expensive way. It just takes a little more time, and a little more work. Here's how...

### Multiple Masters

The active principle of megatracking is this: by creating copies of the master rhythm tracks, we gain additional empty tracks to use to record more parts. This is easy when you have two multi-track machines available; you can just bounce from one to the other. Those of us who are only fortunate enough to have one multi-track machine can accomplish the same end goal by recording multiple copies of the same master! It's quite simple... instead of recording just one master of the song you are working on, record two or three takes of it. (For ease of manipulation, it is probably best to record them one after another on the same reel of master tape.)

This multiple-master technique works best when you are creating a computer-generated rhythm track using a drum machine, sequencers and MIDI keyboards. That way, the timing will be (or should be) identical from take to take. It will take some extra master tape, and a bit more time, but the added cost is minimal considering the potential return.

### A Real Example

With the typical limitations of 8-track, some of the things that suffer most are the stereo "width" of the track (because most tracks are cut in mono), and the depth of the vocal sound (because double-tracking is not generally a luxury that can be afforded on 8-track). So here's a prime example of how we can effectively use megatracking: fattening up background vocals recorded in a home 8-track studio. In typical multi-track productions, the background vocals may be tracked three, four, five or more times to add a slight "chorusing" or depth to the part. We can emulate this process using "do-it-yourself" megatracking:

Using your sequencers, create two identical master recordings of your track, one after the other on the master tape. Mark one as the master and one as the vocal slave. (Make sure you keep track of which one is which so you won't get confused later on.) To make the most effective use of megatracking, try to record as few rhythm tracks as possible. The more you use now, the fewer you will have available to record your doubled parts. Remember, you can still use "live sync" later to bring the drums and keyboards into the mix live from their sequencers.

After you have determined just where the background vocals parts will go, and what voicings will be used, you can begin to record those parts on the *vocal slave take*. Since the only tracks you will need to keep will be the original rhythm mix, you may have as many as six tracks to use (assuming you cut your whole rhythm track in stereo, and erase the SMPTE or sync track). In a more typical usage, you may only use four or five tracks, and keep the SMPTE in case you should need it. Even four or five passes of multi-voice background vocals will add a rich, full timbre to the sound, helping to make your demo sound more like a finished record.

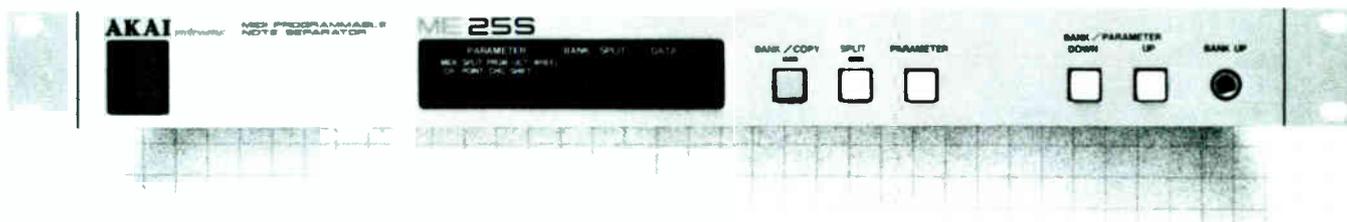
These completed background vocal tracks must now be mixed together into either a mono or stereo configuration, and then transferred to the master take for use in the actual mix. In effect, the slave take is like a "scratch pad" for your vocal parts, and need not be used again after you have transferred the finished vocals to the master take.

Here's the big difference between

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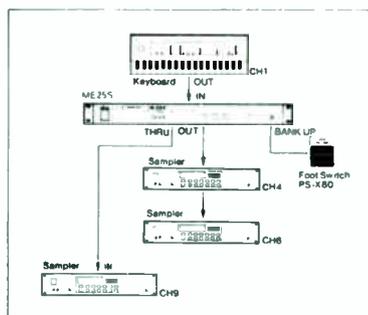


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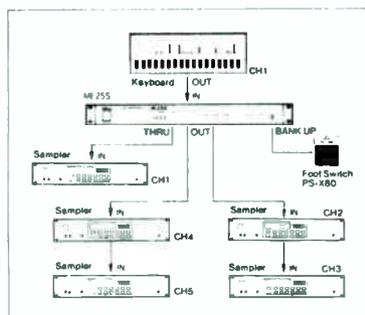
### AKAI ME-25S SYSTEM APPLICATION

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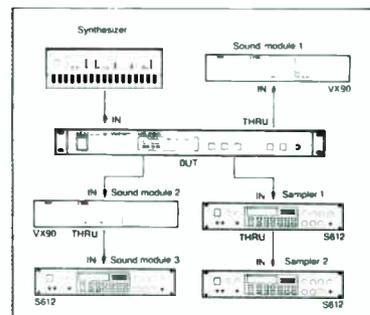
When the ME25S is used, transmission is possible on any channel by using the foot switch, even with a keyboard whose MIDI transmission channel is fixed at CH1

#### Using as a Keyboard Splitter



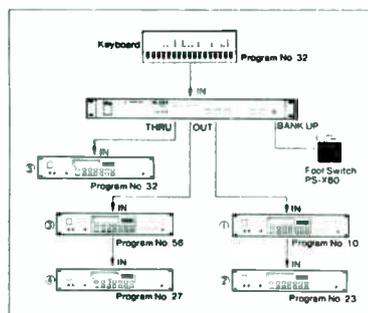
A keyboard not equipped with the split function can be split four ways

#### Using as a Keyboard Splitter with one Sound Source over Entire Keyboard.



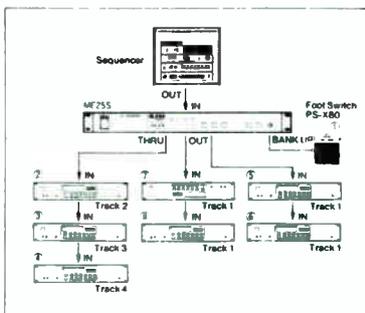
In this example, several external sources (sound modules, samplers) can be played on the keyboard with split voices.

#### Using as a Program Change Number Presetter



The ME25S can be used to preset the program change numbers, convenient when the keyboard's program change numbers are different from the MIDI delay, reverbator and external sound sources' program change numbers.

#### Using the Split Function to its Fullest



The split function on the ME25S can be used to run different parts on many external sound sources over a single sequencer track. The following example fully utilizes the octave shift function

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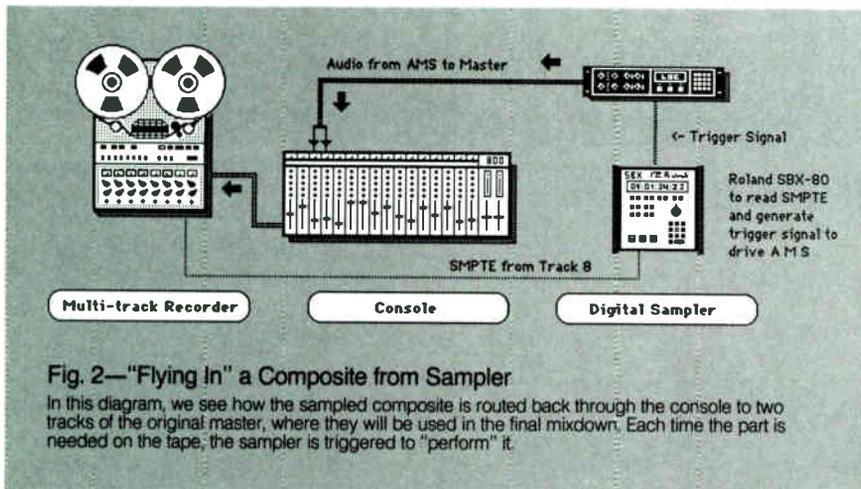


Fig. 2—"Flying In" a Composite from Sampler

In this diagram, we see how the sampled composite is routed back through the console to two tracks of the original master, where they will be used in the final mixdown. Each time the part is needed on the tape, the sampler is triggered to "perform" it.

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Flying from 2-track requires good coordination and a sense of musical rhythm. It is not too difficult once you have mastered the proper setup. Here's how:

—First, locate the desired section on the 2-track you wish to fly in. Park the machine at the beginning of that section, and mark the tape with a white crayon at a convenient place. This will be the "start mark." If your machine has one, zero the autolocator at this point. You will be re-cueing to this spot every time until you get a successful take, so the autolocator can save you a lot of unnecessary work.

—Rewind your multi-track master to a convenient point somewhere before the spot you wish to fly into, park the machine, and zero the autolocator. Select the tracks you will be flying into, and put them in "input" monitor mode. This will allow you to hear the incoming "wild tracks." Patching the output of the 2-track machine to the input of those same tracks will complete the setup stage. (By the way—once you're in this setup, never put the 2-track machine in input mode! Doing so will open up a feedback loop through the console, possibly damaging your ears or your monitors!)

—Now comes the tricky part. With the 2-track parked at the "start mark," hit "play" and try to get a feel for how long a delay there is before you hear the background vocals. This is the "start delay," which we will be compensating for as we fine-tune this setup. Let's say we're very lucky and that there is exactly a one-beat delay before the vocal part begins. This means you must hit "play" exactly one beat before the part is supposed to start, in order to sync with the tracks on the master take.

—Assume that the background vocal part is supposed to start exactly on beat one of the chorus. We already know we have a one-beat start delay. To fly in the part, "play" the multi-track master, and one beat before the chorus begins, hit "play" on the 2-track machine. It may take a few attempts to get the proper feel for it, but eventually the background vocals will fall in exactly on the beat where they should be. When they do, I hope that you are recording! Usually what happens is the first time you try it, it's bang on, and you're not recording. Then you spend the next five minutes trying to get the same perfect sync you had the first time. (Who says Murphy's Law ever takes a vacation?) After a while, you will begin to develop a sense of when you have "hit the mark" with sync, and when you haven't. If not, don't wait for the parts to play out.

megatracking with two multi-track machines and our adapted single-machine technique. Transferring is a two-part process: instead of being bounced directly across to the original multi-track master, the completed vocals must first be mixed and stored on some medium, then re-recorded onto the master take at the correct places. Figure 1 is a diagram of a typical mixdown configuration: multi-track machine, console, and 2-track machine. In this mix, however, *only* the background vocals will be mixed down. So turn off the rhythm tracks, and balance the background vocals. This will be the vocal mix on the finished master take. Record the parts on the 2-track machine, or a digital sampler.

One note here: with a 2-track machine, you can get up a good mix of your vocal tracks and just let the machine run. All of the background vocals will be transferred to the 2-track as they play. With a sampler, however, you almost always have to transfer only one part at a time. This is due to the sample time limitations inherent in most samplers. However, an amazing amount of good work can be done with even modest sample times. A typical AMS DMX 1580S with memory expansion can sample for about 6.4 seconds in each channel, enough time to record several complete bars of 4/4 music at typical pop tempos.

After the parts have been recorded on tape or sampled, you are ready to transfer them to the master take at the appropriate places. This requires a unique technique called...

### "Flying In" Parts

"Flying in" parts has become commonplace in recent productions, for a variety of different reasons. "Flying" is the controlled transfer of vocal or musical parts from the tape locations where they were originally recorded to any different locations they are

needed. The name comes about because of the way the parts are transferred: "on-the-fly," and usually without benefit of SMPTE time code lock-up. Generally, the multiple tracks are composited into their final form, (usually a stereo pair), then lifted off (digitally sampled or mixed to a 2-track machine) and moved around as needed. There are several reasons why this technique was developed, but one of the biggest reasons is time. As an example, creating a vocal slave reel with eight tracks of background vocals means you have to record the vocal parts not once or twice, but eight times every time that part occurs. Even with superhuman session singers, this dramatically increases the amount of studio time necessary to complete even a simple background vocal session, as well as the wear and tear on the singers. This increase of studio time means a corresponding increase in the recording budget, as well as steep doubling fees for the singers. Multiply this factor by seven or eight songs, and the recording budget goes through the roof! To compensate for the length of time it takes to create them, the flying in technique is used to duplicate identical parts. A common example of this would be recording one complete vocal chorus on a pop song, then sampling it and flying it back into every chorus in the song. The time savings can be dramatic: it may take two hours to completely record the background tracks for the chorus, and less than 15 minutes to fly them back into the whole song! Good quality sampling units have made this a common technique. (Culture Club producer Steve Levine reportedly uses his custom-built 25-second AMS DMX 1580S extensively for just this purpose.)

### Flying In From 2-Track

There are two ways to fly parts in.

Stop the machines, re-cue them both and try again. If the sample is coming in too late, moving the tape to the right will advance the playback a bit. Moving it a bit to the left will retard it. Now, let me clarify this: do not change or redo the start mark. Rather, the start mark is used as an absolute reference point so that you will always be playing the sample from the exact same point. The start mark is also used as a gauge for how much you have moved the tape as you fine-tune the timing. If a move in one direction is too much, split the difference. By lining up the start mark with various "landmarks" in the tape path (erase heads, tape lifter, sync head, etc.) you will have a method of creating a repeatable playback.

### Flying In From a Sampler

Flying in from a sampler is a bit easier, in that we can use SMPTE to "automate" the triggering process a bit. Figure 2 shows a typical AMS setup for flying in parts. The output of the sampler has been routed through the console to the appropriate tracks on the multi-track machine, and the machine has been prepared to accept the input and record it. Remember that the AMS will trigger a replay of its loop contents by an audio signal that is loud enough to light its green input LED. Using a Roland SBX-80 SMPTE Sync Box, we can set the offset parameter to start the clock at exactly the beat we want to trigger the background vocals in at. We'll use the "click" or "metronome" output of the SBX-80 as the audio trigger signal. Edit a one-beat measure (one measure of time signature 1/4) into the SBX-80's memory, and set the offset to the appropriate measure and beat number. When the SBX-80 reads the time code for that point, it will start the clock, which will click into the AMS's input and trigger the background vocal playback. Fine-tuning the SBX-80's offset parameter will allow you to slip the background vocals forward or back as needed. This technique is much easier to use than the 2-track technique, but the 2-track can sample a longer part more easily.

### 2-Track and Center Channel SMPTE

Sometimes, the length of the section you need to lift exceeds the sampling time available in your sampler, or you may not have a sampling unit available. The trusty 2-track recorder works well for this same purpose. Although flying from a 2-track is a bit trickier than pushing the trigger switch on an AMS, it is definitely a technique that is being widely used. Since flying things

in "wild" (without SMPTE) requires a technique that resembles "trial and error" more than scientific precision, SMPTE is starting to make some inroads here as well. Recent 2-track recorders have started to appear with Center Channel Time Code capability (CCTC). This is something new that promises make the mixdown-and-fly-back technique easier in much the same way as SMPTE has made slave reel mixdowns easier. CCTC requires new heads for the recorder that have a third, almost invisible track "centered" in between the two existing audio tracks. This third track is used to record and playback the SMPTE time code from the 2-track tape. In theory, you should be able to add SMPTE to any existing half-track tape without disturbing the previously recorded material, or pre-stripe time code on a 1/4-inch tape and then record your audio mix around the SMPTE on that tape. In practice, CCTC enables any suitably equipped 2-track recorder to be synchronized to the master recorder under SMPTE control, facilitating the precision transfer of recorded material. Put another way, this can mean an end to the trial and error flying techniques of the past. Reading SMPTE from the Center Channel, the synchronizer can be programmed to align the 2-track recorder with the master recorder just like any other slave. Should the timing (the offset) need to be adjusted forwards or backwards, this can be done with split-second precision.

### SMPTE Hardware Advances

Up until just a few years ago, SMPTE synchronizers were a high-ticket item, affordable by just a few of the biggest studios. Now, the trickle-down effect has brought affordable, functional SMPTE sync to the home studios. Since we listed the names of most of the major manufacturers of synchronizer hardware a few months back in our first SMPTE column, more new units have come on the market and prices have continued to drop. Even the "semi-pro" manufacturers have gotten into the game, with Fostex in particular making big inroads into the low-cost synchronizer market. In addition to making audio-to-video sync affordable, the Fostex 4030/4035 combo can also be used for audio-to-audio sync applications like megatracking. And it can put a surprisingly mild nibble on your finances, too. I was curious as to just how mild, so I did some checking around. Talking with Kevin Gillespie from Hy James (the Pro Audio connection here in Detroit), we put together a sophisticated 32-track recording system with two Fostex B16s and a Fostex synchroniz-

er for less than \$15,000 (not including console, outboard gear, etc.). The technology has really come a long way in a short time. Even if you are 24-track, you should be able to outfit your studio for SMPTE sync for a relatively modest investment.

### We Get Letters . . .

Since our open invitation for feedback began a few months back, we have gotten quite a few letters that really require a personal reply. These letters usually fall into the category of "Can you tell me exactly what piece of gear I need to do this?" I am gratified that you took the time to write, but I can answer most of your letters with the following advice:

The best friend you can have in the recording studio business is a *knowledgeable* audio salesman whom you can *trust*. It is his business to be aware of the available hardware and to keep you informed so that you can make a qualified decision. Likewise for MIDI keyboards, computers and sequencers. Having a few close alliances with music store salesmen in your home area can assist in keeping you aware of the various new MIDI devices that are being introduced, especially since it seems that hardly a week goes by without some new device entering the market!

### In Sync is Online!

After weeks of preparation, In Sync is now online and accessible to all subscribers as part of Synthnet on Esi Street ("Ee-Zee Street"). All 1986 back columns of In Sync are available and can be read by anyone who has a personal computer and a telephone modem. Nineteen-eighty-five back columns will be online soon. Many thanks go to all of the Synthnet staff, especially Sysop Gary Rottger, as well as the Esi management for allowing us to bring this service to you. For further information on how you can become a subscriber to Esi Street, contact an Esi representative. In the Los Angeles area: (213) 937-0347. In New York: (212) 757-0320.

### Don't Forget . . .

Your feedback and suggestions are always welcome. Write In Sync c/o *Mix* magazine, 2608 Ninth Street, Berkeley, CA 94710. In Sync now has an online mailbox. If you're online on Esi Street (IMC), send your comments via Email to GNOME-US. Next month we'll delve a bit deeper into the computer revolution and how it has affected the way we work in the studio and at home. Don't miss MIDI-MAC-MODEM next month! Til then, stay In Sync. . . ■



**Arley Seeger, Platinum Island's chief of maintenance, installs the modified API console in the unfinished Platinum West control room.**

—CONTINUED FROM PAGE 42, MONSTER  
 ined to use it as extensively as possible at Platinum Island. "When you open a studio, you're bound to have a lot of the same equipment that everybody else has," says Kessler. "We felt that by using only Monster Cable, we would have something that set us apart from the rest. We were also looking ahead to the future—the braided Monster Cable is so much more transparent sounding and gives such a better reproduction of the signal than single strand wire, that if we decided to go digital, we'll have an unbelievable edge over other studios. And rather than upgrade at a later date when everything is already constructed and the wiring is built-in, let's do it now. Sure it's more expensive, but having a better wire now will make us better off in the long run, when we won't have to change the floor."

Platinum Island's Monster Cable installation involved laying in over 17,000 feet of the wire, using the Prolink 1 for the mic lines, Prolink 2 for the high level audio interconnects, and the company's new Powerline 2 for the speaker cables. According to Finelli, the biggest challenge posed by the novel undertaking concerned hooking the Monster Cable to the ITT Cannon DL Connector.

"Monster Cable was like a round peg in a square hole when it came to terminating the wires," says Finelli. "Normally you would just strip off the vinyl surrounding an ordinary wire and crimp it on to a connecting pin,

but with Monster Cable, they suggest that you first dip the wire into a thousand-degree solder pot in order to vaporize the additional insulation coatings surrounding the multiple strands. The DL, however, was designed for untinned, stranded wire. Also, the DL pins aren't big enough to handle Monster Cable."

Luckily, this obstacle was only temporary. Continues Finelli, "We contacted Marty Henning, ITT Cannon's senior product specialist, and he sent

us samples of bussing pins, or double pins with a flat terminal, which we then used to solder on to the wire using solder with two percent silver content to maximize conductivity. This additional step was needed to ensure proper binding of the cable to the pin."

In other words, the necessary barring of the Monster Cable filaments from their coatings (via dipping them in the solder pot) at the same time created essentially a single solid wire at its endpoint as opposed to the spreadable standard wire strands which are invariably crimped to the standard DL pin. But now, with the fatter-than-standard size of Monster Cable and the added layer of metal from the original tinning, a larger pin was needed. Henning's bussing pin neatly did the trick, though only after Finelli wrapped the cable around it and then again soldered, this time to solidify the contact in the connection and make it stick.

Finelli notes, however, that the bussing pins were only needed for the Prolink 1 cable, since the smaller Prolink 2, while falling in between the standard wire gauges, was still able to fit a larger size DL pin after being similarly treated.

"One of the side benefits of the procedure was that we opened up the line of communication between Monster Cable and ITT Cannon," adds Finelli, noting that while Monster Cable currently sells wires with the standard XLR connection, the cable's bulk has so far obviated its use with multi-pin connectors. But he predicts that his experience will eventually help facilitate the wider use of the newly developed Monster Cable wire in such situ-

**The completed control room. Note the panel over the window conceals a pre-wired space for easily adding a video monitor at a later date.**



PHOTO: MELVIN ADELGLASS

ations as Platinum Island.

Having successfully bound the Monster Cable to the DL Connector, Finelli was still faced with strain relief for the heavier-than-normal wire. "Jim Stephen, president of Interface Technologies Inc., which is a wire harnessing company, came up with the idea of adding extra shrink tubing to the existing insulation on the cable," Finelli explains. "What happens is this: when you dip the cable end into the solder pot, the insulation peels back so far that it never really makes contact with the crimp claw on the pin, since it's shrunk back and never catches on. But by putting another piece of shrink tubing on the wire and then shrinking it onto the original insulation and wire, the crimping became more like DL intended it to be, such that the pull was not on the wire and the connecting point of the pin, but instead was spread out along the insulation, which evens the pressure on the pin itself."

Finelli adds that strain relief for the Monster Cable was needed only at the point where the audio wire on the floor was elevated to the DL Connectors hooked into the interface box set up by designer/builder Falconer, who positioned his so-called "birdhouse"

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"Electromagnetic inductive interference from the power line can add at least a dB or two of ground floor noise..."

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wiring terminal point some eight inches high on the wall separating the studio from the control room. As all studio wiring comes to the connectors that terminate in the birdhouse, the entire control room console can be easily removed by unplugging it to make way for the installation of a different one. Just such a console replacement will take place shortly at Platinum West—the smaller of the two back-to-back studios—when the currently in-use API custom console obtained from the Hit Factory and previously used to record albums by the likes of the Rolling Stones, Bruce Springsteen, and Stevie Wonder, is replaced by a new Amek Angela.

Falconer also devised what was for Finelli, another new wiring concept. "He kept all the A/C lines up in the air above the ceiling while all the audio

lines lay in troughs on the floor," says Finelli. Most studios run both audio and A/C parallel on the floor, shielded by metal conduits, but Jim's method maximized the isolation between the A/C and audio lines, eliminating as much as possible any electromagnetic, inductive interference from the power line which can add at least a dB or two of ground floor noise when A/C and audio run together."

Additionally, Finelli and Falconer separated the speaker cables from the floor audio lines by likewise suspending them from the air, instead of also running them in separate troughs along the floor. This permitted the mic cable and speaker lines to be run without any crosstalk between them.

Finelli notes one other wiring innovation in that the modular outboard racks have been made even more flexible by wiring each with a universal six-pin connector to facilitate change-over between outboard equipment.

At time of writing, Platinum West has been operational for just two weeks, and the larger Platinum East is still under construction. Provisions have also been made for both studio rooms to be used for the same session using video monitors in both the studios and the control rooms. ■

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—CONTINUED FROM PAGE 47, INSTALLING  
ard can easily be accommodated with "pig tails." This enables equipment to be moved in patch position and changed as requirements demand with a minimum of fuss and bother. Most of the better relay rack manufacturers provide the ability to dress the audio up one side of the rack with strain relief, and the power on the other.

### Synthesizer Location

With the proliferation of synthesizers, MIDI devices, drum machines and such, control room floor space (already at a premium) is reduced even further. Some of the functional considerations are:

#### 1. Monitor—

It is always nice, when performing a complex musical part, to be able to hear what you are doing. If it is not convenient to be located within the mixer's monitor field, then contemplate a set of small speakers for the synthesist. Headphone feeds to the synthesizer location are a functional alternative.

#### 2. Direct Ins—

The number of mic inputs in the control room often exceeds the studio mic input count. Synthesizers often have an output level of -10 to -20. The output impedance is low and unbal-

anced. Direct inputs are traditionally comprised of a transformer input of 47-100 k ohm with a 150 ohm output impedance. This provides for an output level of -35 to -45. With older, conventional transformer-coupled mic pre-amplifiers, this is a satisfactory arrangement. With newer transformerless instrumentation type pre-amps, this arrangement provides less than available performance. The reason for this disparity has a lot to do with the available headroom of older pre-amp design, and the sound of the pads used on the front end. A traditional "direct" transformer is designed for electric guitar use. For most synthesizer applications, the use of a cable that ties signal "+" to the tip of a 1/4-inch phone and the signal "-" to the sleeve, in conjunction with a separate ground run between console chassis and synthesizer chassis will provide superior performance. The difficulties encountered with this approach involve the buzzes and hums that arise from complex MIDI setups with multiple instruments. MIDI carries its own shields through, and set up ground loops!

### MIDI Connections

There is an increased need for MIDI tie lines between the synthesizer location and the console. This is especially

true when the installation is for the musician's home studio, and both the performing and engineering tasks are the responsibility of the same individual. MIDI control of outboard is also proliferating and a MIDI patch bay is becoming a necessity. Remember to keep these lines physically isolated from the audio lines! Also, keep the chassis grounding integrity of the synth system consistent with the rest of the audio system.

### Power Connections

It seems foolish, but the one thing that most every instrument area lacks is a sufficient number of electrical outlets. The computer system alone will require a full outlet strip on its own. Don't shortchange this important consideration.

### Grounding

The proper "earthing" of any complex electronic system is *not* the arcane black art that many people believe it to be. The confusion that surrounds grounding stems in part from the concept that "ground is ground is ground." This is true in all aspects except real life. This issue is one that deserves a far more thorough treatment than is possible in this article. We will delve into this science in the November (AES) issue of *Mix*! ■



Hundreds of exhibitors packed into Chicago's McCormick Place with the latest offerings in music technology.

## On the NAMM Beat

by Craig Anderton

Every NAMM show seems to have a theme, and Summer '86 featured alternate MIDI controllers. Percussion, guitar, and even mallet MIDI controllers were abundant. Those who claimed to not see any "earth-shattering" products at the show missed the point. Sure, maybe there weren't any new technologies unveiled (like sampling or FM synthesis), but the change in attitude was profound: this show heralded the end of the keyboard as the Only MIDI Game in Town. From this point on, other musicians will be able to play in the electronic playpen without breaking their budget or having to totally re-learn their technique.

Of course, there were many items of interest other than controllers. Following is a sampling of what impressed me at the show, but remember that these shows are *big* and it's impossible to see everything (then again, there's always next year).

**Percussion controllers.** Most drummers sit behind a drum kit; a few stand up and play...now for something

completely different. The BrocktronX black leather MIDI drum suit includes a belt-worn plexiglass "hi-hat" device, acrylic thigh pads, Buck Rogers-like belt control pack, and "boot transducers" for bass and snare, all strung together with wires that terminate at a MIDI port. The basic idea is you start stomping with your feet to create bass/snare patterns, and then use conventional sticks to play the thigh pads and hi-hat. Brock Seiler, the inventor, also plugged into the IDP (Intelligent Dimmer Paks) MIDI-controlled dimmer pack so that stage lights were synchronized to his playing. If the Road Warrior had been a drummer, this would have been his instrument.

Yamaha introduced several new drum products, but unfortunately I kept getting distracted by their \$350 FB-01 four-operator FM synth expander modules (see, I'm getting distracted again...). Roland had some cute little drum machines and *their* percussion controllers. Dynacord, distributed by Europa Technology, showed the Rhythm Stick—a guitar-shaped device optimized for use as a MIDI percussion controller. It may sound frivolous, but in the hands of a good demonstrator, the thing came alive. Also, Dynacord's Add-One percussion "brain" is an excellent addition to the growing world of standard percussion controllers; it stores bunches of programs and sounds, and makes them instantly available at the touch of a stick. Walker's 512 Percussion System puts all

electronics in a single-space rack mount chassis for minimum space problems, and includes two sets of sampled drum sounds (10 voices total). And where was Simmons during all this? Enjoying the validation and respect they so richly deserve for sticking with electronic percussion during the days when it seemed very few people took the subject seriously... and showing off their under-\$1,000 SDS1000 drum kit.

**Casio goes pro.** Casio introduced the CZ-1, a pro version of the CZ-101 with full size keys, velocity response, aftertouch, and a \$1,395 list price. Their AZ-1 is a honey of a MIDI remote keyboard for about \$550 that includes definable controllers, velocity/aftertouch, program change for 128 programs, and simultaneous transmission on two MIDI channels.

**Studio automation.** J.L. Cooper introduced SAM, the SMPTE Automation Manager (\$849). Used in conjunction with the Cooper MidiMute (\$549), SAM provides console mute automation and is the core of a complete fader/mute/merge mix automation system. It writes and reads SMPTE, stores over 11,000 moves, doesn't use VCAs, downloads data to tape or MIDI mass storage devices, and also prepares tasty meals in under 20 minutes (just kidding about the last one). Meanwhile, IBM PC owners can enjoy automated mixing with MegaMix (\$1,995 for 16 channels, \$595 for eight channel expansion up to 40 channels total) from Musically Intelligent Devices, Inc. This VCA-based package offers an excellent graphic display with moving faders, mute, solo, real time edit, cut and paste for choosing the best sections of different mixes and splicing them into a new mix, grouping, and song position pointer for easy synchronization.

Meanwhile, Fostex introduced the F.A.M.E. system for automatic audio assembly editing. Based on the Apple II computer (with other versions slated to follow), F.A.M.E. lets you store sound effects, music cues, and such on a SMPTE-reading recorder and insert them into a master tape at various programmable times. This may not be as state-of-the-art as storing a bunch of digitized sounds in Emulators or hard disks, but the price is right. With an optional VCA adapter, F.A.M.E. can also program automated fades and mutes for automated mixdown.

PHOTO: GEORGE PETERSEN

**Samplers.** The two samplers that got the biggest buzz were the Roland S-50 12-bit sampler (\$2,895) and E-mu's Emax (\$2,595). The S-50 is a 16-voice polyphonic machine with velocity and pressure sensitivity, 32 eight-stage envelope generators, and 16 LFOs. There's a 32-digit fluorescent display, but the big news is an RGB/composite video out connector. According to Roland, this interface will be supported with waveform processing, sequencing, and music education software packages—just slap on a monitor, and you won't even need an external computer or waveform editing software. The Emax is basically an Emulator II for those who couldn't previously afford an Emulator II. Although Emax doesn't have SMPTE capability, it offers many of the E-II's features and some that the E-II doesn't offer (such as crossfade looping, variable sample rate, and aftertouch). The secret to this excellent price/performance ratio is a highly complex custom chip. Incidentally, Emax will also be available in a rack-mount package. And to keep E-II owners happy, E-mu is stressing their Emulator II+ package with double memory and Emulator II+ HD with hard disk.

Samplers don't always mean keyboards, though. The ADAP Sound Rack, a peripheral for the Atari ST

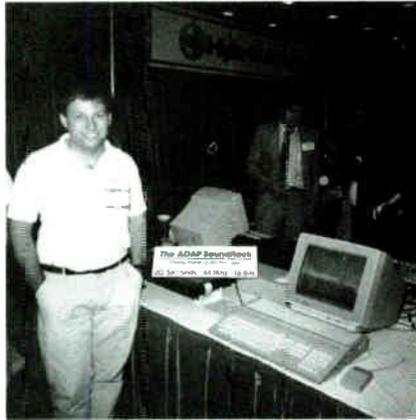


PHOTO: GEORGE PETERSEN

*ADAP designer Wendell Brown.*

computer distributed by Hybrid Arts, provides 20 seconds of 16 bit polyphonic sampling at 44.1 kHz (mono mode; stereo mode is also possible). That's right, CD quality on an ST. Real time effects processing (echo, reverb, envelope-following, etc.), a real time oscilloscope, and waveform editing (cut/copy/paste, auto loop, mix, etc.) round out the \$1,995 hardware/software package.

**Guitar controllers.** My general experience with guitar controllers is that they sound like garbage for about ten minutes until you learn the way in which they want to be played. During the course of the show, I played every

available controller (except for Roland's new guitar-to-MIDI converter, which looked quite promising) and as far as I was concerned the star of the show was the K-Muse Photon guitar. After an embarrassing introduction at the January show, K-Muse probably deserves a comeback of the year award. Despite Kevin Kent's protestations that the thing wasn't fully perfected, I strapped on the guitar and played. Yeah, it works, and it survived most of my guitar-to-MIDI torture tests. Assuming that the recipe doesn't get lost in the transition from prototype to production, this is the controller to beat.

**Software.** We'll look at software in more detail later, but I couldn't resist mentioning Digidesign's Softsynth for the Macintosh. This program is a 32 oscillator, digital additive synthesizer where you specify groups of harmonics and envelopes to create a high-quality digital sound. Once created, you can then transfer the sound to an Emulator II, Mirage, or Prophet 2000. At \$295, it's quite a tool to the sampler's bag of tricks.

Well, we've already used up our space for this month's column; see you next time with the scoop on software, signal processors, synthesizers, drum machines, collapsible guitars, and other news from NAMM. ■



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# LAURIE ANDERSON

## Gets the Movie Bug

by David Gans & Bonnie Simmons

As the lights went down and the screening of *Home of the Brave* began, I couldn't help thinking that Laurie Anderson had her work cut out for her with the movie critics. None of the chattering press people around me seemed to have any idea of what they were about to see, although they bandied second-hand bits of information about before the start of the new performance film by the noted performance artist.

Everything turned out okay, though. The less "performance art" vibe about this deal the better, I'd say, because what comes across onscreen is a blessed relief from the attitude-heavy posturings of artists and rockers. Anderson and her ensemble—including a rear-projection screen—deliver 90 minutes of engaging music, stimulating wordplay and conceptual fun that combines the best attributes of pop music, video and theater.

*Home of the Brave* consists chiefly of material performed on Anderson's 1984 *Mister Heartbreak* LP and tour, along with selections from her mammoth *United States* and a couple of new pieces. The performing ensemble includes keyboardist-vocalist Joy Askeu (last seen on tour with Joe Jackson), guitarist Adrian Belew (that's no ordinary Stratocaster, and no ordinary Stratoplayer either), brass-and-woodwind player Richard Landry, vocalists Dolette McDonald and Janice Pendarvis, kayageum player Sang Won Park, percussionist David van Tieghem, and other musicians in limited roles. Anderson seems to pay careful attention to how the musicians look while playing and apparently tries to play them *against* stereotype rock musician behavior. Still, I can imagine her saying to a player, "Can you find a way to make that sound with a bigger motion?"

In one number, Belew and van Tieghem kneel opposite each other with instruments on the stage between



PHOTO: LES FINCHER

Anderson in action with modified violin and tape bow.

them. Belew plays his guitar with a spatula, then with a knife and fork, drawing unearthly sounds from it, while van Tieghem creates sounds with a variety of objects, and shapes are projected on the screen overhead—oriental pictograms, clear images, schematic representations, some seemingly random ideas.

Verbal gems pop out of the music and onto the screen throughout; Anderson's strength is in instant sketches, brief but powerful phrases ("This is my first life as a woman—which explains lots of things." "He was an ugly guy/With an ugly face/An also-ran/In the human race...").

The critics love *Home of the Brave*. Gene Siskel and Roger Ebert of *At the Movies* gave the film hearty thumbs-up recommendations—Ebert praised

the film's "offbeat music and challenging ideas"—and critics at the daily papers have been equally positive as the film opened in various cities.

Anderson wrote and directed *Home of the Brave* and co-produced the music with Roma Baran (Paula Mazur produced the film). From the moment she appears on the screen wearing a ski mask, her voice electronically lowered to the timbre of John Huston, it's clear that this isn't a typical rock concert movie. The cinematography (by John Lindley) and editing (by Lisa Day, who also did *Stop Making Sense*)—along with the extensive use of images playing on a screen behind the stage—make comparisons to the Talking Heads' concert film inevitable. But Anderson is as warm and engaging as David Byrne is cold and self-involved;

tor, signals to the house mixer, the lighting designer—and they turn into dances. And they're doing it back to me. I can see them real well, because we light 'em.

**Mix:** I always feel outraged on behalf of people like you who spend a lot of time and energy creating new things out of nowhere or from unlikely combinations of objects, and then have someone else come along and turn those ideas into big, ugly, stupid—and lucrative—*products*. What it boils down to is, what's it like out there on the leading edge?

**Anderson:** I'm flattered if people want to use something that I use. More power to 'em—go right ahead; I'm on to

something else. And I think people should learn from each other. Besides, what people do with images or sounds they always do in their own way, and they change it in another way. You can't be possessive about things. If you do them in public, they're for anyone.

Besides, I have zero respect for television... I see MTV passing by, if I'm working in a studio and it's on... but as far as I'm concerned it's for ten-year-olds. I have no interest in it. And I think it is a shame. I don't mean to be—no, I *do* mean to be a snob. And I don't have anything against ten-year-olds, either (laughs)—there's some real smart and cute ones.

People say that box is a drug be-

cause it sucks people in and hypnotizes them, turns them into zombies. That's certainly true, but if you really want to look at it, what it is is a *drug-store*. What they are hawking on that box is not the programs, it's the products. They're not trying to help you, or teach you anything, or do anything for you—they are trying to sell you stuff.

I don't really need a lot of stuff. That's a *lie*—wait a second. I'm probably America's Number One sucker consumer of new electronics...

**Mix:** You use some fairly high-tech, innovative equipment and different computerized effects. Have there been times when you had to wait with your ideas until technology developed so you could use them?

**Anderson:** No. I *never* get an idea and then try to force equipment to do it—that doesn't work. I go the opposite way: I turn everything on in my house all at once and try to respect what each piece of equipment can do and let it teach me what I can get out of it. Those are my instruments, more than violin or keyboards or a pencil. Those are my tools. I need to know really well how to use them.

In shooting the movie, I was not as familiar with the tools. You not only have sound, lights, projection, electronics—you have cameras, SMPTE, an entire interface system. So when you say "action" on that set, 500 machines are going *BVVVVVWVVOHH!* It's incredible. You can feel it in your feet coming through the floor.

We built a stage three feet up from the stage that we shot on, because I think monitors on the floor are clunky and ugly. There were 11 grates, and under those grates were monitors—and five *million* cables. This was a *hot* stage.

We used radio mics, which I hate the sound of but which we had to use. And we *still* didn't get rid of all the cable, and the cameramen would dance with us. One thing I regret about the film is that you only see one cameraman in the whole film. But you can *feel* them; you can feel the way they're moving, especially the hand-held stuff. And so we were like wrapping ourselves around each other's cables... I tried to lose them a lot, because I wanted them to move more. I was trying to get out of their frame, and they were right on me. They were on to me from the second they met me. (laughs) When I told them to be *bunraku* players they were on to me.

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**ian Eales:** Ian has served as technical audio consultant and as engineer for numerous rooms on the west coast. Ian's work includes David Foster's "Best Of Me" LP and Sheena Easton's "Kept Secret". Ian has worked extensively with Al Jarreau, including his latest album "High Crime".

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of outside material, even though all four Bangles flex their songwriting muscles ably. "If it's something we can see ourselves doing—that we can *Banglify*—we do it." Recording the Prince number may prove to be the decisive move in the Bangles' career. The Minneapolis auteur has a well-publicized habit of showering female singers with his creative gifts, and he was mightily impressed with the Bangles when he saw them at the Palace in Los Angeles. "Manic Monday" was gathering dust in his music vault, says Steele, "so he gave us a demo tape of him doing it, with Apollonia singing in the background. It was really cool—reminded me of the Velvet Underground, but it had that paisley, Partridge Family, harpsichord vibe to it."

With *Different Light*, the Bangles have begun conquering sexual stereotyping of what a female band should sound like. Now that they're fulfilling various proclamations of musical savvy, what remains is to maintain the fragile balance of a creative ensemble. "It's a strange band," states Steele, "because it's a fairly democratic unit. We're just sort of a protoplasmic blob. It's hard for me to analyze how we do it. Maybe David Kahne could describe it."

"It's been working so far. We're four separate, distinct personalities and four strong egos and four willing and

able singers; somehow we manage to respect each other's space and each other's desire to be heard. Somehow, we work it out." ■

## Gold & Gouldman Wax Eloquent

by Dan Daley

"Things are getting healthier and healthier," says Graham Gouldman. "In the late '70s we had that period of disco, which was terrible from a song point of view." However, he adds, "It was good in that it let the [recording] technology develop."

Gouldman pauses. "You see, every cloud has a silver lining."

Andrew Gold, Gouldman's partner in a two-man band called Wax, nods in agreement.

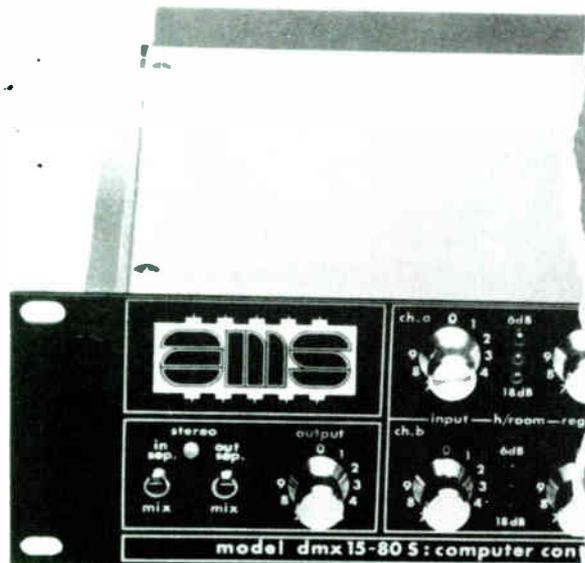
*Magnetic Heaven*, the duo's debut, reflects their shared song sensibilities and the sense of humor they hold in common. Gouldman's credits unquestionably qualify him as a veteran of the pop era that began in the mid-'60s with the British Invasion. He wrote a number of tunes that went on to become classics of the period and staples of countless garage bands. For example: "For Your Love" and "Heart Full of Soul" for the Yardbirds; "Listen People" and "No Milk

Today" for Herman's Hermits; and, for the Hollies, "Look Through Any Window" and "Bus Stop."

Gouldman passed briefly through another relic of the mid-'60s, the Mindbenders—after that band's founder, Wayne Fontana, had departed—and met future partner Eric Stewart in the process. After taking a shot at a solo career and putting in a stint as a staff writer for the Kasenetz-Katz bubblegum mill in the early '70s, he and Stewart joined with Kevin Godley and Lol Creme to form 10cc, a band that managed to combine pop and parody in a sporadic but appreciable string of hits.

Andrew Gold is a familiar name to any aficionado of late '70s SoCal rock. Falling in with the local session "A" team in L.A. earlier in the decade, he applied his talents as a guitarist, keyboard player, drummer and vocalist to records by the likes of Art Garfunkel, Maria Muldaur and J.D. Souther. The big time called when he joined Linda Ronstadt just as she became America's *chanteuse premiere* with *Heart Like a Wheel*; Gold became an influential force in Ronstadt's career as arranger and bandleader.

Without relinquishing his spot in Ronstadt's band, Gold maintained a solo career, releasing four LPs and garnering hits with "Lonely Boy," "Never Let Her Slip Away," "How Can



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This Be Love" and "Thank You for Being a Friend."

The foundations for Wax were laid in 1982 when Gold was suggested as producer for 10cc by the band's U.S. label. On *Ten out of 10*, Gold co-wrote and produced three tracks with Gouldman and Stewart, each of which had radio and sales success, according to Gouldman. Gold and Gouldman turned out to be fans of each other's work, but after that initial collaboration they went their separate ways—Gouldman to session work, film scoring and record production in England, Gold to producing in L.A. (Nicolette Larson, Moon Martin, and others).

Then, in 1984, Gouldman called Gold "and said if I wasn't doing anything, did I want to come over [to England] and try writing together?" Gold agreed, since "I had nothing to do at the time." They began making demos on Gouldman's Fostex 16-track, and Phonogram (Gouldman's label at the time) signed the duo under the moniker Common Knowledge. An LP was recorded, but only singles were released; Gold characterized the songs as "old-fashioned, folky, Beatlesque." Though Phonogram felt otherwise, Gold and Gouldman decided their partnership had potential, and they holed up in Gold's L.A. residence aiming to prove it with their material.

"When we started writing for this album, we had certain things in mind," says Gouldman. "We wanted to make it danceable. But I think we benefitted by writing the songs in America this time. I came over and immediately started watching MTV 24 hours a day," he says with a laugh.

Gold laughs, too, adding, "And religious programming. He got a kick out of watching TV evangelists."

"I was in a great frame of mind," Gouldman chimes in. "It was like being on holiday. And because we were feeling good, I think the music felt good."

After landing a deal with RCA, they recorded in London at RAK Studios with Phil Thornalley (Thompson Twins, The Cure, Duran Duran) producing and engineering. "The arrangements were often identical to the demos we did," says Gold, so Thornalley's production role was mainly to keep things in hand sonically as Gold and Gouldman created, playing and singing all the parts by themselves. (Thornalley is featured in Wax's video playing drums. "Good haircut," comments Gold with a grin.)

The tunes on *Magnetic Heaven* (the title is a reference to where what's on tape goes after you hit "Erase") are stylistically and melodically consistent with their authors' previous efforts—Gold's almost-trademarked diminished-

into-relative-minor chord sequence is there on "Shadows of Love," and the light-stepping upbeat groove of the first single, "Right Between The Eyes," bears more than a trace of Gouldman's traditional pop stamp.

### Lyrics In The Spotlight

But when questioned as to why a listener might think the lyrics didn't seem to be as center-stage as had been the case in their earlier works, and why a lyric sheet wasn't included—as Gold had done on half of his solo releases—they both bristle mildly. "I think the lyrics on this album are better than any I've ever written before," Gold retorts. "There are songs on this album that I'm very proud of. But I

think both of us are more interested in the musical side of things. There are some songs, like 'Systematic,' that are silly little lyrics, just for fun. But there are songs like 'Rise Up' and 'Shadows of Love' that really say things."

Gouldman amplifies: "The lyrics are important. The thing is there's never been a hit record that had great words and lousy music, and many hit records that have had great music and lousy lyrics. I'm not making an excuse, but what we're doing is what intuitively feels good to us. And a lot of the tunes are dance-oriented."

### "Pure Sonic Scientists"

*Magnetic Heaven* also features an instrumental—the title track—which

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**Graham Gouldman (left) and Andrew Gold of Wax.**

Gouldman defines as "An 'underture.' We had the idea of doing a track that would incorporate all the other songs on the album. They're not all visible [sic], but they're there. And we took sounds off all the tracks, sampling them and playing some of them backwards. The bass drum track is actually a (bathroom) door slamming, including the squeak. It intrigued me. It

sounded like trumpets."

"We were going for texture," says Gold. "On this song, we wanted to be pure sonic scientists."

Wax are (is?) planning already for the second record. "We want to get a few months of writing in between now and early next year," when they expect to start recording, says Gouldman.

But given the myriad other outlets

each of them has available for their time and talents, is there a temptation to make Wax into just one of many aspects of a career?

"We're dedicating ourselves to Wax," says Gold. "We'll occasionally do outside stuff as producers, individually or together, but Wax is the priority." ■

## Understanding Bill Laswell

by Bill Milkowski

How does one come to understand the complex bundle of energy and ideas and instincts that is Bill Laswell?

Well, you don't. The man is an enigma, a renegade, an upstart in an industry bent on following fashions and formulas. He's not the hand-shaking, slap-you-on-the-back type. He's mysterious. Even in broad daylight he seems to be lurking in the shadows. Bill doesn't open up to many people. And screened, as he is, by partner Roger Trilling (Laswell's business-minded alter ego and press liaison), it's hard to get to him.

Those few who know and understand Bill Laswell count him as a lasting friend. Drummer Anton Fier (Gol-

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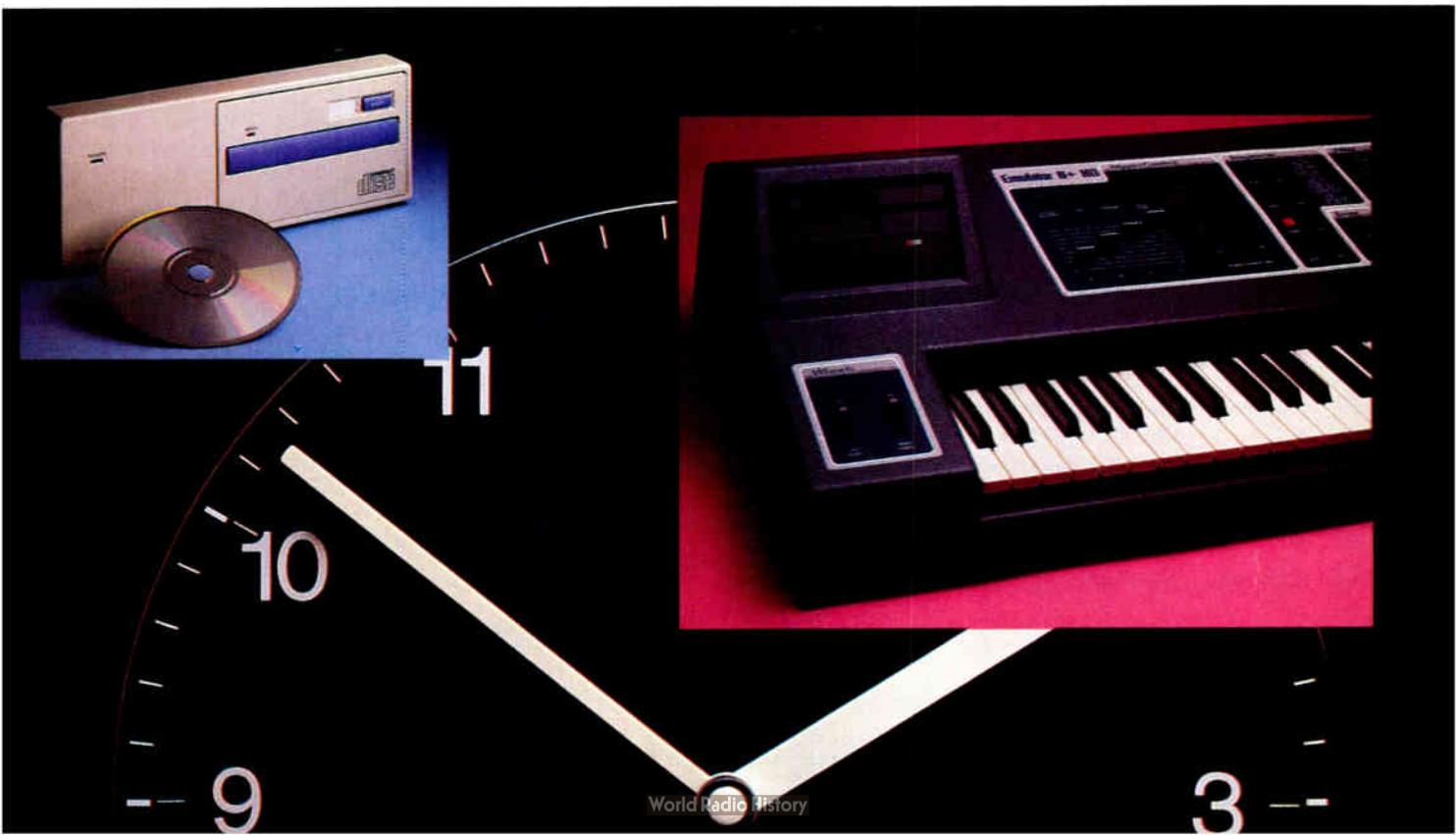
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den Palominos), scratch artist D. St., keyboardist Bernie Worrell, singer Bernard Fowler, drummer Ronald Shannon Jackson, guitarist Nicky Skopelitis, composer and game call specialist John Zorn, his girlfriend Thin-Le (who does the evocative cover photos for many of Laswell's personal projects like Material, Massacre and his solo LP, *Baselines*)—ask any of them. These people know what Laswell's all about.

And after spending several hours with the enigmatic Mr. Bill—hanging out at Quad Recording in Manhattan during the recording of an upcoming Bootsy Collins album for Arista, observing the whole crew during the playback session over at the Power Station, bantering over brewskis at various watering holes near the studios where he works—I think I, too, have a fair idea of where the man is at. And with that understanding, I have come away with a newfound respect for the guy. Like his albums or not, Laswell is extremely good at what he does. He's fast and efficient, a quintessential perfectionist with keen ears and an uncanny instinct for what "feels" right. At one overdubbing session I witnessed at Quad, Laswell had Ghanaian percussionist Ayib Deng punch in with an 8-bar conga fill on top of a Bootsy funk vamp. The first one sounded good to me, but not to Bill. Something was missing. He couldn't exactly verbalize it, but he knew. He could feel that something was missing. He had Ayib do another take.

"You wanna do another?" he calmly inquired from behind the glass. "That's definitely the right beat. If you can get it to really pop, that'd be great. That's the rhythm. Don't lose it."

Ayib did another take. Same passage, same 8-bar fill. Again, Bill was unsatisfied. "The end was perfect but you gotta get that feeling the whole way through... just rolling, really charging."

Another take. Close but no cigar. "You gotta get that to really roll. It swings better if you get that doo-doom to really roll, just like a machine." He hears the problem and systematically works to resolve it.

Yet another take. This one misses the mark. "That got turned around somehow," Laswell announces to Ayib, who is sitting at the congas with headphones on in the studio. "Just play with it," he encourages. "Forget the pattern totally. Just imagine that we're live in Osaka. You can even play more syncopation if you want. It's breaking up too much."

Another try. And another. Each one sounds similar to a layman's ears, but Laswell knows precisely what he wants and works feverishly to get it. A dozen takes for just an 8-bar fill. I can't imag-

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ine what went down with the other 47 tracks. It boggles my 4-track mind.

This little scenario was a good example of Laswell's keen ears in action. But as engineer Rob Stevens observes, "It's beyond that. It's like, he *feels* what's right. He feels when Ayib hits Ayib's point. It's not even as specific as 'this attack was a little early or a little late'—what kind of thing. It's just knowing exactly when Ayib was Ayib. It goes beyond keen ears. It goes into keen perceptual apparatus and an ability to translate it into what's right about the whole thing, how it fits into the whole thing."

Stevens, who worked with Laswell on several projects (Yoko Ono's *Starpiece*, Herbie Hancock's *Sound System*, the John Lydon-Afrika Bambaata collaboration, *World Destruction*, among others) has a high opinion of Mr. Bill:

"It's hard to use conventional terms to describe him because he really doesn't exist in conventional terms. He doesn't really exist in the plane of consensus reality, as far as I'm concerned. He understands what it is, but he certainly doesn't exist within it. He uses it to his advantage; he plays off it, he manipulates it and he recognizes other people who don't necessarily live within it either, and he knows how to use their talents. He hires musicians who he trusts enough that he doesn't have to really give them that much direction. He lets them be themselves and he sets up a situation where as themselves they provoke a good record. It's a very heady thing. And as an engineer, you get to watch it. I mean, my production skills have improved greatly from watching Bill work. He just sheds a whole other light on it."

Steven adds, "Suffice it to say, he's a genius."

Engineer Robert Musso heartily concurs. "I regard Bill as one of the best producers in the world because he is inventive and very musical. He is, of course, a great musician, so he knows when somebody is pushing the beat a little, is on top of the beat or dragging a bit. He has a really good perception of that and of feel, and how the total production should feel. That's his strong point."

Musso, who has worked on some 20 or more projects with Laswell dating back to 1982, says Laswell is an easy man to work with. "When I first met Bill, I thought he was kind of crazy. I was called in to RPM Studios to record a session with Archie Shepp playing saxophone and Whitney Houston singing, for the Material album *One Down* ["Memories"]. I thought Bill was looser and a little crazier than normal producers, which I liked. He's not a formula guy by any means. He

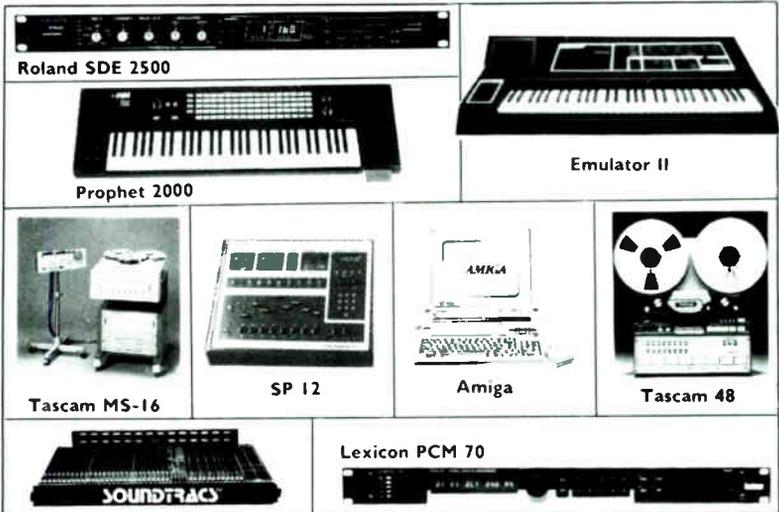
does have pre-production ideas. He always has an idea of the direction he wants to go, and around that idea he'll act spontaneously with whatever might happen at the moment. If an idea works, he'll keep it. If not, he'll try something else. I guess we have a good rapport because I've always been that way... a little on the outside. I mean, I really hate middle-of-the-road formula stuff because I feel that anybody could do that. I don't prescribe to that way of thinking, and neither does Bill."

After that initial meeting on the *One Down* session, Musso went on to record Sly & Robbie's *Language Barrier*, Public Image's generic album, Bootsy's latest LP, Mick Jagger's *She's*

*the Boss*, the upcoming Miles Davis album and a whole host of Celluloid records. As engineer, Musso helps to execute Laswell's ideas quickly and efficiently. "He's not very technical," says Musso. "He knows when sounds are right but he doesn't exactly know what knobs to turn to get them. That's what I do, and because I've been working with him for so long, I might know what he's gonna do before he does it. So I'll often have things ready and set up. In other words, we work very quickly together."

Musso makes all the microphone choices and decides where to place them. Sometimes he'll discuss the choice of studios with Laswell, and he is given a lot of free rein during the

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mixing sessions. The two have developed a strong working relationship, but it's based on an even stronger friendship. In fact, all the people that Laswell works with, from engineers to musicians, are close friends of the enigmatic producer. He continues to call on the same musicians for his various projects, be they big-budget albums like Laurie Anderson's *Mister Heartbreak* for Warner Bros., smaller pet projects like Toure Kunda for Celluloid, or the many Japanese records he's worked on.

His friends come from a variety of backgrounds—a tough street kid from the Bronx who scratches records, a stately kayagum player from Korea, a master percussionist from Cuba, ad infinitum. And Laswell has the unique ability to blend them together into a coherent, copacetic stew.

As engineer Jason Cosaro observes, "I think Bill's greatest aspect is his ability to get people together that you would never expect to work together. He brings together musicians from different worlds and he gets them to work without causing any sort of friction between anybody. He just blends people very, very well."

He points to the recent PiL album as a good example. "He used Tony Williams, Ginger Baker, Steve Vai, Shankar, Malachi Favors (Chicago Art Ensemble bassist), Riuchi Sakamoto (Yellow Magic Orchestra), Foday Musa Suso. There's no way that anyone else would've gotten all those people together in one room. And he made the whole thing work. Because with Bill, there's no ego trips. Nothing gets done unless it's for the music. If somebody doesn't put in a big enough effort into that, then they're just not a part of what's going on. It never has anything to do with stars or attitude or anything, it has to do with the music, which I really respect."

Stevens adds, "I don't think there's ever been such an intertwining of different cultures on the same record as, say, the Deadline album (*Down By Law*, Celluloid) or on Herbie Hancock's *Sound System* album, or even Yoko's *Starpeace*. We had studio musicians, we had Sly & Robbie, we had exotic instrumentalists from Gambia and Korea, and he just mixes them up and knows how to do it.

Laswell is very selective in choosing projects. His success with "Rock-it" for Herbie Hancock back in 1983 made him a bankable commodity, and the phone hasn't stopped ringing since. Offers keep pouring in. Everybody wants a piece of this guy. They all want to sound...fresh. With his street-wise instincts, combined with a generous dose of studio manipulation, Laswell can be counted on to deliver the

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*"Everyone I've worked with, I have known their music. You have to know where the people are to see what they can do next."*

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goods. And he does it without pandering to trends or proven formulas or the whims of record company executives. He is his own man, doing his thing, blinded by conviction.

"I don't get involved with record companies," he maintains. "I refuse to talk to them or see them or know anything about what they think. And I have no respect for their opinions...not even a slight bit of respect. So when I do a project, they have to go along with that."

Laswell tends to work with artists he admires or was directly influenced by—personal heroes like bassist Bootsy Collins, jazz legend Miles Davis, funk pioneer Sly Stone (an upcoming project), avant-garde trailblazers like Yoko Ono, Laurie Anderson and Ronald Shannon (whose brilliant *Pulse* LP on Celluloid set the words of Edgar Allan Poe against the drummer's powerful, passionate beat).

"Everyone I've worked with, I have known their music. That's really the reason for doing it," he says. "You have to know where the people are at and where their stuff is coming from in order to see what they can do next. I would never take on a project unless I understood at least something about that person's past—and not only understood it...in the sense that I was learning something from it or applying things from that to what I was doing."

That certainly applies to Bootsy and Sly & Robbie and Herbie, all masters of rhythm who can put up the funk, feel the pocket and lay down a groove as easily and instinctively as we breathe.

But what about Yoko? Was the aspiring funk bassist from Detroit actually influenced by her free-form primal-scream approach to music?

"Yes, very much," he says. "See, I was never really into The Beatles at all. I never knew anything about The Beatles. In fact, I always hated The

Beatles, but I liked Yoko's early solo records. I thought those were real statements. And by doing this project with her, I somehow got involved in listening to The Beatles, and I finally figured out that I did like them—not so much them, but George Martin's production in particular. George Martin is really a good producer...one of the few people I guess you could really call a *producer*. Everybody else is just goin' for it; whatever they can do, whatever works. Then they call that a formula and they live off that for the rest of the time that they can get paid for it.

"But George Martin was really a producer. And really clever. He proved that you could do some incredible shit on just an 8-track or a 16-track. You really don't need all that shit to make good music, all those tracks and equipment. It can be done simply. It just takes a lot of time. And you have to have a plan. You just can't play around. I mean, when you have 48 tracks, you can screw around endlessly and later on somebody can come in and clean up the mess. But that's what takes time and costs money in making a record. So I prefer to plan everything."

Apart from George Martin and a handful of others he truly respects, Laswell seems to have a dim view of producers today. "I think producers are really middlemen. They're the kind of guys who talk to the record company but they can also talk to the artists, and they happen to be lying to both, usually, just to get through the project. And I don't approach it that way. I never start a project by telling the artist, 'I guarantee you a hit record,' because what I guarantee them is far from a hit record. Most of these yuppie producers today go along with what the record company people say. And between them and the accountants and the lawyers, they got it pretty well sewed up."

In retrospect, Laswell feels that his earliest production efforts were largely naive and slightly sloppy. "Those [Massacre's *Killing Time* and Curlew's self-titled debut album on Landslide Records] are basically live records," he says. "Massacre was recorded live to 2-track in a little club in France. And Curlew was recorded in a studio when I didn't even know nothin'. We'd just play in the room live and the engineer would say, 'Yeah, you got it. Sounds good.' But it really sounded pretty horrible. Those things were so long ago, it seems now. Really primitive stuff. I mean, you can make a better-sounding recording at home on a little 4-track, if you're technically oriented. I couldn't, but somebody could."

As engineer Musso mentioned, Laswell is not very technically oriented,

which seems ironic in view of the fact that he established his reputation through the use of drum machines and other innovative studio effects based on Herbie Hancock's hit, "Rock-." On one of his recent projects, however, Laswell eschewed his signature drum machine sound for live-in-the-flesh drummers beating feverishly and soulfully on real drums. It was the PiL project, John Lydon's baby. The drummers were Ginger Baker and Tony Williams.

"Ginger really shocked me," says Laswell, "because his time was really excellent. I think he's playing better now than he did with Cream. And Tony surprised me because he sounded really excellent playing some heavy-duty hard rock. It's a very strong record because of the presence of those two great drummers."

Laswell and engineer Jason Cosaro set up a unique makeshift resonating chamber at the Power Station to help get that huge drum sound heard on early Led Zeppelin LPs. As Cosaro recalls, "Bill wanted that particular drum sound on the PiL album. Those old Zep tracks were cut in a stone mansion, and it's very hard to fake that sort of thing. But we tried. We had them play inside this elevator shaft at the Power Station and we suspended mics inside it. And it worked out. Sounded great. Basically, we were trying to replicate the length and depth of a tone hall to get that great bass drum sound that John Bonham got. Of course, the Bonham sound is pretty much just Bonham. There's no way you can fake that. But Bill had that sound in mind and we just worked to approximate what he wanted."

Laswell may or may not continue to use drum machines. He certainly will be doing a solo project with Ginger Baker sometime later this year, and he mentioned that Ginger is presently experimenting with drum machines back home in Italy, where he lives in total isolation on an olive farm. But his current interest in working with real drummers is not, he says, a conscious decision to break away from being so widely identified as someone adept at programming drum computers.

"What I'm identified as and what people think I am has nothing to do with what I'm doing. All I'm doing is continuing my process of meeting people and resolving projects. And that's got nothing to do with audience expectation or media anticipation or any critique or nothing. It has to do just with evolution. I continue to do records for two people—one, I do it for myself, first, always and forever; and second, I do it for the person I'm working with. Outside of that, there's nothing." ■

## George Howard Plays It Straight

by Josef Woodard

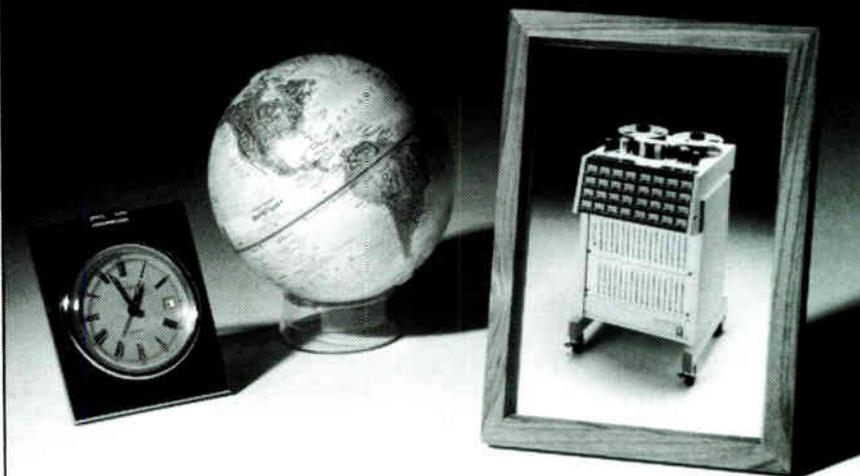
"I don't resent being categorized as a jazz artist," claims soprano saxist George Howard, one of the more popular practitioners of pop/jazz at present. However, he adds, "People use that term to identify an idiom, and I like to think it's a little more diverse than what they're describing. If my music was what they call jazz, maybe it wouldn't be exposed on some of the stations I'm getting airplay on."

Howard, at age 28, has learned

many a lesson about the music industry and the jazz-versus-commerce debate in the climb that landed his unabashedly pop-oriented jazz album, *Dancing on the Sun*, at the apex of the *Billboard* jazz charts last summer and also put sizeable dents in the Pop and Urban Contemporary charts. Howard bolstered the airplay bonanza with dates opening for the likes of Whitney Houston and Bill Cosby. From all outward appearances, Howard is fast following in the footsteps of jazz populist Grover Washington, Jr., in whose band Howard apprenticed in 1979—something of a catalyst in his career.

There is an obvious commercial shrewdness behind Howard's third album for Palo Alto/TBA Records. He

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keeps the medium funk tempos afloat and the tunes upbeat, with covers such as the Lionel Richie hit "Love Will Find a Way" and "Telephone," from the last Diana Ross LP. Yet, even for his lighthanded approach to jazz, Howard has an impressive consistency of tone and a nimble sense of phrasing that makes you want to hear him in less silklined surroundings.

As it turns out, Howard has made some inward bargains to cure himself of jazz elitism. "I had to go through certain evolutionary stages in my head," he says. "All I was worried about for a long time was trying not to bastardize myself. I always had to make the conscious effort to make the art and the music synonymous. But art is art; it's undeniable, whether it's four notes or 4,000 notes. I didn't realize that at first, and I got turned down by a lot of people. Some of them turned down the same songs I'm recording now.

"I may have been a little too cocky," Howard concedes. "I thought they were the problem—they were racist, they were this or that, there was a plot against George Howard because I can't be controlled. I had a lot of indulgences and things out of perspective that fed those kinds of delusions. Ultimately I figured it all out—that I was the one who was screwed up. That was rough, man. It's really hard to kick your own ass." He bursts out laughing.

Howard was a precocious sax wizard from Philly, weaned on classical music, R&B and, inevitably, the stuff of Coltrane, Wayne Shorter, Sonny Fortune and Bennie Maupin (an admitted influence on soprano). Howard's musical childhood took him from playing Vivaldi's Bassoon Concerto at age ten to playing sax in cabarets and bars at 13, to studying with the underappreciated sax giant Odean Pope at 16.

After dabbling with all the ranges of the sax family, he settled on the highest and, along with the lowly baritone, the least frequently called-upon. "I like soprano because it feels most comfortable," he explains. "I don't miss the range. I always wanted to go higher. I started on clarinet, so soprano was always easiest for me because of the tight embouchure. On tenor, it seems like I can't get a tight enough grip."

That pure soprano tone has become a sonic signature for Howard, whose fourth album, *Love Will Follow*, furthers the accessible direction so saleable on *Dancing in the Sun* and deploys a timely emphasis on drum machinery over drum kits. Howard's originals, along with such covers as Kenny Loggins' snappy title cut, adhere to a cleaner-is-better approach to arrangements and production, with no



George Howard

excess solos or jarring touches. By all market calculations, it should be another bestseller.

A little blinded by the attention at this point, Howard is reflective about the foibles of the music industry. "I would like to see them take the colors off of music," he comments. "I really would. It breeds separatism and racism by denying masses of people the chance to understand each other. Nobody has the right to do that, even under the guise of free enterprise. People don't know why they like each other—they respond to what's good. It's the record companies that impose these things."

Howard is proud of his career's upward swing but puts a premium on his integrity. "If I had gotten a shot back in '79, when a certain major label was thinking about signing me, I'd be a trivia question by now—'Whatever happened to that cat who thought he was gonna play soprano sax?'

"That may happen still. Who says I'm exempt from that now? I might still be a trivia question in two years, but as long as I don't come into the business the wrong way, I can still go out with my dignity." ■

## A Moment in Time with Leon Redbone

by Rip Rense

Leon Redbone sits sipping a mint julep. Horseflies buzz languidly about. The sun sets slowly on distant Warner Bros. cartoon hills, throwing a buttery light on Redbone's face. This is the Redbone estate—or estate of mind, perhaps—somewhere between New

"There's no mystery about what I do. It's all the kind of music being recorded in the early days of recording."

Hope, Pennsylvania, and 1920.

Behind him, inside the oakwood Redbone bungalow, the ghost of W.C. Fields shoots pool, a pitcher of martinis at his side. A few feet away, on the white wrought-iron terrace where Redbone, sporting a red tulip in the lapel of his white seersucker jacket, is settled in a rocking chair, the ghost of Jelly Roll Morton tunes a guitar.

Redbone hums. "Polly Wolly Doodle." Or is it "Mississippi River Blues"? He rocks a little. Then he speaks.

"I definitely think the new record is better than anything I've ever done before, and I would take a *dim view* of anybody who thinks otherwise."

This startling outburst is muted only by the man's history of humility. No, it can't be a boast. Just pride, perhaps. The voice, after all, is still humble. A mumble, but somehow clearly enunciated. A baritone, smooth as old Scotch. The sincerity of the old South.

"I like the fact that there's no particular continuity in the material," he says. "Because that's the way I like to listen to things."

And so be it. Redbone's first album in five years, *Red to Blue*, finds continuity only in eclecticism—a quality considered a virtue among musicians before the era of the synthesizer and the marketing survey. *Red to Blue* is on Redbone's own label, August Records, and was produced by Redbone and manager Beryl Handler. It features David Bromberg, Mac Rebennack (Dr. John), the Roches, Hank Williams, Jr., and a teenaged gypsy guitarist named Bireli Lagrien. The songs are by everyone from Bob Dylan to Shadrick Smith to—Leon Redbone. And it was named by Jelly Roll Morton himself.

"It was just a line spoken by him one time, describing the transformation between Spanish influence and the blues," says Redbone. "It's a reference he made to the idea that by changing a syncopation, you can change it over from a Spanish feel into a blues. You could still use the tango beat in one hand, and change it

in the other to make it a regular blues." Redbone sips. The ghost of Jelly Roll nods.

"Always stayed in my mind as being something kind of interesting. And most of what I do is based on just that principle."

Leon Redbone is a fellow who's been around quite a while now. He has thick eyebrows and a thick moustache, and usually wears dark glasses. He sings songs that were popular on record earlier in this century. Sometimes the songs just *sound* like they were popular earlier in this century. He has not been on MTV (except maybe in his Budweiser commercial), but has made wonderful short films for some of his songs—notably "Champagne Charlie." He has recorded everything from "When You Wish Upon a Star" to "Ain't Misbehavin'" to Bob Dylan's "Living the Blues." He takes pictures of his audience (so does Joe Jackson). He is a master of shadow puppetry. He has a fine vegetable garden. He listens to opera, loves tango music, and is very fond of the late Hungarian vocalist Imre Laszlo. Oh, and he is a wonderful guitar player. Writers, usually in a sweat to categorize everything, have labeled him a charming anachronism, a throwback. Throwback, perhaps, but anachronism, no. This music is hardly *obsolete*.

"There's no mystery about what I do," says Redbone. "There's a very simple definition. All it is is early American recording. Very simple. The kind of music being recorded in the early years of recording. The popular music of the day, depending on what neck of the woods you were in at the time."

One wonders what neck of the woods Leon Redbone might have been in, and is left to conclude that either all that jumpy old music was playing in the house during Leon's formative years, or the guy is 80 years old.

"More like a 110," he says.

Redbone *has* been away, recording-wise, although only for the past five years. Where has he been? On the road, he will tell you, or at home. The hiatus from the studio stemmed from difficulties with his previous record company, Emerald City—which just released a two-record live Redbone album. It's unauthorized, says Leon, and not at all representative. Of special interest on the LP is his version of Dylan's "Living the Blues," and the gypsy guitarist Lagrien. It sounds more like something done in 1925 than anything Dylan has ever done.

"Well, it comes out the same to me," says Redbone, "but that's the way it comes out when I do a tune. I like a tune, and I perform it. Had some people write about it who didn't know

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where it came from. They made some kind of remarks like 'He did another one of those old standbys.' Didn't realize what they were saying.

"Still, it would be kind of hard to tell the difference between it and an old blues number, I think. And that's the reason I like the tune: it has that timeless quality to it."

Lagrien is an 18-year-old from Alsace, the area near the French-German border—"the same neck of the woods as Django Reinhardt," Redbone advises. The kid, featured on "Whose Honey Are You," was spotted in a New York nightclub. His playing, too, exudes that "timeless quality" Redbone alludes to. Almost an "old world sentiment," he calls it.

"We got him in the studio," Leon pronounces, "and he just rattled it right off. He's an amazing guitar player, plays a lot of Django material in an almost flawless manner with great ease."

The remainder of the record is jaunty and brisk, smooth and mellifluous—all the things that normally characterize a Redbone LP. But this one has a ripened feel to it, and more of a sense of ensemble delivery. It definitely is no novelty record—a category some of his earlier albums are sometimes sadly relegated to in record stores. If anything, Redbone is carrying on an American tradition—and, arguably, doing it somewhat singlehandedly.

"There's a wealth of information out there on records, and people tend to forget that," he says. "To tell you the truth, I haven't had much time to listen to modern music. Nothing has caught my ear. I'm still finding amazing recordings from the turn of the century and up."

Such as...?

"Well," he says, an air of formality coloring his tone, "most of my listening hours are spent listening to European recordings. You find that in a lot of European music, there's still quite a bit of the old sentiment. There isn't quite as much of a big turnover, as there seems to be over here, where you only hear the older music in some kind of novelty-reflective mood. You know, some of these people get hold of some of these '50s kinds of tunes, or big band tunes, and it never really works."

"Now, in certain parts of the world, they never stopped playing it. You can hear it done as something quite valid, as opposed to an attempt at something trivial."

And so the leisurely Mr. Redbone finds himself listening frequently to people like Abdel Whahab, a "marvelous" Egyptian singer who was very much "in the old tradition—a 19th Century sentiment"; and Portugese *fado* vocalists Maria Teresa and Fernando Farina; and Imre Laszlo. Of special

pleasure to him is his recent discovery of orchestra leader/composer/pianist Roberto Firtó, a foremost exponent of tango music in the 1920s. And he has followed with much interest the restoration of the Mapleson cylinders, recordings of Caruso and other opera singers done just at the turn of the century.

All of which leads to the correct conclusion that somehow all of this stuff influences his work. But, not to get too scholarly here, it seemed appropriate at this point to ask Redbone *that* question—the one that most writers ask him, the one that most editors want most writers to ask him:

*Leon, how have you survived as a recording artist?*

"Oh, is *that* the question? Now who'd ask a crazy question like that? That's an interesting question, in that I don't really know what it means. The business? Well, you mean, 'If you're not part of the business, then what are you?' That kind of question?"

Behind him, the ghost of Jelly Roll Morton slowly shakes his head. *Yeah, guess so, that kind of question.*

"Let's put it this way. I'm not likely to be on the next awards show. And that's where it really is. Everybody's expected to play some kind of game in their life, which is to conform with what everybody else thinks they should be doing. And if everybody was that kind of a character, we'd have a pretty sterile environment."

He pauses, then chuckles a deep chuckle.

"Instead of the *wonderful* environment we do have. Well, some people are after a certain thing, and are willing to compromise to get it, because they don't have any great conviction in what they're doing. And some people are just total crazy people who don't compromise. At all!"

"I don't happen to fit into any of those categories. This is what I know how to do best, and that's what I do."

The ghost of Fields sinks the eight-ball prematurely and curses, "Godfrey Daniel!" Redbone has time for just one more question. *C'mon, Leon, how old are you—really?*

"Well, we established a 110," he says. "I'll go for that." ■

## Cured by a Compact Disc?

by David Gans

This happened to me. It really did. It is *not* a story about the miracle of digital sound, it's a story about the miracle of great music.

The head cold that didn't ruin Monday night for me slammed in on Tuesday and made life miserable for me and all I beheld, but Thursday night I emerged from a three-day funk via a very special experience that I hope I can describe adequately.

Around midnight, I put on the CD (the British version, DJM CD8, for those of you who are keeping score, played on a JVC XL-V200—a serviceable, if not top-of-the-line, CD player) of Elton John's first (American) LP (Your Song, etc.) and lay down with the headphones on to listen to it straight through. Amazing things happened!

It's great to listen to a record you've loved for years but haven't heard in a long while. I heard it with new ears, and the CD revealed so very much that I'd never heard before. I wasn't a very good listener 15 years ago, but I "knew" every inch of that album. Hearing it with the brain I now use, all the things about it that worked on my noisome little adolescent musical personality back then worked *even better* this time.

I put myself into a fairly subjective state just before going under, and it was just what the doctor ordered. Those songs took me through many, many changes. The orchestrations, the the richness of the recording, the strangely powerful wimpiness of the whole thing...

At one point I pictured—then felt—a wave rippling through solid matter, and somehow the matter was me. Then it became a wave in the ocean, and I was in the ocean looking through glass-green water and thinking about this thing that moved while standing still. This is very, very hard to explain.

Then I found myself in a place (inside my mind) definitely three-dimensional and visual in character but independent of my eyes. I was moving from one room to another in this realm and suddenly realized I was in this fully articulated place that *didn't exist* anywhere but inside my mind.

These revelations and ineffable understandings came one after the other, while my musical self listened to this pivotal record and made some notes... So much of my "sound" is owed to that record, and I had sort of lost touch with it. There was a passage in "The Cage" that I used to think of as a "rubber band" synth solo, and I heard its component parts that night for (I think) the first time—and for once it didn't destroy the romance of the music. It made my heart swell.

When the record ended, I had tears in my eyes, and I stood up and walked over to where my girlfriend was innocently reading a book and staying out of my impossible way, gave her a hug and said, "I'm cured." ■

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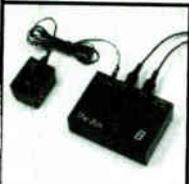
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—CONTINUED FROM PAGE 80, CIANI because I liked it the way it was. Fortunately, this is a commercial building and we're the only ones here after five o'clock, so we really haven't had any complaints about our music.

"We have a concept of five work stations in the room: self-contained islands where our electronic creative associates and sound designers can work. Each station has its own custom-designed MIDI switches and headphone mixer. The switcher allows you to quickly assign a local master, or to be controlled by any other work station in the room via a central custom MIDI Matrix. And the stereo headphone mixers let you blend the elements of a sound at one station as well as mixing in the sounds from the other stations. You can work privately or together. Plus there is instant audio or MIDI muting and foot pedal control."

Over time, each island has developed its own personality and idiosyncracies. "We always knew that the Synclavier with poly sampling would be a separate entity, and it's hooked up to the video projector to display its monitor on large screen. And a Yamaha DX-TX-QX station has evolved with a Macintosh for timbre storage and editing. Another station developed into a Roland area, with two Roland piano modules, a Planet S, Super Jupiter, and MSQ-700. Those pieces naturally sought each other out, and a Voyetra landed there too." The drum station is on wheels with an "umbilical cord for mobility."

"Rob Zantay has his own Lyricon station with Oberheim Expander, modified Prophet, and Korg. The piano room is kind of an extra station. It's MIDI connected to the rest of the studio but was set up independently with its own piano module, amplifier and speakers so it can be played immediately, as if it were acoustic. The processing gear for the whole studio was always planned to be a special 'rack on its back' in the middle of the room, a concept from my living-room studio. All the work stations can rotate so everyone can reach the centralized processing, including Eventide SP2016, H949, a Y-expressor, Bode Vocoder, Yamaha SPX-90s, and more.

The central synchronization for the studios includes Lynx Modules for locking video and tape machines and a Garfield Masterbeat for locking video and tape to all drum machines and sequencers.

"I think that reverb is especially important in an electronic studio," Ciani adds, "and the Amek console (with Masterdisk automation) is set up to send to any number of them, including Lexicon 224X, 200, Yamaha REV1, REV7, SPX90, and Eventide SP2016."

Rainbow Recording, her prior facility in San Francisco, gave Ciani considerable insights when she began to plan C/M. "I think one of the first things you learn when you build a studio is what you will and won't do next time," she explains. "It's all so clear, after you've made the mistakes. That's why people keep building rooms, they're constantly solving the problems they ran into in the last room. My first studio was a struggle because I had an idea of what a studio should be, and my partner didn't agree. The space, which had previously belonged to the Kingston Trio, was a traditional studio, with a very small control room and a recording area. My partner was very traditional too. We had constant arguments about quad sound, which was just coming out then, and about my wanting to use the studio as a control room to utilize the quad sound."

But it wasn't her frustration at Rainbow that sent Ciani catapulting into home studio mania. "I had a lot of experiences after I left Rainbow, working out of Soundmixers when it was around, and then practically living out of a cartage truck so I could drag all my synthesizers around to sessions. I felt it was important not to be isolated. I

**"My philosophy is to let things expand by themselves."**

was definitely opposed to home studios then, because they take you out of the context where music is happening. And that's creatively stifling. Isolation, I felt, was the weakness of home studios at that time. People were sitting in ivory towers and not integrating into the mainstream of music production. Running around with a cartage truck was great. It kept me in studios where everything was happening. I only made the change to a home studio when the truck became impractical."

When Ciani had 15 road cases and someone to set up her gear, the truck made sense. "But when the Synclavier came along with the Winchester Disk Drive, I couldn't move around anymore, and suddenly a home studio was appropriate. Electronics by then had been integrated so efficiently into everyone's awareness that my reasons for avoiding a home situation were no longer relevant. For years, I worked from the 'two studio' approach. I'd do the traditional part of the music in an outside facility, then bring the tape home for further work. I couldn't get the amount of control or sophistication outside. The work I do is like performing surgery, all kinds of instruments

have to work together, something I could never achieve in an outside studio. Trying to get everything together was a nightmare, no one ever had all the processing gear we needed."

In Phase III of the Ciani Production Plan, "we don't really need to use other studios at all. Even though we aren't acoustic, we have a vocal booth and an overdub room. I haven't been in an outside studio since I moved here, which is a little weird. But I think the electronic palette is so broad now you don't need to go out. I still wrack my brain over whether or not to do a project all electronically or not. It's hard to draw the line, because electronics and acoustics are so merged now. The orchestral sounds are here, even the performance elements."

By keeping C/M open to outside clients (with the exception of jingle dates which would be direct competition with Ciani's commercial work), the studio enjoys frequent visits from "the outside world." "Music is inspired by communication. By having other people in, I get the same type of exposure I used to get in my cartage truck days. We don't advertise, so we haven't had any 'strangers' popping in off the street. But Leslie Gore recently recorded what she thinks is her next hit here, and Benji King of Hush Productions and Michael Urbaniak have

done some great work in the room. Electronic people from all over the world pass through to see what we're up to, including Vangelis."

Like her clients, Ciani also books studio time in advance, "though I do get priority on weekends."

In addition to offering clients their expertise in leading-edge equipment and the talent to run that equipment creatively, C/M is "perfect for people who want the technology but don't want to read all the manuals. And, we're developing a strong reputation as a Beta test site. We do equipment evaluation for many technology companies, working the bugs out in each machine, and assessing the functions of various programs, as well as offering feedback and design information. Yesterday we had four sound designers buzzing away back here, sampling for a piece of equipment not yet on the market. That type of service is becoming quite valuable as there's more need for interface between the software, the instrument, and what the public wants in an instrument, in terms of how it sounds and works. I can imagine the concept of a studio like this expanding in the future."

Choosing a location for her studio could have been a nightmare for Ciani, but years of experience came to her rescue. Rather than hope for a

rare landlord who would be amenable to a recording studio in his building, C/M is simply listed as a Computer Development Center on the lease. "We'd had previous problems getting a lease," Ciani admits. "People would hear the word music and go crazy. We were hip to that by this time, and we re-worded our organization."

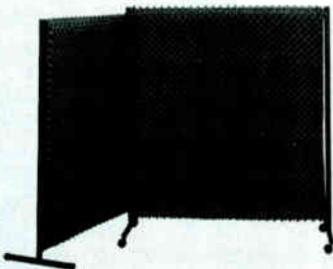
When Ciani built C/M, her goals were two fold. She sought the highest caliber electronic production area possible, one that would answer the emotional as well as technical needs intrinsic to a creative working environment. "I think everything here," Ciani waves toward her array of electronic friends, and hand-sewn cushions, "addresses needs in either an emotional or technological vein. I call it high technology's soft touch, a natural evolution over the years.

"The most satisfactory solutions, I think, are those that rise out of the environment. They have an appropriateness you couldn't design in from a distance. My philosophy is to let things expand by themselves. I could have built this studio three years ago, but it gave birth to itself. There is a certain validity to the consistent, steady pace, the rhythm of growth, that my studios have kept. And though C/M is neither a public nor a private studio, people know it's special." ■

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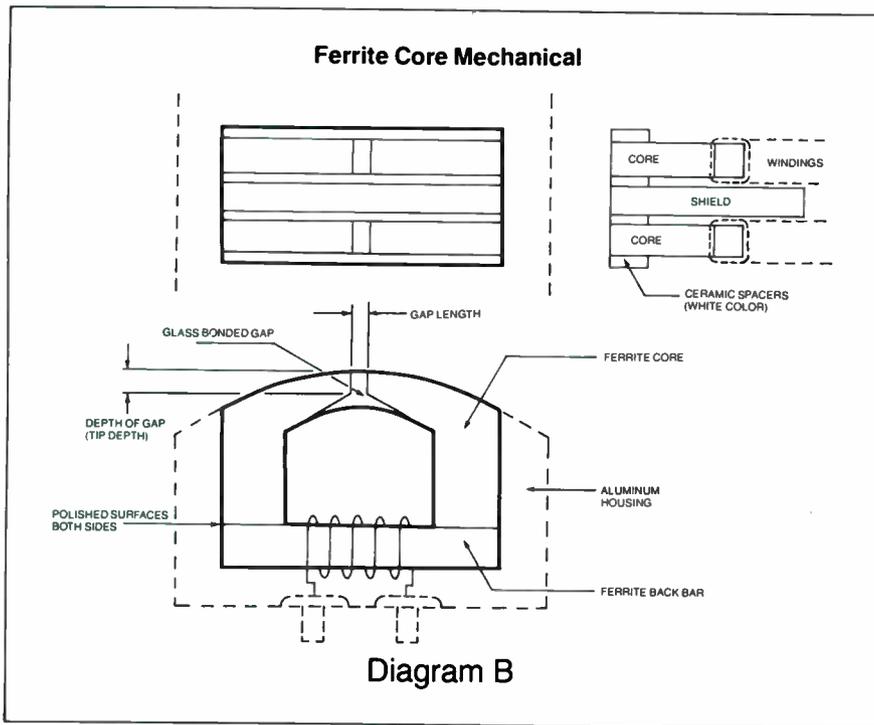


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**—FROM PAGE 89, TAPE HEADS**

turer. However, in general, most fall within the following specifications.

- Inductance:  $\pm 15$  percent
- Gap length:  $\pm 5$  percent
- Tip depth: .012 minimum
- Track width:  $\pm .001$
- Track to track (ctr/ctr) location:  $\pm .001$  (non-accumulative)

Core lamination thickness: .001-.006 (metal heads)

It is important to note that as a head wears, inductance drops proportionally. As a general rule, when a head is worn out (tip depth within .001 of go-

ing through) inductance will usually measure about 50 percent of the initial (new) reading. Since output is a function of the number of turns and efficiency of the core material, level will not drop as a result of the reduction of inductance.

Since all recording equipment is designed and manufactured around the operation characteristics of new magnetic heads, a good maintenance program is essential in preserving optimum performance. Magnetic heads and assembly tape guides on many tape machines are the only non-rotating contact surface within the tape path. As tape passes over the heads

with sufficient wrap and tension to insure intimate stable contact, the inevitable result is going to be head wear in one form or another.

Head wear is directly related to:

1. **Tape Passage (in feet):** the operational speed of the tape machine, particularly the volume of tape passing over the heads, must be considered when looking at head wear. Often overlooked, a machine operated at 30 ips will pass twice as much tape over the heads as a machine at 15 ips. Within the same period of time, the 30 ips machine will obviously exhibit greater wear.

2. **Tape Tension:** this (user adjustable) variable can be devastating to the expected life of magnetic heads. Under normal use, light adjustments are usually made to compensate for tape to head contact losses caused by head wear. Never should the tension be adjusted to exceed the recommended specifications of the equipment manufacturer. It should be noted that after head reconditioning, it is very important to readjust (reduce) tape tensions to the minimum acceptable setting.

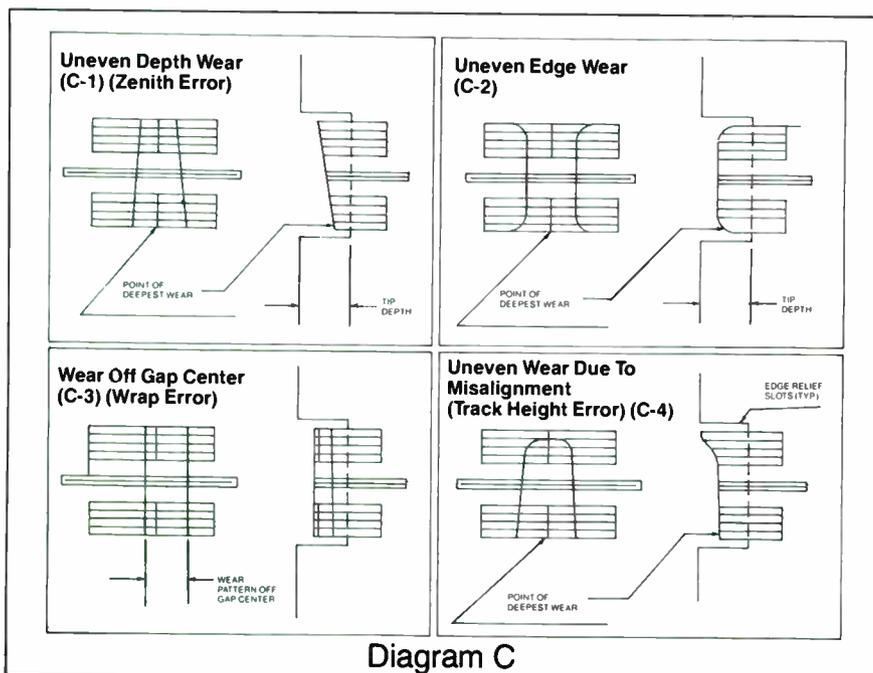
3. **Tape Path Cleanliness:** everything in the tape path including heads, guides, rollers, lifters, capstan, pinch rollers and posts should be kept as clean and free of debris as possible. Heads should always be cleaned in a horizontal (or tape passage) motion and never up and down. In some types of heads, an up/down cleaning motion will cause lamination spreading and breakdown.

4. **Tape Abrasiveness:** this is for the most part an unknown value that varies from manufacturer to manufacturer.

5. **Environmental Conditions:** as a general rule, tape recorders are comfortable when we are comfortable. While optimum settings may vary in different parts of the country, in general, temperature should be kept between 68 and 72 degrees; and humidity 30 to 50 percent. Typical tape handling problems related to climate control conditions can include oxide shedding, oxide sticking to heads, tape path instability, static, poor tape winds, and excessive head wear.

As a magnetic head wears in normal operation, certain conditions and minor problems develop that indicate a gradual deterioration in performance. On metal heads, the symptoms are a result of minor changes in contour and tape-to-head contact loss caused by wear. These include: signal amplitude instability, slight loss of high frequency, and unstable tracking or tape path.

Ferrite record and playback heads, due to the extreme hardness and composition of the core material, do not



wear as conventional metal heads do. Slight losses in high frequency response are generally the early indications of core surface and gap deterioration caused by material erosion.

Variation or change in performance caused by wear is usually very slight and normal EQ and/or minor transport alignment compensation will maintain operational consistency and spec.

Ferrite erase heads are often regarded as indestructible and never in need of attention. While their operational properties usually do not vary, wear does take place and problems develop, thus signaling erase head deterioration. In conventional erase head construction, the edges of each track contain an epoxy or glue line, and the guard band (area between

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Since all recording equipment is designed and manufactured around the operation characteristics of new magnetic heads, a good maintenance program is essential in preserving optimum performance.

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the tracks) is usually made up of a softer non-magnetic material such as brass, aluminum, copper or barium titanate. Over a period of time, as the guard band material wears, the ferrite edges on some or all of the tracks fracture and break down, producing small chips and sharp edges along these surfaces. This condition is visually almost undetectable without the use of a microscope. Early warning signs will show up as small areas of oxide buildup either on the erase or record heads. A worn erase head is a major contributor to oxide shedding problems within the head assembly.

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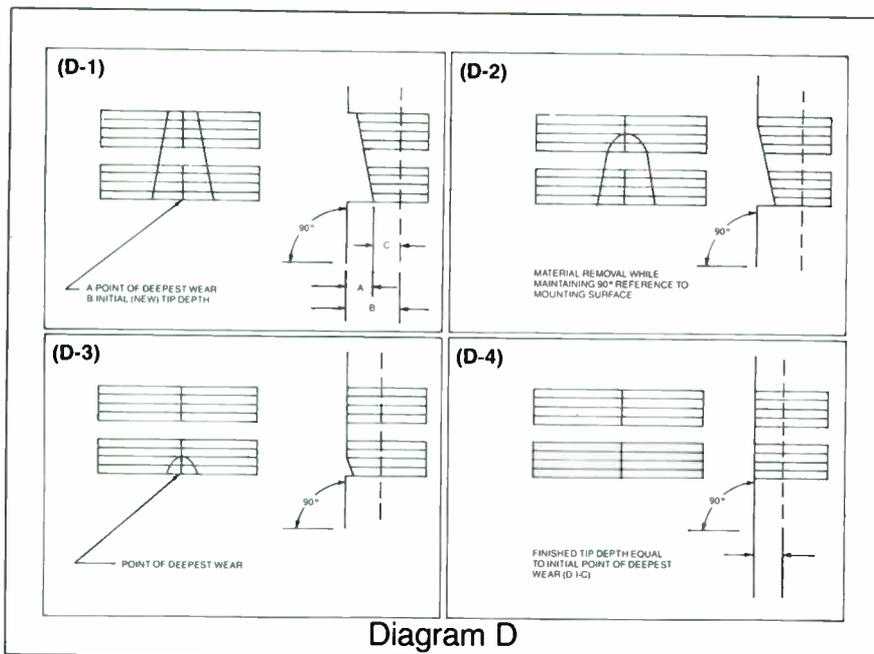


Diagram D

The question is often asked, when is it time to refurbish or replace tape heads? Since the definition of acceptable performance varies between individuals, facilities, applications, and quite often, economic considerations, the answer is very subjective. As a general rule, heads and assemblies should be refurbished at, or prior to, the point at which maintaining performance is in question. If wear is allowed to continue, minor problems can become major ones, and alignment is no longer possible. Major symptoms include:

- oxide shedding and excessive buildup
- dropouts
- loss of high frequency response

- midrange bump
- distortion
- noise
- unstable signal and tape path
- tracking error
- edge track instability on multi-track heads
- insufficient erasure

Usually by the time any of the above symptoms appear, others are present as well, and the result is a serious overall deterioration in quality. Since wide variations exist between tape machines, the materials used in head manufacturing, and of course the quality of maintenance, an expected head life calculation based on hours is very difficult. The data accumulated in our studies over the years indicates that

in most cases, magnetic heads failing to meet operational spec exhibit wear patterns less than 50 percent of initial tip depth.

It should be noted that a ferrite record or playback head in serious need of refurbishing will show no obvious wear pattern, groove, or change in contour (as compared to metal heads.) Upon close visual inspection of the tape contact area, a matte or dull finish is noted as compared to the high polish non-contact area. Under a microscope, the dull finish reveals a surface deterioration and pitting at, and around the gap area. This surface breakdown alters the surface gap length and definition (sharpness).

The procedure of relapping, recontouring, reprofiling, refurbishing and so on, performed properly, restores a magnetic head to its original specifications. Strict adherence is paid to maintaining original contour, ramp angle, gap/crown centering, and end to end crown radius consistency. Zenith or tilt 90 degree reference to mounting surface, and precision finishing is essential.

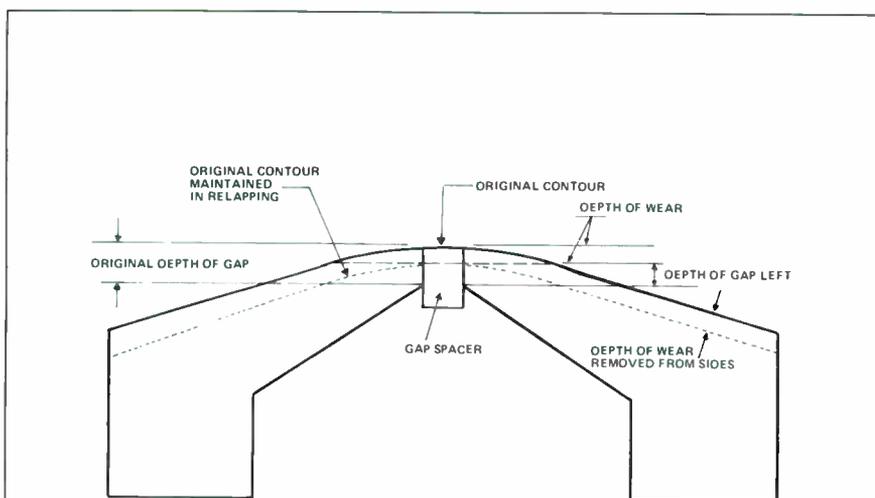
The following diagrams (C1-C4) illustrate the most common wear patterns found on metal heads. These same wear conditions are typical on everything up to two-inch multi-track head stacks. Assuming that the contour is consistent end to end, the widest wear area is always the deepest.

Most uneven wear conditions are the direct result of tape path problems and/or head mis-alignment. Diagrams C1, C3 and C4 represent wear patterns caused by mis-alignment. As a general rule, metal heads will usually wear slightly deeper at the edges. This is due to tape tension and curl effect of magnetic tape (C-2).

There are countless combinations that can include any or all of the above wear patterns within a single head. It must be understood that the longer a head is allowed to wear uneven, the more material or usable life is sacrificed in refurbishing to correct the condition. This is because the relapping procedure references to, and must maintain, the original contour and tip depth consistency (end to end). Usually an uneven amount of material must be removed to correct an uneven wear pattern, as illustrated in diagram D.

Since tip depth is directly proportional to dollars, removal of the absolute minimum amount of material in the refurbishing process is of major concern. For example, a \$2500 multi-channel head with a .010 (ten thousandths of an inch) tip depth means that every .001 (one thousandth) of depth is valued at \$250.

Electrical and mechanical analysis, which consists of inductance, DC re-



Proper Relapping Procedure Insuring Optimum Performance

Diagram E

“Tip depth is directly proportional to dollars: a \$2,500 multi-channel head with a 0.01-inch tip depth means that every 1/1000 inch of depth is valued at \$250.”

sistance, Q, measured gap depth, wear depth, initial contour and wear pattern is an important part of head refurbishing. A complete analysis must be performed prior to and after relapping. It is this information, coupled with documented wear characteristics, design data on the specific magnetic head, and tolerance, which enables accurate performance and expected life estimates. Considering that the cost of refurbishing ranges from five to 25 percent of replacement, the savings are substantial.

An important part of a refurbishing program includes the precision head mounting and optical alignment of the entire head assembly. Since a large percentage of head problems stem from tape path and/or initial head misalignment, it is very important to start with a known reference when re-installing new or refurbished heads.

The procedure of optical alignment includes a thorough cleaning, wear analysis and any repair, replacement and re-alignment of all tape path components on the head assembly. Fixed tape guides, roller guides, wear posts and flutter idlers should be cleaned, rotated to a fresh tape contact surface (if non rotating), set to the exact reference height and aligned for perpendicularity and parallelism. Magnetic heads are installed and aligned for exact track placement (within .0005

referenced to edge of tape location). Azimuth, zenith and track placement is aligned with the use of high powered optical viewing and digital measuring equipment. Head wrap is aligned for gap centering on the scrub or wear pattern.

The re-installation of a properly refurbished and optically aligned head assembly usually requires only a minor azimuth adjustment (for phase alignment) and the standard electrical adjustments. Tape tension *must* be checked and adjusted (reduced) to the minimum acceptable setting. The time saved in the studio for mechanical installation can be substantial.

Often times, the overall effects of normal head wear, and various minor

mis-alignments within the tape path, result in the machine being only slightly out of alignment. Head wear in one form or another, is a gradual, long term, but continuous process, which in many cases goes unnoticed.

The requirements and demands for higher quality analog recording grow each year. It is hoped that the information contained in this article will help in the understanding of magnetic heads and the benefits of a good maintenance program. ■

*Author John French is the owner of JRF Magnetic Sciences, Inc., a New Jersey firm involved with the repair, restoration, and sale of replacement tape heads.*

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Bob Todrank of Todrank Designs was called on to design the Welk Music Group's new studio building in Nashville, a three-story affair that houses a 24-track demo studio for Welk writers, and additional office space for lease tenants. Valley Audio of Nashville supplied the equipment, which includes a new NEOTEK Elite console, LFD (Low Frequency Diffuser) by RPG Diffuser Systems, the Boxer monitoring system from England (by Discrete Research), and Otari tape machines. Hardwood and ceramic floors add to the "liveness" of the room.



PHOTO: LAURA FRIED

39th Street Music Productions of Manhattan has a newly renovated control room featuring the SSL 4000E console, and a computer-based MIDI synth station enabling quick keyboard set-ups and easy MIDI routing between synthesizers, sequencers and MIDI outboard gear. Acoustical design was by Russ Berger of the Joiner-Rose Group, technical design by the studio's Barnaby Bristol and Richard Kaye, and wiring design by Greg Hanks of New York Technical Support.



Sanman Productions, Inc. in New Jersey was completed last December under the design of James Hovey. Offering 16-track recording of demos and masters, the facility is equipped with a TAC Scorpion console, Otari tape machines, and an abundance of outboard gear. Victor's House of Music in nearby Ridgeway supplied the equipment.



(Right) Advanced Media Productions has recently opened a state-of-the-art production facility in Suffern, NY. The coordinated equipment list, partially provided by Audiotechniques of NYC and Connecticut, includes a 28 x 24 Trident series 75 mixing desk, and Otari MX-70 recorder, outboard processing by Lexicon, Orban, Yamaha and others, and monitors by JBL.

# The Thin Man becomes a Fat Boy

... or how a Mirage Digital Multi-Sampler can make your DX-7\* Deluxe



The DX-7 is a marvelous machine, but quite a few of you think it could use a little fattening up. DX sounds are punchy and crisp, but a tad on the thin side.

Not to worry. With a Mirage Digital Multi-Sampler and a MIDI cable, you can change all that.

While the DX uses operators, algorithms and sine waves to create its sonic personality, the Mirage uses multi-sampled waveforms of actual acoustic instruments for sounds with acoustic richness and character. Just connect the MIDI Out of the DX-7 to the MIDI In of the Mirage, power up your system, and turn yourself on to the hottest performance set-up going.

## Partners in Crime

If killer sounds will help you steal the show, the DX and the Mirage are perfect partners in crime. There are over 100,000 sound combinations among the available DX and Mirage sounds. Rather than list them all, here are a few favorites.

Dualing pianos. DX and Mirage keyboard sounds complement each other perfectly. The electric piano sounds in particular combine the synth punch of the DX with the realistic timbre and dynamics of the Mirage. In fact, any synthesized sound takes on a

new dimension when combined with the sampled acoustic counterpart. Strings, brass, mallets and fretted sounds take on a new personality when doubled on the Mirage.

The bells are stringing. The impressive bell sounds of the DX come alive with orchestral richness when combined with the Mirage string sounds from Ensoniq Sound Library Diskette 3. Depending on



Mirage sounds + DX sounds... over 100,000 combinations

how you balance the levels, the effect can be either subtle or startling. While you've got the strings loaded into the Mirage, try some of the DX synth bass sounds (especially percussive variations) and hear how well the strings support the bass.

Digital Doo-wop. The "Tah" and "Doo" vocal samples from diskette 17 add new life to many of the old standby DX sounds. Try the "Tah" and DX brass sounds together. Use the "Doo" with the caliope. The human voices add a jazzy sophistication to even clichéd patches.

## The Special Effects Department

With pitch and mod wheels, velocity sensitivity, after touch, breath controller and pedals, the DX is among the most expressive synths. If the truth be known, the new Mirage operating system (version 3.0 and up) was developed specifically to take advantage of these DX features.

Through the magic of MIDI, the DX and the Mirage can be configured many different ways. For instance, you can modulate the Mirage LFO from either the DX mod wheel, breath controller, foot pedal controller, volume pedal, after touch or even the data entry slider. And all independently of how you are controlling your DX.

So you can use after touch to modulate a DX string sound while using the DX mod wheel to control vibrato of the Mirage sampled strings.

The Mirage has the ability to vary the mix between the two oscillators of each voice. The solo rock guitar sound on diskette 6, for instance, has a heavy guitar

sound on one oscillator and a harmonic feedback sound on the other. You can vary this mix with any of the DX control functions. A favorite of Mirage/DX players is to use the DX after touch to control the mix. Playing the keyboard normally gives you

that "wide-open-through-a-couple-of-stacks" sound, and pressing extra hard will bring in the feedback. A little practice with the pitch and mod wheels will earn you a convincing guitar technique.

## Remote Territory

Changing sounds and programs on the Mirage is simply a matter of pressing a few buttons, but if you want to rack mount your Mirage you can just as easily change sounds and programs right from your DX



Just 11 pounds of Mirage can make your lean DX a fat boy

over MIDI. Pressing one button on the DX can change your entire set-up from a sweet string background to a sizzling solo sound on both the Mirage and DX.

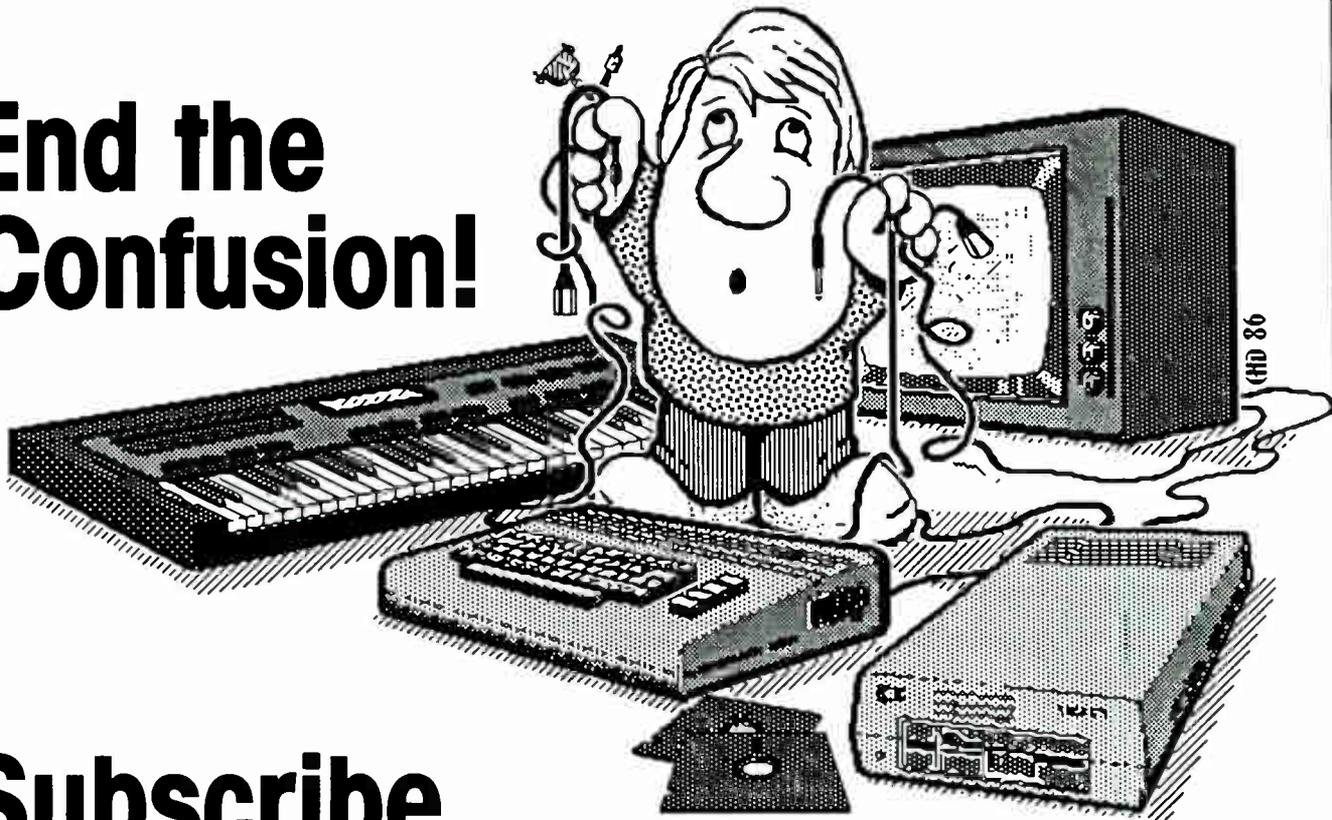
## A Marriage made in Malvern

The Mirage/DX partnership is a natural. Although the instruments are designed and built on opposite sides of the globe, they go together like hot dogs and mustard (or sushi and soy sauce). If you own a DX-7, bring it down to your authorized Ensoniq dealer and let it spend some time getting friendly with a Mirage Digital Multi-Sampler.

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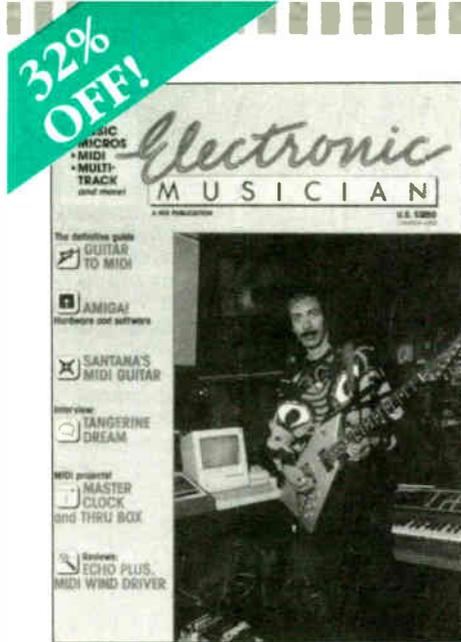
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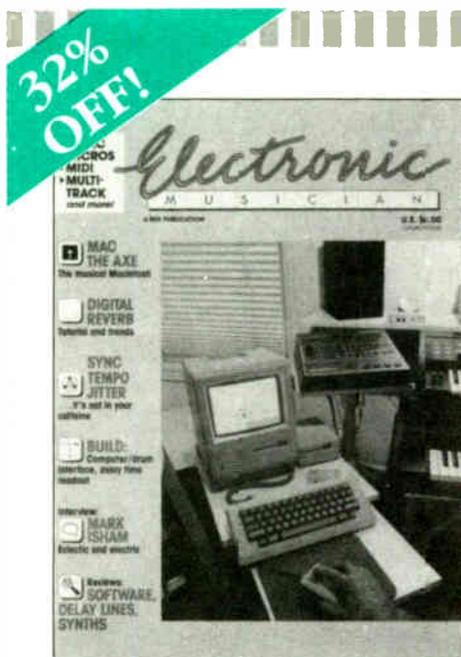


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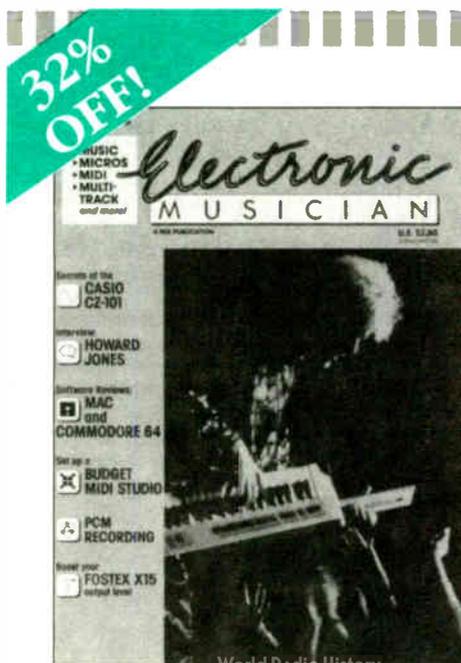


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# PLAYBACK



Meadowlark's Richard Souther (aka) Douglas Trowbridge

## MEADOWLARK RECORDS

by Tony Thomas

### THE MUSIC IS THE MESSAGE

As you turn on your stereo, strains of ethereal music begin to envelop you, blowing into your living room like a warm summer breeze. The recurring wafts of sound caress and comfort you, bringing you into communion with your Creator. What you're listening to is not a tone poem by some obscure classical composer, it is "contemplative music for the contemporary" from Meadowlark Records. Meadowlark is the newest subsidiary of Sparrow Corporation, a nine-year-old company that has made its mark in the contemporary and traditional Christian record markets and is, with this new label, trying to reach an even broader audience.

While certain similarities can be

drawn between Meadowlark's output and the rest of the current crop of independent instrumental records that seem to defy categorization due to their airy and eclectic style (e.g. Windham Hill), the difference is that Meadowlark music emanates from the strong Christian faith of its originators. Each of Meadowlark's artists has been hand picked by Sparrow for their musical virtuosity as well as their spiritual insight. This unique combination makes for an enjoyable listening experience that is full of both musical diversity and emotional intensity.

#### The Birth of a Label

According to Peter York, A & R director of Sparrow: "The whole idea came from Billy Ray Hearn, the president of Sparrow. He saw the need for a non-verbal communication of the attitude that is exemplified in Mea-

dowlark's music. The advertising slogans for the series sum up that attitude: 'Music for Your Personal Retreat,' 'Contemplative Music for the Contemporary,' 'Music Without Words for Thoughts Without Limits.' Those slogans are not hype, but very descriptive. We live in a time when society is so stressful and there is such a hyped mentality that we have decided to take a different approach musically. Of course, our approach is not new since it is influenced by labels such as Windham Hill, but we feel that it's different since Windham Hill caters to a more esoteric audience since their music has a rougher edge. What we have done is taken that basic concept and made it more palatable and accessible to the mainstream audience without sacrificing the authenticity or integrity of the music."

Hearn's vision of a label comprised of "instrumental music that can be played while the listener reads a book, or the Bible or a newspaper, or while eating dinner, sitting quietly, or perhaps thinking or meditating" is largely realized in the various Meadowlark releases. It is music that, in the words of artist Richard Souther, "creates a relaxing non-taxing mood." Although Sparrow has ventured out in the field of instrumental music before via its "Breakers" subsidiary with the jazz

ensemble Koinonia (whose members are well represented in the Meadowlark line-up), this new label represents for Sparrow a truly fresh approach, since the music itself defies description, and thus cannot be easily pigeonholed as being jazz, classical or pop. With artists ranging from a classically-trained pianist, to a monk who plays classical guitar, to in-demand session keyboardists, guitarists, horn and wind players, to even an accomplished harpist, Meadowlark has a sound to match almost any musical taste.

### A Commitment to Quality

Even though the typical Meadowlark release was produced with a recording budget of less than \$12,000 (and sometimes substantially less), the high quality of each and every offering is evident. It is clear from listening to Meadowlark's releases that the sonic superiority of each project has not been compromised by a comparatively small budget, but rather that a great deal of live recording and pre-production helped keep the costs down.

In the case of Douglas Trowbridge's *Song's Unspoken*, a solo piano album, the recording took place at a state-of-the-art studio (Chick Corea's Mad Hatter Studios) with top session engineer Bernie Kirsch at the controls. The project was completed in just a few days,

however, since a minimalist approach was utilized: a single matched-pair of Neumann U67s were suspended over the pristine 1940 Hamburg Steinway nine-foot concert grand and connected to a Trident Series-80 console which fed a Mark Levinson modified Studer A-80 half-inch deck running at 30 ips. Reverberation was provided by a combination of a Lexicon 224X digital reverb and an EMT 140 tube stereo reverb.

For "Heirborne" by Richard Souther and Jeff Johnson's *No Shadow of Turning*, recording at home helped keep costs in line. Souther carefully sequenced more than 20 analog and digital synthesizers for "Heirborne" (which included an impressive array of Rolands, Korgs, Yamahas, Oberheims, Casios and Sequentials, with a Moog, Linn 9000 and 360 Systems MIDIbass thrown in for good measure) using Roland MSQ-700 and 100 digital keyboard recorders well in advance of the actual recording. The sessions were eventually completed by pulling Tim Pinch's 24-track mobile up to his home studio and transferring the sequenced parts to tape. The album was later mixed at Larry Carlton's Room 355 with Peter York producing and Jay Lewis (nominated for a Grammy for his work on Gary Wright's *Dream Weaver LP*) doing the mix.

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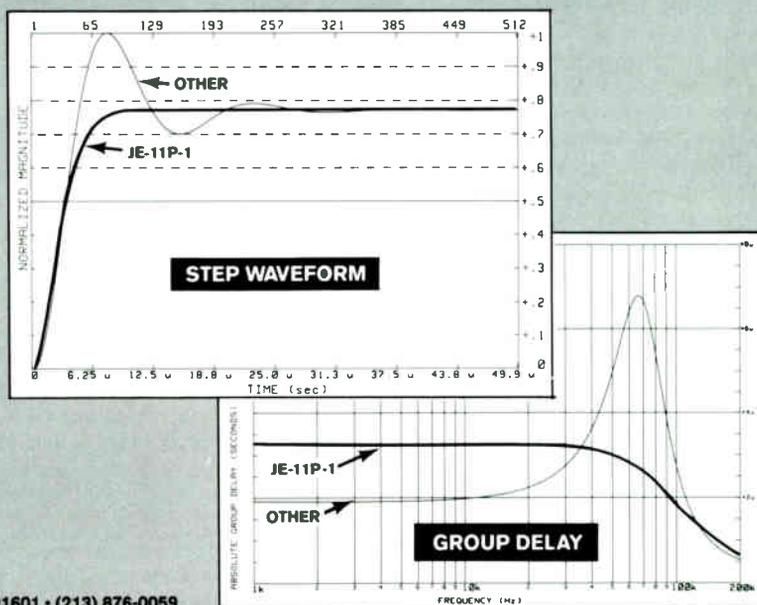
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World Radio History

For *No Shadow of Turning*, Jeff Johnson and collaborators Sandy Simpson, Dieter Zander and Kathy McClatchy used only a Tascam 80-8 8-track with dbx, 25-2 2-track with dbx, a Nagra portable for effects, and a Sound Workshop Series 20 (16 x 8) console to capture their eclectic blend of piano, guitar, tablas, autoharp, Celtic harp, recorders, wood chimes, Oregon bass, synthesizers, Emulator and even a real rainstorm, recorded on location. The careful use of top notch studio mics (Neumann U87s, AKG 451s and Sennheiser 421s) coupled with the application of a wide variety of outboard gear (Roland Dimension D Chorus, DeltaLab AcoustiComputer, Eventide H-949 Harmonizer, MICMIX XL-305 reverb) and some creative editing makes this record sound a lot fuller than merely an 8-track recording.

On Justo Almarino's *Forever Friends*, a line-up of studio greats (Alex Acuna, Russel Ferrante, Bill Maxwell, Hadley Hockingsmith and Abraham Laboriel) adds to Bill Maxwell's flawless (Andrae Crouch, Keith Green) production. "On Justo's album," session engineer Win Kutz reflects, "I went for as much of a live sound as possible; even going to 2-track on some of the tracking dates, hoping to get a 'keeper' mix. We usually ended up overdubbing only one synth part and going to half-inch 2-track ATR. Everything else was live. I contribute the 'air' on this album to sparse, tasty production and also to minimum tape wear. There were only four days total of recording and mix-down. We also utilized spacious echo effects such as the AMS RMX-16, reverb combined with plates and ambience and very little EQ."

John Michael Talbot's *The Quiet* was the only album to be recorded and mixed digitally. The guitar parts were laid down at United-Western in Hollywood, with the instrumental overdubs and mix completed at CBS Studios in London. The classical guitar parts were recorded using two AKG-414s. One was placed approximately eight inches from the hole of the guitar, favoring the high strings and at a 45 degree angle. The other 414 was positioned where the strap hook would normally be at the end of the guitar at a 45 degree angle and about 12 inches away. A slight amount of limiting was employed using UREI 1176 limiters, and the second 414 was slightly delayed and occasionally harmonized.

To insure that the quality of each project was not lost, each album was carefully mastered and then sent to KM Records in Burbank to be pressed using audiophile grade virgin vinyl. The records were then placed in premium quality static-resistant plastic inner-sleeves and the covers in heavy-

weight plastic bags to prevent warpage. The cassettes were duplicated onto Capitol Magnetic's CS-1 cobalt tape utilizing Dolby B noise reduction. A three-dimensional black-and-white cover adds to the quality "feel" of each release. In the very near future, Meadowlark releases will also be made available on Compact Disc.

#### Not Just a Lark

Meadowlark Records is no mere whim. The records released thus far have done quite well, with the Justo Almarino and Richard Souther releases getting significant airplay on jazz and urban contemporary stations, as well as receiving attention from the music trade press. New projects slated for

release later this year include an untitled album from famed producer and session player Michael Omartian (Rod Stewart, Debbie Boone, Donna Summer, Jermaine Jackson), an album from 21-year-old harpist Amy Shrieve, *Heartsongs* from studio guitar and bass ace Hadley Hockingsmith, Billy Smiley's *New Night* featuring his trumpet and flugelhorn stylizations, a Christmas album with selections from the various artists, and an '86 sampler (the '85 sampler, released last year, will be the first album to be released on Compact Disc). Based upon the success of its initial releases, Sparrow's newest bird looks like it will be singing sweetly and flying high for some time to come. ■

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## Duplication by ESP

*A real time facility keeps ahead of the high speed challenge.*

by Philip De Lancie

The threat posed by the Compact Disc to the continued market dominance of the prerecorded cassette has, as previously noted, greatly stimulated fidelity consciousness amongst cassette consumers and duplicators. It also seems to have intensified the debate between real time and high speed duplicators about the relative merits of each approach. As manufacturers of high speed equipment im-

prove their systems, it has been asserted by some that any fidelity gap between real time and high speed is a thing of the past. Real time duplicators, having justified the comparative inefficiency of their method with claims of superior quality, cannot afford to let these kinds of challenges go unanswered. Clearly, their survival will depend largely on the success with which they are able to perpetuate the distinction between real time and high speed product.

One example of an effort in this direction on the part of a real time duplicator is a promotional packet distributed by Eastern Standard Productions, Incorporated of Buffalo, New York. Primarily a facilities description, this piece paints a picture of a working environment that is a far cry from the industrial setting of many high speed duplicating plants. ESP believes that the care with which they have designed and built their facility will be reflected in the quality of its output, and will distinguish it from high speed product.

The entire duplication operation at ESP takes place in a room designed to allow accurate monitoring. To minimize the intrusion of external sounds,

the facility was built as a room within a room. It utilizes a non-parallel wall design to avoid standing waves and regenerated room reflections. Materials of varying absorption and diffusion characteristics were employed for interior surface treatment to achieve uniform frequency response and random dispersion of upper-mids and highs. For the ceiling, a combination of dead air space with mazed bass pallet baffles was chosen to reduce low frequency standing waves. The floor, poured concrete covered with carpet, is credited by ESP with reducing wow and flutter on the duplication decks by inhibiting the transmission of shock to their transports. The room is environmentally regulated, with humidity and temperature kept within a strict range to aid the stability of electronic components.

Audio signal distribution in the room uses balanced and shielded lines "whenever possible," and "proper systematic runs" to eliminate RF and hum interference. Signal feeds to the cassette inputs radiate from a single source, with equal lengths used to guard against discrepancies introduced by inconsistent wiring. On completion of the installation, ESP ana-

Shape Optimedia, Inc. of Kennebunk, Maine has announced shipment of their first commercial order of audio Compact Discs. The release for Rounder Records, *Ancient Beauty* by the Do'a World Music Ensemble, is to be followed by several other Rounder releases this summer. Shape Optimedia, formed in 1985 as the tenth division in the Shape family of companies, is headed by William C. Peck, a specialist in electronic media manufacturing formerly with Eastman Kodak. "This manufacturing run of CDs represents a milestone," says Peck. "We have been able to develop our CD manufacturing process and ship product for sale in less than five months." Shape Optimedia uses injection molding, described by the company as a "proven and cost-effective method of producing Compact Discs." The company's plans call for production capacity of 20 million disks per year by the end of 1987, and twice that amount in 1988.

### Shape Begins CD Production



*Above: Rounder Records' Bill Nowlin (left) and Randy Armstrong of Do'a (second from right) pose with Shape Optimedia managers after the release of Ancient Beauty, the first commercial CD to come off the production line.*

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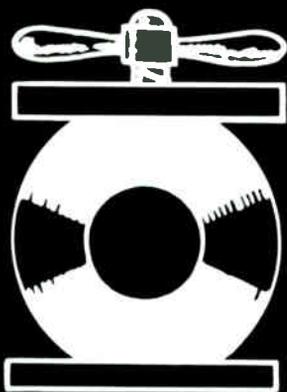
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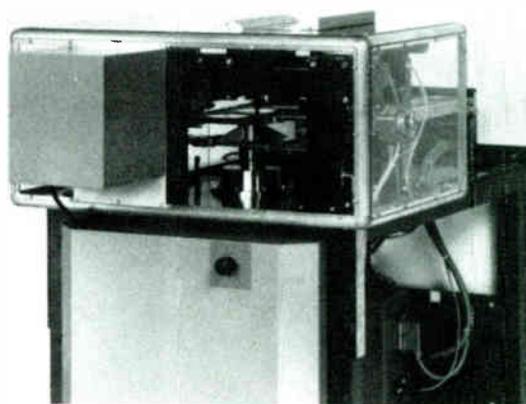
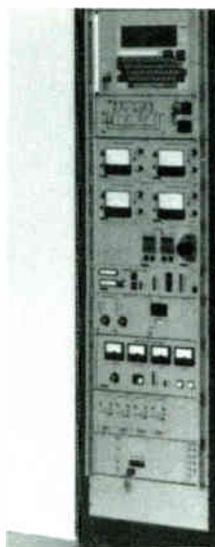
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*Balzars CD sputtering system*

lyzed the distribution network and found flat frequency response across the audio spectrum and on up to about 45 kHz. The system also tested free of RF interference from nearby radio sources.

One reason that ESP chose a studio style approach to the facility design appears to be the company's conviction that they need to be able to hear well in order to do their job well. The company uses three head decks, and claims to check each cassette as it is recorded. Additionally, accurate monitoring allows the room to be used for mastering and sweetening. This process is often necessary, the company believes, because "the transfer to a different medium changes sonic attributes. The cassette responds to program material in its own special way. Each oxide formulation displays its own characteristics. Even after proper calibration of the cassette deck, the format itself introduces its own brand of coloring. Mastering, therefore, becomes an integral part of our duplication. We compensate as would a disc mastering engineer. The process need not be drastic or heavy-handed, but it must accommodate the cassette format if the cassette is expected to accurately resemble the master tape."

Of course, resemblance to the master is the crucial criterion by which any distribution medium must be judged. Common sense suggests that the closer one gets to the original, the better one's chances of rendering it accurately. The significance of this point is not lost on ESP: "As a real time facility, we can record from an original master or production master. The generational degradation normally encountered with high speed duplication is avoided. With real time, no secondary generation must be inserted in the production chain." With this and other arguments, ESP's promo makes

a strong pitch for real time duplication, and reaffirms the intention of real time duplicators to defend their high fidelity turf against high speed competitors.

• • •  
A new sputtering system for coating Compact Discs that can be fully integrated with injection molding machines, cassette to cassette systems and automatic loading devices is being introduced by Balzers of Hudson, New Hampshire. The Balzers CDI 602 Compact Disc In-Line Sputtering System features air to air operation with no valves or moving parts under vacuum for low maintenance. The system executes all process functions automatically and can produce 900 disks per hour when integrated with an automatic load/unload device. It is clean room compatible, with service and maintenance performed in the gray area. The CDI 602 is designed to deposit aluminum (55 nm film thickness on polycarbonate) onto 100,000 disks before requiring maintenance. Automatic loading devices eliminate the need for manual handling, even when using masks.

• • •  
LaserLogic, based in Danville, CA, has recently publicized the development of its own proprietary process for the manufacture of audio Compact Discs. The disks are compatible with standard Sony/Phillips specifications. The company has produced, in "sample quantities," playable CDs that have been made available to various record companies and other interested parties. Advantages of the new process are claimed by LaserLogic to include higher yields, faster production time, lower cost, higher quality and greater durability. According to the company, "Independent quality tests have been performed to determine the environmental and error characteristics of LaserLogic's disks. Standard require-

ments were exceeded in all tests."

LaserLogic's recently appointed president, Richard Johnson, is currently negotiating with domestic and foreign concerns regarding the licensing of the proprietary production process. The company is also seeking to raise capital for the construction of their own production facility. Meanwhile, company research continues on the application of the technology to the area of CD-ROMs.

• • •

A new digital transfer console, dubbed the Neve DTC, has been unveiled by Rupert Neve, Inc. of Bethel, Conn. Designed primarily for the preparation of master tapes for Compact Disc production, the DTC is expected to be available for delivery early this fall. The new console's design, based on a two channel digital console built by Neve for Tape One Studios in London, England, was developed in close cooperation with three mastering facilities: Disc Mastering, Inc. of Nashville, and Sterling Sound and Masterdisk of New York. The DTC has three stereo channels, two digital and one analog, allowing real time crossfading. The four band equalization section utilizes, according to Neve, "a system of curves ideal to disk mastering needs." Also included are limiter/compressor/noise gate/expander controls, which allow vocal stressing or de-essing, and stepped source level trim controls. All signal processing take place in the digital domain. The system is compatible with both PCM-1610 and AES/EBU standards, with sampling rates of either 44.1 kHz or 48 kHz.

Configured as a compact, transportable unit with electronics housed in a separate rack, the DTC will incorporate a snapshot memory system linked to SMPTE time code with storage on floppy diskettes. This "Instant Reset" feature will allow fast and precise recreation at any DTC equipped facility of console settings stored during the mastering of a project.

• • •

Versadyne International, Inc. of Campbell, CA has introduced the 1500 Series High Speed Cassette Tape Duplicator. Attributes of the new system are described by Versadyne as "extended frequency response, HFE (bias controlled High Frequency record Enhancement), a record level expander circuit and dual channel 5 MHz bias supply." The loop bin is an agitator type designed to handle up to 2,000 feet of two mil tape. Up to 12 slave recorders may be driven by the dual capstan master reproducer for copying at 32:1 or 64:1 ratios on either ferric or chrome tape. Duplication ratio, equalization, bias setting and transport speeds are determined by single



#### *Versadyne 1500 series cassette duplicator*

push button format selection. The slave recorders, of closed loop capstan design, feature 12-inch pancake capability, constant tape tensioning, packer arms and motorized tape wipers.

• • •  
Targetting cassette loaders and dup-

licators whose requirements are below 15,000 shells per order, Burlington Audio/Video Tapes of Oceanside, New York is now distributing the I.P.S. line of audio cassette shells. Both five screw and sonic weld shells will be stocked, tabs in or out, in a variety of colors. ■

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Circle #099 on Reader Service Card

by Elizabeth Rollins

Oh good. Another consumer/industrial video format to lay bets on. One more technological darling to take to our hearts as we wrestle that nagging suspicion that the latest and the greatest may in ten years lie belly up in the silicon meltdown cauldron.

Those who feel a bit dazed lately by

back both the current audio encoded CDs, as well as this new CD-I species.

Great. Pictures, music, spoken and written words, finally all in one convenient, consumer-friendly package. (See sidebar).

But beyond these technological enticements—and perhaps most significant to the potential success of the fledgling format—are fairly favorable market conditions and corporate sup-

market.

Back in VCR-explosive 1983, when the unpleasantness of the RCA CED *faux pas* was still fresh, along came the Compact Disc. After a couple of years of slow going, this format became the high-tech, high-status accoutrement for any upwardly mobile living room or heavily insured motor vehicle. Consequently, supply cannot meet the surge of demand for consumer discs—and most importantly, there is solidarity among entertainment companies to support CD. Thus, Sony and Philips see a consumer-conscious marketplace for hardware that cannot only feed a well-whetted public appetite for CD, but could also offer the promise of electronic publishing.

## Here Comes CD-I

the barrage of tape and disk formats may ponder that before 1923 in the early days of film, more than 40 formats had their day on the screen before the industry nailed down enough standards to allow the evolution into our current industry. For those who actively greet each ascending step in the hardware-software evolutionary ladder—here's something to get excited about.

Compact Disc Interactive (CD-I) is just what its name instructs: a new format using the Compact Disc as the storage medium for digital audio, video, graphic and text information that can be randomly accessed, thus allowing interactivity. Each disc will hold up to about 660 megabytes, and the new CD-I players will be designed to play

port. Last March at the Microsoft CD-ROM conference in Seattle, a joint Sony/N.V. Philips announcement of the CD-I format came as a dramatic surprise. (Although there was no secret of this alliance; Sony and Philips had also worked out a CD-ROM standard before this.) January's COMDEX show will host the unveiling of the prototype, if all goes as planned. At press time, the manufacturer's provisional technical specifications handbook, the *Greenbook Standard* was slated for July publication.

CD-I is not simply being groomed to be an esoteric industrial training or archival tool (the fate that has befallen Laserdisc), but also to be a part of the household audio/video environment—an extension of the growing CD

### CD-I Software

The guys who thought this whole thing up are aware that people do not buy new machines unless they can also buy software to go with them. That's why Philips has set up two new divisions of their subsidiary, PolyGram Records, called American Interactive Media (AIM), and The Record Group. Both companies are supervising development of consumer, commercial, industrial and educational software development for CD-I. Vice president of marketing at AIM, Emile Petrone, says, "We're approaching fairly large companies... content providers... and we're trying to set up co-ventures where we'll help them produce titles.

### CD-I: Some Background Bits

A few years ago, we were awed by the 240 megabyte storage capacity of 12-inch Laserdisc. Then came CD-ROM (Read Only Memory) with 550 megabytes. For 1987, CD-I promises 660 megabytes on a little 12 cm laser disk. Yes, ones and zeros are all well and good for the 0.9 percent of the population who understand...but what do these numbers mean in real life?

In concrete terms, this memory capability translates to a possible 7,000 natural still pictures, up to 32,768 colors for user-manipulated graphics, up to 256 colors for full programmed animation, up to 30,000 typed pages, or the equiv-

alent of 1,000 floppy disks of data. Motion video is limited at this time, with only one-third of the screen available. Philips claims that this severe restriction can be ameliorated in time.

As for the kinds of audio that can be buried in those laser-pits...there are four levels: (1) what we now know as CD-quality 16-bit pulse code modulated-audio, 70 minutes worth; (2) LP-quality with two channels stereo or four channels mono, up to 70 minutes per channel; (3) FM-quality with four channels stereo, eight channels mono, 70 minutes each; (4) AM-voice grade quality audio with 16 channels mono, eight stereo, which could yield more

than 16 hours mono, or eight hours stereo run time.

There are also two levels of video resolution for computer graphics: (1) 384 x 280 pixels in the low res mode; (2) 768 x 560 pixels in the high res mode.

These are maximum capability numbers. For example, if you use motion video, you can't get a lot of other information on the disk because it uses up so much storage space. The same is true with natural stills or high resolution graphics. One of the producer's tricky tasks is to mix the correct combination of data-using modes, while still assigning the best resolution to the priority features of the programming.

Philips is looking at a major push for CD-I in early 1987." AIM is helping by not only providing the technical supervision, but also by putting up as much as \$125,000 per title to encourage investors to step out there on the cutting edge with them. Look for an extensive CD-I update in the November issue of *Mix*.

At the National Computer Graphics Association (NCGA) Convention last May in Anaheim, Peter Black of Xiphias Graphics offered a tutorial on CD-I. There were also 16 sessions in videography, among the throng of other computer-related disciplines that were covered.

"Overwhelming" might be the best word to describe this high-input show. Nearly 30,000 people registered, and 1,400 new products were listed and displayed. For the first time in its seven year history, the show sponsored a computer animation competition, and, you guessed it, Robert Abel won. With each year, it seems computer concerns and sophisticated video production houses become more integrated. Next year's NCGA show will be held in Philadelphia March 22-26, 1987.

#### **Montage Corporation Still Paying Phone Bill**

Before April's NAB in Dallas, we heard that it was curtains for Newton,

Mass-based Montage Corporation (you know . . . another victim for the gaping jaws of that silicon scrap melting cauldron). But apparently the company, which made a splash a couple of years ago when it introduced its non-linear, random access video editing system, has been revived by a group of outside investors.

A quick check this summer with Dan Belmour at Raleigh Studios in Hollywood confirmed that indeed, Montage is still supporting its clients by sending out software updates. "We got the latest update, the 3.23 free . . . and I know there had been some talk of charging \$250 for it," says Belmour. "These businessmen rehired the old staff so they could maintain a dialogue with their customers. That's one thing they've always been good about," says Belmour, who's film facility purchased the Montage system in January.

The staff may be back, but they're not picking up the phone in either Massachusetts or Los Angeles. It rings, but nobody has answered repeated attempts to get through.

#### **Los Angeles Gets New Teleport**

Next month, the satellite communications company, Wold Communications, breaks ground on the first teleport serving the Los Angeles area. The earth station complex will include

eight antennas to handle domestic communications, plus two more to link the southland with the international satellites stationed over the Atlantic and the Pacific.

The six-story Wold Communications Complex will sit in the heart of the Hollywood production community at Vine between Santa Monica and Melrose. The plan is to provide production facilities for video teleconferencing as well.

The American Teleport Association reports that 22 teleports are operating in the United States, with 20 more under construction.

#### **The Global Talent Pool**

National Public Radio is offering an interesting new service through their satellite services division. Ad agencies are buying time to uplink voice-overs for commercials to other cities. Now Vincent Price can come to *your* town for *your* spot, without first class airfare, hotels and per diem expenses. This service is particularly good for agencies handling political candidates with tight deadlines and specialized messages for individual areas. Uplinks are in 20 cities, including: Washington, D.C., New York, Chicago, Los Angeles, and Minneapolis. Also, there are 300 other cities in the system that can receive transmissions. ■

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## THE INTELLIGENT STUDIO

by Lou CasaBianca

### Introduction

Among the hottest topics on the international building architecture and engineering scene is the "Intelligent Building." A multitude of converging technologies, driven by the microprocessor, and innovations in telecommunications and control systems, have helped to create the concept of "smart space." The desire on the part of owners/developers and tenants to build structures that will be able to function and adapt to changing technologies has become one of the most important areas of growth in new and retrofit construction.

### Overview

The development of digital recording, MIDI, SMPTE-controlled editing systems, expert software, computer graphics, and the personal computer are technologies that are profoundly affecting the audio recording and video production studio environment. The concept of the intelligent or smart studio is presented here as an approach to handling the exponential increase in complexity associated with the introduction and continuing refinement of these technologies in the studio, and the need for technology integration that can be managed cost effectively.

The importance of microprocessor based technologies and electronics has generated a requirement for even greater interdisciplinary skills in the studio. Studio owners, operators and engineers have had to adjust to the marriage of analog and digital; audio and video editing; film and tape technology; voice and data, and transmission. Musicians and producers, talent and directors have each had to adjust to the new techniques and opportunities presented by the union of high touch and high tech in the production process.

Jargon, the nemesis of simple communication, is well entrenched in the world of smart space. The dialect bor-

rows heavily from both electronics and computerese. The Intelligent Studio Technology Glossary is designed to provide definitions for the design options currently available for integration into intelligent studios. In order to provide a comprehensive and consistent terminology for describing these requirements, we have developed a set of major categories of Intelligent Studio Technologies, as illustrated in Figure 1.

### Cross-Impact Matrix

Space user or client requirements are further illustrated in the Intelligent Studio Cross-Impact Matrix (see Figure 2). This matrix provides a visual organizational foundation for evaluating intelligent production space. In addition to providing a format for illustrating the potential scope of a project, it also establishes a framework for selecting design options.

The matrix is designed to indicate the architectural and engineering disciplines involved in intelligent studio design with special emphasis on the new requirements for electronics engineering. The studio space user requirements, shown on the left-hand vertical axis, are divided into two basic areas: client/user services and studio management.

These areas are further divided into ten sub-categories reflecting network topology and design methodology. Occurrences and impacts of intelligent studio communications technologies are shown in the appropriate cells. All of the items under the heading "electronics" are occurrences of technological components that must be quantified and incorporated in the overall design. Items under the other discipline column headings represent cross-impacts which must be communicated to, between, and among the other

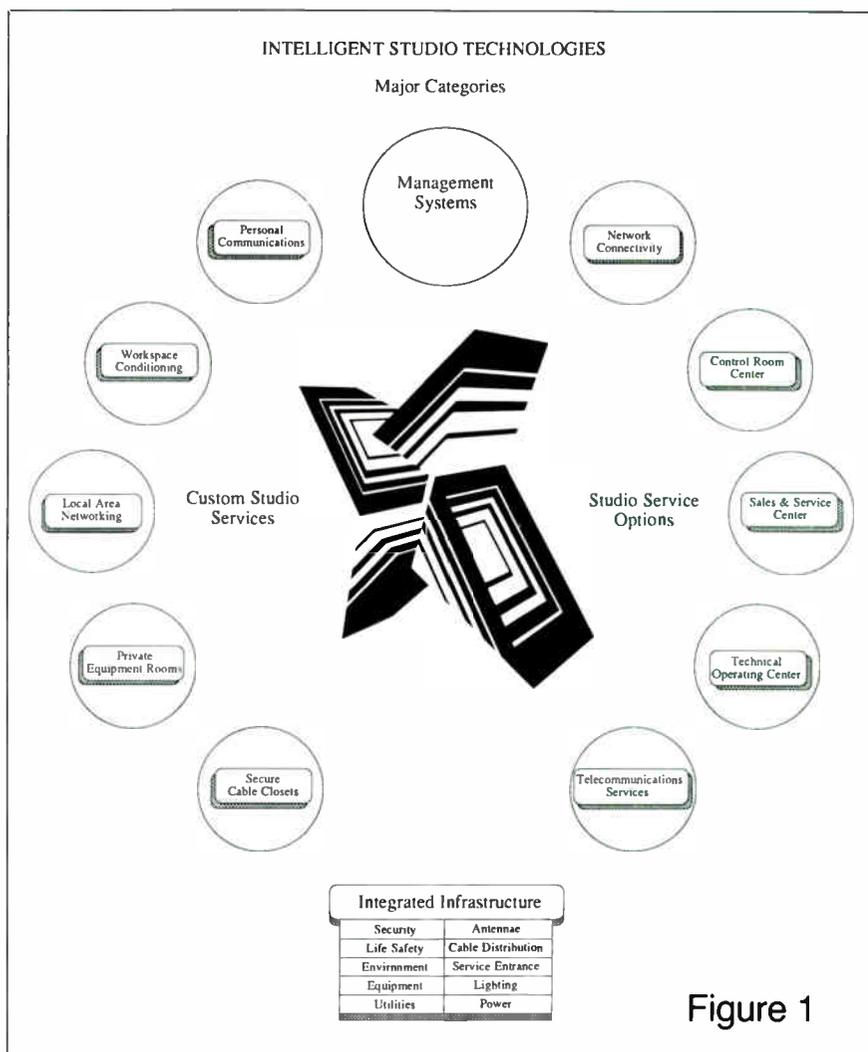


Figure 1

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**In the Laboratory** The Carver PM-1.5 was rigorously tested by Len Feldman for MODERN RECORDING (February 1985). His laboratory test results also prove that the PM-1.5 really delivers. The following quotes from the Lab Report are reprinted with permission of MODERN RECORDING & MUSIC:—

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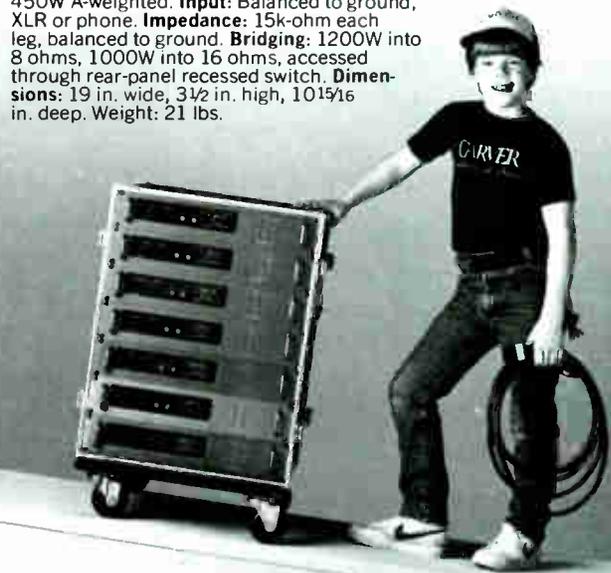
"The amplifier delivered a clean 480 watts per channel into 8-ohm loads with both channels driven for its rated harmonic distortion level of 0.5%. Even at the frequency extreme of 20 Hz, power output for rated THD was 470 watts as against 450 claimed by Carver. Furthermore, at rated power output, distortion decreased to an insignificant 0.015% at mid-frequencies and 0.007% at 20 Hz. When connected to 4-ohm loads, the PM-1.5 delivered 750 watts per channel for rated THD of 0.05%—far more than the 600 watts claimed by Carver. Clearly, when it comes to specs for a professional amplifier, Carver has taken a very conservative approach... All (manufacturer's claims) equaled or exceeded published specifications—usually by a wide margin."

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members of the architectural design team. The client services area and the studio management area are different. In the client services area, the emphasis is on the open-circuit signal transport utility services that are offered to the client and are characterized as voice, data, and audio/video. The client interface to the control systems is shown in the fourth column. In the studio management portion of the matrix, emphasis changes to closed circuit control and feedback elements, with the transmission media type compressed into a single column. Thus, the matrix integrates the two aspects of communications design: open circuit exchange networks and closed circuit control networks.

### Generic Requirements

The generic requirements are provided as an overview of all the glossary entries and how they relate to each other within the framework of space user requirements and signal distribution networks. This glossary lists space user requirements in terms of voice, data, audio, video and controls. All of the technologies listed indicate design options that are available to the studio owner for integration into his studio. At the top of Figure 1, "Management Systems" refers to the particular set of operating guidelines developed by the owner/operators of

the facility to accomplish the overall studio management goals established for by management for the operation of the facility. The "Integrated Studio Infrastructure" at the bottom of Figure 1, relates to systems that are considered part of the base building construction.

### Intelligent Studio Technology Glossary

The Intelligent Studio Technology is divided into the four categories and related sub-categories indicated in Figure 1:

**Custom User/Client Services:** personal communications, workspace conditioning, local area networking, private equipment rooms, and secure cable closets.

**Studio Service Options:** shared Telecom services, technical operating center, sales and service center, conferencing center, and network connectivity.

**Integrated Infrastructure:** security, life safety, environment, utilities, antennae, cable distribution, service entrance, lighting, and power.

#### Facility Management Systems

Each of these sub-categories is further divided into the classifications which comprise the Signal Distribution Networks: voice, data, audio, video, and controls.

The glossary, which is arranged in

the category and classification order described above, provides definitions of each of the terms located in the cells of the Cross-Impact Matrix. Any or all of the technology/design options located at a given point of intersection may be assimilated into the space provider's service offering, with a resulting impact on the studio's overall intelligence.

### PERSONAL COMMUNICATIONS

#### Voice

**Standard telephones**—The standard telephone provides single-line touch-dial access to all PBX and integrated control system services and user features. It is the most economical voice terminal available. Modem connection provides ability to transmit or receive data, including MIDI information.

**Digital telephones**—The digital telephone, in addition to providing all of the capabilities of the standard telephone, also permits simultaneous voice and data transmission over the standard two-pair universal cabling system. Other features of the digital telephone include multiple line appearances and single-button activation of features such as call forwarding, conferencing, transfer, etc. On some digital telephones, LED or LCD displays indicate the time and extension numbers from which incoming calls originated. They may also be equipped with standard data communications equipment (DCE) interfaces for accommodating data terminals and it generally costs more than single-line standard sets.

**Pocket Bell**—This PBX-based feature provides instant telephone contact with personnel whose job requirements dictate continuous mobility within and throughout work spaces. These systems generally employ FM radio for operation, although some of the newer systems use infrared transmitters and detectors and can actually locate employees within the building. Different systems make use of tone signals, voice announcement, vibrations, and/or LCD displays to signal personnel. Use must be tailored to the operating requirements of audio and video recording environments.

#### Data

**VDTs/CRTs**—Control room and tech space requirements include video display and cathode ray tube terminals which may be hard-wired or switched to other terminals, computers, recording and processing equipment. Switched connections may be provided using the data support capabilities of separate local area network media, depending upon data and signal transmission requirements and costs.

**Personal computers**—The powerful microprocessor-based business and

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technical tools, can emulate terminals such as those described in the above definition of VDTs/CRTs, or act as stand-alone data processing systems with a virtually limitless, readily available selection of applications software packages. Most of the personal computer systems available today are operationally "user friendly," and this feature has contributed to general proliferation and acceptance of these products in the workplace. The PC is the key to managing and monitoring the smart space capabilities now available in the studio.

**Workstation peripherals**—VDTs/CRTs and personal computers usually require a variety of general and highly specialized auxiliary or peripheral equipment ranging from keyboards, printers, and disk-drives to digitizers, plotters, light pens, optical character recognition (OCR) systems, and various operational controllers.

### Audio

**Audio tape**—Audio tape recorders are used for many applications such as central dictation, capturing conversations, etc., and these may be incorporated within the general telecommunication plant design.

**Audio Compact Disc**—Audio Compact Discs are being used in a number of applications similar to audio tape. Stock music and sound effects catalogs are now available on this format providing high quality digital audio as source material. The new CD-I (interactive) and CD-ROM formats allow Compact Discs to be used as an interactive training tool or for entertainment possibilities still being developed. The CD-ROM offers the most cost effective and versatile storage medium ever developed.

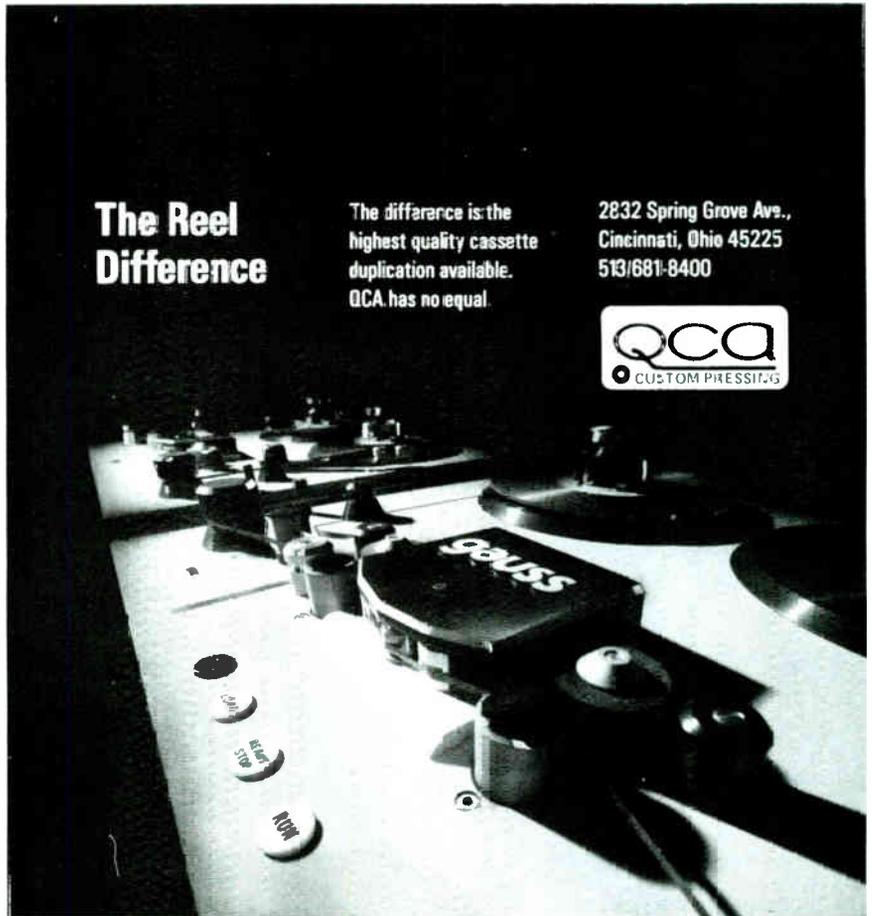
### Video

**Cameras**—Beyond video production and graphic input use, video cameras have been adapted to multiple tasks. Conferencing, video marketing material productions, process monitoring and general security are all applications in which video cameras are now used extensively.

**Receivers**—Accommodation of receivers for video broadcasts, external cable systems, and internal closed circuit systems must be a requirement in the design of an intelligent studio's signal distribution plant.

**Video monitors**—The use of monitors in editing video has been expanded to include their use in computer graphics generation, as well as being used in central security monitoring stations, and being strategically placed to provide general information and playback capability.

**VCRs**—A design allowance for



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Figure II  
**INTELLIGENT STUDIO  
TECHNOLOGY  
CROSS-IMPACT MATRIX**

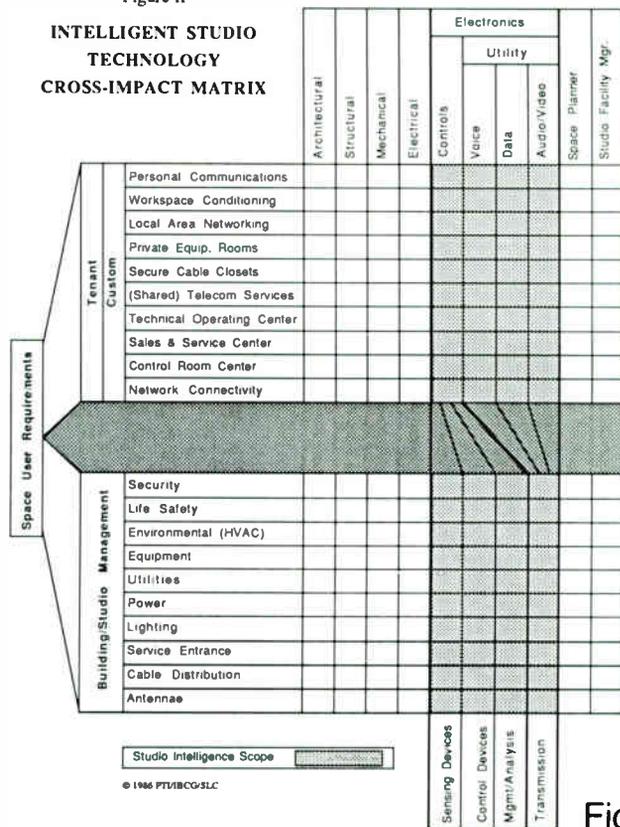


Figure 2

switched or shared video cassette recorders can be incorporated in concert with receivers and monitors on a centralized or edit room workstation cluster basis.

**Video disks**—Video disks represent a relatively new technology, but one which has already found extensive acceptance due to its high data capacity, quality, and utility of the recording method. Video disks may be used in conjunction with computers to provide highly interactive personal instruction.

### WORKSPACE CONDITIONING

#### Voice

**Wall jacks**—Standard wall jacks and universal cabling facilitate installation, relocation, and changes of terminal and telephone equipment. They provide a convenient common or "universal" connection for voice, data, and digitized video terminals as well as various peripheral equipment. The use of these standard connectors enhances interior appearance of work spaces by minimizing the visibility of supporting wiring harnesses.

**Intercom**—This feature, implemented through a combination of PBX features and multi-button voice terminals, provides a convenient abbreviated signalling and voice channel capability

for internal communication within the facility.

**Attendant console**—Attendant consoles are multi-button and multi-function voice/data terminals used as a central answering point for organizational subgroups. In shared tenant services applications, a single attendant console may be shared by several companies. The primary functions of the console include answering and processing incoming calls, serving as message center terminals, and providing directory assistance. Secondary functions include placement of domestic and international long distance calls for authorized but restricted users, paging and locating personnel, originating and coordinating conference calls, and activating or deactivating PBX features.

#### Data

**Application software**—Application-specific word processing, spreadsheet, and data base, and graphic programs have become essential operating tools in most business and creative workplaces. In studio environments, the most common is the personal or shared system supported by a personal computer. (See "Personal Computers" under "Voice/Personal Communications.") Music scoring and computer graphic

application PCs are rapidly replacing dedicated systems as prices for these versatile systems continue to decline. **Wall jacks**—See "Wall jacks" above. A convenient and unobtrusive receptacle provides universal connectivity to the building's signal transmission network.

**Shared disks (file servers)**—Shared disk memory or file server systems are used in multi-workstation arrangements where an extensive number of large files must be accessed regularly by multiple users. The file data transfer rate may be a critical factor in work efficiency or the work process. A shared file for a given application or set of applications may be more economical than providing disk drives at each individual workstation.

**Copiers/facsimile**—Shared-use copy and facsimile machines can be included within workstation conditioning designs, and in certain instances, are incorporated into individual workstations.

### Audio

**Public address systems**—The general ambiance of the administrative areas in the studio can be greatly enhanced through the use of a distributed background music system. The requirements associated with background music effect several de-

sign areas in addition to the signal plant, e.g., interior design, electrical, acoustical, etc. The amplifiers and speakers used for background music may also be used for paging through a PABX connection.

**White noise**—White noise generation has an effect similar to that of background music (see above), and it also can be used to provide a better masking effect for conversation or discordant sounds.

### Video

**Teleconferencing booths**—In some instances, a designer may find that private video conferencing booths are required. These are simple in comparison to large conference room designs and may be accommodated on an as-required basis.

## LOCAL AREA NETWORKING

### Voice

**Twisted pair**—The twisted pair cable plant is designed to deliver four to eight wires (two to four pairs) from the master or intermediate distribution frame to each user location. The composition of twisted pair is copper metal with conductors sized between 22 AWG (American Wire Gauge) and 26 AWG. For universal cabling that will accommodate both analog and

digital instruments, 22 AWG is preferred. This type of cable can support digital data within buildings at data rates of up to three megabits per second. This is the universal signal transport or transmission medium.

### Data

**Shielded twisted pair**—IBM has recently introduced its "shielded" version of the twisted pair cable. This cable can support higher data rates over longer distances than standard unshielded twisted pairs due to careful manufacturing techniques which preserve uniform impedance, frequency response, capacitance, and loss specifications. The cable, however, is expensive and difficult to install and should be installed on a speculative basis only after careful consideration of cost/performance benefits.

**Coaxial cable**—Coaxial cable can support data rates close to 300 Mb/s, or in the analog mode, a vast number of television channels. This medium has wide application in building transmission systems and is used in applications ranging from closed circuit TV to support high-speed clustered or multi-dropped data terminal systems. It is also used extensively in baseband and broadband local area network implementations.

**Fiber optic cable**—Fiber optic cable

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NFL Films, Mt. Laurel  
Streeterville, Chicago  
Chicago Recording Company  
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RCA Digital Editing, NY  
Shake Down Studios, NY

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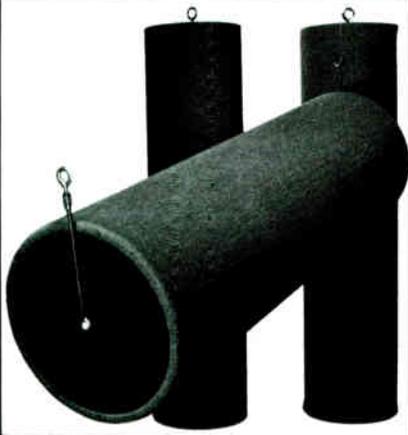
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**Multiplex equipment**—Multiplexing modules and equipment are used extensively in transmission and support systems. The equipment is used to multiply channel capacity in basic cable systems and its use and expense are justified based on the benefits provided by this basic function. In local network implementations, the multiplexing equipment is used to change the data terminal equipment bit rate to a standard speed (usually bursts of several megabits per second) and to control media access through a standard protocol (usually carrier sense multiple access with collision detection or token passing).

### Audio/Video

**Coaxial cable**—Coaxial cable will be required to support the video signal distribution in the building, and, with appropriate supplemental hardware, may be used to interconnect a wide variety of terminal equipment.

**Fiber optic cable**—Fiber optic cable may be used in place of coaxial cable (see above), and, due to vast bandwidth capacity, may be used with appropriate terminal additions for a wide variety of transmission needs.

### PRIVATE EQUIPMENT ROOMS

#### Voice

**Key systems**—A key system is a small telephone system with a number of telephone instruments, each capable of selecting one of several trunks. It can switch individual telephones to a limited number of trunks. It offers flexibility and a wide variety of uses, i.e. pickup of several central-office lines, foreign exchange lines, and PBX station lines. Key systems usually include station to station intercom capability. Telecommunications in the studio are and will continue to become an important part of moving data, sound and images within the facility and to other locations.

**PBX equipment**—Individual building tenants may wish to have their own private PBX (private branch exchange)

equipment rather than share a single large PBS system. The PBX equipment includes the telephone switching system and all ancillary equipment including billing computers, uninterruptible power equipment and transmission equipment such as channel banks, termination sets, modems, and multiplexers for interfacing to off-premises networks, etc. The technical operating center (TOC) must be environmentally conditioned to support the operating requirements of the system. In modern TOCs, computer and automation control systems are often co-located with the PBX to facilitate the integration of these systems through the universal distribution cable plant to provide economies of scale in environmental conditioning, and to optimize support. While the average studio will not have PBX capability, the phone and switchboard capability have taken on much more critical importance in the operation of production facilities.

**Voice mail**—Voice mail is a commonly used term for describing voice store and forward systems. Voice mail reduces "information float," permits non-real time information exchange between people, and provides a means of rapidly disseminating data to groups of people. Individual tenants may prefer to house these systems in private equipment rooms rather than share a large multi-tenant system. The IMC Network is one such network providing services to the entertainment industry.

**Cable distribution frame**—Cable distribution frames are primary points of connectivity for a building's cable distribution plant. The cable frames are termed main distribution frame (MDF) and intermediate distribution frame (IDF). The MDF serves as a central point onto which all PBX ports, central office trunk facilities, and other systems' cabling terminates. IDFs are found in satellite communications closets in specific secondary strategic areas, or on each floor of a building as part of the riser system. IDFs are commonly used to connect user terminals with the building's backbone cable distribution system.

#### Data

**Computer equipment**—Distributed equipment rooms conditioned to support computer and other systems are required within an intelligent building studio complex. These rooms are separated from the building's central technical operating center for any of a number of reasons such as security, special applications, client- or tenant-owned equipment, etc. These extra conditioned rooms have significant multi-disciplinary impact on all design

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parameters associated with the building. These include architectural, structural, mechanical, interior, building automation/information (electronic systems) design, etc.

### Audio/Video

**Video equipment**—Video equipment plays a major role in the operation of a technical operating center. Uses include service productions, surveillance, audio/video intercom, training, etc.

### SECURE CABLE CLOSETS

#### Voice

**Backboard layouts**—This is a logical numbering plan and physical layout of the intermediate distribution

frames (IDFs) used to support signal transmission between the master distribution frame (MDF) and the end user station location. These IDFs are strategically located in satellite communications closet(s) in the building structure. All pair terminations are labeled and keyed to a master distribution record/graphic display program to facilitate record keeping and re-arrangements.

**Locking IDF closets**—Backboard layouts (above) are generally placed in a locked room or closet with floor dimensions of approximately 120 cm by 250 cm. This room should also serve as the riser closet for providing vertical sleeves in which to install the building backbone cabling system.

### Data

**Cross connects**—Cross connects are typically found on master and intermediate distribution frames; they provide the flexibility for connecting equipment and workstations to the building's cable distribution system. The sensitive or specialized nature of the cross connected cabling must be secured against inadvertent disturbance or damage. For this reason, the satellite communications closets containing the IDFs must be locked with access limited to service personnel.

**Equipment racks**—Design space allowance is often made for equipment racks within the satellite communications closet. These racks are used to house units such as electronic key modules, multiplexing equipment, cluster controllers, low power converters, etc. As mentioned in the paragraph on computer equipment, a multi-disciplinary intelligent building design impact should also be expected for cross connects and equipment racks.

## TOM HIDLEY ON FM ACOUSTICS AMPLIFIERS

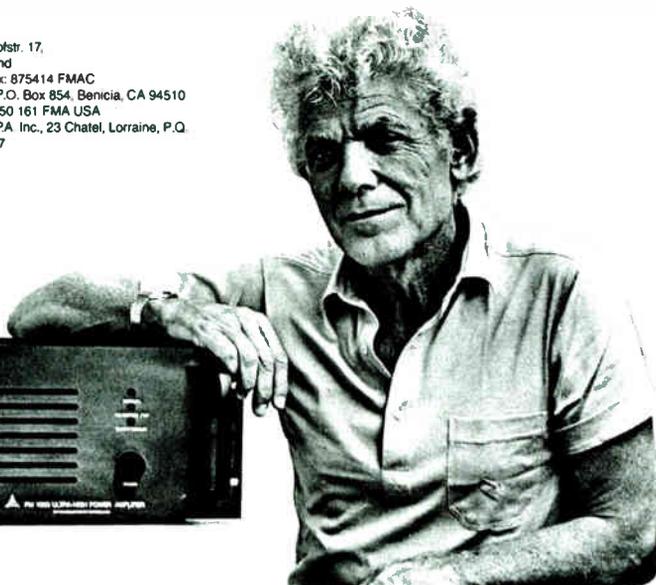
Tom Hidley's continuous strive for the ultimate in State of the Art design is documented all over the world. His wealth of experience allows him to accurately judge the performance of highest class equipment. We asked Tom if he could describe his thoughts on power amplifiers. Here are his words:

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### Summary

The varying levels of intelligent studios may be evaluated on the basis of the number and quality of the elements listed above that are contained in the building. The more intelligent the building structure is, the easier it is to add intelligence to the studio space. In dedicated owner-occupied structures, it is easier to control these factors. Most studios facilities are tenant operated facilities within a larger multi-purpose building, and the technology requirements will not necessarily be as critical to other tenants. Intelligent building planning also includes the concept of smart space within a dumb building. Obviously the design of technology enhanced real estate, while adding costs, adds commercial potential to the resale of the building and the "leaseability" of the space.

The concept of intelligent buildings and smart space was developed less than two years ago. It may be thought of as an extension of "office of the future," which was promoted heavily during the mid-'70s. The field represents a new amalgam of interdisciplinary experts working together to create technology enhanced real estate. One such group is the IBC Group of San Francisco. Working with Pacific Telesis International, the group has pioneered the concepts and the methodology used herein to discuss and evaluate intelligent buildings. I would like to thank David Coggeshall, Don Sanders and the consultants of the Pacific Telesis International/Intelligent Building Communications Group for their valuable assistance in the preparation of this article. ■

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# CHIPS DAVIS on **LIVE-END, DEAD-END™**

by Linda Jacobson

"Live-End, Dead-End" (LEDE) is a phrase often heard in conversations about the state of studios. LEDE acoustic design was developed to control sound reflections in the mixing area, the ones that can blend into the recorded audio. The idea is to let the mixing engineer hear the first reflections from the studio before hearing any from the control room. What was once theory is now technique, ever since electronics whiz/engineer/musician Chips Davis redesigned his Las Vegas recording studio control room. That was in '79.

"Live-End, Dead-End" is its marketing name; its roots lie in precise acoustic measurement technology called Time Delay Spectrometry. (TDS was originally developed for a satellite project by an audiophile named Richard C. Heyser, of the Jet Propulsion Laboratory; his TDS theory was published in 1968.) To use the LEDE trademark, control rooms must satisfy criteria set by Syn-Aud-Con (Synergetic Audio Concepts in Southern California, holder of the LEDE trademark). Essentially they must have "soft stuff at the front of the control room and hard stuff at the back." The LEDE designer is guided by time/energy/frequency (TEF) computer analysis and

"People are starting to accept what we're doing. They realize we've got it down to a science... we're on a quest to make things better."

other audio measurement technology, and incorporates the right electronics, physical layout, and construction materials.

Chips Davis' first built-from-scratch LEDE studio was Tres Virgos in northern California (now Narada Michael Walden's Tarpan Studios), a site responsible for plenty of hits, including those by Aretha Franklin, Whitney Houston, Lionel Richie, and Van Morrison. At Toronto's Sounds Interchange, the first band recorded after the room's LEDE redesign was the Nylons, whose LP hit the charts. Europe's first LEDE studio, Starmusik of Hamburg, has produced three hit albums since going LEDE. Davis is currently redesigning NBC-TV's Burbank studios for *The Tonight Show*, after completing their Brooklyn facility for the *Cosby Show*. Twenty other music, audio, and video facilities have been LEDE-certified via Chips Davis LEDE Design, Inc.

Chips and *Mix* recently discussed the LEDE scene:

**Mix:** How is the industry as a whole accepting LEDE?

**Davis:** It's finally at a point where we don't have a lot of animosity, and people are starting to accept what we're doing. Finally, they don't think it's just a marketing ploy. They realize we've got it down to a science, looking for anomalies; they're starting to understand we're on a quest to make things better. And that includes not only acoustics, but the electronics, the problems along the complete chain.

It's been a long fight since '78 when we first started using TDS, when I kept asking myself, why can't we reproduce instruments the way they really sound? Throughout this whole process, there have been evolutionary states in which different people have added different things to it. Today, I'm at the point where I'm looking for slight nuances that cause us to perceive sound. I just finished giving a lecture for a JBL seminar where they had 300 representatives, about how we perceive what we're hearing, why do we perceive it as such, imaging, how to hear absolute polarity... I spent years using test machines and computers to try to predict these things, and finding out new aspects that cause us to perceive sound in a certain way.

*Chips Davis computes "Room Modes" for his newest studio, Columbia Academy.*



PHOTO: JERRY ERWIN

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PHOTO: JERRY ERWIN

*Taking a first look at the building footprint on site at Vancouver, B.C. for Columbia Academy.*

**Mix:** So equipment manufacturers are taking you seriously.

**Davis:** For a long time they didn't. I'd always get, "Well, you can hear those things, but hardly anyone else can," and they'd laugh it off. But now, with many new monitors coming out, they've cured some of the problems that we bitched most about. There are some promising devices coming along.

There are *by far* no perfect monitors; even the grille cloths cause a problem. You can see funny rippling in the frequency domain, or you can put a back pressure on the driver that causes a rippling effect, or some funny things happen in the Nyquist phase of the loading of the grille cloth back into the device; it's like a standing wave. I don't use any grilles, but people like them for aesthetic reasons. At least now the manufacturers are going as transparent as possible with the cloth, where the edges of the grille don't cause a bounce-back problem.

Once you start to drain these problems or anomalies, you can design a room that's more neutral, where you can really judge what you're doing. A control room is not a listening room, it's a neutral environment in which you control sound.

**Mix:** Do you find people still wary of the LEDE concept?

**Davis:** In a lot of areas, people think it's a marketing ploy. A lot of engineers have mixed in extremely hard-front rooms with many anomalies and reflections; they get the perception that the room is much louder than it

really is. When you remove the anomalies, and a person walks in and starts mixing, they look for a certain thing that hurts their ears—and it's not there.

We perceive distortion as loudness. When you remove the anomalies, which cause you to perceive loudness and your ears to fatigue, the first thing an engineer does—if not familiar with the LEDE room—is turn the monitors way up because the "loudness" is no longer there. He looks for that point at which his ears tell him "this is the loudness that I normally mix." Sometimes it takes them a couple of hours to realize "my God, I'm mixing loud," when they turn to talk to someone and they have to yell.

We also found that if you first walk into the *dead* end of an LEDE room, your perception is "this is a really dead room—" until you get back to the mixing position, where it's live and normal listening. That first perception can leave a lasting impression, and that's one of the problems, preconceptions, when the only place you could get into the room was through the dead end. So to overcome that, try not to have people enter through the dead part of the room.

Many people are designing LEDE-type rooms, and if you do not watch a lot of things, you won't get LEDE. We're going with classical acoustics which we don't try to change at all. We're just dealing with the parameters of making a reflection-free zone between the monitors and the mixer, and then adding back the diffusion. If the diffusion

**CONTINUED ON PAGE 193**

63 Sound effects. From the obviously necessary to the quite bizarre. Pre-packaged and MIDI selectable. Single and multi-tapped delays... with filtering and reverb ambient outputs. Perfect for vocals and instruments. Stereo effects that get attention. Reverb effects that don't exist on the plane of current reverb understanding. Interested? We call it

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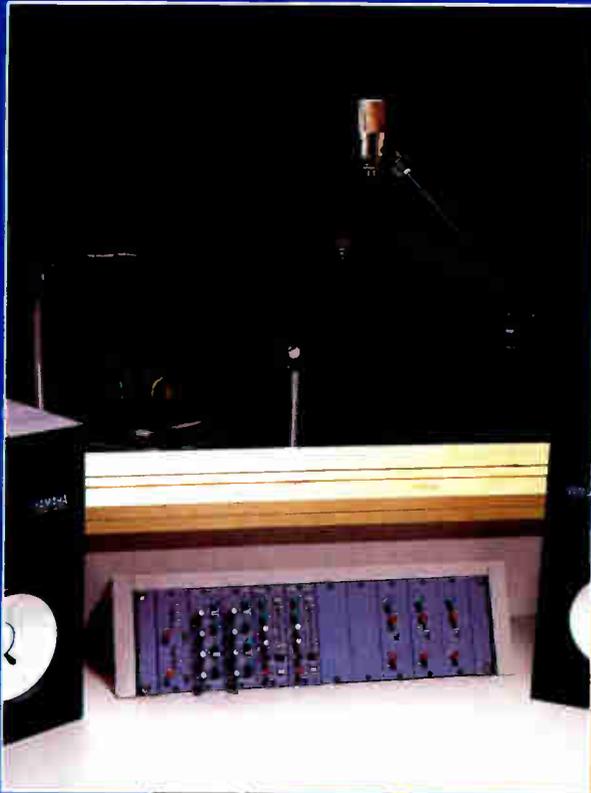
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Photo Credit - Photo by Novachrome Communications, Inc., Greenville, SC

*American Media* (Atlanta, GA) produces "Coast to Coast Top 20" - one of the hottest programs in national radio syndication. A TAC Scorpion console and Neumann microphones highlight a studio package that is sonically competitive with far more costly rooms.

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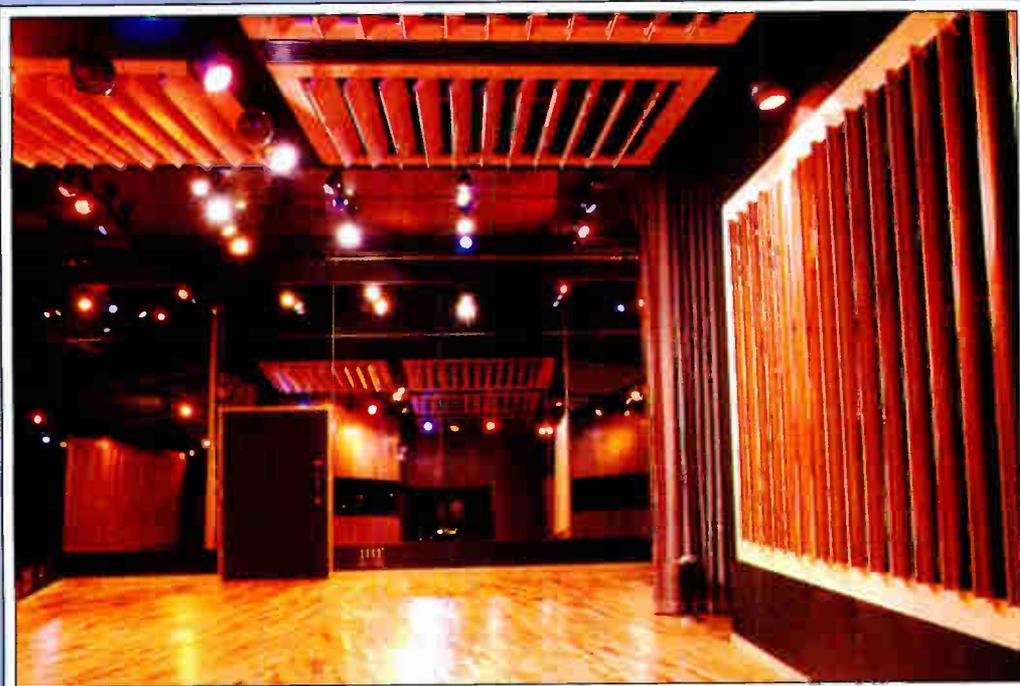
# 1986 MIX DIRECTORY

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## ***STUDIO DESIGNERS and SUPPLIERS***

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All of the information in the following directory is based on questionnaires mailed earlier this year. *Mix* does not take responsibility for the accuracy of the information supplied to us by the companies listed. We encourage other studio designers/suppliers to contact us, to be listed in our next directory.



Originally designed by Tom Hidley and Kent Duncan, and later modified by Lakeside Associates, Encore Studio of Burbank, California features variable acoustics via motorized wall/ceiling louvers and moveable draping. Photo by Shelly Rayn Barnett.

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### **CONTENTS**

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|     |                         |
|-----|-------------------------|
| 156 | NORTHEAST STATES        |
| 164 | SOUTHEAST STATES        |
| 168 | NORTH CENTRAL STATES    |
| 173 | SOUTHWEST STATES        |
| 175 | SOUTHERN CALIFORNIA     |
| 180 | NORTHWEST STATES/HAWAII |
| 185 | OUTSIDE U.S.            |

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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. Basic listings (name, address, contact) are provided free of charge. Extended listings (equipment, credits, specialization), and photographs or company logos may be included at a nominal charge. If you would like to be listed in a *Mix* Directory, write or call the *Mix* Directories Department, 2608 Ninth Street, Berkeley, CA 94710, (415) 843-7901.

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#### **Upcoming Directory Deadlines:**

New Products Directory: **August 6, 1986**

Mastering, Pressing and Tape Duplication: **September 3, 1986**

Northwest/Hawaiian Studios: **October 1, 1986**

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**LEGEND:** SD: Studio Designer; AC: Acoustical Consulting; SES: Studio Equipment Supply; EI: Equipment Installation; MR: Maintenance Repair Services; ER: Equipment Rentals

## NORTHEAST

### ACOUSTIC DESIGN/CONSTRUCTION

SD, AC  
P.O. Box 646, Naples, ME 04055  
(207) 693-6499  
Contact: John Julien

**Services offered, credits, specialization:** Serving the communications industry of the East Coast, central U.S., and Canada; audio/video facilities (new construction); club/studio upgrading; initial site evaluations (at a fee).



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Woodstock, NY

### ACOUSTIC SPACES INC.

SD, AC, EI, MR  
P.O. Box 884, Woodstock, NY 12498  
(914) 331-1726

**Services offered, credits, specialization:** Acoustic Spaces Inc. is a full-service firm specializing in the design and construction of recording facilities for the production industry; also smaller rooms for the individual musician. Our upstate New York office includes a well equipped shop for both design and repair of audio, video, and digital equipment. Our staff has serviced, designed and built for studios and musicians alike. East Coast clients include Cotton Hill Recording, Hit and Run Studios, Four Bits Recording, The Chateau Club, Coyote Studios, and Elias Associates. Specializations: 1) consultation and acoustical design; 2) installations and re-wiring; 3) analysis of other company designs and bids; 4) on-staff personnel in all fields; 5) residential recording and rehearsal studios. For further information, please call.

ACOUSTILOG, INC.  
SD, AC, SES, EI, MR, ER  
19 Mercer St., New York, NY 10013  
(212) 925-1365  
Contact: Greg Guanno

ADVANCE MUSIC CENTRE  
SD, AC, SES, EI, ER  
Upstairs 44 Church St., Burlington, VT 05401  
(802) 863-8652  
Contact: Peter Wilder

ANDREWS AUDIO CONSULTANTS  
SD, SES, EI, ER  
347 West 39th St., New York, NY 10018  
(212) 736-9570  
Contact: David M. Andrews

ANGEVINE ACOUSTICAL CONSULTANTS, INC.  
AC  
1021 Maple St., P.O. Box 725, East Aurora, NY 14052  
(716) 652-0282  
Contact: O.L. Angevine

APPLIED AUDIO  
SD, AC, SES, EI, MR, ER  
315 Mt. Read Blvd., Rochester, NY 14624  
(716) 436-8475  
Contact: Seth or Mike

ARTISTEK COMMUNICATIONS  
AC, SES, EI  
P.O. Box 112, Swampscott, MA 01907  
(617) 598-2205  
Contact: Joe Poimboeuf

SAM ASH MUSIC STORES  
SES, MR, ER  
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150 W. Queens Blvd., Forest Hills, NY 11375  
(718) 793-7983  
124 Fulton Ave., Hempstead, NY 11550  
(516) 485-2151  
447 Rte. 110, Huntington Station, NY 11747  
(516) 421-9333  
E. 50 Rte. #4, Paramus, NJ 07652  
(201) 843-0119  
178 Mamaroneck Ave., White Plains, NY 10601  
(914) 949-8448  
1669 E. 13th St., Brooklyn, NY 11229  
(718) 645-3886  
Mail Order:  
124 Fulton Ave., Hempstead, NY  
4-SAM ASH, (718) 347-7757

A/T SCHARFF RENTALS  
ER  
1619 Broadway, New York, NY 10019  
(212) 582-7360  
Contact: Peter Scharff, Josh Weisberg

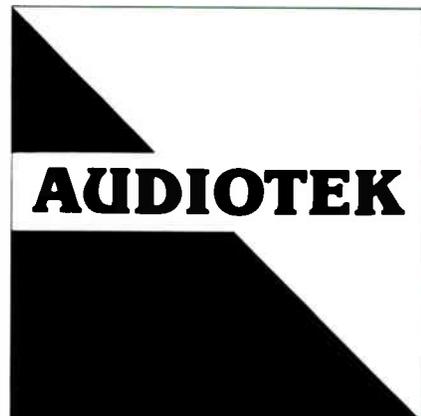
ATLAS SOUND  
SES  
10 Pomeroy Rd., Parsippany, NJ 07054  
(201) 887-7800  
Contact: Dave Chambers

AUDIO/BROADCAST SERVICE  
EI, MR  
190 Allegheny Ave., Pittsburgh, PA 15202  
(412) 734-5085  
Contact: Charles Ray

THE AUDIO FACILITIES ORGANIZATION  
EI, ER  
435 Hudson St., New York, NY 10014  
(212) 242-7300  
Contact: Cynda Berger

AUDIOFORCE, INC.  
SES, ER  
37 W. 20th St., New York, NY 10011  
(212) 741-0919, (800) 847-4123  
279 Wilson Pike Circle, Nashville, TN 37027  
(615) 373-2625  
Contact: Sid Zimet

AUDIOTECHNIQUES, INC.  
SES, EI, ER  
1619 Broadway 4th Fl., New York, NY 10019  
(212) 586-5989  
Contact: Gene Perry



AUDIOTEK  
Hollis, NY

AUDIOTEK  
SD, AC, SES, EI, MR  
182-35 Jamaica Ave., Hollis, NY 11423  
(718) 526-1456

Contact: Herb Horton, Charlie Purnell  
**Services offered, credits, specialization:** Audiotek is a full-service company providing everything from A to Z with regard to studio consultation, studio design, installation, modification, custom manufacturing, as well as equipment installation for all broadcast transmission equipment, etc. Services also include 24-hour supply and sales of all pro audio, video, and broadcast equipment available on the market, including full maintenance and service of this equipment. Audiotek has been in business 16 years providing expert consultation and conscientious servicing of all your needs, with full financing available for all projects. We provide anything and everything your heart desires with no limitations in completing your project.

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Contact: Steven Remote

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 9 Heneary Dr., Miller Place, NY 11764  
 (516) 331-5022  
 Contact: Nonnette

**AVTECS**  
**MR, ER**  
 619 Hungerford Dr., Rockville, MD 20850  
 (301) 279-2500  
 Contact: George Weber, Jim Drnskl

**B.A.E. INC. (BLEVINS AUDIO EXCHANGE)**  
**SES**  
 1717 Elm Hill Pike Ste. B-9, Nashville, TN 37210  
 (615) 361-8429  
 Contact: Rarily Blevins



**BENCHMARK ASSOCIATES**  
 New York, NY

**BENCHMARK ASSOCIATES**  
**SD, AC**  
 425 E. 63rd St., New York, NY 10021  
 (212) 688-6262  
 Contact: Vin Gizzi  
**Services offered, credits, specialization:** Architectural and acoustic design for the recording industry. Complete planning and project design; room acoustic design—computer-assisted optimization of room geometry and proportions, diffuser and absorber design, monitor alignment, specifications for isolation systems and all construction materials; certified LEDE design; preparation of all construction drawings and specifications—architectural, acoustic and mechanical; interior design and furnishings. Technical facilities design: conceptual planning; electro-acoustic systems design and engineering; video systems design and engineering. Consulting services: acoustic testing and measurement—isolation, reverberation time, TEF, analysis and solution of noise problems—air conditioning systems, noise control; computer assisted room acoustics design. Typical projects: recording studios and control rooms; digital audio facilities; audio for video facilities; video production stages and control rooms; video editing facilities; radio and television studios.

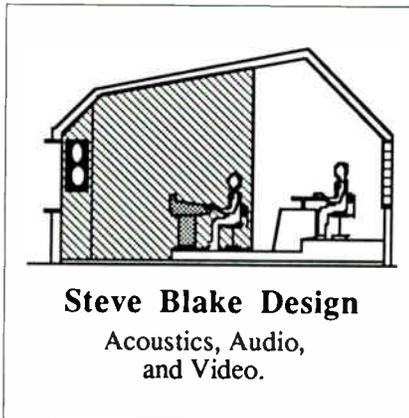
**BJM ELECTRONICS LTD.**  
**SES**  
 2008 Victory Blvd., Staten Island, NY 10314  
 (718) 442-0223, outside NY 1-800-342-5256  
 Contact: Ed Knieriem

**STEVE BLAKE DESIGN**  
**SD, AC**  
 6 Bird Lane, Sharon, MA 02067  
 (617) 784-2543  
 Contact: Steve Blake  
**Services offered, credits, specialization:** Acoustical consulting, LEDE™ control room design, TEF® analysis, LEDR™ stereo imagery analysis. MIDI/audio/video synchronization and system design. Macintosh aided design, plans, and consultation can be transmitted by modem. Clients include: Long View Farm, North Brookfield, MA; Megaphone, Portland, ME; Celebration Sounds, Pawtucket, RI; Kevin Tracey Productions, Manchester, NH; Hoyt & Walker, Little Rock, AK; Video One, Boston; Chedd/Argier Productions, Watertown, MA; Pennfield Productions, Arjwam, MA; Natua Sound, Leominster, MA; In House Productions, Cambridge, MA; Polymedia, Boston; Estabrook Hall, Clark University, Audio Matrix, Cambridge, MA; Studio Tracks, Wayland, MA; Newbury Sound, Boston



**LEGEND:** SD: Studio Designer; AC: Acoustical Consulting; SES: Studio Equipment Supply; EI: Equipment Installation; MR: Maintenance/Repair Services; ER: Equipment Rentals

## NORTHEAST



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 Acoustics, Audio,  
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 Sharon, MA 02067

**BOOGIE HOTEL STUDIOS**  
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 Contact: Bruce Stuart

**BRIAN GUITARS INC.**  
**SES**  
 61 Amity Rd., New Haven, CT 06525  
 (203) 387-4492  
 Contact: Brian

**BRIGHTON SOUND, INC.**  
**SES, EI, MR, ER**  
 315 Mt. Read Blvd., P.O. Box 60977, Rochester, NY 14606  
 (716) 328-1220, 328-0066  
 Contact: G.T. Sweeney

**BURG MUSIC COMPANY**  
**EI, MR**  
 219 M St. N.W., Washington, DC 20001  
 (202) 737-9111  
 Contact: Jerome Washington

**BURLINGTON AUDIO TAPES**  
**SES**  
 106 Mott St., Oceanside, NY 11572  
 (516) 678-4414  
 Contact: David Schwartz

**C&C STUDIOS**  
**SD, AC**  
 RD #1 Box 581-A, Glassboro, NJ 08028  
 (609) 881-7645  
 Contact: Ed Candelora, Jr.

**CAPE COD AUDIO**  
**SD, AC, SES, EI, MR, ER**  
 80 Enterprise Rd., Hyannis, MA 02601  
 (617) 775-1710  
 Contact: Mr. Davis

**CAPRON INCORPORATED**  
**EI, MR, ER**  
 278 West St., Needham, MA 02194  
 (617) 444-8850  
 Contact: Howard Resnick

**J.A. CARPENTER (CINE)**  
**SES**  
 P.O. Box 1321, Meadville, PA 16335  
**Services offered, credits, specialization:** Sales only; equipment for film, audio, video use: portable cassette and open-reel recorders for sync-sound use. Microphones, portable mixers, 16 mm and 8 mm cameras. Projectors, telecine units, editors, lighting equipment. Signal processing equipment. Line available: Uher, Sennheiser, Sony, Elmo, Lowel-Light, Bolex, Super-Edit, Fostex, AKG, Bose, dbx, Shure, Electro-Voice, Audio-Technica, Beyer-Dynamic, Cetec-Vega, etc. Also: products by the Film Group.

**CAVANAUGH TOCCI ASSOCIATES, INC.**  
**AC**  
 18 Main St., Natick, MA 01760  
 (617) 655-1300  
 Contact: Tony Hoover

**CENTRAL JERSEY SOUND CENTER**  
**SES, EI, MR**  
 P.O. Box 332, Oakhurst, NJ 07755  
 (201) 542-4100  
 Contact: H. Ducore

**COAST COMMUNICATIONS, INC.**  
**AC**  
 Ste. 32 Independence Mall, Wilmington, DE 19803  
 (302) 654-2713  
 Contact: Mitchell Hill

**COLOR LEASING STUDIOS**  
**SD, SES, EI, ER**  
 330 Rt. 46, Fairfield, NJ 07006  
 (201) 575-1118  
 Contact: Jack Berberian  
**Services offered, credits, specialization:** Color Leasing Studios offers sales, installation, rental and production services for audio and video studio requirements. We specialize in one-inch to one-inch A&B roll editing with basic effects and key from Chrynon Title Generator. We also work with 3/4-inch to 3/4-inch editing. Our new Ampex ACE computer will drive up to 16 transports (video and audio decks) and addresses effects switcher for effects. Dubbing and mass duplication services are offered. Special audio sweetening and video/audio lockup for posting are offered.

**COMMUNICATION SYSTEMS CO.**  
**SES, EI, MR**  
 956 Wyoming St., Allentown, PA 18103  
 (215) 439-4063  
 Contact: Jim Landis, Wayne Becker

**COURIER SOUND**  
**AC, EI, ER**  
 P.O. Box 205, Painted Post, NY 14870  
 (607) 962-6169, 562-8321  
 Contact: Jeff or Kevin

**CSE AUDIO**  
**SD, AC, SES, EI, MR**  
 1200 A Scottville Rd. Ste 370, Rochester, NY 14624  
 (716) 436-9830  
 Contact: Craig Fennessy

**A.W. D'ALESSIO ASSOCIATES**  
**SD, AC**  
 330 East 39th St., New York, NY 10016  
 (212) 692-9777  
 Contact: Sidney Feldman

**db ENGINEERING & AUDIO**  
**SD, AC, EI, MR**  
 161 Massachusetts Ave. Ste. 204, Boston, MA 02115  
 (617) 262-0155, 897-8459  
 Contact: David "db" Butler  
**Services offered, credits, specialization:** Design your studio with experience! David "db" Butler offers 17 years of pro technical support and recording expertise. All of our techs are well versed in music and recording as well. The result? A productive music environment that maximizes human and equipment potentials. We have fresh approaches to each install: a turnkey installation of a Trident Series 80 system for Embassy Recording in Amherst, MA, overseeing installation of the first 48-track SSL in New England at Boston's Mission Control; and a 3/4-inch suite with 8-track audio and a variable-character acoustics room at SMAP in Somerville, MA. Full-service and maintenance of all pro audio gear, custom design and modifications, and custom snakes and cables. Factory authorized Otari service.



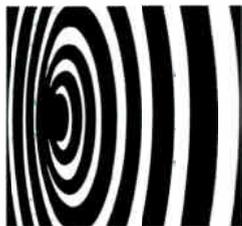
db ENGINEERING & AUDIO  
Boston, MA

DUCALE USA INC.  
SES, EI  
76 Pearl St., North Plainfield, NJ 07060  
(201) 757-0300  
Contact: Robert Kniss

DUTCHMAN SOUND LABS  
MR  
52 Frederic St., Springfield, MA 01119  
(413) 783-3765  
Contact: Marcel Bissonnette

EAR CRAFT  
SES, EI, ER  
14 Fourth St., Dover, NH 03820  
(603) 749-3138  
Contact: Brian Fischer

EASTERN STANDARD PRODUCTIONS, INC.  
SD, SES  
26 Baxter St., Buffalo, NY 14207  
(716) 876-1454  
Contact: Mark Mecker



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ELECTRONIC ACOUSTIC RESEARCH SYSTEMS  
SD, AC, SES, EI, MR  
3 Hanson St., Boston, MA 02118  
(617) 423-9565  
Contact: Rob Rosati

Services offered, credits, specialization: Acoustical design and audio electronics consulting service for the audio and video fields. The firm specializes in the total design of control rooms, studios, multi-media facilities, theaters, concert hall environments and sound reinforcement systems. Services offered by the electronics division are the design of custom electronic devices, installations, field service, power and ground schemes, equipment modifications and patchbay assemblies. Acoustical products manufactured are variable acoustic wall systems, multiple reflection diffusers (providing controlled reflections over a wide frequency band) and gobos. Consultation for noise control, vibration isolation and balancing room absorption versus reflection is also offered. The firm delivers advanced designs to meet your demanding needs.

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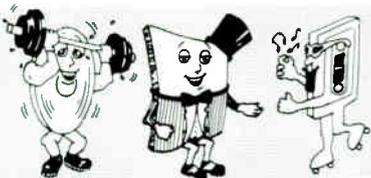
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| ART-MXR        | Shure         |
| Audio-Technica | Soundcraft    |
| Countryman     | Studer-Revox  |
| Crown          | Studiomaster  |
| DBX            | Symetrix      |
| DeltaLab       | Teac/Tascam   |
| Eventide       | TAC/AMEK      |
| Fostex         | USAudio Gatex |
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LEGEND: SD: Studio Designer; AC: Acoustical Consulting; SES: Studio Equipment Supply; EI: Equipment Installation; MR: Maintenance/Repair Services; ER: Equipment Rentals

## NORTHEAST

EPA AUDIO  
AC, SES, EI, MR  
844 Park Ave., Hoboken, NJ 07030  
(201) 795-3339  
Contact: P. Maneri

CHRIS GATELY AUDIO SERVICES  
EI, MR, ER  
P.O. Box 526, Bryn Mawr, PA 19010  
(215) 525-3605  
Contact: Chns Gately

GATES SERVICE GROUP  
SD  
14 Edgewood Ave., Natick, MA 01760  
(617) 655-1180  
Contact: John C. Gates

PETER GEORGE ASSOCIATES, INC.  
SD, AC  
34 West 17 St., New York, NY 10011  
(212) 243-8600  
Contact: Jay Panzer

GRC STUDIOS  
EI, MR, ER  
1137 Fillmore St., Baltimore, MD 21218  
(301) 889-4228  
Contact: Robert Friedman

TOM GREENE  
SD, AC, SES, EI, MR, ER  
10 Parkwood Ave., Rochester, NY 14620  
(716) 442-6209  
Contact: Tom Greene

TERRY HANLEY AUDIO SYSTEMS INC.  
AC, SES, EI, ER  
329 Elm St., Cambridge, MA 02139  
(617) 661-1520

HIGHLAND STUDIOS  
SD  
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(412) 468-6661  
Contact: Mark Valenti



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Highland, NY

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(914) 691-6077, 11 a.m.-6 p.m.  
Contact: Richard Rose

Services offered, credits, specialization: We are a small organization specializing in close personal client relations. Our product line is characterized by equipment we have found to be the most functional, cost-effective and reliable. In addition to the broad range of products offered, we provide system design, installation and maintenance for the pro and semi-pro recording studio, disco, sound reinforcement, electronic musician, and home audiophile. Our recording studio/demonstration facility is available for equipment evaluation by appointment only. Tannoy, Kimber, Kable, Perreaux, Tetra stand, ASC tube trap, Anechoic absorber, studio monitor systems, Akai, AKG, Alesis, Aphex, Astatic, Audio Logic, Benner, BBE, Belles Research, Beyer, Brooke-Siren, Celestion, Crown, dbx, Digitech, DNR, Drew Y-Expressor, EAW, Emilar, Eventide, EXR, Fane, Fostex, Fried, Gatex, Goldline, Grado, GT Electronics, Hartley, Hill, HME, JBL, Klark-Teknik, Lexicon, LoTech, Marshall Electronics, Milab, Nakamichi, Onkyo, Orban, Otari, Rane, Revox, Roland CPE Edit/Automation Systems, SCs, Sennheiser, Shure, Soundcraft, Soundtracks, SWA, Swintek, Tandberg, Thorens, UREI, Ursa Major, Valley People, and Yorkville Sound.

HP ELECTRONICS, INC.  
SES, EI  
9 Newburg Ave., Baltimore, MD 21228  
(301) 744-4077  
Contact: Martin Philip

ICE ASSOCIATES, INC.  
SD, AC  
One Bala Plaza Ste. LL-40, Bala Cynwyd, PA 19004  
(215) 668-0714  
Contact: Jerry Mainardi

IMMEDIA  
SES, EI, MR, ER  
11 Catherine St., Worcester, MA 01605  
(617) 791-3366  
Contact: Jerry

INNER EAR  
SD, AC, EI  
118-17 97 Ave., Queens, NY 11419  
(718) 849-5725

K.D.P. ENGINEERING  
SD, AC, MR  
P.O. Box 884, Woodstock, NY 12498  
(914) 331-1726  
Contact: Mr. Vercelletto

KEILYN ENGINEERING  
SD, AC, SES, EI, MR, ER  
RD #8 Box 132, Somerset, PA 15501  
(814) 445-7143, 893-5179  
Contact: Kevin Custer, Brian Fritz

LA SALLE  
SD, AC, SES, EI, MR  
1116 Boylston St., Boston, MA 02116  
(617) 536-2030, (800) 533-3388  
Contact: Les Arnold, Mark Parson  
also:  
22 La Salle Rd., W. Hartford, CT 06107  
(203) 236-5401, (800) 533-3388  
Contact: Jeff Ehrlich, Peter Solak, Bob Kuhl

LAKE SYSTEMS CORP.  
SD, AC, SES, EI, MR, ER  
55 Chapel St., Newton, MA 02160  
(617) 244-6881  
Contact: Steve Blake, Luke Furr, Tom Cook  
Services offered, credits, specialization: Lake stocks over 100 lines of pro audio and video equipment. Top studio designers, consultants, and architects consistently specify Lake Systems for system design, equipment requirements, and their knowledgeable time efficient installation and service team. Lake has been in business for over 30 years, and can handle any size job, from a small production studio or nightclub, to fully blown multi-track recording studios, TV and radio stations, casinos and stadiums. We are in the forefront of the digital audio movement, and leaders in interactive video technology. We are committed to our clients.



**LAKE SYSTEMS CORP.**  
Newton, MA

**LANDY ASSOCIATES, INC.**

*SES, EI*  
1890 E. Marlton Pike, Cherry Hill, NJ 08003  
(609) 424-4660  
Contact: Jim Landy, Dave Newborg  
also: 330 Bear Hill Rd., Waltham, MA 02154  
(617) 890-6325

Contact: Brad Reed, Mike Landy  
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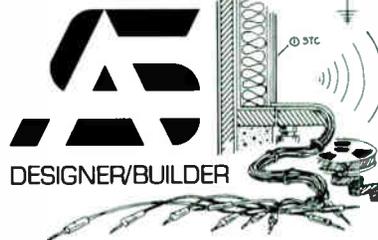
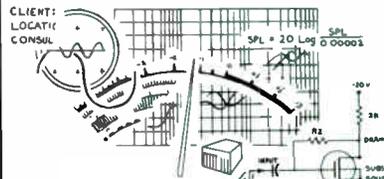
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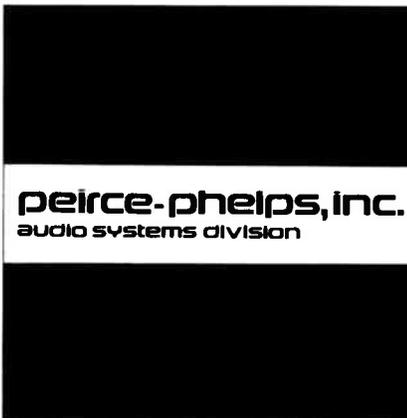
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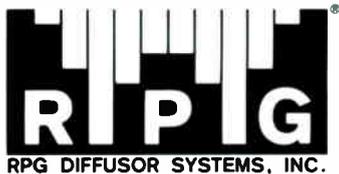
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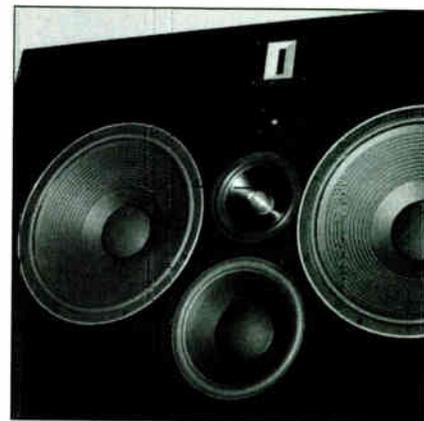
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**giveaway** (giv-'a-wa) *n.* 1: an unintentional betrayal; 2: something given away free; *specif.* a television program on which prizes are

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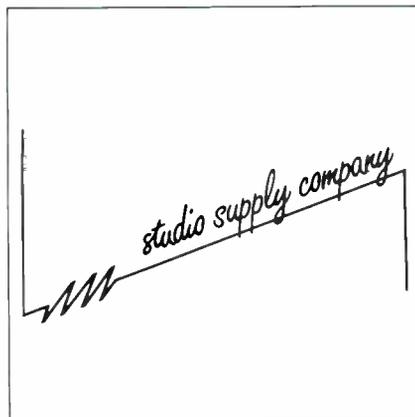
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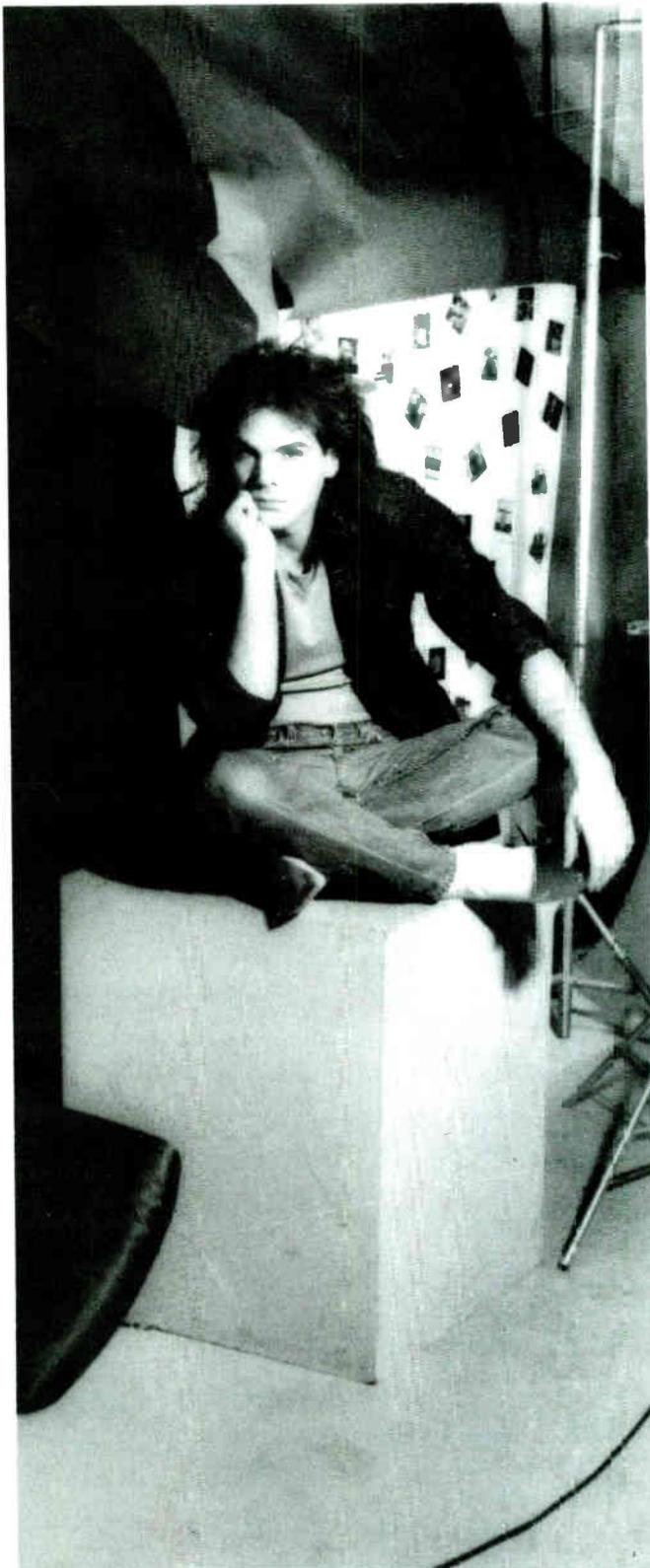


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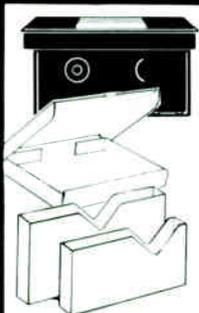


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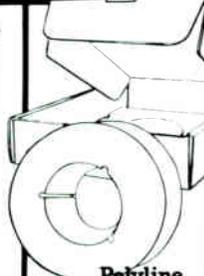


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(216) 431-4663  
Contact: Jack Boessneck

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(219) 255-6100  
Contact: Richard R. Johnson



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(313) 471-0027  
Contact: Henry Root  
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craft, Ramsa and more; microphones: Neumann, AKG, Beyer, B&K, Sennheiser, Crown, E-V and more; signal processing: AMS, Lexicon, Klark-Teknik, Symetrix, dbx, Eventide, etc.; monitors: UREI, JBL, E-V, Fostex and Tannoy; synchronizers: Adams-Smith; Q.Lock and Fostex. Hy James is more than the 100 companies on our line card. We are experts in our field with the ability to assist you in selecting the right equipment for your situation.

**ICB AUDIO**  
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(513) 281-5535

Contact: Ian Budd, Stephan Haller  
Services offered, credits, specialization: ICB Audio is a full-service audio dealership specializing in sales, consultation, and service of audio equipment for recording studios, broadcasters, video, audiovisual, industrial, sound reinforcement, and quality home needs. We sell recorders, mixers, amplifiers, CD players and disks, cassettes, signal processing, speakers, cabling and much more. Our emphasis is on friendly knowledgeable service both before and after the sale. See exactly how valuable full-service is—call today!



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(313) 846-3800  
Contact: George J. Kereji

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Contact: Gregg Stauffer

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(217) 352-7031  
Contact: Ron Putjenter

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Contact: Mark Tate

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Contact: Marguerite Mowry

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Contact: Mark Gardner, Steve Jacula

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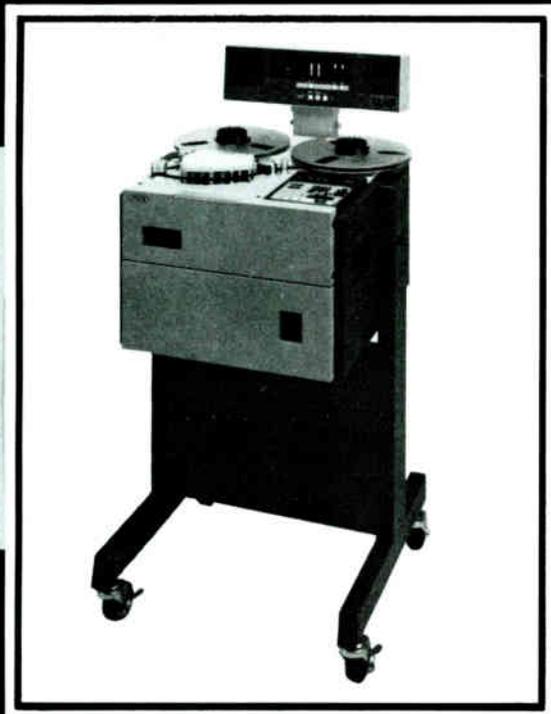
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Contact: Rob Vukelich, Larry Schara

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 Contact: Roy Stuewe, Jim Rivard



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(713) 495-8220  
Contact: Lupe Alvarez

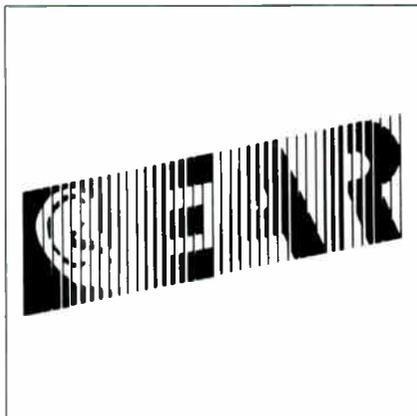
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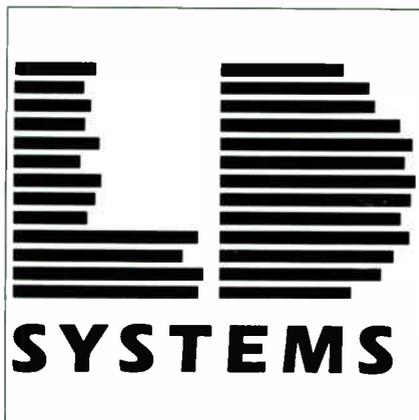
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*SD, AC*  
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(214) 392-7800  
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Contact: Mike Simpson, Richard Avery, Jeff Jones, Bruce Strom

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**LEGEND:** SD: Studio Designer; AC: Acoustical Consulting; SES: Studio Equipment Supply; EI: Equipment Installation; MR: Maintenance/Repair Services; ER: Equipment Rentals

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(713) 529-5442  
Contact: Bart

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Contact: Pilar Saiffe

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Contact: Barry Dickey

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Contact: Dan Smith

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(602) 942-7363  
Contact: James Larson

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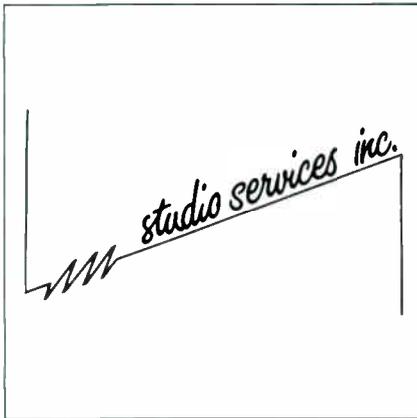
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**Services offered, credits, specialization:** We are a full-service professional audio organization staffed by top-flight recording engineers, studio consultants, and equipment designers dedicated to serving the Texas, Oklahoma, Louisiana area and offering state-of-the-art pro audio equipment, system installation, and maintenance. SSI is a sister company of Studio Supply, Nashville and is not affiliated



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with any studio or sound production company, we have no other interest than to provide the best in service and equipment. Our product line includes but is not limited to: Akai, AMS, Audio & Design/Calrec, Hafler, Harrison, Studer/Bevox, Sanken, Sierra Audio, Sony, Studiomaster, Ursa Major, and Valley People. Studio Services manager Leland Burns is highly experienced in sound production and knows what clients go through to maintain high-caliber work, his love and attitude towards good studios insures SSI does its part to see they are successful. Microphone to mixer to monitors, analog and digital, radio or records, plus audio-for-video—Studio Services Inc. is ready to serve.

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 Contact: Claude H. Venet  
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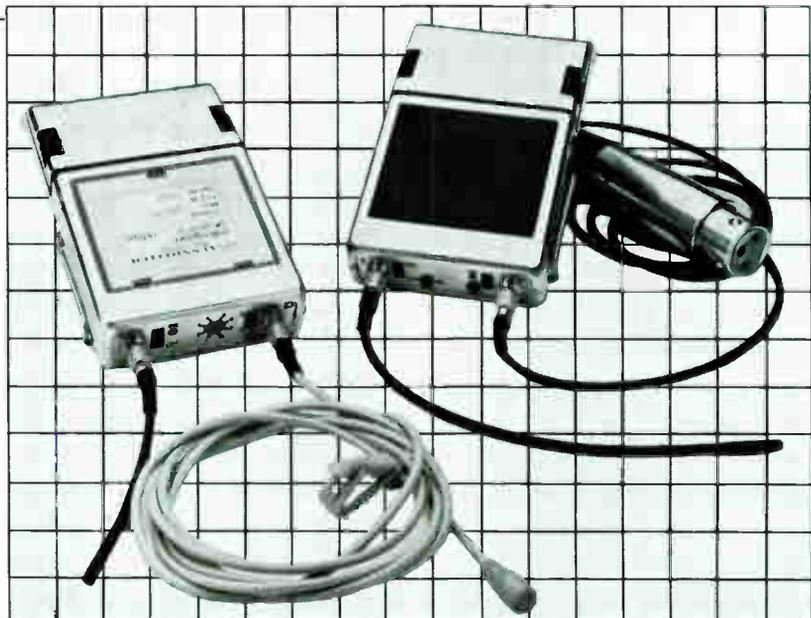
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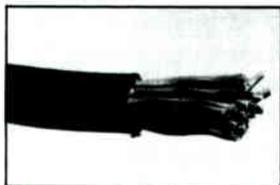
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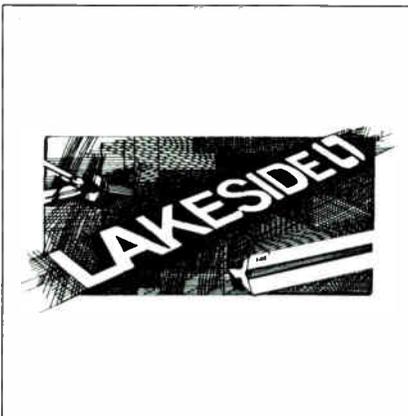
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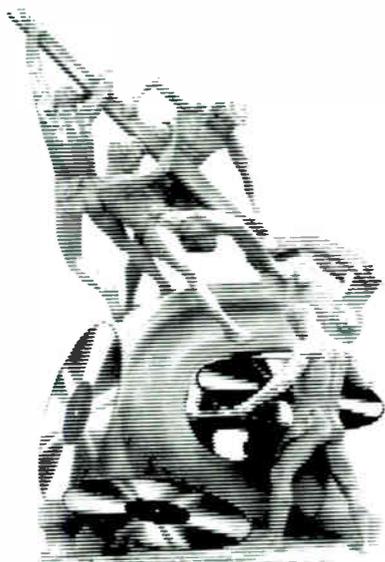
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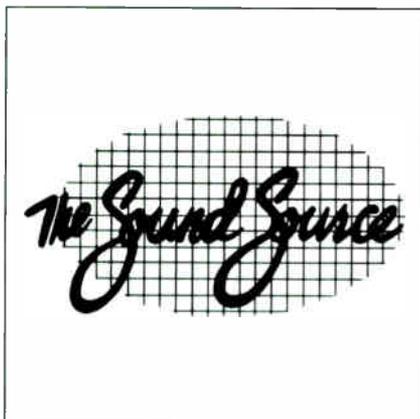
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Contact: Fred Ginsburg

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**Services offered, credits, specialization:** The Sound Source is a full-service audio and synthesizer rental company. We feature AMS, Massenburg, Quantec, Lexicon, Eventide, EMT, Publison, API, Roland, Valley People, dbx, Drawmer, Sontec, Lang, Pullec, Aphex, TC Electronic and Klark-Teknik. In our synthesizer department you'll find E-mu, Yamaha, Kurzweil, PPG, SCI, Oberheim, Roland, Linn, Simmons, and Gerfield Electronics. We also rent the Mitsubishi X-80. The Sound Source offers free local delivery, 24 hours a day, and no tax is added.

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*SES, EI, MR, ER*  
P.O. Box 648, No. Hollywood, CA 91603  
(818) 764-3355  
Contact: Denny McLane

**SPEAKER REPAIR OF CALIFORNIA**  
*SD, AC, SES, EI, MR*  
4334 Sunset Blvd., Los Angeles, CA 90029  
(213) 666-4161  
Contact: Stephan Christofferson

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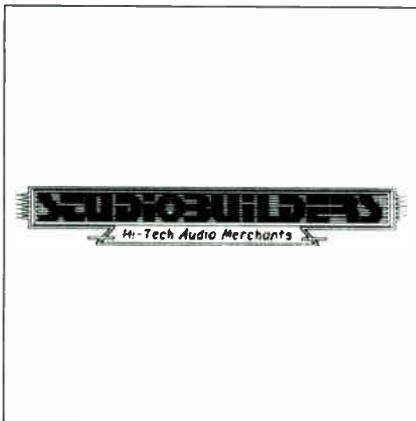
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(213) 874-5106  
Contact: Bruce Fallis

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(805) 325-2732  
Contact: Will Roland

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(818) 440-9919  
Contact: Joe Pollard



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Contact: Glenn Washington, Chuck Huber

**SUPERSOUND STUDIO**  
*MR*  
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(213) 836-4028  
Contact: Morris Golodner

**TRITRONICS INC.**  
*ER*  
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(818) 843-2288  
Contact: Bruce Stevens

**VIDEO FOR SPROCKETS**  
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(714) 545-2485  
Contact: Alex Alonso

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*AC, SES, EI, MR*  
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(213) 322-9075  
Contact: Bert Kronfeld

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(818) 787-3966  
Contact: Scott Hesson

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Contact: Christopher T. Carey

**ZAISER COMMUNICATIONS**  
*SD, SES*  
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(619) 481-5999  
Contact: Larry Zaiser

## NORTHWEST

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Contact: Bill Donnelly

**ADRIAN'S TV & SOUND ENGINEERING SERVICE**  
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982 Lower Main St., Wailuku, HI 96793  
(808) 244-5922  
Contact: Adrian Tom, Wilfred Murakami

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1940 B Olivera Rd., Concord, CA 94520  
(415) 686-6493  
Contact: Ron Timmons

**AMERICAN CONCERT TOURS**  
*AC, MR, ER*  
3618 Tahoma Place West, Tacoma, WA 98466  
(206) 863-6655  
Contact: Dennis Livingston

**ARTISTS' ENGINEERING**  
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14444 Skyline Blvd., Woodside, CA 94062  
(415) 851-0388  
Contact: Harry Sitam  
**Services offered, credits, specialization:** A full range of technical services for recording studios and related pro audio facilities, (except acoustical or computer work). Both shop and field services are available by appointment. Owner/operator was employed at Wally Heider's San Francisco maintenance department 1970-76; provides technical services for Neil Young's studio 1971-present; established Artists' Engineering in 1976 to provide service for various Northern California studios; factory trained at 3M and Ampex. Specialization: 1) installation and modification of recording systems; 2) custom design and fabrication of sub-systems and interface assemblies for recording systems; 3) tape recorder service; experienced on most brands and models; facilities for complete overhaul.

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 Contact: Bob Martin

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 (303) 750-6474  
 Contact: Jim Barath

**BEST MUSICAL INSTRUMENT CO.**  
*SES*  
 564 14th St., Oakland, CA 94612  
 (415) 832-2020, outside CA 1-800-233-BEST  
 Contact: Pete Rauhoit

**BROWNELL SOUND & HI-FI**  
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 3601 S.E. Concord, Milwaukie, OR 97267  
 (503) 659-0394  
 Contact: Kurt Bevers

**CAE SOUND**  
*EI, MR*  
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 (415) 348-2737  
 Contact: Peter B. Miller

**CLASSIC SOUND/CENTER STAGE RENTALS**  
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 (208) 525-8028  
 Contact: Chuck McCoy III

**COLORADO SPRINGS MUSIC CO.**  
*SES, EI*  
 321 N. Tejon St., Colorado Springs, CO 80903  
 (303) 635-1561  
 Contact: Mike Harper

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 (916) 929-1324  
 Contact: B.J. Goodwin



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**CHIPS DAVIS LEDE DESIGNS, INC.**  
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**CHIPS DAVIS LEDE DESIGNS, INC.**  
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 (702) 731-1917  
 Contact: Chip Davis  
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 (415) 459-2888

**Contact: Jerry Jacob**  
**Services offered, credits, specialization:** Chips Davis designed and built the first LEDE control room in 1978 in Las Vegas, NV. Since then, Davis has defined and set the standards for LEDE and LEDE-type monitoring environments. Davis' research and continued commitment to the scientific principles involved have made him the acknowledged expert in the field. Among Chips Davis-designed facilities you might wish to visit are: Tarpan Studio, San Rafael, CA; Crescendo Audio Productions, San Juan, PR; Radio-TV Caracas, Caracas, Venezuela; Audio Archives, Syracuse University, Syracuse, NY; NBC Training Center, NY; ABC, NY; Sounds Interchange, Toronto, Ont., Canada; MBC Center, Winnipeg, Manitoba, Canada; NBC PPS 1, CRs 2 and 4 Burbank, Brooklyn 2, Brooklyn, NY (Bill Cosby Show); National Public Radio, Washington, DC; JBL, Columbia Academy, Vancouver, BC, Canada; Grammie's House, Reno, NV; Starstudio, Hamburg, W. Germany. Services offered: design, consultation, seminars and training, TDS™ measurements, electronic and product design consultation, marketing and management services as well as on-site supervision and turnkey services.

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 Contact: Fred Nesbitt

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*SES*  
 Box 1090, Reno, NV 89504  
 (702) 826-MIDI  
 Contact: Tom White  
**Services offered, credits, specialization:** MIDI system specialists. Sales and support for computerized MIDI studios, keyboards, samplers, effects, sequencers. Lexicon, Garfield, Cooper, Alesis, Atari, Passport, Digidesign, Mark of the Unicorn Opcode Systems, Jim Miller software. Design consultant staff will specify to your requirements. Four years experience with MIDI and pro studio supply. Toll free support line. Quotations available.

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*ER*  
 750 Bryant St., San Francisco, CA 94107  
 (415) 495-3852  
 Contact: Lauretta

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 (503) 485-6951  
 Contact: Michael K. Pfohl

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 1540 Haight St., San Francisco, CA 94117  
 (415) 863-7327  
 Contact: Paul Reitz

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 (209) 252-6000  
 Contact: Alan Chrisman

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 1785 Fourth St., Berkeley, CA 94710  
 (415) 528-1505  
 Contact: Frank Hubach

**Services offered, credits, specialization:** FHA offers a unique blend of experience, skill and instrumentation for the design and testing of all types of studios, performance spaces and listening rooms. We are a professional partnership of consultants in acoustics, vibration and sound system design with no products to sell and no rigid design philosophy. Our partners have backgrounds in recording, electronics, video, live performance audio, music, structural and mechanical engineering and the construction industry. We also have experience as professional musicians and recording artists. FHA's laboratory has the finest instrumentation from Bruel and Kjaer. So, whether your project is large or small, complex or "no frills," you should consider our services: design, design review, HVAC noise control, noise and vibration control, room acoustics, site evaluation, sound systems, specification and testing. Previous clients include: The Record Plant, Bill Graham Presents, F M Productions, Jefferson Starship, Alice Cooper and The Automatt.

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 Contact: James K.C. Chang

**K&K MUSIC**  
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 (916) 486-9888  
 Contact: Alan

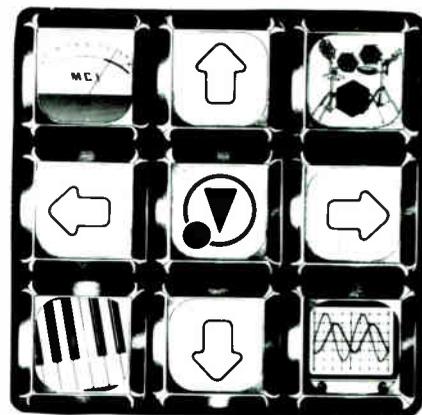
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 816 NE 45th St., Seattle, WA 98105  
 (206) 632-8989  
 Contact: Spring M. Selby

**KIMBER KABLE**  
*SES*  
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 (801) 621-5530  
 Contact: Ray Kimber

**LACKEY SOUND & LIGHT COMPANY**  
*ER*  
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 (206) 632-7773  
 Contact: William Lackey

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**Services offered, credits, specialization:** Sales, service, and installation of Sony/MCI professional audio equipment and virtually every major brand of professional recording, broadcast, and sound reinforcement equipment. Extensive inventory of keyboards, synthesizers, computers, and software for studio and stage use including the new and highly innovative Kurzweil 250. Leo's maintains four showrooms including a working 24-track control room and is uniquely able to demonstrate the complete product lines of over 120 manufacturers. Our sales staff is particu-



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 (408) 268-4344  
 Contact: Steve Lorente



**LUDÉ BROADCAST ENGINEERING**  
 San Francisco, CA

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 Contact: Peter Ludé  
**Services offered, credits, specialization:** Ludé Broadcast Engineering is a design and installation firm providing high quality, cost effective audio and video facilities of all sizes. Services include designing operator-friendly systems using existing equipment, or consultation in specifying the appropriate new hardware. Custom equipment modifications and design is also available. Regardless of the size of the facility, Ludé Broadcast Engineering installs all systems with logical design, impeccable craftsmanship and complete documentation. Specializing in video post-production, audio sweetening, broadcast control, and mobile units, recent projects have ranged from state-of-the-art videodisc pre-mastering edit systems to modest cut-only edit suites, and from mobile EFP units to broadcast studios. Clients have included commercial and non-commercial television stations, corporate media centers, educational and government institutions, production houses, equipment manufacturers, and cable TV operators.

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 (408) 353-3811 evenings  
 Contact: Richard Markell

MORGAN SOUND, INC.  
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Contact: David Kimm  
**Services offered, credits, specialization:** Morgan Sound offers system design, equipment supply, installation, acoustic design and electronic analysis. Along with a full-service repair facility, we are TEF™ equipped and have a trained technician to supply and interpret TDS™ documentation (Techron and Syn-Aud-Con). The latest computer software is available to aid in efficient placement of AUL (Acous-Tech), Sonex and other effective acoustic treatments. Specializing in studio equipment and electroacoustic interfacing, our staff is available to meet your design requests. Besides our retail facility, Morgan Sound carries a complete inventory of outboard processors, mics and auxiliary equipment for rental and lease to studios and production houses. Call for answers to your audio and audio/video needs. Product lines we represent include Otari, Soundcraft, JBL/UREI, Lexicon, Klark-Teknik, Eventide and over 70 other carefully selected lines. Clients include SRO Theatres, Ironwood Studios and London Bridge Studios of Seattle.

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(707) 255-2123  
Contact: G.R.

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EI, MR, ER  
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(808) 254-5318  
Contact: Steven Manno

NORTHERN STAR VIDEO SYSTEMS  
SD, EI, MR  
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(916) 920-3496  
Contact: Randy Kirkbride

OTARI CORPORATION  
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(415) 592-8311  
Contact: John Carey

PAOLETTI/LEWITZ/ASSOCIATES INC.  
SD, AC  
40 Gold St., San Francisco, CA 94133  
(415) 391-7610  
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(702) 832-7711  
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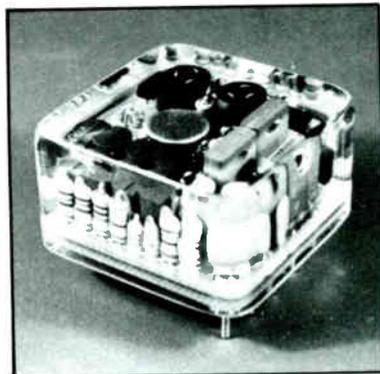


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**PRO SOUND**

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(303) 444-1731  
Contact: Craig Conner

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(415) 664-3361  
Contact: Marjon Schmutger



**RLS ACOUSTICS**  
San Francisco, CA

**RLS ACOUSTICS**

**SD, AC**  
650 Fifth St. Ste. 301, San Francisco, CA 94107  
(415) 541-0818

Contact: Randy Sparks

**Services offered, credits, specialization:** At RLS Acoustics, we provide design, engineering, and consulting services. Whether you're expanding existing facilities, or starting a new organization, we'll work directly with you in the development of your concept. Reinforcing your ideas with solid engineering principles and innovative design solutions we can build a strong foundation for your successful venture. Our experience in the design and use of technical facilities can help you avoid costly mistakes. Proprietary engineering software, along with our CAD system, enables our personnel to arrive at design solutions quickly and save you money in the process. If you're interested in creating a state-of-the-art audio control room, designing a recording studio with a variable acoustic environment, incorporating accurate stereo audio into your video production suite, installing an audio-for-video synchronization system, or anything in between, call us and we'll help develop your ideas and turn them into reality. Recent projects include: facilities design and remodel for San Francisco Production Group, a new Video Master control room for Robert Berke Sound, and a complex for Steve Dobbins Productions housing four sound stages and a legitimate theater.

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Contact: Sharon or Bob



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**CHARLES M. SALTER ASSOCIATES, INC.**

**SD, AC**  
930 Montgomery #101, San Francisco, CA 94133  
(415) 397-0442

Contact: Thomas Schindler

**Services offered, credits, specialization:** Acoustical design and construction consultation for audio/video/film production, post-production, and screening facilities. Clients include Lucasfilm Ltd., Dolby Laboratories, WED Enterprises, Todd A.O., Glen Glenn.

**SATRONICS COMPANY**

**AC, EI, MR**  
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(808) 949-1317

Contact: Thomas Sahara

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Contact: I. Schwartz

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Contact: Richard J. Pappas

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Contact: Donald Setaro



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Contact: Ed Alves

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Contact: Ritchie Sidener

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—LISTING CONTINUED ON NEXT PAGE

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—CONTINUED FROM PAGE 10, SESSIONS  
 duced by *Lou and Joe Parente*. Mix co-produced by *Godfrey Diamond* and engineered by *Joe Alexander*, assisted by *Ryan Dorn* and *Brooke Hendricks*. . . *Omega Studios* in suburban Washington, D.C. played host to Chrysalis Records' *Device* featuring Holly Knight. Produced by *Mike Chapman*, the album was presented to the Washington, D.C. radio and press community at a reception held in Omega's huge Studio A. . . Mastering projects at *the Cutting Edge*, Ferndale, NY, included LPs for *Something Good, Backroads, Green Mountain Skyline* and *Banjo Dan & The Mid-Nite Plowboys*. . . A&M Recording artist *Tramane* was in re-mixing his fourth single off of his album *The Search is Over*, "How I Got Over." This cut has a guest appearance by DJ Larry Patterson. It was produced by *Robert Byron Wright* and engineered by *Tom Roberts*. . . *Michael Saia* of Spotwise Productions returned to *In House Studio* in Cambridge, MA, to mix and edit two 30-second spots for WPIX and three "Wedding Cake" promos for Blair Entertainments' syndicated program, *Divorce Court*. . . *Colonel Abrams* was in *INS Recording* in NYC with *Larry Patterson* to work on the remix of "Over And Over," the third single from his latest album. *Robert Kasper* engineered the session. The Colonel has also been there working on material for another A.M.I. Management artist that he is producing. Engineering on that with Robert was *John Poppo*. . . Actor *John Savage* worked at *Barclay Productions* in NYC. He put down preliminary vocal tracks for Cannon Films' upcoming film musical, *Beauty and the Beast*. Keyboard and vocal sessions were engineered by *Bruce Coughlin*, with *Richard Regner* assisting. . . *Barclay Productions* in NYC was busy producing tracks for Cannon Films' new series of fairy tales on film called *Movie Tales*. . . *The Bad Boys* were at *Highland Studios* in Delmont, PA laying down final tracks on their upcoming album, engineered by *Gary Popotnik*, produced by the Bad Boys. . . *Bias Recording Company* in Washington, D.C. has been busy these past few months with Rounder Records artists *Norman Blake & Tony Rice* and *Del & Jerry McCoury* working on upcoming albums. . . At New York City's *Unique Recording Studios* songwriter/producer *John Oates* was in mixing *Parachute Club's* debut release for Current Records. SSL master *Frank Filipetti* engineered with *Jeff Lord Alge* assisting. Also at Unique, producer *Russ Titelman* finished mixing *Chaka Khan's* next release for Atlantic records. . . At *Sigma* in Philadelphia, *Patti La Belle* completed vocals on a 30-second TV spot for Kodak. *Arthur Stoppe* engineered, assisted by *Randy Abrams*. . . *Milton Bingham* produced *Donald Malloy* for Savoy Records at *Secret Sound* in NYC. . . Recording at *D&D Studios* in Catskill, NY, was NY oldtime/bluegrass band *Uncle Steve Crockett & The Log Cabin Boys*, recording their second LP of traditional oldtime string band mu-

sic. Engineering was *Don Poole*. . .

*Metal Church*, the Seattle-based heavy metal band, is in Studio A at *Steve Lawson Productions* recording a second album. . . *Greg Gumbel*, whose 1985 debut LP *California Republic* continues to be a critical and college radio favorite, hit Berkeley's *Fantasy Studios* to make a follow-up single with engineer *Dave Luke*. . . *Polkacide* recently recorded and mixed their debut album at *Russian Hill Recording* in San Francisco. First engineer was *Dave Lumaye* with *Radley Hirsch* assisting. . . 1986 Bammie Award winners, *The Freaky Executives* were in at *Prairie Sun Recording* in Cotati, CA working on a three-song demo for David Rubinson Management with *Scott Roberts, Andre Johnson*, and *Mark (Mooka) Rennick* producing. . . San Francisco's only engineering couple, *Ken Kessie* and *Maureen Droney*, have been sharing duties recently at *Starlight Studio* in Richmond on *Sylvester's* new LP for Megatone Records. . . A number of local bands recorded at *OTR Studios* in Belmont, CA this spring, all of them completing demos. The bands included *Playing Children, Jimmie Talks, Sabor*, and *Sub Level 7*. *Sub Level 7* was produced by chief engineer, *Randy Sellgren*. . . *Jock Bartley* (Firefall) was in *Avalanche Recording* (Northglenn, CO) with his new band laying tracks for his latest project; and *Flash Cadillac* was back mixing for their newest album with *Duane Scott* engineering. . . At *Music Annex* in Menlo Park, CA, veteran sax-man, *Stan Getz* recently completed work on his new album, entitled *Voyage*. This is Stan's first for Blackhawk Records, a label headed-up by Herb Wong formerly of Palo Alto Records. Music Annex crew included *Jim Dean, Brian Lanser* and *Roger Wiersema* tending to the technical side and independent engineer *Phil Edwards* as mixer. . . Producer *Robin Yeager* was back in Studio "A" at *The Plant Studios* in Sausalito, cutting basic tracks for an upcoming album by *Shea Roxi*. . . At *Triad Studios* in Redmond, WA CBS recording artist *Deniece Williams* was in to record a local choir for her new album, with *Brad Westering* producing and *Lary Nefzger* engineering. . .

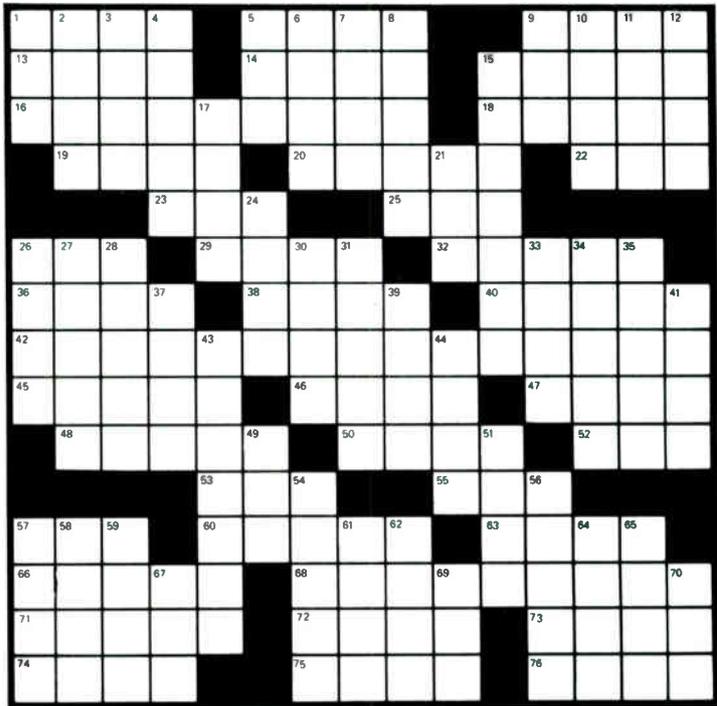
Tennis champion *Chris Everett Lloyd* completed shooting and voice-overs for a new *Sports Illustrated* ad campaign at *A&R Recording Services* in Rancho Mirage with *Stuart Rickey* producing and engineer *Nick Mandala* at the board. . . Producer/engineer/songwriter *Peter McIan*, who produced the early Men At Work albums and the first Mr. Mister album, is back at L.A.'s *Westlake Studios* to record *The City* for Chrysalis Records. As well as producing the new band,

McIan wrote all the material. *Paul Ray* is co-engineering. . . *The Beach Boys* were in *Sound Solution* in Santa Monica recording their 25th anniversary album. The project is being produced by *Terry Melcher* and *Brian Wilson*, engineered by *Keith Wechsler*, with *Jim Burnett* as second engineer. . . *Linda Ronstadt and the Nelson Riddle Orchestra* finished up the final mixdowns on their latest album at *The Complex* in West L.A. The album was produced by *Peter Asher* and *George Massenburg*, engineered by Massenburg and assisted by *Sharon Rice*. . . *Bobby Womack* was in the *Music Grinder* in L.A. doing percussion overdubs on his newest project with famed percussionist, *Paulino Decosta*. *Barney Perkins* was at the board and *Jon Ingoldsby* assisted. Also, *The Pointer Sisters* were in doing keyboard overdubs with *Michael Brooks* engineering and Ingoldsby assisting. . . *Kim Carnes* recorded her latest album at *Record One* in Sherman Oaks. *Val Garay* produced and engineered, with *Richard Bosworth* and *Julie Last* assisting. *Neil Young* recorded his latest album there also, with *Danny Kortchmar* producing, *Niko Bolas* engineering, and *Julie Last* assisting. . . At *Perspective Sound* in Sun Valley, CA, *The Spectres* cut a four-song demo with producer/engineer *Bill Thomas*. . . Recent activity at *Master Control* in Burbank included *Madonna* mixing her new album, *True Blue*, for Sire Records with co-producers *Pat Leonard* and *Steve Bray*. *Michael Verdick* engineered with assistant *Dan Nebenzal*. . . At *Sound Image*, North Hollywood, Operation Entertainment Inc. artists *Castle Bravo* (including former members of Berlin and Psychedelic Furs) are laying down tracks for a forthcoming EP. *Brian Leshon* and *Brent Williams* are producing with Leshon also handling engineering chores. . . *Andy Taylor* of Duran Duran and Power Station was in at Hollywood's *Galaxy Sound Studios* working on a soundtrack entitled *American Anthem*. The soundtrack was recorded in preparation for the July 4 reopening celebration of the Statue of Liberty in New York City. *Roy Thomas Baker* produced and *Jerry Napier* engineered. . . At *Preferred Sound* in Woodland Hills, *Rosie Flores* has been cutting tracks with producers *Steve Fishell* and *Howie Epstein* (of Tom Petty's band) for Warner Bros. *Matthew Spindel* engineered with *Scott Campbell* assisting. . . Recent activity at *Rusk Sound Studios* in Hollywood included *The Chipmunks* working on a new movie for Bagdasarian Productions with *Randy Tominaga* engineering, *Christopher Danley* assisting and engineering. . .

At *ARS Recording Studio* in Alsip, IL, the mixdown of *Eddie Blazonczyk's Versatones* new album, *Polka Celebration*, was completed. It was engineered by *Gary Cobb*, and produced by Blazonczyk. . . In Evanston,

# MIX WORDS

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## "CELESTIAL CONSTRUCTION"

### ACROSS

1. Weed
5. Part of 16A
9. Popular war game
13. Seed covering
14. New Hebrides island
15. Cheech \_\_\_\_\_
16. With 5A and 75A, certain celestial travelers
18. Basic acid
19. Cooking direction
20. Show contempt
22. Baste
23. Bite
25. Certain military person
26. J.G.s, e.g.
29. Winning difference
32. Dandies
36. Chemical compound
38. Aldo \_\_\_\_\_ Canadian rock singer
40. Soporific prefix
42. With 68Z, 16A's claim of foundation
45. Lab burners
46. Of the ear
47. Parched
48. Bank job
50. Continent or rock group
52. Thing, in law
53. "\_\_\_\_\_ shoes with pink shoelaces"
55. \_\_\_\_\_ Just Seen a Face"
57. Certain verse arrangement
60. S. European prefix
63. "For \_\_\_\_\_ In My Life"
66. Melodic idea
68. See 42A
71. Opposition
72. Play section
73. \_\_\_\_\_-podrida
74. Ooze
75. See 16A
76. Ogle

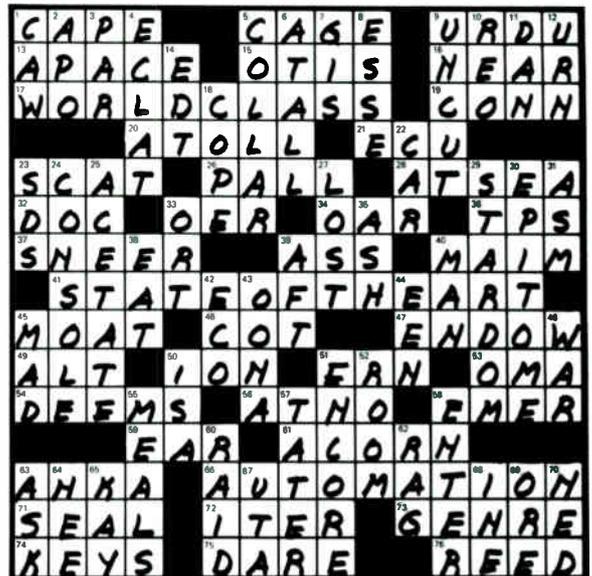
### DOWN

1. \_\_\_\_\_-Mahal
2. Mars
3. Break
4. Like a certain spirit
5. \_\_\_\_\_ Douglas
- Quintet

6. Word with ring or coin
7. Soon
8. Make fresh
9. McCartney album
10. Rainbow, to Plato
11. Wave
12. Be hep to
15. Name associated with radio
17. Irish girl's name
21. Dine
24. Fr. bridge
26. \_\_\_\_\_ and oil
27. No B.S.
28. Net
30. Area below Houston St. in Manhattan
31. Musical about Argentina
33. Domino
34. Chicken
35. Film music

37. Asian range
39. Sale sign
41. Certain bills
43. "I Wanna \_\_\_\_\_"
44. 1967 soul hit
44. Early third century date
49. Make lace
51. Bard's river
54. Grammy org.
56. Sign up
57. Iowa city
58. Brass instr. nickname
59. Suited to \_\_\_\_\_
61. \_\_\_\_\_ Ness
62. Numerical prefix
64. Alto player Richie
65. Fr. girl
67. Gremlin
69. Untanned hide
70. Household god

## Solution to July Mix Words



IL, reggae heavyweight *Yabba Griffiths* has been in at *Soto Sound* working on his upcoming album *Don't You Worry*. *Jerry Soto* and *Bruce Gomez* engineered. . . At *Gnome Sound* in Detroit, Motech recording artist *Carol Hall* was in to record new material for Gnome Productions with producer *Bruce Nazarian*. . . At *The Disc Ltd.*, East Detroit, MI, MCA recording artist *One Way* finished working on their latest album with *Eumir Deodato* producing and *Greg Reilly* engineering; and *Michele Goulet* completed her album for Island Records with *Jim White* producing and Reilly behind the console. . . *Liza Minnelli* has been in *Pumpkin Studios* (Oak Lawn, IL) recording new material for an upcoming album with Styx producer *Dennis DeYoung*. Gary Loizzo is engineering with *Jim Popko* assisting. . . Mandolin picker extraordinaire *Jethro Burns* completed recordings for digital Compact Disc at *Seagrape* in Chicago. The project was co-produced by *Graham C. Carlton* and *Ken Rasek* for release on Hybrid Records. *Harry Brotman* and Ken Rasek shared engineering duties. . . Recent recording activity at *Studio A*, Dearborn Heights, MI included Light Records gospel artists, *Commissioned*, laying down tracks for their self-produced album, *John Jaszcz* engineering, assisted by *Eric Livengood*. . . An all-star cast of blues artists were recording at *Paragon Recording Studios* (Chicago, IL) for the Blues Festival at Grant Park. *Gloria Hardiman* and *Otis Clay* came for the performance. *Robert Cray*, *Willie Dixon*, *Albert King*, *Dr. John* (Max Rebennack) and *Aaron Neville* delivered their messages via the telephone. *Bob Kearney* engineered the session, and *Tom Quinlan* assisted. . . *Evensong* was in at *IVO Sound Recorders* in Hastings, NE to record a demo; *Majesty* recorded a cassette album; and *Toad-O* was back working on their followup to *Nuke the Whales*. . . *Jewel Recording Studios* in Cincinnati hosted *Lonnie Mack* and former Elektra vice president *Russ Miller* recently in a session to be recorded in the near future for Lonnie Mack. . .



Ex-Rascals leader Felix Cavaliere at Sountec Studios in Norwalk, CT.

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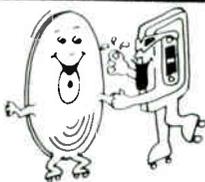
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—CONTINUED FROM PAGE 152, LEDE

is added back correctly, you have a much more relaxed feeling, and that psychoacoustic feeling of being in an anechoic chamber is gone.

**Mix:** Have you run into Live-End, Dead-End pirates, people who say they've designed LEDE rooms that really aren't?

**Davis:** Oh, lots of them. Syn-Aud-Con has drawn up criteria for LEDE certification, and you're not supposed to use "LEDE" without giving their trademark reference. You can say it's an "LEDE-like" room. But I've received complaints; there are many problems caused by people saying they've gone into an LEDE room and it sounds terrible, even if they've got soft stuff in the front and a hard diffused rear end of the room; you have to look at the whole chain, the electronics, speakers, classical acoustics.

**Mix:** Star Studio in Germany has an LEDE isolation booth. Do you think that'll be a continuing trend?

**Davis:** That was for drums and percussion, done like an LEDE control room to get the ambience of the drums and to control the low frequencies. Drums, especially rock, sound better in open spaces, you play them so heavily that you've got to let the sound

expand. In a small confined space, the overall sound is going to suffer... the smaller the room, the more critical the design becomes. You have to deal with the room's modal patterns, then deal with the room's absorption and diffusion; these factors are equally important.

I've been doing work at NBC, I've done evaluations for the Canadian Broadcasting Company, and for ABC; I've been in their rooms, where they traditionally start out saying, "Absorb everything; make everything dead." When you do that, the anomalies from the speakers and reflections off the console and electronics just stand out like big-headed snakes. If you don't deal with all these things equally, then you've got problems. It's not that a room necessarily should be all dead in the front and all hard in the back, I don't design that way. Many times I absorb things in the back, certain things near the mixer, I diffuse things where there aren't direct reflections. You have to deal with these things each time, you can't generalize, you've got to look at the geometry, the physical volume and space, along with formulas from classical acoustics.

**Mix:** What are the elements that comprise a state-of-the-art recording studio?

**Davis:** A good console—SSL, Harrison, that type of thing; capability of at least 48 tracks; the outboard equipment that producers and writers want for today's popular enhancements; and the right power amplifiers along with a really good monitoring environment. The ability to do video post is very important because if you go out with a good recording, you may want to post it down at the place in which you recorded it.

I think the years of the place where everyone went that had the "luck," and an engineer who truly knew the room, are pretty much over. When the music business fell on hard times, that shook out the hundreds of thousands of dollars being thrown on each production. Now you have to turn out work without wasting money.

Today's world-class studio is a place where you can work efficiently, and still have a great deal of artistic freedom and the license to relax. It can't be hospital-like, all business, and it has to be conducive to flexibility. If they want to pile the control room full of synthesizers, fine, you have to be flexible to do that. Most musicians want to be in the control room where they can feel the music, where they can put out some pretty heavy sound pressure levels, so let them have that artistic feel. ■

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# ADVERTISERS INDEX

| PAGE          | ADVERTISER                           | PAGE   | ADVERTISER                        |
|---------------|--------------------------------------|--------|-----------------------------------|
| 136           | A & R Record & Tape Manufacturing    | 196    | JBL, Inc.                         |
| 122           | Ace Music                            | 132    | Jensen Transformers               |
| 146           | Acoustic Sciences Corporation (ASC)  | 31     | The Joiner-Rose Group             |
| 161           | Acoustic Spaces                      | 85     | Klipsch & Associates              |
| 144           | Acoustilog                           | 117    | Lake Systems                      |
| 74, 75        | ADA                                  | 69     | Lakeside Associates               |
| 108           | Advanced Music Systems (AMS)         | 125    | LD Systems                        |
| 149           | AKG Acoustics                        | 41     | Lenco                             |
| 71, 91, & 151 | Akai/IMC                             | 51     | Leo's Audio & Music Technologies  |
| 44            | Akia Electronics                     | 185    | Linear & Digital Systems          |
| 153           | Alesis                               | 178    | Made To Order Music Library (MTO) |
| 101           | Allen & Heath Brenell                | 157    | Manny's Pro Audio                 |
| 47            | Alpha Audio                          | 178    | Marshall Electronics              |
| 67            | American Tape Warehouse              | 139    | Master Sound Astoria              |
| 86            | AMP Services                         | 73     | Meyer Sound Laboratories          |
| 195           | Ampex                                | 9      | Mitsubishi Pro Audio Group        |
| 36            | Aphex Systems                        | 47     | Monster Cable                     |
| 152           | API Audio Products, Inc.             | 82     | Nakamichi                         |
| 109           | Sam Ash Music                        | 15     | NEOTEK Corporation                |
| 53            | Audio Technica                       | 125    | New York Technical Support        |
| 166           | Auteri Associates                    | 170    | Opus Recording                    |
| 63            | AVC Systems                          | 45     | Orban Associates                  |
| 61            | Kenneth A. Bacon Associates          | 7      | Otari Corporation                 |
| 34            | Bel Electronics                      | 23     | Peavey Electronics                |
| 175           | Bertech                              | 118    | Pi Audio                          |
| 127           | Beyer Dynamic                        | 133    | Platinum Island                   |
| 77            | Biamp Systems                        | 170    | Polyline Corporation              |
| 86            | Big Mo                               | 143    | QCA Custom Pressing               |
| 29            | Blue Jay Recording                   | 39     | Quad Sound                        |
| 172           | Bridgewater Custom Sound             | 113    | Rane Corporation                  |
| 80            | Bryston                              | 181    | RCA Test Tapes                    |
| 35            | Burlington Tapes                     | 167    | Reliable Music                    |
| 177           | Camera Mart                          | 89     | Renkus Heinz                      |
| 141           | Carver                               | 159    | Resolution                        |
| 106, 107      | Carvin                               | 142    | Rhythm City Music                 |
| 87            | Cetec Gauss                          | 81     | RLS Acoustics                     |
| 112           | Countryman Associates                | 79     | RolandCorp U.S.                   |
| 159           | Cramer Audio/Video                   | 145    | RPG Diffuser Systems              |
| 54, 55        | Crown International                  | 146    | SCMS Pro Audio                    |
| 163           | CSE Audio                            | 154    | Showcase Audio/Video              |
| 152           | Dalbec Broadcast Company             | 135    | Sound Impressions                 |
| 183           | Data Base Design                     | 171    | Sound Productions                 |
| 187           | Chips Davis Design                   | 27     | Soundcraft Electronics            |
| 122           | Decillionix                          | 64     | Soundcraftsmen                    |
| 10            | Digital Creations                    | 19     | Soundtracs, Inc.                  |
| 118           | Digital Sound Technologies (DST)     | 65     | Spataro Audio/Video Workshop      |
| 160           | Diskmakers                           | 49     | State of the Art Electronic       |
| 21, 114       | DOD Electronics                      | 37     | Jim Stitt Associates              |
| 3             | Dolby Laboratories                   | 76     | The Stocking Screen               |
| 52            | Doppler Studios                      | 179    | Stoughton Printing                |
| 175           | EAR Pro Audio                        | 2      | Studer Revox                      |
| 111           | E-mu Systems                         | 80     | Studio Consultants                |
| 129           | Ensoniq                              | 57     | Symetrix                          |
| 179           | Filament Pro Audio                   | 43     | Tannoy                            |
| 59            | Flanner's Pro Audio                  | 11     | Tascam                            |
| 148           | FM Acoustics                         | 20     | Techron Industrial Products       |
| 147           | Fostex Corporation                   | 97     | Tekcom                            |
| 119           | Full Compass Systems                 | 67     | Thoroughbred Pro Audio            |
| 110           | Goldline                             | 32, 33 | 3M Corporation                    |
| 137           | Bernie Grundman Mastering            | 46     | TMI Engineering                   |
| 183           | Hardy Company                        | 166    | Trackside Engineering             |
| 102           | Hill Audio                           | 123    | Tubecraft                         |
| 62            | HM Electronics                       | 89     | United Tape Company               |
| 169           | Hy James                             | 165    | Valley Audio                      |
| 103           | Ibanez                               | 22     | Valley People                     |
| 98            | Institute of Audio Research          | 160    | Victor's Audio                    |
| 143           | Institute of Audio/Video Engineering | 28     | Wireworks Corporation             |
|               |                                      | 112    | Wise Music                        |
|               |                                      | 161    | World Records                     |
|               |                                      | 115    | EU Wurlitzer                      |
|               |                                      | 17     | Yamaha International              |



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