OCTOBER 1985
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THE RECORDING INDUSTRY MAGAZINE

Mix

INTERVIEW: NILE RODGERS

TEC Awards Preview

68 Pages of New Products for AES!

Maintenance and Testing

Ambisonics

The Starship

Ben Burtt on Imax

On Tour With The Pope

Photographing Music

This is our newest multitrack. It is also the most affordable multitrack in Studer history.

For the fourth time since its inception, we've changed the A80VU. We've improved the sonic performance, tape handling, and durability. And we've substantially lowered the price.

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STUDER REVOX

Circle #001 on Reader Service Card

OCTOBER 1985
VOLUME NINE
NUMBER TEN

THE RECORDING INDUSTRY MAGAZINE

Mix

DEPARTMENTS

AUDIO

MUSIC

VIDEO

LISTINGS

Cover: The newly renovated Studio A at Sound Emporium, Nashville features a 35' x 40' x 22' room with a 10' x 20' string alcove. The 20' x 22' Control A is equipped with a new Neve 8128 48-input, 32-channel output console with Necam 96 automation. Three-quarter-inch video synching is also available.
Photo by: Rick Horton

Since this is our annual AES issue, many of the features in the magazine have a fairly technical slant. Besides a multitude of **new product listings** including microphones, mixing consoles, signal processors, recorders, speakers and much more, writer Greg Hanks offers a valuable do-it-yourself guide to **audio maintenance** (page 82); Russ Berger and Tom Rose explain some often overlooked principles of **studio partition construction** (page 64); and Larry Oppenheimer wraps up his epic, five-part series on **digital reverb** (page 32).

This month we also offer a special section spotlighting **six producers: Nile Rodgers,** who is arguably the hottest producer in New York right now; **Helen Keane,** best known for her work with Bill Evans over the years; **Jeff Weber,** master of the live-to-2-track recording; **Steve Levine,** whose most recent triumph was The Beach Boys' recent hit album; **Dan Aron,** one of the most successful producers of commercials; and veteran writer/producer **Wes Farrell,** whose career has spanned so many styles of popular music. The section begins on page 194.

Mix Magazine is published at 2608 Ninth St., Berkeley, CA 94710 and is ©1985, by Mix Publications, Inc. This is Volume Nine, Number Ten, October, 1985. *Mix* (ISSN 0164-9957) is published monthly. Subscriptions are available for $24.00 per year. Single or back issue price is $4.00. Subscriptions outside U.S.A. are $36.00. Please address all correspondence and changes of address to *Mix* Magazine, 2608 Ninth St., Berkeley, CA 94710. (415) 843-7901. Second Class postage paid at Berkeley, CA and additional mailing offices. *Mix* Magazine is distributed in recording studios, pro-audio stores, music stores and other related businesses. If you have a recording or music related business and would like to distribute *Mix*, please give us a call. Display advertising rates, specs and closing dates are available upon request.

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AND THE BEAT GOES ON

CURRENT

AES Convention Expands to Five Days

This month's AES conclave at the New York Hilton, October 12 through 16, marks the first time that five days have been given over to this largest of U.S. audio conventions. The show has been expanded in several areas. The AES Convention is perhaps the most vital international stage for presentation of technical papers aimed at audio developers and engineers, and this year an unprecedented 60 technical papers covering virtually every aspect of professional audio will be offered. "Simultaneously," says the organization, "the membership demand for more and varied workshops and seminars has increased the number of these events to 20 during the five-day period."

In addition, the AES has created a two-day special program concentrating on "Sound Reinforcement Technology & Usage." For example, the 79th convention opens on Saturday, October 12, with seminars and workshops on acoustic fundamentals, room acoustics, large loudspeaker arrays, acoustic measurements, and a special workshop—"Sound Reinforcement on Broadway." Four of the five days will feature three floors of exhibits, with over 300 displays, and 40 on-site demonstration rooms.

Among the multitude of subjects covered in the technical papers and seminars this year are digital recording, transducers, acoustics, location recording, psychoacoustic fundamentals, electronic architecture, audio for FM broadcasting, wireless microphones and more. For more information on the convention, call the AES Convention Services division at (212) 661-2355 or (212) 661-8528.

CEO Sales Tax Follow-up

The California Entertainment Organization, after a long and drawn out struggle to clarify the California sales tax uncertainty for recording projects, has announced the final acceptance of CEO's proposed amendments to the California State Sales and Use Tax Regulations. The final wording of this law, in effect since August 14, 1985 and retroactive to January, 1976, declares that sales tax is limited to blank recording media and does not include a contribution for engineer's time, producer's services, or any other "fabrication labor." All "intangible" elements, whether paid in the form of royalties or not, are exempt. Tax applies only to the sale of the unprocessed recording media. For further clarification, contact the CEO at P.O. Box 512, Van Nuys, CA 91408, or call (213) 469-5485.

Audio Group Promotes Multi-Image

Nearly $200,000 of professional audio equipment was donated by Otari, QSC, Aphex, Community Light and Sound, Pro-Co, Soundcraft, White Instruments, Audio Technica and Technical Products, for use at the fifth annual International Multi-Image Festival held August 12 through 17 in Dallas, Texas. In addition to the donations, SPARS conducted two seminars concerning planning, budgeting and producing original music tracks for multi-image shows. White Instruments' official, Emory Straus, noted that "great improvements have been made in the production and reproduction quality of multi-image audio" since the Association for Multi-Image International began its conclaves.

Electro Sound Stages Seminar

A sellout crowd of almost 300 recording industry professionals attended the second annual cassette duplication seminar sponsored by Electro Sound of Sunnyvale, CA. The four-day intensive workshop, held at San Francisco's Hyatt Union Square Hotel on August 19 through 22, addressed a wide scope of the areas of concern to both duplicators and their clients, such as: the artistic considerations in mastering for cassette, how to produce the best possible running masters, the specifics of tape performance, specifications and variations of cassette housings, duplication quality assurance, a clarification of industry standards, and an examination of the design and construction of recording and playback heads.

Ambitiously organized by the staff of Electro Sound, the program also enjoyed support of 30 additional sponsoring organizations including Ampex, Dolby, Studer Revox, Agfa-Gevaert and BASF.

Billboard Hosts 7th Video Confab

The future of the music video medium will be examined in-depth as Billboard Magazine presents their seventh annual Video Music Conference, November 21 through 23 at the Sheraton Premiere Hotel in Universal City, CA. Topics to be discussed at the event will include updates on music video product in the international marketplace; the status of cable, broadcast TV, pay-per-view, syndication and other transmission avenues; record label reports on music video activity and panels of producers, directors and other behind-the-scenes types on the latest creative technologies available. For more information, contact Kris Sofley, Billboard Video Music Conference, 9107 Wilshire Blvd., Suite 700, Beverly Hills, CA 90210.

NAMM Elects Officers, Promotes MTV Ads

New officers were chosen at the recent New Orleans convention of the National Association of Music Merchants (NAMM). Elected to the five-member Executive Committee were: Immediate Past President, James C. Kleeman, Karnes Music Company, Elk Grove, IL; President, Alfredo Flores, Jr., Alamo Music Center, San Antonio, TX; Vice President, Donald Griffin, West L.A. Music Inc., Los Angeles, CA; Treasurer, Jack Coffey, Coffey Music Co. Inc., Norwood, MA; and Secretary, Warner Paige, Paige's Music, Terre Haute, IN.

In other business, NAMM acknowledged $75,000 in member contributions, to be matched by NAMM, for use in organizing an advertising campaign on MTV designed to convert "music lovers" into "music makers." "It's time that our industry does something to expand its market," says committee co-chairman Fred Bramante. "MTV is a natural vehicle for our message, and we're truly missing the boat if we fail to take advantage of it."

INDUSTRY NOTES

INDUSTRY NOTES...

Circuit Research Labs, Inc. has announced that they purchased assets including inventory, patents, licenses, contract rights and the business name of ***MICMIX Audio Products, Inc.***, a privately owned company that manufactured and marketed professional audio sound reinforcement equipment...***NAMM*** has announced January 17 through 19 as the dates for their annual Winter Market to be held at the Anaheim (CA) Convention Center... ***Digital Entertainment Corporation,*** a subsidiary of ***Mitsubishi Electric Sales America, Inc.*** has announced the start of their sales and service operations in the United Kingdom, near London. Principals in the new operation, to be called ***Mitsubishi Pro Audio Group,*** will include mssrs. ***Peter Sidey, Adrian Bailey*** and ***Barry Motton***...***Donald F. Bogue,*** general manager of ***Ampex Corporation's*** Magnetic Tape Division, has been promoted to vice president and ***Ms. Marty Blanchard,*** a senior marketing analyst at Ampex, has been named chairman of the Audio-Video Statistics Committee of the ***International Tape Association***...***Lenard Pearlman*** has been appointed president of ***Editel/Chicago,*** a recently acquired division of ***ScanLine Communications***...***International Tapetronics Corporation/3M*** has announced the promotion of ***Mike Bové*** to senior technical service representative...***Hugh J. Miller*** has been selected as the first vice president of finance for ***JBL Professional*** in Northridge, CA...***Peavey Electronics Corporation*** was one of 18 U.S. businesses to receive the Presidential "E Star" award for excellence in exporting at a recent Washington D.C. presentation...***Michael J. Feniello*** has been named national product manager for ***Sony Professional Audio Division,*** with responsibilities to include product and market analysis, product training and trade show support...***The Droid Works*** has opened an Eastern Region Sales and Field Support Office at 645 Madison Ave., New York, NY 10022, ph. 212/753-4077...At ***Electro-Voice, Earl D. Harris Jr.*** has been named director of engineering, responsible for administering E-V's microphone, loudspeaker, electronics, military and aviation engineering divisions...***Joan Weade*** has been officially appointed exec. vp/general manager at ***Editel/NY***...***Larry Brieloff*** has joined ***Movielab Video, Inc.,*** in New York City, as vice president of sales and client services...***Ken Thornhill*** has been promoted to the position of rental manager at ***A/T Scharff Rentals*** in New York City...***Le Mobile,*** Guy Charbonneau's remote recording truck, has established offices in the Southern California area, at 22240 Victory Blvd., Suite E112, Woodland Hills, CA 91367, phone (818) 992-8481...***William Kranzush*** has been named general manager of ***Unitech,*** marketer of audio, video, telecommunications and microwave products in Pacoima, CA...***Scientific Audio Products*** has welcomed ***Paul Hayden and Associates,*** and ***Advanced Marketing Group*** to their roster of manufacturer's reps ...***Triad Marketing Associates*** has been appointed New York metro area representative for ***Audio Technica*** professional products...***Commercial Music Productions, Inc.*** has opened a sales office in Atlanta, GA, to market recorded music products to advertising agencies and industrial accounts...***Symmetrix, Inc.*** has appointed ***Barry Wolfson*** of ***New Breed Associates*** and ***Chris Pelzar*** of ***Pro New England Marketing*** to represent their product line...***Telex Communications, Inc.*** has announced the promotion of ***Rick Peterson*** to product manager, audio tape duplication products and the appointment of ***Daniel M. Paulnock*** to director of marketing, audiovisual division...***Richard Zarro*** has been chosen as general manager of ***Mediatech West,*** in Hollywood, a joint venture of ***Mediatech, Inc.*** and ***Unitel Video, Inc.***... ***Cubicomp Corporation*** has opened a New York regional sales office in White Plains, NY, headed by ***Gary Attanasio***...***Rapco Cable and Lighting*** has broken ground on their 12,000 sq. ft. manufacturing facility in Jackson, MO, scheduled to be on line this fall...***Dom Saccio*** has been appointed president and chief executive officer of ***Montage Computer Corp.,*** of Hollywood...***Dr. Ronald L. Marshall,*** former information management administrator for GTE Service Corporation in Tampa, FL, is the new director of the Center for Telecommunications at the ***University of Mississippi***...***Arnold Toschner,*** president of Amek Consoles, Inc. of North Hollywood, CA, has announced the appointment of ***Toby Sali*** as national sales manager for TAC products, including the Matchless and Scorpion recording consoles...***Neil Grosman*** has been selected as account executive for ***Compact Video Services,*** in Burbank, CA...***S. Richard Ravich*** has been appointed to the post of vice president and general manager, and ***Robert C. Majernik*** has been named vice president and treasurer at ***AKG Acoustics, Inc.***... ***Audio Intervisual Design,*** the L.A.-based professional audio equipment/systems company, has been named U.S. distributor for the new 833/834 Studio Reference Monitors from ***Meyer Sound Laboratories, Inc.***...***Jim Rondinelli*** has joined the pro audio supply firm of ***Sound Genesis*** as a sales representative responsible for accounts in the corporate studio market...***Martin Audio,*** NYC, has announced the formation of ***Martin Music Technology,*** a full-service sales organization providing equipment and software for musical applications...

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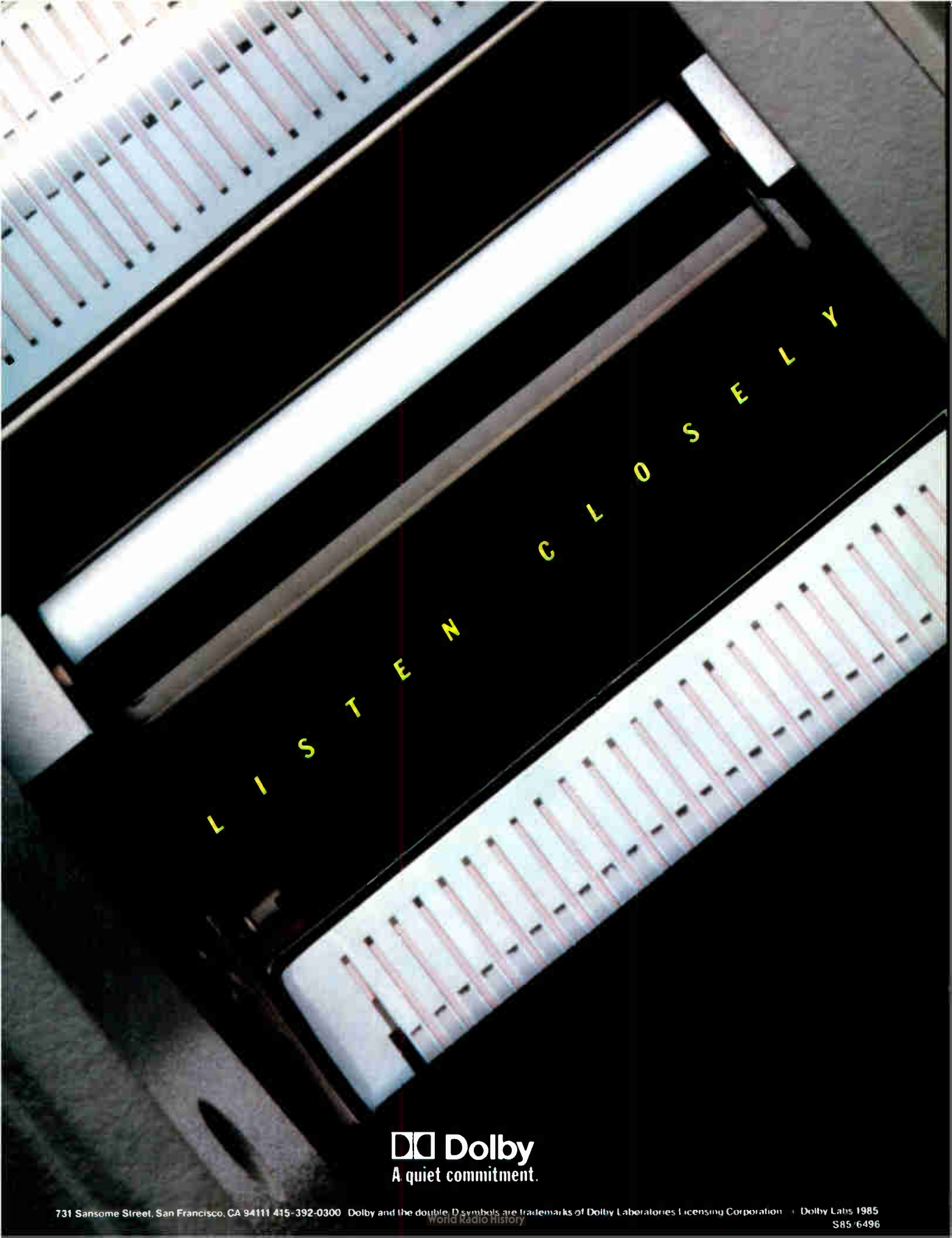

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SESSIONS

NORTHWEST

At ***The Music Source*** in Seattle, ***Fletch Wiley*** produced tracks for Anthony-Paul Productions' ***Bullfrogs & Butterflies II,*** and studio manager ***Dave Raynor*** engineered demos for a new ***Danny O'Keefe*** album...Seattle's popular rock group ***Attachments*** emerged from two month's recording work at ***Steve Lawson Productions*** in that city with ten original songs for its first full length LP. ***Terry Date*** engineered...At the ***Music Annex*** in Menlo Park, CA, popular Swiss bassist/composer ***Karim Sharaf*** finished his first album, as yet untitled, for release in Europe on EMI Records-London...***Kim Aubry*** of ***The Sound Service*** in San Francisco completed engineering and mixing of four half-hour radio documentaries about Salvadoran refugees in the United States. Entitled "Voices in Exile," the programs were produced by ***Claire Schoen*** for Fine Line Productions...At ***Montage Recording Studio,*** Newark, CA, activity included ***Billy J. Walsh's*** new album project with ***Elliot Mazer*** producing and ***David Hartzheim*** engineering...***John Fogerty*** was at ***The Plant*** in Sausalito preparing for his new album project due out in late fall by Warner Bros. ***Jeffrey Norman*** has been engineering with ***Dana Chappelle*** assisting. Also in was ***Jonathon Cain*** (Journey) producing Australian artist ***Jimmy Barnes. Jim Gaines*** mixed down four of the songs for the LP release...At ***Russian Hill Recording*** in San Francisco, ***Mark Isham*** has composed and arranged the score for Alan Rudolph's new film ***Trouble in Mind*** starring Kris Kristofferson and Genevieve Bujold...The ***Dead Kennedys*** have been working at ***Hyde Street Studios*** in San Francisco on their next album, scheduled for a fall release, and an EP for Christmas. ***John Cuniberti*** engineered the project in Hyde Street's Studio D. ***Tim Jones*** was the assistant engineer...Producer ***Pam Bobbitt*** of Gamut Music Productions Colorado, Inc., and engineer ***Terry McMurtry*** have been recording singer/songwriter ***Paul A. Bernadou*** at ***FTM Studios,*** Lakewood, CO...

NORTH CENTRAL

At ***Perfection Recording*** in Akron, OH, ***Joy Circuit*** finished tracks for a new release due out this fall. Engineer for the project was ***Ivan Burketh***...At ***United Sound Systems*** in Detroit, MI, ***Andre Fox,*** guitarist/vocalist for Parliament/Funkadelic has been producing tracks for artist ***Dawn Rock.*** Engineering these sessions was ***Frank "Cornbread" Corn, Jr.***...Contemporary Christian singer ***Wendy Phelps*** finished up final mixes on her new album project ***Runnin' Shoes,*** which ***Don Robertson*** produced with ***Noah Zarck*** engineering...At ***Recording Workshoppe*** of Chillicothe, OH, engineer ***Jeff Ling*** just completed a project with ***Stark Raven***...***Brent Malnack*** and ***Mars Booth*** completed tracks for their EP cassette, ***That Conversation,*** at ***Sound Recorders,*** Kansas City/Omaha, with engineer/producer ***Jim Schrader***...***Barry Manilow*** was in Cincinnati's ***Fifth Floor Productions*** for two days surrounding his concert appearance in town, recording Portugese versions of "Copacabana" and "Mandy" for RCA. ***Michael Delugg*** engineered these sessions with ***Carol Burkart*** assisting. Also in Fifth Floor was ***Bootsy Collins,*** cutting tracks for his new Arista album with ***Robin Jenney*** and ***Gary Platt*** engineering...Detroit-based rock and rollers, ***Streetwise,*** recorded their debut EP at ***Sound Trek III*** in Detroit, MI. Producing and engineering was done by ***Dennis George*** and ***Greg Stevens.*** A January release is slated ...***Ambience Recordings*** in Farmington Hills, MI, also had ***Barry Manilow*** in the studios working on two songs for a forthcoming album ...Recent activity at ***Paragon Recording***

Pictured are Stevie Wonder (center) and staff members of The Cutting Corporation in Washington, D.C., where the singer dropped in to duplicate a tape of his public service song, "Don't Drive Drunk."

Are YOU Suffering From

THE STEREO NIGHTMARE?

For years, science has known that many people dream in colour. Recently though, large numbers of television audio engineers are experiencing an entirely different phenomenon: The Stereo Nightmare.

The VTR starts arguing with the synchroniser. The multitracks struggle with the VTR. As the music and efx fight the dialogue, the automation is having yet another brilliant disagreement with itself. The clock looms ominously. The producer is emitting homicidal glares. Maintenance tries to reach the scene, but can't break through the writhing mass of incompatibilities. In the middle of this chaos, a nervous voice comes on the intercom and informs you that the entire management structure has just exploded!

The most frightening thing is that The Stereo Nightmare strikes when its victims are wide awake. The syndrome is all too real. And as it spreads, the industry's loss in man-hours and production costs has become staggering.

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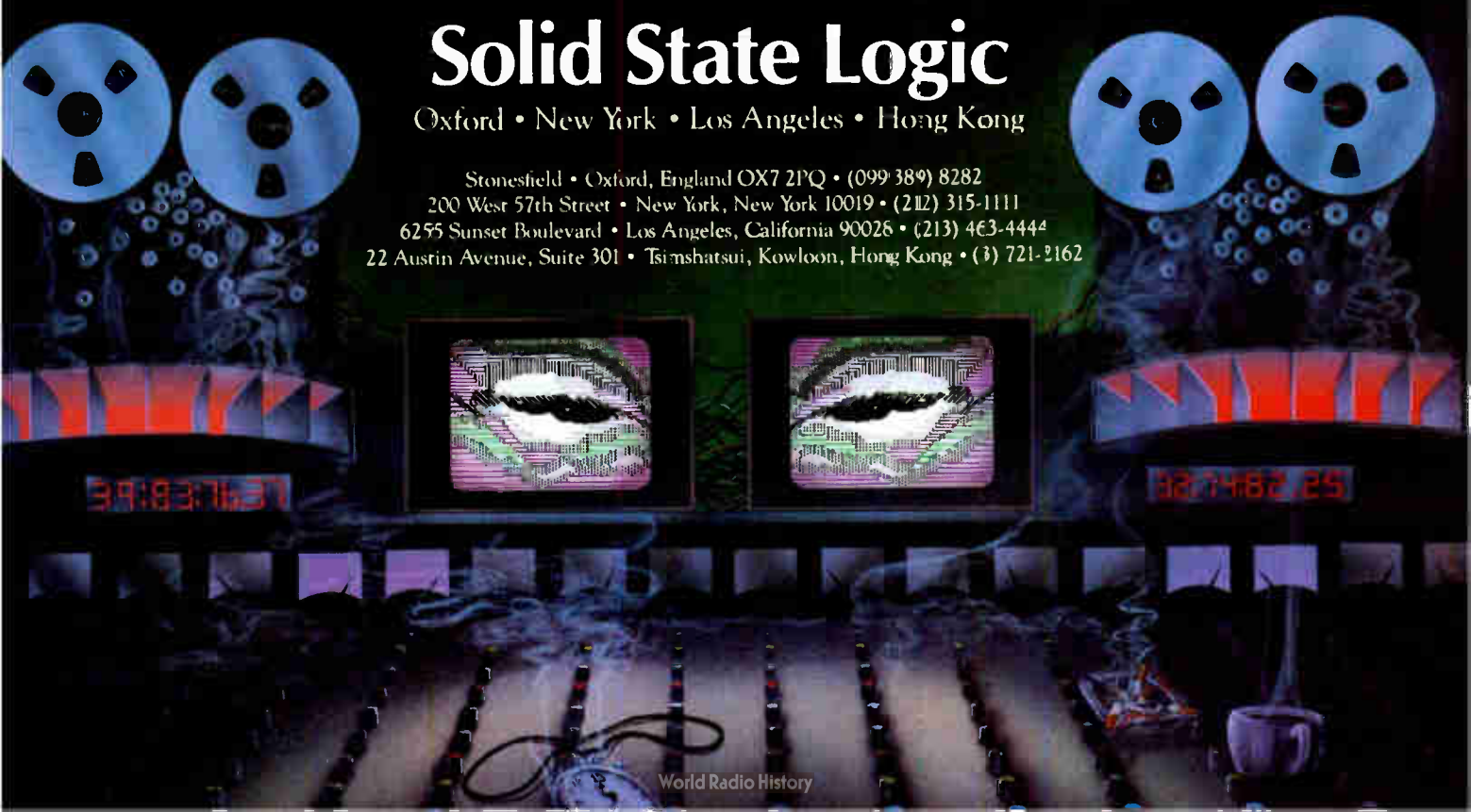

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Studios, Chicago, included *Robert Irving III* (synthesizer player, producer and songwriter for Miles Davis' latest album) producing an album project for Expansion Records featuring artist *Tony Ransom.* Paragon's *Marty Feldman* engineered the project; *Bob Kearney* was the assistant engineer...

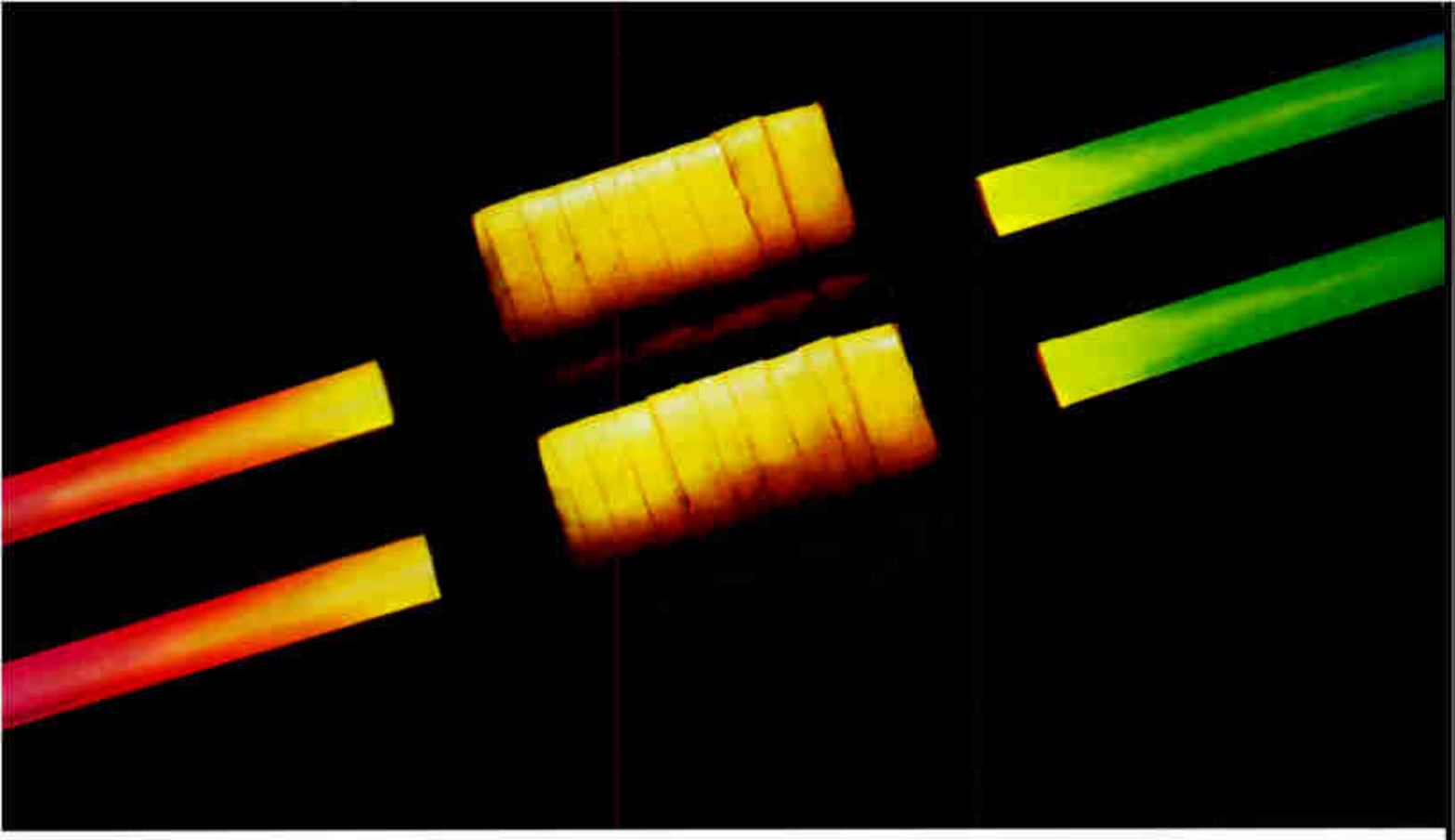
NORTHEAST

David Grisman was in *Track Recorders* in Silver Spring, MD with members of his band to record tracks for a forthcoming album by Grammy-nominated singer-songwriter *Liz Meyer;* Track's chief engineer *Mark Greenhouse* was at the board...At *Reel Platinum Studios* in Lodi, NJ, *Sharon Stone* cut a 12-inch for O-Tone Productions, and *Hernandez & Allecca* produced *Cathy DeRico*...Vibraphone virtuoso *Roy Ayres* was produced by *James Mtume* and *Phil Field* with final mix being done at *Ears* (Eastern Artists Recording Studio, E. Orange, NJ). *Steve Kahn* engineered, *Tom Vercillo* assisted...At *Normandy Sound,* Warren, RI, *Charlie Farren* recorded and mixed new material with engineer *Phil Greene* and assistant *Fletcher*...At the *Power House,* Camden, NJ, Philly R&B artist *Patrice* shared lead vocals with the Delphonics' *William Hart,* and rapper *Frankie Smith* on "In The Name of Brotherly Love." The record was written, produced and engineered by *Dan McKeown*...Recent activity at *Skyline* in NYC, included producer *Nile Rodgers* working on mixes for *Sister Sledge, Mick Jagger,* and *Teddy Pendergrass* with engineer *James Farber* and assistant *Scott Ansell*...Activities at *Rawlston Recording* included *Chad Elliott* laying tracks for a song for Michael Schultz' and Russell Simmons' new movie *Rap Attack; Kurtis Blow* produced, *Akili Walker* was at the board with *John Lavort* assisting...At *Planet Sound Studios* in Manhattan, *Martin Atkins,* former member of Public Image Ltd., has formed and produced a mini-LP for *Brian Brain* with *Rick Kerr* co-producing and engineering for Plaid Records ...At *Quadrasonic Sound Systems,* NYC, *Tom Waits* was in the studio laying down tracks for his new album entitled *Rain Dogs* for Island Records. Featured guest guitarist on a few of the tracks is the Rolling Stones' own Keith Richards. It was produced by Waits, engineered by *Bob Musso*...At *Kajem Studios, Pieces of a Dream* cut a new album for Manhattan Records, produced by *Deodato* and engineered by *Mallory Earl*...At *Secret Sound* in NYC, *Gerard McMahon* recorded for Mirage Records, engineered by *Joel Soyfer*...*The Muppets* were in at *Sound Heights Studios* in Brooklyn this week with producer *Joe Carroll,* tracking and mixing a TV soundtrack for Hensen Associates' TV program called *Jim Henson's Muppet Babies and Little Monsters. Vince Traina* engineered with *Gary Collins* assisting...At *Systems Two* in New York, producer *John Glen* cut tracks for *I. Giullari Di Piazza's* next album. The sessions were engineered by *Michael Marciano* and *Joe Raguseo*...At *Greene Street Recording,* NYC, *John Robie* produced an *Ish Ledesma* album for Geffen Records on the new Mitsubishi X800 32-track and Greene Streets' new Mitsubishi X80 digital 2-track. Robie and *Dave Harrington* engineered...At *Beethoven Studios* in NYC, singer/comedian *Chris Rock* was doing his new rap record "Choice is the Word!" with *Griff* at the console, and *Angelino* producing...*MRC* were in at *Inner Ear Recording* cutting their latest rap production. *Gabriel Araqua* was producing with *Matthew Shottenfeld* and *Steve Vavagiakis* engineering...Heavy metal singer *Wendy O. Williams* returned from performing in the U.K. to record her second solo album at *Broccoli Rabe* in Fairfield, NJ...L.A.'s KCBS-TV returned to New York's award-winning *Ciani/Musica* recently for an entire station identification package including show openings with beds and bumpers...At *Power Play* in Long Island City, NY, *Tony Arfi* was in with *Spyder D* producing *Master Gee's* new single for Atlantic Records called "Do It." *Barry Hearn* and Tony Arfi engineered...At *39th Street Music* in NYC, *Richard Bassoff* and *Nickey Braddy* co-produced tracks for *Mahogany Watkins* on Island, with *Tim Cox* engineering. Also, *Full Force* produced a dub-mix of *UTFO's* "Bite It," with *Richard Kaye* engineering...At *MediaSound Studios* in New York, *Chaka Kahn* recorded the theme song for Columbia Pictures' *White Knight,* directed by Taylor Hackford. *Tim Hatfield* engineered the tune, called "Other Side of the World," with an assist by *Rick Slater.* Hatfield was also at the controls recording and mixing several tunes for ex-Stray Cat *Brian Setzer; Miami Steve Van Zandt* produced and *Michael Reiter* was assistant engineer...The *Outlook Recording Studio,* Bethel, Maine, had *Rebecca Martin* in recording her debut album, produced by *Connie St. Pierre*...At *Eras Recording* in NYC, *Charlie Gross* was in mixing the feature film *Sweet Dreams,* the story of Patsy Cline with Jessica Lange. Behind the console was *Cynthia Daniels* with *Peter Sturge* assisting...Working at *I.N.S. Recording* in NYC was *Mantronik,* who finished "Needle to the Groove," the follow-up to their rap success "Fresh is the Word." Co-producing were Mantronik and *John Poppo,* with Poppo also engineering...At *The Cutting Edge,* disk mastering 45s for Tel-e-vue Productions/ Howard Shaw, By Disguise Records, and MP Records/ La Scola were completed...Engineer *Herb Powers, Jr.* of *Frankford/Wayne Mastering,* NYC, has been busy with the new *Nolan Thomas* single, "Too White," for Emergency/Mirage Records, *Scritti Politti's* 12-inch, "Perfect Way" for Warner Bros., and a myriad of other records...At the *Sound Cottage, Glenn Johnston* is still recording tracks for his demo project...At the *Boogie Hotel* in Port Jefferson, NY, *White Lion* recorded a single, "Web of Desire" for the film *The Money Pit,* directed by *Richard Benjamin.* The project was produced by *Richard Sanders* and White Lion, and engineered by *Jeffrey Kawa* with *Mike Larkin,* and *Mark Procopio* assisting...Artist *Cory Kessler* and producer/ engineer *Barry Harris* finished their EP at *Tiki Studios* in Glen Cove, NY...Recordings of scores for upcoming episodes of *George Romero's Tales From the Dark Side* were recently completed at Michael Levine's Studio in NYC; *Michael Gibbs* was composer/arranger, and Michael Levine was producer/-engineer...

SOUTHEAST

At *Sounds Unreel Studios* in Memphis, Manhattan Records artist *Rob Jungklas* was in working on his debut album, produced by *Jack Holder* and recorded by *Niko Bolas* and *Don Smith*...At *Soundshop Recording* in Nashville, albums were being cut by *Exile,* with producer *Buddy Killen* and engineer *Pat McMakin; Lee Greenwood,* with producer *Jerry Crutchfield* and engineer *Ernie Winfrey;* and *Fats Domino,* with producer *Bob Vernon* and engineer *Mike Bradley*...*Grand Central Studios* in Nashville, a division of Pat Patrick Productions, recently hosted album projects produced by *Greg Nelson* and *Terry Meade/Bill Ryan* (Big Band Country). *Kent Madison* engineered... *Audiofonics, Inc.,* a Raleigh, NC-based video /audio production house has changed its name to *Videofonics, Inc.* to better represent their primary services. Videofonics, Inc. will continue to provide all the services that were offered as Audiofonics, with the addition of 3-D computer animation...At *Cotton Row Recording* (Memphis), Atlantic recording artists *Xavion* recorded their version of Prince's "Seventeen Days." Engineers included *Nikos Lyras, Danny Jones,* and *Gerard Harris*... *Wally Cleaver's Recording Studio* in Fredericksburg, VA had their remote unit in Washington, D.C. to record the *Holy Comforter St. Cyprian Gospel Choir. Frank Qualls* of First Hill Records produced with *Peter Bonta* engineering, assisted by *Gerry Rothschild*... Recent mastering projects at *Disc Mastering Inc.,* Nashville, include the following, all mastered by *Randy Kling:* "On the Other Hand," *Keith Whitley's* new single for RCA, produced by *Blake Mevis;* "Seize the Moment," a high-energy pop theme song for the National Sports Festival, produced and performed by *Bill Wray;* and "Heroes of Vietnam," a tribute to veterans performed by *Roger Wright* and produced by *Harold Bradley* for Rustic Records...*Studio Solo* of New Orleans completed work with EMI America artist *Bill Wray* on a single for the National Sports Festival held in Baton Rouge, Louisiana. Also, Rounder Records artists *Red Tyler* (of Little Richard fame) and *Irma Thomas* completed album projects with *Scott Billington* producing and *David Farrell* as engineer...Recent activity at *Cheshire Sound Studios* in Atlanta included *Robert Plant* mixing his recently recorded live project for *Atlantic Records. Tim Palmer* engineered...

Sessions continued on page 224.



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THE SPARS STUDIO EXAM

by John Monforte

In today's world, nearly every career field that requires specialized vocational training has a standardized exam to evaluate or license potential job applicants. Lawyers, beauticians and nuclear reactor technicians all need to be tested regardless of their college diplomas or on the job experiences. There is, for some reason, no counterpart in the audio industry which is becoming more technically complex every day.

The idea to create such a test has been bantered about the industry for at least ten years now, but the task of establishing one has been formidable. Foremost among the concern is the concept of a requisite license, which opens the host organization into the possibilities of complex legal entanglements. Still, many studio owners, several of whom entered the field themselves back in the halcyon days of mono, want to hire a young person who is up-to-date on the latest computer-based multi-media technology that his studio is currently involved with. Not knowing exactly what questions to ask a potential employee, the owner could well use the results of an exam that shows the applicant's areas of strength.

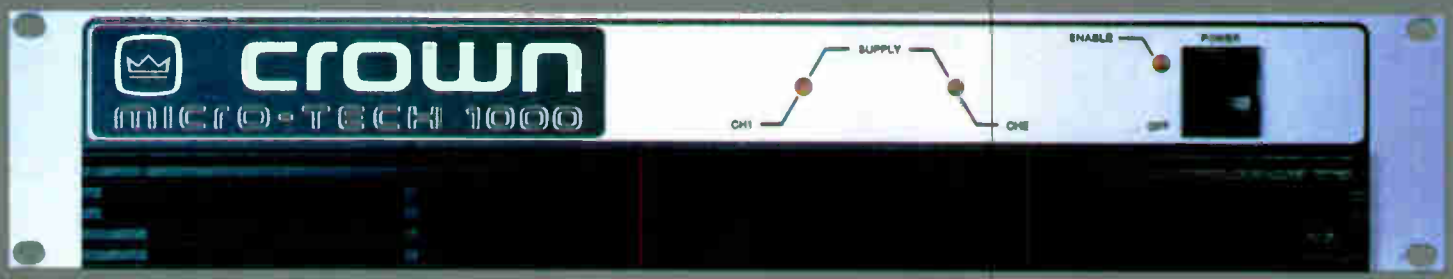
More and more it's WHAT you know that's important in determining who gets jobs in recording.

In 1979, the Society of Professional Audio Recording Studios (SPARS) was formed for the purpose of assisting professional recording studios to establish stronger bonds with both manufacturers and educational institutions. One of the original items on the priority list was the idea of working to establish a standardized exam. SPARS has always had a keen interest in audio vocational training, the source of the majority of its member studios' entry level employees. There have been on-campus meetings of SPARS at several universities where the members were happy to meet with students, tour the facilities, and speak on topics in their field. Individually, SPARS studios and their employees have been involved in education through offering internships, on-campus lectures, and in-studio demonstrations. It is through the efforts of Larry Boden, of the education committee, the SPARS executive board, and executive director Gary Helmers, that the concept gained its current momentum.

It wasn't until the Audio Engineering Society (AES) convention in 1984 that all the elements were put in place to begin. Here, Sony of America chipped in the $55,000 necessary to hire a professional testing service to coordinate the formation of an exam and its administration. The Educational Testing Service (ETS), authors of the SAT, ACT, GRE, MCAT, and other acronyms that cause students to lose sleep, was selected to organize the task through its division known as the Center for Occupational and Professional Assessment (COPA). The center is itself a major user of #2 pencils, as the source of many occupational licensing exams for such diverse occupations as podiatrists, cosmetologists, and building code inspectors.

Still, the COPA people can't be expected to know the needs of the industry or the questions to be asked. This is done through a panel of experts consisting of educators and people in the industry (see box). These people donated their time (and their organizations, the expense) to work with COPA and formulate the exam working with some very scientific procedures.

The first order of business was to determine just what an entry level studio employee needs to know in order to perform the job. This was accom-



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plished in a four-step process. First there was a survey of the literature describing the job. This was followed by on-site visits, with interviews of studio employees. From all this, a questionnaire was formed, with final revisions made by an advisory committee. This questionnaire was distributed to more than 400 studios throughout North America with the request that they be administered to employees with "...the only restriction being that they are working members of our industry, from maintenance technicians to gofers." This was done to insure the exam would be job-related, and also to test whether the candidate would have the background to advance and remain in the industry.

There were 174 respondents to the survey. The results were analyzed by COPA and reported in a beefy handout that was circulated among the panel. Among some of the interesting statistics uncovered: 77 percent have had some college education, the majority had spent six months or less in apprenticeship, and most employees hold the same job description for less than four years.

The remainder of the survey was devoted to the task of finding out just what a person does in an average day's work, thereby determining what they need to know to perform well. The results of this required careful interpretation. For example, an employee could be found operating a telephone or photocopier more frequently than a multitrack digital recorder. It was necessary to sift out this "background noise" to get a better perspective. A policeman, for instance, may fire a gun a couple of times in his whole career, while he spends most of the day driving around in a patrol car. While good driving skills are important, an occupational test needs to concentrate on the skills that are unique to the profession. So, gone are the questions on how to operate a Mr. Coffee—a skill that has eluded me just the same.

Another point of interpretation was resolved in a different fashion. It seemed there was, on the average, very little use of test equipment. On the surface there would seem to be little need for the skill, however it was determined (although we neglected to ask in the questionnaire) that about one in five persons is a maintenance technician. For this person, the skill is of paramount importance, while the other folks don't use it much (if at all). This would account for the low average found. To accommodate this, the test was divided in such a way that the candidate received separate scores for the different areas, thus separating the solder jockeys from the knob diddlers.

The next step was the hardest and most time-consuming—the item writing sessions. While there were developments that I could spend several pages describing, the sessions are considered to be sensitive information not for public disclosure. The censors have allowed me to say two things about the sessions: 1). The sessions were held in large stone buildings in major metropolitan areas. 2). The item writers took time off to eat sandwiches made from cold cuts.

Out of the smoke-filled rooms came the exam in its more or less final form. Even at the time of this writing there are illustrations being prepared, and typesetting is being completed. Preparations are now being made to administer the exam for the first time. There are plans to administer the test once each year, but this could change depending on demand.

I would like to take a moment to describe exactly what the exam entails and how it can be used to best advantage. But first, I would like to state one *caveat*. Certain details such as the exact form of score reporting, and even the exam's name are still subject to change at the time of this writing. Still, the basic concepts have been already well established.

The structure of the questioning forms a matrix that evaluates three task descriptions over 18 knowledge areas, forming a total of 200 questions. The first task description is called "Session Planning and Setup" and involves skills common to all studio personnel, such as understanding equipment specifications and physical properties. The next is "Equipment Operation," which requires skills such as reading flowcharts and all the other artistic endeavors required of a mixing engineer. "Equipment Maintenance" is the third section and it is obviously the nuts-and-bolts technical skills needed to interface or repair equipment. For each of these three, there are questions based in the 18 knowledge areas which include such topics as "Acoustical Properties of Sound," "Environmental Acoustics," "Digital Recorders and Reproducers," "Video Recorders," "Synchronizers," "Music Theory and Terminology," and "Musical Instruments." The exact number of questions in a given knowledge area and task description was determined from the original questionnaire.

It was decided early on that it would be a great disservice to assign a "pass/fail" or even a single number test score to show the candidate's results. Instead the score will be given in a fashion that will require some interpretation. The candidate will have a percentile score for each of the three task descriptions, showing his or her relative strengths in the areas of mixing, maintenance and general knowledge, as compared to the others that took the test. There will also be 18 percentage scores that show the candidate's knowledge of a particular topic. An employer can use the scores to assist in evaluating the applicant's strengths. In addition, schools can see how their students perform on

THINGS YOU DON'T NEED TO KNOW FOR THE SPARS EXAM

When reviewing questions for the exam, many were filtered out for various reasons of unsuitability. Questions cannot discriminate against any ethnic background, concern trivia, or allow a "man on the street" to figure the answer with unspecialized knowledge, for example. So, we ended up with a bunch of derelict questions. We decided to print them here instead of throwing them away.

QUESTIONS:

1. How many grooves are there on a long-playing record?
   a. 1 c. 3,000
   b. 2 d. 30,000
2. Which musician is heavier, Madonna or Cyndi Lauper?
3. Who are Eddie Mahoney, Steveland Morris, George O'Dowd, Gordon Sumner, and Robert Zimmerman?
4. During a recording session of a major star, you wind the tape for a playback of the "perfect take" only to find out that the music contains remnants of improperly degaussed reference tones used to align the machine that morning. You should:
   a. commit hara-kiri with a hot iron
   b. claim a need to "readjust levels"
   c. tell the musicians they really could play it better
   d. pan it and add reverb
5. Why do they always say "used by permission" instead of the grammatically correct "used with permission"?

ANSWERS

Come on, no peeking!

1. b. There is one long, continuous spiralling groove on each side.
2. Madonna, by at least ten pounds.
3. Eddie Money, Stevie Wonder, Boy George, Sting, and Bob Dylan, respectively.
4. d. At least that's what they did on Steve Miller's hit "Fly Like an Eagle."
5. There is no sensible answer to that question. ■

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The exclusive program mix control allows you to mix both tape and live tracks simultaneously. Effectively increasing the number of inputs for overdubbing.

You can also record and overdub through the eight-group output section, or go directly out from the input modules. And on the WR-T820, the eight-group output sections have two outs. So it literally functions as a 16-out console for 16-track recording.

Program Mix Control

Both boards have separate inputs for mike, line and tape. To let you mix any vocal, instrument or tape track you want.

Pushbutton Input Selection

And if you need to isolate any part of the mix, just hit the stereo-in-place solo switch. And the tracks you want will come up in stereo.

You'll also find that both consoles have a powerful three-band EQ with sweepable frequency to give you greater precision.

And to help you keep an eye on everything, you've got the option of combination LED and VU meter bridges so you can monitor all inputs and outputs.

So if you'd rather spend more time making music and less time making patches, discover the recording consoles that'll make the most of your time. And your money. The Ramsa WR-T820 and WR-T812.

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a national basis, thus helping them assess their programs.

I should be careful to mention that this is not a licensing exam, and employers cannot require the exam be taken in order to qualify for a job. It would also not be prudent to use the exam as a simple replacement for other, more conventional ways of screening applicants: reviewing resumes, interviewing, and checking references. As far as the last item is concerned, I am surprised how infrequently references are consulted. I'm certain that many disappointing employment situations could have been mitigated or even averted if the employer had taken the time to discuss the applicant's unique characteristics with someone who has worked with him or her at length.

Still, the SPARS Studio Exam should be another useful tool in the evaluation of an applicant's suitability to match with a job description. As the use of the exam becomes more universal, both the quality of educational programs and the expertise of studio personnel can be expected to improve. Even now, plans are being made to improve the exam and modernize it as new technological developments occur. The SPARS commitment to quality education will continue to be a cornerstone of their purpose.

TO TAKE THE SPARS EXAM

Applications are now being accepted for the first administration of the SPARS Studio Exam. If you will be graduating in 1986, or if you want to make the break and "go professional," you should consider taking the exam. The results of your individual scores will remain confidential and you may opt to retake the exam at a later date. The first step is to obtain an application from SPARS, P.O. Box 11333, Beverly Hills, CA 90213. The fee is $50. Upon receipt of your application, you will be assigned to a testing center near your home where the exam will be administered on December 7, 1985. No calculators or notes will be allowed. Results should arrive within two to four weeks.

THE PANEL OF EXPERTS

When the time came to actually write the "items," or test questions, along with the three "distractors" (incorrect choices), a committee was selected among industry professionals and equipment manufacturers, along with educators such as me. This group is otherwise known as the "Panel of Experts." Expert comes from the Greek "ex" or "has been" and "-spurt" which is a drip under pressure. It is these guys who sat up late nights dreaming up those diabolical mindbenders that make up the test.

The names listed below should give an indication of the diversity of expertise assembled, and more importantly should serve as proof to the IRS that they weren't out squandering away corporate funds on a junket: Murray Allen (Universal Recording), Jerry Barnes (United Western Studios), John Barrilla (Center for the Media Arts), Charlie Benanty (Soundworks), John Binder (Editel-Chicago), Larry Boden (JVC America), Guy Costa (Motown/Hitsville), Lou Dollenger (Digital Entertainment Corp.), Albert Grundy (Institute of Audio Research), Greg Hanks (N.Y. Technical Support), Gary Helmers (SPARS), Harry Hirsch (Center for the Media Arts), Alan P. Kefauver (Peabody Institute), Ira Kemp (Gordon Entertainment Ltd.), Oliver Masciarotte (University of Miami), John Monforte (University of Miami), Len Perlman (Editel-Chicago), Martin Polon (Polon Research Institute), Roy Pritts (University of Colorado), Don Puluse (Berklee College of Music), Joe Tarsia (Sigma Sound), Van Webster (UCLA Extension).

I would also like to recognize the efforts of COPA representative Nancy Thomas, who was the authority on test construction and of our participles she prevented us from dangling. ■

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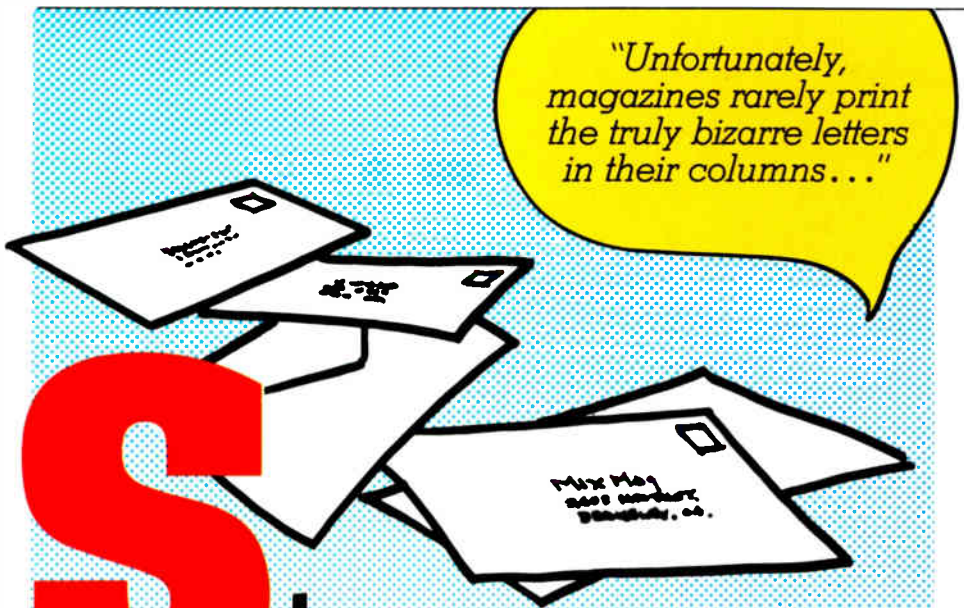

Strange Reader Mail

by Ken Pohlmann

A mailbox is a fine thing to have. It's a joy to come home from work each day, to see what paper treasures have been deposited by the outside world. Increasingly, my daily load contains contributions from involved readers, eager to offer additional information, insight, encouragement, or to pose questions. I also attract a lot of wacky letters, as well as some hate mail. Unfortunately, magazines rarely print the truly bizarre letters in their letters column (e.g. "Feedback") and that's too bad because they're the most fun, and reveal the true depths of human strangeness. And in the music business, those depths are deep and strange indeed, particularly when it comes to topics such as digital audio, the Compact Disc, rock and roll gods, and studio dress codes... Just check out these few examples. And keep in mind that these are actual letters; I am not making them up. Only the names have been changed to protect the eccentric, and the lame.

Dear Mr. Pohlmann,
I am sick and tired of reading your pro-digital comments in *Mix*. The Compact Disc is the worst thing since the LP. I have a collection of more than 440,000 78s and as far as I'm concerned, they sound great on my system. I have a custom turntable with a tonearm carved from Carvel lychee nut ice cream, kept at precisely 17 degrees Fahrenheit to prevent resonance and melting. It is equipped with a Hans Brinker skating switch, and a cactus needle stylus that needs replacing only every 30 revolutions. The turntable has a 300 ton lead base, mounted on a concrete pillar extending three-quarters of a mile into the earth's crust. With audiophile gear like this, you'll understand that gimmicks like digital audio have little value for me.
Sincerely yours,
Dr. E.A. Fingers

Dear Dr. Fingers,
I understand your position completely. And speaking of position, I see from your postmark that you are located precisely over the San Andreas Fault; if you ever play the "1812 Overture" on your turntable, California would slide into the ocean. While this would improve the air quality in L.A., it would make the fog in San Francisco even worse. I have advised the Mix *staff to evacuate to Des Moines immediately. Meanwhile, the Civil Defense Corps is converging on your house with pitchforks and torches.*

• • •

Dear Mr. Pohlmann,
Ever since I can remember, I wanted to be a rock and roll god. I started taking lip-synching lessons when I was three, and skipped grade school to concentrate on pelvic exercises and gymnastics. I can do both forward and backward flips from a standing position while looking into the camera. When I was 12 I had a leather jumpsuit surgically implanted on my body, and I always carry a pair of rolled-up socks you-know-where. I think I'm ready for the Big Time, but someone suggested that I study music, or maybe learn to sing. Is this really necessary?
Thank you in advance,
Ted Minx

Dear Mr. Minx,
Don't bother. Just make sure your manager drives a leased Corvette, and your producer has a complete wardrobe of satin baseball jackets. Of course, your own preparation is still essential; before your first quadruple-platinum recording session, you'll have to learn how to wear headphones with one ear covered, and the other open, and say "Can I have more reverb on just my vocals?" That should about do it. Since no one else wanted it, I've taken the liberty of signing you for the lead in Van Halen. I hope you don't mind.

• • •

Dear Ken,
The best I can tell, about 200,000 people read *Mix* every month, unless there's a James Bond movie on cable TV. Here's the scheme—in your next column, start off with a story about a kid who needs ear transplants, so you want readers to send in donations. With that many readers, we should get at least $100,000. I'll split it 50/50 with you. What do you say?
Sincerely,
Tom Slime

—PAGE 22

FROM HAIRPIN TURNS TO STRAIGHTAWAYS, THE SPEED OF SOUND HAS NEVER BEEN SO SMOOTH.

For years, sloppy tape transportation and handling have made the audio engineer's day much harder than it had to be.

This tormenting state has come to an end with the introduction of Sony's APR-5000 2-track analog recorder, available in a center-track time code version.

The APR-5000's precise handling and numerous advanced features make the audio engineer's day run much smoother. For example, the APR-5000's 16-bit microprocessor manages audio alignment with a precision that's humanly impossible. And the additional 8-bit microprocessor opens the way for extremely sophisticated serial communications. In tandem, they reach a truly unique level of intelligence.

Not only does the APR-5000 do its job well: it does it consistently. The die-cast deck plate and Sony's long-standing commitment to quality control maintain that the APR-5000 will hardly need time off.

All of which results in a consistent sonic performance that'll stand even the most critical audio professionals on their ears.

For a demonstration of the recorder that transports analog audio to a new fidelity high, contact your nearest Sony office:
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Central Region (312) 773-6000;
Western Region (213) 639-5370;
Headquarters (201) 930-6145.

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—FROM PAGE 20

Dear Mr. Slime,
I am very disappointed in you. How could you consider ripping-off people like that? Don't you realize how hard people work for their living, and how much they need those bucks to make ends meet? For example, I've been working seven jobs for the last five months, trying to scrape up enough to save the life of a little baby deer that's been trapped in a barbed-wire, electrified cage. I only need $100,000 more. If only all the readers who aren't watching the James Bond movie would take time out to send me a dollar, care of Mix *magazine, we might be able to save this fragile thing of beauty.*

• • •

Dear Ken,
I would like to introduce you to our new line of Rock and Roll Designer clothes. We have three new looks for the music business. The Recording Engineer Designer clothes feature a razor blade sharpening strap, vintage MCI T-shirt, and a pouch for food stamps. The Producer Designer clothes feature an inflatable pillow for napping under the console during late night sessions, and a cordless telephone that causes RF interference on tracks 3 through 11. The Lead Singer Designer clothes feature black satin pants, leather bra, silver scarf, and see-through bottoms; there is also a complete line available for female stars. The entire Designer collection will be previewed at our Fall Showing on the loading dock behind the New York Hilton, October 12 at 8:00 p.m. You are cordially invited.
Sincerely yours,
Alex of Hollywood

Dear Alex,
Thanks for the invitation; unfortunately, I have to do my laundry that night. Also, I now have my own line of Designer apparel—Circuit Designer clothes. These have been specially created by a team of unemployed video game programmers and feature plastic pocket protectors crammed with mechanical pencils, belt loops for hanging calculators, and mismatched socks, all with my exclusive NERD label.

• • •

Dear Mr. Pohlmann,
Miami Vice has great music, but the stories aren't realistic enough. I've got a great idea for a script. A recording engineer goes crazy and starts erasing master tapes so Crockett and Tubbs have to nuke Miami. What do you think?
Respectfully Submitted,
Jorge Valesquez, Key Grip

Dear Mr. Valesquez,
This is a pretty good idea, but it's pretty tame stuff for Miami. Why don't you send the idea to Simon & Simon?

• • •

Dear Mr. Pohlmann,
Several times, I have read your column while waiting for my veterinarian, who shares a waiting room with Pearls Before Swine Recording Studios. My parakeet, Arthur Schopenhauer, has been very pessimistic lately, and my veterinarian has advised me that digital audio is the cause. It all started when I played a Compact Disc for Arthur Schopenhauer and he became impotent. Actually, I'm not really sure whether it's a male or a female, but it's obviously under a lot of stress now because it isn't singing anymore, or moving. Also, it has started to smell. Can you advise me of the health hazards of digital audio? It's very important. Pearls Before Swine has already signed Arthur Schopenhauer for a triple platinum album; we only have to complete the demo tape.
Thank you,
Mrs. Wilhelm Zipp

Dear Mrs. Zipp,
You are obviously a very perceptive person. In fact, if you look closely, I think you'll see that the reason your parakeet isn't singing is that it is dead. I suggest you file suit against Sony and Philips, the inventors of the Compact Disc. If you read the fine print on a disk, you won't find any disclaimer about responsibility for wrongful parakeet death, thus it should be an open and shut case. Furthermore, I suggest you have Mr. Zlott, the author of the next letter, represent you in court.

• • •

Dear Mr. Pohlmann,
My mind is like a *steel trap,* so very little gets in, or out. Therefore I am not fooled by your constant prejudice toward digital audio. As everyone knows, digital audio has no future. The Nyquist Theory is only a theory; it might be fine for mathematicians, but it doesn't work for people with ears. Too much signal is lost between samples, and anyway, the high-end response is unnaturally flat. The only kind of music it's any good for is organ music, because organs play only sinewaves. Any complex waveforms—forget it. Also, digital audio is bad for loudspeakers because the constant stream of ones and zeroes causes cone breakout. In the future, you should check your facts before you attempt to discuss digital audio. Remember, a little knowledge can be a dangerous thing. How did you get your writing job anyway? Are you David Schwartz' brother-in-law, or what?
Shape up!
Alfred Zlott

Dear Mr. Zlott,
Frankly, I think you are a jerk. I have taken out a subscription for Absolutely Analog *magazine in your name, because primitives are very tribal by nature. Also, if all you guys are on one list, it's easier to keep track of you.*

• • •

Dear Mr. Pohlmann,
I am a microphone repair technician, second class, at ACME Audio, where I read your column religiously during my lunch break. After cleaning dried saliva off microphone diaphragms for 11 years, a brilliant notion struck me. You know when you go to the dentist, and they hang that suction thing from your lower lip to drain off your saliva? Well, how about doing that with vocalists too? Last time I had a cavity filled, I tried singing and everyone said I sounded as good as the lead singer in Van Halen. Could you please send me patent information on this idea, and Van Halen's unlisted number?
Sincerely,
Biff Motel

Dear Biff,
This is a great idea. As a recording engineer, I've done my fair share of mopping up after overdub sessions, so I can commiserate with you. Now maybe you can invent a device to electrocute people who put Pepsi cans on the console.
P.S. I am sorry to inform you that the Van Halen vacancy has already been filled by Mr. Minx. However, MTV is always looking for people who have licked their drooling problem.

• • •

Dear Kenneth,
I have just learned of the publication of your new book, *Principles of Digital Audio,* available from the *Mix* Bookshelf. With 320 pages and 237 illustrations, it is a real bargain at $19.95. Plus, this is one of the few comprehensive books on digital audio with a cover picture of a "Digimusiphone," an instrument with two spit valves, but no place to blow into. Keep up the good work!
Sincerely,
Mrs. Pohlmann

Dear Mom,
Thanks, but I'm still not going to give you a free copy. If you want one, you'll have to order it like everyone else. The Bookshelf's number is (415) 843-7901. MasterCharge and Visa are accepted. I hope you understand. My lip-synching lessons are costing me a fortune. ■

prophet 2000

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Sequential is proud to introduce the Prophet 2000, an 8-voice professional quality sampling instrument. Based on 12-bit digital technology, the Prophet 2000 will reproduce any sound you sample with astounding realism and studio quality audio fidelity. And that's just the beginning! Once you've sampled a sound (or selected one from our library of pre-recorded factory disks), you can modify it by using the many digital, analog, and keyboard controls provided. Each voice features a 4-pole, low pass VCF, a VCA, and velocity controlled, four stage envelopes. You can assign multiple samples (up to 16) anywhere on the keyboard. By assigning two or more samples to the same keyboard range you can create layered sounds and multiple-voice stacks for unison effects.

Mfr's. Suggested Retail $2499.00

The Prophet 2000's velocity sensing 5-octave keyboard provides you with precise control over loudness, modulation amount, timbre, sample start points and crossfading between two separate sounds. The keyboard's weighted action responds positively to every nuance of your playing technique. Additional user-sampling enhancements include a variable input level control, complex sample editing (reverse, mix, truncate), and automated looping functions such as computer assisted zero cross-over and zero slope selection to help you find the best possible loop points.

The Prophet 2000 comes with multiple wavetables stored in on-board memory for building "traditional" synthesizer sounds. You can play these sounds alone or in conjunction with sampled sounds by splitting the keyboard or layering sounds on top of each other. The on-board 3½-inch disk drive provides you with a fast and easy method of storing your sounds and custom programs.

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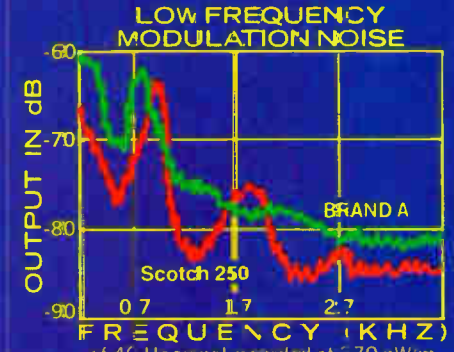

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Ambisonics:

A NEW LEASE ON LIFE

by Barry Fox

Over the next few months, the recording industry can expect a surge of publicity for the British Ambisonic surround-sound system. New hands are at the helm.

A national quasi-official corporation, the British Technology Group, has until now been responsible for trying to sell Ambisonics, but with little success. BTG, previously the National Research Development Corporation, was created to help British inventors exploit their innovation. But NRDC and BTG have been heavily criticized over the years for their lack of initiative and stuffy bureaucracy. Dealing with BTG is like dealing with schoolmasters and bank managers. As you would expect of such an organization, they have no experience in domestic or professional audio. Under the circumstances, it is hardly surprising that they have failed to get Ambisonics off the ground. (BTG is joint-sponsoring a seminar on Ambisonics in October but decided against press-releases!)

Now, after literally years of behind-the-scenes haggling, a Vancouver company, Maple Technology, has finalized a deal with BTG. It will take an option on Ambisonics and the 115 patents granted worldwide on the technology, in return for a down payment and annual royalty of around ten percent on any commercial success. With a bit of luck, BTG will now be freed from trying to exploit something it has never really understood, and the Ambisonics system will be taken more seriously by the audio fraternity. The big question, yet to be answered, is whether it is now too late for *any* surround-sound system to be taken seriously.

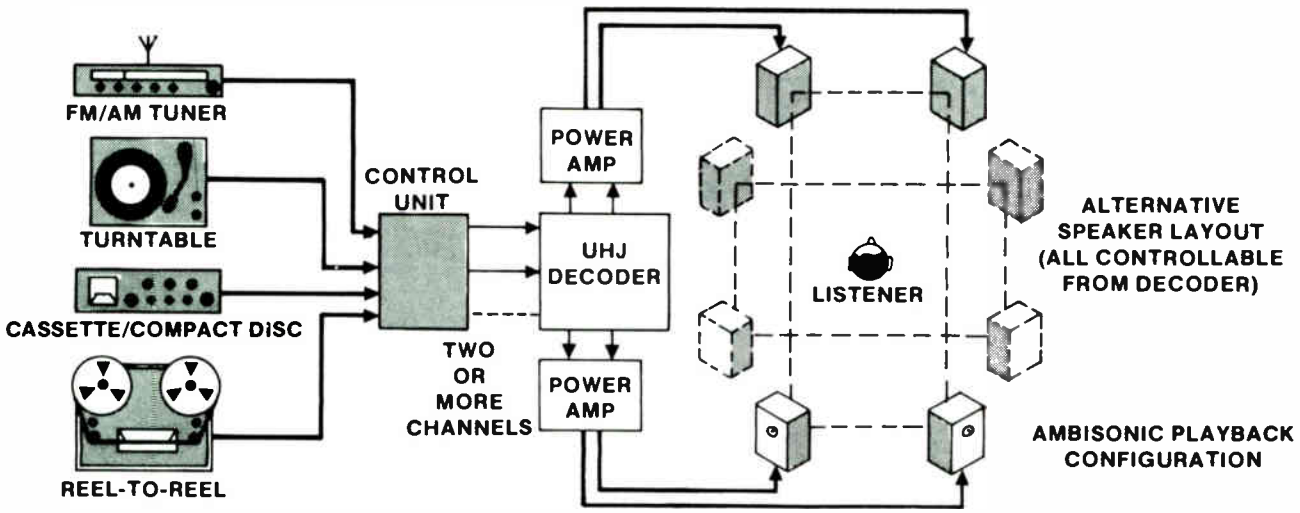
In the early '70s the audio industry went crazy about the idea of surrounding the listener with sound. No one could agree on how best to do it. Out of dozens of ideas, most of them patented, four main approaches emerged. All recommended four loudspeakers around the room, ideally fed with separately sourced signals. Essentially the idea was quadruple stereo; the four speakers provided four stereo pairs. As such, the idea was doomed from the outset.

Conventional stereo works properly only when the listener is facing a pair of loudspeakers separated by an angle of not more than 60 degrees. The system also works to a certain extent when the speakers are behind the listener. But pairs of speakers to the side produce no real stereo effect. Also, when four loudspeakers are arranged in a square, each pair subtends a listening angle of 90 degrees. This is wrong for stereo. The theory tells this, so does practice.

Try listening to a 90 degree pair. It is too wide to avoid a hole in the middle. Try standing side-on to a stereo pair of loudspeakers and hear what happens to the image spread. Two-channel stereo, based on the ideas of Alan Blumlein in the '30s, relies on each ear of the listener hearing each loudspeaker at the same time, but with the loudspeaker reproducing signals of different amplitude, depending on where the sound is intended to come from.

As evidenced by modern Dolby cinema stereo, the effect of putting music, bombs and applause behind the audience can be dramatic. But this is a far cry from the avowed aim of surround-sound engineers, namely to recreate

POTENTIAL PLAYBACK ARRANGEMENTS FOR AMBISONIC-ENCODED MATERIAL



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the sound of a live musical performance in the home. For this you need an image spread that smoothly surrounds the listener.

Back in the '70s, there was a boom in anything labeled "hi-fi," and the dramatic appeal of quadraphonic sound was enough to make the idea a craze. As most rooms are rectangular, and a four-loudspeaker system fits naturally into the four corners of a rectangular room, surround-sound became known as "quadraphonic" or "four channel" sound. The industry burned the midnight oil devising better ways of recording or reproducing four channels of sound instead of two. That's how the four systems were born.

The SQ and QS matrix systems, developed by CBS and Sansui, simply mixed two extra channels of rear sound in with the front stereo pair, adding extra phase shifts to help separate the signals again by addition and subtraction. JVC and Nippon-Columbia (Denon) developed multiplex approaches, with extra channels of information recorded on high frequency carriers. Inevitably, if only because all four systems were incompatible, they all failed commercially. But Nippon-Columbia also had rights on an encoding technique patented by Duane Cooper, of the University of Illinois. Meanwhile, in Britain, two university academics, Professor Peter Fellgett of Reading University, and Michael Gerzon then of the Mathematical Institute of Oxford University, were working on an approach which turned out to be similar in some ways to Cooper's. The first thoughts struck both Fellgett and Cooper at around the same time in 1970. Both filed patents. Gerzon joined in and took the idea much further.

The Ambisonics team always rejected the quadraphonic approach to surround-sound. Whereas in quadraphonics, the starting point is assumed to be four signals, and these are intended for amplification and direct feed to a loudspeaker, Ambisonics begins with the idea of encoding direction itself. There is thus no attempt at pairwise blending, the technique of surrounding the listener with four loudspeakers fed with four stereo signal feeds. There is thus no desire to try and record or transmit four separate loudspeaker signals in a two-channel medium and then try to recover them as well as possible.

The object of Ambisonics is to create an illusion of sound from any direction using four (or more) loudspeakers around the listener. Signals for use as loudspeaker feeds are generated only in the final decoding equipment using the directional information in the incoming signals carried by two or more recording or transmission channels, depending on what is available. Loudspeaker feeds cannot exist at any previous point in the chain, because they must depend on the actual loudspeaker layout. Two transmission channels are adequate; but a better illusion is obtained if the speaker feeds are derived from three channels. As a compromise, the third channel can be of more limited bandwidth, a so-called half channel. If a fourth transmission channel is used, there is nothing to be gained (and in practice even something to be lost) from using it to produce the feeds for a simple horizontal loudspeaker set-up. If a fourth channel is available, it is used to convey height information. From this the decoder can derive feed signals for speakers positioned above and below the listener.

The signals recorded in the studio are so-called B-format. They are a clutch of four, including height information, and suitable for recording and transmission on any four-channel medium. Because they are not loudspeaker feeds, they are not directly playable. The B signals are best thought of as an archive format, from which a variety of user signals can be derived, in 2-, 2½-, 3- or 4-channel formats depending on the carrier medium available. Hence Ambisonics can make good use of the two channels available in conventional stereo media, or of extra channels available by multiplexing, or in modern digital media.

In 1979 the British NRDC, (now BTG), did a deal with Nippon-Columbia in Japan. It had become clear that Ambisonics research could progress best in conjunction with the Duane Cooper patents, and the multiplex technology developed by Nippon-Columbia for UD-4 could also help. The 1979 deal created a patent pool which cleared the way for research and commercial exploitation without the risk of patent infringement suits.

One aim of Ambisonics was to sample the soundfield in a studio or concert hall at a single point in space. It is physically impossible to have even two microphones located at precisely one and the same point. Even a few millimeters offset will cause phase discrepancies at high frequencies. This problem was overcome by the development of the soundfield microphone in which the passing soundwaves are sampled by a regular array of sensitive elements, the outputs of which are processed to give signals characteristic of the soundfield at a single central point. In the soundfield mike now available from Calrec Audio, four capsules are positioned so that their maximum responses are respectively left back down, left front up, right front down and right back up. The four capsule signals are separately amplified and mixed to deliver four equalized outputs. One of these is an omnidirectional signal. The remaining three are equivalent to the signals which would be produced by figure-eight microphones pointing front-to-back, left-to-right and up-and-down. A tailored frequency response in the mixing unit ensures that the output signals have identical frequency response for sounds arriving from all directions. These four output signals (omni, front-back, left-right, up-down) are the B-format signals. The three figure-eight signals, when related to the omni as reference, carry directional information on all sound arriving at the microphone.

Although classical recording engineers will be happy to use a single soundfield-sampling microphone located in front of the orchestra, it is not at all what the pop industry wants. Over recent years, the Ambisonics team has worked with the British firm, Audio & Design, to develop a studio desk bolt-on which will take an input of multi-track mono recordings and mix them into a reasonable equivalent of the B-format soundfield-sample. This now allows engineers to make pop recordings with multi-track equipment, and mix down into Ambisonic surround-sound. Stereo and mono compatibility are good, because there is none of the brutal rear channel anti-phase coding used by the quadraphonic matrix systems.

For the foreseeable future at least, the Ambisonic signals delivered to the listener will be in two-channel format. A few broadcasters have experimented with the transmission of an extra full, or half, channel; the Nippon-Columbia multiplex technology makes it possible to record the extra channels on vinyl disk; and Compact Disc coding leaves room for three or four channels. But realistically it would only be after Ambisonics was already well accepted that there could be much prospect of persuading the broadcast and recording industries to take an interest in these possibilities, or of the public buying the necessary multi-channel equipment. So for the foreseeable future, Ambisonics will stand or fall on its ability to create a reasonable surround-sound effect from two-channel recordings or broadcasts.

The consumer or C-formats are known collectively as UHJ, a hierarchy of directly compatible 2-, 2½- and 3- or 4-audio signals. The UHJ signals arriving from disk, tape or radio are decoded by an amplitude-phase matrix into signals generally corresponding to the B-format signals which originated in the recording studio, so that there exists inside the decoder an omni signal, and two difference signals, one front-back and one left-right. If the UHJ input contains height information in a fourth

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channel, a fourth up-down difference signal is produced by the decoder.

The decoded signals are further processed prior to amplification in a way which depends entirely on the number of loudspeakers used, their angle around the listener, and their distance from the listener. The decoder has adjustment controls for this. This is not simply a variation in the gain of the signals fed to the various loudspeakers. In a simple four-loudspeaker set-up, it allows for the arrangement not necessarily being square, as was normal in quadraphonics. If, for example, the loudspeakers are further apart front-to-back than side-to-side, selecting the appropriate decoder setting causes the gain of the front-back difference signal to be reduced to compensate for the increased speaker separation. At the same time, the gain of the left-right signal is increased to compensate for the decreased width in this direction.

At low frequencies where the distance of the listener from the loudspeaker is comparable with the wavelength of sound, the difference signals inevitably suffer some bass boost and phase shift similar to the well-known "boominess" of some microphones used at close range. The decoder therefore includes inverse high-pass filtering which compensates for this distance effect when the decoder is set to match the room layout.

Even when the loudspeaker layout and decoder are directly matched, there is still the very real problem of how to produce sounds from the loudspeakers which will create audible clues to fool the listener's ears and brain into believing that the soundfield is originating from an infinite number of sources, not just a clutch of loudspeakers. The accepted theory on sound localization is that humans evaluate the amplitude and phase of signals which arrive in each ear. For low frequency, long wavelength sounds, a human head offers virtually no obstacle so the sound arriving at each ear is virtually the same level, but there is a difference in phase because of the extra distance traveled across the head. So at low frequencies, phase is a directional clue.

At higher frequencies, where the wavelength is comparable to the size of the head, phase relationships become ambiguous. At these high frequencies, the head acts as a baffle and creates a difference in sound level amplitude. So for high frequencies the ears and brain use level as a directional cue. Ambisonic decoders exploit these mechanisms with a frequency-dependent matrix which emphasizes amplitude clues above the transition point and phase clues below it. An important point is that there is gradual transition between the two effects, rather than an abrupt switching. Shelf filters are used in the three signal paths, omni and two difference signals. All this filtering takes place ahead of amplification; it is not equalization in the conventional sense.

Maple is now up against the same hard fact of audio life that scuppered BTG. Almost no one—public, studio engineers, broadcasters, record company executives and so on—has any interest in trying to launch what they see, however mistakenly, as just another quadraphonic system. Another obstacle to commercialization is the need for a systems approach. There is no single, simple circuit which does the trick; the Ambisonic approach is like a jigsaw, where each piece is of equal significance. The only way to sell it is to get the system heard, and let the sound speak for itself. This is where the stuffy British bureaucrats have failed miserably.

Although there are records on sale which are encoded in Ambisonic UHJ format, they are bought mainly by people who do not know what Ambisonics or UHJ mean, and play them in mono or stereo. Although there are decoders available, from the small British firm Minim, they are known mainly to hi-fi buffs. There has never been any attempt to exploit a valuable feature of Ambisonics, stereo decode or "super stereo." This could have broken the no hardware-no software vicious circle.

Stereo decode works on ordinary stereo recordings or broadcasts, and uses the available circuitry and extra loudspeakers to improve the localization of front images. It also provides a width-control, enabling the user to spread the directions from which sounds appear so that instead of being confined to between the front loudspeakers, as in stereo, they can be spread to the sides and around the back. Used in this way the decoder can produce an impressive spread of surround-sound from most stereo material, better than the pseudo-spread produced by old quadraphonic systems. People who bought decoders for the super stereo effect could then try playing UHJ recordings.

The same thing might happen, although it now seems too late, with video surround-sound. An increasing number of hardware firms are now offering decoders for the Dolby surround-sound available on most stereo video tracks. An Ambisonic decoder for Dolby surround could have offered UHJ decoding as a bonus. None of this has happened under the BTG regime. Now that what one British inventor recently described as their "dead hand" has been lifted, perhaps Ambisonics will finally take off. ■


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Digital REVERB

PART FIVE

building the perfect beast

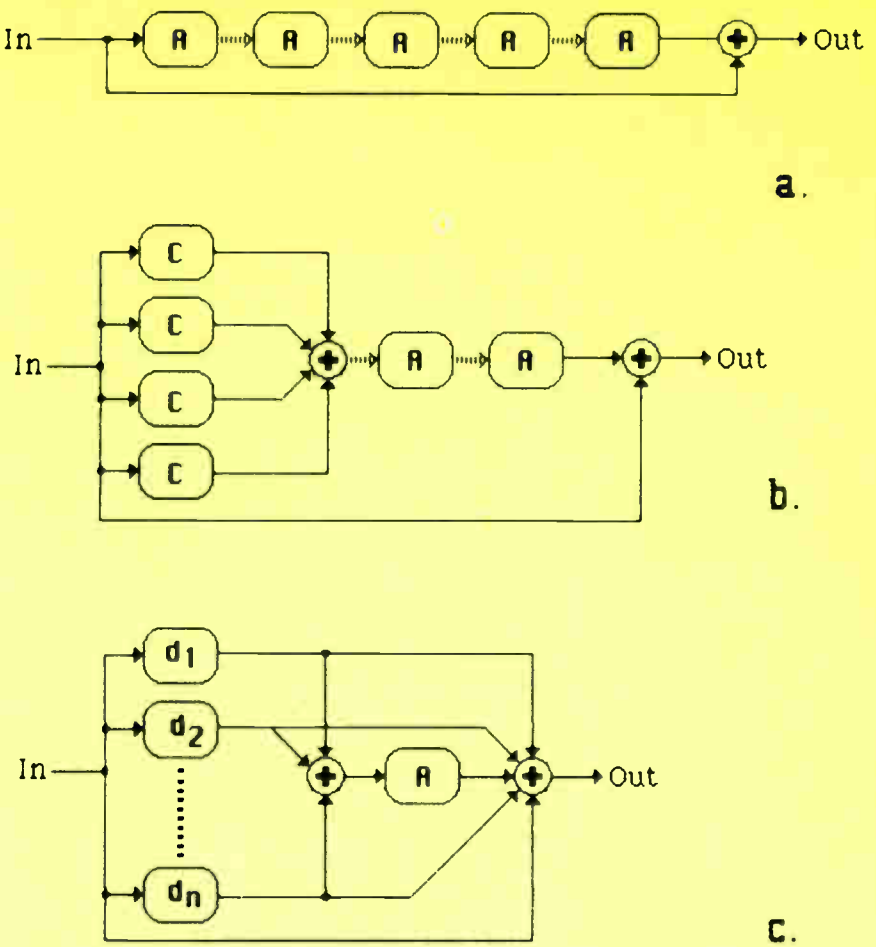
by Larry Oppenheimer

This is really the last part of this series. If you have been following along throughout, you are probably eager to dive into the meaty conclusion of the *Mix* Digital Reverberation Roundtable, which was held during the 78th Audio Engineering Society convention in Anaheim, California. If you have not read parts one through four, you probably don't understand who the participants were and what they were discussing. Shame on you. Parts one through four can be found in the May, June, July, and September 1985 issues of *Mix*.

In any event, only three topics are covered in this part, but they are three of the most vital points in the entire subject of digital reverberation, and, in fact, digital audio signal processing in gen-

—PAGE 35

Some of Manfred Schroeder's reverberation algorithms.



a. Five all-pass filters in series (1961). Schroeder called this "colorless" reverberation.

b. Four comb filters in parallel, followed by two all-passes in series (1962). Realizing that real room reverberation is anything but colorless, Schroeder added the comb filters for spectral contouring, then used the all-passes to add density. This combination he called "natural sounding" reverb.

c. Summed discrete delays feeding a reverberator such as in (b) (1970). Early reflections are simulated more accurately with a number of carefully timed and spectrally contoured delays, then the result is reverberated. Note that the characteristics of the delays greatly affect the characteristics of the reverb.
All elements in a, b, and c are scaled before summing. Creating the algorithm is only half the battle; properly setting delay times, feedback gains, and scaling factors is crucial, too.

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We know that you don't always think in terms of "pitch ratios". Sometimes, you simply want to go up a major third, or down a fifth. So to make things easy, the H969 gives you twelve "instant" pitch change presets. Setting a precise major third, minor third, fifth, seventh or octave of pitch change is a cinch — just push one button. Each interval can be selected as a sharp (increase pitch) or flat (decrease pitch). There are also instant presets for sharp and flat micro-pitch change, for vocal doubling and effects.

You choose from two ways to select pitch ratios and delay times on the H969 — positional and auto incremental. Individual coarse and fine adjust controls make it a snap to get exactly the pitch ratio you want. And once you choose your settings, the digits are rock-stable. Unless of course, you ask the H969 to automatically vary the pitch ratio — up or down, at your choice of speed.

To make the H969 as easy to use in live performance as it is in the studio, we've included a front panel preamplified input, in addition to the usual XLR-type studio level input. Just plug in your instrument. There's a companion front panel output jack, too. The H969 also has remote line in/out switching capability, plus remote pitch ratio/delay time set provisions. A keyboard can also be accommodated.

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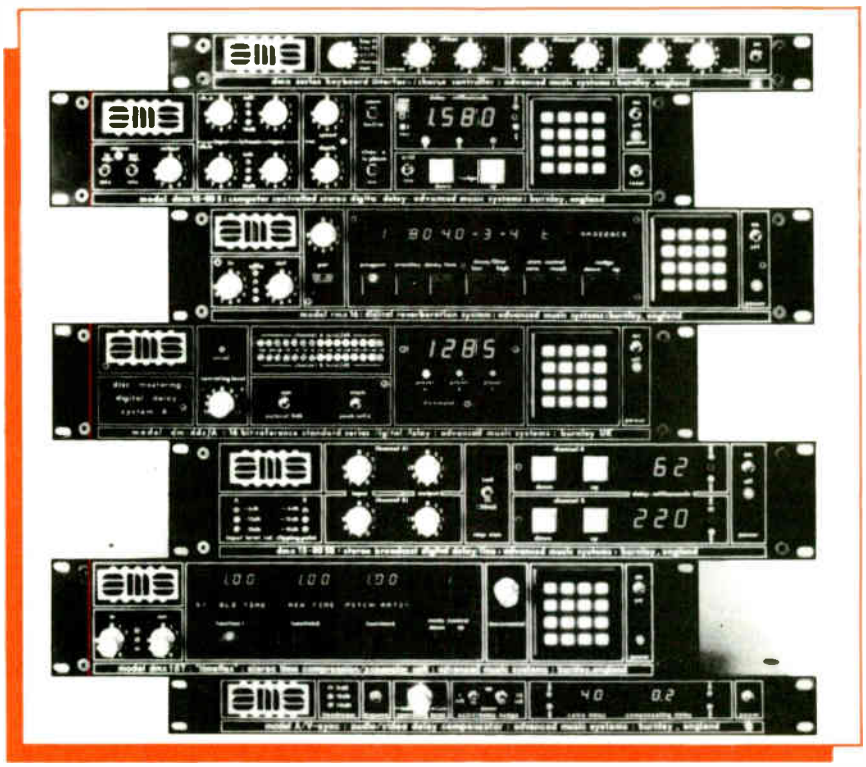
September 1985 No. 6

ECHO TIMES

EMI: AMS

At a recent studio managers' conference held at EMI Abbey Road Studios in London it was unanimously agreed that pieces of AMS outboard equipment would be made available for every control room in all EMI recording studios worldwide. The delegates represented studios from EMI's international network including Japan, Australia, New Zealand, U.S.A., Germany, Sweden, South Africa, France, Holland and the U.K.



NEW·NEW DMX 15-80S Two Channel Sampling

A new update has now been introduced for the DMX 15-80S giving users the option of sampling and triggering two independent pieces of information.

Each of these samples is controllable as with the original single loop – continuously looped, manually single triggered or triggered by audio input. In the case of audio triggering, audio input sufficient to illuminate either the channel A or channel B input LEDs will result in triggering of the sample stored on that channel of the unit.

NEW·NEW RMX 16 Memory Expansion

The RMX 16 can now be supplied with memory expansion to increase the number of factory set programmes from 9 to a number capable of accommodating all AMS factory set programmes available at any one time. New programmes for the RMX 16 will still be made available on bar code allowing those owners with remote terminals and wands to immediately take advantage of new software issued.

NEW·NEW TIMEFLEX

AMS Timeflex has continued to prove its popularity with audio, video and film post production facilities by providing very high quality audio time compression. Timeflex is capable of operating in mono, dual channel or stereo modes and for this reason contains additional circuitry to that offered with standard AMS pitch changers to ensure complete phase matching of channels when used on a stereo signal.

A new interface card for AMS Timeflex is now available providing communications to external audio, video or film machines. The two standards currently offered are RS 422 and 9K6/19K2 tacho signals. These interfaces allow Timeflex to automatically correct audio pitch should the machine to which it is interfaced be vari-speeded. Alternatively, again using this interface, Timeflex can behave as master simply allowing the user to enter a new play time and accordingly Timeflex will accurately alter the machine speed and correct the audio pitch.

TIMES SIX

The popularity of "Echo Times", particularly in the U.S.A., as a medium for keeping owners, users and potential owners of A.M.S. equipment up to date with the latest developments has not gone unnoticed. We have received many requests to supply back-issues and accordingly reprints of all previous issues have been made and complete sets are now available on request.

The following people were interviewed in issues 1 to 5, all discussing their uses and applications for A.M.S. units: Martin Rushent, Kevin Peak, Air Studios, Hilton Sound Rental Company, Tom Bailey (of the Thompson Twins), Phil Collins, Humberto Gatica, Jeff Lynne of ELO, Paul McCartney and Hugh Padgham.

People in the know

"The AMS DDL is used to provide variation on the various rhythms, especially the bass drum rhythms. Effects used on 19 were setting the delay to a semi quaver's length so that instead of a steady four on the bass drum you get sixteenth notes in succession. A reverb with a long delay time could then be added to the original bass drum but omitted from the echoes for extra effect. Another effect that was used was to make the echo fall on an existing beat such that phase elimination would occur.

Also sometimes I add a bit of white noise to the snare by playing it onto a track from a synth, just to make it sound bigger. And I've found ways of using the AMS to make the sound much bigger."

Paul Hardcastle talking in an interview with Richard Walmsley in Electronic Soundmaker and Computer Music magazine.

"It is generally felt in digital circles that hard-disc editing is the way of the future, and with AudioFile, AMS has beaten many of its larger competitors. The software possibly needs a little refinement, but I for one am looking forward to the day when I can install one of these devices in Tape One."

Bill Foster of Tape One studios talking in Music Week.

"One of the stars of APRS 85 was AudioFile from AMS."

Jim Evans of Music Week.

"On Mag element A there was an LCR band mix, mag B contained Sting's vocal on track one, and the girl backup vocals on tracks two and three, and on the last three-track mag element there was bass and stereo audience. AMS digital effects were summed onto selected tracks during this mixdown: "AMS mania" according to Aaron."

Brad Aaron talking to Larry Blake of Recording Engineer/Producer magazine about "The Police Synchronicity Concert" film.

"After all, recording in 1985 is not like recording even in 1982. A little bit of the modern technology had kind of passed them by while the band was regrouping (after Lionel Richie went solo). They saw the AMS gear lined up in the outboard rack, and they couldn't believe it. We were sampling drums: we'd have a guy come in, but we wouldn't use him playing – we'd just sample his kit. Then we would have the track programmed on a Linn and we'd replace the machine bass drum or snare with sampled sounds.

It took the making of this album for the band to embrace the new technology."

Dennis Lambert talking about the making of the Commodores "Nightshift" album in an interview with Mel Lambert and Ralph Jones of Recording Engineer/Producer magazine.

"If we're doing the cymbal parts separately, I'll use an AMS stereo timeprocessor with no delay using pitch changer on A channel reading 1.005 and on B channel reading 0.995 (1.000 is normal pitch). If you send the left hand cymbal track to the B channel of the AMS which returns on the right hand side, and send the right hand cymbal track to the A channel of the AMS which returns on the left hand side, this gives a nice zingy spread to the cymbals without being too splashy."

Producer Steve Brown talking to Janet Angus about his work with Wham, ABC and many others in HSR magazine.

APRS '85: Stuart Nevison of AMS with Stewart Copeland of the Police, discussing AMS AudioFile.

APRS '85: Ian Noble of AMS discussing AMS AudioFile with John Paul Jones formerly of Led Zeppelin.

"Is there any outboard equipment you particularly like?"

"Well I really like our AMS reverb, it gets used on nearly everything."

Muff Murfin, studio owner talking to Paul White of HSR magazine.

"One thing we did was to take the kit out into the live foyer, record the snare onto digital, pick up a good sounding hit and dump it into the AMS digital memory. Then in the mix we triggered it from the normal snare and added it to the overall sound to give a bigger Ambiance."

Producer Chris Kimsey discussing the track Kayleigh by Marillion with Jim Betteridge in International Musician and Recording World.

"When I mix I like to have a couple of AMS delay lines, minimum, an AMS reverb, as many Pultec (valve) equalisers as there are in the world because I love to record drums through them."

Chris Tsangerides talking about studio work with such bands as Thin Lizzy with Peter Buick of Sound Engineer magazine.

"Outboard equipment is also comprehensive with AMS 1850S and RMX16 units, a Yamaha Rev 1 and the Lexicon 224. Nick also has thoughts for the future in this area, "I would dearly like to get the AMS Audiofile. It would be absolutely super – both for our audio clients and straight audio use".

Nick Turnbull talking to sound engineer

"On the Go West album we only had the MSQ 700, which was our lifeline. Now we've got the SXB, which links up really well with the TR 909. It's great for programming, triggering the AMS and stuff like that.

"For the Radar album we used the SRC – I like to have that facility because you can change the drum patterns if new ideas come up. On some of the tracks we had to pull out whole bass lines and relocate them with the AMS. It's like painting pictures – you can just rub a bit out and move it. It might take two hours but I'll pick out a couple of things I can use somewhere else and it sounds really whacky."

Go West producer Gary Stevenson talking to Peter Buick of Sound Engineer magazine.

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Stuart Nevison, Esq.
Advanced Music Systems
Wallstreams Lane
Worsthorne, Burnley,
Lancs.

1st July, 1985

Dear Mr. Nevison:

We have just finished mixing the sound track of "Return to Oz" and I would like you know how pleased I have been with the A.M.S. Digital Reverberator unit which we used on the film.

I found it to be extremely flexible and reliable, and would give me back whatever my imagination could think of. The controls were easy and straightforward and this applies to the instruction booklet as well.

We have taken the same unit to four different mixing theatres (EMI, Pinewood, Twickenham and International Recording in Rome) and I know that all of the mixers I have worked with in these places have felt the same way as I.

With best wishes.

Yours sincerely,
Walter Murch
WALTER S. MURCH
Director

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Following receipt of the above letter. I would like to take the opportunity of thanking Mr. Murch on behalf of all the staff and workforce at AMS. His letter brought a spell of sunshine to us all during what must be one of the coldest and wettest English summers on record!

Ray Parker Jnr.

Ray Parker Jnr. is one of those people who never cease to amaze you as to how many projects they have been involved in or even how many successful songs they have written. Although not particularly big in England, Ghostbusters gave Ray three separate attacks at the British charts – firstly on the singles release, secondly on the release of the Ghostbusters film and finally it climbed the charts again as a 12" mix.

A.M.S.: *Briefly, what is your history?*

R.P.J.: The first 5 or 6 years of my career I worked as a studio musician and got involved in a series of different projects ranging from Marvin Gaye and Stevie Wonder to the Rolling Stones and Boz Skaggs. Then I got into writing songs and had success with things for Barry White, Rufus, Chaka Kahn and of course my own stuff – Ghostbusters was obviously a big break.

A.M.S.: *Is there anything you consider distinctive in the way you work?*

R.P.J.: I don't know about everyone else but I write to sounds. I have to go into the studio and hear the drums just like they are going to be on the record – I've got to hear the synthesizers, again just as they are going to sound on the record. Once I've got a framework I can formulate other things around that – I can't just sit down with a Linn like some people do. I have to have the sound EQ'd with reverb and effects added which is why AMS is so important.

A.M.S.: *What other reverb units do you use?*

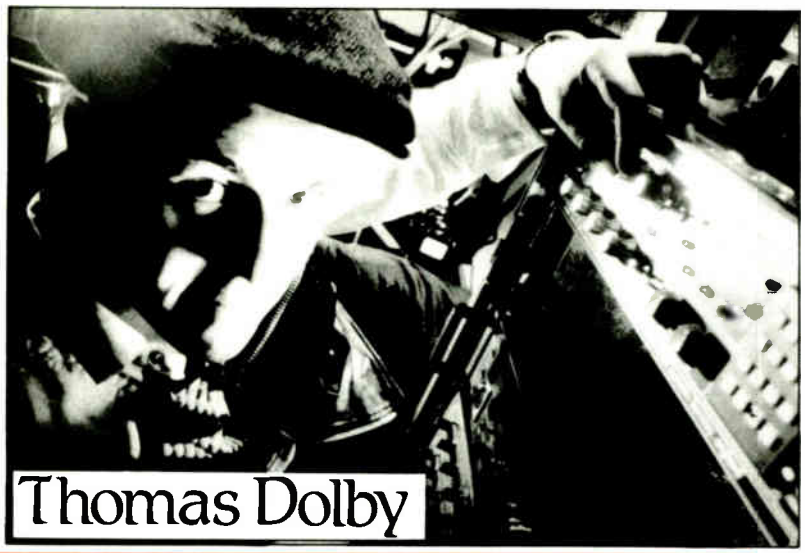
R.P.J.: Let me see, I've had a AKG spring for 9 years. I have a Lexicon 224 and the 224X and a big EMT but I've never really got into that. I like things where I can reach them and just punch buttons which is one reason why I decided to add the RMX 16. I love the sound of the A.M.S. reverb and the sounds I really like I can get quickly and easily. For that reason it's the system I use most of all – that and probably the 224.

A.M.S.: *Do you have any favourite programmes?*

R.P.J.: All the programmes sound real good but my favourite is the AMS Nonlin. It's so different – it's unique – yeh! AMS Nonlin I really love that one. The Reverse programme is nice too. I guess a plate or a plate programme will get people to say well that's reverberation – but these special effects programmes are real nice.

A.M.S.: *So what's next for you?*

R.P.J.: I enjoy being a solo artist/ engineer and all I want to do is get in there and play with more buttons and gadgets and just experiment. I've heard a lot about DMX 15-80S DDL pitch changer and it sounds real interesting – I don't own one yet but my studios here are just choosing some new gear so who knows! Don't forget to listen out for my new album and 45 you'll definitely hear lots of AMS on them.



Thomas Dolby

Thomas Dolby seemed to appear from nowhere at a time when totally synthesizer based bands such as the Human League were enjoying the peak of their success. Unlike quite a few of the "totally electronic" bands. Thomas Dolby has survived and gone on to further develop his individual style. AMS caught up with him during a three month stay in Los Angeles where, amongst other things, he was completing work on a project with Joni Mitchell.

A.M.S.: *So here we are in the Holly' Hills!*

T.D.: Yeh! I've rented this house whilst working here. The best thing about the house is not that it originally belonged to Jenny Agutter but that Steve McQueen's 50's pick-up truck is down in the garage in absolutely showroom condition.

A.M.S.: *How did your career develop?*

T.D.: When I was 14 I used to write the odd song on the piano but with not having lessons there was never any discipline to get good at it. Because of that I moved to synthesizers. People had just got past the long blond hair and cape stage and instead of individual bravado on a Minimoog, people like Brian Eno exploring different textures created by a synthesisers were beginning to influence popular music. Living alone in London during the Punk era meant that even though I'd got very good at writing and arranging quite sophisticated songs on the Portastudio that had just come out, I really wanted to play in a band. So I managed to get some session work with bands including Bruce Woolley. Lene Lovitch and Foreigner.

A.M.S.: *So how did the first album surface?*

T.D.: Doing sessions got me a bit of a reputation as a player which did open a few A & R men's doors. The first album was really just making a 24 track version of my demo material which I think caused it to suffer a bit as there were some things I just couldn't recreate. There is a lot going on in my songs and the fact that I write and direct my own videos gives me an opportunity to explain them better. The coverage given to the music and videos by MTV and cable here in the States gave me the break and it happened here in America before anywhere else.

A.M.S.: *Did you approach the second album differently?*

T.D.: Very much so, I don't think I was ever a part of the totally electronic sounding cult, but, people that liked those sort of bands would at least give me a listen and hopefully find something else in there. By this time I had used the DMX 15-80S as a sophisticated delay line, it was the first system with a good sound and character that meant you could match tape echo. Peter Gabriel and Kate Bush had just been through Townhouse studios using the Fairlight and at the same time "sampling" was everywhere and really hip.

A.M.S.: *So sampling and the Fairlight played an important role on your second album?*

T.D.: Yes they did and so did A.M.S. I write mainly on the Fairlight – however the Fairlight, as it stands now, seems to have the potential that the more you build – the smaller it gets if you know what I mean. So once I've done my arrangement I go back to the original sounds that I've sampled, store and edit them in the 15-80S and then trigger them from the Fairlight. That gives me far superior sound quality and perspective, longer samples and also very importantly more accurate control by being able to offset the triggered samples to get the right feel to the piece.

A.M.S.: *You aren't the first person I've heard mention perspective. How important is that to your music?*

T.D.: Perspective has been an enormous breakthrough. The creative energy in England that continues to build up seems to have gone into production rather than the raw commodity, but there are a group of English producers that are 2 or 3 years ahead of the rest of the world – and I think it's because of their use of perspective. When all you had was an echo plate the information you got was how far away you were from an instrument. Now with delay lines and units such as the RMX 16 you can create atmospheres and your instruments can come from anything from a small room to an empty lonely canyon.

A.M.S.: *Do you create these perspectives during recording?*

T.D.: Yes, my approach is very cinematic, I tend to use the RMX 16 during the recording process to build up the song as I don't like leaving everything to the mix. You can make mistakes this way introducing perspectives to a single track that don't work when taken with the whole song. In an ideal world I would have a huge rack of multiple everything such that the mix would be vocals from the multitrack and everything else running live.

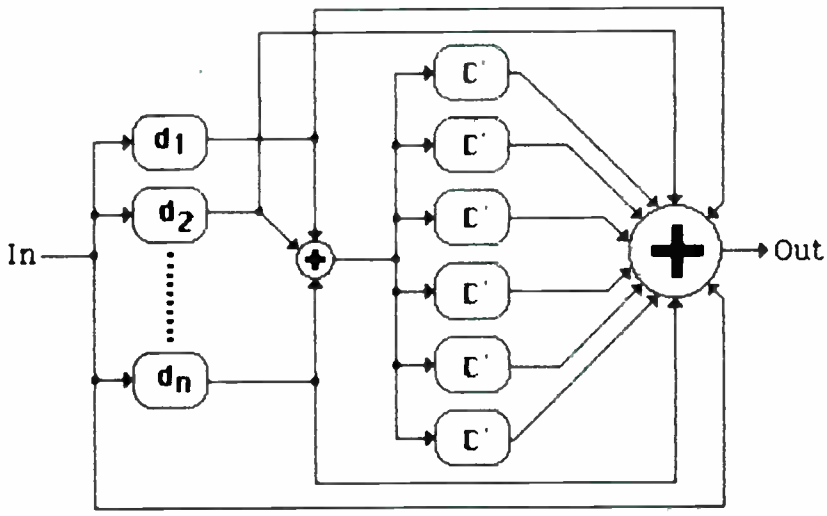
A.M.S.: *Does that mean something like AMS AudioFile interests you?*

T.D.: AudioFile is very exciting, I could quite happily do away with my multitrack tape recorder because AudioFile would allow me to drop in and out of record, edit within a track and repeat phrases. It's fascinating and given it's my own view of the way things are going to go I think AudioFile is the first serious device to arrive and I'm sure it will have a big influence.

A.M.S. *A final question. Is there any function on any piece of A.M.S. equipment you would miss most if you lost it?*

T.D.: No. I'd miss them all!

eral: algorithms, computational power, and the user interface. Although parts of this piece are somewhat technical, it is worth the effort to try and grasp what is being said: This information is not available elsewhere. A user of digital reverb does not by any means need to be able to understand the intricacies of processor design, but an awareness of some essential design issues can bring a little insight into the engineering choices made in a given unit; this can be quite useful in evaluating strengths and weaknesses. A good carpenter understands why there are both ball-peen and claw hammers, and uses each appropriately. Here, then, are Anthony Agnello (Eventide) Jeffrey Borish (The Droid Works), David Griesinger (Lexicon), Gary Hall (Sony), Christopher Moore (Ursa Major), and Richard Neatrour (ART) to talk about ball-peen hammers.



Algorithm suggested by Andy Moorer (1979) which was adapted from Schroeder (c). Moorer recommended 19 discrete delays, generally obtained with a Finite Impulse Response filter (FIR), but said that as few as seven could sound passable. His comb filters employ a first-order low-pass filter in their feedback loops, which produces frequency-dependent decay times. This is intended to simulate the effects of air absorption. Although Moorer here used six parallel combs, he has remarked, "You should hear 24!"

ALGORITHMS

Larry Oppenheimer: What's so terrible about Schroeder algorithms? Where do they fall down? Everybody says they sound awful.

David Griesinger: I frankly don't think they're that bad. The Schroeder algorithm is very poor at making a room, but that doesn't mean you can't do something useful with them. If you want a very dense sound, basically a plate sound or a small chamber sound, and I think there's a lot of reverbs on the market that use them very successfully, you can go quite far with them. You just have to say, "Well, Schroeder used four combs, is that enough? Maybe not. He used two all-passes, is that enough? Maybe not. His algorithm isn't stereo, how do you make it stereo?" Think about that one for awhile.

Christopher Moore: The question is, when is an algorithm not a Schroeder algorithm?

DG: Indeed, since he covered just about all the possibilities there are. Then if you read the paper by Baeder and Blesser, Barry (Blesser) suggests a number of others, and Andy Moorer's paper, the wonderful one in the *Computer Music Journal* ("About This Reverberation Business"), suggests a whole slew of others and within that subset of algorithms is just about everything you could possibly conceive of.

CM: There are other ones, though.

Anthony Agnello: There are other ones, that's the whole point.

CM: I'd be curious to talk a little bit if anyone's done any work with the cross-coupled algorithm of John Stautner's (published in *Computer Music Journal*). I've never heard that thing; it's always struck me as intriguing.

AA: Oh yeah, I programmed that in.

DG: I did too. What did you think?

AA: It was interesting. It's non-linear buildup of echo density.

DG: It's four loops, the output of one which goes to the input of the other. Always two loops are summed and they're going to the input of another. So the output of every loop goes to two other loops, but not to itself, with a number of minus signs thrown in for good measure. I programmed this, and I thought I did it carefully, but I didn't check my results to be sure I'd done it right. I decided it was interesting, but not something I'd ever want to use, and I told that to John, and he said, "Let me play you something I did." *His* was *much* nicer, but he was using a considerable amount of variable time delay, so that they weren't constant times, they were moving times. From my experience, if you don't use the variable time, it doesn't sound any better than a lot of other ways of interconnecting delays. It's only marginally stable. In his article, he mentions a stability criterion. That kind of stability criterion could be written for a large number of ways of interconnecting things and it doesn't mean that it will sound good, it only means that under these conditions it will be stable. As you approach the limits of those conditions, it becomes unstable, and it sounds very bad. So if you're well below it, it will make a kind of passable reverb, but if you're not well below it, it just comes under the class of: There are a lot of ways of making reverb, and some of them sound good under certain conditions.

AA: And a lot of them could be made to sound good if you work rather hard at it.

COMPUTATIONAL POWER

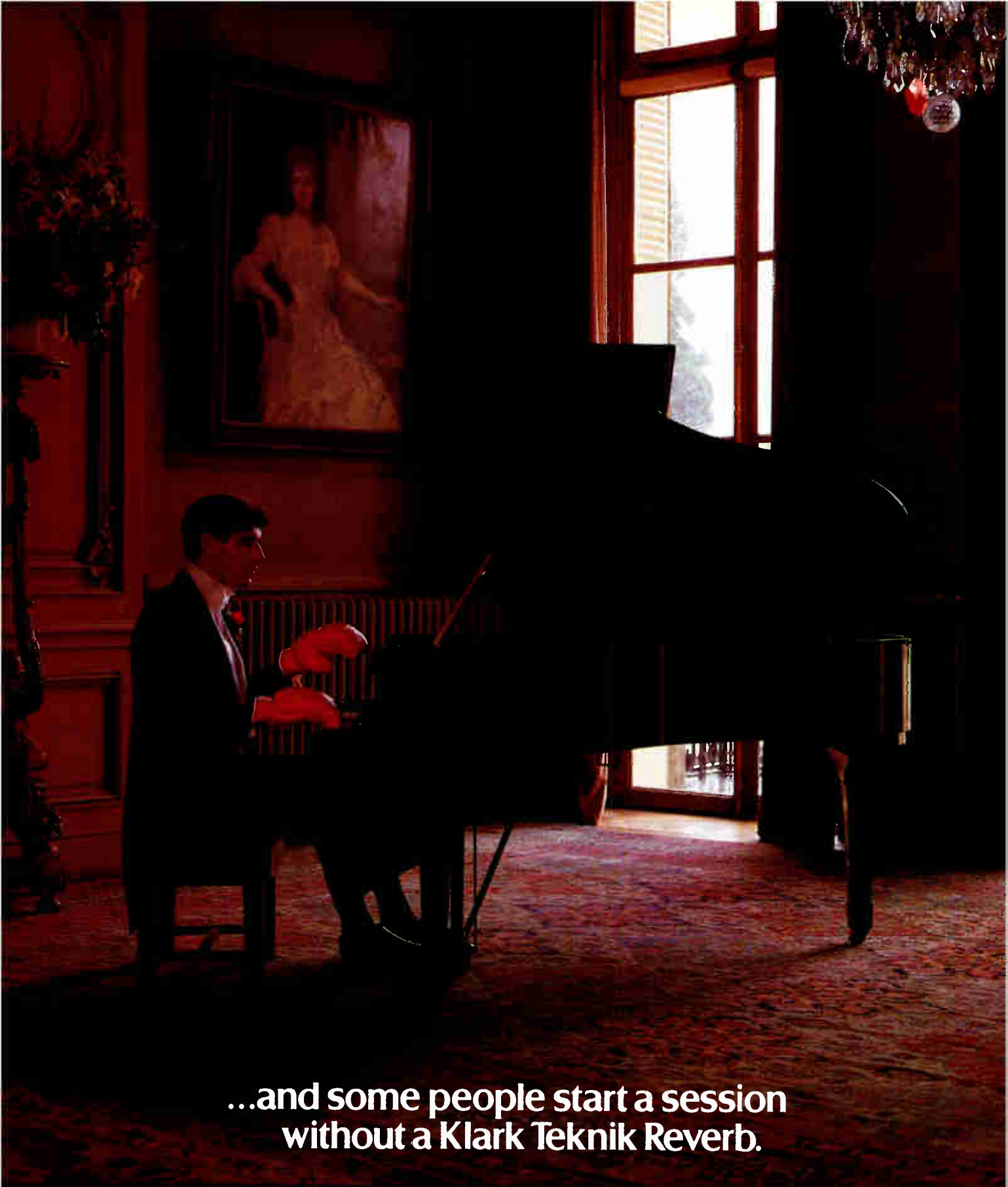
LO: It seems like a large limitation for everybody is computational power. If you had basically unlimited computational power, would that change your approach? Would you just start cloning hall responses?

DG: Oh, let's go around the table on that one. I'm dying to hear what people say. If you had three times the computational power, what would you do?

Richard Neatrour: Still have a lot of the same problems. It wouldn't really get a lot further at cloning a hall.

DG: Why do you think that's true? What is the limit that you see? Why wouldn't it just open up new worlds?

RN: I'd have to play with it; maybe I could provide a better simulation. Possibly the thing you mentioned of having more power allows you to try a few different methods of simulating combs, or approaches to all-passes; not just having more, but different approaches that may come a lot closer. I don't know if increased computational power alone is the answer. It more provides the tools.



...and some people start a session without a Klark Teknik Reverb.

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I think we'd all agree that we need to get a little more processing power to really be able to have a shot at coming closer to a hall, but there's still more work to be done on the algorithms to getting the hall sound.

LO: Jeff, you've worked on some pretty big machines; have you worked in small situations also, in terms of computational power?

Jeffrey Borish: Well, the domestic simulator I developed is about as small as you can get, because it's intended to retail for considerably less than the professional devices we've been talking about. There's very little signal processing you can afford to do in that price range. But first I was going to say that one thing that is perfectly clear to me is that you're not going to start cloning concert halls for the same reason that I keep coming back to, which is that you're not going to be able to recreate the directional field properly within the limitations of stereo. But there was some work that I did many years ago that might be interesting. It produced the best-sounding reverb that I've ever heard, but it's horrendously computer-intensive. The experiment that I performed was to generate a synthetic impulse response by basing it on a random process. My first pass through I used a Poisson process to describe the timing of the reflections. The Poisson process has a rate parameter in it that allows you to change the density of the events, which in this case would be reflections, so that you can actually simulate the effect of the increasing density of the reverberation. Once you've generated a large set of reflections, you simply impose an exponential decay on them. Once you have that synthetic impulse response, of course, all you have to do is convolve it with an audio signal. Now that works fine in a research environment or if you give me this infinitely powerful signal processor, but otherwise it's much too time-consuming to do in any practical situation.

LO: What are we talking about when you say, "much too time-consuming"?

JB: If you're trying to simulate a concert hall whose impulse response is, say, two to three seconds long, then we're talking 100,000 samples or so. That's approximately 100,000 multiplies per point of output. It's going to take several hours to produce a second of output.

DG: Actually, there's a way of doing that that's much simpler. If you could take an FFT of a three-second block, for example, and then do a multiplication by an impulse response that you've stored in a template, it's only two multiplications per sample at that point, and then you have to de-FFT it.

AA: But then you have to deal with block after block, and then overlap, or something like overlap.

DG: Yes, you have to meld blocks, that's correct. But this is do-able. I mean, I could make such a machine for the mere sum of $50,000. I was all set to do it until I realized it has a tremendous disadvantage. Well, there's a number of disadvantages, all of which are important.

AA: One disadvantage is that it only defines one point inside a room.

DG: Ahhh! That's one. Let me give another one. There's going to be at least a two and possibly three block-sized delay in this machine.

AA: Of course. You're doing a three-second FFT, you have to wait three seconds for it to be done even if you can do the FFT instantaneously.

JB: If you do it using the method you're describing. If you do it as a convolution, of course, it comes out instantaneously.

DG: Yes, that's right, but then you have to do a hundred thousand multiplications in samples.

AA: No free lunch, this is called.

DG: Anyway, it's do-able that way, but then you're stuck with, let's be conservative, a ten-second delay running through the machine. Now that's some-

thing you could live with, but you'd have to certainly get used to it.

AA: Some of us could, some of us couldn't.

DG: I think in the world of recorded music you might be able to get away with that, but I think the market is not ready for it.

CM: It's still only a two-second decay time.

JB: Actually, I was just going to say one other thing about that: I also tried it with a pure Gaussian process. I had a reflection every sample period and used a Gaussian process to describe the amplitude, and even though that's much simpler and doesn't recreate what happens in concert halls in any sense, it still worked amazingly well, and that's basically noise.

DG: That sounded good, huh? Andy Moorer's paper suggested that method and he said it sounded wonderful. Just take a block of Gaussian noise, apply an exponential, convolve that with your signal, and you've got whatever you want.

LO: Tony, what would you do with unlimited computational power?

AA: Oh, that makes sense to me. If you can analyze a room, one position in a room to be sure, and characterize that room in terms of its impulse response fine enough and then duplicate it digitally, that's what I would do, I guess. If you're really talking about infinite power. You're also talking about an infinite number of people working on the project...

LO: ...and an infinite number of monkeys typing the documentation.

AA: But in terms of reproducing a room, that's the way to do it, to be sure. Everything else we're doing is for tricks, really.

Gary Hall: With infinite amounts of computing power there would be a whole lot of things. What's come out of everybody else's talk is what I thought of immediately: You would start working in very different ways. You would stop experimenting with tons of all-pass filters and combs, and begin to think of other processes to work with. You would go from one bottleneck to the next bottleneck, which is the conceptual one. You would get past that one and come up to the limits of what your concepts were and you'd begin to work on them.

CM: I think it would be a hell of a lot of fun. I would first have to somehow end up having to do less management. (Laughter.) I would still have a lot of room to explore and roam working with some of the basic building blocks and some ideas I've had in notebooks for years but haven't had the computational power to deal with.

AA: What would you do, David?

DG: I've been trying to answer this question for quite some time, and I've

spent a lot of time fooling with the algorithms I've got, and trying to figure out: Do they sound artificial? And the answer is always, "They sure as hell do." And then saying, "Why? What is it? Could you remove it with more computational power?" I don't have a real answer to that at the moment, because I've never heard anything that works any better. Everything I try that I think will improve some parameter by killing some other parameter always turns out not to work.

Right now, my guess is that it is in the nature of the process, and the artificiality I'm hearing in it is a theoretical one, and it won't go away no matter what I do. It is the following: Anytime you take some sort of process involving time delay and images to a signal, there's going to be a timbral alteration if you add it in with the original sound. I think that the ear, my ear, anybody's ear, can hear it. In real rooms, reverberant signals come from different directions, and don't interfere with the original sound as much, but real rooms sound better even when recorded with two microphones and played back on two loudspeakers. The reason is that a real room is not a fixed process.

Say we record a musician in a room in mono. The sound will have a whole bunch of reflections, and the microphone's going to pick this up. You can hear it easily. The room will add a timbral color to that instrument. It's immediately recognizable as a room; a particular room, a musician in a particular place. But the musician moves. Talk to a person like [musical physicist Arthur] Benade. In New York, he gave a paper on how the transfer of room and instruments goes, how all instrumentalists move their instrument around when they play, and this is an essential part of the process. More than that, all the people who listen to music move their head around and that's an essential part of the process. OK, let's make a room that moves. We can do that, put our computers on it, get them all going. Now the walls are all moving around. Try playing that. Still doesn't work. Why doesn't it work? Well, it does work if you're doing it with only one instrument. Then suddenly it begins to sound better. But you play a whole orchestra through it, it still sounds wrong. Why? A whole orchestra has many sources. Every single source has a completely different set of timbres. Every one completely different. That's because if you just move a foot, that one millisecond difference in all the time delays makes an outrageous change in the timbre. It changes almost everything. Subjectively, it's enormous. If you just have a whole bunch of people in the room in different places, the timbre that you get from each one is completely different.

Is there any solution to this? Probably not. I have made the observation, and I've said it many times, that two inputs sound better than one in reverb. I think this is why. If you're supplying the reverb with a stereo feed, and you have a grossly different impulse response in the two stereo channels, you've at least got two chances. That's not as good as having a hundred, but it's better than one.

AA: Talking about second and third order effects of placement of sources inside a room, what about the transmission medium itself? The air is doing things as well, there are always air currents; there is some dispersion of frequencies in a pulse moving across a room.

DG: I think you can simulate the dispersion; it's not too expensive computationally.

AA: Well, if you had Larry's machine, that would be something else. As you knocked off the more obvious effects of the room, you'd eventually get down to things like the movement of air inside the space.

RN: Then you have its non-linearity in terms of its compressibility at higher music levels, also.

AA: It's a non-linear process in every respect.

LO: I'm interested in being able to get some idea of the scale of computational power. Where does digital reverb fit in with digital mixing, or complex filtering, or the various other signal processing tasks, particularly audio signal processing tasks, of course?

AA: There are reverbs and there are reverbs.

LO: Great.

DG: If I can interject a comment by Andy Moorer, "You know," he said, "I made this paper where I suggested that six parallel combs made a pretty good reverb . . . you should hear 24!"

LO: But is digital mixing trivial compared to digital reverb or filtering?

GH: Well, if digital mixing were trivial in comparison to reverb we'd all be selling digital mixers, wouldn't we?

DG: No.

RN: No.

JB: Not necessarily.

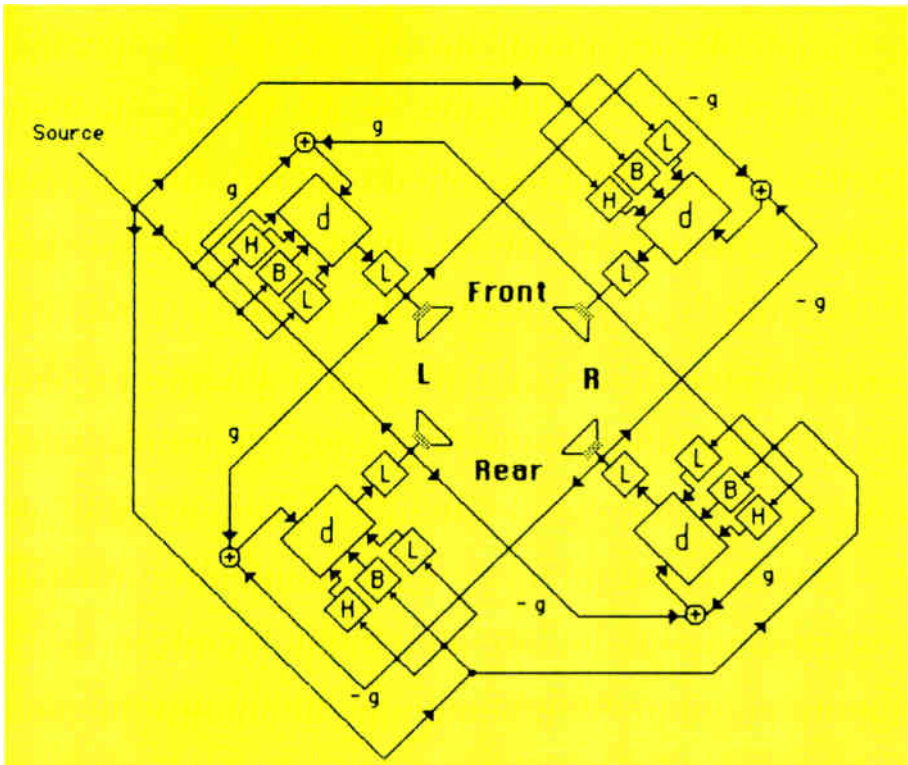
AA: No.

CM: No.

AA: Well, we finally got a consensus.

LO: Actually, I'd be interested in that point. Why not?

RN: I like the effects.



Four-channel delay matrix algorithm suggested by John Stautner (1982). Setting and varying delay times and feeding scaled amounts of the source (here entering from front left) to the delays (d) allows simulation of early reflections. The low-pass, band-pass, and high-pass filters (L, B, H) model aspects of room behavior such as absorption of walls, air, etc. Gains and relative phases of the paths in the matrix are shown by (g).

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DG: Reverb is more interesting.
CM: Digital mixers at this point are in a phase of the technology where there aren't that many digital sources to mix. I think that's why there's fewer digital mixers on the market, because there hasn't been enough digitally encoded material pouring into the mixer.
AA: No digital mikes.
CM: It'll come, it'll happen, but mixing, I think, is computationally less intensive than reverberation. Mixing with EQ and panning and compressing gets to be hairy. One of the major differences, I guess, is that those kinds of processors don't need to access large amounts of audio memory, they can be done with things like TMS-320s [a digital signal processing chip from Texas Instruments].
DG: Jeff, do you want to comment on this?
JB: Gee, this is right in my field. That's why I got quiet all of a sudden.
DG: Come on, out with it.
JB: I basically agree with that. First of all, how many channels of mixing are we talking about? If it's two channels of mixing to one output, then it's very simple, you need two multiplies, right? Reverberation needs a lot more than that, depending on what algorithm you're using. As Chris was just saying, if you throw in some of the other processing that's typically done in a mixing situation, then it does get much more complicated. Equalization must take, well, one filter element would be something like five multiplies, and that's still less than reverberation, but once you throw in 24 EQ sections, or 24 times three [for high, mid, and low frequency EQ] or something like that, that gets to be pretty horrendous.
RN: With processing power, it's a trade-off as to how complex this thing gets, how many channels, but one thing is that in digital mixing and panning the algorithm is defined at least, you know that. Given your Olympic computing power machine, we could all whip together a digital mixer in a lot fewer hours than a realistic concert hall.
DG: I disagree. I haven't even seen the Droid Works machine, but I heard about it at NAB, and I'm bowled over by what I've heard in terms of the amount of effort that's gone into the software. It's not the mixing algorithm, which is easy, it's not the EQ algorithm, which is easy, it's getting it all to work together. A nice interface. I tell you, man, that's a hard problem.
GH: The difference between combining two channels and getting to a functionally useful product is huge. And by the way, there is a need for all those inputs. I'm dealing now with a company that supplies 24- and 48-track digital systems with some regularity. The reason there's not more digital mixers is primarily technological at this point. For really useful products analagous to analog recording consoles, the computational needs are really large, and larger than we're typically playing with.

THE USER INTERFACE

CM: On this question of the interface, David's comment that the system from Jeff's company has a lot of attention put into user interface goes back to the question Larry had about how much control to give to the user of a digital reverb. Part of the problem is giving you an interface that's sufficiently sophisticated and informative so that you can do something with it all. We all have this problem of an obscuring window between the processor and the user no matter how many of the parameters you could actually make available to them. To have a way to get at them and to know what the hell they are, and to see enough of them at a given moment to have a feeling for what it's doing, is difficult. It tends to define a very expensive interface to give the guy real meaningful control.
LO: Can you speculate on a direction you would see as preferable given not necessarily infinite amounts of money to deal with the problem, but given more facilities than you have right now to deal with it, enabling you to build what you considered a superior user interface?
CM: I suppose that one rather fanciful

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idea I had was to have a plug-in card for an IBM-PC that was a digital reverberator, and then the PC and the CRT graphics could be the user interface.
AA: Maybe a mouse or two.
RN: And then on the CRT, you'd have a user-definable front panel for the unit. The user will still have presets or a front panel-type product he's dealing with, albeit through the keyboard or mouse, but he can define what keys or what actions he's going to access quite frequently, and other ones that he'd just as soon run with the factory versions of.
GH: The Reverb Construction Set.
AA: Use PC Paint to draw your room and your listener in it.
CM: I think that really, the percentage of end users that are going to be responsive to a product like this and be willing to pay for it is diminishingly small. It doesn't strike me as commercially very rewarding offhand. I think that we'll all watch and see what happens with SPUDs [the Eventide SPUDSystem]. Richard [Factor, founder of Eventide] had the fear, maybe jokingly expressed two or three years ago, that the only market for the SPUD would be other digital reverb designers.
DG: We can't afford it.
AA: It's true; there's some resistance from users to our product doing too much. People said, "I'm looking for a digital reverb, and I want it to be a digital reverb. I really don't want it to be used for other things. I don't want it to be set up incorrectly." SPUDSystem is meant not for users but for designers.
LO: Obviously, stuff like the Apple Macintosh, and the GEM operating system for the IBM are part of a trend that's being accepted pretty well in the larger market of users. PCs are seeing acceptance nowadays in the same way that digital reverbs are seeing mass acceptance and I'm wondering if front panel pushbuttons are really the best way to go, or if any of you would see it as feasible that you might choose to go to a more graphics-oriented interface at some point.
AA: Well, sure, especially for a product like ours, it would be wonderful to draw, like Richard said, a front panel for a specific device. If it's being a digital parametric EQ draw that front panel or that set of faders on the screen, and maybe have a touch sensitive screen where you could move the fader on the screen.
JB: What a great idea.
AA: Sounds like Droid Works, doesn't it?
RN: At that point, you just use the function keys.
JB: It seems clear to me that's the direction things are going to go. The only thing that's inhibiting is the cost involved.
DG: It's not just the hardware cost, either.
AA: The product becomes the software. In fact, there's no reason why with something like the Droid Works system someone couldn't be assigned the task of analyzing an LA2A limiter and writing the software that would do that, then draw that front panel, then your LA2A would be on a floppy disk or wherever.
LO: Do you see this as being a forseeable possibility?
AA: It's happening now.
LO: Yes, at very high bucks.
AA: It's only likely to get less expensive. Hardware is inherently more expensive than the software. The problem is having the installed base of hardware that can run this various software, and that's really where all this is going.
DG: I see a problem in marketing. The cost of developing the software is really pretty enormous, unless . . . sometimes you can find someone who is willing to spend their life making a piece of software, and they'll sell it for $50. That could happen.
RN: If they were single and they lived at the lab, yes.
DG: Exactly.
LO: The role of hackers.
DG: In the real world of trying to actually get something done, it's really hard to do that, and the question is: What is the market for such a thing? How many of these things could you sell? Who would buy it? The musical instrument market is huge, but how many of those people can afford not only the processor, but the PC that will have to be coupled with it, all the interfaces? And then sit down and learn this software well enough to use it? And is that number big enough to amortize the kind of software cost that would go into it?
LO: That's a question that I think is being addressed right now in the music industry, with the PC-based music software programs that are coming out. They're looking at exactly that: Will people buy the synthesizers, and buy the PC, and take the time to learn how to use the program.
DG: Well, what's the answer?
LO: Some people who are in positions to make such judgements, such as Roland Corporation, seem to feel, "yes".
GH: The Roland units are not high-priced systems, those are low to medium-priced systems in the spectrum. We have examples of successful manufacturers selling systems that can range well over $100,000 per, and they're doing kind of all right. New England Digital would be the premier example of that. They don't seem to hurt, and every time they introduce some wildly expensive new option, they find a number of takers: those for whom it's a tool and justifies itself that it'll get the money back.
DG: Gary, I agree with you; there's always a high end. How big is the middle?
GH: The middle is pretty substantial; it depends on where you define it. The last thing you hit at, the people who can afford several to ten thousand dollars worth of gear to use is very large. When you get to the point of learning to use it, sometimes you hit the bottleneck there. Mindspace is often at a premium, and the same people who would need to use this have to manipulate 48 channels up on a board, and it becomes all somewhat more complex than a 747 cockpit. How do you make it all talk in such a way that a human being can deal with that without constant gear-changing or gear-crunching?
LO: Well, there's also the market that's developed for programmers, too, specifically for that reason: Because there are people who will own or rent, or for one reason or another have Equipment that they themselves are unable to deal with, so they will hire somebody else to come in and deal with it, and just say, "This is what I want, you do it." I'm not sure the fact that people won't be able to learn to use it is a limitation to sales. People buy things all the time that they can't use. I'm sure you guys all have clients that are that way.
AA: I've sold some of those.
JB: Furthermore, I would say that the most basic advantage of having a more technologically sophisticated user interface is that it can assist users with the process. It allows them to control more sophisticated processes with a lower level of understanding, in a way. The mixer is a perfect example of it: You have bank after bank of all these controls, and you don't have all these controls there because you need them, it's because you don't know which ones you're going to need before you start. With a more sophisticated interface such as the one we're designing, you'll only have those controls that you actually need, and it makes it that much easier to grasp. Everybody's familiar with the concept of user-friendliness and that's really what we're talking about even if we're sick to death of that phrase.
AA: We're talking about more software.
JB: A "simple" matter of programming.

• • •

Well, there you have it. Hopefully, the information given in this series will be of use in dealing with one of the most valuable tools in the audio industry today: digital reverberation. It would seem appropriate to acknowledge here that Yamaha International, Alesis, Inc., and Harris Sound (representing AMS) all contributed significantly to this series, in addition to everyone who has already been thanked. ■

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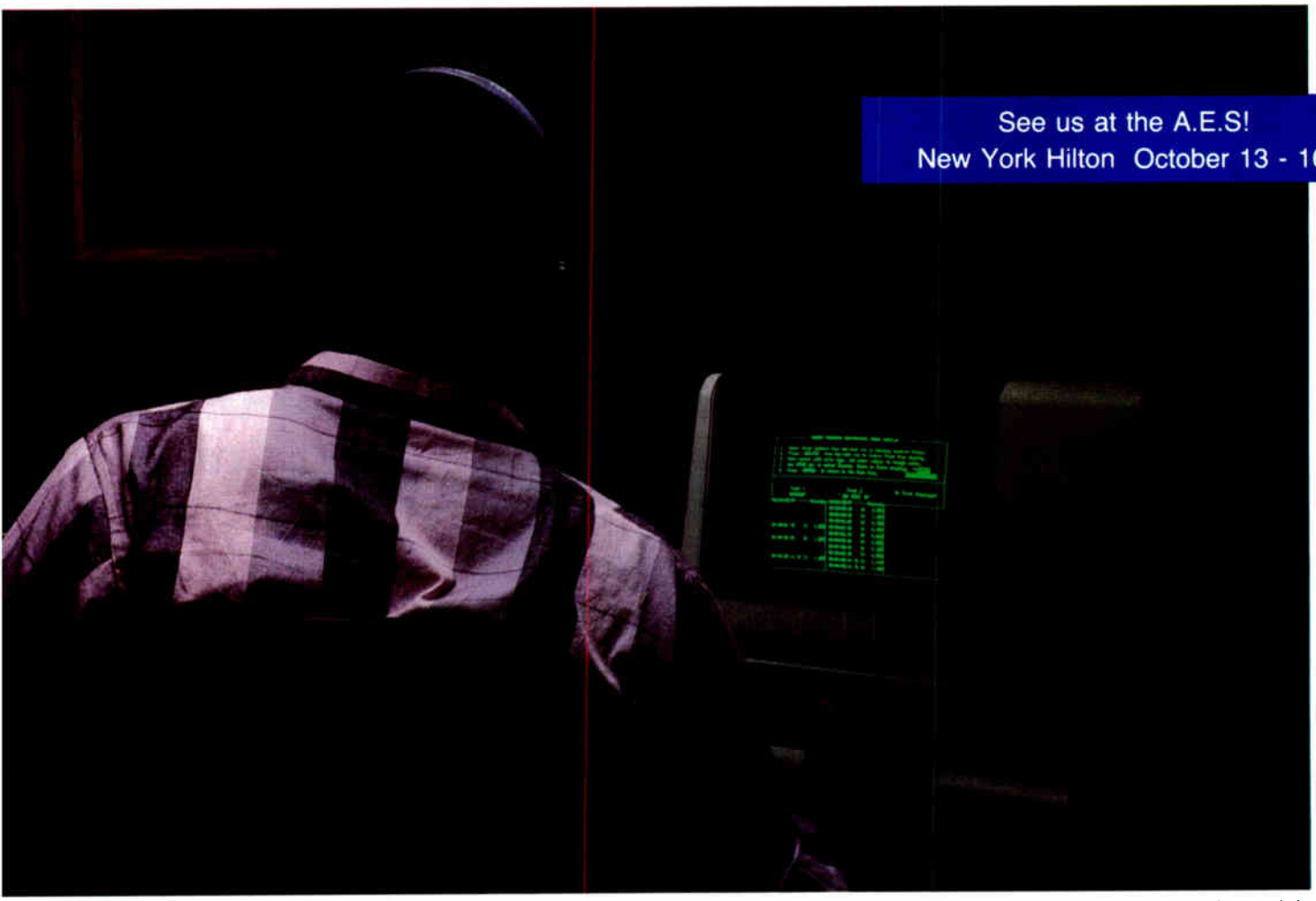

Synclavier operator captures continuous live vocal overdub

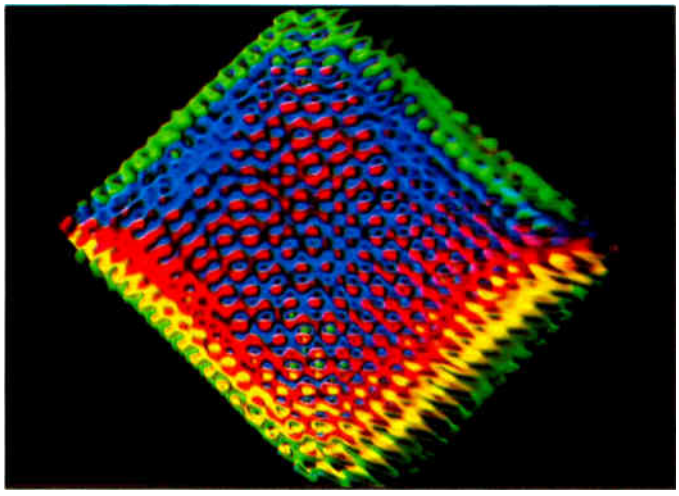

PHOTO: DR. GARY S. SETTLES

Color music display: treble note

PHOTO: DR. GARY S. SETTLES

Color music display: 3-D "Tunnel" pattern

MOVING BEYOND LIGHT SHOWS

A NEW CONCEPT IN COLOR MUSIC DISPLAYS

by Professor Gary S. Settles

The idea of a colored visual display to accompany music has been around for a long time—in fact, at least two centuries. It's something that appeals to mass audiences, recording artists, and inventors alike. The U.S. Patent Office has a special classification just for such devices, called *color music displays* or *color organs*. But, even though there are several hundred patents, no single device has succeeded in setting a standard for the definitive method of producing color music.

Most of the previous color music displays have produced amorphous, nonrepresentational color patterns by shining lights through colored filters, bouncing light beams off distorted reflectors, or filtering the music by pitch ranges to selectively flicker arrays of lights. Some such devices strive to choreograph color and motion with the tempo, tension, and resolution of the accompanying music, while others simply rely on serendipity or avoid such audio-visual synthesis altogether.

Color music's mass appeal seems to have matured in recent years along with the audio and visual mass media. Visual psychedelia became salient features of rock concerts in the 1960s. Then came the popular laser light shows. Most recently, video synthesis and other special effects have been set to music in the burgeoning field of music video.

However, though the mass appeal is there, it appears that the technology of color music still lags decades behind our ability to deliver it to an audience. Most of the available "color organs" lack the visual detail, variety and coordination with the music to really hold one's fascination very long. Like children's kaleidoscopes, their visual repertoire becomes exhausted long before the aural repertoire of the music they accompany is properly represented.

Here lie the two major problems with current color organs: an inade-

Schlieren photo of heat rising from girl's body

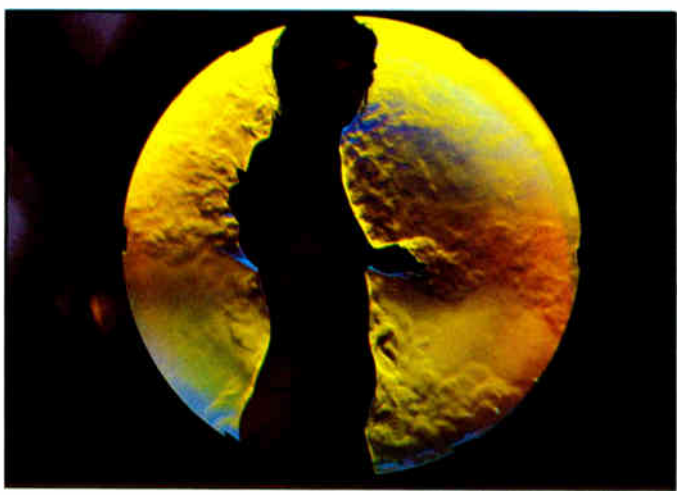

PHOTO: DR. GARY S. SETTLES

Color music display: peacock pattern

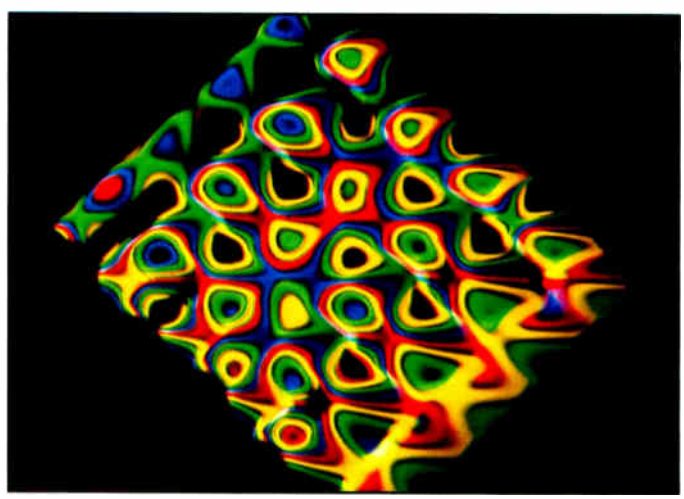

PHOTO: DR. GARY S. SETTLES

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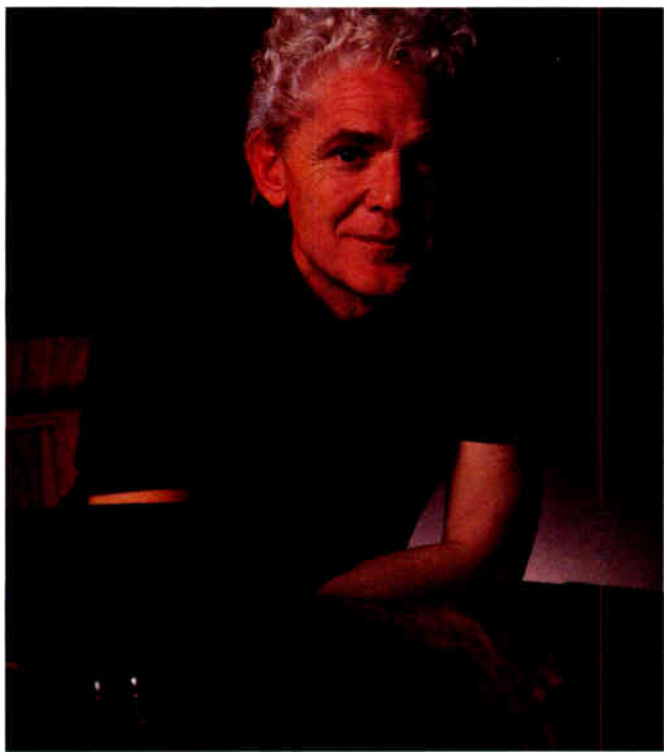

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Photographed at Dolphin Sound, KHNL Channel 13.

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—FROM PAGE 48, LIGHT SHOWS

quate variety of visual patterns and colors, and the inability to express a coherent and satisfying train of images that *interprets* or represents the music. As some earlier "pioneers" of the field have recognized, this second problem is the key to a successful approach to color music.

Disney's famous animated film, *Fantasia* (1940), is a good example. Early in the film an abstract animation of a musical soundtrack was used to achieve a spectacular color music effect. Even with modern computer technology, it's hard to imagine how one would program an automated display to respond as successfully to any arbitrary soundtrack. The success of the color music in *Fantasia* lies in the imagination and creativity of the animators, not in any programmed device.

This is so because music appears not to be *literally* translatable into imagery. A given piece of music conjures up many different mental images in different listeners. If you display Mozart on an oscilloscope screen, it doesn't look much like the impression you get from hearing the music. In fact, it doesn't look like anything at all. It moves much too fast, and the sophistication of the music's themes and moods is lost. Filtering the music into pitch ranges and displaying these in various colors is little improvement, because the musical content is far more sophisticated than that.

My approach to a new color music instrument is based on effects which can be produced in a *fluid* medium and then transferred to a light beam to produce a visual image.

The upshot of this is that successful color music appears to require human intervention. Creativity is called for in interpreting the music in a visual form. Just as we can't program a machine to write great music, we also can't program a machine to create its visual accompaniment.

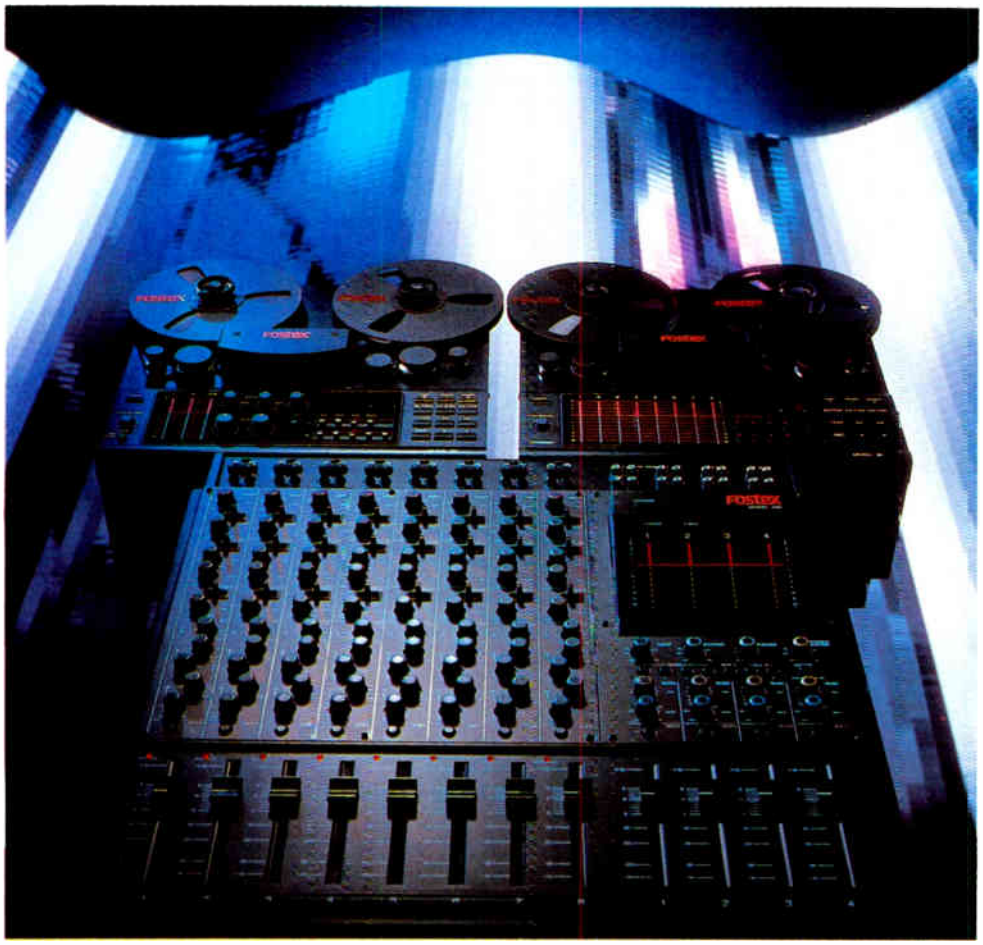
So, given a capable individual to perform the necessary creative translation of music to visual form, an *instrument* for this purpose is still required. This instrument must be, in essence, a visual pattern generator. It should present the performer with a wide range of sophisticated imagery and colors to choose from, but should also be relatively easy to "play." Video synthesis equipment, computer animation labs, and the laser scanning projectors used in light shows fulfill the first requirement. They are, however, expensive, difficult to use, and not well adapted to the real-time interpretation of music in visual form.

My approach to a new color music instrument is based on effects which can be produced in a *fluid* medium and then transferred to a light beam to produce a visual image. There is a precedent for this, beginning with the psychedelic "wet shows" of the 1960s in which colored liquids were mixed and projected onto screens for viewing (similar liquid-mixing special effects are now used in science-fiction movies). In my case, a byproduct of my research studies has produced striking color images of warm air currents rising from the human body, as shown in the accompanying photo. The technique used to take this photo—known as Schlieren photography—is potentially useful in its own right for video and cinematic special effects. It also suggested to me a new approach to the problem of color music based on fluid effects.

Briefly, the complex equations which describe fluid (liquid or gas) motion provide for an infinite variety of patterns to be generated. A fluid is thus an ideal medium with which to construct a pattern generator. In fact, what we hear as music is actually the patterns of sound waves in the air. Since these waves travel at 760 mph, they are too fast to follow and are invisible to the naked eye in any case. If one could slow them down and render them visible, one could "see" sound.

I was able to accomplish this by developing a sort of acousto-optic transducer which converts sound waves in air to waves on the surface of a liquid. Here the waves move only a few centimeters per second, slow enough for the eye to follow. The Schlieren technique mentioned above picks up the bending of light rays by these liquid surface waves and produces a color image of them. The resulting patterns amount to visual representations of sound,

THE NEXT GENERATION. THE NEXT STEP.



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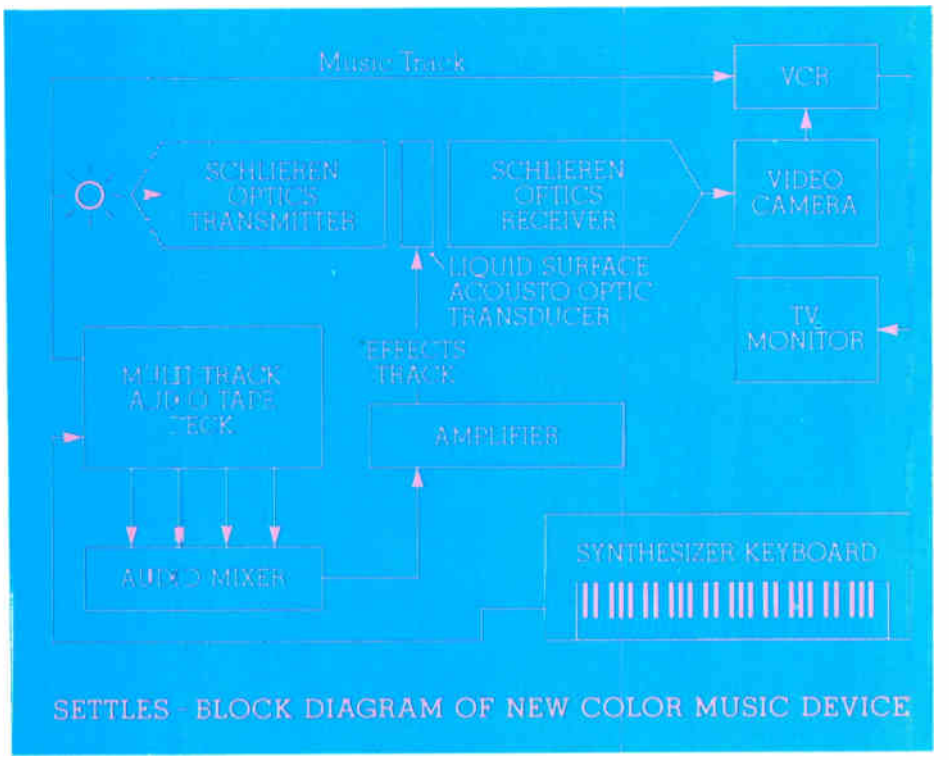

SETTLES - BLOCK DIAGRAM OF NEW COLOR MUSIC DEVICE

which is the key to a new concept in color music.

Thus my new color organ—which I have resisted naming with a silly acronym—uses a special soundtrack to produce a visual display to accompany another soundtrack containing the music. These two tracks are not the same, as explained earlier, but they are related in a specific way. The block diagram of the device shows how this is done. The color organ is "played" by pressing keys on a standard synthesizer keyboard. The audio signals from the keyboard may be sent directly to the acousto-optical transducer through an amplifier, or they may be recorded for later playback. Either way, each combination of key and keyboard setting produces a distinct surface-wave pattern in the transducer, which is then converted to a color visual display by the Schlieren optics. This display may be observed on a viewing screen or recorded using video or cinema cameras.

The content of each visual "note" is up to the discretion of the keyboard player within very wide aesthetic limits. Depending on the keyboard settings, the resulting visual patterns may stand still or they may move in very complex ways. While the patterns are generally abstract and symmetrical in nature, such a variety of them is available that one can choose patterns to "represent" musical themes or even certain physical objects. Further, the choice of color combinations in the patterns is adjustable through an element of the Schlieren optical system. Finally, simple visual notes may be played in sequence, or several may be superimposed to produce an extremely sophisticated pattern display in motion and color. The advantage here, as I see it, is in avoiding restrictions on the creativity of the person who plays the color organ.

Although it's impossible to convey the effect of this device with still photos, three frames are shown here to suggest the sort of effect that can be obtained. The first pattern—somewhat reminiscent of peacock feathers—might be used to visually represent a bass musical note. By giving it an undulating motion in sync with the music, it can represent a musical theme (a drumbeat, for example). The same pattern at a higher audio frequency is shown in the second photo, and could be used to represent a treble note or theme. The final photo shows a circularly-symmetric pattern produced by beating two audio tones of almost identical pitch together. In motion, this pattern produces the striking 3-D impression of traveling down a tube. So far, my student, Doug Flournoy, and I have produced and catalogued hundreds of such patterns. All are available through simple keyboard settings, wherein lies the versatility of this new color organ.

The creative use of this device involves choosing and choreographing a set of visual patterns to accompany a musical piece. Doug, who is also a musician, does this by experimenting with various patterns to develop a "visual vocabulary" for the particular music under consideration. His first color music composition, set to "Heart of Rock and Roll" by Huey Lewis & the News, hinges on a heartbeat pattern in sync with that theme of music. As many as a dozen other patterns are brought in to represent other musical elements such as the voice track, hand claps, harmonica, etc. Typically, two or three keyboard keys at a time are set up to produce the desired patterns, and are then played in sync with the music and laid down on one track of a multichannel audio tape deck (shown in the block diagram of the device). The music itself resides on one track of the tape, but is not used to drive the visual display for reasons explained earlier. By making three "passes" and recording three separate effects tracks alongside the music, a sophisticated visual display is built up to represent the themes, background, tension, resolution, warmth, surprise, and other elements of the music. On playback, the effects tracks are fed through an audio mixer to drive the display, while the music track goes directly to a VCR when video recording the results. Of course, it's possible to listen to the audio-frequency effects signal, but it typically sounds like only a highly simplified version of the music itself. This is how we solve the problem, discussed earlier, of translating music into a satisfying visual display.

Those who have seen our color music results have given them rave reviews so far. The level of eye-ear coordination obtainable with the new color organ seems to rivet the attention of the listener/viewer. Youngsters appear to be especially fascinated with it. Several prominent figures in the recording, music video, and cinematic special effects fields have expressed an interest. One wag claimed that it was "like the '60s without having to do drugs."

The instrument itself is small enough to fit on a tabletop. Anyone familiar with a synthesizer and a mixing console can learn to use it in a few hours. Any type of music can be accompanied with this instrument, from classical to modern popular works.

A patent application on this new color music device is being filed. Numerous uses for the system exist in both video and cinema, especially in music video productions. While exploring these avenues, experimentation continues in search of the (still unknown) limits of the device, and exploring the possibilities of using a MIDI interface, so a microcomputer could be used to aid in the creative process of color music composition.

[For more information, contact Dr. G. S. Settles, 303 M.E. Bldg., University Park, PA 16802, (814) 863-1504. Or, on the West Coast, contact Susan B. Cheek, Box 1331, Bonita, CA 92002, (619) 267-6332.] ■

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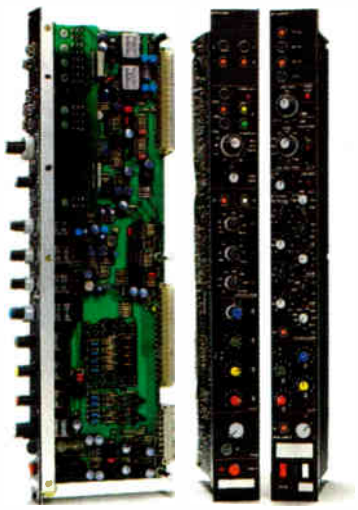

Basic input modules feature 3 or 4 band EQ, microphone/line inputs, 5 pre/post-fade auxiliary sends, and channel overload indicators. Options include transformerless mic preamps on a subcard, separate transformerless TAPE input for remix, stereo input modules, stereo EQ, internal stereo X-Y/MS active matrix, stereo blend control, dual line inputs, variable HP and LP filters, user defined panel switches, and the list goes on.

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As time goes by. All 900 consoles adhere to strict Studer standards for precision and reliability. The frame is built on a rigid channel and brace structure, and each module uses pin-and-socket Eurocard connectors. Frame connectors are mounted on longitudinal master boards with solid support from horizontal and vertical frame members. All components, switches and pots are commercial/industrial grade from the best U.S. and European manufacturers. In sum, a 900 is built to last as long as a Studer recorder.

The Swiss alternative. If you have been considering a high quality mixing console from any American or English manufacturer, you should also look closely at the Swiss-made Studer 900. For quality, flexibility, and reliability, it ranks among the world's finest. Also, you may find the pricing surprisingly competitive.

For more information on Studer consoles, call or write: Studer Revox America, Inc., 1425 Elm Hill Pike, Nashville, TN 37210; (615) 254-5651.

STUDER REVOX

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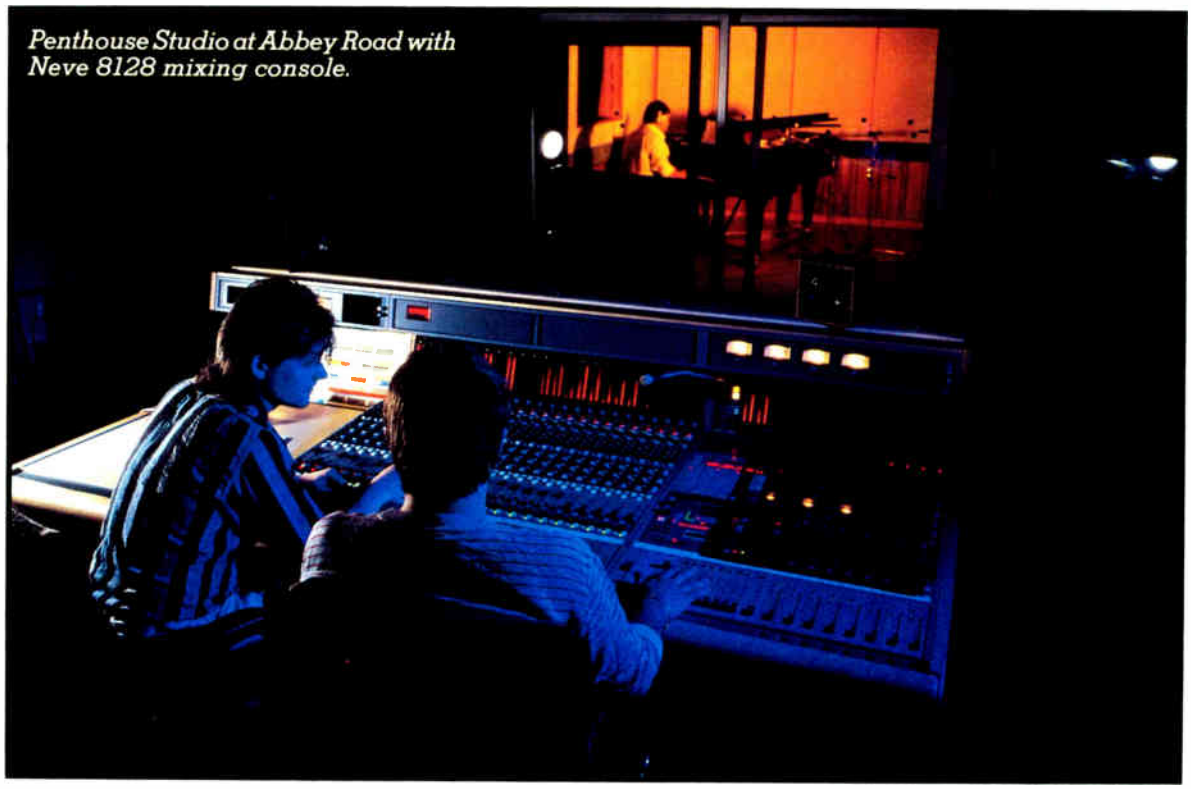


Penthouse Studio at Abbey Road with Neve 8128 mixing console.

ALL PHOTOS: JOHN PRICE

ABBEY ROAD

YESTERDAY · AND · TODAY

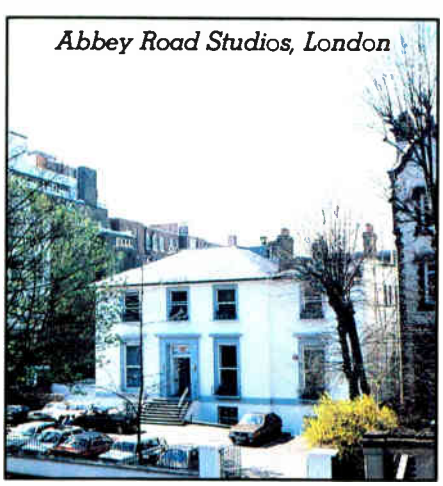
by Richard Elen and Kathy Varley

Few, if any, recording studios have conjured up as strong or as affectionate an image as has EMI's Abbey Road Studios. Thanks to those lovable Liverpool lads, the hallowed halls of their London recording chambers were forever sanctified on vinyl with hit after breathtaking hit.

But the studio facilities at Number 3, Abbey Road, St. John's Wood, London NW8, has opted to not live in the past, even such an illustrious one. Abbey Road Studios in 1985 are as well-equipped and diversified as any you will find anywhere in the world.

Abbey Road Studios today offer a wide range of facilities and services including complete audio production in a choice of four studios or on location, Direct Metal and conventional mastering in both digital and analog formats, projection and/or video interlock facilities in all the studios, plus film scoring, track laying and re-synchronization facilities. In addition, Abbey Road offers a complete broadcast quality video production facility.

Abbey Road Studios, London



The Studio Areas

Ken Townsend is the manager of Abbey Road Studios, and one of the best-known studio managers in the UK industry. "Abbey Road opened on November 12, 1931," according to Townsend. "It was opened by Sir Edward Elgar. At that point in time, it was a very unique facility, being based in St.

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John's Wood, not far from Central London.

"Up until the growth of multitrack, in the '60s, Abbey Road was purely an in-house facility. It was traditional that major recording companies such as EMI had their own studio. All their work was done in that studio. With the rapid expansion of pop groups and so on in the 1960s, it became possible for independent studios to spring up—so much so that major record companies began to use independent studios as well as their own facilities."

EMI, like the majority of other British labels, started off as a classical record company. But as time went by, and different types of music began to emerge on record, the type of recording done at Abbey Road changed. Today, over three-quarters of Abbey Road's work is in the contemporary, rather than the classical field. "To put this in perspective," says Townsend, "when Abbey Road opened, there were three studios—Studios One and Three were for classical music, while Studio Two was designed for the dance bands, and singers like Gracie Fields. Today, there are four studios on the site, of which three are devoted totally to popular repertoire, and the other one—Studio One—is used not only for classical recording, but for orchestral recording of pop work, and, of course, for major motion picture work."

Studio One

Studio One was the room in which Elgar opened the studios in 1931, and today, says Townsend, "It is now the largest recording area of its type in the world, purely devoted to orchestral music." These days, Studio One is used for more than simply classical music, of course. "The completion of the new control room adds quite a new dimension to the potential of this facility," says Townsend.

The new control room is fitted with a Solid State Logic 52-input, 48-out SL4000E with Total Recall. Main monitoring is on B&W 808s, with Yamaha power amps behind them. Stereo machines are Studer A80s, and the pair of 24-track A80 Mk III machines can be synchronized and used for 48-track work. Townsend is waiting for standardization in the industry before plunging into major capital expenditure on digital multitrack.

Studio One also has its own projection room, and a 44-foot wide screen which is lowered into position at the touch of a button, as sound-to-picture work is a major occupation for the room. Recent recordings included *Raiders of the Lost Ark,* and *Return of the Jedi.*

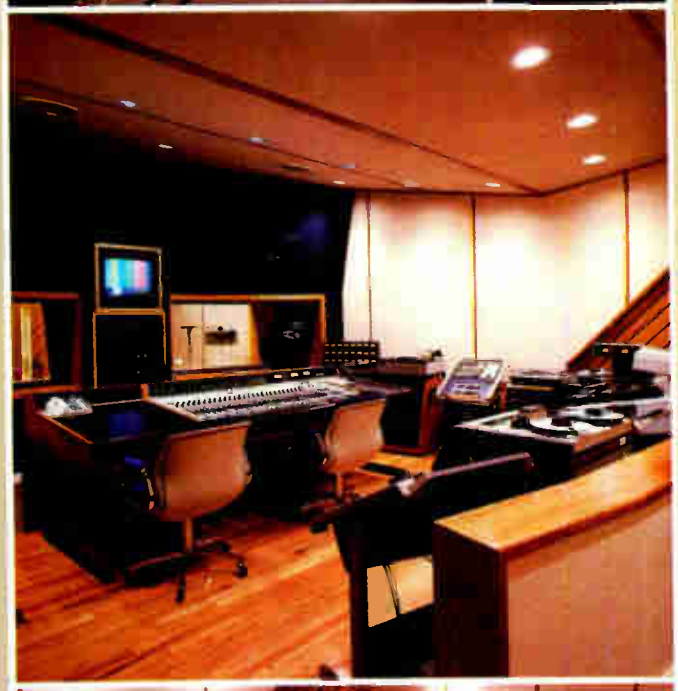
But the real attraction of Studio One —a massive 94 ft. x 58 ft. x 42 ft. high, with a capacity of over 150 musicians —is in its acoustics. "With the long reverb time of 2.4 seconds," says Townsend, "string, brass and other orchestral sounds are really enhanced."

The basic design for the new control room in Studio One was by Alan Brown, with acoustics by Abbey Road's Peter Dix, and Michael Bley Associates, while the actual studio acoustics were designed in-house.

Studio Two

Studio Two is 58 ft. x 37 ft. x 28 ft. high, with a capacity of around 55 musicians—depending, of course, on what sort of music they're playing! The control room was re-equipped and reopened in September 1983. Again, at

The enormous Number 1 Studio at Abbey Road is often used for orchestral dates and is shown here set up for scoring to picture.



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the center of the control room is a 52-input SSL SL4000E with Total Recall. Monitoring is on JBLs, although other monitors can be installed to a client's taste—UREI Time-Aligned units were in use the day I was there, for example—and the tape machines are a pair of Studer A800 multitracks with Audio Kinetics Q-Lock synchronization systems (available in all the studios) and A80s for everything else—¼-inch and ½-inch with, of course, optional digital equipment as required.

Studio Two, before World War II, was used for dance-band recordings, but since the early 1950s, a grand total of 85 Number Ones, and literally *thousands* of hit records have been recorded there, beginning with Eddie Calvert's "Oh Mine Papa" in 1954. "Now, of course, in this current day," says Townsend, "groups go in and book the studio for several months, so the most you can get is a hit album and a hit single about once a quarter! And with more studios around, it's obviously more difficult to get a Number One." But the facility has been very heavily booked since its reopening, with recent clients including Meatloaf, Russ Ballard, Alan Parsons, The Alarm, and ABC.

Studio Three

The studio room in Number Three is around 40 x 30 x 18 feet, enough for about 30 musicians. The console is a Neve 36/24 design; in fact, it might better be called an "EMINeve," as it was a custom design thrashed out between Neve and Abbey Road which later formed the basis for the Neve 8078 range of consoles. The desk is fitted with NECAM automation, and a useful facility is the ability to use the monitor panel as extra inputs during mixing, allowing the manipulation of up to 60 inputs—very useful for 48-track work.

The primary multitrack tape machine in Studio Three is a Studer A800, while a 24-track A80 can be hooked up via Q-Lock when required. Monitoring is a JBL/Yamaha combination. "Studio Three is a relatively small studio: It's used almost exclusively for pop groups," Townsend points out.

The Penthouse Studio

The Penthouse Studio was built in 1980 as a smaller, more intimate recording environment for groups, particularly those using synthesizers. Today it contains a Neve 8128 and A80 24-track and stereo machines. Monitoring is JBLs driven by Amcron (Crown) amps.

Modern music technology, featuring a Fairlight CMI, the new Linn 9000 drum machine with MIDI sequencer, Q-Lock and video gear makes this room especially suited to contemporary, electronic-based material, especially where picture is important. The room is also frequently used to mix-down film music previously recorded in Studio One. The Penthouse was linked into a transatlantic satellite recently for an NBC show on Duran Duran.

All EMI's classical work is now done by Direct Metal Mastering (DMM), so this room is often seen with a digital system installed for transfer to disk. The DMM cutting room is on the same floor as the Penthouse suite; future plans include bringing the third cutting room (equipped with a VMS-70 with SX-74 cutter, and running Tannoy Lancaster monitors driven by Quad 50E amps) up to the top floor as well, thus locating all the cutting rooms there, and adding a lounge.

The hub of the real-time cassette copying room is a bank of Aiwa F770 3-head cassette recorders; all connected to the EMI transfer desk via an error-sensing system specified by Abbey Road and custom-built for them by ex-EMI man Phil Plunkett's Abacus Electrics. This unique device looks at the inputs and outputs of all 20 machines all the time, sequencing round the recorders at a predetermined rate. A delay in the unit brings the inputs into sync with the outputs, and the device can signal the operator when it detects a discrepancy between the two greater than a preset amount. Individual machines can be locked out of the sampling sequence, or the sequence scan can be halted to examine the per-

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PARTITIONS

by Russ Berger & Tom Rose

Sometimes More is Less

Have you ever found yourself scouring old copies of *Mix* for drawings of wall sections in hopes of finding the ultimate partition design for your studio? If, like many readers, you are planning the new construction of a private recording facility, you will be working with a tight budget. Who isn't? You want the walls to provide the most isolation for the least money. If you are planning a commercial facility, hopefully you will show good judgement and enlist the help of an acoustical consultant. (We had to get that plug in there somewhere.) Well, let us temper your search and selection of partition designs with some not-so-common sense logic and little-known facts about wall construction.

HOW MUCH IS MORE OR LESS

STC (Sound Transmission Class) is used almost universally as a standard in the construction world to describe the sound isolation abilities of all types of partitions. Please note that we said "*all* types of partitions," regardless of their intended use. The ASTM E-413 standard states that STC is designed to correlate with subjective impressions of sound isolation from normal sources found in dwellings and offices. This means that the STC rating of construction is not easily applied to music studio construction. STC would probably be better thought of as "Speech Transmission Class" since the testing procedure is weighted heavily to the mid-frequencies centered around the speech range. Thankfully, it should be noted that at least one industry source has not only recognized this problem, but is actively promoting a new testing and rating system, MTC (Music Transmission Class). This is a valiant attempt to fill the gap between evaluation of high performance walls that need to cover a broad musical spectrum and that of speech noise control problems. However, the

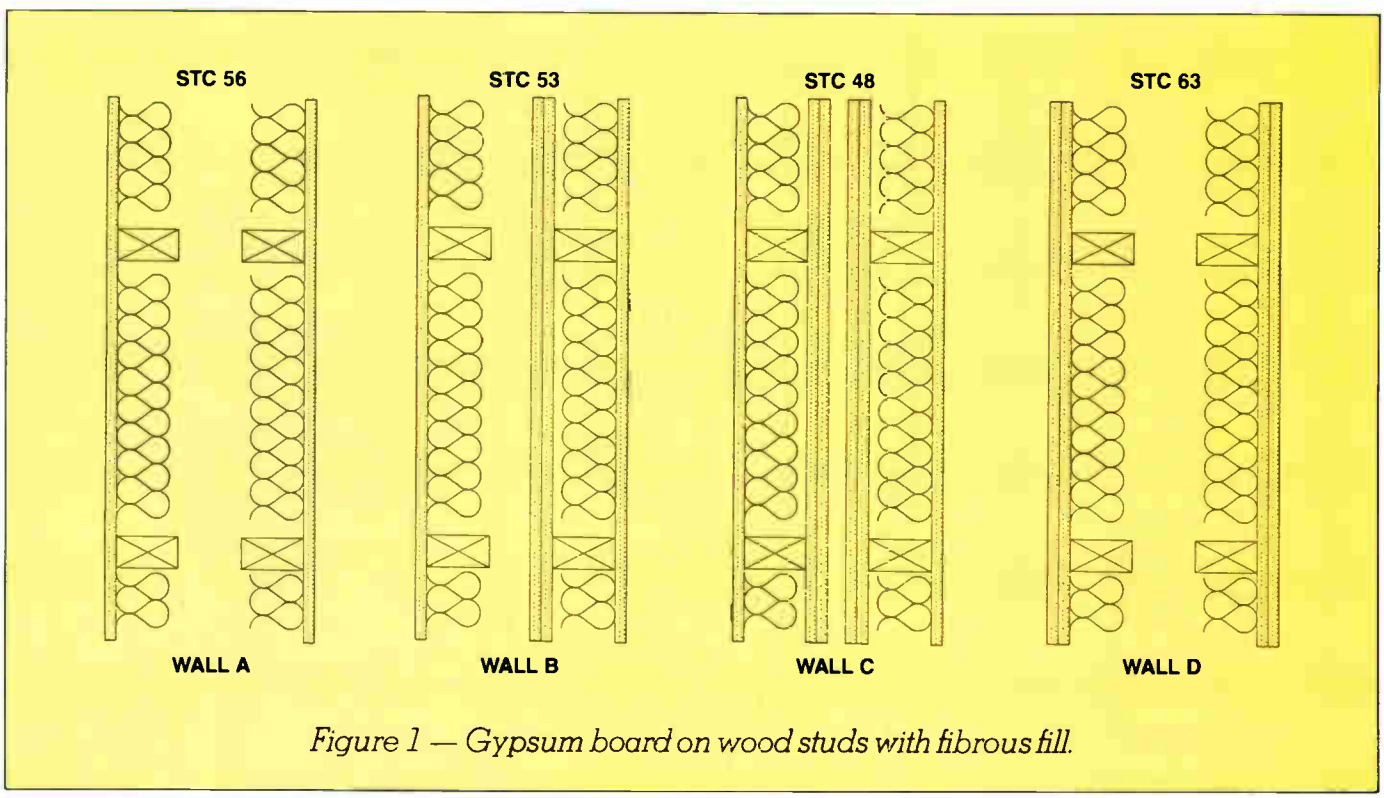

Figure 1 — Gypsum board on wood studs with fibrous fill.

only acoustical rating or performance information of studio walls you will usually see published, if any at all, is STC. No tests, no calculations, only an occasional STC number probably copied from a third- or fourth-hand source.

We would even venture to say that a majority of the walls constructed for studio use are not designed at all but are brought into being by either of two basic methods. One is the "elephant gun" method: A man, when asked why he carried an elephant gun with him everywhere replied, "You don't see any elephants around here, do you?" Traditionally these are expensive, over-built walls constructed with large quantities of strange assortments of materials in particular "proprietary" (bizarre) ways. The other method is the FOF technique.

Frequently we hear people exclaim that they have a friend-of-a-friend (FOF) who built this super incredibly great wall and it worked wonderfully. Well, will it really work in your application? Will you get the performance you need and are paying for? There is usually no acoustical rhyme or reason behind assuming someone else's construction will work in your situation unless you have proof of performance in the form of test results and engineered predictions. Inadequate per-

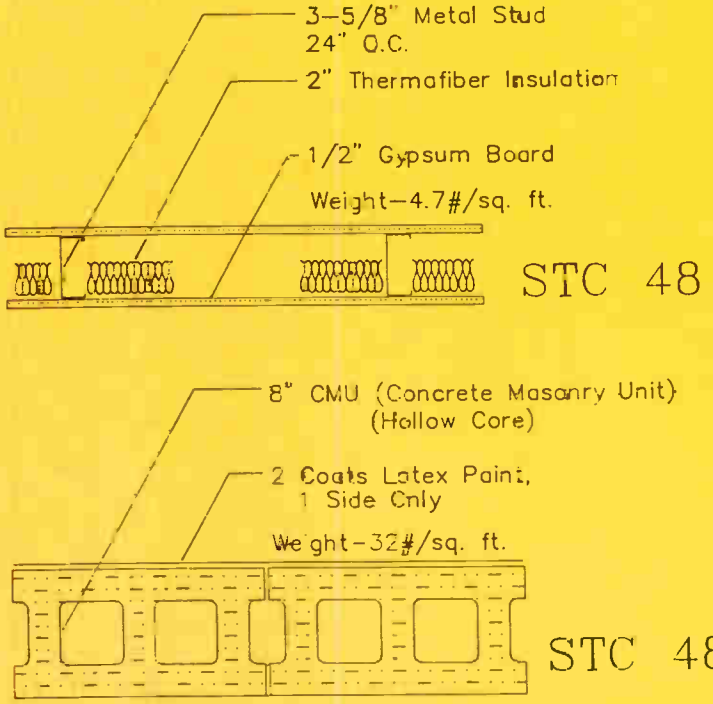

Figure 2 — Composition comparison of different walls with the same STC.

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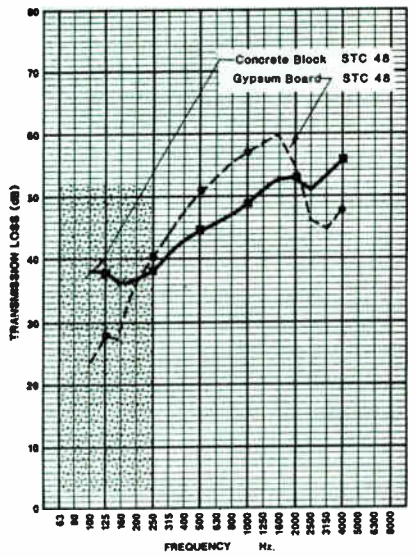


Figure 3 — Sound transmission loss of concrete block and gypsum board walls both STC 48.
Note greater low frequency performance of concrete block wall.

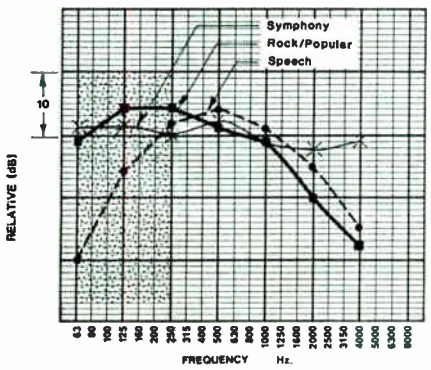


Figure 4 — Relative spectral (not amplitude) comparison of music and speech.
Note greater relative low frequency content of music compared to speech.

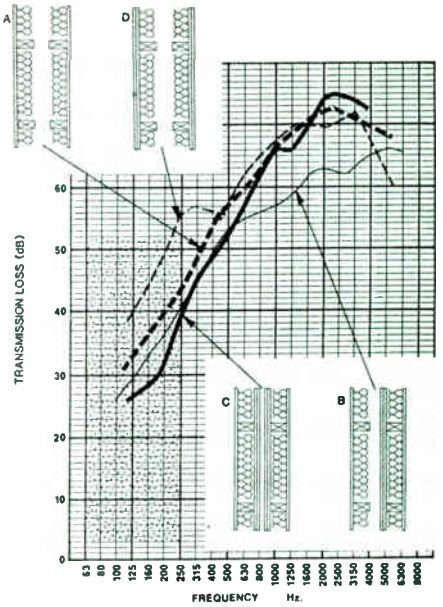


Figure 5 — Effect of multiple wall mass distribution on transmission.

formance can render your facility useless; too high performance means you paid too much. Having said this, some examples are in order to illuminate one aspect of the complex but predictable mechanics of transmission loss of partitions.

MORE IS LESS?

To demonstrate the acoustical kernel of the article, let's compare the performance of three gypsum board walls, named A, B and C, which are all commonly used in construction today and have been evaluated by independent acoustical tests. Shown in Figure 1 are the three different wall constructions and their associated STC ratings. Confused by what you see? More is better, right? Wrong! The ratings were not inadvertently reversed; they are correct.

Each wall section is of a double-plate construction with wood studs, insulation, and with no cross-cavity bracing. Wall "A," with a single layer of gyp board on each outside face, rates an STC 56. Since two layers of gyp board is good, two more layers must be better. Right? Wrong! By putting these extra layers inside the cavity on one of the studs, we degrade the wall to STC 53, as shown by tests of wall "B." Well, according to the law of "more is better," we continue on and add two more layers of gyp board to the inside face of the other stud. Oops, wall "C" at STC 48 is worse still.

The acoustical kernel of knowledge demonstrated here is that *how* materials are arranged is more important than the *quantity* of materials used. A "mass-air cavity-mass," or two-panel wall, is the best (and cheapest) type of construction for obtaining maximum transmission loss. In the example, you can see the STC decreasing as the inner layers of the three-panel walls are added. So, in this case, more is less!

MORE OR LESS?

As mentioned earlier, the STC rating of partitions is inappropriate for studio construction. A preferred method of evaluating the performance of a partition is to analyze the transmission loss/frequency spectrum. Figure 2 shows two walls of standard construction with identical STC ratings. However, one look at the comparison of their individual transmission loss spectra (Figure 3) reveals that the concrete masonry partition outperforms the drywall partition significantly in the lower frequency range. Figure 4 demonstrates the magnitude of difference between speech and music below 250 Hz. Good wall transmission loss performance in this region below 250 Hz is extremely important in studio construction, although expensive to achieve. Only mass stops low frequency sound effectively. When you hear sound coming through a wall, what do you hear—high frequencies or low frequencies? It is the low frequency "boom-boom" that is predominant every time, indicating a low frequency deficiency.

This exemplifies that the single number STC rating alone doesn't tell the whole story, especially in the design of studios. In selecting a partition to effectively isolate unwanted sound, it is best to use the wall's transmission loss/frequency spectrum for the evaluation. This is a better way to determine if a wall will perform appropriately in the desired ranges.

LESS *IS* MORE!

By now you are probably anxious to see the transmission loss spectra of those three walls in the first example. You are probably thinking there is no way that walls with less material will outperform ones with more, especially in the lower frequency range. Would we lead you astray? Look at Figure 5. Breaking up the air cavity between the outer layers greatly affects and derates the performance of the walls, even at low frequencies, and counteracts the benefits of the added mass. In this instance, the spectral performance is in agreement with the STC ratings in meeting an important goal for studio construction: good low frequency performance. You should also notice the addition of another partition type (D) which is very common—one constructed of two layers of gyp board on each face. The tested performance results of this wall should further drive home the point that two-panel walls perform better.

So, the next time you're perusing the pages of *Mix* looking for some good ideas for wall or window construction, keep in mind the fact that a wall with multiple small cavities will probably not give you a good cost/performance ratio. A "mass-air cavity-mass" construction will provide predictable, reliable, and cost-effective results. It is as important to consider the *way* something is constructed, as of *what* it is constructed. ■

IMAX

A GIANT LEAP FOR FILM

Inside an Imax theater, viewers are dwarfed by the huge screen.

by Elizabeth Rollins

Imax film is no gimmick. You can't smell it, you don't have to wear peculiar cardboard glasses to enjoy it. It's simply very large and vivid—the perfect film format to watch pictures from space. What could be more persuasive to galactic vastness than sitting in the dark in front of a six-story parabolic screen with six discrete channels of audio orbiting your head?

The Dream is Alive is a 39-minute Imax documentary funded by NASA and the Lockheed Corporation which chronicles the story of the United States Space Shuttle program. It actually takes the audience up inside the Discovery and two Challenger space shuttles, whose missions spanned April through October of 1984.

Fourteen astronauts became cinematographers in space, using the Imax proprietary 70mm film camera and two stereo audio cassette recorders, one on each deck of the shuttle. The film not only opens the viewer's mind to the idiosyncracies of a day in the life of a crew floating around in zero gravity (mission specialist Judy Resnick's longish brown hair, for example, stands up nicely all around her head without the aid of sprays, mousses, or other special effects cosmetics), but it presents glorious footage of Earth itself. Narrator Walter Cronkite guides us omnisciently across the islands of the Mediterranean, down the Nile River Delta, reminding us of the mysteries of lost civilizations that once ruled these lands. When the shuttle glides over the Swiss Alps and south into Italy, Cronkite points to

the birthplace of Leonardo DaVinci as a tribute to one of the original dreamers of this 20th Century dream.

Working on *The Dream is Alive* was not like shooting an average documentary. "You're doing everything once removed from the way we would make the film ourselves," says producer/director Graeme Ferguson, who started Imax Systems of Toronto 18 years ago with two partners. "It takes a bit of getting used to, but it works quite well. The filmmakers—the director and the camerapeople—are really the astronauts, and the way you work is *with them*, the crew on a given flight. And then you work through the system of all the support that NASA gives them, which is hundreds and hundreds of other people on the ground. We keep in constant communication with them here at Johnson Space Center," says Ferguson, who is already back in Houston preparing to shoot another film from space.

In fact, the Johnson Space Center seems to have become Ferguson's second home. *The Dream* took about two years to make; most of that time was spent training the three shuttle crews and gathering audio and film footage of their actual astronaut training program.

Editor/writer Toni Meyers entered the project early on to get an understanding of the program. "We started off right from the beginning with the crew training, so we had to develop a storyboard or a storyline that was quite sophisticated before we began shooting, which is quite different from the normal documentary pattern." Meyers explains that the astronauts had to know what the storyline was: "They met me and they knew there was a focus as far as what would happen to their footage in the cutting room, so they were able to ask questions in terms of what to shoot, how long to run the camera, and things like that."

In October of 1984, 14 astronauts became cinematographers in space, using the Imax proprietary 70mm film camera and two stereo cassette recorders, one on each deck of the shuttle.

Meyers would view the rushes as they came back from space (which were printed up to 70mm) and she would construct rough cuts using 35mm work prints. As an integral part of the Imax team, she's worked on five of the company's films since 1971 when she cut the first Imax film, *North of Superior*. By now, Meyers has gotten the hang of this very large screen format: "Because there's so much more to look at in an Imax frame, you have to allow time for the audience to actually look around and take in the detail. The density of information you're getting in one single shot is far greater, so I generally tend to cut at a slower pace than I would for TV, for example."

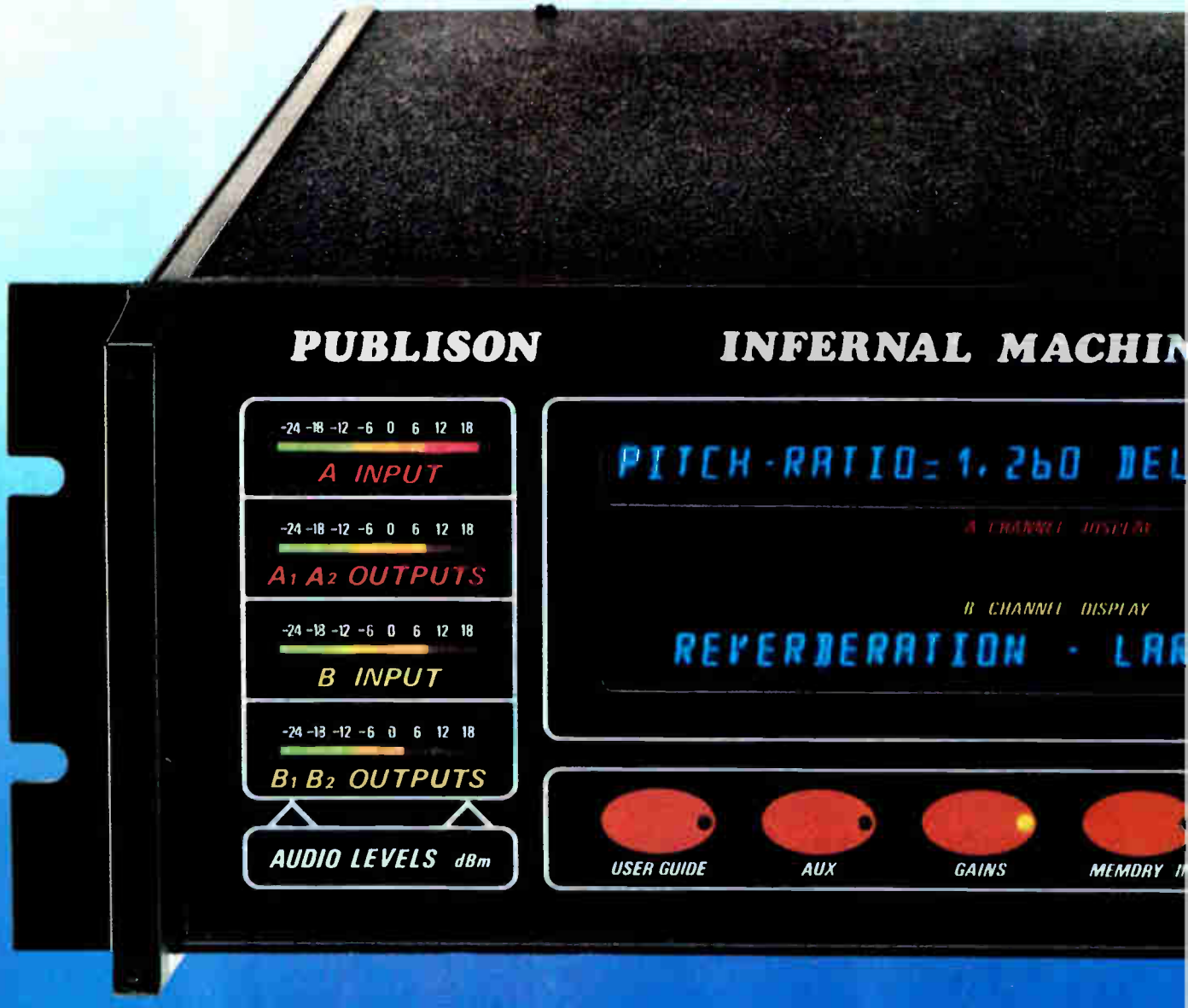
Toronto film score composers Micky Erbe and Maribeth Solomon also worked from the rushes to spark inspiration for the music. "After all—we'd never been in space—we had no idea what it was like!" says Solomon, who with her husband Erbe has scored five Imax films. "We immediately saw the mixture of fragility and strength we had to portray," says Solomon. "When we write for Imax with its six channels, we think about how to position the sounds. We might divide a synthesizer or a string part. It frees you and makes you think more spacially. It also suggests things to write." Erbe and Solomon used the 70-piece Toronto Symphony Orchestra and a Fairlight II programmed by Rob Yale. Recording and mixdown to eight tracks was done at Toronto's Manta Studios with Hayward Parrot engineering.

By the time the score was taking shape, sound designer Ben Burtt of Lucasfilm's Sprocket Systems had come on board. "I went on for the last six months to record the sound and re-record the soundtrack with Gary Summers—we always do the mixing together."

For Burtt, who's won Academy Awards for his work on *Star Wars*, *Raiders of the Lost Ark*, and *E.T.*, working on *The Dream* was a different kind of challenge. "The soundtrack was interesting because for ten years I'd

The Imax system uses 70mm film (shown actual size) running in a horizontal format.

PUBLISON infer



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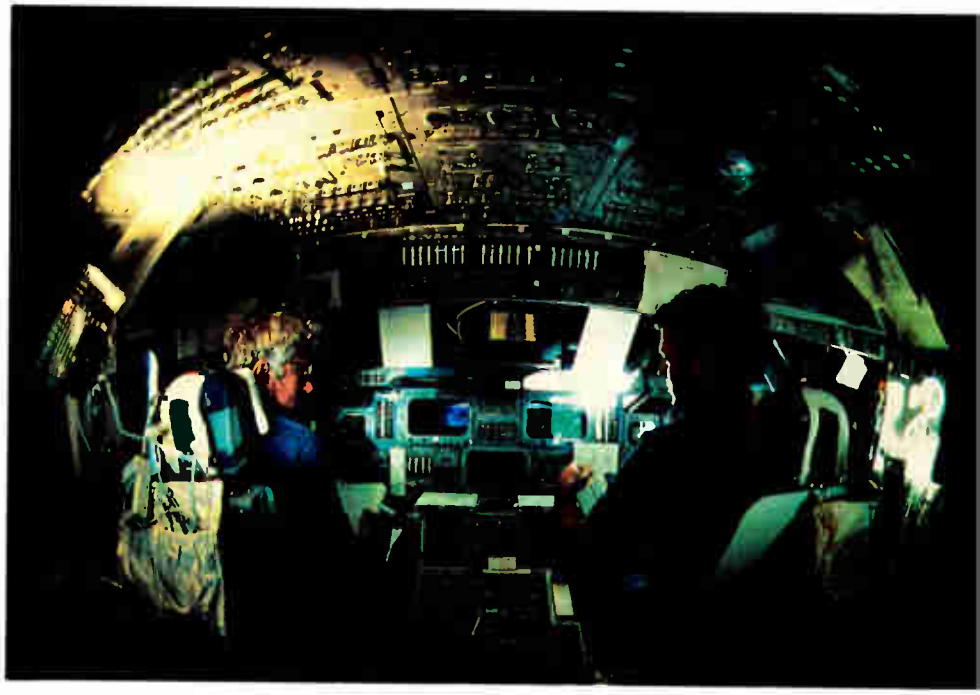

You'd think that Ben Burtt had already had more than his fair share of fun. Some people might even get jaded working on some of the top-grossing films in history. As sound designer for the Lucasfilm audio post-production house Sprocket Systems, he's blown up lakes and trees, fired revolvers in large deserted canyons, gained intimate knowledge of the mechanics of arcane combustion engines, and even dared to mike a roaring elephant, all in the continuing search for just the right sound effect. And what of a NASA documentary after all this rollicking good-fun? "This was my second-favorite film experience," he says of *The Dream*. "*Star Wars* is still first."

The Imax and Omnimax six-channel theater audio configurations gave him new freedom to experiment. "We were given a chance to try something new and we learned a lot. We certainly learned a lot about using the theater room to create special effects with sound, and some old habits were broken," says Burtt.

Normal 70mm theaters are not set up for the flexible surround channel capability that Imax provides. Burtt explains the differences in the two systems: "The surround channel in normal 70mm in our films is considered kind of an enhancement; we don't use it a lot. We'd love to use it more, but we

—PAGE 74

spent my time doing imaginary sounds. You'd look at a film and say, 'Here's a giant boulder made of cardboard—let's make it sound like a boulder. Here's a spaceship,' and obviously there's no existing sound for it, so we invented a sound for it. So many thousands of sounds were invented and in almost every case, I didn't have any literal things to go by. I'd have to make the sound up from something else. On the Imax film, they were very literal-minded. Here's a film about the space shuttle, and everything we hear in this film we want as accurately as possible to represent what you really would hear if you were right there as that camera was being used. So that necessitated a certain amount of discipline. I couldn't put an elephant roar in for a missile taking off as I would for a spaceship or something."

To preserve the authenticity of the story, NASA would not allow artificial audio. That meant Burtt could process a sound to enhance or correct it, but he couldn't completely invent it by using an entirely different source. He recorded the launches from 12 different locations, analyzed them and modified them to create the sensation of the scene, which effectively blows you out of your theater seat. Burtt was particularly frustrated by the NASA edict that no dialogue could be looped because that would be changing history. "The biggest task was going through hundreds and hundreds of hours of distorted, unintelligible radio dialogue and trying to make sense of it," he says wearily. All actualities were recorded on mono or stereo Nagras, with the exception of those recorded on the shuttle with two stereo cassette decks.

The core production team on *The Dream* has been working together successfully for about 14 years. Burtt was the newcomer, and his insights illuminate the differences in working for Imax and working on a Hollywood-style feature. "I loved it," he says succinctly. "Their whole attitude was that you can have a great deal of creative freedom with very little supervision over a reasonable amount of time to do things—unlike the features that we do." For example, Burtt says Ferguson, Meyers, and he collaborated on many of the decisions for the soundtrack. Meyers says she feels a commitment to multi-channel audio when editing the rough cut, "because there are sound

Lucasfilm chief sound designer Ben Burtt

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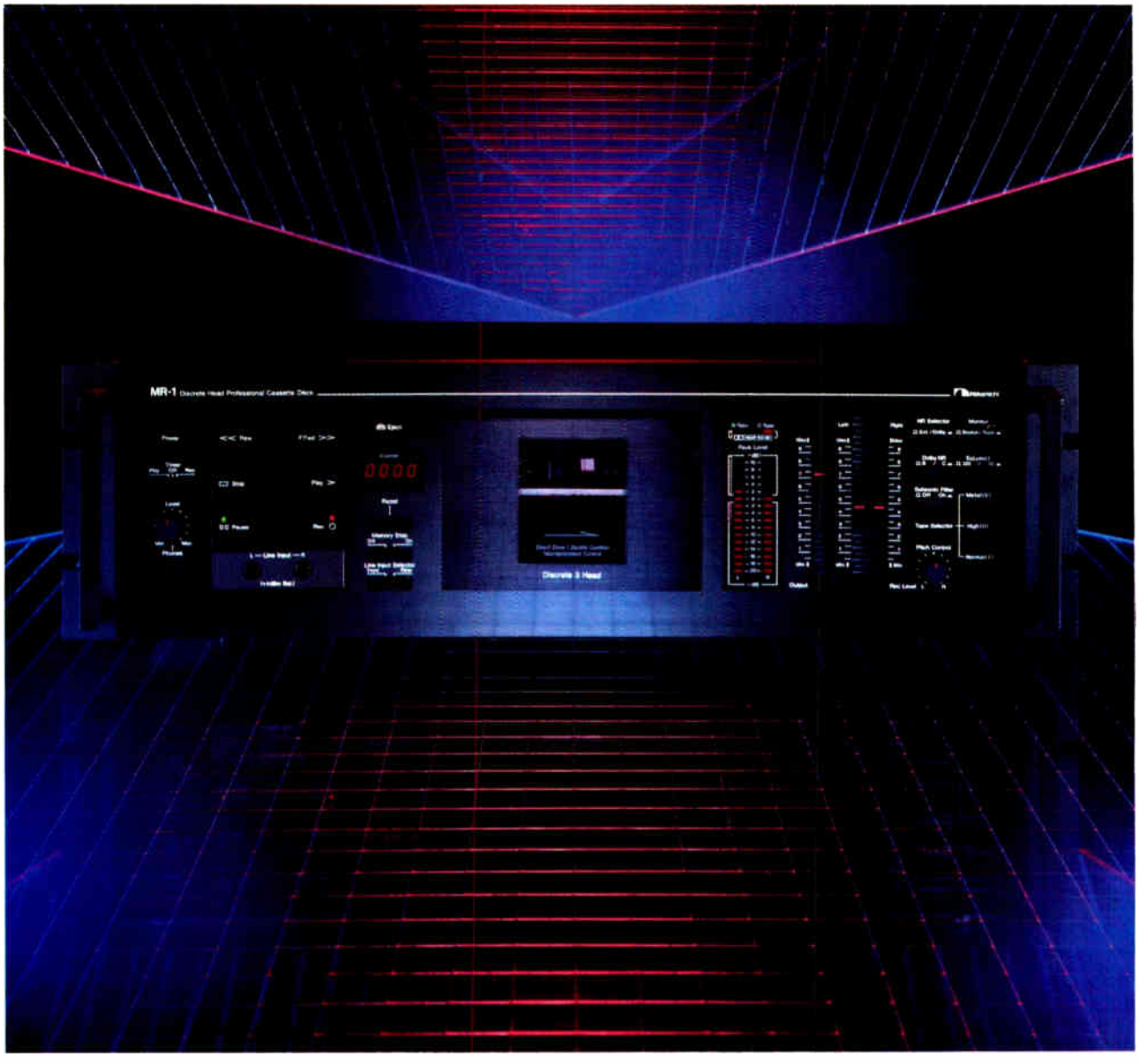

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Tape Transport

A Guide to Expediting Services

by Philip De Lancie

We've all seen the ads on television. Courier companies are spending big bucks to convince the public that they are faster, more reliable and more efficient than their competitors. For the most part, these campaigns are specifically targeted towards the traditional business community. But media and recording industry professionals have good reason to be interested as well. Consider the following examples:

1.) You had just finished the last dub of a series of spots when the producer decided to change the narration. Ten hours and a hundred edits later, it's 3 a.m. You've only got one more thing to do before you crawl home to bed: figure out how to get the dubs across the country for an 11 a.m. meeting...

2.) The basics took longer to record than anyone had expected. Now you're ready to record solos, but half the band is touring Europe with another artist. They'll be in England for three more days, and you've arranged an overdub session at one of London's finest studios. They'll have everything they need, except the tapes...

3.) Reel Ten was coming along beautifully until Dubber Two ate the effects premix. A screening for the studio brass is only two days away. If you can finish Reel Ten and get it to Hollywood on time you'll be a hero. If not...

While situations like these are perhaps more dire than most, they are not altogether uncommon. A well-run studio, like the Boy Scouts and the Strategic Air Command, has to be prepared. With that in mind, *Mix* decided to look into who's taking what where, when and for how much. The number of firms in this field makes a complete listing or rating of services impractical. Instead, we hope to give a general idea of what is available by looking at a sample group of companies (see chart). Some of the factors we thought to be of interest in choosing a service are discussed below:

Area of Service:

What is the destination of the item(s) to be delivered? The emphasis of the better-known rapid delivery companies has tended to be domestic nationwide (as opposed to local) service, but many offer international service as well, with destinations ranging from Antigua to Zimbabwe. While few "worldwide" companies actually go to every country on the planet, service to major cities overseas should be relatively easy to find.

For destinations closer to home, most major cities in the United States are likely to have a number of messenger firms providing same-day delivery within their metropolitan area. Messengers are usually faster and less expensive for local jobs than the nationwide couriers. Some local companies act as agents for long-distance transport as well, moving their clients' goods by arrangement with air freight carriers.

Between the national/international companies and the local messengers are those offering rapid delivery within a state or region. The service boundaries of these companies can only be determined by specific inquiry.

Transit Time:

For same-day service within a metropolitan area, local messengers, as noted above, have the edge. Long-distance same-day service is available from some companies, but it can be very expensive. The change of time zones as one moves across the country limits the availability of same day deliveries from the west to the east coast.

Next day delivery within the continental U.S. should be easy to arrange for those with need and the finances. Specific guarantees (by 10:30 a.m. for instance) vary by company, with many offering a range of transit times. A difference of only a few hours (9 a.m. as compared with noon) may be a significant factor in the expense of a next day service.

Most of the "next day" companies also offer domestic two-day delivery, often at substantially lower rates. For less urgent needs, domestic ground transport can be an even less costly option (up to seven days coast to coast).

For overseas international deliveries, two days seems to be the minimum transit time. For relatively obscure or out-of-the-way destinations, a week or more may be necessary.

Pick up and delivery times:

Many companies pick up only during regular business hours. Others offer some extended hours, some up to 24 hours, seven days a week. The day and time of one's moment of need could greatly limit the choice of company.

Available delivery times are similarly varied. Sunday deliveries are rare, and even companies that deliver on Saturday may be unable to do so in some international destinations.

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Weights and sizes:

Maximum weights, which vary considerably from firm to firm, are usually on a per item basis, with no limit on the number of items. While these restrictions should pose no problem for the transport of tapes, they might be a consideration for racks of signal processing or other weighty equipment. Many companies also restrict the maximum dimensions of items.

Handling:

What actually happens to the package en route to its destination? In the case of local messenger services, the item is generally delivered directly to the destination, without being routed through any central office, by the same person who picked it up.

For long distance delivery, handling varies depending on the type of company. Some companies own their own planes. They normally fly all packages to a central sorting facility, where they are grouped by destination and then flown out again for delivery. In this type of operation, even a local delivery may go halfway across the country before being returned to its destination.

Those companies without their own planes tend to sort locally, grouping items by destination and then arranging cargo space on commercial airlines serving those areas. Company representatives in the destination cities claim the items at the airport and complete delivery on the receiving end.

Whether handled by private fleets or commercial carriers, the conditions of air transport for recording tape are likely to be much the same. Some particular areas of concern are:

X-rays:

None of the companies we spoke with normally use X-rays to examine the contents of packages for security or other reasons. However, particularly in the case of international deliveries or those using commercial carriers, few companies would guarantee that items will not be X-rayed unless they are clearly marked. Some companies provide "Do Not X-ray" stickers for this purpose. X-ray sensitive items may be opened for physical inspection. The care with which items are repacked is open to speculation.

Temperature:

It is likely to be fairly chilly in an aircraft cargo hold at 35,000 feet. An airport warehouse in Kingston or Cairo, on the other hand, may be rather humid or hot, especially for a tape arriving Friday and left undelivered until Monday. The actual impact of these temperature extremes is hard to guage. It should be noted for those concerned that none of the companies we contacted offered temperature or humidity stabilized environments for magnetic tape transport.

Magnetization:

The possibility exists for tapes to end up in close proximity to articles producing magnetic fields. No special precaution in this regard seems to be available from the companies. However, many of these carriers transport substantial quantities of computer tapes and disks without any apparent problem.

Customs:

International deliveries have to go through customs unless categorized as non-dutiable items (such as documents). Specific regulations vary depending on the destination country, but some sort of accompanying paperwork is normally required describing the contents and the reason for importation. Most delivery companies are presumably able to explain the regulations in detail for those destinations they serve. Charges for guiding items through customs may be included in a company's international rates or listed as a separate customs brokerage fee.

> The guiding principle of delivery pricing is a twist on the old "time is money" axiom: The less time you have, the more money you pay.

Accompanied Shipment:

In general, items which go by air are not accompanied by a courier throughout their journey. Even those companies with "courier service" utilizing scheduled airlines must check items exceeding carry-on limitations. Thus, while the courier may be riding in style, any tapes which are too large to fit under the seat are subject to the same conditions (and hazards) as any other airline luggage.

Those companies with their own planes normally move items through their systems without individual attention. However, some offer a category of service in which the items are signed for at each change of hands (a sort of relay race approach).

Confirmation:

Many senders can't get a good night's sleep until they know their delivery has arrived safely at its destination. Some companies call the sender to confirm the successful completion of the mission. Others send signed proof of delivery slips, or provide a number for the sender to call for confirmation. Still others suggest a stamped, self-addressed post card. The cost and availability of these various methods depends not only on the company, but which level of service one chooses.

Insurance:

What if the very worst should happen? The combination of creative energies that goes into a successful project is often impossible to duplicate. The best one can hope for if a tape is lost or irreparably damaged is to recoup one's financial investment. Some minimal level of replacement coverage is usually included in the delivery charges. Senders are generally able to supplement that coverage up to a specified maximum declared value. The rates and maximum coverage amounts differ significantly between companies.

Cost:

The guiding principle of delivery pricing is a twist on the old "time is money" axiom: The less time you have, the more money you pay. A two-pound package can be picked up in Los Angeles and delivered to New York the same day for $140. The same delivery can cost $136 less if the item need not arrive until two days later.

Two other obvious factors that may influence cost are the weight of the item and the transit distance. Because of the way various companies structure their rates, they may be relatively expensive at some weights and inexpensive at others. By the same token, charges for some services are based on distance, while others are provided at the same rate to any destination in the continental U.S. The specific circumstances of weight, urgency and destination all combine to determine which company is the best deal in any given situation.

Discounts are offered by some companies to heavy volume customers. Other special rates may also be available, such as Purolator's Media Rates for television and radio stations (also newspapers and magazines).

The chart shows some of the rates and features of 26 types of service offered by nine companies one might consider for the delivery of tapes. The information is as of August 1, 1985, and should be reconfirmed by the sender when arranging service. The sample shipments are based roughly on the weight of one roll of ¼-inch x 2,500-feet tape (two pounds) and six rolls of 2-inch x 2,500-feet tape (66 pounds). As noted earlier, dozens of other companies exist, and the reader is advised to let the fingers do some walking, if time permits, before making a choice.

Company/Service	Destination Type			Pick Up Times				Delivery Times				Max. Weight	Sample Deliveries S.F. — L.A.			L.A. — N.Y.C.			L.A. — London			Insurance			Confirmation		Comments (See key for explanations)
	Local	Domestic	Internat.	Bus. Hours	Night	Saturday	Sunday	Bus. Hours	Night	Saturday	Sunday	(lbs. per item)	Speed (days)	Cost in $ 2 lbs.	Cost in $ 66 lbs.	Speed (days)	Cost in $ 2 lbs	Cost in $ 66 lbs.	Speed (days)	Cost in $ 2 lbs.	Cost in $ 66 lbs.	Included ($)	¢ per $100 extra	Max. $ available per item	Incl.	Extra	
Airborne	●	●	●	●		●		●		●		—	Next	25	107	Next	25	107	2	48	287	9/lb.	60	5,000	●		2, 5, 10, 11, 12, 13, 14
American Airlines																											
Priority Parcel		●	●	●	●	●	●	●	●	●	●	70	—	—	—	Same	60	92	1-2	75	200	750	40	1,500	●		10, 17
General Air Freight		●	●	●				●				—	—	—	—	Next	63	143	2-3	71	254	9/lb.	40	—	●		7, 15, 16
Express Air		●	●	●				●				—	—	—	—	Same	86	213	2-3	95	351	9/lb.	40	—	●		7, 15, 16
2-Day Air		●		●				●				250	2	16	51	2	16	51	—	—	—	9/lb.	40	—	●		2, 3, 5, 10
DHL Airways	●	●	●	●		●	●	●		●		120	Next	25	105	Next	25	105	2	80	275	100	50	25,000		●	1, 2, 3, 11
Emery																											
Same Day		●		●	●	●		●	●	●		70	Same	140	222	Same	140	222	—	—	—	10/lb.	50	—	●		14
Emery AM		●		●		●		●		●		—	Next	25	107	Next	25	107	—	—	—	10/lb.	50	—	●		4, 5, 14
Emery PM		●		●		●		●		●		—	Next	24	102	Next	24	102	—	—	—	10/lb.	50	—	●		4, 14
Emery Day 2		●		●		●		●		●		—	2	19	82	2	19	82	—	—	—	10/lb.	50	—	●		4, 14
First Class			●	●		●		●		●		—	—	—	—	—	—	—	2	73	417	10/lb.	50	—	●		4, 6, 14
Business Class			●	●		●		●		●		—	—	—	—	—	—	—	3	60	177	10/lb.	50	—	●		4, 6, 14
Standard			●	●		●		●		●		—	—	—	—	—	—	—	3	47	222	10/lb.	50	—			7
Federal Express																											
Priority 1	●	●	●	●		●		●		●		150	Next	25	105	Next	25	105	2	65	237	100	30	25,000	●		1, 2, 6
Standard	●	●		●		●		●				150	2	14	67	2	14	67	—	—	—	100	30	25,000	●		2
Greyhound		●		●				●				100	Next	6	13	4	14	66	—	—	—	100	35	1,000			8, 10
Purolator																											
Priority	●	●		●				●		●		125	Next	11	22	Next	24	104	—	—	—	250	50	25,000	●		1, 10, 14
Standard	●	●		●				●		●		125	—	—	—	2	13	72	—	—	—	250	50	25,000	●		1, 10, 14
International			●	●				●		●		70	—	—	—	—	—	—	2	52	234	250	50	10,000	●		10, 14
Sonic Air																											
Rush	●	●		●	●	●	●	●	●	●	●	70	Same	80	160	Next	120	210	—	—	—	50	100	5,000	●		
9 AM		●		●				●		●		70	Next	29	157	Next	34	162	—	—	—	50	100	5,000	●		5
Express		●	●	●				●				50-70	Next	26	159	Next	26	159	3	41	425	50	100	5,000			9, 12
Premium			●	●	●	●	●	●	●	●	●	50-70	—	—	—	—	—	—	2	120	486	50	100	5,000	●		9, 12
Airpack			●	●				●		●		50-70	—	—	—	—	—	—	3	71	455	50	100	5,000	●		5, 6, 9, 12
United Parcel Service																											
Next Day Air		●		●				●				70	Next	13	69	Next	13	69	—	—	—	100	25	25,000		●	10, 14
2nd Day Air		●		●				●				70	2	4	54	2	4	54	—	—	—	100	25	25,000		●	10, 14
Ground	●	●		●				●				70	2 or 3	2	10	6 or 7	2	24	—	—	—	100	25	25,000		●	1, 10, 14

KEY TO COMMENTS:

1. Local service is next day
2. Extra charge for Saturday pickup
3. Extra charge for Sunday pickup
4. Extra charge for delivery by 9 a.m.
5. Extra charge for Saturday delivery
6. Weekend delivery restricted in some international destinations
7. Delivery to destination airport only; no customs clearance
8. Extra charge for pickup/delivery to and from bus station
9. Maximum weight depends on destination
10. Maximum dimensions restricted
11. Frequency discounts available
12. International rates may be higher depending on customs duty
13. Higher insurance maximum available by special arrangement
14. Signed proof of delivery available at extra charge
15. Maximum insurance value varies
16. U.S. pickup included on L.A. to London rates
17. $250 maximum declared value on international parcels

Tri-Amp System C24-2000 DIRECT **$5469** List $9695
The new tri-amp C24-2000 Concert system produces a wall-of-sound that's earth shaking! Components include; the new 24 ch MX2422 pro stereo console, 2 dual 15" 2000M folded horn sub-woofers, 2 1220M mid-range enclosures, 2 R540H Carvin/Renkus-Heinz radial horns, 2 DCA800, 1 DCA300 power amps (1900 watts rms), and 1 XC1000 electronic cross-over. Also, our ultimate **SC24-2000 Super Concert** tri-amp system features twice the speaker components and sound coverage. DIRECT **$7699**

System S16-1330 DIRECT **$2579** List $4995
Carvin's popular 16 ch S16-1330 System delivers clarity and power for the most discriminating audiophiles. It's crystal clear highs from Electro-Voice drivers and deep bass punch from horn loaded Carvin HE15 woofers, exceeds equivalent systems. Components include; the new MX1622P stereo powered mixer with 400 watts rms, 2 1330M woofers, 2 R540E radial horns and cables.

Carvin Sound Systems. .

Sound System S12-980

System S12-980 DIRECT **$1979** List $3895
Our best compact 12 ch sound system, S12-980, features the same speaker components as used in our large S16-1330 system. Tremendous volume levels are obtainable with a sound that's second to none. Components include; the MX1222P stereo powered mixer with 400 watts rms, 2 980M speaker enclosures, and cables.
The 980M speaker enclosure features the Carvin high energy HE15 woofer and Electro-Voice DH1202 radial horn compression driver. DIRECT **$369** List $695. Add $50 ea. for the optional 980E model with the Electro-Voice woofer.

Sound System S8-960

System S8-960 DIRECT **$1449** List $2695
One of our best performance values is the 8 ch S8-960 system featuring the 960M enclosures. The 960's offer Carvin's high energy HE15 woofer in a tuned port enclosure for smooth, deep bass output. Carvin's HE490 compression horn delivers superb highs. Components include; the MX1222P stereo powered mixer with 400 watts rms, 2 960M enclosures, and cables.
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Carvin's Pro monitors are incredibly powerful, projecting a clear full-range sound to your ears when everything around you seems deafening. The 12" 750M model sells DIRECT **$179** List $295. The 15" 790M model sells DIRECT **$219** List $395. Optional Electro-Voice woofers, add $50.

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- *Brad Gillis (Night Ranger)*
- *Danny Gottlieb (John McLaughlin)*
- *T Lavitz (The Dregs)*
- *Peter McIan (prod. Men at Work)*
- *Missing Persons*
- *Oingo Boingo*
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MX2422
$1999 List $3995

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- Dual graphic EQ's w/patch jacks
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Do-it-yourself Maintenance

A Guide to Cost-Effective Tools and Techniques

by Greg Hanks

The hidden mainstay of any successful audio operation is the often ignored technical department. For these fine folks to perform their function, tools and test equipment are essential. Tools and their use are what differentiate intelligent beings from the rest of the animal kingdom.

It seems that the smaller studio is always beset by the lack of proper implements to accomplish any given task. Sometimes one will find a VOM and a small collection of Korean-made screwdrivers and pliers, but what about a good triggered scope, or (eyes looking to the heavens!) a real-time analyzer? The purchase of the simpler pieces of test equipment or the more robust professional hand tools seems to be in the realm of the larger studio. These purchases are often delayed, until "just one last piece of outboard, you know, the one that we've been renting for the last month" is obtained.

Supplies that enable corrective and preventative maintenance, but consume capital resources, are a difficult pill for studio administration to swallow. However, a few shekels judiciously placed in this area will prove to be a wise investment. A moderate number of well-chosen pieces of technical equipment will provide the smaller studio with the ability to competently evaluate the correct operation of the facility, as well as make it feasible to correct any serious difficulties that may arise. It seems that my little foray into the philosophy of studio maintenance and financial management have led me a little astray from a piece on test equipment!

Within every "shop" certain test equipment should have a permanent home. Many facilities can't even cope with fixing their own microphone cables or headphones, for want of the humble VOM! Let this scenario not be yours, for the lack of ongoing simple repair work can become thy economic downfall. For most of the situations that arise in a commercial audio concern, the following listing should be considered essential fare.

VOM — (Volt-Ohm Meter) used for measuring DC voltages, continuity, resistance and semi conductors.

AC VTVM — (Vacuum Tube Volt Meter) used for measuring noise, operating level and frequency response. This device is an invaluable aid for tracking down headroom problems and other common maladies.

Oscillator — The garden variety oscillator will often do, as long as it will produce tones in the 20 Hz to 20 kHz region with less than .1% distortion. (I prefer a unit that will produce sine waves between 5 Hz and 200 kHz, and give you an output level of at least +24 dBm, but that is another matter that we will discuss later.) It is beneficial to be able to get square waves and pulses as well as sine waves, but not essential, which is what this table discusses.

Oscilloscope — Most cheap oscilloscopes that go for $300 to $400 are not really any form of bargain. These devices frequently trigger incorrectly, have poor frequency response, heavily load down the circuit under test, and are not worth the effort. What is required in performance can be satisfied with a little over $500 (prices have been going up recently, however). Two vertical inputs with flat frequency response from DC to 30 MHz (minimum), "triggered" sweep with a trace that doesn't disappear at the higher sweep rates, external trigger input, trigger source selection and indication are the prerequisites of a proper instrument. I find the scope to be the single most useful tool in my diagnostic bag of tricks. A 10X probe is essential for the proper utilization of a scope.

The above list is indeed a minimum requirement for any facility that wants to seriously engage in the full-time business of audio. For the more esoteric problems that we all sometimes face, we can acquire the use of more complex and expensive equipment either by rental or through the services of a consultant. The purpose of this article is to examine more thoroughly the application of the more common and mundane equipment that is available to the majority of us, and we will cover some of the more esoteric only insofar as they are not covered elsewhere in this issue. So at this point it would be germane to our intent to cover some of the more essential items, such as...

ESSENTIAL HAND TOOLS

Test equipment is essential for discovering what type of affliction ails the equipment that we are responsible for. Once we have isolated our difficulty, we must go about putting it in order. This task usually involves the replacement of components. Replacing or repairing electronics involves soldering, grasping, probing, cutting, stripping and other tasks that require hand tools. With the proper implements, it becomes a simple matter to change an IC, replace a buried switch lamp, repair an intermittent relay, or install a new pot. Some of the common technician's hand tools are not too well known, and some of the things that prove difficult to do are only because of the lack of knowledge of the proper hand tools to accommodate the task at hand. For example, it is not common knowledge that there are in fact three different types of "Phillips" type screws in common use in today's professional audio gear, and they are:

THE ONLY COMPANY THAT DIDN'T HAVE TO IMPROVE ITS LAVALIER MICS JUST DID.

As the world's leader in lavalier microphones, we've just taken some very important steps to ensure that we retain that distinction.

For one, we've taken our mics in a new direction with the addition of the Sony ECM-66 unidirectional. Its wide-angle cardioid pattern provides better off-axis frequency response than the classic pattern—while also providing an unprecedented level of isolation from ambient noise.

We've also made the least of a good thing: The new ECM-77 is the smallest microphone in Sony history. We've even made our new cable housing smaller—and more durable.

We've made more of some good things, too. The new ECM-55, for one: the latest refinement of our successful ECM-50 series.

And we've expanded our line of accessories—with new color windscreens; pencil-type, safety-pin and necklace-type clips; and a power supply holder that clips to your belt.

Sony lavalier microphones operate on either a single AA battery or phantom-power. You also have a choice between black or satin-nickel finishes; and XLR, pigtail or Sony wireless-compatible output configurations.

So to see (barely) and hear (very clearly) the results of Sony's refusal to rest upon its laurels, call your Sony representative: Eastern Region, (201) 368-5185; Southern Region, (615) 883-8140; Central Region, (312) 773-6000; Western Region, (213) 639-5370. Or write to Sony Professional Audio Products, Sony Drive, Park Ridge, NJ 07656.

SONY
Professional Audio

1.) The common American Phillips screwdriver, for equipment made in the US of A, Germany and Switzerland. The sizes are 0, 1 and 2, with 2 being the most common.
2.) The "Pozi-drive" screwdriver for most of the equipment made in Great Britain. Again the most common sizes are 1 and 2, with 2 being the predominantly used size.
3.) The "Vessel" type screwdriver that fits Japanese screws that conform to ISO standards. Here the prevailing sizes are 0 and 2, with 2 being the prevailing champion.

The amazing thing about this is that most of the people that service these devices, without factory advisement, are not aware of why these screws are so tough to install and remove. With the proper fitting driver, it's a piece of cake! In this author's humble opinion, the minimum hand tool requirements are as follows.

SOLDERING EQUIPMENT

The minimum requirements of soldering tools would of course be the common soldering iron. This should be the temperature-controlled type, with a properly treated tip. The temperature should be sufficiently high to promptly melt the solder at the connection to be made (or removed). This is in the 700 to 800 degree range. The tip should also be isolated from the AC line that the iron is plugged into. Many firms manufacture such devices. Some of the recommended makes and models are:
Weller – W60 for portable use, and the WTCP line for bench, or in-studio application, or any of their temp-controlled stations
Oryx – complete line of temperature-controlled irons
Ungar – Ungarmatic 50t, 9000 or 9200 series
Hex a con – Therm-o-trac series
Edsyn – Loner series
Therm-O-Trac – Temp-controlled stations

As well as an iron, there are other tools necessary for professional results, and they are:
Solder Sucker – The best of these are the metal barrel type, with either a teflon or nylon tip. The tip material is important because for proper use, the tip must be placed directly on the molten solder connection for proper removal. Some makes and models that we recommend are:
Paladin – PA1700
EREM – DP-1 tip is conductive, or the T2
Solder Pick – When soldering, there are two different types of "picks" that are very valuable. The first type is the common dentist type of pick; this can be used for cleaning out solder-filled holes, clearing away solder bridges, and holding small parts in place as they are being soldered. This should be made of stainless steel, so that it is strong enough to hold up to the rigors of heat and mechanical abuse. The second type of pick is called an "orange wood" stick. These are usually round, with pointed ends. They are even more handy for clearing solder-filled holes, but are unusable for clearing traces, etc. They have the advantage of not leaching the heat away from the connection.
Solder – This is one of the more important elements in proper soldering. Most of us are aware of the importance of using rosin core solder, and not acid core, so such things will not be discussed. But how many of you were aware of the problems of precious metal leaching that occur when soldering? This type of problem occurs infrequently, but once is too often. Whenever you are working with silver-plated connections, make sure that the solder that you are using contains at least 3% silver in its alloy content, or your otherwise good-looking connection will sooner than later become one of the intermittent connections that plague us all eventually. The most common solder used with recording equipment is either Ersyn or Kester Multi-Core solder. The configuration of alloy and melting temperature that we prefer is identified with the label "WRAP3." The details of differing solders can be found in *Solders and Soldering* by Howard Manko.

WRENCHES

A proper removal tool for nuts and hex type bolts: that is the claim for wrenches. Many different types of fasteners proliferate in the world today, the two most common varieties consisting of metric and American standard. When British gear is involved, both are used as well as other "standards" known as British Standard and Whitworth. Both of these kind of fit within the American and Metric systems, so that ownership of Metric and American type wrenches will usually suffice for working on British gear. From our experience, it is shown that the most efficient working tool arrangement is that of a complete selection of "Spin-tights" in the American configuration, with a complete selection of end and box wrenches for both standards, as well as having on hand the proverbial "crescent wrench" (or knuckle-buster as it is affectionately known). There is no winning when it comes to carrying a compact selection of wrenches, if you are to be prepared for whatever fastener comes along. We recommend that the end or box wrenches that are chosen be of first class quality. The stamped variety do not maintain their size for more than a few uses, and they serve to

smear the edges of whatever fastener they are used on. Snap-On or a similar quality are required. For spin tights, Xcelite is the name, with the blade type being of the most compact.

We haven't mentioned them yet, but oh how important they are! What I am referring to is the "Allen" type of wrench. An inverted (or 1/box for the mathematically inclined) box, this wrench has seen an increasing use in audio equipment manufacture. There are a number of types and manufacturers. The hex wrench and hex head fastener are products of the aviation industry, and the materials that are employed in their manufacture are of a little higher precision than your garden variety screw. The most common malady to face your humble narrator is that of a completely stripped hex head flush-fitting screw. That type of problem may be cured by either drilling out the offending retainer, or removing it through the use of a punch. We prefer the use of an automatic center punch, as it is quick and painless. Most hex wrenches are not made of a material that is compatible in "Rockwell" terms with the fasteners that they are intended for. For this reason, we must say that the only robust and dependable drivers that we know of are manufactured by "Allen" manufacturing. The only exception to this that we know of are the tools employed by Studer. Nonetheless, it is imperative that a full selection of wrenches be maintained, for without them, you'll sooner or later get stuck at an incorrigible, unremovable fastener.

So we would recommend the common sizes in Allen, and a full selection of both American and metric drivers from Xcelite, as well as the three wrenches that Studer sells. Throw in a little blue packet of very small drivers from Otari, and you're set! This all takes up a fair amount of room in the tool kit, but it cannot be helped. I seem to dwell on the concept of compact, and this is so. It is both difficult and ungainly to wheel in a 6-foot mechanics' tool chest to the control room to work on a machine. Thus, for common repair work, we prefer that the entire collection of common hand tools fit comfortably within the standard briefcase-type tool box. We will discuss the case requirements at a later time.

PLIERS

Whenever an application requires holding, bending positioning, or any other manipulation that is ill-fitting for human fingers, then pliers come into use. There are many different types of pliers currently in use in the electronics trade today. Some of these include: standard type long nose, extended long nose, bent long nose, chain link, electrician's, lead forming, "channel

lock," and "vise grip."

. . . and many other specialized types for specific purposes in the electronics trade. The essential requirements of pliers are that they open and close smoothly, the hinge is tight so that the jaws do not twist in use, and that the proper type be appropriately applied to the task at hand. The most often used pliers in console and tape machine repair work are the long nose type. The variety of long nose is also a bit staggering when you go through a tool catalog looking for just the right one for your kit. There are extremely long nose, short long nose (a bit of a contradiction in terms), bent long nose, and all of the above with or without serrated jaw faces. A minimum requirement would be a pair of 3½-inch standard long nose, a pair of long bent long nose, and a pair of extended thin long nose. With these three, most requirements will be fulfilled. The recommended brands are: EREM, VACO, Barco, Diamalloy, Xcelite (for occasional use), Klein, Utica, Lindstrom, and Vigor.

CUTTERS

Cutting tools needed for maintenance work are not too many, but without those essential ones, much time can be spent in vain. The cutting tool category includes: pliers, saws, files, sand paper, drills, grinders, and the like. Many of the aforementioned are nice to have but not essential. The required cutters are:

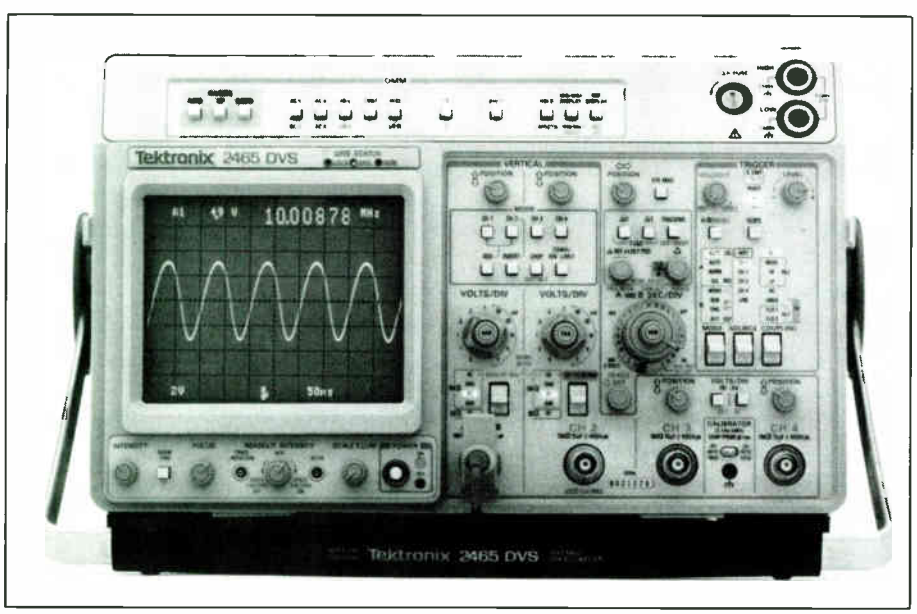
1.) **Hacksaws** - Almost any hacksaw will do, but having one is necessary. Whenever you try to replace a "type J" pot, you have to cut the shaft to the proper length. Therefore, you need a hacksaw.

2.) **Files** - Files come in more shapes and sizes than pliers do! Strange as it seems, it's true that files will beguile the purchaser if you have to use a catalog number to buy them. By far the most commonly needed file is the 6-inch bastard end mill, fine pitch. A set of jewelry files is very handy to have as well.

3.) **Drills** - An electric hand drill and set of bits should be in every shop. The drill chuck should accommodate bits up to and including ½-inch. The drill bit selection must include the fractional sizes from 1/16 to ½-inch. Optionally a numbered set from 0 to 60 should be included. In the manufacturing world, numbered bits are used exclusively, but the fractional set is less expensive, and will accomplish (with a bit of room for error) any task that you need to perform.

4.) **Pliers** - The cutting pliers required are of three types: strippers, diagonal cutters, and flush-cutting tip diagonal cutters. Strippers come in a variety of shapes and sizes again, the particulars determined by the primary use to which they will be put. The "fancy" strippers are nice when you have a large quantity of work to be done that the particular tool is intended for. What is essential is a device that will remove insulation from a variety of wire types and sizes, without nicking the conductors. There are a number of manufacturers of this type of stripper, and they are: Xcelite - Model 100, Klein - 100, and EREM 410HL (Oh so Swiss!).

5.) **Diagonal cutters** - Commonly known as "dykes," the diagonal cutters' prerequistes are that they work on the wire types that you use, and that they do not damage the components that they are used on. In wiring applications, almost any cutter will suffice, as long as the wire diameter will not damage the tool itself, and the tool cuts, of course! For repair work the requirements change a little bit. Whenever one is working on a semi-conductor, it should be kept in mind that the junction between the lead and the piece of silicon that is the business end of the device, is shock sensitive. Do you remember how the lead flies across the room when you cut it? Well, this is an example of the stress that a pair of cutters applies to the semi-conductor internal connection. For this reason, flush-cutting dykes are the preferred type to use whenever this type of operation is performed. A good pair of dykes will have a hinge joint that does not allow flexing of the jaws in any plane. Tip dykes are also necessary. The need for these pliers arises when it is necessary to replace a DIP type IC on a board with plated-through holes. These cutters should be able to get to the IC leads individually. When replacing an IC in this type of environment, we prefer to cut the leads from the IC itself, flush with the body, and then remove the leads individually. This type of technique will minimize damage to the PC board, and will help maintain the plate-through in the board itself. Some manufacturers of the preceeding pliers are: Xcelite 73cg nose cutters, Xcelite 95cg flush cutters (large), EREM 495 EHM (beautiful 4-inch flush cutters), and EREM 90E1 Tip dykes, etc.



Tektronix 2465 DVS oscilloscope.

SOME TEST EQUIPMENT THAT IS NICE TO HAVE

While the previous discourse might seem lengthy, it has been meant only to outline some of the necessities of technical life. Herein we will describe some of the more desirable stuff available.

Lavell AC VTVM

The Lavell AC VTVM is a little-known measuring instrument that hails from Great Britain. With a very large meter movement that has an extended range, it is not necessary to look at +4 as being -6 on the +10 scale. Unlike the domestic meters that have a useful range of 300v to .0003 (at best!), this unit will measure accurately, though with limited frequency response, down to -110 dB! There is a filtering section on the front end that allows for high and low pass cut-offs at 1Hz to 3MHz, 10Hz to 100kHz, or 10Hz to 10kHz. Battery-powered, the unit floats from the unit under measurement, and has a buffered output so as to allow for hook-up to a scope, real-time analyzer, or whatever. We use one of these on our bench, and can attest to its versatility, and desirability. Recommended for the operation that wants separate instruments to measure beyond the average ranges.

Triggered Oscilloscopes (Generic)

Oscilloscopes deserve more than an

NO DROPOUTS

Samson's "Phase-Reflex" technology solves wireless' biggest problem.

The total freedom of movement promised by wireless mic and instrument systems is a very attractive option for most modern musicians and singers. Unfortunately, the stratospheric prices of the more "professional" systems exceed their ability to eliminate problems like *drift, interference* and *dropouts*—so many of the most adventurous performers have gone back to messy cabling.

Samson's Broadcast Series "Phase-Reflex" Wireless System finally solves the big problem of dropouts, and other types of interference, by incorporating the most sophisticated wireless technology available into a versatile and surprisingly cost-effective package.

We've combined the most refined "true diversity" receiving system operating at a Hi-Band VHF/FM frequency range to insure full-fidelity wireless performance with no unexpected interruptions or surprises.

The system consists of a full-frequency response microphone (with a choice of the Shure SM58 Dynamic or SM85 Condenser capsule) or "belt-pack" instrument/lavalier transmitter and Samson's PR-50 30 Channel FM Digital Receiver. These elements working together result in a frequency response of 20 Hz to 18 kHz, extremely low harmonic distortion and excellent signal-to-noise specs for the strongest, most uncolored and "natural" sound possible. The system's range is a full 300 ft. under the most adverse conditions and 1500 ft. line of sight.

To offer greater performance, the Samson PR-50 receiver features an exclusive three-parameter "Auto-Mute" (patent pending) function to mute off-station noise when the mic is off; a streamlined and compact 19" rack-mountable housing and balanced line outs and a line level out for recording and mixing. Samson's HT-20 microphone transmitter uses a standard 9V battery and has no protruding antenna to get in your way.

And when it comes to the *bottom line*, Samson's Broadcast Series System is priced at $1,295 U.S. (w/Shure SM58 mic cartridge), $2,000 less than our closest performing competitor. In fact, competitive units at twice the price don't offer all of these features. We've created *the* system that solves your biggest problems with wireless. The Samson Broadcast Series "Phase-Reflex" Wireless System is the first *real* step towards experiencing the ultimate freedom of wireless.

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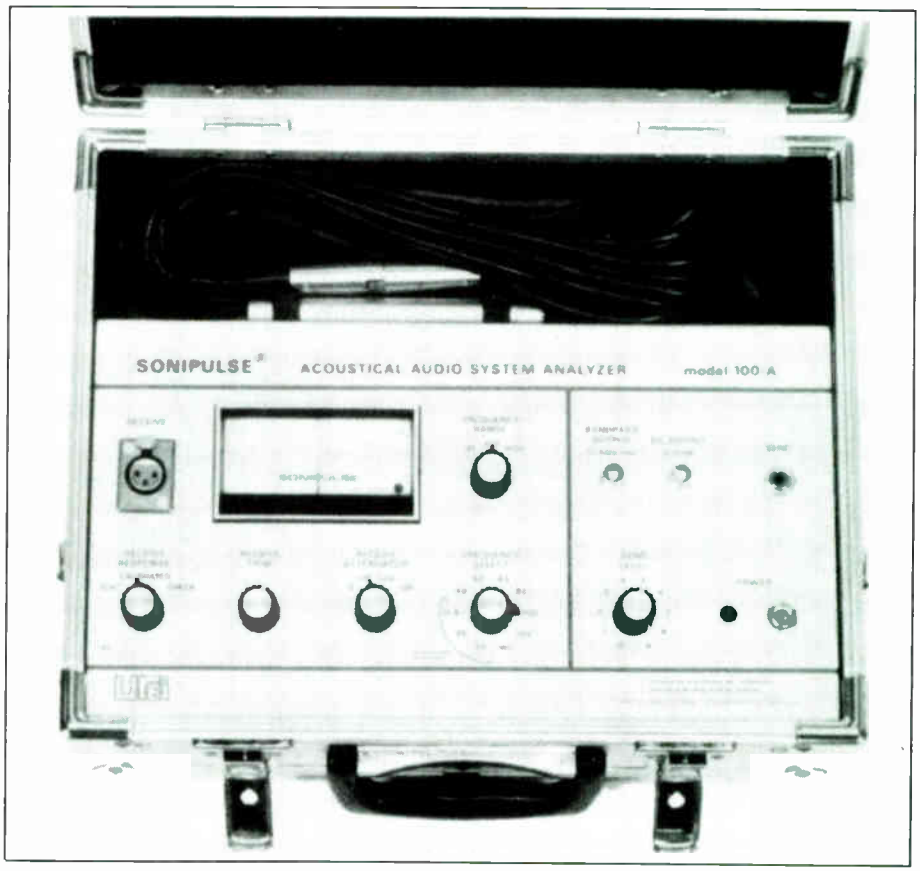


UREI Soni-Pulse Model 100-A

article all by themselves. There are many good books written about the proper way to use, unusual applications for, and specifications that are desirable in scopes. When the budget allows, it is our firm belief that the scope is where a little more cash should be invested. Aside from the minimum requirements that were outlined previously, a desirable scope will have two inputs that you can select individually, alternately, together in the chopped mode, or added together, with at least one input having a choice of inversion so as to make a true differential input. The desired scope will have an input sensitivity of .005v or better, at full bandwidth, and have a bandwidth of 60MHz or higher. Aside from this, the triggering should allow for selection of the input(s) that it triggers from, as well as having provisions for triggering on video frames and horizontal sweeps. Trigger delay allows for viewing events with a faster time base, but occur over a longer time interval. One of the most common uses of the trigger delay is for the observation of the initial rise of the bias and erase waveforms so as to find out what causes punch in and punch out pops on tape machines. In any event, the oscilloscope is one of our most used test instruments, and as such, it deserves much care and thought in its selection. Recommended brands are: Hewlett/Packard, Hitachi, Leader, Non-linear systems (for small/portable/ and inexpensive), and Tektronix.

Acoustilog Impulser

The impulser is one of the dedicated pieces of test gear manufactured by Acoustilog. This device performs two functions. The first is the generation of an impulse type of waveform (it is actually much closer to a raised co-sine pulse than a true pulse of infinite amplitude and zero duration, but that is a matter for textbooks, not this article) and a microphone pre-amplifier. There is a trigger output from the box that is used to trigger an oscilloscope. The preamplifier is then taken to the input of the scope, and the delay between the impulser output and the observed trace on the scope is equivalent to determining the acoustic delay that occurs between the speaker output and the microphone input, observing speaker polarity, microphone polarity, crossover polarity, time delay between drivers, early reflection times and the like. A handy thing to have, not essential but very nice!

UREI Soni-Pulse

The Soni-Pulse unit has risen from disfavor over the last couple of years. This unit uses a raised co-sine pulse, much like the one discussed earlier in the Impulser. Firing this pulse rapidly, the unit detects the output of a speaker

system through the use of the system microphone. This pickup is then amplified and equalized, and sent to a metering system. Primarily used for tuning systems, the unit is also useful for investigating echo, delay and EQs. Time consumption is the main drawback in the use of the unit. It is accurate at the low frequencies and works well if you have the patience to use it.

Fluke 8060A

For the field serviceperson, this unit is almost indispensible. It incorporates the standard functions of a DVM, AC VTVM, and a frequency counter. Under the control of a microprocessor, this unit extends the range and utility of the above mentioned functions. The VTVM can measure up to 200 kHz with accuracy, and give the readout as dB or relative dB. What this means is that you can set a reference level, and then take future readings relative to the preset reference. dBm become dBv with the touch of a button! Voltage and resistance readings can be done in the same way, and resistance can be assigned to the dB scale. This enables feedback and input resistors on an opamp to be measured, and the gain of the opamp read out directly. The other extensions to function are in the way that the ohm meter works. In standard operation, the unit operates below the .7v diode drop of a semi-conductor, so that in-circuit resistance readings can be accurately taken, and conductance is measured as a separate function so that shorts and opens in semi's are handled equally as well. Not a necessary piece for a studio if the functions are accomplished elsewhere, but for the field—irreplaceable!!! A must-buy at $369 from Fluke manufacturing.

Function Generators

A function generator is a very useful device to have around the studio. On its own it is of very little utility. However when it is coupled with an oscilloscope, it can be used to: plot frequency response, observe impulse response, and optimize square wave response, etc.

Distortion Analyzer

Distortion analyzers seem to be a changing breed. The classic dedicated distortion analyzer seems to be headed for obscurity. The direction of the newer family of instruments that encompass distortion analysis is that of a multi-purpose instrument that is under the control of a computer. Distortion analysis is somewhat cumbersome in the analog domain, requiring a high degree of component precision, and a somewhat laborious tuning procedure in operation. In the digital domain, distortion analysis requires only appropriate software, and sufficient resolu-

See photos in *Mix* New Products Directory on page 132.

tion at the A to D and D to A. Once the hardware is implemented to operate in the digital domain, the instrument can become a spectrum analyzer (narrow, broad, or octave type), and IM analyzer, a reverb time analyzer, a fast fourier machine, a wizz bang oscillator, or whatever the software designer deems appropriate. With this type of chameleon power available in the hardware, it is only a matter of time before most of the more expensive dedicated analyzers are considered obsolete. There is a great amount of good fortune here for the smaller studio that cannot or will not attempt the cash outlay necessary for these "smart" analyzers, and that is why when they are in greater proliferation the price of some of the nicer distortion analyzers will fall to very inexpensive levels. Some of the manufacturers of devices that fit within the above mold include: Tektronix, Audio Precision, General Radio, Hewlett/Packard, Sound Technology, and Bruel and Kjaer.

Real-Time Analysis

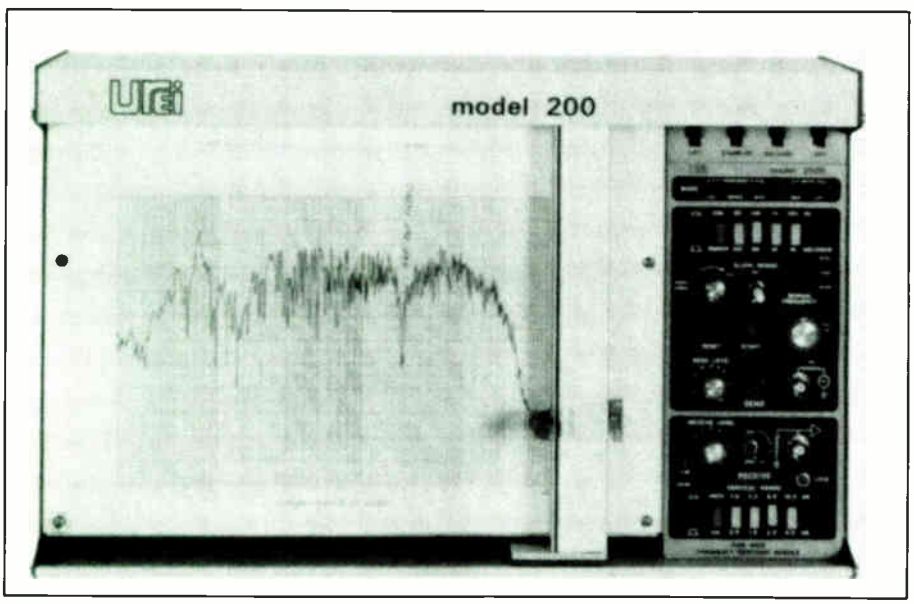
A real-time analyzer is one of those items that everybody knows what it is, but quite often do not think about some of its less obvious applications. You know it is not necessary to use it at mike level only! Apply a pad at the input, hook it up to the output of your AC VTVM, (assuming you have an output available), and you can look at the spectral content of the noise floor of your tape recorder/console/echo system or whatever.

SPL Measurement

Sound pressure level meters come in a variety of prices, sizes, levels of accuracy, and intentions of application. This is a device that is best examined carefully before purchasing. Bruel & Kjaer make some of the most versatile (and expensive!). The primary application of an SPL meter is to ascertain the noise level, on a broad band basis, in a given environment, with known excitation. However, in the studio environment, it is more often used to ascertain the maximum SPL available from the monitors, provide a tool for setting monitor level balance, and setting up crossovers, small speakers, and the like. With some of the more advanced meters, they come with filter sets, so that "Room Tuning", frequency selective isolation analysis, and other forms of testing are possible, without the expense of additional testing apparatus. Meters of this type are available from: Bruel & Kjaer, General Radio, and Ivie (although this device is most often considered a real-time analyzer with SPL capabilities built in).

Frequency Response Plotter and Warble Tone Systems

There are only a few systems that are dedicated to the hard copy plotting of frequency response, and it seems to me that this is rightly so. The applicability of most of these systems is limited at best, and the prime use for most of these systems is for testing in the manufacturing process. There are, however, some very good applications of these devices for the larger studios that have a need for documentation of the performance of their equipment. We have applied these systems to the charting of the frequency response of loudspeakers so as to match the left and right characteristics of the main monitor system. We also plotted the response of all spare speakers so as to have a ready reference as to what speaker would fit in a given control room pair, should one of the main devices fail. In order to apply a frequency response plotting system to speakers, microphones, acoustic spaces and the like, a device must be implemented in the generator to enable the swept oscillator to be frequency modulated. The amplitude of the modulation will determine what the effective response bandwidth will be. The modulation frequency should be kept below the lowest frequency of interest, yet be fast enough so as to truly provide for integration of the desired bandwidth. This is often called a "warble tone" system. By using the warble tone method you can test, using the appropriate warble frequency and amplitude and (with an appropriate reference microphone and pre-amplifier), the response of the control room, the frequency response of loudspeakers, microphones, etc. UREI made the Model 200 system for the above mentioned purposes. Neutrik has come out with a line of test equipment to complement its "Audiotracer" for the same purposes.



UREI Model 200 plotter with Model 2000 plug-in sine wave frequency response module.

Reverb Time Analysis

The reverb time analyzer, available as an option to: Goldline real-time analyzer, Eventide Apple Board, General Radio RTA, Bruel & Kjaer RTA, or as a dedicated instrument available from Acoustilog.

This instrument provides the facility of looking at the reverb time, in narrow band increments, of an echoic environment. This can be a control room, an echo chamber, a digital echo device, or for that matter give you some interesting information on the print through characteristics of tape. It is truly amazing how much information can be gleaned with a specific piece of test equipment.

Spectrum Analyzer

Of late, the epidemic profusion of the microcomputer into all phases of our professional and private lives have brought forth a new generation of test equipment. Some of these new offerings take the form of add-ons to popular home computers such as the ⅓ octave analyzer PCB and software for the Apple from Eventide, the Fast Fourier Analyzer card and software for the Apple, available from Rapid Systems, of Bellevue, WA. Other systems are coming out on a seemingly daily basis, for the purposes of sequencing synthesizers, running synchronizer systems, managing console automation systems, and the like. These applications of micros to the operation and simulation of test equipment should provide for some very interesting systems in the near future. ■

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QUALITY SOUND MONITORS

6 Sub-Compact Two-Way
Near field control room auxiliary monitor for mixdown reference, broadcast monitor, residential high fidelity system, and commercial sound distribution where space is limited. 6½" (165 mm) polypropylene cone woofer with foam suspension; 1" (25 mm) soft dome tweeter with ferrofluid voice coil coolant; 8 ohms impedance; 80 watts program power handling; Anechoic frequency response: 50-20,000 Hz ±3 dB; Sensitivity: 88 dB 1W/ 1M; HWD: 14½" x 9½" x 10" (36.8 x 24.1 x 25.4 cm); Approximate shipping weight: 36 lbs (16.3 kg) pair.

RC66 Road Cube Two-Way
Mobile and field recording and broadcast reference monitors, performer's or musician's monitors, small auditorium public address systems. Two 6½" (165 mm) polypropylene cone woofers with foam suspension, 1¼" (34 mm) soft dome midrange-tweeter; 8 ohms impedance; 100 watts program power handling; Anechoic frequency response: 55-18,000 Hz ±2½ dB; Sensitivity: 90 dB, 1W/1M; HWD: 24½" x 14⅞" x 14⅞" (62.2 x 37.8 x 37.8 cm) closed; Approximate shipping weight: 70 lbs. (31.8 kg) set.

T5 Ultra-Compact Two-Way
Neutral response small system reference monitor, A & R demonstration speaker, high quality extension speaker system for home and commercial applications. 5¼" (133 mm) polypropylene cone woofer with foam suspension; 1" (25 mm) soft dome tweeter with ferrofluid voice coil coolant; 8 ohms impedance; 40 watts program power handling; Anechoic frequency response: 90-20,000 Hz ± 3½ dB; Sensitivity: 87 dB 1W/1M; HWD: 10½" x 7" x 7⅜" (26.7 x 17.8 x 18.7 cm); Approximate shipping weight: 20 lbs (9.1 kg) pair.

QC66 Quality Control Three-Way
Control room and mobile recording reference monitor, studio playback, mastering monitor, residential and commercial sound systems. Two 6½" (165 mm) polypropylene cone woofers with rubber suspensions; 1¼" (34 mm) soft dome midrange-tweeter; 3/4" (19 mm) polyamide fiber dome super-tweeter; 8 ohms impedance; 100 watts program power handling; Anechoic frequency response: 50-20,000 Hz ±2 dB; Sensitivity: 90 dB 1W/1M; HWD: 13½" x 16½" x 12½" (34.3 x 41.9 x 31.8 cm); Approximate shipping weight 35 lbs. (15.9 kg) each.

T66 Compact Two-Way
Near field control room reference and mixdown monitor, broadcast monitor, sound reinforcement and sound distribution system for small and midsize auditoriums, churches, classrooms, performer's or musician's monitor. Two 6½" (165 mm) polypropylene cone woofers with foam suspension, 1¼" (34 mm) soft dome midrange-tweeter; 8 ohms impedance; 100 watts program power handling; Anechoic frequency response: 55-18,000 Hz ±2½ dB; Sensitivity: 90 dB, 1W/1M; HWD: 12" x 18" x 12½" (30.5 x 45.7 x 31.8 cm); Approximate shipping weight: 33 lbs. (15 kg) each.

- **WOOFERS.** Modified polypropylene cones. Low mass, optimum stiffness, internally damped. Minimal coloration or audible distortion. Environmentally stable.
- **MIDRANGE/TWEETERS.** Impregnated fabric dome. Massive magnet structures. Wide dispersion. Exceptionally smooth frequency response. Powerful impulse response.
- **TWEETERS.** Viscous damped soft dome. Ferrofluid in voice coil gap. Minimized coloration and secondary resonances. High power handling.
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- **CROSSOVERS.** Close tolerance polyester capacitors. Air core chokes. Fiberglass printed circuit boards. Controlled blending of drivers. Consistent quality.
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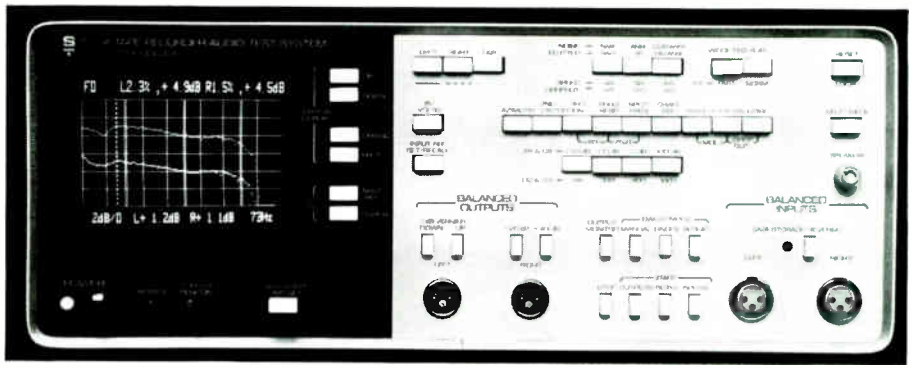
A LOOK AT A COMPUTER-IZED STUDIO DIAGNOSTIC SYSTEM



A Sound Technology 1510A Tape Recorder/Audio Test System, equipped with an IEE-488 bus and interfaced with an IBM PC-compatible computer, formed the basis for the automated diagnostics system at The Village Recorder.

by Tony Thomas

In the studio of the future, it will be possible to hook up a black box to the console, go to lunch, and come back later to analyze the print-outs generated by such a device which has the ability to graphically depict the operational integrity of each of the console's modules. Surprisingly, this computerized console analyzer exists today at The Village Recorder, one of Los Angeles' most progressive and popular recording facilities. In their quest for sonic superiority, the Village has designed what may be the first computerized application of Automatic Test Equipment (ATE) technology to the rigors of the recording studio environment.

Although a thorough preventative maintenance program is by far the best means of insuring against unexpected equipment failure, its tedious and time-intensive nature has effectively prevented most studios from aggressively pursuing its implementation and enforcement. Because of this, many studios suffer the inevitable consequences of not adequately maintaining their studio equipment: excessive downtime, often resulting in a loss of clientele, invariably producing a corresponding loss of studio revenue. Ironically, one of the reasons most cited to explain why such maintenance is not performed is the amount of time it requires, not taking into account the amount of time that can be saved by the development and application of a comprehensive PM program.

While it is true that checking out a 24-input console module by module is quite time-consuming, it is far better to schedule downtime when it is conven-

—PAGE 292

KEY TO SCREEN DISPLAYS AT RIGHT:

SCREEN 1:
Displayed on system boot. The program that displays this screen also automatically sets system time from a battery operated clock on the Ziatech GPIB interface card.

SCREEN 2:
Main selections. Note that the "8108 Console Channels" displayed under Main Menu reflects the name of the data disk in Drive B.

SCREEN 3:
After tests are completed, the operator would be able to see the test data analyzed. Note that the lower part of the screen shows the title of the most recent test performed. In this case it means All Tests on channels 1 through 24 of the 8108 console. The date and time are part of the test name in order that the user can distinguish between similar tests done on the same day.

SCREEN 4:
Display showing the summary analysis of the test name displayed near the bottom. On the screen, a check mark is displayed if the test data meets standards. A highlighted letter X is displayed where the test is out of standard. There are three highlighted X's, two in channel 3, one in channel 8.

SCREEN 5:
The details of the channel 8 test results. The first two blocks display frequency response information, the next two show noise and cross-talk results, and the last two display distortion (2nd on top, 3rd on the bottom). The lower right hand corner displays the analysis standards used. The left column of each block shows the frequency or level at which the test was performed. The center column of each block displays the actual test data received (in the case of frequency response, the levels are normalized to the 1 kHz reference). The right hand column of each block would show the deviation from standard. This screen has all deviation columns blank; the problem is that the gain is -6.1 as shown on the bottom, i.e., the input vs output level of channel 8 is different by 6.1 dB.

SCREEN 6:
Details of channel 3 test results. Readings in deviation column of 2nd and 3rd harmonic distortion tests indicate a problem with this channel.

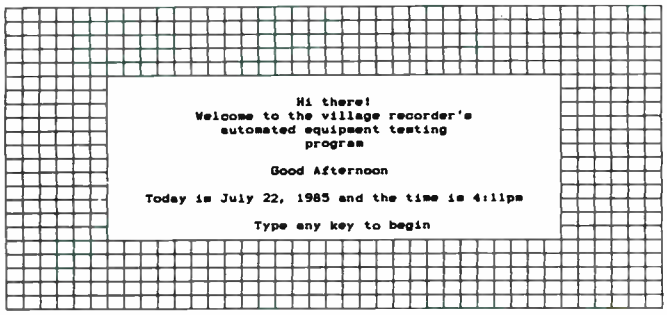
SCREEN 7:
A computer-produced graph of a 4-channel equalizer. Graphs are automatically ranged and scaled in order to show the most detailed response curve. Ranges may be 1, 2, 4, 8 and 16 dB/major division.

SCREEN 8:
When a test is to be performed, the operator fills in the top left block on this screen using the choices on the right.

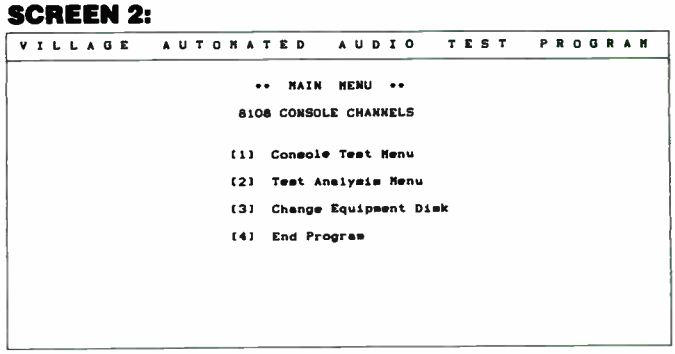
SCREEN 9:
Screen displayed during equipment testing.

SCREEN 10:
Analysis standards can be altered at any time.

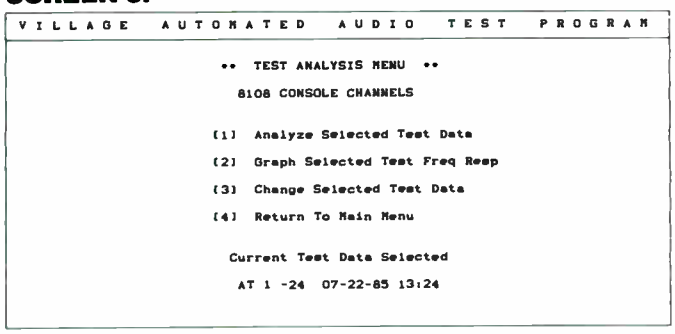
SCREEN 1:



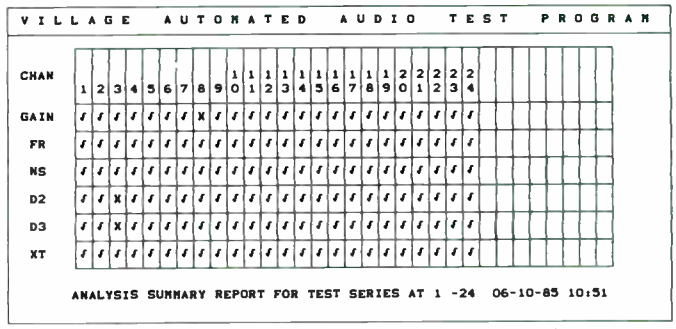
SCREEN 2:



SCREEN 3:

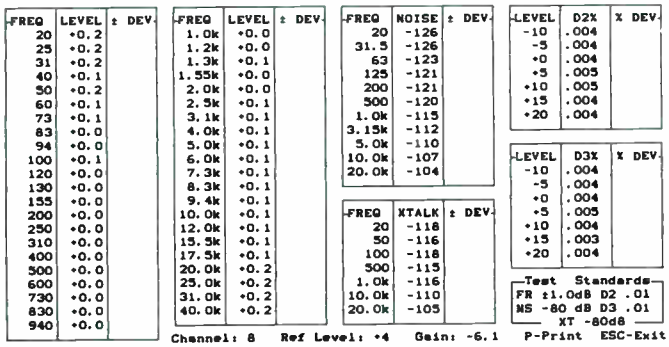


SCREEN 4:



<ESC> To Exit <P —> To Print To Display Test Results, ENTER Channel #:

SCREEN 5:



FREQ	LEVEL	± DEV
20	+0.2	
25	+0.2	
31	+0.2	
40	+0.1	
50	+0.2	
60	+0.1	
73	+0.1	
83	+0.0	
94	+0.0	
100	+0.1	
120	+0.0	
130	+0.0	
155	+0.0	
200	+0.0	
250	+0.0	
310	+0.0	
400	+0.0	
500	+0.0	
600	+0.0	
730	+0.0	
830	+0.0	
940	+0.0	

FREQ	LEVEL	± DEV
1.0k	+0.0	
1.2k	+0.0	
1.3k	+0.1	
1.55k	+0.0	
2.0k	+0.0	
2.5k	+0.1	
3.1k	+0.1	
4.0k	+0.1	
5.0k	+0.1	
6.0k	+0.1	
7.3k	+0.1	
8.3k	+0.1	
9.4k	+0.1	
10.0k	+0.1	
12.0k	+0.1	
15.5k	+0.1	
17.5k	+0.1	
20.0k	+0.2	
25.0k	+0.2	
31.0k	+0.2	
40.0k	+0.2	

FREQ	NOISE	± DEV
20	-126	
31.5	-126	
63	-123	
125	-121	
200	-121	
500	-120	
1.0k	-115	
3.15k	-112	
5.0k	-110	
10.0k	-107	
20.0k	-104	

FREQ	XTALK	± DEV
20	-118	
50	-116	
100	-118	
500	-115	
1.0k	-116	
10.0k	-110	
20.0k	-105	

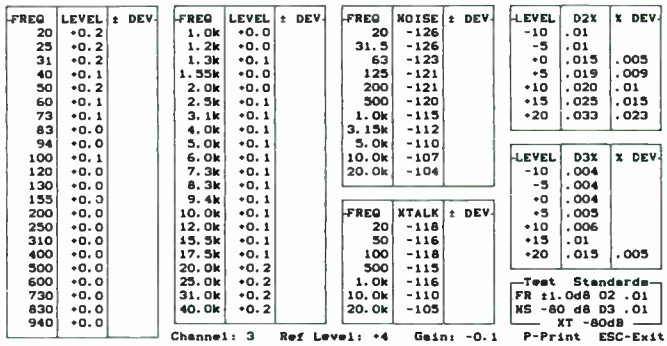
LEVEL	D2%	% DEV
-10	.004	
-5	.004	
+0	.004	
+5	.005	
+10	.005	
+15	.004	
+20	.004	

LEVEL	D3%	% DEV
-10	.004	
-5	.004	
+0	.004	
+5	.005	
+10	.004	
+15	.003	
+20	.004	

Test Standards
FR ±1.0dB D2 .01
NS -80 dB D3 .01
XT -80dB

Channel: 8 Ref Level: +4 Gain: -6.1 P-Print ESC-Exit

SCREEN 6:



FREQ	LEVEL	± DEV
20	+0.2	
25	+0.2	
31	+0.2	
40	+0.1	
50	+0.2	
60	+0.1	
73	+0.1	
83	+0.0	
94	+0.0	
100	+0.1	
120	+0.0	
130	+0.0	
155	+0.0	
200	+0.0	
250	+0.0	
310	+0.0	
400	+0.0	
500	+0.0	
600	+0.0	
730	+0.0	
830	+0.0	
940	+0.0	

FREQ	LEVEL	± DEV
1.0k	+0.0	
1.2k	+0.0	
1.3k	+0.1	
1.55k	+0.0	
2.0k	+0.0	
2.5k	+0.1	
3.1k	+0.1	
4.0k	+0.1	
5.0k	+0.1	
6.0k	+0.1	
7.3k	+0.1	
8.3k	+0.1	
9.4k	+0.1	
10.0k	+0.1	
12.0k	+0.1	
15.5k	+0.1	
17.5k	+0.1	
20.0k	+0.2	
25.0k	+0.2	
31.0k	+0.2	
40.0k	+0.2	

FREQ	NOISE	± DEV
20	-126	
31.5	-126	
63	-123	
125	-121	
200	-121	
500	-120	
1.0k	-115	
3.15k	-112	
5.0k	-110	
10.0k	-107	
20.0k	-104	

FREQ	XTALK	± DEV
20	-118	
50	-116	
100	-118	
500	-115	
1.0k	-116	
10.0k	-110	
20.0k	-105	

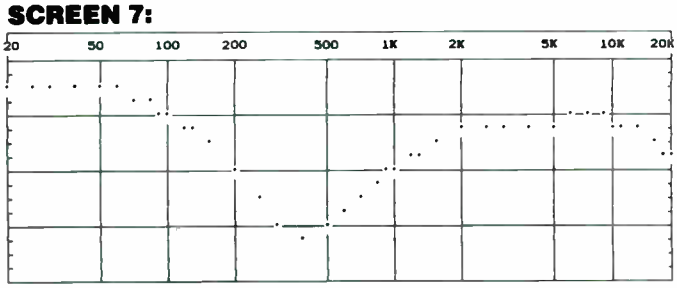
LEVEL	D2%	% DEV
-10	.01	
-5	.01	
+0	.015	.005
+5	.019	.009
+10	.020	.01
+15	.025	.015
+20	.033	.023

LEVEL	D3%	% DEV
-10	.004	
-5	.004	
+0	.004	
+5	.005	
+10	.006	
+15	.01	
+20	.015	.005

Test Standards
FR ±1.0dB 02 .01
NS -80 dB D3 .01
XT -80dB

Channel: 3 Ref Level: +4 Gain: -0.1 P-Print ESC-Exit

SCREEN 7:

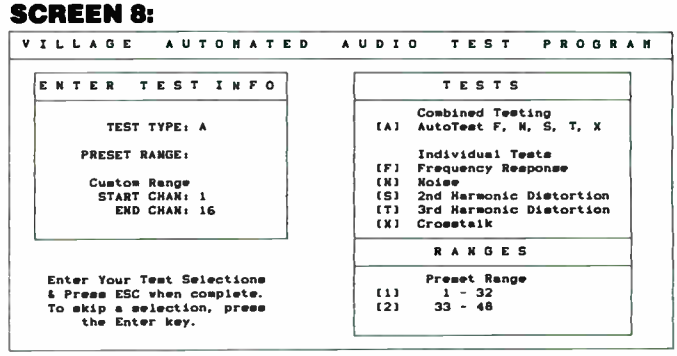


SCALE: 2 dB/Major Division
.5 dB/Minor Division
± .25 dB Display Accuracy
FR 1-4 01-10-85 18:54

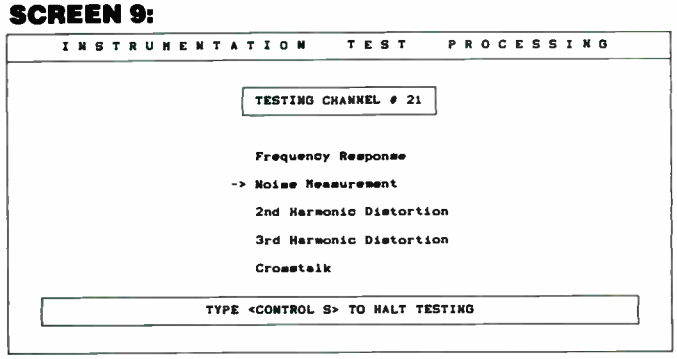
Input Reference Level: +4dBm
Channel Displayed: 2

TYPE: <P> PRINT <ESC> MENU

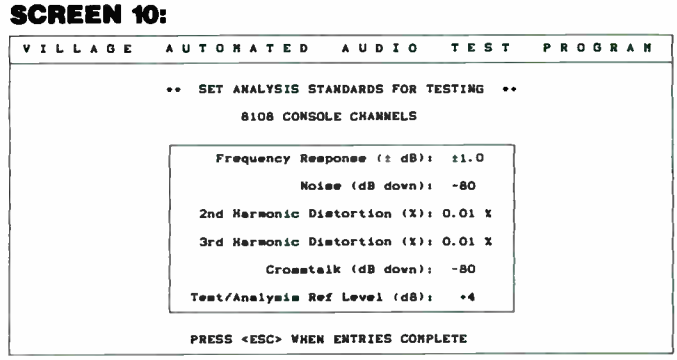
SCREEN 8:



SCREEN 9:



SCREEN 10:



NOW FOR SOMETHING

NEOTEK's new **Elite** consoles offer unprecedented flexibility that is simply unavailable on any other console. Split monitoring consoles have gone the way of the brontosaurus. In-line monitoring consoles are soon to follow, no matter how many complicated functions get tacked on. What contemporary studios need are consoles with a completely different approach.

The **Elite** is the first dual channel console, the first 26-track console, and the first console to meet the future requirements of modern multi-purpose studios. Each input/output strip contains two signal paths controlled by linear faders, and the inputs and outputs of each path may be independently selected. Inputs include three line inputs, buses, and the other fader, while outputs include 24 multitrack and two stereo buses. The sweep high pass filter, insert point, and four band parametric equalizer are individually assignable to either path. Input channels can be Y-ed at any of five points, all without patch cords. Full-featured stereo input modules with stereo sends, filters, patch, and four band EQ are available for use as line inputs and subgroup masters.

The result is the most flexible operating system ever offered in any console. There are over 75 simultaneously useable line inputs and 72 effects sends on a typical **Elite**, yet intelligent layout, clearly labeled switches, and calibrated controls make the console easy to operate and quick to reset. There are no mystery switches with labels like 'Flip,' 'Float,' or 'Split.'

The **Elite** mute logic system offers direct digital interface to video editors, MIDI controllers, and computer data lines. An **Elite** with full-featured **Audio Kinetics** automation offers an incredibly powerful disk based, SMPTE locked system. With factory installed **Massenberg Labs** moving fader automation the **Elite** has power and flexibility second to none, without the sonic shortcomings of comparable computer controlled consoles.

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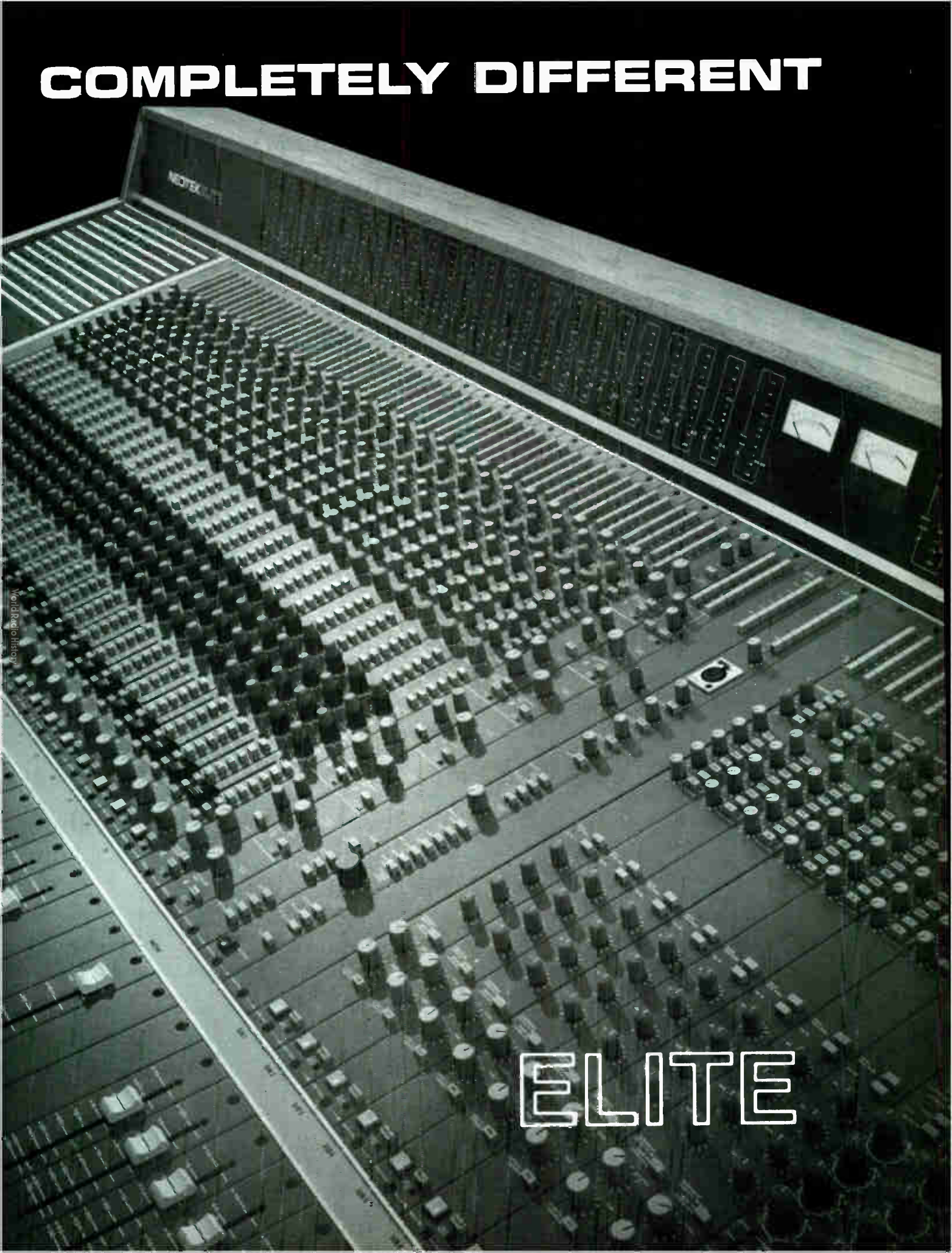
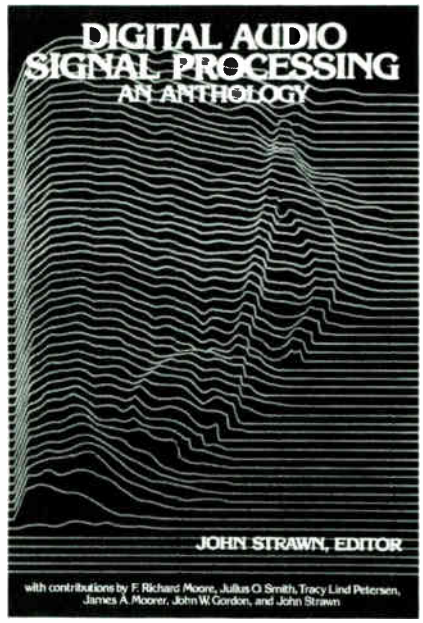


NEW RELEASES IN COMPUTER MUSIC

by Larry Oppenheimer

"Digital audio is transforming us all," proclaimed film composer Giorgio Moroder in a recent advertisement, and I must agree. Sampling, MIDI, digital reverb, FM synthesis, and digital recording are just a few examples of how this transformation is undeniably altering music and audio. In fact, it becomes increasingly evident as the Siamese twin fields of computer music and digital audio (CM/DA) progress that many of the distinctions between music and audio are being blurred. Sampling machines such as the Emulator 2 or the Fairlight CMI have been generally classified as musical instruments, but they are actually specialized examples of digital recording/playback technology, which is generally regarded as audio. The appearance of rack-mounted samplers which are intended for musical use but lack any keyboard or controller reinforces this.

What does this have to do with books? Everything. Information is the lifeblood of this transformation, and up until now, gathering detailed information in these areas has consisted largely of locating and procuring various pertinent papers from periodicals often buried deep in the science stacks at the library (if they even have the needed publication at all). It is not unusual for me to spend nearly half of my research time for an article this way. Perhaps it is simply because a great deal of the significant developments in CM/DA have happened in the last 15 years or so, but there are really only a few books worth mentioning for the serious practitioner (as opposed to the equally serious user that does not care to delve into the actual workings. There are numerous works in several media, such as Ferro Productions' "SynthArts" package, which are becoming available for them). In



computer music, there are two classics: *The Technology of Computer Music*, by Max Mathews, et. al. (MIT Press 1969), and Hal Chamberlin's wonderful, *Musical Applications of Microprocessors* (Hayden 1980). That's about it for books.

That situation has now quite suddenly been changed, thanks to the efforts of Curtis Roads and John Strawn. These two gentlemen have taken the interesting step of contracting with two publishers to edit what I feel are the most significant books on CM/DA to appear since Chamberlin's. The nature and scope of Roads' and Strawn's contributions, however, are unsurpassed.

In this review, I will give a necessarily brief report on *Foundations of Computer Music*, the first of two books from MIT Press, and on the first three offerings from William Kaufman, Inc.: *Digital Audio Signal Processing: An Anthology, Composers and the Computer,* and *Digital Audio Engineering: An Anthology*. MIT Press will publish only the volume reviewed here and another entitled, *Computer Music Tutorial,* but the books from Kaufman are the vanguard of an entire series, edited by Strawn, on these subjects. The releases in this first flurry are all anthologies of articles, many of them out-of-print classics, intended for the serious practitioner. *Computer Music Tutorial* and some of the future releases from Kaufman will be less technical in nature and are intended for a broader range of people with interests in CM/DA.

Roads' and Strawn's credentials are impeccable. Both have been involved with CM/DA since the early 1970s, and been editors of *Computer Music Journal (CMJ),* the pre-eminent technical periodical in the CM field (along with the *Journal of the Audio Engineering Society* which emphasizes the DA

STOP THE PRESSES!

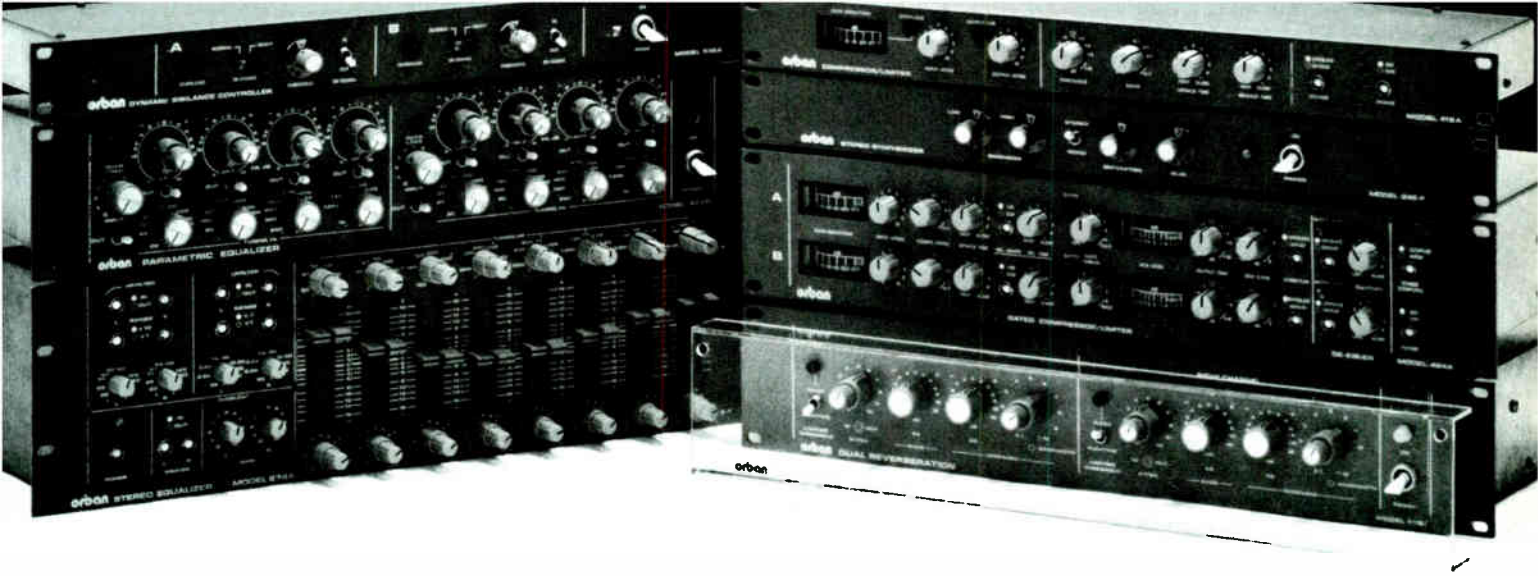
by Larry Oppenheimer

As this issue of *Mix* was going to press, we received a copy of *Principles of Digital Audio* by Ken Pohlmann (Howard W. Sams & Co., 1985). Pohlmann is quite active in the field as a recording engineer and consultant, a columnist in numerous audio magazines (he is an associate editor of *Mix*), and director of the music engineering program at the University of Miami, Florida. In fact, I must admit a bit of a bias in reviewing this book, as Pohlmann has been a hero of mine since before I started writing. This has nothing to do with his notorious affinity for riding large displacement motorcycles, such as his 1962 500cc BMW at high speeds. Actually, I have a rather firm dislike for the internal combustion engine and its legacy.

Rather, my respect for Pohlmann stems from his ability to present complex and often new technical subjects in a clear, accurate, and typically entertaining (!) fashion. This approach is found on every one of this book's 284 pages (I include the index, as it fits the above description).

Principles presents precisely what its name implies, no more and no less. By this I mean that the subject of digital audio involves a great number of individual topics, each a study in itself, and attempting to present one book which contains extensive explanations of all of them is to define a volume so massive as to be useless in any practical sense, if it could even be done at all. Instead, Pohlmann has come up with what amounts to a comprehensive survey of the significant considerations in a digital audio system, and more or less explanation as appropriate to the importance of the particular topic at hand. He particularly concentrates on digital recording and the Compact Disc, avoiding most issues of digital signal processing (which are quite adequately addressed in the other books reviewed in this issue).

One example of this approach is seen by looking at the subject of errors in digital data storage systems. Pohlmann broaches the subject in the early chapters on digital recording and reproduction, but



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more than the CM). Both are in positions to see the cutting edge: Roads as current editor of *CMJ*, and Strawn, having recently completed doctoral studies at Stanford's CCRMA, as a member of the SoundDroid team at George Lucas' arts/digital technology brain trust, currently known as the Droid Works.

Foundations is a collection of 36 articles, primarily from the early issues of *CMJ*, many of which are out-of-print and quite hard to find. The articles have been updated to reflect more recent developments, and some have been expanded in the process. The book has a concise foreword by computer music pioneer Max Mathews, followed by the text, which is divided into four sections: "Digital Sound-Synthesis Techniques," "Synthesizer Hardware and Engineering," "Software Systems for Music," and "Perception and Digital Signal Processing." Roads and Strawn have written an excellent overview addressing the pertinent issues for each section to tie it all together, plus added extensive referencing and a comprehensive index, all of which makes this book thoroughly useful as a reference for study or research.

The first section contains a number of articles on the currently popular technique of FM synthesis (including John Chowning's original 1973 paper, which remains the definitive discussion), plus articles on several other forms of digital synthesis which you may or may not have heard of.

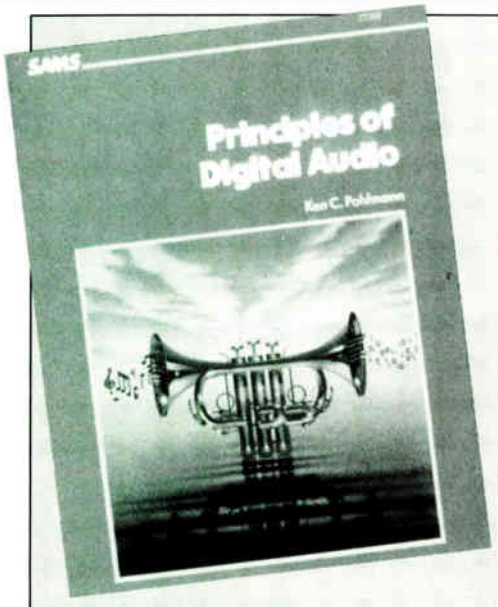
The second section includes papers on several digital synthesis machines that have been built (such as the SSSP from University of Toronto, the DMX-1000, and the 4B and 4C machines built at IRCAM in Paris), some on digital oscillator design, and so on. Several papers here are by Hal Alles, another AT&T Bell Laboratories scientist (along with Max Mathews and F.R. Moore) who has taken an interest in computer music.

The section on software for music is rather heady, presenting 12 articles which detail just about as many different approaches to structuring synthesis software. Some articles discuss control systems for digital or analog synthesis systems, some look at philosophies of compositional software (like Roads' fascinating paper applying linguistic grammatical concepts to music). Microprogramming, live performance systems . . . there's some meaty stuff here, folks.

The last section has only three papers, but they may be the most thought provoking of all. Andy Moorer's in-depth study of digital reverberation updates M.R. Schroeder's work, David Wessel discusses a system for quantifying timbral perception, and the book finishes with a paper on perception within musical contexts. All in all, this book is a one-stop reference for a perspective on the art and science as it exists today.

The Kaufman books are shorter, but contain the same excellent referencing and indexing, and are in no way redundant or less noteworthy in content. *Digital Audio Signal Processing* contains five papers which cover the basics, which is a lot, and some advanced applications. F.R. Moore presents a tutorial survey of the mathematics of digital signal processing, which is immediately followed by a tutorial on digital filtering written by Julius Smith explicitly to follow Moore's paper in this volume. Andy Moorer's survey of applications has been updated here, and Tracy Lind Petersen presents the first published description of his innovative Spiral Synthesis technique. Finally, there is a paper on the Phase Vocoder, an analysis/synthesis technique for working with time varying spectra.

Digital Audio Engineering is also five articles, two of them concerning theory of digitizing audio with its attendant limitations and problems, and three on



considers it vital enough that he dedicates an entire chapter to it later on. This is one solution to a classic quandary in explanatory material: how can a topic be explored without having to go into each related topic as it comes up?

The organization of the book is quite logical: the eight chapters cover digital audio basics, fundamentals, recording, reproduction, and media, the Compact Disc, and a perspective entitled, "A New Beginning". (Note that "basics" refers to the simplest concepts of sound, the difference between analog and digital representations of it, and pertinent number systems, while "fundamentals" refers to the underpinnings of the technology: sampling and quantization.) Within this context, Pohlmann examines virtually every aspect of these classifications. A/D and D/A conversion are broken down into their component processes (anti-aliasing filtering, sample-and-hold, modulation processing, etc.), various storage systems are examined (rotary-head tape, stationary-head tape, magnetic and optical disk, etc.), and so on. Pohlmann is quite complete in his romp through the new technology we have all come to know and love—or at least "come to terms with." Along the way, options, limitations, problems, and current practice are all covered. I am most impressed with the breadth of his coverage; as noted above, it would be impossible to treat this much breadth in an equal amount of depth. There are a few of the inevitable typos and proofing errors, but in most cases they do not cause serious confusion.

Of course, Pohlmann's unique style is given free rein here: rambunctious and silly examples to demonstrate concepts, mixed with large doses of serious, heavy-duty technical information. Although this book is in many ways introductory, it is in no way for beginners. That is, if you don't understand what "overall signal throughout bandwidth of the digitization system" is, perhaps you should consider finding a more elementary source or a teacher before proceeding much further than page 38, where that phrase appears, because it only gets heavier from there. Pohlmann does make a few assumptions about the reader's background, and it may be for that reason that no glossary is included.

There is, however, an excellent bibliography which is organized by chapter to allow quick location of other sources by topic. This seems to me to be representative of this book's role as I perceive it, which is as a holistic look at the subject of digital audio, giving the big picture and all its pieces, and pointing the way to further information in areas that may be of individual interest. If you are trying to get a grasp on what all the brouhaha is all about, this would be an excellent place to start.

Principles of Digital Audio costs $19.95 and is published by Howard W. Sams & Co., Inc., 4300 West 62nd Street, Indianapolis, IN, 46268. It is available from the *Mix* Bookshelf.

specific implementations of synthesis/processing machines: the Systems Concepts ("Samson box") used at CCRMA, the FRMBOX (built at CCRMA) used at University of California at San Diego, and the Lucasfilm ASP (now known as the Droid Works SoundDroid). All three of these are large, interesting machines. I would like to reiterate here that none of this material is duplicated in *Foundations*.

Composers and the Computer is dedicated to the aesthetics of computer music, as opposed to technical considerations. Four interviews (conducted by Roads) and five essays make up this work, and the likes of John Chowning, Iannis Xennakis, and Charles Dodge are represented. As you might imagine, each composer sees the same things in different hues, from James Dashow's advocacy of sociopolitical responsibility in music to Herbert Brun's intellectualization of compositional issues. The book presents a fascinating spectrum of thought on mastering the 20th Century's newest music machine: the computer.

All of the books reviewed here are hardback and physically of very high quality, using good paper, binding, and the like. They should last for awhile. All are liberally illustrated with graphs, diagrams, scores, and photographs as appropriate.

Kaufman has announced three other titles so far: *The Little Book of Computer Music Instruments, A Computer History,* and *Computer Applications in Music: A Bibliography* (presumably this last will include references to the volumes reviewed here). Several textbooks are also in the works. Kaufman is also open to and interested in new manuscripts and proposals.

In short, if you are interested in the nuts and bolts of computer music and/or digital audio, you should have *all* of these books. Seriously. They're certainly not cheap, but they are well worth the price. The point is that there now exists a choice of literature and you are free to pick what you find affordable and interesting. If you don't take to chasing electrons or *Z* transforms to and fro but are interested in playing with all this stuff, keep your eyes peeled for offerings aimed your way soon.

Foundations of Computer Music is $50, 736 pages and is published by: MIT Press, Massachusetts Institute of Technology, Cambridge, MA 02142. It is available from the *Mix* Bookshelf. *Digital Audio Signal Processing: An Anthology* is $34.95, 283 pages. *Digital Audio Engineering: An Anthology* is $29.95, 200 pages. *Composers and the Computer* is $24.95, 201 pages. All are published by: William Kaufman, Inc., 95 First Street, Los Altos, CA 94022. They are also available from the *Mix* Bookshelf. ■

U.S. Radio Accepts Tape:

Bing Crosby badly wanted to produce his Philco show on magnetic tape on a permanent basis, and saw the Ampex machine as the answer. To mollify nervous network executives, Crosby backed Ampex with a personal check for $50,000, thus insuring an early start for the professional magnetic tape recorder market in the U.S. By late 1948, just a year after Ampex introduced that first machine, most American radio networks, radio stations, and recording studios had switched to tape as their new recording standard. Shown is one of the studio control rooms at Capitol Records in Hollywood around 1951, with two Model 300s and a Model 201 (a 200 with a 300 head assembly and modified electronics). Ampex built only 112 Model 200s. However, more than 16,000 of the Model 300s were sold over the years.

Tape Recording Spreads in the 1950s:

The almost total acceptance of tape in American entertainment and industry represented one of the quickest and most successful technological revolutions in our history, surpassing even the recent proliferation of microcomputers. Some of tape's early growth occurred in the consumer market, with popular makes such as Webcor, Brush, Revere, Wollensak, and Pentron. Among other U.S. recorder makers in the '50s, Magnecord, Stancil-Hoffman, Fairchild, RCA, Presto, and later, 3M and Scully, offered Ampex some real competition in the professional recorder market. The photo shows one of the venerable Magnecord PT-6 recorders in use by U.S. Marines.

Tape Portability:

Besides its high quality and ease of editing, tape offered the distinct advantage of portability compared to transcription disks. Magnecord's early popularity showed the recordist's need for a transportable, studio-quality machine. Two of the most popular machines in broadcasting and recording history were the Ampex Model 350 and 351. The 1953 Model 350, designed by Frank Lennert and shown here in its portable configuration, was the offspring of the successful Model 300 and the failed Model 400 from 1950.

—PAGE 104

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—FROM PAGE 102, MAGNETIC REC'GS

The Model 600:

Bing Crosby Enterprises represented Ampex until Crosby sold his Electronics Division to 3M in 1957. Crosby is shown here with the prototype of a most-famous recorder, the Ampex Model 600 in its Samsonite case. The 600 inspired the first home stereo player in 1955, the Model 612 with its 620 speakers, as well as started the pre-recorded stereo tape industry.

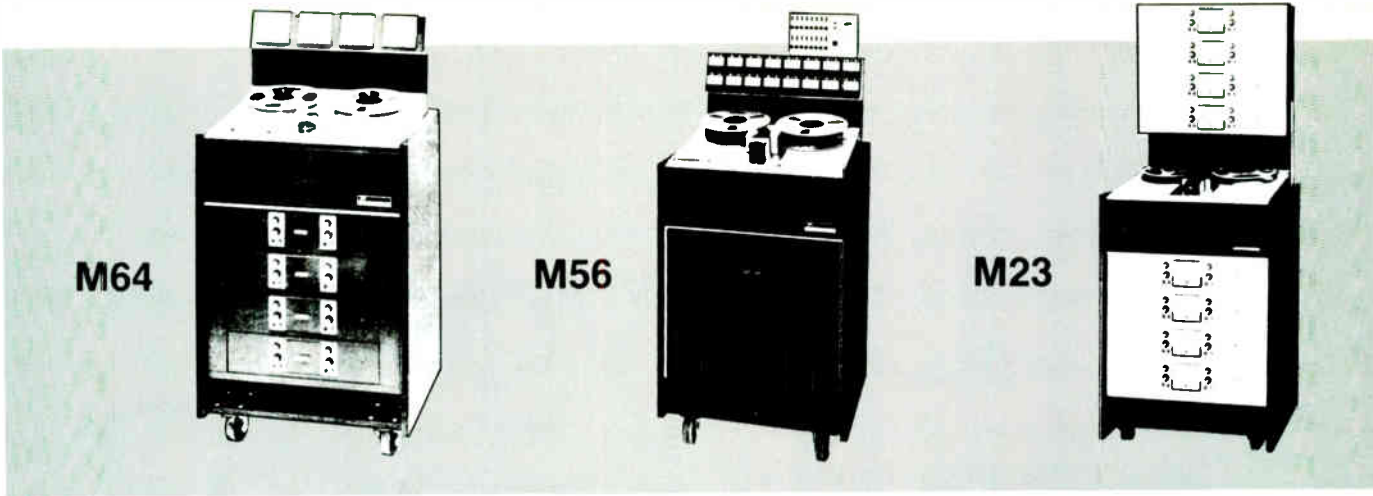
Les Paul and the Birth of Multi-Track Recording:

By the late 1940s, the inventor of the electric guitar, Les Paul, and his wife Mary had become one of the most popular singing acts in the country. Using a second playback head mounted in front of a Model 300 monophonic head stack, Paul applied his disk-based overdubbing techniques, producing the famous Les Paul sound that often propelled him and Mary to the top of the charts. In 1954, Paul approached Ampex to produce a true multi-track recorder, a Model 300 modified for one-inch tape with eight sets of Model 350 electronics.

Commercial Multi-Track Recording:

In the mid-1950s, Ampex built several more recorders like Les Paul's well-known custom Model 300-8 8-track recorder. In 1960, Paul saw one of the machines standing, disused, in a hallway at RCA, and asked an executive why musicians were not using the multi-tracks for recording sessions. The executive's answer: "There's only one Les Paul." Musicians and the music business were simply not ready for multi-track recording.

By the mid-1960s, with rock and roll already ten years old, performers in England and America—including The Beatles—began serious use of multi-tracking with modified 2-track machines, including units from EMI and Ampex. Shown is the 1967 MM-1000 ("MM" for "Master Maker"). The MM-1000's transport is based on an Ampex videotape recorder, while the electronics are from the Ampex AG-440 series.



The 3M Audio Recorders

Bing Crosby sold his Electronics Division to 3M in 1957, when the group became the Mincom Division. For the first several years, the engineers, based in Southern California, concentrated on professional instrumentation recorders for the military and industry. For his prototype videotape recorder in 1951 (see next month's article on videotape history), Jack Mullin had developed the earliest practical closed-loop capstan or differential capstan system, the basis for 3M's Isoloop™ design.

In 1960, 3M saw an opportunity to compete successfully with Ampex in the professional audio market, and began adapting its data recorder designs to audio applications. The result was the famous M-series recorders, all of them using Mullin's "tight loop drive" system. Mullin and his engineers introduced their M-23 prototype at the 1966 AES Convention in Los Angeles. The machine incorporated their Dynatrack™ noise reduction system, which utilized a second track on the tape. The 3M system was said to be more effective than the first noise reduction system from Ray Dolby, but required too much tape space. Successors to the M-23 included the very compact M-56, introduced in 1968 just after the Ampex MM-1000, and the M-79. All M-series recorders used similar transports.

The Post-War Europeans:

After World War II ended in 1945, the pioneer engineers at AEG-Telefunken in Berlin continued their work in magnetic recording with the K-7 and later "T" series machines. Quickly joining the post-war European fray were EMI in England, Grundig (primarily consumer units), head makers Woelke and Bogen, and in Switzerland, Willi Studer and Stefan Kudelski. Shown here is a 1969 Studer C-37, one of the successors to Studer's first professional recorder, the Studer 27. Meanwhile, by the mid-1960s, Kudelski's famous NAGRA series of ¼-inch portable recorders with their pilot tone synchronizers had revolutionized the audio process for cinematographers, replacing many of the bulky field recorders then in use.

The Recent Years

As multi-track burst onto the scene in the late '60s, new manufacturers such as Scully and MCI entered the pro market, with MCI growing to dominate the multi-track field by the mid '70s.

The Japanese were selling mostly consumer audio recorders in the U.S. until the late 1970s. Many audio pros did use the Sony 777 in the mid-1960s, which, like the 1967 Studer-Revox A77, was marketed as a consumer machine.

Sony's recent purchase of MCI, and the company's advances in digital audio have propelled them into the center of the professional audio business in the past five years. The less expensive audio recorders marketed by Otari and TEAC/Tascam in the mid-1970s offered some of the first serious competition to U.S. and European audio recorder makers, and both manufacturers have continued to innovate and produce high quality products.

The first commercial use of digital recording was the Soundstream Digital Tape Recorder, developed by Dr. Thomas Stockham in Salt Lake City in 1976-77. A total of 17 machines were built.

3M began their first digital audio work in 1976 in California, using an M-series transport. Mitsubishi joined the digital audio scene in 1981, while Sony and Studer have recently spearheaded the new Digital Audio Stationary Head (DASH) format.

Magnetic audio recording technology has seen many advances in the past 50 years—advances that fall into four basic eras: the pioneer German work of the 1930s; the post-war Americans led by the Ampex Models 200 and 300; the international multi-track movement; and now, digital recording.

Ironically, the extraordinarily high quality of certain recordings made in the early days of tape rivals most analog recordings made today. In many ways, digital audio represents the first *quantum* leap in sound quality since the inception of AC bias magnetic tape recording in the 1940s. ■

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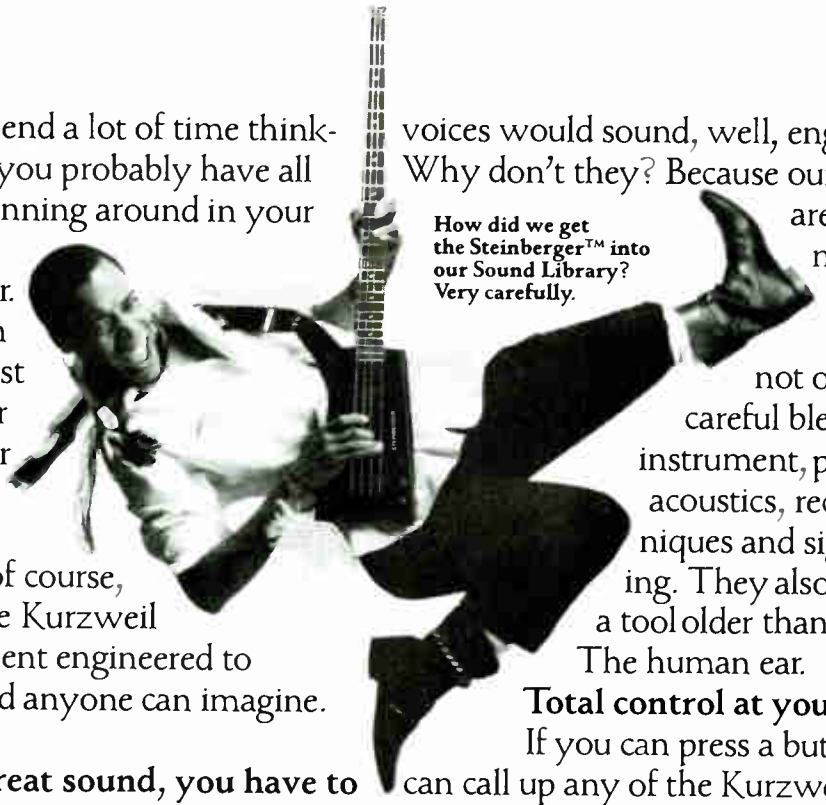

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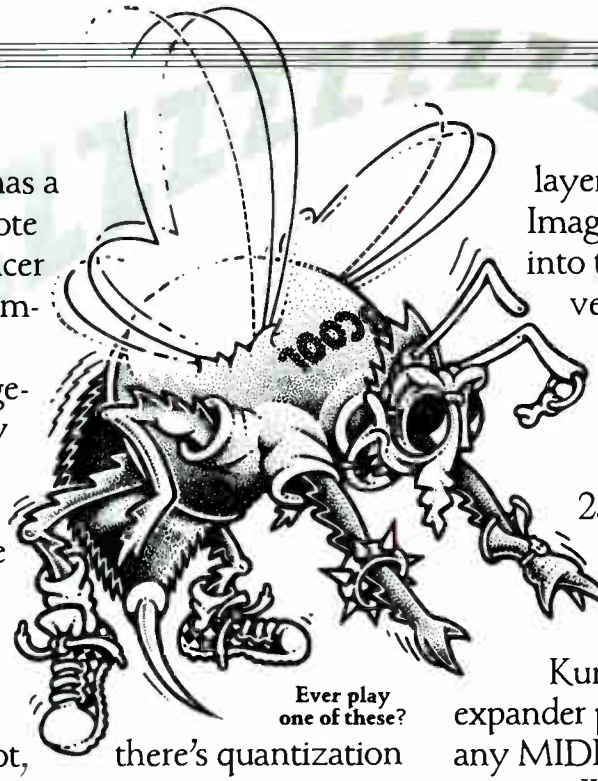

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But whatever we bring to the Kurzweil 250 will always be for the same reason. So the voices you're hearing, everyone can hear.

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To find out more about the Kurzweil 250, visit your local Kurzweil retailer, or call us at 1-800-447-2245. Or send $6.95 (Massachusetts residents add 35¢ tax) for a copy of our 50 minute demo cassette, to Kurzweil Demo Cassette, P.O. Box 863, Providence, RI 02901.

Kurzweil Music Systems, Inc., 411 Waverley Oaks Road, Waltham, MA 02154-8464.

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KURZWEIL™

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TEC

TECHNICAL EXCELLENCE AND CREATIVITY AWARDS

The Publishers of Mix Magazine *invite you to attend*

THE

1985

TECHNICAL EXCELLENCE AND CREATIVITY AWARDS

A recognition of superior achievement in the professional recording and sound production industries.

Monday, October 14, 1985
7:00 p.m. to Midnight

At the Puck Building
295 Lafayette Street, New York, New York

SCHEDULE OF EVENTS:

7:00 - 9:00 p.m.
Cocktails, champagne, buffet dinner

9:00 - 10:30 p.m.
The Awards Presentation—Well-known figures representing all areas of our industry will present the 1985 TEC Awards to the winners, as voted upon by the readers of *Mix Magazine*. Proceeds of the evening will also be presented to the Deafness Research Foundation, the Audio Engineering Society Scholarship Fund, and the winner of Recording School of the Year.

10:30 - 12:00 Midnight
Live Musical Entertainment by Herbie Hancock and the Rockit Band
Don't miss the industry event of the year! Limited numbers of tickets are still available, and may be ordered by calling (415) 843-7901.

THE RECORDING INDUSTRY MAGAZINE **Mix**
2608 NINTH STREET, BERKELEY, CALIFORNIA 94710, (415) 843-7901

DEAR MIX READERS:

For several months now you've read our announcements about the Technical Excellence and Creativity Awards, conceived to recognize and reward excellence in the professional audio industry. You chose the nominees by suggesting deserving professionals, products and institutions on the nominating ballot in last January's Mix. You voted for those most deserving with the voting ballot included in the May issue. For your participation in this process, we sincerely thank you.

On October 14, the results of your voting will be made known at a very special celebration to be held in New York City during the Audio Engineering Society Convention. This event will be an opportunity for many audio professionals to meet and greet their peers, enjoy fine food and top-name entertainment, and participate in the first awards ceremony exclusively designed to recognize the technical support structure of today's music industry.

The purpose of the TECs goes another step beyond recognition, however. All of those attending the TEC Awards will be making a very important donation. The $35 (and any additional contribution) paid for a seat at the event will go directly into a special three-way fund. One-half of that fund will be given to the Deafness Research Foundation, a non-profit organization that sponsors research into the causes and cures of deafness and hearing impairment. One-quarter of the remaining amount will be presented to the Audio Engineering Society Scholarship fund to be awarded for advanced study in audio. The final part of the contribution will go to the Recording School or Program of the Year, as judged by Mix readers, to assist in establishing a scholarship fund for deserving students.

The Publishers and Staff of Mix *Magazine* are extremely proud to be associated with the TEC Awards and look forward to a rewarding annual tradition. To those of you who will be able to join us in New York for the event, we appreciate your support and look forward to celebrating with you. And for those who can't make it this time, keep an eye out for details on the winners, to follow soon. We hope you'll be able to join us next year.

All the best,

PENNY JACOB
Publisher/General Manager

DAVID SCHWARTZ
Publisher/Editor

HILLEL RESNER
Associate Publisher

THE 1985 TEC AWARDS NOMINEES

The nominees for the 1985 TEC Awards represent the highest levels of technical excellence and creative achievement during the 1984 calendar year, as judged by the readers of **Mix Magazine.** Nominations have been made in three major categories: Outstanding Technical Achievement, Outstanding Creative Achievement and Outstanding Institution awards. The voting ballots are tabulated by a certified public accounting firm. The results will be placed in sealed envelopes and the winners made known during the TEC Awards ceremony. This year's nominees are as follows:

I. Outstanding Technical Achievement

Awarded to those individuals, companies and/or innovations that have made the most significant contributions to the advancement of audio technology during the past year.

A. Recording Technology
- Akai Professional Products—12 track recording system
- Bruel and Kjaer Instruments—studio microphones
- CompuSonics Corporation—computer audio recording system
- Lexicon—PCM60 reverberation unit
- George Massenburg Labs—automation system
- Meyer Sound Labs—833 studio monitor
- Mitsubishi Digital Audio Systems—digital recorders
- Rupert Neve Inc.—DSP digital mixer
- Sony Pro Audio—digital recorders

B. Acoustic Technology
- Crown International—Tecron 10 TEF Analyzer
- Chips Davis Design—LEDE control room design
- Sierra Audio Acoustics, Ltd.—variable acoustics for studios
- Manfred Schroeder—RPG Diffusion System
- Perception, Inc.—control room designs
- Valley Audio—Acorn Studio design

C. Sound Reinforcement Technology
- Carver Corp.—power amplification
- Clair Brothers—S-4, Series II loudspeaker system
- Community Light and Sound—M-4 loudspeaker system
- Crown International—Micro-Tech amplifiers
- JBL—Constant Directivity horns
- Meyer Sound Labs—MSL-3 speakers
- Peavey—DECA power amplifiers
- Turbosound—TMS loudspeaker

D. Film and Broadcast Sound Technology
- Adams-Smith—System 2600
- dbx/Zenith—stereo television broadcast system
- Lucasfilm—technical innovation
- Nagra—Nagra IV time code system
- NBC TV—Tonite Show stereo broadcast
- Solid State Logic—SL 6000 recording console

E. Musical Instrument Technology
- Fairlight—CMI
- Kurzweil—250 keyboard
- New England Digital—Synclavier II
- Passport Designs—computer interface for DX7
- Roland—MIDI components
- Simmons—SDS7 Drum machine
- Yamaha—DX synthesizers

II. Outstanding Creative Achievement

Awarded to those persons who, over the last year, have made exceptional creative contributions to professional audio.

A. Recording Engineer
- Bob Clearmountain (Bruce Springsteen, Huey Lewis)
- Jim Gaines (Huey Lewis, Santana)
- Humberto Gatica (Chicago, Kenny Loggins)
- Cal Harris (Lionel Richie, Diana Ross)
- Roger Nichols (John Denver, Donald Fagen)
- Rik Pekkonen (Joe Jackson, Womack and Womack)
- Allen Sides (Olivia Newton-John, Supertramp)
- Bruce Swedien (Quincy Jones, Jacksons)

B. Recording Producers
- David Foster (Chicago, Kenny Loggins)
- Rupert Hine (The Fixx, Tina Turner)
- Trevor Horn (Frankie Goes to Hollywood, Malcolm McLaren)
- Quincy Jones (Michael Jackson, James Ingram)
- Mutt Lange (The Cars, Def Leppard)
- Giorgio Moroder (Irene Cara, Berlin)
- Michael Omartian (Rod Stewart, Donna Summer)
- Richard Perry (Pointer Sisters, Julio and Willie)
- Phil Ramone (Billy Joel, Julian Lennon)

C. Mastering Engineer
- Greg Fulginitti (Artisan Mastering)
- Bernie Grundman (Bernie Grundman Mastering)
- Steve Hall (Future Disc Systems)
- George Horn (Fantasy Mastering)
- George Marino (Sterling Sound)
- Doug Sax (Mastering Lab)
- Wally Traugott (Capitol Mastering)

D. Film and Broadcast Sound Engineer
- Angel Balistier (Group IV)
- Mark Berger (independent)
- Bruce Botnick (Digital Magnetics)
- Ben Burtt (Lucasfilm)
- Steve Maslow (Warner Hollywood)
- Tim Sadler (Taj Soundworks)
- Tom Scott (independent)
- Armin Steiner (Digital Magnetics)

E. Sound Reinforcement Engineer
- Gene Clair (Clair Brothers)
- Bob Estrin (BEST Audio)
- Bruce Jackson (independent)
- Bob Kingsland (independent)
- M.L. Procise III (Showco)

F. Recording Session Musician
- Jeff Baxter (guitar)
- Michael Boddicker (keyboards)
- Steve Gadd (drums)
- Jerry Hey (trumpet)
- Steve Lukather (guitar)
- David Paich (keyboards)
- Alan Pasqua (keyboards)
- Jeff Porcaro (drums)
- Steve Porcaro (keyboards)

III. Outstanding Institutional Awards

Awarded to those companies and/or facilities which have contributed most significantly, in terms of technical or creative achievement, during the past year.

A. Recording Studio
- Cherokee, Los Angeles
- Compass Point, Bahamas
- CTS Studios, London
- Ocean Way, Los Angeles
- The Plant, Sausalito, CA
- Power Station, New York City
- Record Plant, Los Angeles
- Sound Emporium, Nashville
- Unique Recording, New York City
- Woodland Sound, Nashville

B. Mastering Facility
- Artisan, Los Angeles
- Fantasy, Berkeley
- Frankford Wayne, New York City
- Future Disc, Los Angeles
- Bernie Grundman, Los Angeles
- Kendun, Burbank, CA
- Masterdisk, New York City
- Sterling Sound, New York City
- Tape One, London

C. Sound Reinforcement Company
- A-1 Audio, Los Angeles
- Audio Analysts, Plattsburgh, NY
- Best Audio, Los Angeles
- Clair Brothers, Lititz, PA
- McCune Sound, San Francisco
- Sound on Stage, Brisbane, CA
- Showco, Dallas, TX

D. Record Company
- CBS
- Geffen
- GRP
- Motown
- Warner Bros.
- Windham Hill
- Nimbus Records

E. Recording School/Program
- Berklee School of Music
- Center for Media Arts
- College for the Recording Arts
- Eastman School of Music
- Fullerton College
- Institute of Audio Research
- Middle Tennessee State University
- University of Miami
- University of Southern California
- University of Surrey

F. Remote Recording Facility
- Digital Services, Houston, TX
- Fanta, Nashville
- Greene-Crowe, Burbank, CA
- Le Mobile, Woodland Hills, CA
- Mobile Audio, Rome, GA
- Record Plant, Los Angeles
- Record Plant, New York City
- Reelsound, Manchaca, TX

Dear Audio Professional:

The Northeast U.S. is home to some of the finest recording studios in the country. Many of these are in and around New York City, site of the 79th Convention of the Audio Engineering Society. The Publishers of **Mix** hope that while attending AES, you'll find the time to visit some of the studios whose ads appear on these pages, or call or write them for more information.

Mix Magazine

TESTED. PROVEN.

The Carver PM-1.5 Magnetic Field Power Amp—For performance, reliability and sound.

On the Road Since the professional debut in 1983 of the Carver PM-1.5 Low Feedback High Headroom Magnetic Field Power Amplifier, the sonic excellence and reliability of this 21-lb., 450 watts per channel* powerhouse has been tested—and proven—on some of the biggest and toughest tours ever to go on the road. 108 Carver PM-1.5's were used by Clair Brothers on the Bruce Springsteen tour, and 180 PM-1.5's on the Michael Jackson "Victory" tour. In both cases the result was purely awesome power.

"Our new Carver amp racks pack twice the number of channels in about the same truck volume as the conventional racks they replace. In addition the average power per channel has increased while the average weight per channel has decreased. In the low end, for example, we now have 1,200 watts per cabinet where 650 watts were previously available. They take less room on the truck, they weigh less and our systems have more headroom than before. The Carver amplifier has allowed us to take a significant step in improving our sound systems." *CLAIR BROTHERS*

And not only a sound industry giant like Clair Brothers tours with Carver.

"We have toured Carvers with the following artists: Softcell, Paul Young, Johnny Mathis, Donna Summers, Howard Jones, Pointer Sisters, Psychedelic Furs, Lee Greenwood, General Public, George Thorogood. This is exclusive of our numerous one-nighters. The consensus of the performers is that the equipment sounds great. They have been amazed by the sound of the amps as well as their size and weight. As for reliability, out of 50 amps we had only one fail in the past year of touring. This is by far the best record we've had with any manufacturer of amplifiers. Sonically, the extra headroom is readily apparent. We, at Manticore unanimously agree that the PM-1.5 is incredible and is the only amp we intend to buy."

Tom Whisner (owner) MANTICORE

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:—

"The first thing we noticed when we began to work with the Carver PM-1.5 was the ease with which the amplifier delivered almost limitless power to speaker loads which we had previously considered to be difficult to drive to loud levels. This is the sort of amplifier that just refuses to quit."

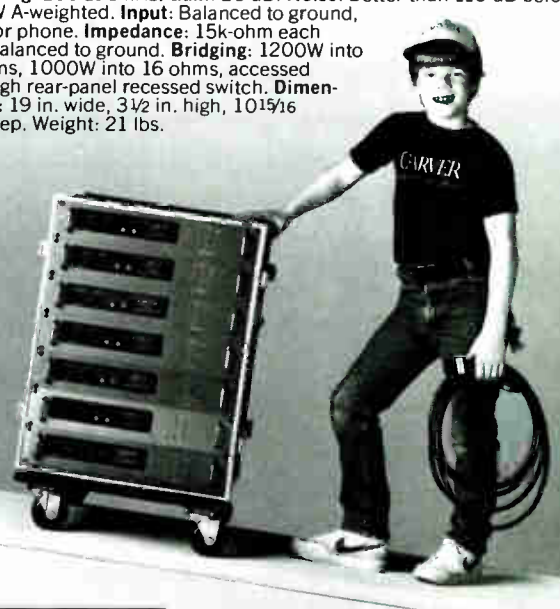
"The amplifier delivered a clean 480 watts per channel into 8-ohm loads with both channels driven for its rated harmonic distortion level of 0.5%. Even at the frequency extreme of 20 Hz. power output for rated THD was 470 watts as against 450 claimed by Carver. Furthermore, at rated power output, distortion 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."

"Carver has managed to deliver a tremendous amount of power in a small lightweight package at a very reasonable cost..."

"For the professional audio engineer or technician who has to move a lot of gear around much of the time and who expects total reliability and circuit protection, come what may, the Carver PM-1.5 represents, in our view, a real winning product. We will probably see it used increasingly by professionals in every area of sound reinforcement."

Now—don't you think you owe it to yourself to hurry over to your local Carver Pro Sound Dealer and *test your own PM-1.5*? Whether you run a megawatt sound company, a struggling bar band, or a recording studio gearing up for digital, the Carver PM-1.5 will pay you. In increased portability and reduced freight costs. In freedom from expensive blown drivers. In sheer sonic excellence.

***Power:** 8 ohms, 450 watts/chan. 20 Hz-20 kHz both channels driven with less than 0.5% THD, 4 ohms, 600 watts/chan. rms 20 Hz-20 kHz both channels driven with less than 0.5% THD. 16 ohms, 300 watts/chan. 20 Hz-20 kHz both channels driven with less than 0.5% THD. 2 ohms, 525 watts/chan. at clipping, 1 kHz, with less than 0.5% THD. Note: 2-ohm specification for information purposes only. Operation at 2 ohms is permissible but not recommended. **IM Distortion:** Less than 0.1% SMPTE. **Frequency Response:** -3 dB at 3 Hz. -3 dB at 80 kHz. **Damping:** 200 at 1 kHz. **Gain:** 26 dB. **Noise:** Better than 115 dB below 450W A-weighted. **Input:** Balanced to ground, XLR or phone. **Impedance:** 15k-ohm each leg, balanced to ground. **Bridging:** 1200W into 8 ohms, 1000W into 16 ohms, accessed through rear-panel recessed switch. **Dimensions:** 19 in. wide, 3½ in. high, 10 15/16 in. deep. Weight: 21 lbs.



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Steve Loeb, *President*

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NEW PRODUCTS

AMPLIFIERS

1 · 9 · 8 · 6

BGW SYSTEMS, INC.
13130 S. Yukon Ave., Hawthorne, CA 90250
(213) 973-8090
Product Name: BGW 850
Contact: Brian Wachner, President
Date Product Introduced: September, 1985
Product Description & Applications: The BGW 850 is an all new digital-ready state-of-the-art monitor power amplifier capable of reproducing the widest dynamic range material. Delivering almost 2 kilowatts of music power and capable of driving the most difficult of speaker loads, this all new BGW amplifier sets new standards for performance and reliability. New features and technology include: Ultra-case power devices, toroidal power transformer, low feedback discrete circuitry, 60 dB LED VU meter, thermal status monitoring system and superrails power supply.
Basic Specifications & Suggested List Price: 450 watts/channel at 4 ohms, total harmonic distortion less than .01%, signal to noise ratio 115dB unweighted 20Hz to 20kHz, 30dB voltage gain. Suggested list price of $1,799.

BGW SYSTEMS, INC.
13130 S. Yukon Ave., Hawthorne, CA 90250
(213) 973-8090
Product Name: BGW 750D
Contact: Brian Wachner, President
Date Product Introduced: July, 1985
Product Description & Applications: An updated, improved version of the BGW 750C amplifier. It features a toroidal power transformer, new technology complementary transistors that are 50% stronger than those in the 750B with five times the speed, a reversible low-noise fan, reduced distortion and noise and increased power output. Other features include: LED status indicators (power on, true clip, signal presence), 2 ohm operation in the stereo mode and XLR and ¼" inputs with internal phase inverting jumpers.
Basic Specifications & Suggested List Price: Priced at $1,499, 400 watts/channel into 4 ohms and 1700 watts mono into 4 ohms. 250 watts/channel into 8 ohms. Total harmonic distortion: .03%. Reduced noise greater than 118dB A weighted. Increased gain-requires only 1.40 volts input for rated output (250 watts) into 8 ohms.

BOGEN, A LEAR SIEGLER COMPANY
P.O. Box 500, Paramus, NJ 07653
(201) 343-5700
Product Name: Bogen Hi-Tek Power Amplifiers HTA-125 & HTA-250
Contact: Emily B. Sobin, Manager, Public Relations
Date Product Introduced: April, 1985
Product Description & Applications: Two MOSFET power amplifiers, Model HTA-125, rated output 125 watts RMS, and Model HTA-250, rated output 250 watts RMS, are capable of continuous operation at rated output. They feature high efficiency, low heat, simple over-all design and convenient size and weight. Multiple output voltages/impedances available. Low-cut filter of -10 dB @ 100 Hz. Overload LED indicator and reset switch. Auxiliary receptacle. Thermal, electrical and electronic failure prevention.
Basic Specifications & Suggested List Price: Distortion less than .5% THD, 20-20k Hz. Frequency response: +1dB, 20-20k Hz at full rated output. Input sensitivity: high impedance, 500 mV. Low-impedance balanced, with optional transformer, 100 mV. Hum & noise: 90 dB below rated output. Output loads: 4 ohms, 8 ohms, 25 VCT, 70.7 V. Output regulation, better than 2 dB from no load to full load. 19"W x 11"D x 5¼"H. Black finish. HTA-125, $812.50; HTA-250, $1,250.

BRYSTON LTD.
57 Westmore Dr., Toronto, Ontario M9V 3Y6
(416) 746-1800
Product Name: Bryston BP-1, BP-5
Contact: Brian W. Russell, President
Date Product Introduced: May, 1985
Product Description & Applications: Broadcast preamplifier, BP-1, Dual Channel phono preamp with balanced outputs. BP-5 same as BP-1 but with switching capabilities for three more line inputs.
Basic Specifications & Suggested List Price: Contact above outside U.S.A. or Brystonvermont, R.F.D. #4, Berlin, Montpelier, 05602, (802) 223-6159 for further information.

CARVER CORPORATION
PM 1.5 Amplifier

CARVER CORPORATION
19210 33rd Ave. W., P.O. Box 1237
Lynnwood, WA 98036
(206) 775-1202
Product Name: PM 1.5 "L" Low Impedance Amplifier
Contact: Carver Corp. Lit. Dept.
Date Product Introduced: Spring, 1985
Product Description & Applications: Professional magnetic field power amplifier for professional use is designed to deliver 450 watts per channel at 2 ohms, yet weighs in at only 21 lbs. Design includes protection devices which protect amp as well as speakers.
Basic Specifications & Suggested List Price: 450 watts/channel @ 2 ohms @ 0.5% THD dynamic headroom 1.4dB; S.N. ratio 110dB; dimensions 19" x 3½" x $10^{13}/_{16}$"; weight 21 lbs; price $1,095.

CARVER CORPORATION
19210 33rd Ave. W., P.O. Box 1237
Lynnwood, WA 98036
(206) 775-1202
Product Name: PM 1.5 "Mono Block" Single Channel Amplifier
Contact: Carver Corp. Lit. Dept.
Date Product Introduced: Spring, 1985
Product Description & Applications: Ultra high current single channel magnetic field amplifier designed for the most demanding applications where extreme current is needed for foundation-cracking bass from L.F. boxes, or walls of full range frequency arrays. Will deliver 600 watts at 8 ohms or 1200 at 4 ohms.
Basic Specifications & Suggested List Price: 600 watts single channel @ 8 ohms w/no more than 0.5% THD; 1200 watts single channel operation at 4 ohms, 0.5% THD; 21 lbs; 19" x 3½" x $10^{13}/_{16}$"; S.N. ratio 110dB; price $1,195.

CARVER CORPORATION
19210 33rd Ave. W., P.O. Box 1237
Lynnwood, WA 98036
(206) 775-1202
Product Name: PM-200 Professional Monitor/Studio Amplifier

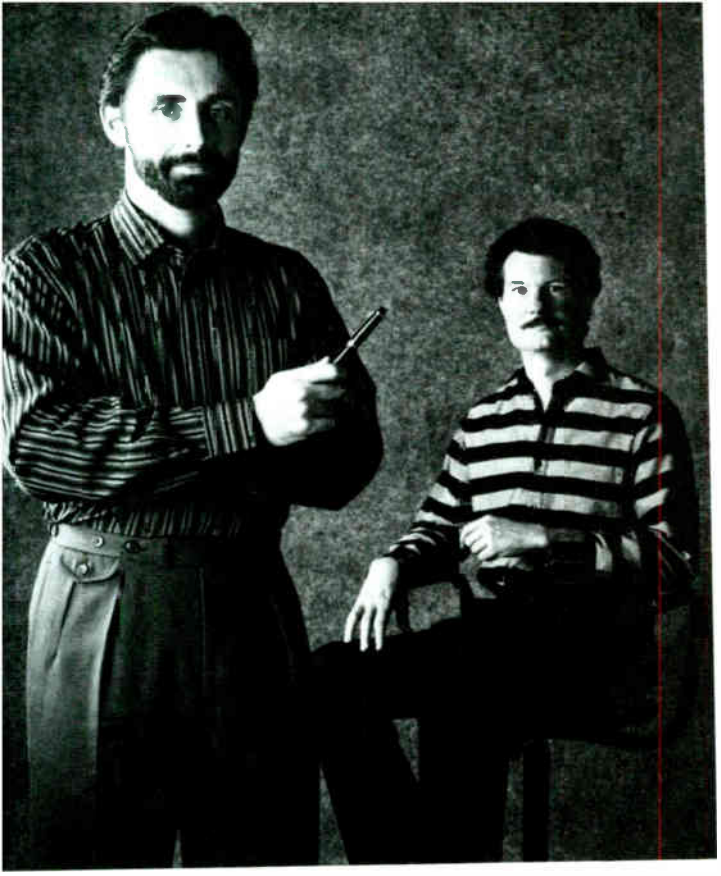
CARVER CORPORATION
PM-200 Amplifier

Contact: Carver Corp. Lit. Dept.
Date Product Introduced: Spring, 1985
Product Description & Applications: Extremely light, compact professional magnetic field amplifier with high current capabilities and excellent thermal characteristics. For use in situations where clean reproduction under heavy demands is needed either in PA use or in the studio.
Basic Specifications & Suggested List Price: 150 watts/channel at 4 ohms @ 0.1% THD; 100 watts/channel @ 8 ohms 0.1% THD; signal to noise: 103dB; weight 14 lbs; dimensions: 19"W x 2.9"H x 9.7"D; price $499.

CREST AUDIO
150 Florence Ave., Hawthorne, NJ 07506
(201) 423-1300
Product Name: 2501A Professional Power Amplifier
Contact: Craig Hannabury
Date Product Introduced: March, 1985
Product Description & Applications: The Crest Model 2501A is intended for applications where high power, sonic quality, reliability and a small package are primary considerations in choosing an amplifier. Only 3½" in height, the 2501A delivers up to 1000 watts (FTC) into a 4 ohm mono load, perfect for today's high power sub-woofers. The ultra "open" sound of the 2501A also makes it ideal for use with full range cabinets as well as part of a multi-way system.
Basic Specifications & Suggested List Price: Standard features include: fully modular construction, balanced XLR and ¼" inputs, variable speed DC fan and signal presence LED. Load protection is activated for turn-on, DC, low frequencies, shorts and thermal overload. FTC power (10Hz-20kHz-.2dB) 200 watts/channel @ 8 ohms, 325 watts/channel @ 4 ohms, 500 watts/channel @ 2 ohms, 650 watts/channel @ 8 ohms mono, 1000 watts/channel @ 4 ohms mono. THD is typically under .004% till just before clipping; damping factor: over 250:1; slew rate: over 40 V/ms. List price: $1,999.

CROWN INTERNATIONAL
1718 W. Mishawaka Rd., Elkhart, IN 46517
(219) 294-8000
Product Name: Micro-Tech™-1000 LX
Contact: Bruce Bartlett, Technical Writer
Date Product Introduced: May, 1985
Product Description & Applications: A miniaturized, yet high-technology stereo power amplifier for professional sound reinforcement and recording. Provides enormous power (1000 watts) in a low-profile package (3½-inches

—LISTING CONTINUED ON PAGE 124

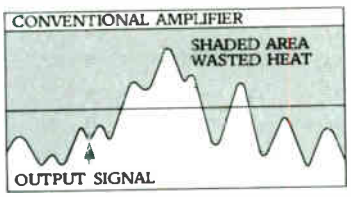


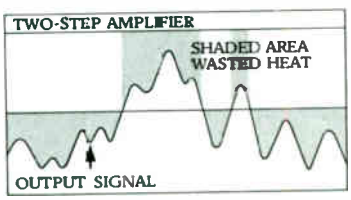
"We're Committed To Building A Quality Product That Really Works..." "We're Committed To Being Number One."

Patrick Quilter
Vice President/Engineering,
QSC Audio.

Barry Andrews
President,
QSC Audio.

Commitment runs deep at QSC. We're dedicated to continually improving our products and our company. For us, building a better product and backing it up with top-notch customer support is the key to success. It's as simple as that. The QSC linear output circuit is one outcome of our commitment to design excellence. Its three-stage signal path optimizes the sonic advantages of traditional push-pull amplifier circuits. By combining a multiple level DC power supply with conventional power transformers and rectifiers, we've improved on previous efforts at increasing heat efficiency–anticipating the benefits of "Class D" and "smart power supply" amplifiers, without relying on unproven technology. This has enabled us to build a power amp that is more compact and reliable, and which delivers unmatched audio performance. The diligent research that went into our Series Three paid extra dividends in the development of our economical Series One amplifiers. Both series feature our patented Output Averaging™ short circuit protection, dual isolated power supplies, calibrated gain controls, premium components throughout, and complete rear panel connection facilities that include balanced XLR and 1/4" jacks, octal sockets for active and passive input modules and a full selection of output connectors. Our dedication to design excellence goes hand-in-hand with our commitment to providing full-service support on all our products. When you put it all together, QSC amplifiers reflect the commitment to leadership, service and design innovation that has guided us since we were established in 1968. For more information contact: QSC Audio Products, 1926 Placentia Avenue, Costa Mesa, CA 92627, (714) 645-2540.





QSC Quality Service Commitment

Circle #074 on Reader Service Card

—FROM PAGE 122

high) Includes a PIP panel for plug-in accessories: a variety of circuit cards that tailor the amplifier to the user's needs by adding functions in series with the amplifier input. ODEP™ circuit detects and compensates for overheating and overload. Extra-rugged front panel with rack handles, display board, and level controls. Efficient heat sinking and reversible air flow.
Basic Specifications & Suggested List Price: Continuous average power at 0.1% THD (stereo): 280 watts/channel @ 8 ohms, 400 watts/channel @ 4 ohms, 501 watts/channel @ 2 ohms. Parallel mono: 300 watts/channel @ 8 ohms, 501 watts/channel @ 4 ohms, 800 watts/channel @ 2 ohms, 1000 watts/channel @ 1 ohm. Bridge mono: 540 watts/channel @ 16 ohms, 800 watts/ channel @ 8 ohms, 1000 watts/channel @ 4 ohms. List price: $1,249.

CYBER-KINETEK SYSTEMS
11839 Starcrest Dr., San Antonio, TX 78233
(512) 496-0717
Product Name: Cyber-Kinetek
Contact: Steve Cayce, Gen. Manager
Date Product Introduced: February, 1985
Product Description & Applications: Digital switch-mode servo power amplifier.
Basic Specifications & Suggested List Price: Power: 250 watts/channel @ 8 ohms, 500 watts/channel @ 4 ohms @ .05% THD, non-servo mode Digital switch-mode amplifier efficiency over 90%. DC-20kHz ±.5 dB; dimensions: 3½" x 19" x 15" EIA rack, 15 lbs. Price: $1,000.

FM ACOUSTICS LTD.
Tiefenhofstr. 17, CH-8820 Waedenswil, Switzerland
(1) 780-6444; Telex: 875414
Product Name: FM 801 Precision High-Power Amplifier
Contact: Manuel Huber
Date Product Introduced: March, 1985
Product Description & Applications: The FM 801 combines all features and advanced technologies that are used in the FM 1000 Ultra-High-Power amplifier with the unmatched class of sound quality of the famous FM 800A. Both amplifiers can drive down to 1 ohm, with dynamic signal impedances as low as 0.5 ohms. Into resistive loads the FM 801 delivers in excess of 1000W RMS per channel, but dynamic power output is considerably higher.

NEW PRODUCTS
AMPLIFIERS
1 · 9 · 8 · 6

Basic Specifications & Suggested List Price: FM 801—Sine wave drive capability: loads between 1.5 ohms and 10,000 ohms; dynamic signal drive capability: down to 0.25 ohms; max. output voltage: 180V pp, continuous output current capability: in excess of 40A, peak current capability unlimited, completely discrete circuitry featuring Class A stages throughout, hand-selected transistors, etc.

GRASS VALLEY GROUP
P.O. Box 1114, Grass Valley, CA 95945
(916) 478-3724
Product Name: 8500/8550 Series Distribution Amplifiers
Contact: Jay Kuca, Marketing Mgr.
Date Produce Introduced: April, 1985
Product Description & Applications: An all new line of video and audio distribution amplifiers. All models are 1-in, 6-out. 8500 Series video DAs include the 8501 basic VDA, 8502 equalizing VDA, 8503 precision VDA, and 8504 delay DA. The 8551 is a basic audio DA featuring active (transformerless) inputs and outputs and a gain range of +30 to -12dB. 1 Ru and 2Ru trays are available for video or audio models.
Basic Specifications & Suggested List Price: Video DAs feature low distortion and ultra-flat(-0.025dB) response to 10M Hz. The 8551 audio DA features +24dBu max., signal level, low distortion, and 110dB signal-to-noise ratio. Representative list prices: 8501, $175; 8502, $285; 8503, $395; 8504, $450; 8551, $275.

HILL AUDIO INC.
231 Marquis Ct., Lilburn, GA 30247
(404) 923-3193
Product Name: DX500
Contact: Bruce Forbes, National Sales Mgr.
Date Product Introduced: March, 1985
Product Description & Applications: The DX500 is a 2 rack space, 1200 watt, power amplifier. Using a transformer coupled driver stage, the DX500 features identical ultra-linear NPN output devices. The DX500 is short circuit, component malfunction protected using a relay protection circuit, which will auto-reset. The DX500 uses 2 fans that are thermally tripped for forced air cooling.
Basic Specifications & Suggested List Price: Power (20Hz -20kHz) 280 watts/channel @ 8 ohms, 425 watts/channel @ 4 ohms, 600 watts/channel @ 2 ohms, 850 watts/channel @ 8 ohms mono, 1200 watts/channel @ 4 ohms mono. THD under 0.01% (within rated power). Noise: -105dB; damping: 650/8 ohm; slew rate: 40V/microsec; weight: 33 lbs. Suggested retail: $999.

JBL PROFESSIONAL
8500 Balboa Blvd., Northridge, CA 91329
(818) 893-8411
Product Name: Model 6290—Dual Mono Amplifier
Contact: Ken Lopez, Vice President-Sales
Date Product Introduced: February, 1985
Product Description & Applications: The JBL/UREI Model 6290 Dual Mono Amplifier is a new product that features two separately switched channels with their own power supplies. The 6290 delivers 300 watts/channel into 8 ohm loads, 600 watts/channel with 4 ohm loads, and 1200 watts/channel in bridge mode driving a single 8 ohm load. The low distortion, high damping and large power supplies of the 6290 give it the typical "UREI sound" favored by studio mixers and touring sound companies. Rise-time limited front-end circuitry is balanced bridging differential type providing complete hookup flexibility.
Basic Specifications & Suggested List Price: Inputs: balanced bridging differential electronic inputs with ¼", XLR, and barrier strip connections 40k ohms balanced, 20k ohms unbalanced, with stereo, dual mono or mono bridge mode switch. Outputs: five-way binding posts. Voltage amplification: variable up to 33dB (one channel). Maximum input level: +20 dBu (7.75 V). Input sensitivity: 1.1 volt for rated output. Noise: at least 100 dB below rated output (15.7 kHz noise bandwidth). Suggested retail price: $1,299.

ONE THOUSAND TWO HUNDRED WATTS RMS

(CONSERVATIVE)

Peavey is proud to announce the big brother of the CS™ family . . . the CS™ 1200. The reliability and sonic purity of the CS Series power amps from Peavey are the stuff that legends are made of.

The CS-1200 represents our 20 year commitment to music and sound reinforcement by taking linear amplifier technology to its limits. High fidelity specifications. Continuous duty rating. Proven PL-Can electronic crossover capability. DDT™ compression. One thousand two hundred watts of state-of-the-art linear power.

The CS-1200 from Peavey. The new standard by which all others will be measured.

RATED POWER:
600W RMS per channel into 2 or 4 ohms (both channels driven)
1200W RMS into 8 ohms (in bridge mode)

TOTAL HARMONIC DISTORTION:
Less than 0.05% at 600W RMS per channel into 4 ohms
10 Hz to 30 kHz; typically below 0.03%

FREQUENCY RESPONSE:
+0, -0.2 dB 20 Hz to 40 kHz at 600W RMS per channel into 4 ohms

SLEW RATE:
50V per mSec at 4 ohms

Circle #076 on Reader Service Card

PEAVEY ELECTRONICS CORP. 711 A Street, Meridian, MS 39301

NEW PRODUCTS

AMPLIFIERS

1 · 9 · 8 · 6

McCANNON RESEARCH
4301 Pleasantdale Rd. Suite E, Doraville, GA 30340
(404) 446-7788
Product Name: L-1 Power Amplifier
Contact: Ron Montgomery, Marketing Mgr.
Date Product Introduced: July, 1985
Product Description & Applications: The L-1 is a single rack space, 50 watts/channel @ 8 ohm power amplifier. The amplifier circuitry is discrete with a toroidal power transformer for low external hum. The front panel contains level controls, signal presence & peak lights and stereo and mono headphone jacks, as well as a power switch. The inputs may be used balanced or unbalanced and are XLR type connectors. Binding posts are provided for speaker connections.
Basic Specifications & Suggested List Price: 50 watts/channel @ 8 ohms with less than 0.1% THD. Suggested list: $499.

PHOENIX SYSTEMS
P-100-MMA Preamp

PHOENIX SYSTEMS
div. of Soundware Corp.
P.O. Box 338-B, Stone Mountain, GA 30086
(404) 934-9626
Product Name: P-100-MMA Reference Phono Preamp
Contact: John H. Roberts, President
Date Product Introduced: June, 1985
Product Description & Applications: High resolution phono preamp for professional applications. Discrete J-FET front-end, passive EQ (75 microsecond), DC Servo, Class "A" - "AB" output driver, low z power supply, and external transformer.
Basic Specifications & Suggested List Price: P-100-MM (kit) @ $99 and P-100-MMA (assem.) @ $149. 47k & 100pf input z, 50 ohm output z, will drive 600 ohms. Mono/stereo switch selectable.

QSC AUDIO PRODUCTS
1926 Placentia Ave., Costa Mesa, CA 92627
(714) 645-2540
Product Name: Series One Model 1700
Date Product Introduced: Late 1984
Product Description & Applications: QSC's Series One amplifiers are designed for performance-conscious users who want superior quality, reliability and built-in system safeguards, all at a moderate price. The Model 1700 is a very high power, stereo amplifier designed for professional and commercial audio applications.
Basic Specifications & Suggested List Price: Output power, 8 ohms/channel, 20-20kHz, less than 0.1% distortion, at least 325 watts RMS/channel; output power, 4 ohms/channel, 20-20kHz, less than 0.1% distortion, at least 500 watts RMS/channel. Distortion is less than 0.01% at 8 ohms, and less than 0.05% at 4 ohms. Signal-to-noise ratio, below rated output, is at least 100 dB, A weighted, and dynamic headroom at 8 ohms is at least 1.9 dB. Balanced input impedance is 20k ohms, and unbalanced input impedance is 10k ohms. Price: $998.

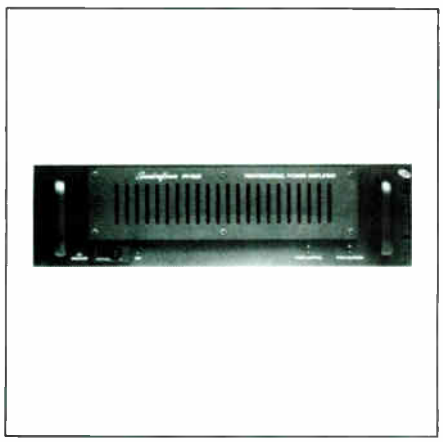
SHURE BROTHERS INC.
FP16 Distribution Amplifier

SHURE BROTHERS INC.
222 Hartrey Ave., Evanston, IL 60202
(312) 866-2200
Product Name: FP16 Distribution Amplifier
Contact: Al DeGenova, Public Relations Coord.
Date Product Introduced: March, 1985
Product Description & Applications: The FP16 is a 1-input, 6-output compact, self-contained audio distribution amplifier for routing multiple audio feeds without sacrificing signal integrity or clarity. The unit is ideal for radio and television broadcasts, ENG vans, press conferences, recording studios, and telecommunication and production facilities. The FP16 features separate, front-panel gain controls (recessed and screwdriver-adjustable) on the input, as well as on each output channel.
Basic Specifications & Suggested List Price: Wide frequency response: 30-20,000 Hz; up to 90 dB gain; low noise (input: -129 dBV into 600-ohm load at full gain; output: -70 dBV at full on); and isolated outputs for superlative signal handling. User net price: $350.

SILVER LAKE RESEARCH
Boulder 500

SILVER LAKE RESEARCH
3101 Third Street, Boulder, CO 80302
(303) 449-8220
Product Name: Boulder 500
Contact: Jeff Nelson, Applications Eng.
Date Product Introduced: January, 1985
Product Description & Applications: The Boulder 500 provides the missing link for engineers who demand the sonic clarity of Deane Jensen's 990 opamp. The 990 is the input stage and is expanded into an output stage for the Boulder 500. Ultra-low THD and elimination of transient distortion are inherent in this discrete two-stage design. 7000 watts of output transistors mounted on massive heat-sinks allow high output currents and provide overload-proof reliability required for professional applications.
Basic Specifications & Suggested List Price: The Boulder 500 delivers continuous power of 500 watts mono or 150 watts stereo into 8 ohms, or 250 watts stereo into 4 ohms with THD of .0015% up to 2kHz and .005% at 20kHz. Bursts of 1300 watts mono are possible into very low impedance loads. Price: $2,450.

SLM ELECTRONICS
1400 Ferguson Ave., St. Louis, MO 63133
(314) 727-4512
Product Name: Audio Centron RMA-1000
Contact: Tony Moscal, Training Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: The RMA-1000 is a commercial grade stereo power amp capable of 220 watts of continuous power at 2 ohms/channel. The unit can be bridged to deliver 440 watts into 4 ohms. A peak limiter prevents clipping and enables the unit to maintain full power for extended periods. Complete diagnostic LED read out indicates signal to the unit, limiting, and fault conditions. Relay protected outputs prevent damaging speaker thumps. Balanced XLR & ¼" inputs. Rear mounted fan with front panel exhaust.
Basic Specifications & Suggested List Price: Power output: 150 watts/4 ohm, 220 watts/2 ohm stereo; 300 watts/8 ohm, 440 watts/4 ohm bridged. Frequency response: +0, -.25 20-20kHz; THD .02 typical; IMD .05%. Signal to Noise: -100dB. Price $599.



SOUNDCRAFTSMEN
PR1800 Amplifier

SOUNDCRAFTSMEN
2200 So. Ritchey, Santa Ana, CA 92705
(714) 556-6191
Product Name: PR1800 basic power amplifier
Contact: Roger Hagemeyer, V.P. Sales
Date Product Introduced: June, 1985 (updated version)
Product Description & Applications: Basic MOSFET power amplifier featuring Phase Control Regulation power supply. Ultra high current design translates into superb low impedance performance (900 w/ch @ 2 ohms). Protection circuitry includes: clip sensing limiter/compressor (switchable), dual output relays, anti-surge turn on delay, multi-sensor thermal protection, front panel mounted circuit breaker. Inputs may be balanced or unbalanced via XLR, ¼" phone or barrier strip. Rear panel mounted level controls and mono bridge selector. Front panel features include true clipping indicators for each channel and circuit breaker.
Basic Specifications & Suggested List Price: Continuous RMS power per channel: 375 watts/channel @ 8 ohms, 600 watts/channel @ 4 ohms, FTC, 10 Hz to 20 kHz, at less than 0.09% THD. Input sensitivity and impedance: 1.22V, 22k ohm balanced, 32k ohm unbalanced. Continuous RMS power bridge mono: 1800 watts/channel @ 4 ohms. Hum and noise: -105dB. IM distortion less than 0.05%. Frequency response: 20Hz-20kHz ± .1dB.

SOUNDCRAFTSMEN
2200 So. Ritchey, Santa Ana, CA 92705
(714) 556-6191
Product Name: PM 860
Contact: Roger Hagemeyer, V.P. Sales
Date Product Introduced: June, 1985
Product Description & Applications: Special purpose MOSFET power amplifier featuring Phase Control Regulation power supply. Small size, lightweight, high power (450 w/ch @ 2 ohms). Ultra-quiet 2 speed fan maintains consistent internal temperature. Phase Control Regulation allows the amplifier to continue operation at virtually any load impedance. Rack mount adapter panel available which will house two PM860's in just three rack spaces (900 watts each @ 4 ohms when bridged). Front panel features true clipping indicators for each channel.
Basic Specifications & Suggested List Price: Continuous RMS power per channel: 205 watts @ 8 ohms, 300 watts @ 4 ohms, FTC, 20Hz to 20kHz at less than 0.05% THD. Hum and noise: -105dB. Frequency response: 20Hz to 20kHz, ±0.1dB. Weight: 20 pounds.

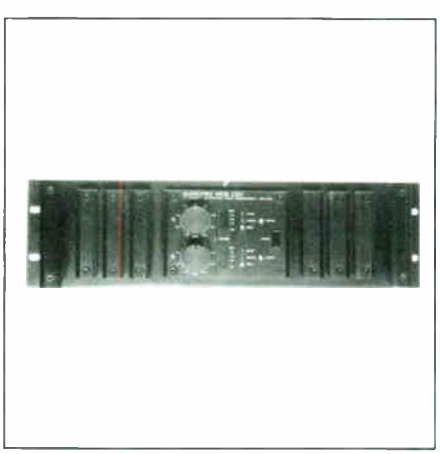
TANNOY NORTH AMERICA, INC.
97 Victoria Street North
Kitchener, Ontario, Canada N2H-5C1

TANNOY NORTH AMERICA, INC.
Tannoy SR-840

1 (519) 745-1158
Product Name: Tannoy SR-840
Contact: Bill Calma, Marketing Mgr.
Date Product Introduced: May, 1985
Product Description & Applications: The Tannoy SR-840 is a 250 watt/channel stereophonic amplifier designed for use in high level studio monitoring. Pro sound reinforcement systems, high quality public address work and the best hi-fi systems. Designed to fulfill the requirements of the recording industry, the Tannoy SR840 is robust, reliable and above all else, provides the maximum fidelity of sound reproduction wherever used. The Tannoy SR840 is a result of "no compromise" design and manufacturing standards.
Basic Specifications & Suggested List Price: Power output in stereo per channel: 250 watts/8 ohms, 440 watts/4 ohms, 645 watts/2 ohms; in mono bridged: 860 watts/8 ohms, 1220 watts/4 ohms; THD less than 0.05 at any power over band 20Hz-20kHz; TIM less than 0.03 [50Hz and 7kHz, 4:1 (-12dB)]; damping greater than 200; rise-time better than, 1.5 microseconds; slew rate 80 V/ms. U.S. retail:$2,598.

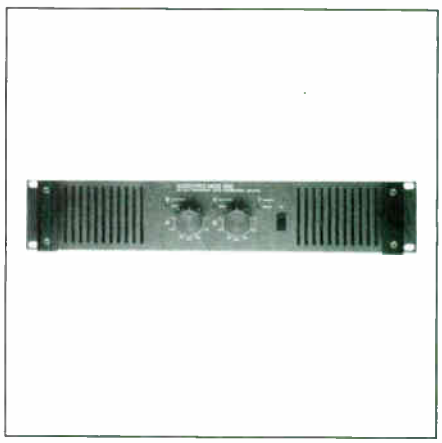
TOA
480 Carlton Court, So. San Francisco, CA 94080
(415) 588-2538
Product Name: "P" Series Amplifiers
Contact: Gail M. Martin, Sr.
Date Product Introduced: February, 1985
Product Description & Applications: Five new "P" Series amplifiers: P-75D stereo 75 watts/channel @ 8 ohms; P-150D stereo 150 watts/channel @ 8 ohms; P-300D stereo 300 watts/channel @ 8 ohms; P-150M mono 150 watts/channel @ 8 ohms; P-300M mono 300 watts/channel @ 8 ohms.
Basic Specifications & Suggested List Price: Frequency response: +0dB, -0.5dB, 20Hz-20kHz; total harmonic distortion: less than 0.01% (8 ohms - 1kHz); input sensitivity: 10k (unbalanced); slew rate: 10 volts/microsecond or better; mono/stereo mode switch: 25V-70V capabilities.

YORKVILLE SOUND
56 Harvester Ave., Batavia, NY 14020
(416) 751-8481
Product Name: Audiopro Model MOS-1200
Contact: Mike Holman, Sales Mgr.



YORKVILLE SOUND
Audiopro Model MOS-1200

Date Product Introduced: January, 1985
Product Description & Applications: A 1200-watt MOS-FET/bipolar amplifier designed for uninterrupted operation regardless of load conditions. Distortion, headroom, bandwidth and slew rates specs are guaranteed at all power levels thanks to a high-efficiency, high-capacity output design. Low or shorted speaker loads are automatically compensated for and indicated via front-panel LEDs as are open and normal load conditions, defeatable soft limiting, signal level and clipping.
Basic Specifications & Suggested List Price: Per-channel power: 20Hz-20kHz continuous RMS, 400 watts @ 4 ohms, 600 watts @ 2 ohms. Mono bridged power: 800 watts @ 8 ohms, 1200 watts @ 4 ohms. Total harmonic distortion: less than 0.1% at all power ratings. Frequency response: 10Hz-20kHz ±0.1dB. Slew rate: 50 V/microsecond; damping factor: greater than 500. Hum & noise: -95dB. Crosstalk: -75dB 20Hz-20kHz. Output short protection: no limit on duration. No reset required. Price: $1,295.



YORKVILLE SOUND
Audiopro Model MOS-500

YORKVILLE SOUND
56 Harvester Ave., Batavia, NY 14020
(416) 751-8481
Product Name: Audiopro Model MOS-500
Contact: Mike Holman, Sales Mgr.
Date Product Introduced: February, 1985
Product Description & Applications: An all MOS-FET, audiophile amplifier designed for durable operation. Features include balanced 3-pin and unbalanced ¼-inch inputs, sonically transparent soft limiting with clip/limit LEDs and a bypass switch. Low (20dB) negative feedback design greatly reduces TIM distortion. This combines ideally with a wide 5Hz-100kHz audio bandwidth and high slew rate in producing exceptional sound quality. Protection features cover the speakers, low or shorted loads, and A.C. surges.
Basic Specifications & Suggested List Price: Per-channel power (20Hz-20kHz) continuous RMS: 175 watts @ 8 ohms, 250 watts @ 4 ohms. Mono bridged power: 350 watts @ 16 ohms, 500 watts @ 8 ohms. Harmonic distortion: less than 0.06%. Frequency response: 5Hz-100kHz +0dB, -1dB. Slew rate: 75 V/microsecond. Damping factor: better than 200. Broadband noise: -100dB. Crosstalk. better than -60dB (10Hz-20kHz). Output short protection: no limit on duration, no reset required. Price: $895.

Proud of your Paperwork?

Mix is on the lookout for good examples of studio paperwork—from track sheets to purchase order forms, to tape labels to rate cards, to you name it—to include in an upcoming textbook on studio business operations. If you've developed forms and systems that you're proud of and wouldn't mind sharing them with others, please contact: Craig Wingate, Mix Books, 2608 Ninth St., Berkeley, CA 94710, phone (415) 843-7901.

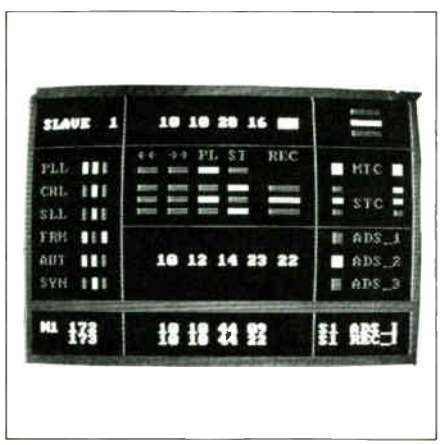
NEW PRODUCTS
AUTOMATION & CONTROL SYSTEMS
1 · 9 · 8 · 6

ADAMS-SMITH
Model 2600 A/V

ADAMS-SMITH
34 Tower Street, Hudson, MA 01749
(617) 562-3801
Product Name: Model 2600 Audio/Video Editor
Contact: Harry E. Adams, V.P. Sales
Date Product Introduced: April, 1985
Product Description & Applications: Double System Editor, based on System 2600 modules, combines simultaneous off-line video and on-line audio editing. During editing, the sound stays on multi-track audio tape for higher quality and soundtrack building flexibility. It is as easy to make picture editing decisions to fit the sound as it is to edit sound to fit the picture—a creative advantage. The system's ability to edit audio and video simultaneously produces important time saving and cost advantages.
Basic Specifications & Suggested List Price: Configuration: variable from two-VTR basic to full three-VTR, three-ATR A/B roll, with automated switcher control; transports: virtually all ATRs and VTRs; decision listing: industry practice disk or tape; time code: full LTC and VITC display; high resolution color monitor; storage: hard disk; screen printer.

ADAMS-SMITH
34 Tower Street, Hudson, MA 01749
(617) 562-3801
Product Name: Model 2600 BPO Bi-Phase Option
Contact: Harry E. Adams, V.P. Sales
Date Product Introduced: April, 1985
Product Description & Applications: The Bi-Phase Option is an add-on to the Model 2600 SY tape synchronizer module. It permits sprocketed film transports to be operated as either master or slave machines in audio-for-video editing systems. A film transport can be cued and synchronized with frame accuracy, using either LTC recorded on one track of the film, or by using a combination of Bi-Phase signals and made-up LTC, using the tape synchronizer's pseudo-address mode.
Basic Specifications & Suggested List Price: Output: bi-phase square waves (quadrature-phased); drive capability: 50 ohms; play speed frequency: selectable, 25 to 500Hz; speed range: 0 to 15 X, with maximum selectable; ramp rate: selectable; input: bi-phase square waves decoded to speed and direction signals for cueing and making up LTC.

ADAMS-SMITH
34 Tower Street, Hudson, MA 01749
(617) 562-3801
Product Name Model 2600 RG Reference Generator
Contact: Harry E. Adams, V.P. Sales
Date Product Introduced: April, 1985
Product Description & Applications: A cost-effective alternative to a video sync pulse generator in studios which do not require color subcarrier signals, the generator outputs both NTSC and PAL composite sync, and field, frame and film rate sine and square waves. Outputs can be referenced to internal crystal, mains, external video, or external TTL signal. Used in audio-for-video tape synchronizing systems to eliminate ATR flutter, synchronize VTRs as slaves, resolve ATRs to video, re-time time code.
Basic Specifications & Suggested List Price: Inputs/outputs: five rear panel BNC jacks allow simultaneous input and output of several different signals, with assignment by user; video-loop-through: 1 VPP, 75-ohm, compensated bridging circuit, with return loss greater than 40dB to 6MHz; output rates: 60, 59.94, 50, 30, 29.97, 25, 24, 23.98 Hz, and 2X and ½X those rates.



AMTEL SYSTEMS INC.
Soundmaster

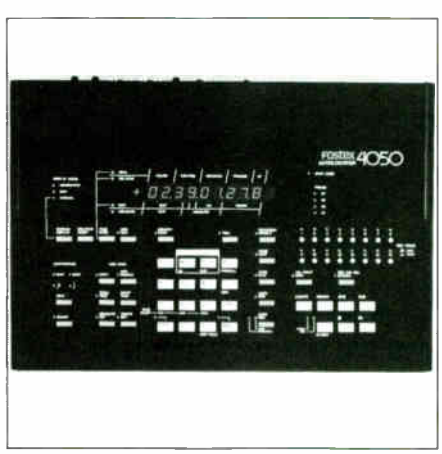
AMTEL SYSTEMS INC.
400 W. Cummings Park, Suite 4750, Woburn, MA 01801
(617) 938-8551
Product Name: Soundmaster
Date Product Introduced: July, 1985
Product Description & Applications: The Soundmaster Audio Editing System is a SMPTE time code based, computer assisted editing/control system designed for audio-for-video and audio-for-film post-production. The product offers the speed, ease of operation and flexibility previously available only in videotape editing systems. Soundmaster can control up to four tape machines (typically three audio and one video transport) simultaneously, using tape synchronizers as intelligent interfaces to the transports. A powerful IBM microcomputer acts as a host for Soundmaster's custom hardware and software.
Basic Specifications & Suggested List Price: Soundmaster can store and execute over 2,500 editing events. Three different video display screens are generated which furnish the user with real-time transport status display (shown in photo); an edit decision list with list management functions; and a system parameter set up screen. Soundmaster list price is $9,995, which includes the IBM computer. Users who already own the necessary computer hardware may purchase the system for $8,195.

API AUDIO PRODUCTS
7953 Twist Lane, Springfield, VA 22153
(703) 455-8188
Contact: Paul Wolff
Product Description & Applications: Wolff Associates has purchased the API product line. New products include: a motorized moving fader which replaces the 940 series fader and retrofits FADEX with little or no modifications. See us at AES booth #308.

COMPUSONICS CORP.
7315 E. Peakview, Englewood, CO 80111
(303) 793-0060
Product Name: DSP 2002—Interface & Software
Contact: Jim Woodworth, Nat'l Sales Mgr.
Date Product Introduced: July, 1985
Product Description & Applications: Interface ties the Sony 1610 Editor to CompuSonics DSP-2002 for editing purposes. Software allows editing to one sample rate or 1/50,000 of a second. Additional SMPTE software has been developed for the DSP-2002.

FOSTEX
4030 Synchronizer

FOSTEX
15431 Blackburn Ave., Norwalk, CA 90650
(213) 921-1112
Product Name: Fostex 4030 Synchronizer; 4035 Controller
Contact: Mark Cohen, Tom Lubin
Date Product Introduced: October, 1985
Product Description & Applications: 4030 SMPTE synchronizer: handles 24, 25 & drop frame; has manual advance/retard and store; lock enable, and chase enable. One synchronizer per slave. 4035 controller allows additional control of 4030, with: 10 locate points; auto record; reader/generator; selectable reader display; zone limits; auto play & recycle; controls 4 machines—1 master/3 slaves; interlock indicators.
Basic Specifications & Suggested List Price: Software will be available to work with most pro video and audio systems. The 4030 (two machine simple interlock) is $1,500. The 4035 accessory controller is $500. A synchronizer interface, model 8070 is also available if more than one slave is required.



FOSTEX
4050 Auto-Locator

FOSTEX
15431 Blackburn Ave., Norwalk, CA 90650
(213) 921-1112
Product Name: Fostex 4050 Auto-Locator
Contact: Mark Cohen, Tom Lubin
Date Product Introduced: September, 1985
Product Description & Applications: Compatible with all current Fostex open reel recorders, the Model 4050 auto-locator features: channel record selects; selectable pre-roll; zone limits, so you don't run off reel in search mode; SMPTE time code generator/reader; MIDI to SMPTE synchronizer; metronome; quantize the time of MIDI composition (make 30 sec. tune into 20 sec. tune); search to time; search to measure; bar & beat; MIDI tape dump & storage; 10 locate points, automatic punch in/out; multi cue point repeat play mode; full track select and machine functions.
Basic Specifications & Suggested List Price: Time code will read/write 24, 25 or drop frame SMPTE code. $1,250.

GIESE ELECTRONIC KG/ESL, INC.
"Taker Series"

GIESE ELECTRONIC KG/ESL, INC.
120 S.W. 21st Terrace, C104, Ft. Lauderdale, FL 33312
(305) 791-1501
Product Name: Giese "Taker" Series
Contact: Lutz H. Meyer, President
Date Product Introduced: March, 1985
Product Description & Applications: Specifically designed for ADR, the Taker A/B allows film style looping with machines used. Has tag functions and next take start is automatically computed as last take end. Data entry thru keyboard with 2 additional displays. SMPTE/EBU TC is read and displayed. Works in conjunction with the Giese "Lock System" 2 and 3 synchronizers, which have over 80 machine interfaces available. Also available is the "Taker 1000" series, offering full EDL functions for up to 15,000 EDL points with complete management and housekeeping printout and control.
Basic Specifications & Suggested List Price: Suggested list price: Taker A/B—(U.S.) $4,500; Taker 1000—(U.S.) $16,275; FOB Ft. Lauderdale.

GIESE ELECTRONIC KG/ESL, INC.
120 S.W. 21st Terrace, C104, Ft. Lauderdale, FL 33312
(305) 791-1501
Product Name: TC Videodisplay
Contact: Lutz H. Meyer, President
Date Product Introduced: March, 1985
Product Description & Applications: This unit is a time code reader with character inserter, designed to fade-in time code in the video screen. Equipped with high speed reader, the TC is displayed on the unit and inserted into the screen in hours, minutes, seconds and frames. The unit features variable insert size, insertion or dissolve, plus different character type (2) and black or white character background.
Basic Specifications & Suggested List Price: SMPTE/EBU time code, level: -20dB to +20dB, ref. 0.775V; speed: 1/10th to 50 times play speed; direction: forward and reverse; video input: 1 Vss on 75 ohm or loop; video output: 30Hz - 6MHz; size: single unit 19" rackmount. Suggested list: (U.S.) $2,095.

NEVE/RUPERT NEVE INCORPORATED
Berkshire Industrial Park, Bethel, CT 06801
(203) 744-6230
Product Name: Necam 96
Contact: Barry J. Roche, President
Date Product Introduced: April, 1985
Product Description & Applications: Neve's third-generation computer automated mixing system—a totally instinctive, touch-sensitive moving-fader mixing system, Necam 96 eliminates the need for read/write/update switching and fader matching on update. Free grouping, automated and group muting, update-from-anywhere capability, snapshot memories, real-time control and displays, and trimming of mutes and events to 1/3-frame accuracy, as well as a host of other features make Necam 96 Neve's most sophisticated automation system yet.

RUPERT NEVE INCORPORATED
Necam 96 System

SOUND AND VISION
8033 Sunset Blvd., Suite 928, Los Angeles, CA 90046
(805) 255-3770
Product Name: SV-1000 "Mini-Loc"
Contact: Cornel Tanassy
Date Product Introduced: May, 1985
Product Description & Applications: The SV-1000 "Mini-Loc" is a programmable 3 position auto locator with memory, punch in/out, play/rewind capabilities, designed to be used on multi-track with or without an existing tape counter. The "Mini-Loc" supplies a precision digital tape counter & tracking system. Also featured are full transport remote, programmable trigger output, "on the fly" single button programming and compact size.
Basic Specifications & Suggested List Price: Priced less than $300. Interfaces with Tascam, Fostex, Otari, and others.

SOUND AND VISION
SV-1000 "Mini-Loc"

SOUND WORKSHOP PROFESSIONAL AUDIO PRODUCTS, INC.
1324 Motor Pkwy, Hauppauge, NY 11788
(516) 682-6210
Product Name: Arms II Console Computer
Contact: Lee Pomerantz
Date Product Introduced: April, 1985
Product Description & Applications: Sound Workshop Professional Audio Products, Inc. (Hauppauge, NY) is shipping the new ARMS-II console computer. ARMS-II is an enhanced version of the widely used ARMS system. In ARMS-II, all functions are sped up by a factor of two. This increased speed is accompanied by several new software based features and functions. Sound Workshop has also announced that ARMS-II is available for retrofit into existing consoles and may be specified for OEM installation from a variety of console manufacturers.
Basic Specifications & Suggested List Price: The ARMS-II console computer is capable of controlling up to 64 channels and now includes such features as solo exclude top panel hardware reset, a narrowed null window and the removal of fader dither. Please contact the factory for additional information and pricing.

NEW PRODUCTS
MICROPHONES & PICKUPS
1 · 9 · 8 · 6

AKG ACOUSTICS, INC.
77 Selleck St., Stamford, CT 06902
(203) 348-2121
Product Name: D321
Contact: S. Richard Ravich, V.P. & Gen. Mgr.
Date Product Introduced: March, 1985
Product Description & Applications: This hypercardioid dynamic microphone is the latest addition to AKG's D300 series. Designed around a new patented handling-noise compensation system, in which the magnet is elastically suspended to virtually eliminate all handling noise. In keeping with the ruggedness of AKG's D300 series of microphones, the D321 uses a die cast housing, stainless steel grill and a protective transducer enclosure. An XLR set screw locks the cable connector securely in place. Finished in an attractive matte charcoal gray.
Basic Specifications & Suggested List Price: Frequency response 40-20k Hz, sensitivity 1.4m V/PA, impedance 300 ohms, balanced output, weight 11.6 oz., provided with SA41 stand adapter and vinyl carrying case. Suggested list price: $170.

ASTATIC CORP.
P.O. Box 120, Harbor & Jackson St.
Conneaut, OH 44030
(216) 593-1111
Product Name: Models 980, 990, 975
Contact: Harry Hahn, Sales Mgr.
Product Description & Applications: New additions to pro mike line include the 980 professional electret-condenser, the 990 dynamic ball-mike, and the 975 straight-mike. All microphones are covered by a two-year warranty and are a tremendous value for the professional and semi-professional recording and sound reinforcement user.
Basic Specifications & Suggested List Price: 980—frequency response: 40-20,000 Hz; impedance 150 ohms; 9 to 52 VDC 990—frequency response: 60-14,000 Hz; impedance 500 ohms; 975—frequency response: 60-14,000 Hz; impedance 500 ohms.

AUDIO-TECHNICA U.S., INC.
1221 Commerce Drive, Stow, OH 44224
(216) 686-2600
Product Name: ATM5R
Contact: Rock Wehrmann, Advert. Mgr.
Date Product Introduced: AES, 1985
Product Description & Applications: The ATM5R is a wide-range fixed-charge condenser microphone with a unidirectional polar pattern. It was designed for use in quality sound systems and for use by professional musicians especially for vocal pickup. It can also be used for professional recording and broadcasting demanding the highest quality performance coupled with excellent reliability. Its small size makes it an excellent choice for camera use or for talent seeking big sound from a smaller, lighter design.
Basic Specifications & Suggested List Price: Element: fixed-charge condenser; polar pattern: unidirectional; frequency response: 50-15,000 Hz; impedance: 200 ohms nominal; maximum input sound level: 140 dB SPL at 1% THD; signal to noise ratio: greater than 45dB @ 1kHz; power requirements: 9-52 VDC; weight: 4 oz. (113 grams); dimensions: 5 1/16" (128.5 mm) long, 1 1/2" (38.1 mm) head diameter. List price: $210.

AUDIX
110 Ryan Industrial Ct., San Ramon, CA 94583
(415) 831-0808
Product Name: Series 200 (UD200 & UD260)
Contact: Cliff Castle, Sales
Date Product Introduced: Late 1984
Product Description & Applications: The UD200 and UD260 are rugged, high-end vocal/instrument mikes designed for live and studio applications. The 200 series provide a smooth response from 50-18,000 Hz without any harsh mid-range peaks. The UD260 is available with lockable on-off switch and comes in six brilliant colors as well as black and matte gray. The UD200 is without switch and available in black and non-reflective matte gray.
Basic Specifications & Suggested List Price: Transducer principles: dynamic; operating principle: pressure gradient; polar pattern: cardiod; frequency response: 50-18,000 Hz; nominal output impedance: 200 ohms; sensitivity: -76.5dB (0 dB = 1V/microbar); max. SPL: 128dB; grille screen: woven steel mesh with pop filter. Supplied with pouch and mike holder. List price: $179.

AUDIX
110 Ryan Industrial Ct., San Ramon, CA 94583
(415) 831-0808
Product Name: OM-1
Contact: Cliff Castle, Sales
Date Product Introduced: September, 1985
Product Description & Applications: A new hypercardioid dynamic designed for high-end vocal/instrument use, the OM-1 provides unsurpassed off-axis rejection and highly improved gain before feedback in live performances. An all-brass construction and a new shock mounted capsule design make for extremely low handling noise. The capsule is housed in a removable middle ring for easy field replacement. Available with two types of interchangeable grille caps: flat end or ball shaped.
Basic Specifications & Suggested List Price: Transducer principle: dynamic; operating principle: pressure gradient; polar pattern: hypercardioid; frequency response: 50-18,000 Hz; nominal output impedance: 200 ohms; sensitivity: -77.5dB (0 dB = 1V/microbar); housing: brass; front to back ratio: greater than 20dB at 180; includes: carrying pouch, mike holder; finish: black or non-reflective matte gray. List price: $325.

BEYER DYNAMIC INC.
5-05 Burns Ave., Hicksville, NY 11801
(516) 935-8000
Product Name: MC 740
Contact: Tony Hawkins, Nat'l Sales Mgr.
Date Product Introduced: July, 1985
Product Description & Applications: MC740 is a large diaphragm studio condenser microphone featuring five selectable polar patterns; omni-directional, wide cardioid, cardioid, hypercardioid and figure-eight. The MC740 can be powered by any 48 volt phantom power source and is supplied with a EA740 suspension. The MC740 was designed as a studio microphone offering excellent flexibility for all recording applications.
Basic Specifications & Suggested List Price: Frequency response: 40-20k Hz; signal to noise ratio: 70dB; max. SPL @ 1kHz with less than 0.5% THD, 134dB (144dB with 10dB attenuation switched on); impedance: 150 ohms. Suggested retail price: $1,000.

EDCOR
16782 Hale Ave., Irvine, CA 92714
(714) 863-1529
Product Name: System 2000 Wireless Microphone
Contact: Larry Weston
Date Product Introduced: March, 1985
Product Description & Applications: Handheld or lavalier microphone and receiver designed for professional systems. Principle application is church, industrial audio & video productions, and commercial usage.
Basic Specifications & Suggested List Price: System 2000 is a completely new unique design. Typical range 750 feet. Distortion is less than 1% and frequency response is 50-12,000 Hz. A contained computer logic circuit virtually eliminates any transients and background noise is under 100dB.

ELECTRO-VOICE, INC.
600 Cecil St., Buchanan, MI 49107
(616) 695-6831
Product Name: RE98
Contact: Mary Ellen Long, PR & Media Services Mgr.
Date Product Introduced: August, 1985
Product Description & Applications: The new Electro-Voice RE98 lavalier microphone is a miniature, omnidirectional, electret model, specifically designed for the broadcast and sound reinforcement industries. It is typically 10dB greater in sensitivity than conventional electret lavaliers, and its diminutive size is ideal for applications in television and sound reinforcement. The RE98 has a black, non-reflective finish and is designed to be attached to the talent's clothing using the supplied tie clasp with the dual-power (phantom or 9V battery) electronics module clipped to the user's belt.
Basic Specifications & Suggested List Price: Frequency response: 80-15,000 Hz; impedance: 150 ohms; output level: -45dB ref (0dB=1mW/10dynes/cm²); S/N ratio: 72dB A weighted; dynamic range: 141dB input-open circuit; equivalent noise level: under 24dB re. 0.0002 dyne/cm²; max. SPL @ 1% THD: 141dB (SPL) @ 1kHz; operating voltage: 9V internal battery or 18-50 VDC phantom.

HM ELECTRONICS, INC.
9675 Business Park Ave., San Diego, CA 92131
(619) 578-8300
Product Name: System 87-870
Contact: Dan Taylor, Prod. Specialist
Date Product Introduced: April, 1985
Product Description & Applications: The System 87 is a wireless hand-held mike with the Shure SM87 mike element. Second generation Dynamic Expansion companding circuit with over 115dB of dynamic range. Standard 9V alkaline gives 1000 ft. operating range for 6-8 hours. Crystal controlled R.F. Choice of studio receiver or battery powered flat-pac receiver. Rack mounting available. Diversity system available.
Basic Specifications & Suggested List Price: Frequency response: 50Hz-15kHz ±3dB; dynamic range: 115dB; frequency stability: ±.005%; transmitter weight with microphone: 12 oz. Meets all Shure Bros. specifications for SM87 audio performance. Pro net price: $2,600.

C.F. MARTIN & CO., INC.
(Martin Guitar Company)
510 Sycamore St., Nazareth, PA 18064
(215) 759-2837
Product Name: Thinline 332 2nd Generation
Contact: John Marshall, Research & Dev. Supervisor
Date Product Introduced: June, 1985
Product Description & Applications: The Thinline 332 is a skillfully handcrafted piezoelectric transducer for amplification of acoustic guitars. Installs compactly & neatly beneath the saddle of an acoustic flat top guitar. Provides optimum acoustical response while maintaining the instrument's structural integrity. The Thinline 332 2nd generation is packaged complete with transducer, output jack, and installation instructions. The Thinline 332 is manufactured by Fishman Transducer, Inc., Woburn, MA exclusively for the Martin Guitar Company.
Basic Specifications & Suggested List Price: Transducer type: piezoelectric; frequency response: DC to above 100k Hz; attack time (transient response): instantaneous; hum & noise level: below audible threshold; output impedance: 1 megohm; special pickups are available for unusual instruments and guitars with non-standard string spacing.

C.F. MARTIN & CO., INC.
(The Martin Guitar Company)
510 Sycamore St., Nazareth, PA 18064
(215) 759-2837
Product Name: V100 Fishman Violin Transducer
Contact: John Marshall, Research & Dev. Supervisor
Date Product Introduced: June, 1985
Product Description & Applications: The V100 Fishman Violin Transducer is a user installable bending mode piezoelectric transducer. It is mechanically affixed to the bridge with no modifications and provides years of trouble-free service. The V100 Fishman Violin Transducer provided true acoustic response for each individual violin. Supplied with output jack and cord. Manufactured for the Martin Guitar Company by Fishman Transducer, Inc., Woburn, MA.
Basic Specifications & Suggested List Price: Transducer type: bending mode piezoelectric; attack time (transient response): instantaneous; hum & noise level: below audible threshold; output impedance: 1 megohm.

You know what "old reliable" can do. It's a remarkably durable design. And still hanging on.

We dare you to look for more. For instance, rejection of off-axis sound that continues working even at the lowest frequencies. Plus our famed ***Road Tough*** construction that made A-T a favorite for reliability from the start.

The differences may seem subtle to the layman...but will be obvious – and most welcome – to you and other sophisticated listeners.

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Audio-Technica U.S., Inc., 1221 Commerce Dr., Stow, OH 44224
(216) 686-2600

Circle #080 on Reader Service Card

NEW PRODUCTS
MICROPHONES & PICKUPS
1 · 9 · 8 · 6

MICRON AUDIO PRODUCTS, LTD.
210 Westlake Dr., Valhalla, NY 10595
(914) 761-6520
Product Name: Micron 500 Series
Contact: Sales Dept.
Date Product Introduced: April, 1985
Product Description & Applications: The standard Micron range of wireless microphones, long established as the world leader, is joined by the new Micron 500 series, featuring the substantial enhancement of Complementary Noise Suppression. CNS is available in Micron hand-held and pocket transmitters, and Micron single and diversity receivers. The new CNS Microns offer the professional user significant improvements—lower noise, wider dynamic range (115dB), extended operating range, enhanced low signal performance, increased immunity from interference and "deadspots," and improved multi-channel performance.
Basic Specifications & Suggested List Price: Carrier frequency: 150-216 MHz; freq. stability: ±0.005%; modulation: FM; power output: 50mw; distortion: less than 0.3% THD; noise floor: 115dB; frequency response: 100Hz-15kHz ±2dB. Model CTR-501 pocket transmitter-mobile receiver—$2,580; Model MDR-530SH hand-held transmitter-mobile diversity receiver—$5,100.

PHILIPS PRODUCTS
77 Selleck St., Stamford, CT 06902
(203) 348-2121
Product Name: Back Plate Electret Microphones
Contact: S. Richard Ravich, V.P. & Gen. Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: A complete line of 11 Back Plate Electret Microphones from N.V. Philips, designed for sound contractors. Professional (60-17kHz) and standard (120-16kHz) versions including hand-held, gooseneck and desktop models provide a selection to suit all requirements. Hypercardioid polar pattern and tailored response combine to provide reduced susceptibility to feedback. Omni and noise-cancelling models are also available. Other features include zinc-alloy housings, balanced output, frequency contouring and on-off switches. These microphones provide the system designer with an excellent price/performance ratio with no compromises.
Basic Specifications & Suggested List Price: Professional versions—frequency response: 60-17kHz; equivalent self noise: 17dB (A); impedance 200 ohm; max. SPL: 134dB. Standard versions—frequency response: 120-16k Hz, equivalent self noise: 19dB (A); impedance: 200 ohm; max. SPL: 134dB. Range in price from $85 to $250.

RAULAND-BORG CORPORATION
3535 W. Addison St., Chicago, IL 60618
(312) 267-1300
Product Name: 1280 Series Microphones
Contact: Sales Eng. Dept.
Date Product Introduced: May, 1985
Product Description & Applications: The 1280 series microphones offer the versatility to adapt to a wide range of practical sound applications. Four cardioid models (1280, 1282, 1285, 1286) cover applications from general sound reinforcement to music requirements. The 1280 provides ruggedness and quality performance for a variety of uses. Professional styling and lightweight design are combined in the 1282. The 1285 offers high performance for reinforcement or live entertainment applications. The 1286 is a quality electret condenser rugged enough for hand-held applications.
Basic Specifications & Suggested List Price: Model 1280—general purpose microphone, 40-15k Hz, Lo-Z, integral switch, chrome finish. Model 1282—professional microphone, 40-14k Hz, Lo-Z, integral switch, matte black finish. Model 1285—professional microphone, 40-16k Hz, Lo-Z, lockable switch, matte black finish. Model 1286—professional electret condenser microphone, 40-20k Hz, lockable switch, matte black finish.

SAMSON PRODUCTS
124 Fulton Ave., Hempstead, NY 11550
(516) 489-2203
Product Name: Body-Pak Transmitter
Contact: Scott Goodman, Nat'l Sales Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: A body pak transmitter for VHF hi-band wireless systems, for use with lavalier microphones and guitar/bass. Also available with a "Hirosi" six pin adapter plug for optional wiring of other types of audio inputs. Nine frequencies are available. Can be used with either Samson's single channel RH-1 receiver or PR-50 channel selectable receiver.
Basic Specifications & Suggested List Price: Frequency range: 174-199 MHz; freq. stability: .005% crystal controlled; modulation: 15kHz deviation; 50 microsec pre-emphasis FM (F3); FCC: part 91 & 74; radiated harmonics & spurious emissions: less than -45dB; RF power output: 50 mW; max. range: 300 feet. Price: $599 w/RH-1 receiver; $1,299 w/PR-50 receiver.

SANKEN MICROPHONE CO., LTD.
CU-31, CU-32

SANKEN MICROPHONE CO., LTD.
c/o Pan Communications, Inc.
5-72-6 Asakusa, Taito-ku, Tokyo, Japan III
(03) 871-1370
Product Name: Sanken CU-31 Axis Direction, CU-32 Right Angle Unidirectional Condenser Microphone
Contact: Ms. Fumiko Serizawa, V.P. Mktg.
Date Product Introduced: October, 1985
Product Description & Applications: The Sanken CU-31 and CU-32 use push-pull conversion systems. They have a high dynamic range of 129dB and frequency range of 20Hz to 18kHz, with smooth frequency responses. Their self-noises (19dB or less) are inaudible for a natural, uncolored sound. These are lightweight and compact microphones, designed for TV and radio broadcasting, and recording applications.
Basic Specifications & Suggested List Price: Transducer type: push-pull DC bias condenser; diaphragm: titanium membrane; directional pattern: cardioid or unidirectional; frequency response: 20Hz to 18kHz; sensitivity: 0.355 mV/0.1 Pa; max. SPL for 1.0% THD: 148 dB; equivalent noise level: 19dB or less; nominal impedance: 200 ohm; supply voltage: 48 V phantom; current consumption: 1.4 mA; weight: 125 grams; dimensions: 113mm (CU-31) and 117mm (CU-32) long, 20.5mm diameter.

SANKEN MICROPHONE CO., LTD.
CMS-2

SANKEN MICROPHONE CO., LTD.
c/o Pan Communications, Inc.
5-72-6 Asakusa, Taito-ku, Tokyo, Japan III
(03) 871-1370
Product Name: Sanken CMS-2 MS Type One Point Stereo Condenser Microphone
Contact: Ms. Fumiko Serizawa, V.P. Mktg.
Date Product Introduced: October, 1985
Product Description & Applications: The Sanken CMS-2 is a MS type, one-point stereo condenser microphone using push-pull conversion system. It has a dynamic range of 129dB and frequency range of 20Hz to 18kHz. Its self-noise (16dB or less) is inaudible, for a natural, uncolored sound. The CMS-2 used with a matrix box allows stereo perspective control. It is a lightweight and compact microphone suited for TV and radio broadcasting, and recording applications.
Basic Specifications & Suggested List Price: Transducer type: push-pull DC bias condenser; diaphragm: titanium membrane; directional pattern: mid-cardioid, side-figure-8; frequency response: 20Hz to 18kHz; sensitivity: 0.28 mV/0.1 Pa; max. SPL for 1.0% THD: 145dB; equivalent noise level: 16dB or less; nominal impedance: 250 ohm + 20%; supply voltage: 48V phantom; current consumption: mid-1.4 mA, side-1.4 mA.

SANKEN MICROPHONE CO., LTD.
CMS-6

SANKEN MICROPHONE CO., LTD.
c/o Pan Communications, Inc.
5-72-6 Asakusa, Taito-ku, Tokyo, Japan III
(03) 871-1370
Product Name: Sanken CMS-6 MS Type One-Point Stereo Condenser Microphone
Contact: Ms. Fumiko Serizawa, V.P. Mktg.
Date Product Introduced: October, 1985
Product Description & Applications: The Sanken CMS-6 uses a push-pull conversion system. It has a high dynamic range of 108dB and a wide frequency range up to 18kHz. Its self-noise (19dB or less) is inaudible, for a natural, uncolored sound. The CMS-6 is a portable microphone. With CMS-MBB, it can change from M-S use to L-R use. It is a lightweight and compact hand-held microphone and is suited for TV and radio broadcasting for both outdoor and indoor applications.
Basic Specifications & Suggested List Price: Transducer type: push-pull DC bias condenser; diaphragm: titanium membrane; directional pattern: mid-cardioid, side-figure-8; frequency response: 50Hz to 18kHz; max. SPL for 1.0% THD: 127 dB; equivalent noise level: 19dB or less; nominal impedance: 150 ohm + 20%; supply voltage: 48V phantom; current consumption: 9.5 mA; sensitivity: 0.56 mV/0.1 Pa.

SENNHEISER
MKH 40 P48

SENNHEISER
48 W. 38th St., New York, NY 10018
(212) 944-9440
Product Name: MKH 40 P48

Contact: Anthony D. Cafiero, Prod. Mgr.
Date Product Introduced: May, 1985
Product Description & Applications: Low noise (12 dBa) studio condenser microphone. Utilizing a cardioid, symmetrical pressure gradient transducer, the MKH 40 offers extremely low IM distortion and a flat frequency response at sound pressures approaching 140dB. The transformerless output renders this microphone an excellent candidate for digital recordings, and the high sensitivity (25 mV/Pa) allows recording levels to be run lower for better S/N ratio.
Basic Specifications & Suggested List Price: Frequency response: 40-20,000Hz; max. SPL: 134dB/142dB (under .5% THD @ 1kHz); sensitivity: 25 mV/Pa; power: 48 VDC ±4V, 2mA; nom. source impedance: 150 ohms; weight: 100 grams; min. load impedance: 1000 ohms; dimensions: 25mm x 150mm long; equiv. RMS SPL (Din 45500): 12 dBa. Price: $685.

SENNHEISER
48 W. 38th St., New York, NY 10018
(212) 944-9440
Product Name: SKM 4031-9H
Contact: Anthony D. Cafiero, Prod. Mgr.
Date Product Introduced: January, 1985
Product Description & Applications: Wireless hand-held microphone for use with VHF carrier frequencies ranging from 174-216 MHz. Powered by three AAA batteries, this microphone has a unique DC-DC converter which regulates the supply of voltage for a more consistent performance. Typical battery life exceeds five hours, and a variety of AC or DC receivers may be used in conjunction with the SKM 4031-9H.
Basic Specifications & Suggested List Price: Frequency response: 70-12.5k Hz; freq. stability: ±3.5 kHz; S/N (type): 96 dBa; pre emphasis: 50 microseconds; max. SPL: 143dB; OP. temperature: -10° - 40°C; modulation: FM narrowband; weight: 9 oz. (inc. batteries); THD: less than 3%; dimensions: 49mm x 205mm. Price: $900.

SENNHEISER
EM 2003-9H

SENNHEISER
48 W. 38th St., New York, NY 10018
(212) 944-9440
Product Name: EM 2003-9H
Contact: Anthony D. Cafiero, Prod. Mgr.
Date Product Introduced: May, 1985
Product Description & Applications: Single channel diversity RF receiver for use with carrier frequencies ranging from 174-216 mHz, and either the SKM 4031-9H hand-held or SK-2012-9H body pack transmitters. Featuring rack mount capability, on board antenna splitter, full instrumentation, and helical filters, the EM 2003-9H delivers consistently reliable performance in a variety of applications.
Basic Specifications & Suggested List Price: Freq. response: 20-12.5k Hz; output level: 0-1.55 volts; S/N (type): 92 dBa (30 microvolts RF); AF output impedance: 20 ohms; THD: less than 2%; RF input: 50 ohms BNC; DE emphasis: 50 microseconds; modulation: FM narrowband; squelch: 0-10 micro volts; power: 110/220 VAC 50/60 Hz, 12-24 VDC, 27 mA. Price: $1,190.

SEYMOUR DUNCAN
203 Chapala St., Santa Barbara, CA 93101
(805) 963-0676
Product Name: Active EQ™ Bass Pickups
Contact: Ron Colantonio, Marketing Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: Active E.Q.™ System Bass Pickups use less coil windings than conventional bass pickups. You get a low impedance design, so the signal comes through without noise or coloration. A small preamp is designed to provide maximum battery life. Three built-in EQ switches let you shift resonant frequencies for 8 different sounds. You can get a warm, fat sound or a snappy high tech sound, or anything in between. All settings deliver great detail and definition.
Basic Specifications & Suggested List Price: Four direct replacement versions are now available: P-Bass, Jazz Bass System (one neck, one bridge), PJ System (one P-Bass, one Jazz Bass bridge) and Jazz Bass bridge only. All models are sealed in epoxy to eliminate microphonic feedback. Wiring schematics, mounting screws, potentiometers, battery clip, ¼" switching jack, and wire included.

SHURE BROTHERS INC.
SM98

SHURE BROTHERS INC.
222 Hartrey Ave., Evanston, IL 60602
(312) 866-2200
Product Name: SM98 Miniature Condenser Microphone
Contact: Al DeGenova, Public Relations Coord.
Date Product Introduced: February, 1985
Product Description & Applications: The SM98 is a professional-quality miniature unidirectional condenser microphone designed specifically for instrument and amplifier miking. The SM98 features a wide, extremely flat frequency response with switchable low-end rolloff, and phantom or battery powering with automatic switchover. Unlike other miniature instrument microphones, whose performance breaks down at high sound pressure levels, the SM98 utilizes advanced state-of-the-art technology in its low-noise, low-distortion preamp for trouble-free close miking of drums (especially), brass instruments, amplifiers, and other high SPL sources.
Basic Specifications & Suggested List Price: Frequency response: 40-20,000Hz; dimensions: 31.8mm (1¼")L x 11.9mm (15/32") Dia; weight: 12 grams (microphone), 320 grams (preamp); max. SPL: (@ 1,000 Hz) 153dB w/800 ohm load. Supplied accessories: windscreen and swivel adapter. User net price is $250.

TOA ELECTRONICS, INC.
480 Carlton Ct., So. San Francisco, CA 94080
(415) 588-2538
Product Name: The J Series, K Series, & HY Series: Microphone lines
Contact: Terry Taylor, Nat'l Sales/Mktg. Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: Three all-new mike lines with individually tailored characteristics provide precision, sensitivity, and clean natural sound in all professional applications. The J Series of dynamic cardioid mikes includes 3 models, voiced for musical instruments or vocals (or both) with shock-mounted dynamic mike cartridge, removable wind screen & pop filter; supplied with padded cloth storage bag & cable. The K Series includes 3 "fixed charge" condenser mikes & 2 "true" condensers, all supplied with removable windscreen, interchangeable capsules, & mike stand adaptor; unique modular approach; internal battery operation or 48V external.
Basic Specifications & Suggested List Price: Power, red "live mike" LED comes with cable and padded cloth storage bag or molded travel case. The HY Series communications headsets feature fixed-charge condenser mikes (full range response) and stereo headphone monitoring systems, interchangeable mike capsules; unique monitoring system accepts external line-level input. Prices: J-1, $139.50; J-2 & 3, $199.50. K-1, $139.50; K-2 & 3, $249.50; K-4, $429.50; KY, $499.50. HY-1, $289.50; HY-2, $249.50.

NEW PRODUCTS
MIXING CONSOLES
1 · 9 · 8 · 6

—PHOTO ON PAGE 134

AMEK CONSOLES INC.
10815 Burbank Blvd., North Hollywood, CA 91601
(818) 508-9788
Product Name: BC01 Series 2
Contact: Arnie Toshner, Ruth Long
Date Product Introduced: May, 1985
Product Description & Applications: Amek BC01 Series 2—audio-follows-video + ENG + STP.

AUDIOARTS ENGINEERING
3224 Console

AUDIOARTS ENGINEERING
5 Collins Rd., Bethany, CT 06525
(203) 393-0887
Product Name: 3224 24-Track Recording Console
Contact: Ray Esparolini, Sales
Date Product Introduced: Spring, 1985
Product Description & Applications: The 3224 recording console is the newest addition to the Audioarts Engineering line of consoles. The 3224, like the Audioarts 8-X recording console, is in a I/O format giving the benefit of space, savings, and ease of operation. The 3224 is a 24 bus, 32 input console complete with patchbay and 24-track VU metering. Inputs, outputs, and patchbay, are totally modular like all Audioarts consoles. Input/output modules feature phantom power, mike and line gain and switching, -20dB pad, and phase reverse. Equalizer section has 3 sweepable bands with switch activated high pass filter. Other features are comprehensive PFL, AFL, tape and group solo system, 20Hz to 20kHz oscillator and our exlusive M-104 long-throw conductive plastic faders.
Basic Specifications & Suggested List Price: Freq. response: line 20Hz-50kHz, ±.1dB; mike 20Hz-20kHz, ±.1dB; THD: line .005% (20Hz-20kHz @ +20dBm out); mike .05% (20Hz-20kHz @ +20dBm out); noise: line less than -90dBm, (20kHz BW); mike -129EIN (20kHz BW); crosstalk: bus-to-bus less than -90dB @ 1kHz, w/patch panel less than -75dB @ 1k Hz (typ); dynamic range: Line 110dB, Mike 100dB (typ); output: max level +26dB bal (ref @ .775V), +20dBm unbal; impedance: 600 ohms bal, 10 ohms unbal. Price for 32x24 w/patchbay $23,900.

BOGEN, A LEAR SIEGLER COMPANY
P.O. Box 500, Paramus, NJ 07653
(201) 343-5700
Product Name: Bogen Hi-Tek Modular Mixer MMR-1
Contact: Emily B. Sobin, Mgr., Public Relations
Date Product Introduced: April, 1985
Product Description & Applications: Modular mixer provides custom flexibility through plug-in modules. Mainframe has built-in power supply and slots for up to nine selectable, changeable modules. Features available: up to 16 inputs, three levels of priority, voice/signal activation of priority, remote volume control, phantom power supply, multiple outputs, stereo output capability. Interconnect two mainframes for 32 inputs. Built-in filtering of RF interference and line noise. Slow-start-up circuit prevents turn-on thumps.

Basic Specifications & Suggested List Price: Typical data for system with 4 inputs per mixing bus (4x2): line output = +18dBm, bal, into 600 ohms; frequency response = 20Hz to 20kHz, ±1dB; distortion = 0.07% @ rated output; equivalent input noise = -177 dBm; gain per channel = lo-z, 68 dB (0.3mV mike input yields 0dBm output), hi-z, 63dB. 17"W x 5¼"H x 7⅛"D. Mainframe: $437.50; modules: $87.50 to $193.75; blank panel & chassis: $25.

CALREC AUDIO (AUDIO DESIGN CALREC, INC.)
P.O. Box 786, Bremerton, WA 98310
(206) 275-5009
***also:* P.O. Box 25456, W. Los Angeles, CA 90025**
(213) 478-2414
Product Name: "UA 8000" Music Production Console
Contact: Nigel Branwell (Bremerton) or Dick Swettenham (Los Angeles)
Date Product Introduced: Winter, 1984/1985
Product Description & Applications: 32/48/64 channels nominal; 32 output groups; 2 stereo outputs with full dynamics and auxiliaries on each; zoned status control for instant console modes (the left tracking section (1-24/32) can be controlled independently of right section (25/33 up); Vocal Stresser™ on every channel; 24 auxiliary buses; two 7-way stereo foldback mixers from all cues, stereo output, C.R. Monitor and RTB; VU and bargraph metering—switchable PPM or VU ballistics; full automation of output, group, and monitor faders (large or small)—silent monitor mutes; separate automation grouping facility.
Basic Specifications & Suggested List Price: Complete path: -128dBm E.I.N.; +26dBm output; freq. response: (+0, -0.1dB) 20Hz-20kHz; crosstalk: -80dB; distortion: less than 0.04%.

CARVIN CORP.
1155 Industrial Ave., Escondido, CA 92025
(800) 854-2235 (Nat'l); (800) 542-6070 (local CA)
Product Name: MX Mixer Family
Contact: Dave Flores, Sales Dept.
Date Product Introduced: March, 1985
Product Description & Applications: PA mixers in 6, 8, 12, 16, and 24 channel. The MX mixer family are a fully modular design, with -128 dBv at the inputs. They complement the established MX 1688 and MX 1644 recording/PA consoles, and are loaded with features like: mike/line switching, sweep mid-EQ, dual monitor sends, stereo effects panning, channel patching, and dual 9-band graphic EQs. Powered mixers are 300W RMS, and 400W RMS, with exclusive Carvin Powertrack® Power Circuits.
Basic Specifications & Suggested List Price: All MX mixers feature: low-noise, fully modular design, allowing for ultra-quiet operation. -128 dBv at input, and -90 dBv output noise. Full 20dB headroom at all stages, +4dB or -10dB operating levels Prices start at $799 (6 ch.) to $1,999 (24 ch.).

CREST AUDIO
150 Florence Ave., Hawthorne, NJ 07506
(201) 423-1300
Product Name: Twenty, Thirty, Forty Series
Contact: Craig Hannabury
Date Product Introduced: Late 1985
Product Description & Applications: Available in mainframes up to 32 channels, the Twenty, Thirty and Forty Series consoles employ the latest in electronic design and fully modular packaging for touring PA and smaller studio use. Input features for the Twenty and Forty series include separate mike and line gain controls, phase reverse, 48V phantom, 30dB pad, 3 band sweepable EQ, 4 aux. sends, mute, solo and in-line tape monitoring. Output features include communications, 8 or 4 LED output arrays oscillator, control room outputs, returns, groups, L/R and mono output faders. The Twenty series contains 4 subgroups, the Forty has eight.
Basic Specifications & Suggested List Price: The Thirty series is a 12 bus stage monitor console. Input features are the same as the Twenty/Forty series but without tape monitoring and a channel fader and including XLR splitters and a 6dB dim button. The eight main outputs contain 3 band EQs, mute, dim, solo and phase reverse. Eight LED arrays and a talkback system complete the output section. Specifications to follow. Price range: $2,590-$8,590.

EELA AUDIO/ESL, INC.
120 S.W. 21st Terrace, C104, Ft. Lauderdale, FL 33312
(305) 791-1501
Product Name: S-191 mixing console
Contact: Lutz H. Meyer, President
Date Product Introduced: March, 1985
Product Description & Applications: The S-191 is a 19" rack mount unit offering 6 mike/line inputs and stereo output. Phantom power, balanced line inputs, VU or peak metering and P&G faders are standard. Three band EQ on each channel and 2 aux send outputs. Complete with program limiter/compressors, this unit is ideal for post-production, remote and mobile situations where space is limited, but professional performance and dependability cannot be compromised. Stereo line inputs optional. The S-191 is part of the S-100 series, which offers frames up to 16 channels.
Basic Specifications & Suggested List Price: 6 into 2 (mike/line), phantom power, bal. inputs/outputs, optional fader "start" switching. S-191 sugg. list: US $2,400, FOB Ft. Lauderdale.

EELA AUDIO/ESL, INC.
S-191 Mixing Consoles

EELA AUDIO/ESL, INC.
120 S.W. 21st Terrace, C104, Ft. Lauderdale, FL 33312
(305) 791-1501
Product Name: Reportophone
Contact: Lutz H. Meyer, President
Date Product Introduced: March, 1985
Product Description & Applications: The model S-20 is a

—LISTING CONTINUED ON PAGE 138

NEW PRODUCTS
MIXING CONSOLES
1 · 9 · 8 · 6

—*FROM PAGE 137*

small 2 channel mixer with mike and tape (line) inputs. Connected in place of a normal telephone, the S-20 is designed for field reports and feeds, allowing the reporter easy use of any public telephone line anywhere. Built in EQ curves and limiter/compressor optimize the signal for standard Telco lines. Powered from the phone line and using a standard dial and ringback, the S-20 can be used virtually anywhere in the world. The S-22 model has interface for 2 lines (4 wires), allowing the communication between personnel while program is in progress, plus 1 line level feed for PA or safety recording.
Basic Specifications & Suggested List Price: Freq. response: down 3dB at 200Hz and 10kHz, presence filter +3dB at 3kHz. Suggested list: S-20 US $480; S-22 US $800, FOB Ft. Lauderdale.

FOSTEX
Model 450

FOSTEX
15431 Blackburn Ave., Norwalk, CA 90650
(213) 921-1112
Product Name: Fostex Model 450
Contact: Mark Cohen, Tom Lubin
Date Product Introduced: June, 1985
Product Description & Applications: 450 mixers 8x4x2; XLR & ¼" phone mike input; switchable phantom power for each channel; easy to get at patch points; 100mm faders, solo switches on input & output; 3 band EQ; 3 aux. sends; in line monitoring for easy punch in/out; LED bar graph meters; stereo output master; 4 stereo effects return; earphone amp; input overload indicator.
Basic Specifications & Suggested List Price: 20Hz-20k Hz (+1dB, -2dB); line 20Hz-20kHz; mike 20Hz-20kHz (+1dB, -2dB); phones 80Hz-20kHz (±2dB); overall S/N one mike 65dB wtd, 8 mikes 56dB wtd, one line 85dB wtd, 8 lines 75dB wtd; equivalent noise: -126dB wtd, -124 unwtd; crosstalk 60dB at 1kHz; THD is .05% @ 1kHz (nominal level). Price: $995.

GALAXY AUDIO
625 E. Pawnee, Wichita, KS 67211
(316) 263-2852
Product Name: Models M802 and M1602
Contact: R.D. Moneyhun, Manager
Date Product Introduced: September, 1985
Product Description & Applications: The M802 is an 8 channel mixing console that is convertible to rack mount. The M1602 is a 16 channel mixing console. Both of these mixers have phantom power and four outputs.
Basic Specifications & Suggested List Price: Prices: M802—$775; M1602—$1,450.

HILL AUDIO INC.
5002 B No. Royal Atlanta Dr., Tucker, GA 30084
(404) 934-1851
Product Name: Soundmix
Contact: Bruce Forbes, Nat'l Sales Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: The Soundmix is a 24:4:2 non-modular mixing console featuring 4 aux. sends, 4 band EQ, mike and line inputs, direct outputs, 48V phantom power, 4 aux. returns, send and return points on all inputs, groups and outputs, 100mm smooth action faders, remote fully regulated rack mount power supply, 26dB pad, mono output, balanced and unbalanced outputs, 12-way LED displays, aux. return assigns.
Basic Specifications & Suggested List Price: Level = +19dBm; headroom = 15dB; gain = 0dB to +60dB; noise = -126dB (A) EIN, -70dB residual; IC type: 5532. Suggested retail: $3,600.

HOLMES
3000 Marcus Ave., Suite 2W7, Lake Success, NY 11042
(516) 775-5510
Product Name: Holmes XM1200 PM
Contact: Bill McGreevy, General Mgr.; Andy Esposito, Director of Mktg.
Date Product Introduced: June, 1985
Product Description & Applications: 12 channel powered mixing console with powered monitor section and expandable by means of Holmes XM100 6 channel expansion module. Great for live applications with dual 7 band graphic equalizers, separate channel cueing system, and comprehensive main and monitor patching system. Also available in 6 and 9 channel models, with or without powered monitor section.
Basic Specifications & Suggested List Price: XM-1200 PM—dual 250 watt power amps. Suggested list price: $1,449.95; XM-100 Expansion module—$399.95.

INTERFACE ELECTRONICS
6710 Alder, Houston, TX 77081
(713) 660-0100
Product Name: Theatre Mixer 34T8-JVL-4X
Contact: Louis Stevenson
Date Product Introduced: June, 1985
Product Description & Applications: New version of the 34T8 Theatre Matrix mixer called the 34T8-JVL-4X uses the new Model JVL input module which includes both VCA for control grouping and 10-light level indicator on each input module, plus a 4-slider remote control which can master four groups including any of the input or output modules. These inputs include four equalizers with frequency switching on the two mid frequency equalizers, four cue/aux. sends with pre/post switching and 8 mix-assign pushbuttons. Mixers make 8 submixes with slider masters which are mixed down in 8 to 16 matrix output modules with slider masters. Matrix outputs are also VCA controlled for grouping.
Basic Specifications & Suggested List Price: 16 to 48 inputs, 8 submixes, 4 cue mixes, 8 to 16 output mixdowns, VCAs on inputs and outputs (optional), extremely low output noise level, remote control optional.

INTERFACE ELECTRONICS
6710 Alder, Houston, TX 77081
(713) 660-0100
Product Name: Location Mixer
Contact: Louis Stevenson, President
Date Product Introduced: March, 1985
Product Description & Applications: New version of Model 200B mixer called the Model 200B-MLM-PSAC2 has lighted VU meters and internal AC power supply, plus all the features of the previous version including external rechargeable battery and exceptionally low overall output noise level.
Basic Specifications & Suggested List Price: 8 in, 2 out (stereo) plus 2 cue sends, transformer balanced 200 ohm inputs, three equalizers on each input with four-frequency switch on mid equalizer, input pads, 48 V and "T" type mike powering, Duncan or P & G sliders, modular plug-in construction, many options, output noise 90 to 100 dB below zero level under typical conditions.

MEYER SOUND LABORATORIES, INC.
2832 San Pablo Ave., Berkeley, CA 94702
(415) 486-1166
Product Name: ATL Monitor Mix Console
Contact: Bob Hodas
Date Product Introduced: October, 1985
Product Description & Applications: The ATL Monitor Mix Console is a joint effort by MSLI and Acoustic Technical Laboratory. Configuration is 24x8 plus 4 aux. mix buses. All 12 outputs are metered and each can be individually assigned to the outputs are metered and each can be individually assigned to the 8 main output faders via a matrix system. ATL's main design objective is high sound quality, and this has been achieved without in any way compromising routing flexibility and operational simplicity, features essential to a professional monitor mix console. Users interested in a high quality stage monitor mix console will be impressed by the competitive price.
Basic Specifications & Suggested List Price: Signal to noise ratio ("A" weighted): 105dB (unity gain into one output), 95dB (24 inputs assigned to one output); frequency response: 10Hz-50kHz (±1dB); THD: 0.01% (worst case); IMD (SMPTE method): 0.02%.

NEI
934 N.E. 25th Ave., Portland, OR 97232
(503) 232-4445
Product Name: Models 1623 & 1223 mixing consoles
Contact: H.C. (Bud) Garrison
Date Product Introduced: June, 1985
Product Description & Applications: Available with 12 & 16 input channels, the 23 series consoles feature differentially balanced mike and line level inputs, channel patching on RTS ¼" phone jacks, monitor, reverb and effects sends, 3 bands of EQ, pan and 60mm slide faders. Master section includes switchable metering (rectangular LED ladders are switchable to monitor all master output functions), panable effects send and return, panable reverb send and slide fader master controls for sub 1, sub 2, mono and monitor. All four master output controls (sub 1, sub 2, mono & monitor) are balanced with D3M-type jacks as well as unbalanced ¼" phone jacks.
Basic Specifications & Suggested List Price: Freq. response: (± 1dB) 20Hz to 20kHz; overall THD: less than 0.2%; hum & noise: -123 dBv; equalization: lo, ± 15dB at 100Hz, shelving; mid: ± 15dB at 1.2kHz, peaking; hi: ± 15dB at 10kHz, shelving; max. input level: greater than ± 20dBv; max. output levels: 18dBv into 5k ohm, unbalanced, 18 dBv into 600 ohm, balanced; S/N greater than 90dB. Suggested list price: 1623—$1,495; 1223—$1,195.

NEVE/RUPERT NEVE INCORPORATED
Berkshire Industrial Park, Bethel, CT 06801
(203) 744-6230
Product Name: 8128-TV
Contact: Barry J. Roche, President
Date Product Introduced: April, 1985
Product Description & Applications: Based on the successful 8128 music console, this new post-production console combines the proven advantages of microprocessor controlled track selection and memory reset, full multi-track facilities and straightforward operation with 8 tracks for 4 stereo mixes—dialog, music, effects and laughs. The 4 stereo mixes can also be mixed down to the regular stereo mix output without noise penalty.
Basic Specifications & Suggested List Price: 32 input mainframe; 24-track for digital recording; 4 dedicated stereo buses; film scoring version with L-C-R-S monitoring; 4-band Neve Formant Spectrum Equalization; central output assignment with recall; dual mute bus for A/B cut operation; dedicated rev send/return modules with full equalization and routing; plus spin and delay facilities.

NEVE/RUPERT NEVE INCORPORATED
51 Series Custom

NEVE/RUPERT NEVE INCORPORATED
Berkshire Industrial Park, Bethel, CT 06801
(203) 744-6230
Product Name: 51 Series Custom Multi-track
Contact: Barry J. Roche, President
Date Product Introduced: October, 1985
Product Description & Applications: Custom multi-track console based on the highly successful 51 Series production and post-production consoles. Features include individual channel dynamics (limiter/compressor/gate) with external keying, separate multi-track and mixdown signal paths with individual faders, and the classic Neve Formant Spectrum Equalizer. In-line and/or separate monitoring, a unique solo system with selectable reverb/effects return, and up to four stereo pairs of individually equalized cue or reverb sends plus a dedicated, equalized reverb/effects return section are included.
Basic Specifications & Suggested List Price: 30-60 inputs/24 or 48 tracks.

PRECISION ELECTRONICS, INC.
9101 King St., Franklin Park, IL 60131
(312) 678-5350
Product Name: Grommes Precision G-226
Date Product Introduced: May, 1985
Product Description & Applications: The G-226 is a preamplifier/mixer with 6 low impedance microphone and 2 aux. channels. Features: 10 band EQ, automatic volume limiter, VU meter, headphone monitor, remote control and speech filters.
Basic Specifications & Suggested List Price: Freq. response: (±0.5dB) 20 to 20,000 Hz; distortion: .03%; output: high impedance, 600 ohm and 150 ohm microphone level. List price: $1,061.50.

PRECISION ELECTRONICS, INC.
9101 King St., Franklin Park, IL 60131
(312) 678-5350
Product Name: Grommes Precision GTE-100
Date Product Introduced: May, 1985
Product Description & Applications: The GTE-100 is a 100 watt amplifier with 6 low impedance microphone and 2 aux. channels. It features a 10 band EQ, automatic volume limiter, output meter, remote control and speech filters.
Basic Specifications & Suggested List Price: Power output: 100 watts RMS; distortion: 0.25%; freq. response: (± 1dB) 20 to 20,000Hz; output: 4 ohms, 25 volt and 70.7 volt. List price: $1,250.

PULSAR LABORATORIES, INC.
3200 Gilchrist Rd., Mogadore, OH 44260
(216) 784-8022
Product Name: Series 8088 touring console
Contact: Gregory Carr, Marketing Mgr.
Date Product Introduced: October, 1985
Product Description & Applications: The Series 8088 is a fully modular professional touring console. Pulsar uses the most up-to-date components such as super beta matched transistor pairs on the input stage and Pulsar's famous "unity gain" circuitry. Some of the standard features found on the Series 8088 are: 8 sub groups, 8 aux sends with pre/post switching, 8 separate effect returns, each with 3 band sweep EQ, 5 band sweep EQ with "Q" control, four-way programmable muting of all inputs and outputs, 8 matrix sends as

—LISTING CONTINUED ON PAGE 140

NEW PRODUCTS
MIXING CONSOLES
1 · 9 · 8 · 6

—FROM PAGE 139

well as 2 discreet master L/R mixes, conductive plastic faders, full VU metering, talkback switching into the matrix and aux. buses, blank modules for future interfacing and/or signal processing. The series 8088 uses a unique busing arrangement that allows any input or output module to be put anywhere in the mainframe. All Pulsar products are made in the U.S.A.

Basic Specifications & Suggested List Price: Freq. response: 20 to 20k Hz (+ .5dB); E.I.N.: 129dBv; THD: less than .02%; max. mike gain: 107dB; max. output: 600 ohm load +26dBm.

SLM ELECTRONICS
1400 Ferguson Ave., St. Louis, MO 63133
(314) 727-4512
Product Name: Audio Centron AC-416
Contact: Tony Moscal, Training Mgr.
Date Product Introduced: January, 1985
Product Description & Applications: The AC-416 multi-sub mixer features 16x4x2x1 submix capability which transforms into 16x6x1 via pushbuttons. The mixer also features trim controls and peak LEDs on the sub and main masters. Full talkback is automatically routed through the monitors but can also be assigned through the talkback out jack. Each channel has assignable inputs, 3 band quasi-parametric EQ, gain control with LED light, 2 pre-sends & 2 post-sends, a channel-on button & signal light and 100mm faders.
Basic Specifications & Suggested List Price: Freq. response: (+0, -2dB) 20Hz-20kHz; THD less than .1% @ +18dBv; EIN: -128.5dB; CMR: 90dB; residual noise: -87dBv; max. gain: 84dB from mike in to sum out. Suggested list: $2,795.95.

SOLID STATE LOGIC
SL 5000M Series

SOLID STATE LOGIC
Oxford, England OX7 2PQ
44+ (099 389) 8282
also: 200 West 57th St., New York, NY 10019
(212) 315-1111
also: 6255 Sunset Blvd., Los Angeles, CA 90028
(213) 463-4444
Product Name: SL 5000 M Series Audio Production System
Contact: Piers Plaskitt, Nat'l Sales Mgr. (NYC)
Date Product Introduced: First deliveries, Fall 1985
Product Description & Applications: The SL 5000 M Series is a new generation of audio control architecture from which an almost infinite variety of specialized and general purpose broadcast audio consoles may be constructed. Special attention has been paid to the requirements of stereo teleproduction and post-production, including full provision for the American MTS standards. Other applications include edit and continuity suites, outside broadcast vehicles, radio drama studios, network news control.
Basic Specifications & Suggested List Price: 8 to 64 mono or stereo input channels, each with multiple mike and/or

—LISTING CONTINUED ON PAGE 142

—FROM PAGE 140

line inputs; mains stereo and mono outputs plus up to 12 additional stereo mix buses, configured as audio subgroups or independent outputs; 10 cue/aux. buses (mono or stereo); optional multi-track buses; available with Instant Reset, Total Recall and SSL Studio Computer. Prices from U.S. $35,000. Full details on request.

SOUNDCRAFT ELECTRONICS, INC.
1517 20th St., Santa Monica, CA 90404
(213) 453-4591
Product Name: Series 200B
Contact: Wayne Freeman, V.P. Sales & Mktg.
Date Product Introduced: June, 1985 to the MI industry
Product Description & Applications: The new Series 200B is an updated version of the existing Series 200 stereo mixing console. It can be used for recording, video production and post-production, broadcast production, and by utilizing the 8 monitor returns (allowing for 8 extra line inputs), it can also be used for sound reinforcement.
Basic Specifications & Suggested List Price: New specifications include: 48v phantom power, switchable on each individual input; direct assign to subgroups; -10 +4 internal switching, pre or post EQ selection for aux. sends; pre- or post-fader selection for aux. sends; 8-track monitoring; and direct assign to stereo buses. The console will be available with stereo inputs as an option.

SOUNDCRAFT ELECTRONICS, INC.
1517 20th St., Santa Monica, CA 90404
(213) 453-4591
Product Name: TV 24
Contact: Erika Lopez, Marketing Coordinator
Date Product Introduced: October, 1985
Product Description & Applications: The TV 24 is a television production console available in 32, 40, 48 and 56 input mainframes. It features 24 track send capabilities, and the console allows one to monitor those 24 tracks on a separate mix bus. 8 stereo subgroups are standard, as are stereo effects returns on each subgroup module. It is the newest product in Soundcraft's TV Product line.

SOUNDOUT LABORATORIES LIMITED
91 Ewell Rd., Surbiton, Surrey KT6 6AH England
(44) 1-399-3392
Product Name: Soundtracs
Contact: Todd Wells, Managing Dir.
Date Product Introduced: #1-3: Mid 1985; #4:
Product Description & Applications: (1) CM 4400—Mixing console for video synchronization or with fully automated muting facilities. (2) MR—Mixing console for 16-track recording. (3) T—Mixing console for 4- and 8-track recording. (4) In Line—24-track in-line console with VCA grouping.
Basic Specifications & Suggested List Price: Priced from $3,000 to $40,000.

SOUND WORKSHOP
Series 34B

SOUND WORKSHOP
PROFESSIONAL AUDIO PRODUCTS, INC.
1324 Motor Pkwy., Hauppauge, NY 11788
(516) 582-6210
Product Name: Series 34B Record/Mix Console
Contact: Lee Pomerantz, Product Mgr.
Date Product Introduced: April, 1985
Product Description & Applications: Sound Workshop Professional Audio Products, Inc. is shipping the "B" revision of their prominent Series 34 record/mix audio console. The new Series 34-B features a new modular patchbay system and an innovative new console interface. The patchbay system uses steel framed "TT" style jacks in a high-strength subassembly. Tape machines and other studio gear wire to the console interface via AMP multi-pin connectors.
Basic Specifications & Suggested List Price: The 34-B also features 24 buses, 6 aux. sends, a four band sweep EQ and our high strength mainframe. With the new enhancements, Sound Workshop will continue to position the Series 34-B as the under $50,000 alternative for prominent studios and production facilities seeking state-of-the-art performance in a digitally controlled console system.

NEW PRODUCTS
MIXING CONSOLES
1 · 9 · 8 · 6

SPECK ELECTRONICS
Speckmix Mk II

SPECK ELECTRONICS
12455 Branford St., Unit 2, Arleta, CA 91331
(818) 897-4188
Product Name: Speckmix Mk II
Contact: Vince Poulos
Date Product Introduced: January, 1985
Product Description & Applications: A 16 input, 8 out, 16-track monitor console for professional recording applications. Each input features 3 band parametric EQ, 2 pan pots, cue and echo sends, solo mute, and the ability to select between 2 line input signals. The Line A/Line B select is very convenient for studios that operate with electronic drums and synthesizers.
Basic Specifications & Suggested List Price: +4 dBm operating level; optional Jensen mike preamps. Price: $4,875.

STUDER REVOX AMERICA
169/269 Consoles

STUDER REVOX AMERICA
1425 Elm Hill Pike, Nashville, TN 37210
(616) 254-5651
Product Name: 169/269 Consoles
Contact: Thomas E. Mintner, V.P. & Gen. Mgr.
Date Product Introduced: October, 1985
Product Description & Applications: Fully modular in design, consoles in the 169/269 series may be tailored to fit a wide variety of applications in broadcast, remote recording, and video editing. Features include two frame sizes (14 and 20 modules), digital-ready signal quality, 3-way power supply, new mike input design, PPM or VU meters, PDM compressor/limiter in each master channel, peak overload LEDs on inputs, and FET switching. Available modules include stereo high level (with or without EQ), mono input (mike/line), master, monitor, aux-communication-talkback, and studio-aux-talkback.
Basic Specifications & Suggested List Price: Max. output level: +24 dBm; S/N ratio: -125dB EIN; crosstalk (worst case): -80dB at 15kHz. Suggested list prices from $9,950.

SUNN ELECTRONICS
19350 SW 89th Ave., Tualatin, OR 97062
(503) 692-4650
Product Name: 2424
Contact: Terry R. White, Mktg. Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: The Sunn 24 Series of unpowered mixing consoles are available in both 16x4x2x1 and 24x4x2x1 configurations. These new four-out consoles are compact for easy portability and ideal for live and some recording applications. Features include an internal 48 volt phantom power supply and VU metering. Preamps include 4-band equalization, individual send and return, input gain and input pad.

SUNN ELECTRONICS
19350 SW 89th Ave., Tualatin, OR 97062
(503) 692-4650
Product Name: 820S
Contact: Terry R. White, Marketing Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: Eight-channel powered stereo mixing console with 225 watts at 4 ohms per channel. Dual nine band graphic equalizers are assignable from stereo operation to main and monitor as well as assigning power from stereo mains to mono main and monitor via a front panel switch. Features include 48 volt phantom power supply.

TASCAM/TEAC PROFESSIONAL DIVISION
7733 Telegraph Rd., Montebello
(213) 726-0303
Product Name: 200 Series, M-208, M-216
Contact: Bill Mohrhoff, Nat'l Sales Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: A pair of compact, full feature sound reinforcement mixers, combined with specific multi-track recording functions enabling effective dual purpose applications. Additional features include 3-band EQ, solo, switched monitoring, separate stereo bus, foldback (cue) and effects buses, grouping, tape returns, and balanced and unbalanced input and output capability. The M-208 is also rack mountable for additional convenience.
Basic Specifications & Suggested List Price: Freq. response: 20-25k Hz (+1, -2dB); equiv. input noise: -130dB; crosstalk: greater than 60dB; dimensions: 216, 25.5Wx 5.25Hx16.5D, weight: 26.5 lbs. 208, 17.25Wx5.25Hx26.5D, weight 19.0 lbs. Suggested list: M216—$1,495; M208—$995.

TECNOLOGIA ELECTRONICA, S.A.
Matrix Mixing Console Series T-2403

TECNOLOGIA ELECTRONICA, S.A.
Sebastian Gomez 5, 28026 Madrid, Spain
(91) 475-9420
Product Name: Matrix Mixing Consoles Series T-2403
Contact: Patricio Ramos, Manager
Product Description & Applications: Matrix mixing consoles Series T-2403, used in multi-plex or conference connections between broadcasting stations. Totally modular, standard configurations. 8-, 14-, and 24-channels including talkback, PFL, and monitoring. Other models (monaural and stereo) under custom requirements. Also manufacturer of broadcasting mixing consoles
Basic Specifications & Suggested List Price: 8-channel—$3,600; 14-channel—$5,200; 24-channel—$9,600.

TOA ELECTRONICS, INC.
480 Carlton Ct., So. San Francisco, CA 94080
(415) 588-2538
Product Name: D-5.5 Electronic Music Mixer
Contact: Terry Taylor, Nat'l Sales/Mktg. Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: Rack mount, 8-input stereo mixer for electronic music & sound. Applications: recording, live performance, broadcast production. Expands to 32 inputs with D-5.5E. RCA, phone jack, & balanced mike inputs, stereo & mono outputs, 16 MIDI-thru jacks. Four groups, aux 1 & 2, effects, reverb, & cue buses. Sum output selectable pre- or post-fader. Pre- & post- accessory patches. Each input: 3-band EQ, 2 aux. sends, reverb send to internal reverb, effects send, direct output. Selectable stereo RIAA inputs. Headphone output with level control. Much more!
Basic Specifications & Suggested List Price: 8 inputs, 4 sub groups, stereo left & right, mono Sum, selectable 2x4 MIDI-thru function (or 32 inputs, 2x16 MIDI-thru with D-5.5E expander). Inputs: RCA pin jacks, ¼" phone jacks, electronically balanced XLRs with 48V phantom power. Pushbutton circuit breaker. Mounts in 19" rack, remove rack ears, side panels, and rotate rear panel for use as console-type mixer. Suggested list: $1,799.50.

WHEATSTONE CORPORATION
5 Collins Rd., Bethany, CT 06525
(203) 393-0887
Product Name: MTX-88 Sound Reinforcement/Theatre Console
Contact: Ray Esparolini, Console Sales
Date Product Introduced: Summer, 1985
Product Description & Applications: The MTX-88 is the latest addition to Wheatstone Corporation's "80" series console line. The MTX-88, like all Wheatstone consoles, utilizes a mainframe with "total electronics" plug-in modules. Input modules feature mike/line, phantom power, 20dB pad, rotary gain, phase reverse. Equalizer section is 3 (all sweep) bands and low cut filter of -12dB/octave, -3dB @ 125Hz. Input modules can be discretely assigned to any individual group and to the master left and right modules. The 8 auxiliary sends are pre/post selectable. The send section is complemented by 8 assignable returns. The 8 subgroup modules contain a matrix and auxiliary tape input with volume control. Left and right master modules have sweepable high pass filter, talkback & tape input with volume control. Control module contains solo, headphone, control room and talkback controls as well as talkback mike input and output to on-stage monitor console. Frame sizes up to 48 inputs available.
Basic Specifications & Suggested List Price: Crosstalk: (odd-even channels) -65dB, (adjacent channels) -80dB; max. gain: console input to group output (line) +35dB, (mike) +85dB, console input to subgroup to main output (line) +50dB (mike) +100dB; equalization: (high— ± 16dB sweepable) 800Hz to 16kHz (mid— ± 16dB sweepable) 400Hz to 8k Hz, (low— ± 16dB sweepable) 40Hz/1kHz; freq. response: (line) 20Hz to 20kHz ± .5dB (mike) 30Hz to 20kHz ± .5dB; THD: (line, 20Hz-20kHz @ +18dBm) .02% (mike, 30Hz-20kHz, -50dBm in) .05%; output level (into 600 ohm load): +20dBm; dynamic range: 105dB. Price varies depending upon options, frame size, and modifications requested.

WHEATSTONE CORPORATION
5 Collins Rd., Bethany, CT 06525
(203) 393-0887
Product Name: M-16 Monitor Console
Contact: Ray Esparolini, Console Sales
Date Product Introduced: Spring, 1985
Product Description & Applications: The M-16 monitor console from Wheatstone is a 16 mix console for live, on-stage, monitor control. The M-16 is totally modular like all Wheatstone consoles and matched by a rugged mainframe. Input modules feature direct outputs, rotary gain 4 bands of all sweep equalization with sweepable highpass filter. High and low bands are switchable, between shelving and peak dip while the two mid bands are both switchable wide or narrow peak/dip filters. The high pass filter is sweepable as well from 10Hz to 250Hz. Other standard input module features are trim adjusted dim switch, mute, solo and 4 programmable mutes. Output modules can be assigned any mix bus via the bus matrix switch option and all input and output modules have patch in/out jacks. Outputs are standard with phase reverse. PFL, AFL, talkback and our exclusive M104 long throw conductive plastic fader. The control module contains the solo and headphone masters, talkback microphone and cue speaker level controls as well as the four programmable mute masters. Frame sizes available for up to 52 input configurations.
Basic Specifications & Suggested List Price: Flow charts, schematics and literature available upon request. Prices vary depending on frame size, options and modifications.

YAMAHA INTERNATIONAL CORP.
Professional Products Division
6600 Orangethorpe Ave., Buena Park, CA 90620
(714) 522-9011
Product Name: PM 3000
Contact: Bob Shomaker, Nat'l Sales Mgr.
Date Product Introduced: October, 1985
Product Description & Applications: The PM 3000 is the successor to Yamaha's popular PM 2000. For use in sound reinforcement, theatre, broadcast, remote and video production, the PM 3000 is available with 24, 32 or 40 input channels. In addition to all of the PM 2000's features, the PM 3000 includes 8 VCA groups with external control possible. In a completely redesigned package, the PM 3000 uses Yamaha's advanced LSI technology for extended capability.
Basic Specifications & Suggested List Price: Specs and features include: 24, 32 or 40 input channels; 8 Yamaha-developed VCA groups; 8 programmable mute groups; 10 assignable analog buses, 8 matrix mixes; electronically balanced inputs and outputs with optional input and output transformers; 26 possible independent mix outputs; test oscillator, phantom power. Prices to be determined.

NEW PRODUCTS
MUSIC PRODUCTS
1 · 9 · 8 · 6

AIRCRAFT MUSIC LIBRARY
The Aircraft Music Library

AIRCRAFT MUSIC LIBRARY
77 North Washington St., Boston, MA 02114
(800) 343-2514, (617) 367-4962 (inside MA)
***also* 25 E. 21st St., New York, NY 10010**
Product Name: The Aircraft Music Library
Contact: Mark Cuddy
Date Product Introduced: NAB, 1985
Product Description & Applications: The Aircraft Music Library is an outstanding collection of original music tracks written exclusively for professionals who produce video, multi-image, film and broadcast productions. Nationally acclaimed composers and arrangers combined with a vast resource of exceptional talent have been used to create this unique sounding music library that offers styles ranging from traditional, classical, popular, humorous, country and high tech to very contemporary. All selections consist of full and alternate mixes as well as 60- and 30-second edited versions. A "Speed Search" system greatly reduces music search time. Sound quality is considered to be exceptional.
Basic Specifications & Suggested List Price: The Aircraft Music Library is licensed annually for a fee of $1,000, quarterly for $275, or by per production. The license allows unlimited use of the entire music library without any further charge. It is available for the above price on audiophile disks. Direct dub masters are available for a one time additional fee (shipping and handling not included).

AQUARIAN ACCESSORIES
1140 N. Tustin Ave., Anaheim, CA 92631
(714) 632-0230
Product Name: X-10s and Lites with Shock Grips
Contact: Roy Burns, V.P. Marketing
Date Product Introduced: February, 1985 (NAMM Show)
Product Description & Applications: The first drum sticks designed for electronic drums. X-10s and Lites have a vinyl handle to absorb shock, vibration and reduce fatigue. Will not irritate skin and will not deteriorate due to hard playing.
Basic Specifications & Suggested List Price: Prices: X-10s, $27.95 per pair; Lites, $17.95 per pair. Shock grips are bright red in color. Same weight and premium wood sticks.

AXE (ARTISTS X-PONENT ENGINEERING)
924 15th Ave., Redwood City, CA 94063
(415) 365-5243
Product Name: KT-1000 Digital Programmable Metronome/Synchronizer
Contact: Lynn Dickworth
Date Product Introduced: February, 1985
Product Description & Applications: The AXE KT-1000 is an extremely accurate, microprocessor-based, Programmable Digital Metronome/Synchronizer that will store 50 different user programmable tempos. With the KT-1000 you can program various tempos to run for a specific number of beats; automatically start each tempo from SMPTE coded video tape, film or audio tape; and not only put out a metronome pulse for live recording, but automatically control MIDI equipped devices, including accelerations and retards, so that everything runs in perfect synchronization.
Basic Specifications & Suggested List Price: Tempos can be entered into the KT-1000 in either beats per minute or in frames per beat. Four frame formats: 24 (film), 25 (EBU), 29.97 (NTSC drop frame), and 30 (NTSC) frames per second. The duration of the tempo can be entered in either the total number of beats or a specific length of time, accurate to 1/100th of a second (e.g.: 16 beats or 17.34 seconds). The KT-1000 can be programmed to go from one tempo to another automatically, accelerating and retarding as needed. Tempos can be started automatically from SMPTE time code off video tape, audio tape, or SMPTE coded film. MIDI interface puts out the required number of pulses (digital words) to automatically control synthesizers, sequencers, and drum machines. The KT-1000 will also save and load user programs to tape, or to a special, non-volatile, AXE Memory Card. The RS-232C computer interface bus allows programs to be input from a computer or read out on either a computer monitor or printed out on a printer with appropriate software. Price: $3,395.

BRUTON MUSIC LIBRARY
c/o Associated Production Music
888 7th Ave., 12th floor, New York, NY 10106
(212) 977-5680
Product Name: Sketches of Africa — BRN-19
Contact: Ierry Burnham, E. Coast Sales Mgr.
Date Product Introduced: April, 1985
Product Description & Applications: Contains several underscores and themes recorded by a small group in pastoral and military styles as well as tension and suspense. Also several cuts with folk, pop, calliope and jazz influences are available; all suitable for nature and travel. Occasionally a synth, electric or acoustic guitar and marimba can be heard on these cuts. Keep your ears open for "Sunbeam", a theme slightly reminiscent of the "Exorcist" and "Lost Tribe" which has a Mid-East flavor.
Basic Specifications & Suggested List Price: Available on 33⅓ long playing stereo phonograph record or 15ips stereo ½-track tape. Price: $10.

BRUTON MUSIC LIBRARY
c/o Associated Production Music
888 7th Ave., 12th floor, New York, NY 10106
(212) 977-5680
Product Name: Travel in Style — BRN-12
Contact: Ierry Burnham, E. Coast Sales Mgr.
Date Product Introduced: March, 1985
Product Description & Applications: Four sports/rock orchestral suites entitled: "Transglobe," "High Priority," "Ready to Race," and "Superflight" are complete with alternate small group versions, underscores and bumpers. Good for competitive sports, adventure, brave and daring acts. The musical aura is urgent and exciting. Featured sounds and punchy brass, swirling strings, synths, congas, and tympany rolls. Another selection entitled "Americana" reflects a classical Coplandesque western style.
Basic Specifications & Suggested List Price: Available on 33⅓ long playing stereo phonograph record or 15ips stereo ½-track tape. Price: $10.

CHERRY LANE TECHNOLOGIES
110 Midland Ave., Port Chester, NY 10573
(914) 937-8601
Product Name: MIDI Software/Hardware
Contact: David J. Archamhault, Managing Dir.
Date Product Introduced: February, 1985
Product Description & Applications: Pitchrider, a pitch to MIDI system for any monophonic instrument and also polyphonically for any guitar. JMS, MIDI software and interfaces for Commodore 64, Smart MIDI, software for IBM, Apple II and Amigo computers.
Basic Specifications & Suggested List Price: Pitchrider: $495 monophonic; $995 polyphonic. JMS, Smart MIDI, from $99-199.

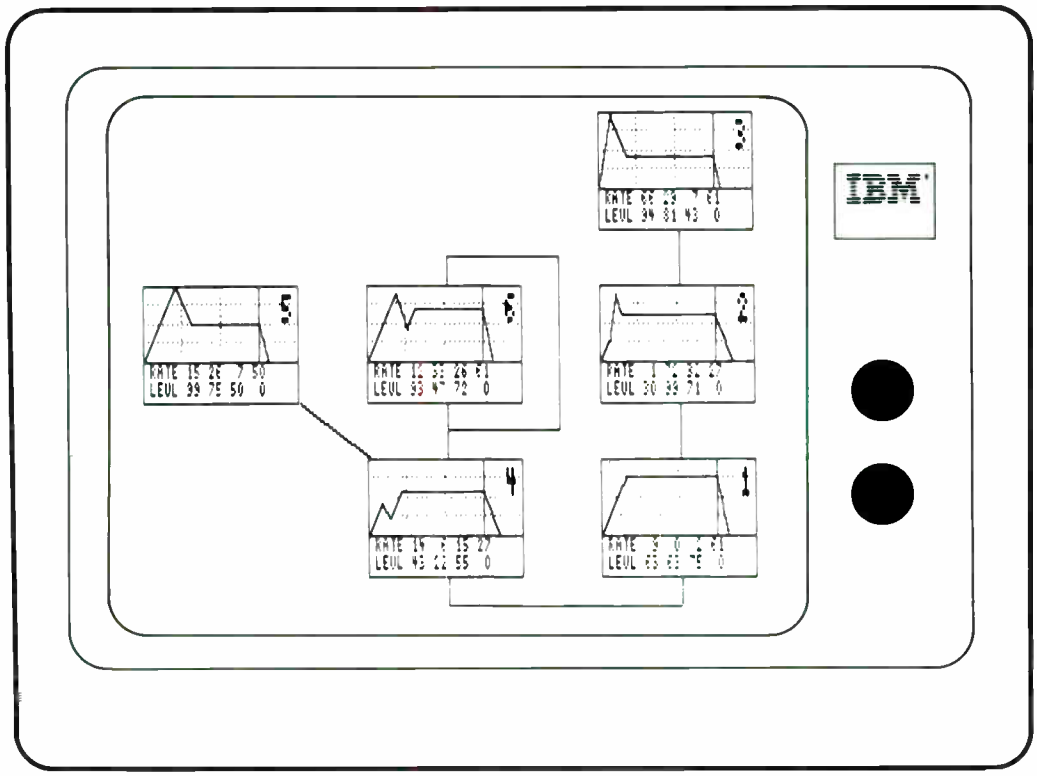
J.L. COOPER ELECTRONICS
1931 Pontius Ave., W. Los Angeles, CA
(213) 473-8771
Product Name: MIDI Switch Box 16/20
Contact: Anastasie Khan, Sales
Date Product Introduced: June, 1985
Product Description & Applications: The MSB 16/20 is a microprocessor controlled MIDI signal routing device capable of inner-connecting up to 16 MIDI sources and up to 20 MIDI destinations. The routings may be stored in internal memory with 64 memory locations. MIDI program change commands may be used to remotely change the routing. Provisions for menu-driven computer control is provided.
Basic Specifications & Suggested List Price: 16 MIDI in, 20 MIDI out; 64 program storage locations with battery back-up; 3½" high rack mount.

DeARMOND, INC.
350 Holland Rd., Suite M, Maumee, OH 43537
(419) 891-1058, (800) 537-3375
Product Name: Bassist 1
Contact: Julie Tosh, Sales Director
Date Product Introduced: February, 1985
Product Description & Applications: The DeArmond Bassist 1 is a quality engineered amplifier designed to complement any small group or serious student. It features 20 watts RMS with a 12" heavy duty speaker, 3-way equalization and line out. The Bassist 1 gives the bass player a full bottom sound with the necessary punch and drive for sound accuracy. Quality craftsmen build the unit to last for years of dependable service.
Basic Specifications & Suggested List Price: Power capacity: 20 watts RMS; impedance: 8 ohms; dimensions: 10"D x 16¾"W x 18"H; weight: 38 lbs. Suggested retail: $189.

DeARMOND, INC.
350 Holland Rd., Suite M, Maumee, OH 43537
(419) 891-1058, (800) 537-3375
Product Name: Guitarist 2
Contact: Julie Tosh, Sales Director
Date Product Introduced: February, 1985
Product Description & Applications: The DeArmond Guitarist 2 is designed for use by the student or any small group. It features 40 watts RMS with a 10" heavy duty speaker, 3-way equalization, line out, distortion boost, and reverb. The Guitarist 2 reproduces a wide range of guitar sounds accurately and is built to last by quality craftsmen.
Basic Specifications & Suggested List Price: Power capacity: 40 watts RMS; impedance: 8 ohms; dimensions: 8½"D x 16¾"W x 16"H; weight: 33 lbs. Suggested retail: $239.

DE WOLFE MUSIC LIBRARY, INC.
25 W. 45th St., New York, NY 10036
(212) 382-0220
Product Name: DeWolfe Music Library Compact Disc
Contact: Mitch Greenspan, Andy Jacobs
Date Produce Introduced: 1985
Product Description & Applications: The DeWolfe Music Library is issuing a new series of six Compact Discs for the video/film/audio-visual and broadcast producer. The wide dynamic music range of the Compact Disc produces sound that is superior to the LP, especially at low levels behind narration. The Compact Disc eliminates pops, wows, rumble, flutter, and distortion of any kind. It is also virtually indestructible.

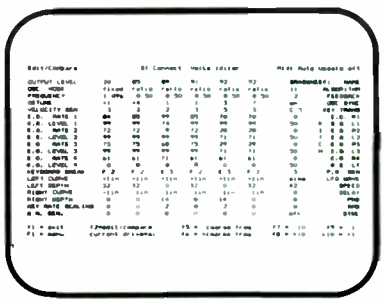
—PHOTO ON PAGE 146



Operator Proficiency

DX-CONNECT is the complete IBM patch utility program for the 6-operator Yamaha DX and TX series of FM synthesizers. It provides unprecedented versatility, visual clarity, and ease of use that has been impossible to achieve on smaller computers.

DX-CONNECT allows single screen text based editing of voice parameters, and the use of DX synthesizer controls with both text and graphic screens. The Bank Edit screen allows voice swapping within and between banks, and disk storage and retrieval.



Voice Edit Screen

Bank Edit Screen

- Easy to use and visually oriented
- Works with all 6-operator Yamaha FM synthesizers
- Edits, stores and transmits function parameters
- Runs on all 128k or larger IBM and compatible computers
- Displays operators on IBM and Hercules compatible graphic cards
- Supports Roland MPU-401, Syntech and Mimetics IBM MIDI cards
- All screens are printable
- Eight banks of voices from leading sounds designers are included
- $149.00 at your favorite music instrument retailer

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DEALER INQUIRIES WELCOMED!

Prices and availability subject to change without notice

—LISTING ON PAGE 144

NEW PRODUCTS
MUSIC PRODUCTS
1 · 9 · 8 · 6

DEWOLFE MUSIC LIBRARY
Compact Disc

DIGIDESIGN INC.
920 Commercial St., Palo Alto, CA 94303
(415) 494-8811
Product Name: Digidrums Sound Chips
Contact: Susan Alvaro, Sales Mgr.
Date Product Introduced: 1984/1985 (New sounds introduced)
Product Description & Applications: Digidrums sound chips are EPROMs (computer memory chips) that contain studio quality digital recordings of drum, percussion, sound effect and musical instrument sounds. Digidrums chips plug into a wide variety of popular drum machines in place of the standard sound chips. Digidrums chips are currently available for the Oberheim DX, DMX and DX Stretch, the E-mu Systems Drumulator, the Sequential Drumtraks, the LinnDrum, and the Simmons SDS7 and SDS1. A wide variety of sounds are available for each machine.
Basic Specifications & Suggested List Price: Retail price: $40 per sound.

DIGIDESIGN INC.
920 Commercial St., Palo Alto, CA 94303
(415) 494-8811
Product Name: Sound Designer
Contact: Susan Alvaro, Sales Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: Sound Designer is a complete computer music system for the Apple Macintosh computer and E-mu Systems Emulator II digital sampling keyboard. Sounds that have been sampled on the Emulator can be displayed on the Macintosh's high resolution screen, and edited, analyzed and modified in a variety of ways. A digital mixer program is provided for digital mixing, merging, gain changing, compression enveloping and equalization. Direct digital synthesis can be performed on the Macintosh, and the resulting sounds played on the Emulator. In addition, Sound Designer provides many graphic programming aids for the Emulator's parameters.
Basic Specifications & Suggested List Price: Data transfer rate between Macintosh and Emulator, 500,000 bits per second. Frequency analysis using 256 point complex FFT (fast fourier transform). Direct digital synthesis using waveshaping, Karplus Strong and other algorithms. Requires 512K Macintosh and 2 disk drives (or internal hard disk). Retail price: $995 including software, interface cable and user's manual.

DIGITAL SOUND TECHNOLOGIES
301 E. Farriss Ave., High Point, NC 27262
(919) 882-1368
Product Name: LinnDrum Alternate Sounds
Contact: Jim Williams
Date Product Introduced: March, 1985
Product Description & Applications: The Digital Sound Technologies alternate sound library contains a wide variety of replacement sound chips and sound chip sets, all digitally recorded specifically for use in the LinnDrum. The continuously expanding DST sound library consists of "studio" and "live" sounding acoustic drum sounds, synth drum sounds, and many unique percussion sounds and sound effects. Ride, crash and splash cymbals are also available.
Basic Specifications & Suggested List Price: The list prices for the one, two, four, and eight chip sounds are $40, $60, $100, and $175 respectively. Custom chips start at $50. ZIF quick-change sockets are $10 each. The $3 cost of the demonstration cassette can be applied toward the first order. Mastercard and Visa are accepted.

DIGITAL SOUND TECHNOLOGIES
LinnDrum Alternate Sounds

DRUMWARE
12077 Wilshire Blvd., Suite 515, Los Angeles, CA 90025
(213) 478-3956
Product Name: Trigger Finger
Contact: Scott Morgan
Date Product Introduced: February, 1985
Product Description & Applications: The Trigger Finger is an audio-to-pulse converter designed to externally trigger many popular drum machines from drum pads or other audio sources. The unit outputs both fixed and velocity pulses suitable for triggering Oberheim DMX/DX, Simmons, and Linn 9000. The Trigger Finger is available in an 8-channel, two rack chassis or as a 4-channel kit for inboard installation in Oberheim DMX/DX.
Basic Specifications & Suggested List Price: Inputs accept drum pad signals and line level audio signals, outputs are 20ms fixed pulse and variable dynamic pulse. The 8-channel rack version is $795 and the 4-channel DMX kit is $295, including a Molex adapter box.

DRUMWARE
12077 Wilshire Blvd., Suite 515, Los Angeles, CA 90025
(213) 478-3956
Product Name: Drumware Soundchips
Contact: Scott Morgan
Date Product Introduced: June, 1985
Product Description & Applications: Drumware has updated its Soundchip library to include alternate soundchips for Linn 9000 and Simmons SDS1, SDS7, and SDS9. The user-replaceable soundchips include a variety of acoustic and electronic drum sounds as well as percussion sounds and sound effects. Drumware offers a custom digitizing service for those with specialized sound requirements.
Basic Specifications & Suggested List Price: High quality 8 bit companding and 8 bit linear sound samples. Most stock library sounds are recorded direct-to-digital. Custom sounds should be supplied on 30 ips 2-track with no noise reduction. Drumware Soundchips start at $40 for single chip sounds.

E-MU SYSTEMS, INC.
2815 Chanticleer, Santa Cruz, CA 95065
(408) 476-4424
Product Name: SP-12 Sampling Percussion
Contact: Susan Howells, Marketing Coord.
Date Product Introduced: June, 1985
Product Description & Applications: E-mu Systems, Inc. has announced the release of the SP-12 twelve bit sampling percussion system. Its 12 bit data format provides sounds of unmatched realism and quality. Literally any sound can be sampled, truncated, looped and programmed as an instrument in your rhythm tracks.

E-MU SYSTEMS, INC.
SP-12

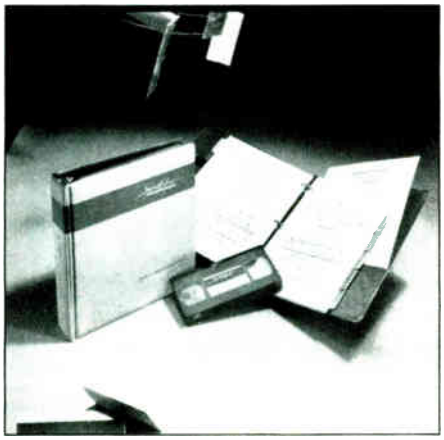
Basic Specifications & Suggested List Price: Features include programmable tuning, decay, pitch and tempo (with accelerandos and deaccelerandos); step programming; programmable MIDI interface; SMPTE code reader/generator and non-volatile sound memory and a disk drive for sound and sequencer storage. Suggested retail price: $2,745.

E-MU SYSTEMS, INC.
2815 Chanticleer, Santa Cruz, CA 95065
(408) 476-4424
Product Name: Emulator II
Contact: Susan Howells, Marketing Coord.
Date Product Introduced: January, 1985
Product Description & Applications: The Emulator II is a digital sampling keyboard that allows you to digitally record any sound and play it back polyphonically. The Emulator II uses a new data encoding technique that results in truly stunning sound quality. Features include a velocity sensing keyboard; powerful MIDI sequencer with auto correct; SMPTE reader-generator. Analog processing tools include filters; VCAs, LFOs; sophisticated digital processors allow you to splice, merge, truncate and loop sounds.
Basic Specifications & Suggested List Price: Options include a hard disk for sound storage and the Digidesign Sound Designer program for the Macintosh which turns your E-II into a complete computer music system. Suggested retail price for the Emulator II with two disk drives is $8,645.

FAIRLIGHT INSTRUMENTS
2945 Westwood Blvd., Los Angeles, CA 90064
(213) 470-6280
Product Name: Voicetracker
Contact: Rita Lambert
Date Product Introduced: June, 1985
Product Description & Applications: The Voicetracker VT-5 is a true performance caliber, pitch to MIDI converter. It can take a single note musical source (voice, sax, etc.) and process it to drive any attached MIDI synthesizer. Full dynamics, special tuning modes (quantized, non-quantized), can also be selected. Powered by a 32 bit CPU (same as the Fairlight C.M.I.), the VT-5 offers unparalleled tracking accuracy. Video output permits all data to be displayed on any standard video monitor.
Basic Specifications & Suggested List Price: CPU Motorola 68008, six banks of ten (10) function selector switches controlling input performance parameters, display and menu functions, etc. MIDI out, in & thru ports, C.V./gate out, mike/line balanced/unbalanced input, footswitch jacks plus DIN aux. footswitch/controllers jacks. Composite video out, RS-232 bus, headphone jack.

FAIRLIGHT INSTRUMENTS
2945 Westwood Blvd., Los Angeles, CA 90064
(213) 470-6280
Product Name: Computer Musical Instrument—Series III
Contact: Rita Lambert
Date Product Introduced: October, 1985
Product Description & Applications: The CMI Series III is the most complete music and sound production system to be offered. At an affordable price, the Series III offers specifications to meet the most demanding needs of the performer, composer and music producer well into the future. Combining multiple high bandwidth, long duration sampling channels with advanced but easy-to-use music composition synchronization and communication features, the Series III will set industry standards for years to come.
Basic Specifications & Suggested List Price: Typical Ser-

ies III configuration includes 16 channels of 4 megabyte waveform RAM, over 120 seconds at 100kHz sampling, 80 channel address, 16 channel internal mix, 150 megabyte hard disk over 12 minutes tracking per channel at 100kHz, music keyboard, monitor, alphanumeric, graphics pad, MIDI, SMPTE, composition and operation software. Approximate cost: $57,000.



FERRO PRODUCTIONS
Secrets of Analog & Digital Synthesis

FERRO PRODUCTIONS
228 Washington Ave., Belleville, NJ 07109
(201) 751-6238
Product Name: Secrets of Analog & Digital Synthesis
Contact: Phil Charles, Customer Relations
Date Product Introduced: June, 1985 (NAMM)
Product Description & Applications: This first volume in the SynthArts series is a comprehensive overview of all aspects of synthesizer sound-creation and performance. The course demonstrates a simple, no-nonsense method of making any sound on any synthesizer, as well as valuable insights into stage and studio performance techniques. It also contains an in-depth "tour" of virtually every major manufacturer's synthesizer product line, as well as "Programming the DX7."
Basic Specifications & Suggested List Price: Written by studio synthesist Steve De Furia, this volume contains: 2-hour video (VHS or Beta), and 130 page illustrated text. The lessons: Physics of Sound, Making Waves, Sound Designer's Tool Kit, Synthesizers & Editing Techniques, Digital FM Synthesis. Distribution: U.S., Cherry Lane Technologies; Canada, Erikson. Suggested retail: $129.95.

FORTE MUSIC
P.O. Box 6322, San Jose, CA 95150
(415) 965-8880
Product Name: Forte MIDI-Mod for PF10/PF15 Electronic Piano
Contact: Steve Salani, Marketing Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: The Forte MIDI-Mod™ is an internally installed modification that provides standard MIDI signals for interfacing a PF10 or PF15 electronic piano to any MIDI-compatible synthesizer or accessory. In addition to sensing keyboard information (including dynamics) the forte MIDI-MOD detects when the piano's sustain pedal is pressed. Any synthesizers driven by the MIDI output will perfectly track the performance on the piano.
Basic Specifications & Suggested List Price: Modification is available through dealers and service centers qualified for service work on the PF10 or PF15. Modification includes MIDI "in," "out," and "through" jacks, plus a MIDI on/off footswitch. Suggested list price: $475 (including installation).

FOUR DESIGNS COMPANY
6531 Gross Ave., Canoga Park, CA 91307
(818) 716-8540
Product Name: Rockmount™
Contact: David Riddle
Date product introduced: Winter 1984-85
Product description and applications: Rockmount is a single-space, 19" rack mountable unit used in conjunction with Scholz Corp.'s "Rockman™" products. Rockmount transforms any one of the Rockman™ units into an on-stage effects device by supplying all the needed interconnections, DC power, an effects level control and effects by-pass function. Rockmount's front panel was designed with a rectangular opening so the Rockman™ unit slides directly in without modification. Rockmount greatly expands the usefulness of the Rockman™ by providing a means to use the excellent sounding stereo effects on-stage or in the studio, not just in headphones.
Basic specifications and suggested list price: Made entirely in the U.S.A. using the finest components including a steel chassis that shields the Rockman™ from RFI and EMI and lowers output noise, Rockmount comes with a one year limited warranty and has a suggested list price of $159.95. (Rockman is a trademark of Scholz Research & Development).

GALLIEN-KRUEGER
504-B Vandell Way, Campbell, CA 95008
(408) 379-3344
Product Name: 200MK
Contact: Jim Ross, Asst. Sales Mgr.
Date Product Introduced: January, 1985
Product Description & Applications: The 200MK is a 100 watt, 3 input keyboard amplifier. It features EQ, chorus, and echo on each channel. It also features a dual speaker system with one 12" woofer and one 3.5" tweeter. The MK was designed to accept the signal from any keyboard while driving an external speaker or going directly to a mixing board.
Basic Specifications & Suggested List Price: Features: 100 watts at 4 ohms; 24 pounds; mike stand mountable; monitor in; direct outs; 13.75"W x 15"H x 7.5"D. Price: $699 each.

HEET SOUND PRODUCTS
611 Ducommun St., Los Angeles, CA 90012
(213) 687-9946
Product Name: EBow (Energy Bow)
Contact: Greg Heet, owner
Date Product Introduced: 1984 (reintroduced)
Product Description & Applications: The Energy Bow is an electronic bow for electric guitar. It is hand held, battery powered and operates directly on the string . . . causing it to vibrate by a pulsing magnetic field. It has been reintroduced in an improved version at a new low price.
Basic Specifications & Suggested List Price: $89.95.

IBANEZ/HOSHINO USA INC.
1726 Winchester Rd., Bensalem, PA 19020
(215) 638-8670
Product Name: EPP400
Contact: Electronic Division
Date Product Introduced: June, 1985
Product Description & Applications: Programmable MIDI patching bay, with: 128 separate programmable patches; 5 loops (3 stereo, 2 mono); within each "patch" program—effect on/off, effect order, input assign, output assign, sub output assign; multiple remote program selec-

—LISTING CONTINUED ON PAGE 148

NEW PRODUCTS
RECORDING DEVICES & TAPE
1 · 9 · 8 · 6

ACCURATE SOUND CORPORATION
3515 Edison Way, Menlo Park, CA 94025
(415) 365-2843
Product Name: AS-200A
Contact: Ronald M. Newdoll, President
Date Product Introduced: May, 1985
Product Description & Applications: Accurate Sound has added a new high-speed loop bin system to our line of duplicator products. With speeds of 480, 240 and 120 ips, this new bin could double your current cassette production. This bin is available in ¼", ½" and 1" tape widths with a capacity of 1800' (1.5 mil) and 2400' (1 mil) tape.
Basic Specifications & Suggested List Price: $24,950.

ADVANCED MUSIC SYSTEMS
Wallstreams Lane, Worsthorne Village
Burnley, Lancashire. England
(0282) 57011/5
Product Name: AudioFile
Contact: Stuart Nevison
Date Product Introduced: March, 1985
Product Description & Applications: A.M.S. AudioFile is a hard-disk based digital audio recording and playback system, with linear 16 bit sampling and a maximum record time capability of many hours. AudioFile can be configured as a mono, stereo or multi-track recording system and incorporates a SMPTE synchronizer for locking to conventional audio or video recording systems. AudioFile is also capable of performing as an electronic stereo digital editing system, offering significant operational improvements over conventional editing techniques.
Basic Specifications & Suggested List Price: Digital coding: 16 bit linear PCM, switchable sampling frequency (50/48/44.1/40kHz); frequency response: 20Hz-20kHz (48kHz sampling); dynamic range: better than 90dB (ref. full output at 1kHz); interfaces: RS422 control for peripheral equipment, SMPTE time code reader/generator.

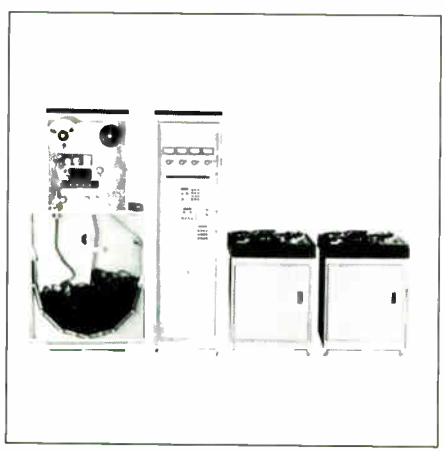
AGFA-GEVAERT, INC.
PEM 297D

AGFA-GEVAERT, INC.
275 North St., Teterboro, NJ 07608
(201) 288-4100
Product Name: PEM 297D
Contact: Andrew DaPuzzo, Nat'l Mktg. Mgr.
Date Product Introduced: Fall, 1985
Product Description & Applications: Agfa PEM 297D features the low dropout characteristic associated with the finest Agfa video tape, along with the mechanical stability and slitting of Agfa studio mastering tapes, for outstanding performance. Combine this with the consistency associated with all Agfa products for the most dependable, high performance digital mastering tape available.

AGFA-GEVAERT, INC.
275 North St., Teterboro, NJ 07608
(201) 288-4100
Product Name: PEM 469
Contact: Andrew DaPuzzo, Nat'l Mktg. Mgr.
Date Product Introduced: Spring, 1985
Product Description & Applications: The new Agfa PEM 469 offers the cleanest possible reproduction using standard bias. Improved head room now provides a wider dynamic range for ultra critical recording applications. Print-through is superior to all standard bias tapes by 2-6 dB to assure minimum pre- and post-echo. In addition to major electro-acoustic advantages, Agfa PEM 469 also offers outstanding mechanical properties. An advanced binder makes PEM 469 the most durable and cleanest running studio mastering tape available today.

AIWA AMERICA INC.
35 Oxford Dr., Moonachie, NJ 07074
(201) 440-5220
Product Name: Aiwa PCM-800
Contact: Vince Wheeler, Sales Promotion Mgr.
Date Product Introduced: June, 1985
Product Name: Single chip LSI analog/digital-digital/analog processor with front panel PCM/VCR selector, line output level control, headphone output level control, microphone jacks, wide scale recording level indicator, REC emphasis switch, tracking level adjustment. 13" x 12⅝ x 2 1/16"—only 7.7 lbs. (AC 120/220V, 50/60Hz).
Basic Specifications & Suggested List Price: 14 bit quantization; error correction: CRCC & PQ2 word parity; dynamic range: more than 86dB; frequency response: 2-20,000Hz (+0.5dB, -0.7dB). Suggested list price: $650.

BASF SYSTEMS CORPORATION
Crosby Drive, Bedford, MA 01730
(617) 271-4000
Product Name: Loop Master 920
Contact: William F. Thomas, Product Mgr.
Date Product Introduced: September, 1985
Product Description & Applications: Loop Master 920 is a pure chrome formulation mastering tape designed for demanding applications in bin mastering systems. 920 allows for higher speed duplication than conventional ferric tapes, with no loss in quality. 920 will also outlast conventional master tapes in high speed duplicator situations.



ELECTRO SOUND, INC.
ES8000

ELECTRO SOUND, INC.
160 San Gabriel Drive, Sunnyvale, CA 94086
(408) 245-6600
Product Name: ES8000 High Speed Tape Duplicator
Contact: David Bowman, Sr. V.P.
Date Product Introduced: January, 1985
Product Description & Applications: The industry standard series 8000 64:1 duplicating system is updated to include new standard features. An extra large powered loop bin, the largest in the industry, easily accommodates more than 2,000 feet of 2.5 mil tape. A new computer control system handles master tapes even more gently than before. The new "multi-master system" improves production efficiency by allowing complete flexibility when assigning slave recorders to more than one master reproducer.

FOSTEX
Fostex 20

FOSTEX
15431 Blackburn Ave., Norwalk, CA 90650
(213) 921-1112
Product Name: Fostex 20
Contact: Mark Cohen, Tom Lubin
Date Product Introduced: June, 1985
Product Description & Applications: The Fostex 20 is a ¼", 2-track NAB EQ recorder with third cue center track. Center track can be used for SMPTE, MIDI, drum sync, multi-image sync. First recorder to use single head for center track; allows razor blade editing (unlike other machines), while still being compatible. Total microprocessor control transport; built-in 2 position auto locator; auto rewind, stop & play; LED bar graph (peak attack, VU decay); built-in synchronizer port standard; search to zero in either direction; punch in/out and return to zero or cue by footswitch. 7½ or 15 ips. Real time tape counter in minutes and seconds; variable pitch ±10%.
Basic Specifications & Suggested List Price: 2-track recorder; 30Hz-22kHz±3dB; 70dB wtd; S/N ratio: better than 70dB crosstalk @ 1kHz for the center channel control track with all channels in record mode. List price: $995.

FOSTEX
15431 Blackburn Ave., Norwalk, CA 90650
(213) 921-1112
Product Name: Fostex 80
Contact: Mark Cohen, Tom Lubin
Date Product Introduced: June, 1985
Product Description & Applications: ¼" 8-track recorder; total microprocessor control transport; built-in 2 position auto locator; auto rewind, stop & play; LED bar graph meters; built-in synchronizer port now standard; improved Dolby C circuitry; search to zero from either direction; punch in/out and return to cue by foot controls; variable pitch control ±10%; real time counter for minutes & seconds.
Basic Specifications & Suggested List Price: 8-track simultaneous recorder; 40Hz-18kHz ±3dB; S/N @ 15 ips (standard speed) with noise reduction is 72dB; weighted;

—PHOTO ON PAGE 154

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Gary Hedden of GHL Ltd. worked with AVC to equip this state of the art Audio/Video Remote Truck.

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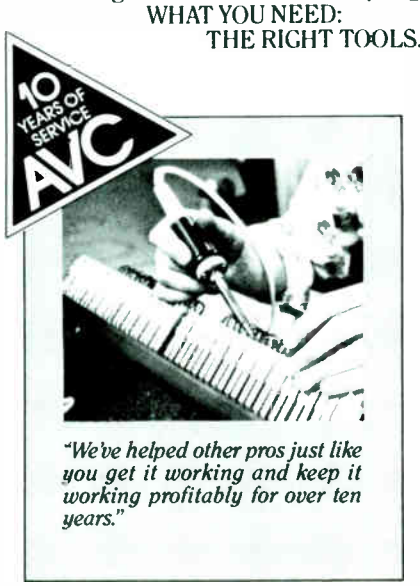

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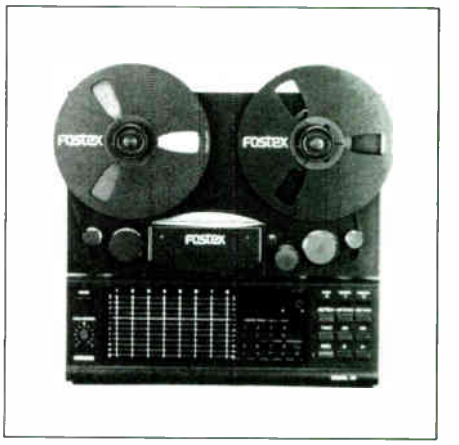
Circle #098 on Reader Service Card

NEW PRODUCTS
RECORDING DEVICES & TAPE
1 · 9 · 8 · 6

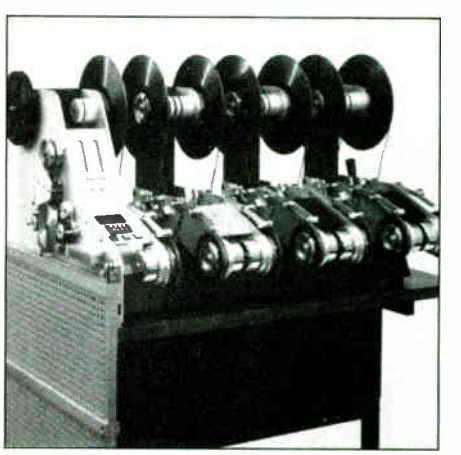
—FROM PAGE 152



FOSTEX
Fostex 80

crosstalk better than -55dB @ 1kHz; adjacent channel; weight: 29 lbs. Price $1,995.

INOVONICS, INC.
P.O. Box 66507, Scotts Valley, CA 95066
(408) 438-4273
Product Name: Inovonics 310/920 duplicator electronics
Contact: Ted Tripp, Sales Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: Inovonics 310 is a high speed audio tape duplicator channel amplifier which incorporates the master-reproduce and slave-record functions for bus-type systems operating at ratios through 64:1. The 920 is a companion bias supply which can drive up to 10 slaves. The 310/920 combination is for OEM applications as well as for upgrading older Ampex, Electro Sound, Liberty and similar systems.
Basic Specifications & Suggested List Price: 310 channel amplifier: $650 per channel; 910 bias supply: $945.

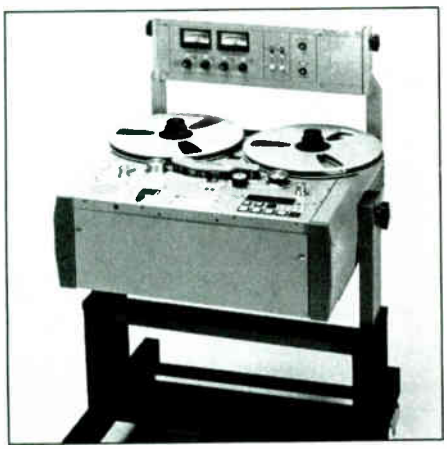


MAGNEFAX INTERNATIONAL, INC.
7000 Series Tape Duplicators

MAGNEFAX INTERNATIONAL, INC.
Route 1, Box 764, Rogers, AR 72756
(501) 925-1818
Product Name: 7000 Series Tape Duplicators
Contact: Dennis W. Tallakson, President
Date Product Introduced. Anaheim AES, 1985
Product Description & Applications: The 7000 Series represents the latest addition to the Magnefax line of high speed tape duplicators. Two models are offered: The 7574 which uses a ¼" master, and the 7575 which makes use of the ½" master format. Both machines feature 1800' capacity

loop bin, 7.5 ips master speed, seven slave configuration and a 16:1 duplicating ratio. Other features include digital VU-meters with memory hold, selected components, plug-in amplifiers, and a shortened audio path for optimum performance.
Basic Specifications & Suggested List Price: Either machine will produce in excess of 6,900 C45's in a 24 hour day. Frequency response is 30Hz-15kHz ±2dB. Crosstalk from A to B is more than 55dB while the signal to noise ratio remains within 2dB of bulk erased tape.

MITSUBISHI PRO AUDIO GROUP
(Mitsubishi Electric)
225 Parkside Dr., San Fernando, CA 91340
(818) 898-2341
Product Name: X-850
Contact: Cary Fischer, Operations Mgr.
Date Product Introduced: July, 1985
Product Description & Applications: Digital Entertainment Corporation announces the new Mitsubishi X-850 32-track digital tape recorder. Second generation design now allows cut and splice editing while being fully compatible with tapes recorded on the X-800. Controls have been simplified while adding new RS-232C and RS-442 remote control interfaces and external clock interfaces. New slim autolocator design enhances new look of the recorder. Now with drop frame SMPTE time code generator and single cable connection to the X-850. Optional LED meter bridge also has new slim design.
Basic Specifications & Suggested List Price: 40 PCM tracks—Cyclic Redundancy Code and Reed-Solomon code error correction. 2 data tracks, 2 analog tracks and 1 SMPTE time code track. Switch selectable 48kHz and 44.1kHz sampling frequencies. Price: $170,000.



OTARI CORPORATION
MTR-20

OTARI CORPORATION
2 Davis Drive, Belmont, CA 94002
(415) 592-8311
Product Name: MTR-20
Contact: Ron Neilson, Publicist
Date Product Introduced: May, 1985
Product Description & Applications: Available in ¼" 2-ch, ¼" 2-ch w/IEC center-track (time code), ½" 2-ch, ½" 4-ch. MTR-20 features: microprocessor-based automatic alignments of record level; hi EQ, mid-high EQ; bias and phase compensation; four speeds: 3.75, 7.5, 15 & 30 ips; reel size: up to 14"; switchable NAB/IEC/AES EQ; transport designed for SMPTE/EBU time code editors; machine controllers or synchronizers; optional serial communications ports available. Other features include: integral four point search-to-cue; ±45% varispeed; direct-coupled, active balanced I/O; reverse-play mode; cue speaker w/headphone amp; spot erase; tape time/speed display; cue shuttle; variable profile console. Options: autolocator, EC Series plug-in synch; mono & FM pilot head assemblies; scissors & marker for program assembly.
Basic Specifications & Suggested List Price: S/N ratio: 75dB (30 ips), 3% 3rd har. to noise floor—30 to 18kHz, unwanted; distortion: less than 0.2% (1kHz); wow & flutter (DIN 45507 peak wtd): 30 ips, .03%; freq. response: 20-22kHz (±2.0dB), 15 ips. Prices: MTR-20 ¼" 2-ch, $11,000; MTR-20 ¼" w/center track, $12,500; MTR-20 ½" 2-ch, $12,000; MTR-20 ½" 4-ch, $13,000.

RECORTEC, INC.
275 Santa Ana Ct., Sunnyvale, CA 94086
(408) 737-8441
Product Name: Automated Cassette Duplicator
Contact: Mat Ceterski, V.P. Mktg.
Product Description & Applications: Recortec's Automated Cassette Duplicator (ACD) system combines high speed duplication and automatic cassette loading into one operation. Each system has one master reproducer and up to ten cassette slave loader units. The two-speed system offers professional quality reproduction at 50:1 duplication ratio and has 100:1 duplication ratio for less demanding applications. Recortec's ACD is perfect for both short run and larger volume operations.
Basic Specifications & Suggested List Price: Duplication ratios: 50:1 or 100:1 with 7.5 ips or 3.75 ips master tape respectively. Frequency response: 50-20,000Hz ± 3dB at 50:1 duplication ratio. Recording bias: 10 MHz, adjustable for chromium oxide or metal tapes. Wow, flutter and distortion less than 0.1%.

ROSS SYSTEMS
1316 E. Lancaster, Ft. Worth, TX 76102
(817) 336-5114
Product Name: 4x4 Multi-track Recorder
Contact: Jim Cowser, V.P. Electronics
Date Product Introduced: May, 1985
Product Description & Applications: The new Ross 4x4 multi-track personal recorder is a true technology breakthrough in the under $500 MTR market. The Ross 4x4 features a 4-channel mike/line mixer and will record on all 4 tracks simultaneously. The Ross 4x4 comes complete with AC power supply, batteries and carrying case.
Basic Specifications & Suggested List Price: 4-track recorder, 4-channel mike/line mixer, 2 band EQ, effects loop, freq. response 40Hz-12.5kHz, S/N -68dB, THD 1%, Crosstalk 45dB, erasure 70dB. Suggested list: $499.95

ROSS SYSTEMS
4x4 Multi-track Recorder

NEW PRODUCTS
RECORDING DEVICES & TAPE
1 · 9 · 8 · 6

L.J. SCULLY MANUFACTURING CORP.
Model LJ-12 Audio Tape Recorder

L.J. SCULLY MANUFACTURING CORP.
138 Hurd Ave., Bridgeport, CT 06604
(203) 368-2332
Product Name: Model LJ-12 Audio Tape Recorder
Contact: Richard Havanec, V.P.
Date Product Introduced: 1985
Product Description & Applications: With the LJ-12 Audio Tape Recorder, L.J. Scully offers the broadcast and recording industries a new standard in analog recording. Now, audio engineers have complete digital control of an analog tape recorder. At the heart of the LJ-12 are three advanced microprocessors, each communicating with the other, allowing unprecedented operational stability and flexibility.
Basic Specifications & Suggested List Price: Features include: no pots in audio chain, machined-pin IC sockets; glass bonded ferrite heads; non-volatile memory; gold plated connectors; standard four speed capstan; Hall effect switches; variable capstan from 3 to 36 ips; rigid transport casting. Price: $7,950.

STUDER REVOX AMERICA
A820 Time Code and ½" 2-Track Versions

STUDER REVOX AMERICA
1425 Elm Hill Pike, Nashville, TN 37210
(615) 254-5651
Product Name: A820 Time Code and ½" 2-Track Versions
Contact: Thomas E. Mintner, V.P. & Gen. Mgr.
Date Product Introduced: October, 1985
Product Description & Applications: The A820-TC is a time code version of the all new A820 transport introduced earlier in 1985. The A820-TC utilizes the new standard format for placing SMPTE/EBU time code on a center track between stereo audio tracks. Separate code heads keep code-to-audio crosstalk better than -90dB while a microprocessor-controlled delay line maintains zero offset at all speeds. The A820 2/2½" has stereo audio on ½" tape for critical quality analog mastering applications. In addition to improved signal-to-noise from wider tracks, the A820 also offers a new generation of phase-compensated audio electronics for superior overall performance.
Basic Specifications & Suggested List Price: Specifications available October, 1985. Suggested professional net price for the A820-TC is $11,500; suggested net price of the A820 2/2½" is also $11,500.

STUDER REVOX AMERICA
B215 Cassette Deck

STUDER REVOX AMERICA
1425 Elm Hill Pike, Nashville, TN 37210
(615) 254-5651
Product Name: B215 Cassette Deck
Contact: Thomas E. Mintner, V.P. & Gen. Mgr.
Date Product Introduced: January, 1985
Product Description & Applications: The B215 is designed for critical quality cassette recording and reproduction in a variety of broadcast and audio production applications. Features include automatic alignment of audio parameters (bias, EQ, record sensitivity), storage of settings for 6 tape formulations, manual or automatic level setting, elapsed time counter, dual autolocate buttons, loop mode, automatic fade-in/fade-out, bi-directional serial data bus, infrared remote control, Dolby B and C NR, Dolby HX Pro, die cast transport, four motor direct drive, and three heads.
Basic Specifications & Suggested List Price: Frequency response: 30Hz to 20kHz (+2/-3 dB); signal-to-noise 72 dB (A weighted with Dolby C on type II or IV tape); wow-and-flutter 0.035% WRMS. Suggested professional user net price is $1,400.

STUDIOMASTER
1316 E. Lancaster, Ft. Worth, TX 76102
(817) 336-5114
Product Name: Studio 4.2
Contact: Jim Cowser, V.P., Electronics
Date Product Introduced: June, 1985
Product Description & Applications: Rack mount 4-track cassette recorder with built-in 2-track mixdown cassette. The Studio 4.2 features a 4-track 3¾ ips cassette recorder with solid state logic controls, Dolby B, C and HX-Pro noise reduction and a 1⅞ 2-track mixdown cassette recorder in a 3 space rack mount package.
Basic Specifications & Suggested List Price: Frequency response: 20-20k Hz, THD 0.7%, S/N -80dB, tape speed 3¾ ips, pitch control ±12%, wow and flutter .05%, crosstalk -50dB, erasure 75dB. Suggested list: $1,995.

TASCAM/TEAC PROFESSIONAL DIVISION
7733 Telegraph Rd., Montebello, CA 90640
(213) 726-0303
Product Name: Studio B
Contact: Bill Mohrhoff, Nat'l Sales Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: A unique combination of 8-track open reel performance and cassette convenience, in conjunction with an 8 input, 8 bus mixer to provide a compact production system of tremendous power and flexibility. A microprocessor controlled "load" function ensures tape will never unspool from the reels regardless of transport mode. Additional mixer functions include stereo solo, aux and effects bus, 3 band sweep EQ, and an 8-channel monitor mixer. The Studio 8 is also SMPTE compatible and employs a switchable dbx system for best possible performance.
Basic Specifications & Suggested List Price: Freq. response: 30-19k Hz (±3dB); format: 8-track, ¼" open reel, 7" reel capacity; dimensions (WxHxD): 33"x8.75"x25.25"; weight: 83.5 lbs. Suggested list price: $3,495.

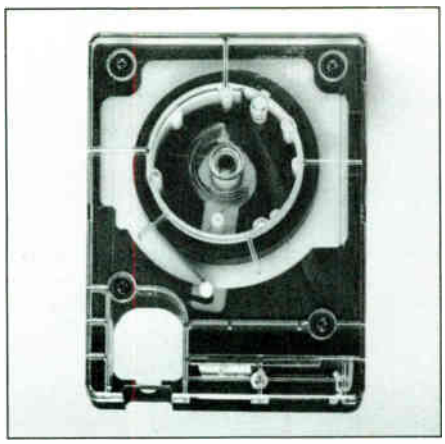
TASCAM/TEAC PROFESSIONAL DIVISION
7733 Telegraph Rd., Montebello, CA 90640
(213) 726-0303
Product Name: ATR Series
Contact: Bill Mohrhoff, Nat'l Sales Mgr.
Date Product Introduced: October, 1985 (AES)
Product Description & Applications: The ATR Series of recorders from Tascam represent the latest design technology available in both tape handling performance, and sonic quality. This group of models consists of 2-channel units incorporating center track SMPTE time code in addition to other multi-track formats, in both standard and wide format track standards.
Basic Specifications & Suggested List Price: Models in the ATR Series will be priced (approximately) as follows: 2-trk w/time code, $5,500; 2-trk ½" hi-speed, $5,000; 2-trk standard speed ¼", $4,000; 4-track ½", $5,500; and 8-trk ½", $6,500.

TASCAM/TEAC PROFESSIONAL DIVISION
7733 Telegraph Rd., Montebello, CA 90640
(213) 726-0303
Product Name: 246 Portastudio
Contact: Bill Mohrhoff, Nat'l Sales Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: The 246 is the next step in the line of all-in-one cassette recorder mixer packages originally developed by Tascam. Refinements include six inputs, two speed cassette transport, a four bus assignable bus matrix for all inputs so any recording combination can be used, two function auto-locator, expanded monitoring, a stereo effects system, plus enhanced metering of all functions.
Basic Specifications & Suggested List Price: Suggested retail price: $1,300.

TASCAM/TEAC PROFESSIONAL DIVISION
7733 Telegraph Rd., Montebello, CA 90640
(213) 726-0303
Product Name: MS-16
Contact: Bill Mohrhoff, Nat'l Sales Mgr.
Date Product Introduced: January, 1985
Product Description & Applications: The MS-16 is a compact 1" format 16-track recorder suitable for recording studio use as well as film and video production and compact remote or mobile environments. In spite of the small size, the design is built on a heavy duty chassis/base plate to ensure long life and stable tape travel. The MS-16 is also capable of SMPTE interface with all popular synchronizers, and is rack mountable with a separate electronics package for ease of installation.
Basic Specifications & Suggested List Price: Freq. response: 30-25k Hz ± 3dB; THD .8% (1k Hz, OVU); wow & flutter: .08% ANSI; adjacent channel crosstalk: 55dB 1k Hz; operating level: +4dBm balanced or -10dBv unbalanced; flux density: 250 nwb/m; weight of transport: 84 lbs; weight of electronics: 35 lbs. Optional: DX8DS dbx units, rolling console, auto-locator. List price: $8,995.

TASCAM/TEAC PROFESSIONAL DIVISION
7733 Telegraph Rd., Montebello, CA 90640
(213) 726-0303
Product Name: T-2640 Cassette Duplicators (T-2640 M/S & T-2640 Z/S)
Contact: Bill Mohrhoff, Nat'l Sales Mgr.
Date Product Introduced: April, 1985
Product Description & Applications: The 2600 series cassette duplicators are heavy duty industrial type in shell transports designed for music duplication, in addition to many other tasks in education, public relations, sales promotion, and other information distribution processes. Available in both master/slave and slave/slave configurations, units can be cascaded in strings of ten units to provide multiple copies in minimum time.
Basic Specifications & Suggested List Price: Freq. response: 40-12,500 ± 3dB; copy speed: 38 cm/s (8:1); dimensions (mm): 335Wx142Hx382D; weight: 24.2 lbs. Prices: T-2640 M/S, $1,995; T-2640 Z/S, $1,995.

3M MAGNETIC AUDIO/VIDEO PRODUCTS DIV.
3M Center, Bldg. 223-5S-01, St. Paul, MN 55144-1000
(612) 736-5209
Product Name: Scotchcart II
Contact: Rich Collins, Mktg. Supervisor
Date Product Introduced: September, 1985
Product Description & Applications: The new and improved Scotchcart II radio broadcast cartridge offers these features: improved tape for better runability and elimination of static-induced interference, upgraded cover for improved durability, a splice window for ease in locating the splice, an improved corner sleeve for better tracking, and range dots in the base to indicate operating range limitations. The new Scotchcart II delivers reel-to-reel mastering tape sound from a reliable, long-lasting cartridge.
Basic Specifications & Suggested List Price: List price: $6.38 to $9.03 dependent upon length.



3M MAGNETIC AUDIO/VIDEO PRODUCTS DIV. Scotchcart II

3M MAGNETIC AUDIO/VIDEO PRODUCTS DIV. 275 Digital Mastering Tape

3M MAGNETIC AUDIO/VIDEO PRODUCTS DIV.
3M Center, Bldg. 223-5S-01, St. Paul, MN 55144-1000
(612) 736-5209
Product Name: 275 Digital Mastering Tape
Contact: Rich Collins, Mktg. Supervisor
Date Product Introduced: May, 1985
Product Description & Applications: 3M's new Scotch 275 digital mastering tape offers a high density oxide suitable for recording and playback on digital hardware from a variety of manufacturers. The new tape has a durable binder system which provides dependable performance for multiple pass operations. 275 is laser inspected to virtually eliminate coated in errors to reduce dropouts. Available in ¼", ½" and 1" widths.
Basic Specifications & Suggested List Price: List price: $67 to $230, dependent upon width and length.

Need up-to-date information on new products? Thousands of readers rely on the Mix *Preview section for the latest offerings in new technology. Watch for it next month!*

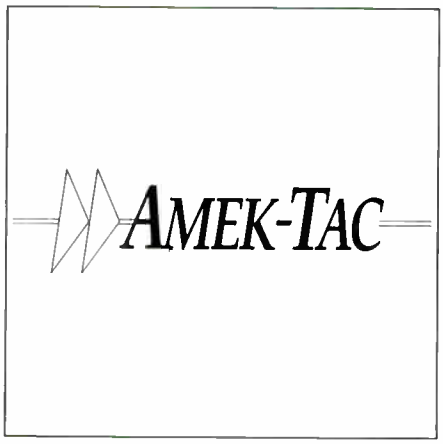
NEW PRODUCTS
SIGNAL PROCESSING DEVICES
1 · 9 · 8 · 6

ADA SIGNAL PROCESSORS, INC.
7303D Edgewater Dr., Oakland, CA 94621
(415) 632-1323
Product Name: Digitizer 4 Programmable Digital Delay
Contact: Lorry Marcus, Nat'l Sales Mgr.
Date Product Introduced: August, 1985
Product Description & Applications: The new Digitizer 4 is a 32-program digital delay featuring complete programmability and instant access to any program. An on-board computer allows simple programming of all effect settings, including sweeps, regeneration, mix, and delay time. Other features include an LED readout which displays delay time or function, stereo outputs, a self-diagnostic program which checks the unit during power up, and an optional DS-4 footswitch controller for remote random access of programs.
Basic Specifications & Suggested List Price: Delay range: 1.0 to 1024 ms; frequency response: dry, 10Hz to 20k Hz; delay, 20Hz to 17kHz; dynamic range: 90dB. List price: $699.95 for the Digitizer 4, and $139 for DS-4 footswitch.

ADA SIGNAL PROCESSORS, INC.
7303D Edgewater Dr., Oakland, CA 94621
(415) 632-1323
Product Name: Prographic Equalizers
Contact: Lorry Marcus, Nat'l Sales Mgr.
Date Product Introduced: September, 1985
Product Description & Applications: The new ADA Prographic 15 (15 band stereo) and 30 (30 band mono) are professional graphic equalizers in a single rack-space chassis. Both models feature switchable ±6dB or ±12dB EQ range, EQ in/out switch (per channel), high pass in/out switch at 40Hz (per channel), 4-step LED headroom indicator, and transformerless balanced inputs and outputs.
Basic Specifications & Suggested List Price: Low-noise, high slew rate op-amps. Input sensitivity: -30dBv to +20dBv; output level: +20dBm; signal to noise: 90dB min; 19"W x 1.75"H x 10.5"D. List price: (stereo 15 or mono 30) $329.95.

ADVANCED MUSIC SYSTEMS
Wallstreams Lane, Worsthorne Village
Burnley, Lancashire, U.K.
(0282) 57011/5
Product Name: Timeflex
Contact: Stuart Nevison
Date Product Introduced: Late 1984
Product Description & Applications: Timeflex is a stereo/dual channel digital pitch changer dedicated to pitch correction of varispeeded audio, video or film. This 2 unit high rack mount device uses the same de-glitched intelligent pitch changers as the DMX 15-80S, but incorporates a 9.6k Hz interface to allow Timeflex to control the varispeed facilities of many popular tape machines while performing automatic pitch correction. Timeflex also incorporates a programmable digital delay line should sound/vision synchronization be required.
Basic Specifications & Suggested List Price: Frequency response: 14Hz to 18kHz +0/-3dB; dynamic range: 90dB; distortion: 0.03% typical at 1k Hz full output; Timeflex range: 0.5 to 2.0 times tape speed; predelay: up to 600ms in 1ms increments. Stereo in/stereo out with both channels "time-locked."

AMEK CONSOLES, INC.
10815 Burbank Blvd., North Hollywood, CA 91601
(818) 508-9788
Product Name: Tex 10 Electronic Crossover
Contact: Bob Owsinski, V.P. Sales
Date Product Introduced: October, 1985
Product Description & Applications: Electronic Crossover Network consisting of a 3-unit high, 10-position rack with power supply, is capable of up to 5-way stereo performance. Each module contains a gain control (with center detent), LED display, output limiter with variable threshold, attack, & release, and phase shift switch with fine tuning & preset switch.
Basic Specifications & Suggested List Price: Available in 12, 18, 24, or 30dB/octave slope, and at any specified frequency. Tex 10 5-way stereo. Suggested retail: $2,700.

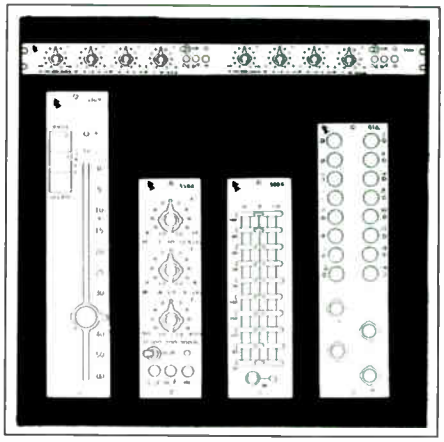


AMEK CONSOLES INC.
North Hollywood, CA

AMEK CONSOLES, INC.
10815 Burbank Blvd., North Hollywood, CA 91601
(818) 508-9788
Product Name: RM01 Rack Mounting Auxiliary Equipment System
Contact: Bob Owsinski, V.P. Sales
Date Product Introduced: October, 1985
Product Description & Applications: The System is based on a 19-inch rack with power supply, and is intended to house a small range of signal processing devices (up to 10) which may be loaded into the rack. The devices available will include: PM01—Amek parametric equalizer (as on M2500 console) which is 4-band, and has separate boost/-cut, freq. select and Q controls, as well as bell selection on hi & lo freq. sections. CL01 compressor/limiter—combines separate compressor & limiter sections. The limiter has in/out switch with variable threshold, attack, release (with auto position), and ratio controls, output gain control, gain reduction meter, and link/bypass switches are also fitted.

API AUDIO PRODUCTS
Springfield, VA

API AUDIO PRODUCTS
7953 Twist Lane, Springfield, VA 22153
(703) 455-8188
Product Name: API
Contact: Paul Wolff



API AUDIO PRODUCTS
Models 550A, 560A, 940M, 416

Product Description & Applications: Wolff Associates has purchased the API product line. New products include: stereo 550A EQ, rack mount (2 EQs, 4 bands each instead of 3); 560A 10-band graphic EQ; motorized moving fader, replaces the 940 series fader and retrofits Fadex with little or no modifications; and retrofit modules to replace and update older modules in API consoles. See us at booth #308, AES Convention.

ART—APPLIED RESEARCH & TECHNOLOGY, INC.
215 Tremont St., Rochester, NY 14608
(716) 436-2720
Product Name: DR2 Digital Reverb System
Contact: Peter A. Beverage, V.P. Sales
Date Product Introduced: April, 1985
Product Description & Applications: The ART DR2 digital reverb is a true digital signal processor with microcomputer control. Many of the parameters of the DR2 are under software control and are updateable. The DR2 is designed to be used in the place of spring, plate, and more expensive digital reverbs. The unit is clean, quiet, flexible, and contains superior algorithms. Besides normal room reverberation, creative use of the DR2's extreme settings can create smaller or larger than life effects.
Basic Specifications & Suggested List Price: Our 1.3 software provides three lockable presets, 7 revised room types, gated and reverse reverb, 3 position diffusion, 4 position H.F. damping. The DR2 offers a wide range of control over refined room algorithms expanding the DR2's range of creative applications. The DR2's suggested list price is $995.

ART—APPLIED RESEARCH & TECHNOLOGY, INC.
215 Tremont St., Rochester, NY 14608
(716) 436-2720
Product Name: DR1 Digital Reverb System
Contact: Peter A. Beverage, V.P. Sales
Date Product Introduced: June, 1985
Product Description & Applications: The ART DR1 containing MIDI, remote control, stereo in and out with mix capability, reverse & gated reverb. Many features are under software control so it is, as all ART reverbs are, software updateable. All DR1 rooms can be dynamic and allow decay times to be practically infinite. Most parameters are adjustable to a fine resolution. Virtually all front panel functions on over 100 presets can be performed via the DR1's remote control.
Basic Specifications & Suggested List Price: The unit has 14k dynamic range and 16 bit accuracy. The ART DR1 features a full function remote control and MIDI interface. Multiple factory presets, 10 user programmable functions per preset, and 100 user presets. Our full function remote allows you to perform all front panel functions on over 100 presets.

CONVENTIONAL CROSSOVERS HAVE BEEN PHASED OUT:

AC 22 AND AC 23 STATE VARIABLE TIME CORRECTING CROSSOVERS

The unique combination of features in the AC 22 and AC 23 have literally redefined the sonic performance capability of electronic crossovers:

Linkwitz-Riley filter configuration eliminates the electrical phase difference at the crossover regions inherent in 6, 12 and 18dB/octave designs.

24dB/Octave State Variable filters are more accurate and consistent, yielding tighter and more reliable performance from speaker components.

Built-in 0-2ms variable time delay allows easy electronic phase alignment of speaker components for uniform dispersion and optimum frequency response.

Complete with 41-detent frequency selectors, auto-internal switching, muting and a host of other features, the AC 22 and AC 23 can make a clearly audible improvement in your system performance: more people will hear a clearer, tighter sound. At suggested list prices of only $389 and $499 respectively, we've proved again that really smart technology can be affordable.

RANE CORPORATION

6510 216th SW, Mountlake Terrace, WA 98043 (206) 774-7309

Circle #105 on Reader Service Card

NEW PRODUCTS
SIGNAL PROCESSING DEVICES
1 · 9 · 8 · 6

ASHLY AUDIO, INC.
100 Fernwood Ave., Rochester, NY 14621
(716) 544-5191
Product Name: PQ68
Contact: Bob French, V.P. Sales & Marketing
Date Product Introduced: June, 1985
Product Description & Applications: The PQ-68 parametric notch filter is a cut-only equalizer which is used to insert relatively sharp dips in the frequency spectrum. As such, it is useful for removing spot frequencies which cause problems such as feedback, cabinet resonances, hum or TV sync signals, and single "hot" notes on musical instruments. A unique setup system with built-in limiter and gain meter makes tuning for max. gain-before-feedback positive and fast. Full 20dB of headroom.
Basic Specifications & Suggested List Price: Amplitude: 0 to -30dB; bandwidth: .3 octave - .03 octave; frequency response: ±.5dB, 20Hz-20kHz; hum and noise: -87dBv (eq. in), -95dBv (eq. out); distortion: under .05% THD, 20Hz-20k Hz. List price: $789.

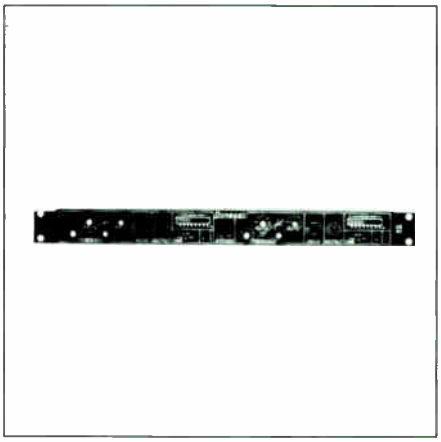
ASHLY AUDIO, INC.
100 Fernwood Ave., Rochester, NY 14621
(716) 544-5191
Product Name: SG33 Stereo Noise Gates
Contact: Bob French, V.P. Sales & Marketing
Date Product Introduced: June, 1985
Product Description & Applications: The Ashly SG33 stereo noise gate is a versatile two-channel noise reduction system, with extremely fast attack time (10 microseconds) and a 60dB threshold range. It was designed to control leakage and background noise in recording and sound reinforcement applications. Acting much like a level-sensitive "switch," it automatically attenuates audio signals which fall below a user selected threshold, while passing audio that reaches or exceeds the threshold. Very low noise and distortion.
Basic Specifications & Suggested List Price: Frequency response: 5Hz to 100kHz, +0, -2dB; THD, 20Hz-20kHz: under .02%; IM distortion, 20Hz-20kHz: under .02%; noise, 20Hz-20kHz: -85dB; slew rate: greater than 10V per microsecond. List price: $429.

AUDIO & DESIGN (AUDIO DESIGN CALREC, INC.)
P.O. Box 786, Bremerton, WA 98310
(206) 275-5009
Product Name: "Compex 2" limiter/compressor/expander/gate
Contact: Kathleen Mallory
Date Product Introduced: March, 1985
Product Description & Applications: Like the original F760X Compex, the Compex 2 offers separate compression, expander-gating as well as overall peak limiting; but does so with an extension of softer ratios and thresholds to -60dB below normal operating levels. Other new features include a choice of "log" or "lin" compressor release times; an AGC "auto" release function; expander-gate ratios extend from 1:1.2 thru soft gating (1:5) to hard gating of 1:20. In the gate section, a "hold" circuit can be triggered to delay the release time up to 2 seconds allowing a fast release with a selected beat sequence to be repeated through the gating window.
Basic Specifications & Suggested List Price: Freq. response: +0 -1 20Hz to 20kHz; signal to noise: -100dB ref +8dBm; CNR: better than -70dB @ 1kHz & 10kHz; distortion: better than 0.05%; control range: 60dB. Price: $875.

AUDIOARTS ENGINEERING
5 Collins Rd., Bethany, CT 06525
(203) 393-0887
Product Name: 1202 Compressor/Limiter
Contact: Ray Esparolini, Sales
Date Product Introduced: Late Summer 1985
Product Description & Applications: The Audioarts Engineering 1202 stereo compressor limiter utilizes Class A VCA technology. The 1202 offers compression, limiting and de-ess functions and fits in one rack space. Front panel controls for gain (input and output), compression ratio and threshold, attack and release time, de-essing, bypass, and stereo interlock. All switching status is clearly indicated by LED and output and gain reduction, each indicated by their respective LED meter displays. Other features are soft knee compression, XLR balanced input and output and side chain patch points. Available in a mono format (1201).
Basic Specifications & Suggested List Price: Frequency response: ±½dB, 20 Hz-50k Hz; THD: .007% 0dBm out (unity gain); noise: less than -90dBm (ref 0dBm); dynamic range: greater than 112dB (unity gain); slew rate: 12 volts/microsecond; gain: 38dB max; maximum input: +26dB; maximum output: +22dBm (600 ohms); ratio: min. 2:1/max. 50:1; threshold range: -25dB to +15dB; release time: 2.5 seconds to 100ms; attack time: 100 microseconds to 2.5ms; input gain +18dB max; output gain: +20dB max. Price: 1202, $599; 1201, $425.

AUDIO/DIGITAL, INC.
1000 S. Bertelsen Rd., Suite 4, Eugene, OR 97402
(503) 687-8412, (800) 423-1082
Product Name: ADX-2000 Digital Signal Processor
Contact: Robin Standafer, Marketing Dir.
Date Product Introduced: July, 1985
Product Description & Applications: The ADX-2000 is a microprocessor-controlled, field-expandable, programmable digital delay and is well suited for permanent installation delay, cluster alignment, touring sound, theme parks or any job requiring professional quality digital delays. The ADX-2000 controls up to 6 input and 64 output modules. Input buss, channel assignments, channel on/off, and delay times are all easily set and stored in memory. Several configurations can be pre-programmed and stored, allowing you to switch delay configuration in moments.
Basic Specifications & Suggested List Price: Dynamic range: 105dB; A weighted (no companding); 0.05% THD + noise @ 1kHz; frequency response: 20Hz-20kHz ±0.5dB; delay range: 10 microseconds to 260 milliseconds; optional memory increases max. delay to 1048 milliseconds; dimensions: 5.25"H x 19"W x 12.5"D (three standard rack spaces); 110 VAC/220 VAC operation. Suggested retail price: $3,500 (1 in/4 out).

BARCUS-BERRY ELECTRONICS
5381 Production Dr., Huntington Beach, CA 92649
(714) 898-9211
Product Name: 202R
Contact: William Matthies, V.P. Sales & Mktg.
Date Product Introduced: Late 1984
Basic Specifications & Suggested List Price: BBE 202R is a multi-band program controlled sound processor which can be employed to improve the overall sonic clarity of commercial audio and video products. Professional applications include recording studios, motion picture production, live concerts, TV and radio broadcasting, and motion picture theatres. The new unit utilizes high-speed dynamic gain control circuitry to audibly improve the reproduction of program transients. Based on a new technology developed by Barcus-Berry, the unit adds brightness and presence w/o the stridency characteristic of equalized sound.
Basic Specifications & Suggested List Price: The 19" rack-mountable chassis occupies two standard EIA spaces and measures a compact 7" in depth. Adding the piece requires nothing more than insertion between the program source and an amplifier, recorder or signal transmission line. A simple adjustment of a single control for each operating channel is all that is required for normal set-up. Suggested price: $1,495.



R. BARTH KG / ESL, INC.
Dynaset

R. BARTH KG / ESL, INC.
120 S.W. 21st Terrace, C104, Fort Lauderdale, FL 33312
(305) 791-1501
Product Name: Dynaset
Contact: Lutz H. Meyer, President
Date Product Introduced: March, 1985
Product Description & Applications: A compressor/limiter dynamic range selector with two independent bands of operation. Allows an upper threshold for a limit point, with a

lower threshold for compression. Ratios on both actions are user adjustable, with attack and decay times dynamically adjusted in three user-set ranges. Hold function prevents "pumping up" of background noise during low or no signal input condition. Available in single unit (U 311) or dual 19" rack mount version. 2 units can be ganged (linked) for stereo operation or program control. Also has expand function.
Basic Specifications & Suggested List Price: Electronically balanced in and output, max inputs level + 24dBm. Output impedance less than 35 ohms. Freq. response: 20Hz-20kHz ±0.5dB, max. limit 54dB, max. expansion 18dB. Suggested list: Dynaset (dual unit, 19" rackmount) US $1,650. U311 (single unit) US $790.

BIG BRIAR INC.
Box 869, Natick, MA 01760
(617) 651-1362
Product Name: Syntovox SPX 216 Vocoder
Contact: Shirleigh Moog, Manager
Date Product Introduced: May, 1985
Product Description & Applications: Signal processor with speech and carrier inputs, and stereo outputs. Speech input is analyzed into fourteen precise frequency bands. Spectral pattern or speech is imparted to carrier signal. In addition to external carrier, internal VCO and noise source are provided. Additional features include voice filter, bypass, remote status control, formant shift, multiconnector for external patching, and speech and carrier cleanfeed.
Basic Specifications & Suggested List Price: Line level speech and carrier inputs; mike level input; line level stereo outputs; DIN remote control jack; 32-pin external patching multiconnector; 110-125 VAC operation; 1¾" rack mount case. Price: $1,395.

BLACET MUSIC RESEARCH
18405 Old Monte Rio Rd., Guerneville, CA 95446
(707) 869-9164
Product Name: Time Machine II™
Contact: John Blacet
Date Product Introduced: March, 1985
Product Description & Applications: The Time Machine II™ is a 19" rack mount version of the company's popular modular unit. It is intended for applications requiring a very high quality analog sound, or where the extended bandwidth of a digital unit would be a drawback. The unit is especially useful for obtaining a warm reverberation sound and for use with drum machines. All functions of the Time Machine™ are voltage controllable, compatible with standard synth outputs.
Basic Specifications & Suggested List Price: Two delay ranges: zooms/5kHz BW; 400ms/2.5kHz BW. Built in LFO, envelope follower, LFO reset. List price: $298. Available direct from factory.

CRL AUDIO (CIRCUIT RESEARCH LABS, INC.)
2522 W. Geneva Dr., Tempe, AZ 85282
(800) 535-7648
Product Name: SPP 800
Contact: Bob Richards, Sales Mgr.
Product Description & Applications: A two band automatic gain controller. Used to automatically correct for errors in audio source levels, as well as for tonal balance and enhanced musical quality and punch. Each band is independent for level conditioning. "Pumping and Hole punching" are eliminated and sudden bass and other tonal bursts are prevented from causing unnatural level changes in vocals and other instruments.
Basic Specifications & Suggested List Price: Frequency response: +.15, -.5dB, 50Hz to 15kHz; signal to noise: 60dB in operate; better than 70dB proof; crossover frequency; 400Hz with 6dB octave filters; distortion: THD .4% in operate, .1% in proof. Suggested list price: $1,750.

CRL AUDIO (CIRCUIT RESEARCH LABS, INC.)
2522 W. Geneva Dr., Tempe, AZ 85282
(800) 535-7648
Product Name: SEP 800
Contact: Bob Richards, Sales Mgr.
Date Product Introduced: April, 1985
Product Description & Applications: A four band stereo processor. Selectable for either multiband dynamic equalization or wideband for combined AGC/Compression. Four band gating to prevent noise pull-up and unit is controlled by complex gain determining signals derived from the audio bands themselves. The output of each band is adjusted with a potentiometer that controls a VCA for precise stereo tracking over the total range of -12 to +6dB.
Basic Specifications & Suggested List Price: Frequency response: ±1dB, 50Hz to 15kHz; signal to noise: greater than 65dB in operate, 70dB in proof; crossover frequencies: 200Hz, 1kHz, 5kHz, with 6dB octave filters; distortion: less than .5% THD operate, .3% proof. Suggested list price: $2,250.

dbx
71 Chapel St., Newton, MA 02195
(617) 964-3210
Product Name: dbx 166 Compressor/Limiter
Contact: Greg Green, Nat'l Sales Mgr.
Date Product Introduced: Spring 1985
Product Description & Applications: The 166 provides the recording engineer, broadcaster, or sound-reinforcement specialist three needed tools: an effective, easy-to-use two-setting noise gate to attenuate unwanted sounds occurring in the absence of desired input signal; a variable OverEasy® compressor/limiter; and a PeakStop® soft clipper to put an absolute (but good-sounding) ceiling on output levels. All in a dual-mono or stereo rack-mount package. A fourth feature is a sidechain monitor, provided for use in adding outboard equalizers, filters, etc., into the sidechain loop (access to the detector input).
Basic Specifications & Suggested List Price: Max. input: +24dBv; max. output: +21dBv; input impedance: 25k ohms differential, 18.5k ohms unbalanced, detector—6.8k ohms, unbalanced; output impedance: low, single-ended, designed to drive 600 ohms; frequency response: 20Hz-20kHz ±0.5dB; THD: 0.2% at maximum compression, 1kHz, 0dBv; output noise: -87 dBv unweighted; crosstalk: 70dB; threshold range: compressor: +20 to -40dBv, gate: +10 to -70dBv, peakstop: 0 to +22dBv; release rates: compressor: 125dB/s, gate: 10dB/s slow, 1000dB/s fast; gate attack time: 4ms for 66%; gate attenuation: 40dB. Suggested retail price: $549.

dbx
71 Chapel St., Newton, MA 02195
(617) 964-3210
Product Name: dbx 163X OverEasy® Compressor/Limiter
Contact: Greg Green, Nat'l Sales Mgr.
Date Product Introduced: Summer 1985
Product Description & Applications: The 163X is a low-cost one-slider OverEasy® compressor/limiter to be used by the working musician as well as in recording & sound reinforcement—whenever an easy-to-operate pro-quality compressor/limiter is needed. It can be used on lead & bass guitars, percussion, vocals to give full control of dynamics. Two units can be linked for stereo mixdowns. Slider adjusts compression (with LED display), makes up gain loss; thumb knob adjusts operating level.
Basic Specifications & Suggested List Price: Frequency

—LISTING CONTINUED ON PAGE 162

—FROM PAGE 161

response: 20Hz-20kHz ±1dB; THD: 0.2%; max. input/output: 18dBv; equivalent input noise: -85dBv; impedances: suitable for both 600 ohms & high-Z systems; inputs/outputs: ¼" phone jacks; rack-mountable singly or side-by-side (hardware included). Suggested retail price: $149.

DOD ELECTRONICS INC.
5639 S. Riley Lane, Salt Lake City, UT 84107
(801) 268-8400
Product Name: Digitech PDS-2000 Digital Sampler
Contact: John Johnson, V.P. Marketing
Date Product Introduced: June, 1985
Product Description & Applications: The PDS-2000 is a battery powered digital sampler with 2 seconds of sample memory, triggerable by either it's own footswitch or a positive going 5V pulse. The PDS-2000 can also be used as a standard digital delay with a repeat hold function. It's dual footswitch system with separate repeat hold/trigger and effect in/out switches provide flexibility unachievable by single footswitch pedals.
Basic Specifications & Suggested List Price: Bandwidth: 7kHz; input: 470k unbalanced; output: 47k unbalanced; power: battery or AC 9V @ 35mA; max. delay time: 2 sec; max. sample time: 2 sec; trigger input: +5V positive edge triggered. Suggested retail price: $269.95

DOD ELECTRONICS INC.
5639 S. Riley Lane, Salt Lake City, UT 84107
(801) 268-8400
Product Name: X838
Contact: John Johnson, V.P. Marketing
Date Product Introduced: June, 1985
Product Description & Applications: The X838 is a single rack space, stereo three-way switchable to mono four-way, active crossover. The filters are Butterworth, 18dB/octave, in a state-variable configuration. Outputs include a low-frequency summed output for a mono sub-woofer in a stereo system. A variable pad and an invert switch are provided on every output except the low-frequency sum.
Basic Specifications & Suggested List Price: Stereo mode: low to mid crossover ranges; 50Hz-500Hz, 500Hz-5k Hz; mid to high crossover range; 750Hz-7.5kHz. Mono mode: low to low-mid crossover ranges: 50Hz-500Hz, 500Hz-5kHz; low-mid to high-mid range: 750Hz-7.5kHz; high-mid to high: 2kHz-20kHz.

NEW PRODUCTS
SIGNAL PROCESSING DEVICES
1 · 9 · 8 · 6

DOD ELECTRONICS INC.
5639 S. Riley Lane, Salt Lake City, UT 84107
(801) 268-8400
Product Name: Digitech RDS-6400 Digital Reverb
Contact: John Johnson, V.P. Marketing
Date Product Introduced: June, 1985
Product Description & Applications: The RDS-6400 is a digital reverb system with the quality required by studios and sound contractors, yet priced for the performing musician. The front panel controls allow quick, logical access to any of 64 program presets. Designed for flexibility combined with ease of operation, the RDS-6400 is well suited for any application requiring smooth, natural sounding reverb.
Basic Specifications & Suggested List Price: Bandwidth: 10kHz; input: mono, 20k balanced, +18dBv max; output: stereo, 100dB balanced, +18dBm max; power: 115V (U.S. and Canada) fused, 230V (Europe) fused; dynamic range: 72dB; reverb time: 0.2 sec; connections: ¼" RTS phone jacks. Suggested retail price: $699.95.

DOD ELECTRONICS INC.
5639 S. Riley Lane, Salt Lake City, UT 84107
(801) 268-8400
Product Name: MT828 Dual Compressor/Limiter
Contact: John Johnson, V.P. Marketing
Date Product Introduced: June, 1985
Product Description & Applications: The MT828 comprises two full-function independent compressor/limiters, which can be linked to operate in stereo, each with its own noise gate. Each compressor has a threshold, attack, release, compression ratio, input, output, and gate controls. The compression ratio is variable from 1:1 to infinity:1 and attack and release times are adjustable for virtually any application. The MT828 stereo compressor/limiter is equally at home in the studio or in sound reinforcement applications.
Basic Specifications & Suggested List Price: Compression ratio: variable from 1:1 to infinity:1; attack time: variable from .5ms to 100ms; release time: variable from 90ms to 1.6 seconds; input impedance: 20k ohms unbalanced, 40k ohms balanced; output impedance: 470 ohms unbalanced, 940 ohms balanced.

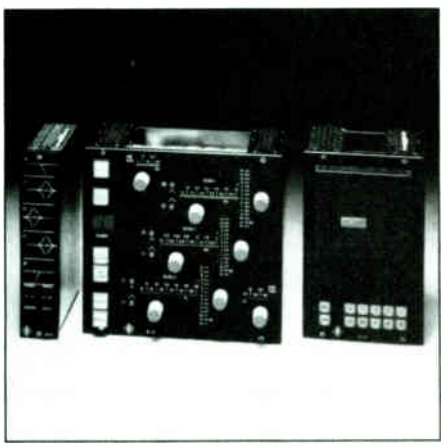
EVENTIDE INC.
One Alsan Way, Little Ferry, NJ 07643
(201) 641-1200
Product Name: New audio effects programs for SP2016 Effects Processor/Reverb
Contact: Suzanne Langle, Marketing
Date Product Introduced: Late 1985
Product Description & Applications: Eventide will introduce at least five new audio effects programs for its SP2016 Effects Processor/Reverb. These include: reverse and non-linear reverb which give the user two independent channels of reverb simultaneously, a two-channel gated reverb program, an automatic panner, and an 18-band channel vocoder program.
Basic Specifications & Suggested List Price: Reverse, non-linear and gated reverb programs will be available free to current SP2016 owners and will be standard on all units. The automatic panner and channel vocoder programs will be available separately.

EVENTIDE INC.
One Alsan Way, Little Ferry, NJ 07643
(201) 641-1200
Product Name: SPUDsystem for the IBM Personal Computer
Contact: Suzanne Langle, Marketing
Date Product Introduced: Late 1985
Product Description & Applications: Eventide will introduce a version of its Signal Processor User Development System (SPUDsystem) for use in conjunction with the IBM personal computer. SPUDsystem (which is currently available for use with the Hewlett-Packard Series 200 computers) allows SP2016 owners to create their own audio effects programs that they can design to their own specific needs.
Basic Specifications & Suggested List Price: SPUDsys-

tem for the IBM personal computer will require an SP2016 Effects Processor/Reverb, an IBM personal computer and various peripherals. Please contact Eventide for specific details and pricing.

FM ACOUSTICS LTD.
Tiefenhofstr. 17, CH-8820 Waedenswil, Switzerland
(1) 780-6444; Telex: 875414
Product Name: Forcelines
Contact: Manuel Huber
Date Product Introduced: July, 1985
Product Description & Applications: Forcelines are FM Acoustics' unique new high-energy transfer cables, designed for ultimate power transfer between power amplifier and load. The cables feature a size of AWG 5 and have the amazingly low resistance of 1.1 ohms per kilometer.
Basic Specifications & Suggested List Price: Forcelines: cont. Current: 200A, peak current 1200A, temperature range: -25 to +80°C.

FURMAN SOUND, INC.
30 Rich St., Greenbrae, CA 94904
(415) 927-1225
Product Name: LC-X Expander/Compressor/Limiter
Contact: Diane Poole, Marketing Dir.
Date Product Introduced: July, 1985
Product Description & Applications: Expander/gate/comp/limiter; limiter with 3 independent sections, each with own threshold control and indicator. Variable attack/release times on expander and compressor sections for either peak or average detection. 10 segment meter switchable between output level and gain reduction. Proprietary, discrete VCA for low noise/distortion, de-ess and side chain functions. Stereo link jack. Ground lift.
Basic Specifications & Suggested List Price: Output noise: -86dBv unweighted 20-20k Hz; dynamic range: 104dB; distortion: .015% w/20dB GR, .005% with no GR @ 0dBv; attack time (compress & expand) variable 30 microseconds-1sec; (limiter) 5m sec; release time (compress & expand) 50m sec-5 sec, (limit) .5 sec; compress threshold: -40 to 20dBv; expand threshold: -60 to +0dBv; limit threshold: -20 to +20dBv. List price: $449.



GOTHAM AUDIO CORPORATION
Neumann AME 591

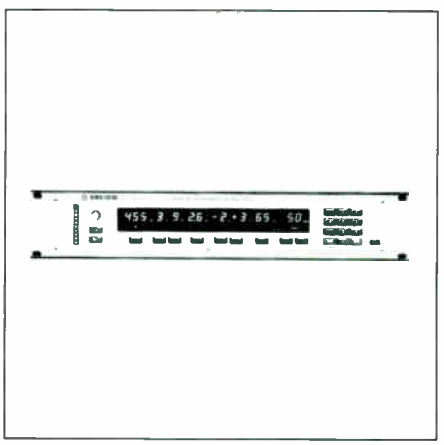
GOTHAM AUDIO CORPORATION
741 Washington St., New York, NY 10014
(212) 741-7411
Product Name: Neumann AME 591 Autonomous Microprocessor Controlled Equalizer System
Contact: George P. Johnson, Sales Engineer
Date Product Introduced: March, 1985
Product Description & Applications: Neumann AME 591 Equalizer System, consisting of one BE 591 operating panel, one SE 591 memory unit with microcassette data storage and eight to sixty-four W 591 equalizer cassettes with LED indication of high and low pass, band boost or cut and bypass or monitor conditions for each audio channel; settings input using master controls on BE 591 panel and retained in RAM and on data microcassette; automatic crossfade between settings as each preset recalled; applications in film scoring, mixdown, reinforcement, sweetening, live and recorded television production; can be autonomous in rack mount or integrated in console.
Basic Specifications & Suggested List Price: 8-64 channel static preset equalizer system; each channel in stepped settings: 3 band filters ± 15dB in 2dB steps for 1.5-15k Hz, 0.3-3k Hz, 45-450Hz; selectable bandwidth of 1 or 3 octave, 12dB/octave high and low pass with four selectable frequencies each; individual channel bypass; one button copy, clear, recall or original setting, A/B comparison; typical eight channel system: $14,850.

GOTHAM AUDIO CORPORATION
741 Washington St., New York, NY 10014
(212) 741-7411
Product Name: NTP 585-200 Programmable Four-Channel Equalizer
Contact: George P. Johnson, Sales Engineer
Date Product Introduced: March, 1985
Product Description & Applications: NTP 585-200; self-contained programmable four-channel graphic equalizer for disk cutting, film scoring, tape duplication, reinforcement and other applications; individual, paired and four channel ganged control of gain ar.d 14 band filter settings; all settings stored to RAM and to resident data microcassette as "takes;" rapid setup and recall of takes; scratchpad memory for A/B testing; single button recall of next, previous, original take, original channel settings; select take by number; external control of automatic next take recall; separate removable control panel; rack mounted audio electronics and PSU.
Basic Specifications & Suggested List Price: Four channel graphic equalizer, 14 band filters, 40Hz-16kHz (ISO frequencies, 2/3 octave), ±7dB in 1 dB steps, upper and lower shelf assignable, channel gain correction±7dB in ½dB steps, input CMRR: better than 60dB at 15kHz, input overload level: +21dBu (8.6 V rms), THD, 40Hz-15kHz at +9 dBu: better than 0.04%, $11,500.

NEW PRODUCTS
SIGNAL PROCESSING DEVICES
1 · 9 · 8 · 6

HAASE ELECTRONIC /ESL, INC.
120 S.W. 21st Terrace, C104, Fort Lauderdale, FL 33312
(305) 791-1501
Product Name: Hum Killer
Contact: Lutz H. Meyer, President
Date Product Introduced: March, 1985
Product Description & Applications: Designed specifically for problem situations in live performance or recorded material with existing hum problems, the Hum Killer user proprietary circuitry to remove 50Hz or 60Hz based noise from signals, to the 13th harmonic, very important when the noise source is light dimmers, portable generator power, etc. Extremely sharp characteristics cause no subjective change to program material. Level of cut of fundamental and ODD or even harmonics can be independently adjusted and harmonic filters switched in and out.
Basic Specifications & Suggested List Price: 2 channel unit, 19" rack mount. Attenuation: 50Hz version—50Hz-40dB, 650Hz-25dB; 60Hz version—60Hz-40dB, 780Hz-22dB; freq. response: linear—20Hz-20kHz ±0.5dB; filter: 20Hz-20kHz±1.5dB. Suggested list price: U.S. $1,950; FOB Ft. Lauderdale.

INTEGRATED MEDIA SYSTEMS, INC.
1552 Laurel St., San Carlos, CA 94070
(415) 592-8055
Product Name: ADA-1000
Contact: William A. Fink, V.P., Dir. of Marketing
Date Product Introduced: April, 1985
Product Description & Applications: IMS announces a laboratory reference A/D/A conversion system for master recording and other professional applications. Special handling of small sign.als produce a system with residual distortion products similar to analog equipment and an effective dynamic range of 7110dB. Other features include AES/EBU digital interface compatibility and modular reliable construction. (44.1k or 48k Hz sample frequencies).
Basic Specifications & Suggested List Price: Max. analog input: +26dB; input impedance: 50 ohms ±5% 20Hz-20kHz; freq. response: 5Hz-20kHz ±.2dB; dynamic range: greater than 94dB; THD+N: less than .01% 20Hz-20kHz typ. less than .005%; IMD: less than .01%; phase: w/in 5° to 15kHz; C.D.P.: all components greater than 80dB below input level; digital I/O: conforms to AES standards; output: 16 bit 2's compliment; square wave reproduction: symmetry within 1%; channel crosstalk: greater than 80dB.

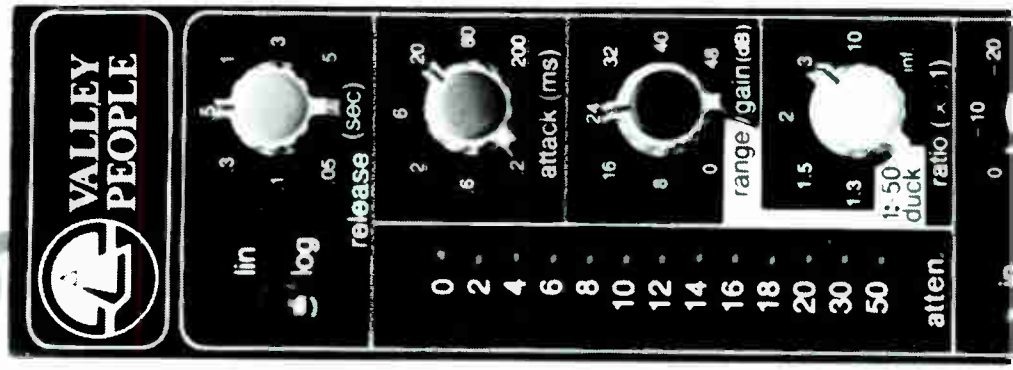


KLARK-TEKNIK ELECTRONICS, INC.
DN780 Version 1.5 Digital Reverberator/Processor

KLARK-TEKNIK ELECTRONICS, INC.
262a Eastern Pkwy., Farmingdale, NY 11735
(516) 249-3660
Product Name: DN780 Version 1.5 Digital Reverberator/Processor
Contact: Keith Worsley, Sales Manager
Date Product Introduced: Late 1984
Product Description & Applications: Version 1.5 is a software update for the DN780, and includes (3) gated decay programs (non-linear, reverse, and Alive™), user memory protection, and remote control fader assign facilities. Additionally, all programs have improved 'brightness,' and the plate program presets have been rewritten.
Basic Specifications & Suggested List Price: Software updates are free for 18 months after initial purchase.

LEXICON
60 Turner St., Waltham, MA 02154
(617) 891-6790
Product Name: PCM-70
Contact: Will Eggleston, Product Applications
Date Product Introduced: October, 1985
Product Description & Applications: Lexicon will introduce the PCM-70, a dynamically controllable MIDI based digital effects processor incorporating 4th generation Lexicon technology, with effects programs derived primarily from the world renowned 224XL.

—PHOTO ON PAGE 166



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1 · 9 · 8 · 6

—LISTING ON PAGE 164

LEXICON
PCM-70

MARSHALL ELECTRONIC
P.O. Box 438, Brooklandville, MD 21022
(301) 484-2220
Product Name: AES-357 Ambience Effects System
Contact: Pirkko Polso, P.R.
Product Description & Applications: The AES-357 is actually three separate processors in one chassis. Stereo Synthesizer/Processor: Ten mono compatible families, including Stereo Ambience Generation, a binaural image construction utilizing psycho-acoustic processing for front and rear dimension. Stereo Post Reverb Processor: Attaches to the outputs of your present reverb, multiplies echo density by 1200 times and converts the programs to room simulation. Stereo Room Simulator/Ambience Generator: Using an exclusive variable delay matrix room images are constructed without perceptible reverberation. Room shape, size, and ambience are controllable.
Basic Specifications & Suggested List Price: Number of programs: 3000 non-volatile; dynamic range: greater than 95dB; frequency response: 20Hz to 20kHz; sample frequency: variable, average 80kHz; output taps: 22 primary x 6 matrix injection points for total of 132; initial reflections: variable from 1 to 1200; inputs: two—stereo L & R or mono, active balanced; outputs: two—stereo L & R, or four with rear option, active balanced; control: RS-232. All functions remotable. Hand held remote and interactive graphic computer program available.

NEI
934 N.E. 25th Ave., Portland, OR 97232
(503) 232-4445
Product Name: DAX 2800
Contact: H.C. (Bud) Garrison, President
Date Product Introduced: June, 1985
Product Description & Applications: Digitally controlled 28 band 1/3 octave graphic equalizer and real-time analyzer which provides automatic equalization to any memory setting through use of on-board microprocessor. Also available is storage and immediate recall of 16 memory settings and instantaneous averaging of EQ settings. For the sound contractor, the DAX 2800 acts as the "master" computer to down-load into the DAX EQ POD any prescribed room equalization curve. The DAX EQ POD is a blank-panelled, third-octave equalizer for permanent sound system installations and cannot be adjusted by unauthorized personnel without the DAX 2800.
Basic Specifications & Suggested List Price: Frequency response: 20Hz to 20kHz, better than ±.5dB (all setting flat); THD: less than .01% @ 0dBm, 20Hz to 20kHz; IMD: less than .005% @ 0dBm, 20Hz to 20kHz; noise floor: -81dBm (refer-

enced to .775 VRMS) all settings flat; nominal input & output levels: 0dBm (referenced to .775 VRMS); max. input & output levels: 20dBm (referenced to .775 VRMS); input impedance: 20k ohms balanced, 20k ohms unbalanced; output impedance: 600 ohms balanced, 300 ohms unbalanced; slew rate: 10 V/microsecond all settings flat, 0°-55°C; data bus: (optional for EQ POD) RS 232/DB 25 connector, 8 bit, 6805 microprocessor at 5 MHz, non-volatile RAM, 2048 memory locations; memories: 16 on-board, non volatile; boost/cut range: 0 to ±12dB in 3dB steps, 0 to ±4dB in 1 dB steps; size: 19"W x 5¼"H x 13.5"D; weight: 16 lbs; power requirements: 120V, 60Hz (220V, 50Hz optional). Suggested list price: DAX 2800, $2,495; DAX EQ POD, $495.

NONSTOP PRODUCTIONS, INC.
3320 E. Century Blvd., Lynwood, CA 90262
(213) 636-2573
Product Name: NSP Centrex—Aperture Noise Reduction
Contact: Arthur G. Wright, President
Date Product Introduced: January, 1985
Product Description & Applications: The NSP Centrex A.N.R. is an unencoded/non-decoded processor operating from -60dB continuously variable to +4. It incorporates discreet circuitry using no VCA's giving it superior sonic quality and full transparency. Eight channels on one chassis allows for greater versatility such as simultaneously gating or controlling up to 8 independent signals. Ideal for TV, recording or P.A. applications. Centrex accepts inputs directly from mikes, musical instruments or synthesizers.
Basic Specifications & Suggested List Price: Low noise integrated circuitry; variable threshold control; superior operation on music, speech, etc.; LED readout; bypass switch; human engineered for ease of operation; 19" rack mount installation. Suggested list price: $1,350.

OMNI CRAFT, INC.
P.O. Box 1069, Palatine, IL 60078
310 W. Colfax St., Palatine, IL 60067
(312) 359-9240
Product Name: GTX (K) or (d) Noise Gate
Contact: Glenn Mullis, Sales Mgr.
Date Product Introduced: May, 1985
Product Description & Applications: GTX Noise Gates plug into most popular signal processing rack systems. High and low pass filters can be switched into the trigger signal path, to eliminate false gating. Low noise and distortion result from developing the GTX modules around Omni Crafts' proven optical controller system. GTX modules also have "duck" capability and a unique LED status indicating system. Applications range from studio and mix-down, through concert and conference systems.
Basic Specifications & Suggested List Price: Audio frequency response: ±½dB, 10Hz to 100kHz; harmonic distortion: .002%, 20Hz to 20kHz; signal to noise ratio: 110dB re +22dBv; attack time for ducking and gating: 1 mil. sec. or less with release time adjustable from .1 sec to 5 sec; range control (ducking & gating): 0dB to -30dB adjustable to -60dB max; dimensions: (d) model: 1½" x 5 1/16", (k) model: 1½" x 5¼". Suggested resale: $275.

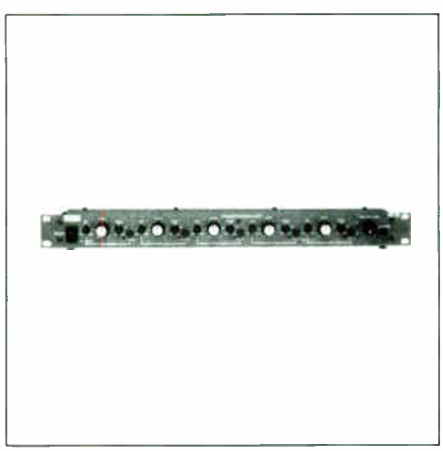
OMNI CRAFT, INC.
P.O. Box 1069, Palatine, IL 60078
310 West Colfax St., Palatine, IL 60067
(312) 359-9240
Product Name: GT4A Noise Gate
Contact: Glenn Mullis, Sales Mgr.
Date Product Introduced: May, 1985
Product Description & Applications: The GT-4A incorporates four gates and a power supply into 1¾" of rack space. Each channel is provided with threshold, range and release controls and a push button to select either the audio signal or a separate "key" input as activator of the gate. Employing Omni Crafts' proven optical controller system results in noise and distortion below measurable levels, as the audio passing through sees only a resistive L-pad. The range control is variable from 0 to -30dB with a detent providing -60dB.
Basic Specifications & Suggested List Price: Audio frequency response: +1½dB, DC to 100kHz; trigger frequency response: +1dB, 10Hz to 20kHz; attack time: 1 mil. sec. or less; range control: 0dB to -30dB adjustable to -60dB max; power consumption: 7 watts, 120 VAC; dimensions: 1¾" x 19 x 5; weight: 4 lbs; rack mountable. Suggested resale: $395.

PHOENIX SYSTEMS div. of SOUNDWARE CORP.
P.O. Box 338-B, Stone Mountain, GA 30086
(404) 934-9626
Product Name: P-522-NR Tape Noise Reduction
Contact: John Roberts, President
Date Product Introduced: February, 1985
Product Description & Applications: Wide band 2:1 companding noise reduction with proprietary ripple cancellation circuit for low LF distortion; pre-de-emphasis, simultaneous encode-decode, and hard wire bypass switch.
Basic Specifications & Suggested List Price: P-522-NR (kit): $79; P-522NRA (assem.): $139. Basic units are 2-track. Deduct 5% when ordering 2 (for 4-track) or -10% for 4 (8-track).

PUBLISON AMERICA, INC.
Infernal Machine 90

PUBLISON AMERICA, INC.
6464 Sunset Blvd, Suite 980, Hollywood, CA 90028
(213) 460-6355
Product Name: Infernal Machine 90
Product Description & Applications: The Infernal Machine 90 is a dual, very versatile, stereo audio computer. It includes: two completely independent stereo parametric reverberations with 52 preset programs and 150 storage location; two pitch shifters with several deglitched algorithms; two sound memories with trigger, MIDI interface backwards mode, time compression (expansion); also delay echo 150 non volatile parameter memories, selection of guide operator language, etc. Memory capacity 20kHz : 2 x 5 seconds, or 2 x 20 sec, or up to 5 minutes by slices of 40 seconds.

RANE CORP.
6510 216th S.W., Mountlake Terrace, WA 98043
(206) 774-7309
Product Name: CD48 Crossover Alignment Delay
Contact: Larry Winter, V.P. Mktg.
Date Product Introduced: January, 1985
Product Description & Applications: CD48 provides 4 separate channels of up to 8 ms each of time delay to achieve phase alignment of non-coincident drivers in multi-way speaker systems. Channels may be cascaded in series for up to 32 ms total delay.
Basic Specifications & Suggested List Price: Frequency response: 20-20k Hz ±1dB at all delay settings; THD: less than .09%; S1N ratio: 106dB; max. input/output level: +20dBm; auto unbalanced/balanced/floating inputs & outputs. Suggested list price: $329.



RANE CORP.
PE 15 Parametric Equalizer & Notch Filter

RANE CORP.
6510 216th S.W., Mountlake Terrace, WA 98043
(206) 774-7309
Product Name: PE 15 Parametric Equalizer & Notch Filter
Contact: Larry Winter, V.P. Mktg.
Date Product Introduced: January, 1985
Product Description & Applications: PE 15 is a single rack 5-band parametric equalizer with bandwidth range from 1.5 octave down to 1/30 (.03) octaves for notch filter

—LISTING CONTINUED ON PAGE 168

NEW PRODUCTS
SIGNAL PROCESSING DEVICES
1 · 9 · 8 · 6

—FROM PAGE 167

capability. Each section has a four-octave sweep, individual bypass switch w/LED indicator and +15/-20dB boost/cut capability with full symmetry and independent function of all controls.
Basic Specifications & Suggested List Price: Complimentary balanced input & output, +20dB overall gain capability, overall bypass, end bands switchable to shelving mode. S/N ratio: 108dB; THD: .02%; IMD: .009%. Suggested list price: $389.

ROLANDCORP US
7200 Dominion Cir., Los Angeles, CA 90040
(213) 685-5141
Product Name: SRV-2000 MIDI Digital Reverb
Contact: Nancy A. Kewin, Dir. of Communications
Date Product Introduced: January, 1985
Product Description & Applications: The SRV-2000 Digital Reverb is a MIDI-compatible reverb which can store up to thirty-two settings of all front panel controls (except input attenuation), allowing that many different room simulations at your fingertips, or automatically recallable via MIDI. All programmed data—attack gain and time, gate time, reverb density and time, early reflection density, high-frequency damping, room size (from 1 to 37 meters cube), and output level—is precisely set by confirming values on the unit's digital display and can be modified in real time.
Basic Specifications & Suggested List Price: 16-bit A/D/A converter; dynamic range; 90dB; S/N ratio: 80dB; distortion: greater than 0.03%; frequency response: 10Hz to 50kHz (direct), 30Hz to 10kHz (reverb); pre-delay time: 0 to 160 ms (reverb mode), 0 to 120 ms (non-linear mode), adjustable in 1 ms steps; reverb time: 0.1 to 99 s (reverb mode), -0.9 to 99 s (non-linear mode); high frequency damping control: x 0.05 to x 1; reverb selection: room (0.3, 1.0, 7.0, 15, 22, 26, 32, 37), hall (15, 22, 26, 32, 37), plate (A, B); dimensions: rack-mountable (EIA-1U); weight: 11.4 lb. List price: $1,495.

ROLANDCORP US
7200 Dominion Cir., Los Angeles, CA 90040
(213) 685-5141
Product Name: SDE-2500 MIDI Digital Delay
Contact: Nancy A. Kewin, Dir. of Communications
Date Product Introduced: January, 1985
Product Description & Applications: The SDE-2500 MIDI Digital Delay incorporates the same A/D/A converting system as the renowned SDE-3000, the Digital Compounding PCM System, and can store as many as 64 different programmable settings which can be recalled using MIDI program change information. The SDE-2500, like the entire line of Roland SDE series of digital delays, combines high performance, superb features, and unsurpassed cost effectiveness into a product that is ideal in live performance using MIDI instruments while satisfying the needs of demanding musicians and engineers in all situations.
Basic Specifications & Suggested List Price: Front panel controls: input attenuator, feedback level, delay output level, modulation rate, modulation depth, memory number (up, down); front panel switches: write, copy, MIDI program, MIDI channel, time x 2, delay phase, filter, hold, bypass; input level/impedance: +4dBm/56k ohm, -20dBm/560k ohm; output impedance: 100 ohm (+4dBm), at 600 ohm (max +19dBm), -20dBm at 10k ohm (max -4dBm); delay time: 0 to 375 ms (time x 2 switch off), 0 to 750 ms (time x 2 switch off), 0.1 ms increments (0 to 10 ms), 1 ms increments (0 to 8k Hz); THD at 1kHz: 0.008% or less; dimensions: rack-mountable (EIA-1U); weight: 9.9 lbs. List price: $795.

STUDIO TECHNOLOGIES, INC.
7250 N. Cicero Ave., Lincolnwood, IL 60646
(312) 676-9177
Product Name: AN-2 Stereo Simulator
Contact: Carolyn Cashel, Dir. of Marketing
Date Product Introduced: March, 1985
Product Description & Applications: The AN-2 is a versatile sound processor designed to create a wide range of effects including convincing stereo from any mono source. The AN-2 has numerous applications within recording, live performance, film and broadcast operations because of its ability to create a simulated stereo signal from a mono source and its many audio effects capabilities. The signal produced is completely mono compatible.

STUDIO TECHNOLOGIES, INC.
AN-2 Stereo Simulator

Basic Specifications & Suggested List Price: Input & output levels: selectable -10 or +4dBm; frequency response: 20Hz to 15kHz ±2dB; distortion: 0.2% THD; dynamic range: 90dB; signal to noise ratio: 70dB. Suggested list price: $650.

SYMETRIX, INC.
4211 24th Ave. West, Seattle, WA 98199
(206) 624-5012
Product Name: Model 528 Voice Track Processor
Contact: Roy Blankenship, Nat'l Sales Mgr.
Date Product Introduced: September, 1985
Product Description & Applications: The model 528 Voice Track Processor is a signal processor specifically designed to handle the spectral and dynamic characteristics of the human voice. Circuit elements in the 528 include an ultra low noise FET microphone pre-amp, a dedicated frequency de-esser, a gated compressor, and a 3-band parametric equalizer.
Basic Specifications & Suggested List Price: Specifications on the 528 have not been released as of the date of this publication. Suggested retail price: $595.

SYMETRIX, INC.
4211 24th Ave. West, Seattle, WA 98199
(206) 624-5012
Product Name: 544 Quad Expander/Gate
Contact: Roy Blankenship, Sales Mgr.
Date Product Introduced: August, 1985
Product Description & Applications: The model 544 from Symetrix is a 4-channel expander/gate for recording and live performance applications. Each channel provides control of threshold, range, attack, time and release time. In addition to internal signal sensing, the user may switch to external input for keyable gating of expansion. A five segment LED gain reduction ladder is provided for each channel.
Basic Specifications & Suggested List Price: Basic specifications have not yet been released as of the time of this printing. Suggested list price is $495.

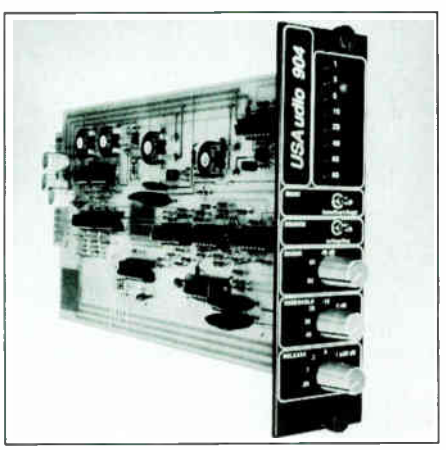
TOA
480 Carlton Ct., So. San Francisco, CA 94080
(415) 588-2538
Product Name: Paragraphic Equalizers/1/3 octave Equalizer
Date Product Introduced: April, 1985
Product Description & Applications: E-111 Paragraphic Equalizer (10-band); E-112 Dual Paragraphic Equalizer (20-band); E-131 1/3 octave Graphic Equalizer (28-band).
Basic Specifications & Suggested List Price: Frequency response: ±1dB, 20Hz-20kHz; total harmonic distortion: less than 0.2% at 1kHz at "0" setting; boost and cut: ±12dB.

TOA
480 Carlton Ct., So. San Francisco, CA 94080
(415) 588-2538
Product Name: V-141 Crossover
Contact: Gail Martin, Sr., Nat'l Sales Mgr.
Date Product Introduced: April, 1985
Product Description & Applications: High quality, low noise electronic dividing network with 2-way, 3-way and 4-way operating modes. Slope for each crossover point is 12 or 18dB per octave. 40Hz high-pass filter. Output phase reverse switch. Transformer-isolated XLR connectors on inputs/outputs, with ground lift switches. Bridging XLR and ¼" on inputs for cascade connections. Smoked plastic security cover included.
Basic Specifications & Suggested List Price: Crossover points range from 63 to 10k Hz. THD under 0.2% (+4dB 20Hz to 20kHz); frequency response: 20Hz (±0.5dB) to 20k Hz (±1dB). Standard 19" rack mount, 3½" high.

UREI
8500 Balboa Blvd., Northridge, CA 91329
(818) 893-8411
Product Name: Model 5547, Graphic Equalizer; Model 5549, Room Equalizer
Contact: Ken Lopez, V.P. Sales
Date Product Introduced: May, 1985
Product Description & Applications: The new UREI Models 5547 Graphic Equalizer and 5549 Room Equalizer are state-of-the-art hybrid discrete circuit equalizers that combine ease of operation with outstanding noise performance and combining filter response performance. Linear self-tracking input and output slide faders automatically maintain unity gain while adjusting input and output levels to optimize system signal-to-noise ratio, and provide parametric frequency high and low-pass filters for further system flexibility, power efficiency and driver protection.
Basic Specifications & Suggested List Price: Bands: 30 bands on ISO frequency centers; adjustment range: 5547 range is +12dB, 5549 range is 0 to -15dB; max. input level: +22dBu (9.75V); max. output level: +22dBm (.75 V/600 ohms); input/output level control range: 20dB; power supply: external safety grounded plug-in supply. Suggested retail price: 5547, $798; 5549, $849.

URSA MAJOR, INC.
P.O. Box 28, New Town Branch, Boston, MA 02258
(617) 924-7697
Product Name: MSP-126 Multi-Tap Stereo Processor
Contact: Gerard Abeles, Marketing Dir.
Date Product Introduced: January, 1985
Product Description & Applications: 8 processing modes for fully compatible stereo synthesis, special effects and much more. 20kHz bandwidth, PCM technology. Also includes: room simulation, Haas-type stereo planning, non-localized stereo images, repeat echoes, filtering in musical scales, etc. Basic stereo effects unit suitable for recording, broadcast and film studios, wherever serious stereo is desired.
Basic Specifications & Suggested List Price: Bandwidth: 20kHz, 44.1kHz sampling rate; noise: 80+dB dynamic range, 15 bit PCM conversion; bypass function: front button or rear panel jack; size: rack mount, 1 unit high (19"W x 1.75"H x 11"D, excluding XLR connector protrusion). Fully boxed weight, approx. 12 lbs. Suggested pro net price: $2,000.

URSA MAJOR, INC.
P.O. Box 28, New Town Branch, Boston, MA 02258
(617) 924-7697
Product Name: Stargate 626 Digital Reverberation System
Contact: Gerard Abeles, Marketing Dir.
Date Product Introduced: April, 1985
Product Description & Applications: Deluxe version of Ursa Major's Stargate 323 Digital Reverberator. Maintains excellent sound quality of the 323, with 80dB dynamic range, 15kHz bandwidth and adds eight new reverb and effects programs to the original unit's eight "rooms." The 626 also utilizes the latest 256k RAMs for expanded memory/time delay.
Basic Specifications & Suggested List Price: Suggested pro net price: $2,500.



USAUDIO, INC.
Gatex 904 Module

USAUDIO, INC.
P.O. Box 40878, Nashville, TN 37204
(615) 297-1098
Product Name: Gatex 904 module
Contact: Ray Updike, Sales Mgr.
Date Product Introduced: August, 1985
Product Description & Applications: The Gatex Model 904 is a single-channel module version of the popular Gatex noise gate/expander. This 5¼"H x 1½"W unit is designed to be housed in the dbx F-900 Powered Frame. The 904's mode select switch permits the unit to perform "hard" noise gating, 1:2 expansion, or unobtrusive noise reduction. In all modes, "turn on" noise is eliminated by means of Program Controlled Attack, which alters attack time according to the demands of the material being processed. Program Controlled Sustain automatically lengthens the release time as dictated by program content. So, desirably short release times may be employed without creation of unwanted distortion. Keying is made possible via the Gatex source switch. In this mode, an external signal may trigger the gating or expansion action of the device.
Basic Specifications & Suggested List Price: 104dB signal-to-noise ratio, ref. max output @ +21dB; -83dB output noise, 20Hz to 20kHz; .04% THD or IMD max.; threshold, -40dB to +20dB; range (max. attenuation), 0dB to -80dB; release, .05 to 5 s/20dB; attack times, program dependent; slopes, selectable 1:10, 1:2, 2:3; keyable, balanced input, unbalanced output; use with -10 to +10dB line levels. List price: $250.

VALLEY PEOPLE, INC.
P.O. Box 40306, 2817 Erica Pl., Nashville, TN 37204
(615) 383-4737
Product Name: Model 440 Limiter/Compressor/Dynamic Sibilance Processor
Contact: Ray Updike, Sales Mgr.
Date Product Introduced: July, 1985
Product Description & Applications: The Model 440 is a single-channel device offering the convenience of a peak limiter, a high quality compressor/expander and a Dynamic Sibilance Processor section, each controlling a common VCA. Sophisticated intercoupling of the control circuitry used for each function allows the device to simultaneously limit, compress, expand, and eliminate high frequency components in sibilance. The proprietary circuitry of the DSP analyzes the sibilant waveform, in order to detect and cancel only the coherent and objectionable portions of the sibilant sound, such as "whistles". This means that the DSP can be used effectively on mixed program material, without affecting the tonal balance.
Basic Specifications & Suggested List Price: Input impedance: 50k ohm; max. input level @ 1k Hz: +24dB balanced, +21dB unbalanced; output source impedance: less than 40 ohm balanced, less than 20 ohm unbalanced; nom. output level: 0dBm to +8dBm (600 ohm); max. output level: +24dBm balanced (600 ohm), +21dBm unbalanced (600 ohm); static THD @ 1kHz, 0dB in, unity gain, into 600 ohm: less than .01%; static SMPTE IMD, 0dB in, unity gain, into

—LISTING CONTINUED ON PAGE 170

—FROM PAGE 169

NEW PRODUCTS
SIGNAL PROCESSING DEVICES
1 · 9 · 8 · 6

VALLEY PEOPLE, INC.
Model 440 Limiter/Compressor/
Dynamic Sibilance Processor

600 ohm: less than .01%; output noise and hum, 20Hz to 20k Hz with 600 ohm source at unity gain: less than -84dB; power requirements: 95-130, 190-240 VAC, 50/60Hz 12VA max. List price: $599.

YAMAHA INT'L CORP.
Professional Products Division
6600 Orangethorpe Ave., Buena Park, CA 90620
(714) 522-9011
Product Name: REV7
Contact: Bob Shomaker, Nat'l Sales Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: Programmable Digital Reverberator, stereo or mono. 30 factory presets and 60 user memory. Controllable parameters include reverb time, early reflections, pre-reverb delay, room size, reverb mode. Presets include: large hall, small hall, vocal plate, delay R/L, stereo flange, chorus, spring reverb, strings and presets for individual instruments. MIDI recall of all 90 memories.
Basic Specifications & Suggested List Price: Balanced XLR inputs (2) and outputs (2); mono or stereo mode; mid-band reverb time (RT) from 0.3 to 10.0 seconds; initial delay 0.1-100 milliseconds; RT for high and low frequencies adjustable; ten steps of reverb diffusion; LCD display for programming; direct signal bandwidth, 20Hz-20kHz; 20Hz-12kHz reverb signal.

YAMAHA INT'L CORP.
REV7

YORKVILLE SOUND
Audiopro Model AX-3

YORKVILLE SOUND
56 Harvester Ave., Batavia, NY 14020
(416) 751-8481
Product Name: Audiopro Model AX-3
Contact: Mike Holman, Sales Mgr.
Date Product Introduced: March, 1985
Product Description & Applications: A 3-way active crossover with 24dB/octave slopes and zero phase shift at all outputs. Digital tuning circuitry pinpoints the control-variable crossover frequencies to within one-sixth of an octave at all settings. Balanced and unbalanced connections are used throughout along with 2-color LEDs for activity/clip indication at the input and all 3 outputs which also feature on/off pushbuttons. Low cut and 2-way selector buttons are included.
Basic Specifications & Suggested List Price: Filter Design—modified Linkwitz-Riley configuration, 4-pole constant voltage. Crossover slopes: 24dB/octave; tuning ranges: lo-mid, 60Hz-960Hz; mid-hi, 600Hz-9.6kHz; input level: -15 to +15dBV; max. output level: +18dBm; subsonic cutoff slope: 18dB/octave; frequency response: 15Hz - 20k Hz ±1dB; hum & noise: 95dB down from full output; harmonic distortion: less than 0.05%; dimensions: 19" x 1¾" x 8". Price: $425.

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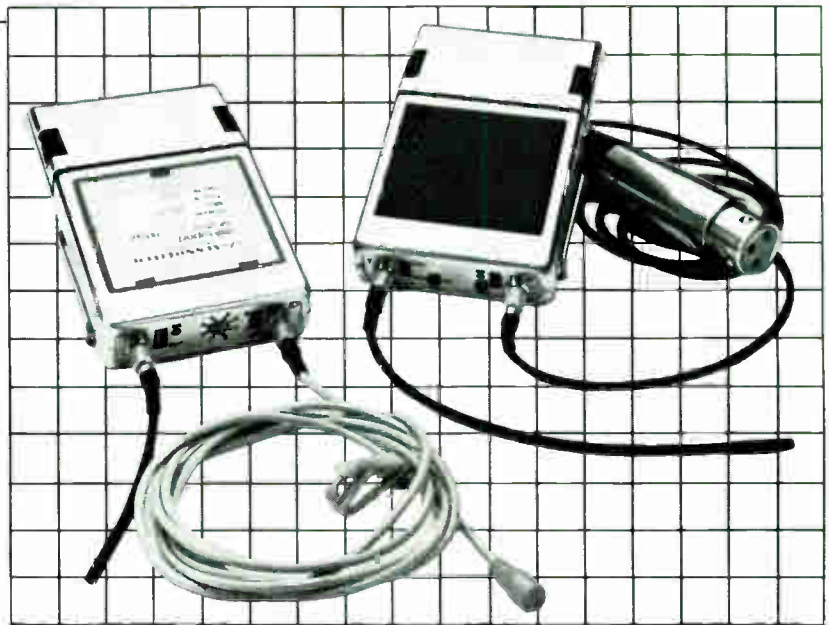
SENNHEISER SK-2012 TVH WIRELESS POCKET TRANSMITTER. Available in UHF and VHF models • 46 dB input pad • defeatable limiter.

SENNHEISER EK-2012 TVH BODY PAC WIRELESS PORTABLE RECEIVER. Two channel capability (one std.) • adjustable audio level • adjustable squelch.

SENNHEISER SKM-4031 TVH WIRELESS TRANSMITTER. For use with UHF and VHF frequencies • ± 10 dB sensitivity pad • wide screen removable for cleaning.



Sennheiser SK-2012 TVH Wireless Pocket Transmitter. Sennheiser EK-2012 TVH Body Pac Wireless Portable Receiver.

Sennheiser SKM-4031 TVH Wireless Transmitter.

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Circle #118 on Reader Service Card

—FROM PAGE 172

Date Product Introduced: June, 1985
Product Description & Applications: Three-way sound reinforcement speaker. Features include: coherent wave front design, precise transient response, high power handling, high efficiency and extended low frequency response. The RS327i uses the M200 mid-range driver in this unique tri-decade design, for frequencies in the fundamental vocal range. Crossover frequencies lie outside this range at 450Hz and 3.5k Hz. A ferrofluid cooled 15" woofer and (2) piezo-electric drivers on a pattern control horn complete this dynamic package.
Basic Specifications & Suggested List Price: Operating range: 45-18k Hz; power handling: 400 watts program; sensitivity: 104dB SPL (400-4k Hz); impedance: 8 ohms; construction: ¾" furniture-grade poplar with black textured enamel finish; dimensions: 32"H x 19"W x 18⅛"D; weight: 77 lbs. Suggested retail price: $639.

DAHLQUIST
601 Old Willets Path, Hauppauge, NY 11788
(516) 234-5757
Product Name: DQM-9, DQM-9 Compact
Contact: Paul Josefson, Customer Serv. Coord.
Date Product Introduced: June, 1985
Product Description & Applications: The DQM-9 and DQM-9 Compact are both three-way monitor speakers; the DQM-9 has an 11" woofer, whereas the DQM-9 Compact has a 9" woofer. Both models offer the combination of high efficiency, wide dynamic range, and high SPL required by the digitally oriented studio professional while retaining the sonic characteristics demanded by the audiophile: flat spectral balance, high resolution of detail, precise spatial imaging, and accurate ambience recovery.
Basic Specifications & Suggested List Price: DQM-9: frequency response, 28-22,000Hz; sensittvity, 95dB/1kHz/1 watt/1 meter; impedance, 8 ohm nominal/6 ohm minimum; suggested list price: $1,200. DQM-9 Compact: frequency response, 35-22,000Hz; sensitivity, 92dB/1kHz/1 watt/1 meter; impedance, 8 ohm nominal/4 ohm minimum; suggested list price: $980. Both models available in genuine walnut or oak wood veneers; suede grey Nextel.

DESIGN-DIRECT SOUND
6850 35th N.E., Suite 1, Seattle, WA 98115
(206) 527-4371

NEW PRODUCTS
SPEAKERS & MONITOR SYSTEMS
1 · 9 · 8 · 6

Product Name: CFD 2-25
Contact: Bob Rice
Date Product Introduced: February, 1985
Product Description & Applications: DDS adds a long throw horn to the CFD series, providing a tight pattern without beaminess. Advanced filament winding technology makes these highfreq's well suited for use with massive drivers in high level systems. No side wall losses as found in most handmade fiberglass throats. Suited best in applications which demand clear crisp highs in the back rows of concert halls and arenas. Custom manufacturing and modifications options are available on all DDS products.
Basic Specifications & Suggested List Price: 2" entry throat, functional frequency range 800Hz to 16kHz. X-over point 1.4kHz. 25H x 30V pattern. Balsa core, biaxial stitched fiberglass mat, continuous spun fiber reinforced throat and mounting flange. Mean directivity 29.6 (+7.1, -3.6dB) 17"H x 13"W x 18½"D. List price: $163.

DESIGN DIRECT SOUND
6850 35th N.E., Suite 1, Seattle, WA 98115
(206) 527-4371
Product Name: CFD 2-65
Contact: Bob Rice
Date Product Introduced: February, 1985
Product Description & Applications: Introducing a medium-throw continuous frequency distribution horn designed for near to medium field applications. Side fills, small mains to large monitor applications. Acoustic coupling in arrays for longer range patterns. The CFD design yields even coverage pattern over its frequency range. The pinched throat creates a zone for greater air to diaphragm coupling. All DDS products are warranted for five years.
Basic Specifications & Suggested List Price: 1.9" entry

DESIGN DIRECT SOUND
CFD 2-65

throat with horizontal slot. Functional frequency range 1.6k Hz to 14kHz. X-over point 1.6kHz, 65H x 50V pattern. Balsa core, biaxial stitched fiberglass mat, continuous spun fiber reinforced throat and mounting flange. Mean directivity 12.8 (+5.6, -3.2dB). 7"H x 14"W x 6¾"D. List price: $130.

ELECTRO-VOICE, INC.
Transplanar HP Horns

ELECTRO-VOICE, INC.
600 Cecil St., Buchanan, MI 49107
(616) 695-6831
Product Name: Transplanar HP Horns
Contact: Mary Ellen Long, PR & Media Services Mgr.
Date Product Introduced: August, 1985
Product Description & Applications: E-V's new Trans-Planar™ HP high-frequency horns feature revolutionary constant-directivity design for the most uniform beamwidth control in the industry. Cast into the metal throat section of every HP horn, beamwidth-control-vanes restore full coverage patterns above 10,000Hz, correcting the problem of high-frequency beaming found in other 2" throat constant-directivity designs. HP horns have mouth sizes only as large as needed to maintain rated coverage angles down to specified low-frequency limits. This directivity optimized size permits both compact cluster design and exceptional directivity control. All HP designs feature a unique TransPlanar joining of curved and straight-sided geometries for unusually smooth frequency response, optimal driver loading, uniform coverage to 20,000Hz and extremely convenient mounting. HP horns also feature integral metal throats which eliminate the cost and inconvenience of bolt-on throat sections, with a predrilled mounting flange for easy installation and "standard" form 2" exits. All HP horns are directly compatible with E-V's new high-performance DH1 and DH2 2" exit drivers.
Basic Specifications & Suggested List Price: All large format HP model numbers describe the horn's nominal coverage pattern: HP4020 (40°H x 20°V), HP6040 (60°H x 40°V), HP940 (90°H x 40°V). The model numbers of small format horns abbreviate coverage-angle information: HP420 (40°H x 20°V), HP640 (60°H x 40°V), HP940 (90°H x 40°V), and HP1240 (120°H x 40°V).

EMILAR
1365 N. McCan, Anaheim, CA 92806
(714) 632-8500
Contact: Algis Renkus

Date Product Introduced: May, 1985
Product Description & Applications: Bass loudspeaker 12", 400 watts, for PA systems, monitors.

GALAXY AUDIO
625 E. Pawnee, Wichita, KS 67211
(316) 263-2852
Product Name: Hot Spot P.A.
Contact: R.D. Moneyhun, Mgr.
Date Product Introduced: August, 1985
Product Description & Applications: The Hot Spot P.A. is a powered monitor or P.A. with 35 watts of clean power.
Basic Specifications & Suggested List Price: Suggested list price: $200.

GOLD SOUND
P.O. Box 141, Englewood, CO 80151
(303) 761-6483
Product Name: PRO-12
Contact: John D. Everhart, Marketing Mgr.
Date Product Introduced: January, 1985
Product Description & Applications: The Gold Sound PRO-12 Stage Monitor System combines the best 12" JBL/Electro-Voice/Klipsch loudspeakers with an efficient Foster horn to provide the professional musician with a high-quality monitor for as little as under $200. They are available as a kit in either a slant or box monitor. Other kits using JBL, E-V, and Audax are available up to the infamous Gold Sound PRO-18—a folded horn using an 18" JBL 22400H woofer, a 7" Audax mid-range, and JBL's best horn tweeter (the 2404) for clean punchy sound.
Basic Specifications & Suggested List Price: Gold Sound Pro-12: 150 watts RMS (Klipsch +60W), 55-15K ±3dB, 100dB, 8 ohm efficiency; for professional small monitor utilization. Gold Sound Pro-18: 600 watts handling, 38-22k Hz ±3dB, 8 ohm, 98dB efficiency; for professional stage stack use, all applications; available either as reflex cabinet or folded horn (horn=103dB).

JBL PROFESSIONAL
8500 Balboa Blvd., Northridge, CA 91329
(818) 893-8411
Product Name: Model 4425—Bi-Radial Studio Monitor
Contact: Ken Lopez, V.P. Sales
Date Product Introduced: February, 1985
Product Description & Applications: JBL's new model 4425 is a smaller version of the famous Bi-Radial™ studio monitors noted for their power-flat acoustic output. The 4425 is built around two completely new drivers and a new horn which provide smooth, un-colored reproduction from a monitor of modest size. The 4425 is ideally suited to smaller audio control rooms, auditioning rooms and video post-production rooms, or wherever the highest possible quality sound is desired in a limited space.
Basic Specifications & Suggested List Price: HF driver: 1" throat, titanium diaphragm w/edge-wound aluminum ribbon voice coil. LF driver: 12" SFG (Symmetrical Field Geometry) w/3" edge-wound copper ribbon voice coil. Power input: 200 watts IEC pink noise; sensitivity: 91dB; SPL: 1w/1m; dispersion: 90 degrees horizontal and vertical; frequency response: 40Hz to 16k Hz (±3dB); crossover: 1.2k Hz; continuous maximum SPL (stereo pair): 120dB; dimensions: 25H x 16W x 12D. Suggested retail price: $849 each speaker.

KLIPSCH AND ASSOCIATES, INC.®
P.O. Box 688, Hope, AR 71801
(501) 777-6751
Product Name: CP-1
Contact: P. Woody Jackson, Nat'l Sales Mgr.; Tracy Crawford, Design Eng.
Date Product Introduced: August, 1985
Product Description & Applications: The CP-1 is a 15" three-way, bass reflex system with horn loaded compression drivers for the mid-range and tweeter sections. The cabinet is constructed of void free ¾" plywood (heavily braced) with a 1" thick motorboard to prevent resonances. The finish is a durable textured black lacquer. Carrying handles, rubber feet, and a black grill cloth with aluminum insert are standard. Recommended for full range sound reinforcement applications.
Basic Specifications & Suggested List Price: Frequency response: 35Hz to 20kHz ±4dB; sensitivity: 100.5dB SPL @ 1 watt, 1 meter (measured in a 100 cu. ft. room); electrical power input: 299 watts max. avg. continuous; max. output: 123.5 dB @ 1 meter; impedance: 8 ohms nominal; 5.4 ohms minimum @ 150Hz.

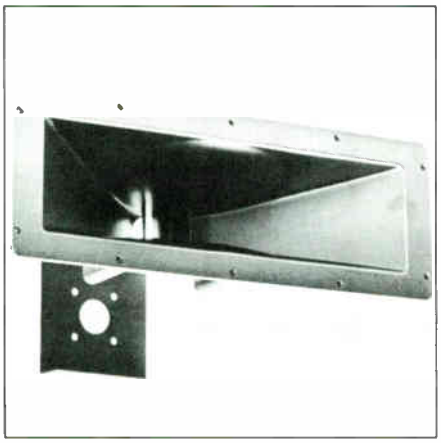
MEYER SOUND LABORATORIES, INC.
2832 San Pablo Ave., Berkeley, CA 94702
(415) 486-1166
Product Name: Meyer Sound 834 Studio Subwoofer
Contact: Pat Maloney, Sales Support
Date Product Introduced: March, 1985 (Hamburg A.E.S.)
Product Description & Applications: The Meyer Sound 834 Studio Subwoofer system consists of a matched pair of 8 cu. ft. vented cabinets each containing a single MS-18 cone loudspeaker and network. The system is designed to reproduce frequencies below 100Hz in order to extend the power bandwidth of the Meyer Sound 833 Studio Reference Monitor System. The combined 833/834 system is capable of output levels exceeding 130dB SPL while maintaining a frequency response of 30Hz to 20kHz ±4dB. The 833/834 Studio Reference Monitor System is recommended to users who require accurate reproduction at all listening levels. Applications include: critical monitoring at both high and low SPLs; realistic amplifier evaluation and testing; accurate monitoring of synthesized sounds; low-frequency reproduction of film and theatrical sound effects.
Basic Specifications & Suggested List Price: Frequency response: 25-18k Hz ±4dB; time response: ±350 microseconds 100-20k Hz, ±25 microseconds 2,000-20k Hz; maximum SPL: continuous 120dB, peak 130dB; HF coverage pattern: horizontal 80 degrees, vertical 40 degrees. Suggested list price: $2,500 per pair.

MTX LOUDSPEAKERS
One Mitek Plaza, Winslow, IL 61089
(815) 367-3811
Product Name: RS-215
Contact: Rob Landsberg, Nat'l Sales Mgr.
Date Product Introduced: Summer, 1985 CES
Product Description & Applications: The powerhouse of the MTX Pro Line, the RS-215 is a portable system specifically designed to meet the demands of the music and audio professional. It's a multi-purpose professional speaker system. As a premier bass guitar and synthesizer system, the RS-215 offers crisp, tight and smooth response over the entire frequency range. Also an excellent music replay system for mobile DJ and disco sound reinforcement applications where loud volume and outstanding bass are required.
Basic Specifications & Suggested List Price: Features (2) 15" polypropylene woofers. It handles up to 400 watts RMS; sensitivity: 96.9dB at 1 meter with 1 watt input; frequency response: 20-20,000Hz; nominal impedance: 8 ohms; shipping weight: 128 lbs. The RS-215 measures 46 1/16"H x 16 3/16"W x 21 3/8"D. Suggested retail: $599 each.

NEW PRODUCTS
SPEAKERS & MONITOR SYSTEMS
1 · 9 · 8 · 6

MTX LOUDSPEAKERS
One Mitek Plaza, Winslow, IL 61089
(815) 367-3811
Product Name: PA-210
Contact: Rob Landsberg, Nat'l Sales Mgr.
Date Product Introduced: Summer CES, 1985
Product Description & Applications: PA-210 drivers are custom-designed to provide smooth, efficient performance. A versatile system, the PA-210 is an exceptional guitar speaker. Two stand-mounted PA-210s used with stereo guitar effects, such as stereo chorus or digital delay, provide brilliant audio. Long throw woofer design results in extended sound projection, ideal for large area applications. Cabinet enclosure is designed to enhance acoustic performance. Covered with heavy-duty carpeting, the PA-210 is a striking addition to any stage setup.
Basic Specifications & Suggested List Price: The PA-210 has a frequency response from 40 to 20,000Hz; sensitivity: 94.4dB at one meter with one watt input; the system handles up to 200 watts RMS; nominal impedance: 8 ohms; dimensions: 17¾"H x 23¾"W x 12⅜"D; shipping weight: 55 lbs. Suggested retail: $399 each.

NADY SYSTEMS, INC.
1145 65th St., Oakland, CA 94608
(415) 652-2411
Product Name: Infrared Cordless Studio Monitor System
Contact: Pete Kalmen, Sales Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: IRT-200 System—a cordless infrared headphone studio monitor system includes IRT-200M transmitter and IRH-210M headphone receiver. The system allows musicians to monitor through a high-fidelity headphone, without the restriction of headphone cords, delivering a crisp, clear sound at audio levels required for effective studio monitoring. Headset features adjustable headband, separate volume controls for each ear, and 360° reception zone. Add slave transmitters as needed for complete coverage of any size room.
Basic Specifications & Suggested List Price: Power: IRT DC powered, IRH-9V battery; full freq. response: 50-15,000Hz; noise level: -59dB; distortion: under 1% @ 1kHz; effect. range and coverage: approx. 600 sq. ft, or 180 sq. M w/both IRT-200M and IRT-200S; audio carriers: FM modulated 108 MHz (L ch.) and 185 MHz (R ch.); stereo separation: over 40dB. Suggested list price as of 7/1/85: $169 for system (IRT-200M, IRH-210M w/AC/DC adaptor).



NORTHWEST SOUND, INC.
340F Radial Horn

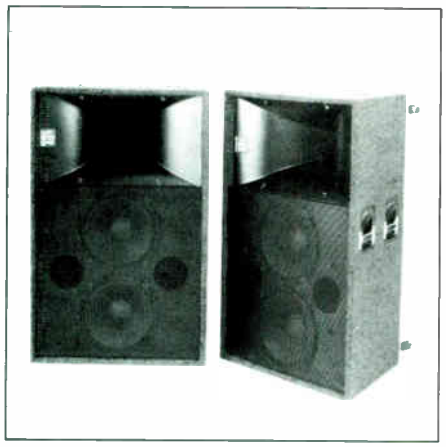
NORTHWEST SOUND, INC.
10761 N. Lombard, Portland, OR 97203
(503) 286-9411
Product Name: 340F radial horn
Contact: Bryan Jonathan, Sales Mgr.
Product Description & Applications: The model 340F is a high quality flush mount radial horn. The design combines principles of mathematics and fluid dynamics to achieve performance unparalleled by other horns available. Three extruded vanes are positioned in the throat to allow mathematically correct exponential expansion of the horn without vertical restrictions. The 340F has a smooth sound without coloration introduced by the horn itself making it very popular for recording studio monitors. The driver is actually supported by a bracket installed between the driver and horn, removing all stress from the horn.
Basic Specifications & Suggested List Price: Usable low frequency limit: 800Hz; recommended crossover point: 800Hz; dispersion pattern: 90 degrees horizontal x 40 degrees vertical; sensitivity: (measured with TAD TD4001 driver swept from 800Hz to 20kHz with 1.0W input, 110dB SPL, 1W, 1M); throat diameter: 2" nominal; construction: one piece molded non-resonant structural foam; finish: black texture; dimensions: 8.25"H x 23"W x 9.125"D; accessories: (order separately) horn mounting bracket, 2" to 1" throat adapter, 2" to 1.4" throat adapter; shipping weight: 7 lbs. $147 (quantity discounts).

PA CONCERTS LTD.
450 W. Taft, South Holland, IL 60473
(312) 339-8014
Product Name: Wonderbox
Contact: Rob Vuklich, President; Mike Acklin, Manager
Date Product Introduced: January, 1985
Product Description & Applications: The ultra-compact three-way speaker is time & phase coherent (without the aid of electronics) & features constant beamwidth above 500Hz. The system is designed to be used in conjunction with the intersonics servo-drive subwoofer & will achieve SPL's equal to systems three to five times its size. A Wonderbox system can be flown from two genie towers to allow flying in venues where rigging is unavailable.
Basic Specifications & Suggested List Price: Frequency response: 80 to 20k Hz, (±2dB); nominal dispersion: 60° x 40°; recommended power: 2250 watts; size: 30" x 27.5" x 22.5"; weight: 180 lbs. Price: $4,000.

PA CONCEPTS, LTD.
450 W. Taft, South Holland, IL 60473
(312) 339-8014
Product Name: Wonderbox II
Contact: Rob Vukelich, President; Mike Acklin, Manager
Date Product Introduced: January, 1985
Product Description & Applications: The ultra-compact two-way speaker is time & phase coherent (without the aid of electronics) & features constant beamwidth above 500Hz. The system is designed to be used in conjunction with the intersonics servo-drive subwoofer & is intended for venues of 5000 or less. Two to four Wonderbox IIs can be flown from two genie towers to facilitate flying in venues where no rigging is available.
Basic Specifications & Suggested List Price: Frequency response: 80-16k Hz (±2dB); nominal dispersion: 60° x 40°; recommended power: 750 watts; size: 30" x 27.5" x 22.5"; weight: 170 lbs. Retail price: $3,200.

PIONEER ELEC. INC. USA/TECHNICAL AUDIO DEVICES
5000 Airport Plaza Dr., Long Beach, CA 90815
(213) 420-5700
Product Name: TH-4001 Stabilized Dispersion Horn
Contact: Randy Dowis, Sales & Marketing Mgr.
Date Product Introduced: January, 1985
Product Description & Applications: The TAD TH-4001 is a stabilized dispersion horn designed specifically for use with our TD-4001 high frequency or any other 2" throat high compression driver. The horn provides excellent dispersion of all frequencies including frequencies above 10kHz. Computer measurements of actual room acoustics have been employed to insure optimized dispersion patterns. High resolution is another result of our acoustic engineering. The horn is made of genuine maple for clean natural sound.
Basic Specifications & Suggested List Price: Cut-off frequency: 320Hz; flare type: hyperbolic curve; radiation angle: 90° (horizontal)/40° (vertical); throat diameter: 1 31/32" 50 mm; driver mounting system: P.C.D. 4"/101.6mm L 90° 4 bolt. Suggested retail price: $1,200 each.

PROFESSIONAL AUDIO SYSTEMS
1224 W. 252nd St., Harbor City, CA 90710
(213) 534-3570, Telex: 469539
Product Name: Modular Reinforcement System 2 (MRS-2)
Contact: Roger DuNaier, Sales Mgr.
Date Product Introduced: February, 1985
Product Description & Applications: The MRS-2 is a fully time corrected two-way PA system, designed for high level sound reinforcement applications where the larger MRS-1 is not practical. Supplied with its own System Processor, additional crossovers, limiters or other electronics are not needed. Permanently set in the processor is the proper time correction, the turn-on/turn-off relay protection, subsonic and supersonic filters and the crossover section. The only controls are: on-off, output for low & high, and the limiters.
Basic Specifications & Suggested List Price: Frequency response: 40Hz to 15kHz ±3dB; phase response: 100Hz to 10kHz ± 10°; dimensions: 32"W x 23"D x 51"H; weight: 185 lbs. Retail price: mono, $3,000; stereo, $3,500.



PROFESSIONAL AUDIO SYSTEMS
Modular Reinforcement System 2

RAINBOW PRODUCTIONS OMAHA
2322 So. 64th Ave., Omaha, NE
(402) 554-0123
Product Name: 1812 Overkill
Contact: Nils Anders Erickson
Date Product Introduced: January, 1985
Product Description & Applications: 4-way, time coherent bins featuring: two eighteens, two twelves, one 2-inch, one 1-inch, all JBL components. 9-ply birch plywood, epoxy finish mag wheels with grease zerks.
Basic Specifications & Suggested List Price: 30-19,000Hz (±3dB). List price: $4,000.

RAULAND-BORG CORPORATION
3535 W. Addison St., Chicago, IL 60618
(312) 267-1300
Product Name: MLS-6
Contact: Sales Engineering Dept.
Date Product Introduced: October, 1985
Product Description & Applications: The MLS-6 is a two-way loudspeaker system which incorporates a 15" bass speaker and a 98H x 58V constant directivity type horn in a compact enclosure. The MLS-6 has wide frequency response and high sensitivity for applications requiring high level quality sound reproduction. It is well suited for reinforcement or music applications in auditoriums, churches, theaters, night clubs or other installations demanding high performance in a compact manageable package.
Basic Specifications & Suggested List Price: Frequency response: 50-15k Hz; power handling capacity: 100 watts RMS; sensitivity: 99dB 1W/1M; 29"(73.7cm)H x 18.5" (47cm)W x 13" (33cm)D; (specifications subject to change).

RENKUS HEINZ INC.
17851 AB Sky Park Cir., Irvine, CA 92714
(714) 250-0166
Product Name: Smart Jr. SJ-2/SJ-6
Contact: George Meals, Sales Mgr.
Date Product Introduced: March, 1985
Product Description & Applications: Smart Jr. is an optimized active/passive loudspeaker system. By using active signal processing, the basic performance of passive loudspeaker systems is improved. A doubling of output is possible with enhanced reliability.
Basic Specifications & Suggested List Price: SJ-2 uses a high performance 15-inch woofer with a 2-inch driver in conjunction with the XJ signal processor to produce 131dB at one meter from 40-17k Hz. The SJ-6 uses two 12-inch woofers and a 1-inch driver for a max. output of 130dB/1 meter from 50-20k Hz.

SENNHEISER
48 W. 38th St., New York, NY 10018
(212) 944-9440
Product Name: HD 230
Contact: Anthony D. Cafiero, Product Manager
Date Product Introduced: February, 1985
Product Description & Applications: Circumaural headphone featuring closed ear drivers for maximum acoustic isolation and full frequency response. Capable of an incredible 12 octave range, this headphone offers two-way drivers, samarium cobalt magnets, notch adjustable headband suspension strap, and user replaceable components.
Basic Specifications & Suggested List Price: Frequency response: 10-30,000Hz; impedance: 600 ohms; weight: 9.2 oz. cord length: 10 ft. (stranded steel); connector: ¼-inch stereo phone plug. Price: $169.

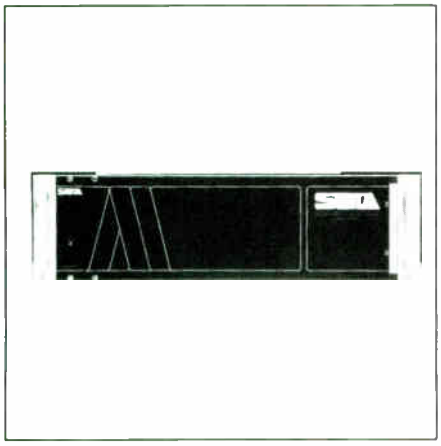
SENNHEISER
HD 230

STATE-OF-THE-ART ELECTRONIK INC.
1995A St. Joseph Blvd., Ottawa
Ontario, Canada K1C 1E5
(613) 830-5002
Product Name: AAX-1 Acoustic Align Crossover System
Contact: Dr. Claude Fortier
Date Product Introduced: January, 1985
Product Description & Applications: An electronic crossover system featuring proprietary (pat. pending) filters which provide equal phase and time outputs for all bands. Some of the features are: flat summed magnitude response; dual channel 2-way, 3-way or 4-way operation; 24 dB/octave slope filters (6dB down at crossover); fully modular design with individual, adjustable equalization available for each band on plug-in cards; and optional time delay compensation plug-in cards configurable for the adjustment of any multi-way speaker system.
Basic Specifications & Suggested List Price: Filter type: 24dB/octave phase corrected all pass; frequency response: 20Hz to 20kHz, ±0.1dB of calculated filter response; THD (+18 dBm output): .002% typical @ 1kHz; signal to noise ratio: greater than 100dB, 22Hz to 22kHz (RMS); dimensions: 483 x 134 x 254 mm. Price: $2,399.

—PHOTO ON PAGE 178

—LISTING ON PAGE 177

NEW PRODUCTS
SPEAKERS & MONITOR SYSTEMS
1 · 9 · 8 · 6

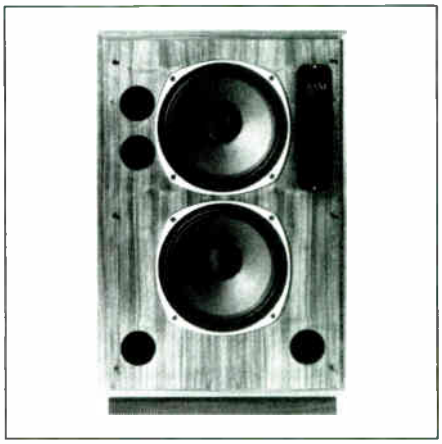


STATE-OF-THE-ART ELECTRONIK INC.
AAX-1 Acoustic Align Crossover System

STATE-OF-THE-ART ELECTRONIK INC.
1995A St. Joseph Blvd., Ottawa
Ontario, Canada K1C 1E5
(613) 830-5002
Product Name: CF-1000 and CF-2000 Acoustic Align Studio Monitors
Contact: Dr. Claude Fortier
Date Product Introduced: January, 1985
Product Description & Applications: The CF-1000 and CF-2000 are 4-way, acoustic align all-cone monitor systems designed to deliver high sound pressure levels in control room applications formerly served only by systems employing horn loaded mid-range and high frequency drivers. The performance of both systems is unprecedented in terms of flatness of frequency response, phase response and group delay. Both systems employ the AAX-1 Acoustic Align electronic crossover system.
Basic Specifications & Suggested List Price: Type: 4-way electronic crossover, all cone monitors; frequency response: 39Hz to 20kHz, ±1.5dB on axis; maximum output: 119dB SPL continuous, 122dB SPL program at 1m; power handling: 600 + 200 + 100 + 56 watts (per driver); dimensions: (W x H x D) CF-2000 (dual 15" woofers) 1100 x 800 x 530 mm; CF-1000 (single 15" woofer) 770 x 900 x 510 mm. Price: CF-2000, $2,750; CF-1000, $2,350.

STATE-OF-THE-ART ELECTRONIK INC.
CF-1000 and CF-2000 Monitors

SYNDER SYSTEMS
16638 E. Warren, Ref, MI 48224
(313) 884-1790, 881-5167
Product Name: SSTLB-1
Contact: Billy Club, Chief Cabinet Designer
Date Product Introduced: June, 1985
Product Description & Applications: SSTLB-1 — A one box (2 cabinets) time aligned portable PA system designed for medium to large bars, halls, theaters, etc. Also to be used in conjunction for small to medium sized venues. Designed for easy loading: low end on coasters w/double handles & mid-horn w/double handles; both are ozite covered w/aluminum extrusion & session corners & back plates. Perfect for local PA rental.
Basic Specifications & Suggested List Price: Low end consisting of two 18", 3" V.C. speakers in a Thiele aligned cabinet. Mid-horn cabinet holds two 12" 2½" V.C. speakers in a horn loaded position, while two radial horns, w/30 watt drivers, top off the cabinet. Available only on a direct basis at a cost of $1,000.



TANNOY NORTH AMERICA INC.
Tannoy FSM

TANNOY NORTH AMERICA INC.
97 Victoria St. North, Kitchener
Ontario, Canada N2H 5C1
(519) 745-1158
Product Name: Tannoy FSM
Contact: Bill Calma, Marketing Mgr.
Date Product Introduced: July, 1985
Product Description & Applications: The new FSM is a natural addition to Tannoy's dual concentric SRM Series. Improvements in specification have resulted in a high power, high sensitivity studio monitor capable of resolving fine detail at extremely high SPL. The twin 15" FSM is divided into two totally separate internal chambers. The bass reflex system employs one 15" dual concentric for mid-hi frequency and one 15" transducer for bass. The system utilizes an LF Window™ for low frequency equalization and "hardware" crossover network technology.
Basic Specifications & Suggested List Price: Power handling: 500 watts, 8 ohms RMS; sensitivity: 97dB @ 1w, 1m; frequency response: 30Hz-20kHz; dimensions: 41"H x 28"W x 21"D; weight: 180 lbs. U.S. retail: $3,998/pair.

UREI
8500 Balboa Blvd., Northridge, CA 91329
(818) 893-8411
Product Name: Model 809—Time Align Studio Monitor
Contact: Ken Lopez, V.P. Sales
Date Product Introduced: May, 1985
Product Description & Applications: The new UREI Model 809 Time Align® studio monitor is a 12" version of the famous UREI Time Align series monitors. The newly developed drivers of the 809 produce the same tight, uncolored sound quality and imaging that characterizes the larger Time Align monitors, such as the Model 813, while allowing smaller control room spaces to benefit from their small size and low price. The 809 makes an ideal near-field monitor and thus is well suited to adverse acoustical environments such as acoustically untreated control rooms and remote location monitoring.
Basic Specifications & Suggested List Price: Frequency response: 50Hz to 17.5kHz (±3dB); power input: 100W / 50Hz-20kHz, pink noise; sensitivity: 93dB SPL, 1W, 1M; crossover: 2.2kHz; impedance: 8 ohms; dimensions: 23W x 16.5H x 13.5D; optional grille: 809G; weight: 60 lbs. Suggested retail price: $699.

WESTLAKE AUDIO
2696 Laubry Court, Bldg. 18, Newbury Park, CA 91320
(805) 499-3686
Product Name: BBSM-4
Date Product Introduced: April, 1985
Product Description & Applications: This 2-way portable reference monitor using two 4" woofers and a ¾" dome tweeter produces a coherent wave front at extremely close range. As a small Q.C. monitor, it will reveal the smallest

WESTLAKE AUDIO
BBSM-4

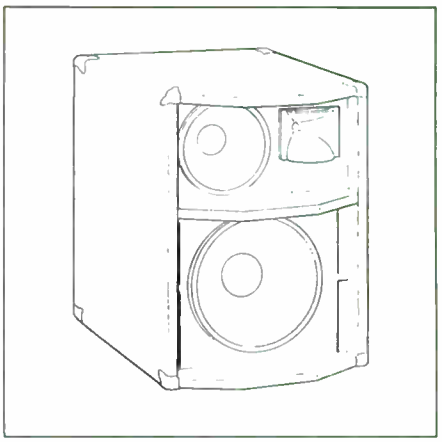
nuances in the recording including small changes in the stereo placement.

WESTLAKE AUDIO
2696 Laubry Court, Bldg. 18, Newbury Park, CA 91320
(805) 499-3686
Product Name: BBSM-5
Contact: Tom Whitaker
Date Product Introduced: April, 1985
Product Description & Applications: This portable reference monitor is designed to provide accurate imaging at very close distances.
Basic Specifications & Suggested List Price: Frequency response: (±3dB) 80Hz to 15kHz; dimensions: 10.5"H x 18"W x 9.5"D; two 5" woofers and 1.25" dome tweeter. Prices: $595 each in black w/o grill; BBSM-5F are $649 each in walnut w/grill.

Basic Specifications & Suggested List Price: Frequency response: (±3dB) 65Hz-20kHz; sensitivity: 89dB/w/m; nominal impedance: 4 ohms; dimensions: 8"H x 15"W x 10"D. Prices: $495 each in black; $549 each in walnut w/grill.

WESTLAKE AUDIO
BBSM-5

YORKVILLE SOUND
56 Harvester Ave., Batavia, NY 14020
(416) 751-8481
Product Name: Elite Model Spectrum 400
Contact: Mike Holman, Sales Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: A compact 400-watt, 3-way concert speaker system with ±3dB linearity from 55Hz to 20kHz. Drivers include an RCF L15/541 15" woofer, Beyma's 10" 6150 for mid-range and their model CP25 high-frequency compression horn. The crossover features 18 dB/octave slopes, current sensing and dual circuit breakers. The enclosure is a time-aligned, vented reflex constructed of ¾", 6-ply poplar covered in black ozite carpeting with a black aluminum grill.
Basic Specifications & Suggested List Price: Frequency response: 55Hz-20kHz (±3dB); low-frequency limit: 40Hz; sensitivity: 98dB; maximum continuous SPL: 124dB; program power capacity: 400 watts; nominal impedance: 8 ohms; drivers: (see above); crossover: 3-way, 18dB/octave with overload protection; enclosure: bass reflex; dimensions: 27¼" x 29" x 20". Price: $845.



YORKVILLE SOUND
Elite Model Spectrum 400

YORKVILLE SOUND
56 Harvester Ave., Batavia, NY 14020
(416) 751-8481
Product Name: Elite Model Micron 600
Contact: Mike Holman, Sales Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: A 600-watt, stand-mounted, linear speaker system capable of generating continuous 130dB sound-pressure levels. The matching P-600 processor provides low-frequency equalization and a stereo active crossover for optionally bi-amping bass bins. The two RCF L10/750's and H2009/N481 horn/driver are regulated by an 18dB/octave crossover with current sensing, a fuse and a circuit breaker. Enclosure construction is ¾", 6-ply poplar & maple covered in black ozite carpeting.
Basic Specifications & Suggested List Price: Frequency response (with P-600 processor): 50Hz-16kHz ±3dB; program power capacity: 600 watts; sensitivity: 103dB @ 1w/1m; maximum continuous SPL: 130dB; drivers: 2 x 10" RCF L10/750, 1 x RCF H2009/N481 horn & driver; crossover: 18dB/octave; dimensions: 19" x 23" x 13". Price: $1,695 per pair including processor.

NEW PRODUCTS
TEST & MAINTENANCE GEAR
1 · 9 · 8 · 6

AUDIO PRECISION, INC.
System One

AUDIO PRECISION, INC.
P.O. Box 2209, Beaverton, OR 97075
(503) 297-4837
Product Name: System One
Contact: Bob Metzler, President
Date Product Introduced: April, 1985
Product Description & Applications: System One: comprehensive audio test system makes distortion, noise, level, frequency, and phase measurements in seconds with graphic results on personal computer screen. Tests consoles, tape machines (has flutter-tolerant distortion measurement circuitry), amplifiers, signal processors. Industry's best specifications; the only automated audio test equipment good enough to test 16-bit digital audio. Menu and panel operated (no programming). Print results to dot-matrix printer, save test data and set-ups to disk, retrieve tests from disk and run.
Basic Specifications & Suggested List Price: Generator +30dBm @ 0.0008% THD; generator and analyzer flatness 0.05dB 20Hz-20kHz; total system residual THD+N 0.001% 50Hz-5kHz, 0.0018% 20Hz-20k Hz. Generator range 10Hz-200kHz, analyzer bandwidth 10Hz-500kHz. Tests and graphs THD+N and frequency response 20Hz-20kHz in 10 seconds.

BRUEL & KJAER INSTRUMENTS, INC.
185 Forest St., Marlborough, MA 01752
(617) 481-7000
Product Name: Speech Transmission Meter Type 3361
Product Description & Applications: For objective assessment of speech intelligibility in auditoria, theatres, schools and industry, Bruel & Kjaer has developed a speech transmission meter based on measurement of the Speech Transmission Index according to the RASTI method. Applications include optimizing of speech reinforcement systems, assessment of public address systems and investigation of acoustical privacy. The Bruel & Kjaer Speech Transmission Meter Type 3361 allows the measurement of an index of speech transmission to be made in less than 10 seconds.
Basic Specifications & Suggested List Price: The Type 3361 consists of two instruments: Transmitter Type 4225 and Receiver Type 4419. The transmitter emits a test signal consisting of a pink noise carrier which is intensity modulated with 9 modulation frequencies between 0.7Hz and 11.2Hz. The receiver analyzes the incoming signal and calculates the Rapid Speech Transmission Index (RASTI).

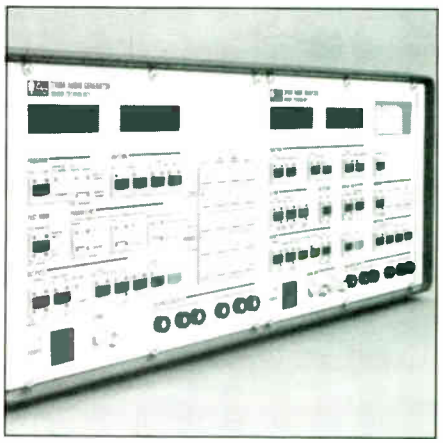
CAIG LABORATORIES, INC.
1175-O Industrial Ave., P.O. Box J
Escondido, CA 92025
(619) 743-7143
Product Name: Cramolin®

CAIG LABORATORIES, INC.
Cramolin®

Contact: Mark Lohkemper
Date Product Introduced: Late 1984
Product Description & Applications: Cramolin is a fast-acting anti-oxidizing solution that cleans, preserves & lubricates all metal surfaces, including gold. When Cramolin is applied to metal contacts and connectors, it removes resistive oxides. Cramolin forms a protective molecular layer that adheres to the metal surfaces and maintains maximum electrical conductivity, thus preventing future contamination. Use on: switches, potentiometers, relays, PCB connectors, batteries, faders, interconnecting cables, plugs, jacks, etc. Applications are unlimited.
Basic Specifications & Suggested List Price: Reduces contact resistance to its minimum values, reduces sparking, improves performance of contacts & connectors, protects against salt air and sulfidic atmospheres, will not absorb moisture, adheres to metal surface. Cramolin R-2 Spray Tech Kit: $9.95. Cramolin Electronic Maintenance Kit: $16.95.

ELECTRO SOUND, INC.
160 San Gabriel Dr., Sunnyvale, CA 94086
(408) 245-6600
Product Name: ES 4300 Quality Control Equipment
Contact: David Bowman, Sr. V.P.
Date Product Introduced: January, 1985
Product Description & Applications: The Series 4300 quality control products have been updated. The ES4312 Test Signal Generator and the ES4316 System Quality Monitor now incorporate ISO standard frequencies and are calibrated from commonly available standard tapes. All calibrations are held in non-volatile memory to avoid loss during power failures. The ES4320 Precision Slave Calibrator is reconfigured to fit on virtually all brands of duplicator slaves. The new ES4312 Real Time Test Signal Generator is now available for making system alignment tapes in the mastering studio.

RECORTEC, INC.
275 Santa Ana Ct., Sunnyvale, CA 94086
(408) 737-8441
Product Name: Video Cassette Evaluator
Contact: Mat Ceterski, V.P. Mktg.
Date Product Introduced: September, 1985
Product Description & Applications: Recortec's Video Cassette Evaluators (VCE) provide high speed testing of either ¾" or ½" cassettes to determine their suitability for reuse. Testing is done at fast-forward speed of professionally modified cassette decks furnished with the VCE and results are given on built-in displays or printed by an optional printer.
Basic Specifications & Suggested List Price: Tests tape magnetically for dropouts and edge damage using principles established by Recortec in other video tape testing equipment. Test speed is approximately twice the rewind speed of the cassette player used.



SOUND TECHNOLOGY, INC.
3000 Series Programmable Transmission/ Audio Test System

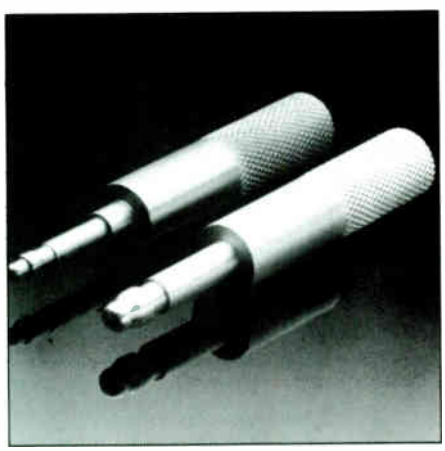
SOUND TECHNOLOGY, INC.
1400 Dell Ave., Campbell, CA 95008
(408) 378-6540
Product Name: 3000 Series Programmable Transmission/ Audio Test System
Contact: Cindy Alderson, Sales; Kent McGuire, Sales Mgr.
Date Product Introduced: NAB, 1985
Product Description & Applications: The Model 3100A Programmable Audio Generator and the Model 3200A Programmable Transmission/Audio Analyzer have the capability of automation without the use of external controllers—whether they are packaged together or the analyzer is at a remote location. Store and chain together front panel set-ups into internal memory and communicate through the line you are testing using frequency shift keying (FSK). Two channel, balanced output, fast, repeatable, RF immunity, analog and digital displays, hard-copy results.
Basic Specifications & Suggested List Price: Outputs two channel, sine wave, square wave, SMPTE IMD, tone burst, sine/step. Analyzes level, signal-to-noise, quantitization noise, THD versus level and frequency, phase error, channel separation. 30 ms to make a level reading and 500 ms to make a THD measurement. The 3000A is $11,750 in single mainframe plus $850 for IMD.

TEKTRONIX, INC
P.O. Box 500, D/S 58-699, Beaverton, OR 97077
(503) 627-2230
Product Name: TSG-170A NTSC Sync & Test Signal Generator
Contact: Cindy Naucler, PR Supervisor
Date Product Introduced: April, 1985
Product Description & Applications: Tektronix's new TSG-170A NTSC television generator combines a cost effective complement of test signals with a full genlock sync generator, all in a rugged 1¾" rack mounted package. Designed for easy operator, this ten-bit digital test generator and stable RS-170A sync generator can be expanded to include an additional SMPTE color bar test signal, with a unique programmable I.D. generator and an audio tone. It allows simple front panel or remote control of signal selection, test signal timing, and separate sync output timing.
Basic Specifications & Suggested List Price: The new generator will be available for delivery in September of '85

and will list at $4,800. Optional SMPTE color bars, I.D. and audio tone will be available for an additional $1,000.

TEKTRONIX, INC.
P.O. Box 500, D/S 58-699, Beaverton, OR 97077
(503) 627-2230
Product Name: TSG-300 Component Analog Test Signal Generator
Contact: Cindy Naucler, PR Supervisor
Date Product Introduced: April, 1985
Product Description & Applications: The versatile TSG-300 Component Television Generator provides direct digital test signal generation in a wide range of commonly used formats, without need for format transcoders. The TSG-300 test signal complement includes color bars, linearity, pulse and bar, and multiburst, as well as new component test signals. It accommodates a number of component formats, including RGB, YUV (EBU or Betacam™), YIQ (M Format) and Y, CTDM.
Basic Specifications & Suggested List Price: The Generator uses 10-bit digital signal generation at 13.5MHz, and can be used in either 525/60 or 625/50 systems. The TSG-300 will be available for delivery in October of '85.

TENTEL
1506 Dell Ave., Campbell, CA 95008
(408) 379-1881
Product Name: Tentelometer® field calibration weight set
Contact: Wayne Graham, Sales Mgr.
Date Product Introduced: April, 1985
Product Description & Applications: Calibration set to allow Tentelometer tape tension gauges to be checked for damage, to factory specification, in the field. The set also allows tension gauges to be "tweaked" up for maximum accuracy on any application. Comes complete with carrying case with tape sample compartment, and complete instruction manual.
Basic Specifications & Suggested List Price: New WS108 allows weight increments of one ounce between one and 8 ounces and lists for $39. The WS120 goes from 1 to 20 ounces in one ounce increments and sells for $49.



VERTIGO RECORDING PRODUCTS
Patch Bay Cleaning Tools

VERTIGO RECORDING PRODUCTS
12115 Magnolia Blvd. #116, N. Hollywood, CA 91607
(818) 769-5232
Product Name: Patch Bay Cleaning Tools
Contact: Charles Bolois/C.E.
Date Product Introduced: December, 1984
Product Description & Applications: New patch bay cleaning tools from Vertigo: two tools, two sizes, correct the most common patch bay problems without disassembling the bay. Vertigo Burnishers are machined from hard steel and are hard chrome plated. The probes' tip has a special burnishing finish that cleans patch jacks when inserted into the patch bay. Vertigo Injectors enable chemical solvents to be directed at the breaking contacts (normals) behind the patch jack.
Basic Specifications & Suggested List Price: Vertigo patch bay tools can be used to clean all forms of contamination caused by smoke, moisture, corrosion, and spills. Effective and durable, they are priced at $29.95 each for both ¼" TRS and TT (bantam) patch bays.

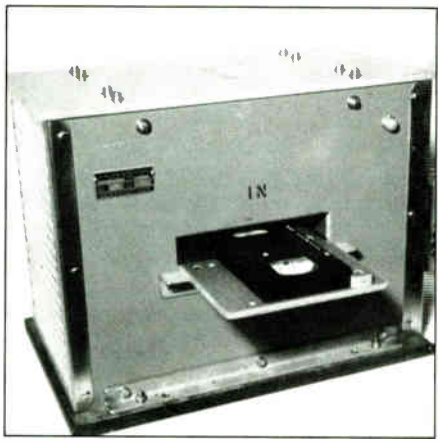
NEW PRODUCTS
OTHER EQUIPMENT
1·9·8·6

AARMOR CASE
420 N. Dexter, Ionia, MI 48846
(616) 527-2120
Product Name: Series 3 Case
Contact: Steve Catlin
Date Product Introduced: January, 1985
Product Description & Applications: Aarmor manufactures a full line of shipping and handling cases. From the top of the line Aarmor ATA air freight shipping cases to the Series II, medium duty case line and the Series III, medium light duty cases. Aarmor has literally thousands of stock designs for audio, lighting, video and film equipment. Aarmor can design and build custom cases for practically anything.
Basic Specifications & Suggested List Price: Aarmor ATA: for air freight and common carrier applications. Series II: for limited air freighting and rugged hand carrying applications. Series III: designed for hand carrying and storage applications.

THE ACCESSORY
810 E. 260th St., 2nd floor, Euclid, OH 44132
(216) 289-1294
Product Name: The Record Rack® Modular Record Storage System
Contact: Jon W. Bugos, President
Date Product Introduced: February, 1985
Product Description & Applications: The Record Rack is an all-wood patented, designer record storage system. Albums are stored in a vertical position to prevent warpage and breakage. Can be used as a speaker stand, end table, or an endless array of wall storage systems. Should one side be damaged, unit can be flipped over to receive new top side. A decorative, practical, and functional piece of furniture.
Basic Specifications & Suggested List Price: Model: One 13½ x 13 x 11¼ inches, 7 lbs; storage: 28 single or 14 double albums. Retail: Model One $29.95. Model: Elite 13½ x 13 x 16 inches, 12 lbs; storage: 36 single or 18 double albums. Elite available in three styles: mediterranean, provincial, traditional. Retail: Model Elite $49.95. Note: Both models are sold unassembled, unfinished in a natural birch veneer.

ADC TELECOMMUNICATIONS INC.
4900 W. 78th St., Minneapolis, MN 55435
(612) 835-6800
Product Name: Pro-Patch MK-II
Contact: Lonnie Pastor, BCST Product Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: Self-contained, 24 circuit audio patch bay featuring ADC's exclusive QCP insulation displacement (punch-down) cable termination system and S.A.I.L.S. (Self Adhesive Identification Label System) designation strips.
Basic Specifications & Suggested List Price: 24 circuit patch bays: PPA1-14, 1-3/4x19x14"; PPA3-14", 3½x19x14"; PPA3-18, 3½x19x18". List price: $640.

R.B. ANNIS CO.
1101 N. Delaware St., Indianapolis, IN 46202
(317) 637-9282
Product Name: Trans-Field Bulk Eraser
Contact: R.B. Annis
Date Product Introduced: January, 1985
Product Description & Applications: Annis Trans-Field Bulk Erasers for production erasing of audio and video tape and cassettes as well as computer floppy disks. Tapered gradient design permits a rapid, straight-through pass, no work rotation or turn-over required. These virgin level erasers are so powerful they are not recommended for use with large aluminum reels due to eddy current heating of the aluminum.
Basic Specifications & Suggested List Price: Trans-Field erasers are available in erasing widths ranging in widths from 6" to 18" in 3" increments; actual opening widths are 2" greater. Opening heights available from ⅜" to 2¼". Duty ratings, from continuous to practical intermittent, depending on requirement. Power input ranges from 3 to 35 kva, for operation on 208 volts or higher, as specified by customer.



R.B. ANNIS CO.
Trans-Field Bulk Eraser

AUDICO, INC.
219 Crossen Ave., Elk Grove, IL 60007
(312) 640-1030
Product Name: 619-T Video Cassette Timer/Rewinder
Contact: Bill Hinkle
Date Product Introduced: April, 1985
Product Description & Applications: Video tape length verifier for U-matic, VHS and Beta cassettes. Provides readout in feet of length of tape. Single unit can be equipped for all three formats. Rewinds tape in one-half the time of recorders, and performs the operation under safe, cooler conditions. The Model 619-T can also be used as part of a video loading system, either as the take-up or as the feed unit to cross transfer tape directly between cassette housings.
Basic Specifications & Suggested List Price: List price of Model 619-T for one format is $1,400. Additional formats are $975 each. Video loading systems with timer/rewinder feature cost $4,975 and up.

AUDIOLAB ELECTRONICS, INC.
3725 Esperanza Dr., Sacramento, CA 95864
(916) 485-0500
Product Name: TD-4A
Contact: Ron Stofan, Sales Mgr.
Product Description & Applications: For heavy-duty radio, television, computer, and audio-visual use. Features strong degaussing field for full erasure of high coercivity tape, high-low operation with continuous duty on low, ferrotune design, built-in blower, timer with adjustable on and automatic shutoff, 5/16" center post with NAB hub; erases reels up to 14" diameter and 1" wide. Tapes may be erased in carton.
Basic Specifications & Suggested List Price: Available in 115 and 230 volt, 50-60 Hz models; size 13 x 7 x 4 inches, shipping weight 46 lbs. Current list price: $795.

AUDIOLAB ELECTRONICS, INC.
3725 Esperanza Dr., Sacramento, CA 95864
(916) 485-0500
Product Name: TD-5
Contact: Ron Stofan, Sales Mgr.
Product Description & Applications: For heavy-duty radio, television, computer, and audio-visual use. Features strong degaussing field for full erasure of high coercivity tape, high-low operation with continuous duty on low, ferrotune design, built-in blower, timer with adjustable on and automatic shutoff, 5/16" center post with NAB hub; erases reels up to 14" diameter and 2" wide. Tapes may be erased in carton.
Basic Specifications & Suggested List Price: Available in 115 and 230 volt, 50-60 Hz models; size 13 x 7 x 4 inches, shipping weight 46 lbs. Current list price: $895.

AUDIOMATIC CORPORATION
400 Madison Ave., New York, NY 10017
(212) 308-6888
Product Name: Apex CA-5 On-Cassette Printer
Contact: Perry Jambor, Sales & Mktg.
Date Product Introduced: July, 1985
Product Description & Applications: The Apex CA-5 is a fully manual on-cassette printer geared toward small volume users with small production requirements. The CA-5 uses a letterflex printing mechanism like the larger CA-10 model and has a production capacity of more than 2,000 cassettes per eight hour shift. The CA-5 is a welcome addition to the other Apex printers: the CA-10, CA-15, CA-30 and CA-80.

avl
AVL SYSTEMS

AVL SYSTEMS
AcousTech™

AVL SYSTEMS
P.O. Box 2267, Orlando, FL 32802
(305) 298-9111
Product Name: AcousTech™
Contact: Philip Hale
Date Product Introduced: Late 1984
Product Description & Applications: AVL Systems has introduced an advanced, multi-density core acoustical treatment which features smooth, consistent broadband absorption along with great looks. The AcousTech™ series of wall panels and baffles were developed through research utilizing TEF® analyzation and offer performance previously unavailable to the general audio industry. These 1" and 2" thick panels install in minutes and range in sizes up to 4' x 10'. Each panel is decoratively covered in any of 60 standard colors.
Basic Specifications & Suggested List Price: Panels are seamless in sizes up to 4' x 10'. Edges are reinforced internally by a concealed, extruded frame. Fabric facings are stretched over panels and adhered to edges and reverse side. NRC is .85 for 1" panels and 1.00 for 2" panels. Composite panel contains no polyurethane foams and has a fire hazard classification of A.

THE BERTECH ORGANIZATION
6804 Foothill Blvd., Tujunga, CA 91042
(818) 352-3181
Product Name: ITR-I; ITR-II
Contact: Lee Berman, President
Date Product Introduced: July, 1985
Product Description & Applications: The ITR is an easy, convenient and efficient way to bypass all the noisy transformers, pots, etc., that get between the sound and you. Bertech's ITR is a completely self-contained 2-channel line level output direct box, containing new independent line amplifiers driving a true 600 ohm impedance. Connect a

guitar, keyboard, synthesizer, contact mike or other high impedance source directly to the recording, mixing or PA console.
Basic Specifications & Suggested List Price: THD: .006% @ 1kHz; frequency response: 15Hz to 150kHz; gain: 0-20dB (controlled by a 40-step dual input attenuator); power: 120 VAC (with built-in bipolar 15 V power supply); construction: heavy-duty black anodized aluminum. Suggested list. $495.

BLACK AUDIO DEVICES
Microphone Boom Replacement Lock Screws

BLACK AUDIO DEVICES
P.O. Box 4573, Glendale, CA 91202
(818) 507-8785
Product Name: Microphone Boom Replacement Lockscrews
Contact: Bruce Black, Owner
Date Product Introduced: Spring 1985
Product Description & Applications: Black Audio Devices announces a line of inexpensive replacement lockscrews for most microphone booms. Since factory replacements are hard to find, these lockscrews offer the superior alternative to retiring expensive boom from service, or using a bolt. Black Audio Devices' lockscrews are also easier to grip and tighten than stock lockscrews. These lockscrews have plastic handles on metal threads, in a variety of styles and colors. Lockscrews are also available for video and film equipment.
Basic Specifications & Suggested List Price: All standard thread sizes are available. Custom and special application lockscrews available. Prices range from $2.50 ea. to $3.50 for standard Atlas and AKG-type lockscrews. No extra cost for colors (black, red, grey).

ROBERT BOSCH CORPORATION
P.O. Box 31816, Salt Lake City, UT 84131
(801) 972-8000
Product Name: FGS-4000 Software Update
Contact: Al Jensen
Product Description & Applications: Smooth shading software for graphic images. Fractal software. Potential for more mountains and other fragmented surfaces.

CALZONE CASE COMPANY
225 Black Rock Ave., Bridgeport, CT 06605
(203) 367-5766
Product Name: Proline II (new construction material)
Contact: Vincent J. Calzone, V.P. Sales
Date Product Introduced: April, 1985
Product Description & Applications: Calzone Cases are light, medium, and heavy-duty (A.T.A. approved) storage, shipping and travel cases for all industries including, but not limited to, musical, audio visual, video, computer, and government (G.S.A. contracted) applications.
Basic Specifications & Suggested List Price: Cases are built to custom specifications for unit to be housed. Please contact customer service department for further information and pricing.

COMPREHENSIVE VIDEO SUPPLY CORP.
148 Veterans Dr., Northvale, NJ 07647
(201) 767-7990
Product Name: Edit Lister™
Contact: Elizabeth Coppinger, Sales Development Mgr.
Date Product Introduced: April, 1985
Product Description & Applications: Computer program that adds memory and list management to off-line editing controllers. Edit lists can be compiled with a control track system using window dubs or by transmitting directly from an off-line edit controller. An optional disk drive package enables the transferring of the list to a CMX format 8" disk which can be taken directly to an on-line facility. Features include: 995 event memory, re-edit with ripple, insert/delete edit, calculate time code in drop-frame, non-drop frame or mixed frame modes and automatic list cleaning.

DORROUGH ELECTRONICS
Dorrough Loudness Meter

DORROUGH ELECTRONICS
5221 Collier Place, Woodland Hills, CA 91364
(818) 999-1132
Product Name: Dorrough Loudness Meter
Contact: Mike Dorrough
Date Product Introduced: 1984 w/4 new versions in 1985
Product Description & Applications: A program level meter accurately defining energy content of the audio wave-

—LISTING CONTINUED ON PAGE 184

NEW PRODUCTS
OTHER EQUIPMENT
1 · 9 · 8 · 6

—FROM PAGE 183

form. This meter offers an operator controlled solution to the problem of inconsistent loudness that results in varying discrepancies of end product as seen in recording and broadcast. The meter features the dual functions of Peak and RMS on a single LED display. The LED bargraph shows normally weighty RMS material which the operator is directed to hold at center 0dB, and a dot mode for Peak indicators which has a normal operator range at +13dB. Red LEDs are at these two points and the operator simply adjusts level up to either red. Equal perceived loudness is achieved by riding maximum gain to either point of reference.
Basic Specifications & Suggested List Price: For mono operation, left or right inputs are provided; for stereo operation, unit will internally sum. New models available: 10-A, 12-A, 20-A, & 21-A along with the original Model 40-A. Price: $475.

EXCALIBUR CASE COMPANY
660 W. Evergreen, Youngstown, OH 44511
(216) 788-7373
Product Name: XL Cases
Date Product Introduced: July, 1985
Product Description & Applications: All aluminum side construction with luan on sides and bottom with ABS plastic laminate available for small mixers, drum machines & synthesizers.

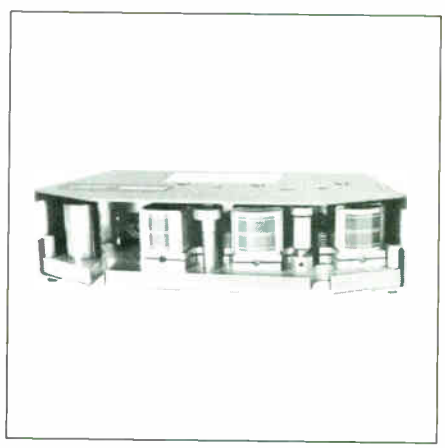
FAIRLIGHT INSTRUMENTS
2945 Westwood Blvd., Los Angeles, CA 90064
(213) 470-6280
Product Name: Computer Video Instrument
Contact: Rita Lambert, John Bezjian, David Bross
Date Product Introduced: January, 1985
Product Description & Applications: A computer-based video effects instrument with a multitude of real-time features. Free from the constraints of programming or confusing banks of controls, the CVI can quickly create a staggering range of visual imagery through the simple use of push-buttons, slide faders and a digitizing touch pad. Menus include color type, paint method, brush type, textures, color recall and colorize control. Plus, the ease of 100 presets, paint and draw facilities, mirrors, real-time pan, zoom and stretch, strobe and freeze frame, multi-plan effects, mosaic & pixelation.
Basic Specifications & Suggested List Price: RS232 Communication Port, input from live camera or VTR/VCR, composite or RGB input/output rack mountable. Suggested retail price: $7,945.

FURMAN SOUND, INC.
30 Rich St., Greenbrae, CA 94904
(415) 927-1225
Product Name: PL-8 A/C Power Conditioner and Light Module.
Contact: Diane Poole, Marketing Dir.
Date Product Introduced: April, 1985
Product Description & Applications: Single space rack mount unit with 8 switched, filtered, spike protected A/C outlets. Power switch on front panel, outlets on rear, indicator light on front. Also, two lights telescope out of the front to illuminate front panels of all items below in rack. 10 amp breaker.
Basic Specifications & Suggested List Price: $149.

GARNER INDUSTRIES
4200 N. 48th St., Lincoln, NE 68504
(402) 464-5911
Product Name: Garner Tape Eraser
Contact: Bruce A. Alderman, Sales Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: High speed bulk tape eraser for high energy audio, video, and computer tape. Can handle magnetic material up to one-inch by sixteen-inch reels.
Basic Specifications & Suggested List Price: 208/240 volts; 33½" x 25" x 11"; 180 lbs.

CHRIS GATELY AUDIO
P.O. Box 526, Bryn Mawr, PA 19010
(215) 525-3605
Product Name: DB-02 Direct Box
Contact: Chris Gately, Proprietor
Date Product Introduced: June, 1985
Product Description & Applications: A high quality passive direct box using the Jensen JE-DB-E transformer in a quality die cast aluminum housing. At 4¾" x 2⅜" x 1¼", it provides big performance in a small package. A one-year road abuse warranty is standard.
Basic Specifications & Suggested List Price: Source impedance: 20k ohms; load impedance: 1.2k ohms; maximum input level: +9dBv @ 20Hz; frequency response: -3dB @ 40k Hz; phase response: -28 degrees @ 20k Hz. Dealer price: $70

INTEGRATED MEDIA SYSTEMS, INC.
1552 Laurel St., San Carlos, CA 94070
(415) 592-8055
Product Name: IMS Series 200/IMS Series 400 Smart Switcher
Contact: William A. Fink, V.P.
Date Product Introduced: April, 1985
Product Description & Applications: The IMS Smart Switcher is an advanced audio routing/mixing system featuring the most powerful and versatile control interface in the industry. This third generation switcher will operate with, and/or slave to most industry standard equipment for audio-follow-video or automation directed systems.
Basic Specifications & Suggested List Price: Freq. response: ±.1dB, 10 Hz-30kHz; crosstalk: -80dB; input/output: -80dB; CMR: -80dB; S/N ratio: -110dB re. max. input; THD: less than .01% (20Hz-20kHz) re. max. input; under .01% (20Hz-20kHz) re. +8dBu op. level; IMD (SMPTE): under .005% re. max. input; max. input level: +28dBv bal. or unbal; max. output level: +26dBu balanced; channel gain/loss: ±10dBv, adjustable; input impedance: over 20k ohms; output impedance: under 100 ohms balanced; min. load impedance: 600 ohms; dimensions: 5.25" x 19" x 18" deep. Price range: $3,100-$6,500.



JRF MAGNETIC SCIENCES
JRF/Saki ½" 2tk Head Assembly for ATR 100

JRF MAGNETIC SCIENCES
101 Landing Rd., Landing, NJ 07850
(201) 398-7426
Product Name: JRF/Saki ½" 2tk head assembly for ATR 100
Contact: John French, President
Product Description & Applications: Complete ½" 2-track head assembly for Ampex ATR 100 analog tape machines. The assembly features precision adjustments for azimuth and head wrap, direct retrofit design and quality Saki long life magnetic recording heads. Optional are ½" roller tape guides for converting from ¼" formats.

KABLE KING
P.O. Box 2646, Savannah, GA 31402
(800) 554-1154, (912) 233-8959
Product Name: "Sound King" Speaker Cables
Contact: Joe Bordeaux, Sales/Mktg. Mgr.
Date Product Introduced: June, 1985
Product Description & Applications: The "Sound King™" series are high definition speaker cables. Available in 12 or 10 gauge, the bare copper conductors are cabled in a rope-lay design to increase the conductive surface and reduce "skin effect." Although these are very large gauge speaker cables, they are very flexible as well. Standard termination is Switchcraft ¼" phone plugs (#184), other ends are available. The wire is also available in bulk and is excellent for wiring studio monitors.

THE LAST FACTORY
Livermore, CA
Canadian Rep:
Perspective Audio, Inc.

23 Chatel, Lorraine, P.Q., Canada J6Z 3C4
Product Name: Last Disc/Head Cleaners
Contact: CLL/P.A., Inc.
Date Product Introduced: August, 1985
Product Description & Applications: Last: Compact Disc cleaners with protective shields; video "wet" cassette tape-head cleaner VHS format; video "wet" cassette tape-head cleaner Beta format; cassette "wet" clean format for tape heads and mechanism. Available at major record and tape stores, plus many stereo, audio, and video specialists.

LATIN PERCUSSION
160 Belmont Ave., Garfield, NJ 07026
(201) 478-6903
Product Name: Claw
Contact: Wayne Cohen, Gen. Manager
Date Product Introduced: January, 1985 (improved version)
Product Description & Applications: Claw mounts to any drum rim by way of clamp. Will attach to all mikes of 5/8-27 threads. Unit has over 2X as much shock mount area which eliminates excess vibration.
Basic Specifications & Suggested List Price: LP592A Claw Microphone: $29.50, list. LP592B Claw Percussion: $27.50, list.

McCANNON RESEARCH
4301 Pleasantdale Rd. Suite E, Doraville, GA 30340
(404) 446-7788
Product Name: Studio stand and rack equipment
Contact: Ron Montgomery, Marketing Mgr.
Date Product Introduced: August, 1985
Product Description & Applications: We manufacture a complete line of heavy-duty equipment racks, console stands and video & audio monitor stands for recording and broadcast studio applications. Please call or write us for a catalog.

OMNIMOUNT SYSTEMS
10850 Van Owen St., North Hollywood, CA 91605
(818) 766-9000
Product Name: Omnimount Systems
Contact: Susan Michelson, V.P. Marketing
Date Product Introduced: July, 1985
Product Description & Applications: Omnimount Systems announces the development of additional Universal Mounting Assemblies—Series 25, 300 & 500—with the full product line now covering a broad spectrum of weight loads, from a few pounds to hundreds of pounds. Omnimount assemblies are widely used by audio/video professionals, in both fixed and mobile environments—to support such devices as loudspeakers, video monitors and related equipment. An adjustable clamp/flange joins with an isolating polymer ball, giving the unit an infinite number of rotational angles. Stable, on-target focusing is easily achieved. Very clean appearance is enhanced by through-the-assembly wiring capability.
Basic Specifications & Suggested List Price: There are a wide variety of models, each with a complement of accessories and tube-bend configurations to cover every mounting and support application. Detailed specifications are available in our full-line brochure, available on request.

OPTI-CASE
Rt. 6 Box 235, Henderson, TX 75652
(214) 657-4663
Product Name: Opti-Case
Contact: Carla Lowery, Dir. Sales/Marketing
Date Product Introduced: June, 1985
Product Description & Applications: The Opti-Case line is a full A.T.A. design custom built case. Featuring structural aluminum framework, double tongue and groove valance, high density foam lining, external panels are of 1/4" AC plywood with 1/16" ABS plastic and utilizes top of the line Sessions hardware. Applications for this product line include all professional sound, musical, audio visual equipment and accessories.
Basic Specifications & Suggested List Price: The Opti-Case line meets or exceeds A.T.A. specification 300 Category I. Opti-Case provides a full 1-year limited warranty. Suggested list prices, depending on model or application range from $200 and up.

OPTI-CASE
Rt. 6 Box 235, Henderson, TX 75652
(214) 657-4663
Product Name: Eagle
Contact: Carla Lowery, Dir. Sales/Marketing
Date Product Introduced: June, 1985
Product Description & Applications: The Eagle Case is an all aluminum wrap frame case with 1/4" AC plywood top and bottom, ABS plastic laminated panels. Foam lined interiors and external top quality hardware. It is designed for synthesizers, guitars and small, portable equipment.
Basic Specifications & Suggested List Price: The Eagle Case is custom designed for the equipment to be cased. It is designed to meet A.T.A. specification 300 Category II. It is priced, depending on model, from $185 to $220 suggested list.

PHILIPS TELEVISION SYSTEMS, INC.
900 Corporate Dr., Mahwah, NJ 07430
(201) 529-1550
Contact: Nick LaBate
Product Description & Applications: Television monitors with "super sharp" picture quality. They both feature in-line Hi-Bri color tubes, two video inputs, RGB input, pulse cross or set-up switch, external sync and split screen.

PRISTINE SYSTEMS, INC.
6515 Sunset Blvd., Suite 201B, Hollywood, CA 90028
(213) 461-2819
Product Name: Recording Studio Management System
Contact: Boyce Williams
Date Product Introduced: May, 1985
Product Description & Applications: The Pristine Recording Studio Management System includes studio bookings, work orders, billing, accounts receivable, accounts payable, tape library management, and financial reporting. The software package is completely integrated and available for use on any IBM compatible microcomputer, including local area networks such as Novell, Corvus, and 3Com. Both hard disk and diskette versions of the product are available, and modules can be purchased separately or in combination.
Basic Specifications & Suggested List Price: Modules in the diskette version are priced at $495 each, and can operate on a microcomputer with 256k memory, a 24 by 80 screen, two floppy diskette drives, and a 132 column printer. The hard disk version requires an additional 10 megabyte hard disk, and module prices start at $495.

PRO CO SOUND INC.
135 E. Kalamazoo Ave., Kalamazoo, MI 49007
(616) 388-9675

—LISTING CONTINUED ON PAGE 186

—FROM PAGE 185

NEW PRODUCTS
OTHER EQUIPMENT
1 · 9 · 8 · 6

PRO CO SOUND INC.
DB-4

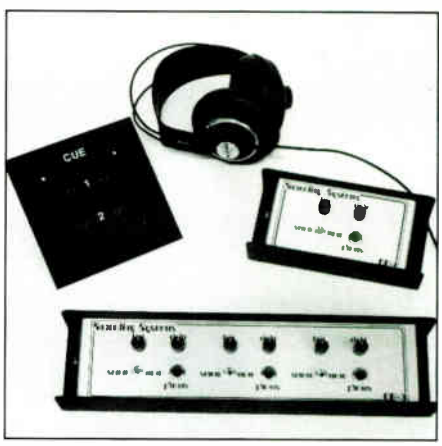
Product Name: DB-4
Contact: Jerry Smelker, Nat'l Sales Mgr.
Date Product Introduced: January, 1985
Product Description & Applications: The Pro Co Model DB-4 Quad Direct Box is a 4-channel, rack mountable unit that allows direct connection of unbalanced, high-impedance instruments to the low-impedance balanced inputs of professional sound reinforcement and recording studio mixers, resulting in a clean sound without microphone leakage and distortion. The DB-4 is ideal for use with keyboard instruments and drum machines.
Basic Specifications & Suggested List Price: Each channel provides a front panel phone jack input/output paralleled to a pair of rear-panel jacks for maximum flexibility. Switchable 20dB pads optimize impedance matching for line level sources. Wide frequency response (20Hz-20kHz, ±.5dB; 3dB @ 85kHz) and THD less than .1% from 40Hz-20k Hz @ -10dB output.

PRO CO SOUND INC.
DB-1

PRO CO SOUND INC.
135 E. Kalamazoo Ave., Kalamazoo, MI 49007
(616) 388-9675
Product Name: DB-1
Contact: Jerry Smelker, Nat'l Sales Mgr.
Date Product Introduced: January, 1985
Product Description & Applications: The Pro Co Model DB-1 is a high-quality, transformer-type interface device for "live" and recording applications. The DB-1 allows direct connection of unbalanced, high-impedance instruments such as electric bass, synthesizers and drum machines to the low-impedance balanced or floating inputs of professional mixing boards. This minimizes unwanted leakage between instruments as well as eliminating the distortion and coloration of amplifiers, speakers and microphones.
Basic Specifications & Suggested List Price: Standard phone jacks are provided for instrument input and amplifier output, with a 3 pin XLR-type connector for the floating low-impedance output to the mixer. The switchable 20dB pad optimizes impedance matching for line or speaker level sources, while the 4kHz high-cut filter tailors the high-frequency response for best results when fed from a speaker output.

RADIO SYSTEMS, INC.
5113 W. Chester Pike, Edgemont, PA 19028
(215) 356-4700
Product Name: Radio Systems LED Metering
Contact: Daniel Braverman
Date Product Introduced: July, 1985
Product Description & Applications: Radio Systems LED meters are tri-colored and switchable for peak or V.U. indication. One double sized segment lights and holds for audio peaks. Internal independent level sets are provided for left, right, and peak hold. Meters are available in counter top, box, or rack mounted in 1, 2, 3, or 5 meter units, or on a bracket for custom mounting. Each meter is provided with an independent power supply and balanced audio inputs.
Product Description & Applications: Segments: 73 total; response: peak or V.U.; audio input: balanced/bridging (40k ohms); sensitivity: -24dBm (50 mv); cost: about $350 per meter unit.

RAL-PRODUCTS
2851 Oleander, Merced, CA 95340
(209) 722-3220
Product Name: Rack Mount Case
Contact: Robert Daughton, Owner
Date Product Introduced: January, 1985
Product Description & Applications: 8-way quality construction: 1) heavy-duty aluminum edging; 2) heavy-duty valance closures; 3) stainless steel rivets; 4) solid full-length hinges; 5) recessed twist catches; 6) recessed spring-loaded handles; 7) heavy-duty casters; 8) HD corners, foam lined. The case also features removable doors—front/back.
Basic Specifications & Suggested List Price: For more information on any case size or shape, call or write. Ask and it's yours. It's our business to take the hassle out of traveling.



RECORDING SYSTEMS LTD.
QB Series Headphone/Cue Systems

RECORDING SYSTEMS LTD.
5803 Velasco, Dallas, TX 75206
(214) 826-5418, 828-4075
Product Name: QB Series Headphone/Cue Systems
Contact: Ron S. Lagerlof
Date Product Introduced: 1985
Product Description & Applications: The Recording Systems QB Series cue system is designed for any studio where individual control over left/right stereo or mixing of two mono signals is required. The QB-1 is a single headphone box consisting of separate left/right level controls, a stereo/mono switch, headphone out jack, an XLR-F input with an XLR-M output connector provided. The QB-3 allows individual, non-interactive, control of (3) three headsets and can be mounted beneath any music stand.
Basic Specifications & Suggested List Price: The boxes are constructed of heavy gauge aluminum, anodized black and gold for a "high-tech" look and durable finish. All components are the highest quality, including aluminum knobs and insulated phone jacks. The QB-3 is PC card constructed and is priced at $250; the QB-1 at $95. Dealer inquiries welcome.

That British Sound

▶ **ACES TR-2:** ½", ¼" 2 track

$4,950.00

■ **ACES TR-4:** ½" 4 track **$6,950.00**

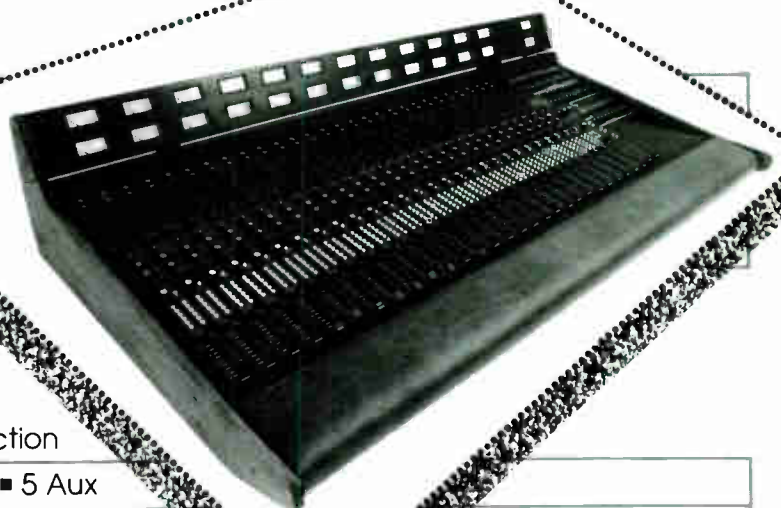
24 TRACK TAPE MACHINE FEATURES:
+4dBm IN/OUT ■ 15/30ips ■ Full-function 9 cue position remote-autolocator ■ stand ■ 50% range vari-speed

◀ **ACES TR-24:** 2" 24 track Recorder/Reproducer

$19,950.00

■ 2" 16trk., pre-wired 24 trk

$14,950.00



▶ **ACES ML24:** I/O console, 32 in x 24 buss, Integrated wired patch bay

$17,025.00

■ **ACES SM16:** Split console, 32 in x 16 buss **$15,665.00**

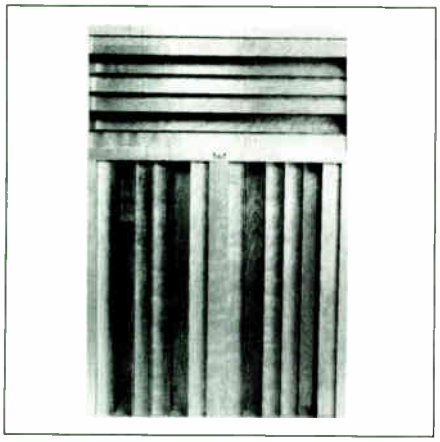
BOTH CONSOLES FEATURE: Fully modular construction ■ Audiofad long-throw conductive plastic faders ■ 5 Aux sends ■ 5 band switchable EQ ■ Input LED PPM's ■ Stand ■ +48v phantom power ■ LED display (optional) ■ Two year parts warranty ■ Other frame sizes available ■ Many options available

Circle #134 on Reader Service Card

PROFESSIONAL AUDIO SERVICES AND SUPPLY CO.

619 South Glenwood Place Burbank, CA 91506 (818) 843-6320

NEW PRODUCTS
OTHER EQUIPMENT
1 · 9 · 8 · 6



RPG DIFFUSOR SYSTEMS, INC.
RPG Acoustical Diffusor

RPG DIFFUSOR SYSTEMS, INC.
12003 Wimbleton St., Largo, MD 20772
(301) 249-5647
Product Name: RPG Acoustical Diffusor
Contact: Dr. Peter D'Antonio, President
Date Product Introduced: January, 1985
Product Description & Applications: The RPG is a new, formerly unavailable acoustical surface treatment which consists of a series of depth variations based on number theory sequences, forming a reflection phase grating. The RPG increases the apparent size of small rooms, allows accurate evaluation of musical balance and signal processing, enhances the perception of stereo images and minimizes frequency coloration by controlling room reflections, without absorption. Applications include recording studios, radio/stereo TV production, audio-for-video, film mix, disk mastering, mobile studios, auditoriums and churches.
Basic Specifications & Suggested List Price: Four diffusor systems are available, allowing wall or standard ceiling grid mounting. The RPG uniformly distributes a broad bandwidth (up to 5 musical octaves) of acoustical energy into a hemi-disk covering half space. Suggested coverage is 48 sq. ft. or more. A typical control room can be treated for as low as $1,470, with the cost-effective QRD-734 system.

RUSSCO ELECTRONICS MFG. INC.
5690 E. Sheilds Ave., Fresno, CA 93727
(209) 291-5591
Product Name: RT-700 Direct Drive Professional Turntable
Contact: Barbara Gaudin, Sales Mgr.
Date Product Introduced: April, 1985
Product Description & Applications: The RT-700 is an all new American-made, direct drive turntable, designed to withstand the usage that commercial applications demand, such as radio broadcast studios, sound studios, auditoriums, etc.
Basic Specifications & Suggested List Price: Turntable rumble level: -52dB DIN "A"; -72 dB DIN "B". Requires 2 inches of back cue at outer rim at 33 RPM, ¼ turn at 45 RPM.

SAKI MAGNETICS, INC.
8650 Hayden Place, Culver City, CA 90232
(213) 559-6704
Contact: Trevor J. Boyer, Dir. Marketing & Sales
Date Product Introduced: October, 1985
Product Description & Applications: At October AES, Saki will be introducing 4 new types of metal heads: ATR 100 2-track ¼"; AMPEX MM1100-1200 24-track; Otari MTR-90 24-track; and Studer A-80 MKII 24-track. All heads will be built to Saki exacting standards and will be available for off the shelf delivery by December, 1985.

SHARP ELECTRONICS CORPORATION
Professional Products Division
10 Sharp Plaza, Paramus, NJ 07652
(201) 265-5548
Product Name: XM-900 Color Monitor
Contact: Ron Colgan, Nat'l Sales Mgr.
Date Product Introduced: April, 1985 (at NAB)
Product Description & Applications: The XM-900 is a 9" professional color monitor designed for studio, field production and editing applications. Outstanding features include an in-line Black Matrix CRT for stable convergence, comb filter, two video inputs, DC restoration by back-porch clamp, pulse cross display mode, normal or fast-sweep time constant, normal or underscan display mode, AC or DC (12-24 V) operation, blue check circuit, front panel controls with presets, automatic/manual degauss switch, and rack mount provision.
Basic Specifications & Suggested List Price: XM-900 suggested list price. $700; XM-9DR double rack mount adapter: $120; XM-9WR WFM adapter kit for double rack adapter: $95.

SHARP ELECTRONICS CORPORATION
Professional Products Division
10 Sharp Plaza, Paramus, NJ 07652
(201) 265-5548
Product Name: XC-A1 ENG/EFP Color Camera
Contact: Ron Colgan, Nat'l Sales Mgr.
Date Product Introduced: April, 1985 (at NAB)
Product Description & Applications: The XC-A1 is a 3-tube MF Saticon® prism optics color camera, designed for high end production, cable, and industrial/educational training applications. It offers superior performance and advanced automatics in a compact human-engineered package. Outstanding features include low capacitance diode gun MF Saticon tubes, 750 lines resolution, 57dB signal-to-noise, advanced automatic functions (including auto-white balance, auto-black balance and auto-centering), a unique character type warning indicator display, die-cast body with RF protection, +9dB and +18dB gain switches, and a 1.5" electronic viewfinder.
Basic Specifications & Suggested List Price: XC-A1 suggested list price (ENG package, including camera head, 1½" viewfinder, AC adapter and carrying case; less lens): $6,500. (A complete assortment of industrial and broadcast grade lenses (priced from under $1,000) are available for use with the XC-A1). Remote operation panel: $1,450. 5" high resolution studio/EFP viewfinder: $645.

S.I.L.I.—SANO INTERNATIONAL LTD., INC.
50 S. Center St., Bldg. 24, Orange, NJ 07050
(201) 674-7017
Contact: Joseph Zonfrilli, President
Date Product Introduced: 1984-85
Product Description & Applications: Complete line of XLR connectors and ¼" jacks; rotary and slider knobs; cabinet hardware including corners, handles, feet, etc.; speaker grills. Sizes 5", 8", 10", 12", 15", 18".

SPEAKER REPAIR OF CALIFORNIA
4334 Sunset Blvd., Los Angeles, CA 90029
(213) 666-4161
Product Name: Page-Com
Contact: Stephan Christofferson, Owner
Date Product Introduced: 1985
Product Description & Applications: Page-Com is a complete marriage of state of the avail. art of intercom & paging functions as installed for Western Airlines, Lax International Airport.

STANTON MAGENETICS INC.
200 Terminal Dr., Plainview, NY 11803
(718) 445-0063
Product Name: 681EEE Mk-IIs
Contact: Mrs. Jean Kapen, Mgr. Advertising & Promo.
Date Product Introduced: June, 1985
Product Description & Applications: The 681EEE Mk-IIs is hand calibrated to insure the ultimate in performance and quality, featuring the new Stereohedron II stylus. This is an advanced stylus geometry that provides ideal stylus to groove interface. Its smaller tracing radi and front to back angle allows for incredibly faithful tracing of high frequency modulation.
Stanton Professional phono preamplifier equalizer Model 310B—designed to correctly interface all Stanton and selected magenetic phonograph cartridges for optimum playback. Available with active balanced or unbalanced output.
Basic Specifications & Suggested List Price: Prices: 681EEE Mk-IIs: $120; Model 310B: $280.

STUDIOFORMS, INC.
186 Glen Cove Ave. Suite 201, Glen Cove, NY 11542
(516) 671-1047
Product Name: Studioforms
Contact: Jan Guarino, Marketing Dir. (516) 621-2112
Date Product Introduced: February, 1985
Product Description & Applications: A complete product line of industry-standard forms and labels specifically designed for the recording industries. These forms and labels help organize and standardize studio information while promoting the studio's image. Studioforms are made to be used by professional studios, musicians' home studios, production houses, broadcast facilities, mobile recording units, etc. They offer studio personnel an accurate means of reporting industry-standard data in a clean, organized manner.
Basic Specifications & Suggested List Price: The complete line of Studioforms are available in different quantities and come printed with the studio's name, address and phone number. For example: 250 pressure-sensitive box labels $41.50, 250 track sheets $18.50, invoices, quote sheets, session logs, etc. Call or write for free catalog.

STUDIOFORMS, INC.
Studioforms

TANDBERG
One Labriola Ct., Armonk, NY 10504
(914) 273-9150
Product Name: TBU-20
Contact: Peter Wellikoff, V.P.
Date Product Introduced: September, 1985
Product Description & Applications: The TBU-20 is an "in the field retrofit" for the Tandberg TD-20A-SE Reel to Reel Recorder. The TBU-20 converts the in/outputs from RCAs only to balanced XLRs and unbalanced RCAs for the inputs and balanced XLRs for the outputs. Therefore, a TD-20A-SE can be purchased in ¼-track or ½-track with 15/7½ips or 7½/3¾ips and with XLR or RCA configurations to fulfill any studio applications.
Basic Specifications & Suggested List Price: The TBU-20 uses transformer balanced XLRs and unbalanced RCAs and has a suggested pro user net of $150. The TD-20A-SE is $1,395 in any configuration.

TECHWORKS
61 Elsie St., San Francisco, CA 94110
(415) 285-6071
Product Name: The Hook™
Contact: Pat Maloney, President
Date Product Introduced: February, 1985
Product Description & Applications: The Hook™ attaches to the side of tape recorders, equipment racks, or the edge of any horizontal surface with velcro. Designed to securely hold ¼" audio leader tape within easy reach, The Hook can also be used to support tape reels, headphones, microphone cables, patch cords, etc. Made from nickel plated steel, The Hook can be easily moved from one work area to another and will last a lifetime!
Basic Specifications & Suggested List Price: List price: $10 each.

TELEX COMMUNICATIONS, INC.
9600 Aldrich Ave. So., Minneapolis, MN 55420
(612) 884-4051
Product Name: PH-61
Contact: Don Mereen, Dir. of Marketing
Product Description & Applications: Telex PH-61 communication or intercom headset. A new lightweight design incorporating foam headband and earcup padding. Covered with soft polyurethane covers and including washable nylon socks for further ear comfort. Noise cancelling dynamic microphone on adjustable ball joint boom. Monaural dynamic earphone receivers.
Basic Specifications & Suggested List Price: Suggested list: $181.50; frequency response: (earphone) 50-15,000Hz, (mike) 100-8,000Hz; output: (earphone) 105dB, (mike) -83dB re 1V/microbar(.071 millivolt); impedance:(earphone) 600, (mike) 150 ohms.

3M MAGNETIC AUDIO/VIDEO PRODUCTS DIVISION
3M Center Bldg. 223-5S-01, St. Paul, MN 55144
(612) 736-5209
Product Name Scotch Re-label Tape
Contact: Rich Collins, Marketing Supervisor
Date Product Introduced: July, 1985
Product Description & Applications: Scotch Re-label tape is ¾" white re-positionable tape for quick and easy

3M MAGNETIC AUDIO/VIDEO PRODUCTS DIVISION
Scotch Re-label Tape

identification of videocassettes, audio cassettes and diskettes, or any miscellaneous item. The user pulls the length of tape required from self-enclosed dispenser. The tape can be easily removed for a new label.
Basic Specifications & Suggested List Price: List price: $2.10.

WATTS
77 Selleck St., Stamford, CT 06902
(203) 348-2121
Product Name: Cecil E. Watts Record Care Products
Contact: S. Richard Ravich, V.P. & Gen. Mgr.
Date Product Introduced: March, 1985
Product Description & Applications: Cecil E. Watts Products are back—with all the quality expected from the "original" record care product line. Most record cleaners use a large amount of fluid which can cause a film or residue to accumulate in the grooves. Watts product use the "humidity" from a new Parastatik Antistatic fluid to prevent static on the record from holding dust while the cleaner reaches down into the groove to remove dirt, not just wash it around. Watts products include the famous DustBug and the Parostatik DiscPreener, an excellent record and CD cleaner.

WAVELENGTH VIDEO, INC.
1438 Manhattan Ave., Hermosa Beach, CA 90254
(213) 372-2191
Product Name: Wavelength Video Showcases
Contact: Cayce C. Butler, President
Date Product Introduced: January, 1985 & monthly
Product Description & Applications: Video entertainment software for public exhibition.
Basic Specifications & Suggested List Price: Beta, VHS, & ¾", from $50-200.

WOOD TAILORING
4334 NE 26th Ave., Portland, OR 97211
(503) 282-0588
Product Name: Toy Box
Contact: Dick Starr, Owner
Product Description & Applications: Designed to fit all 19" EIA rack mount equipment that is not permanently mounted in both studio and post-production projects. Equipment mounted in enclosures may be stacked in any order making hookup and use troublefree.
Basic Specifications & Suggested List Price: Toy Boxes come in walnut or oak. Toy Boxes will accommodate 1¾", 3½", and 5¼" high equipment. All mounting hardware is provided with each Toy Box. An attractive top is also available giving a finished look when stacking. Suggested list price is $70-85.

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LUNCHING WITH BONZAI

GUARDIAN OF THE VILLAGE

by Mr. Bonzai

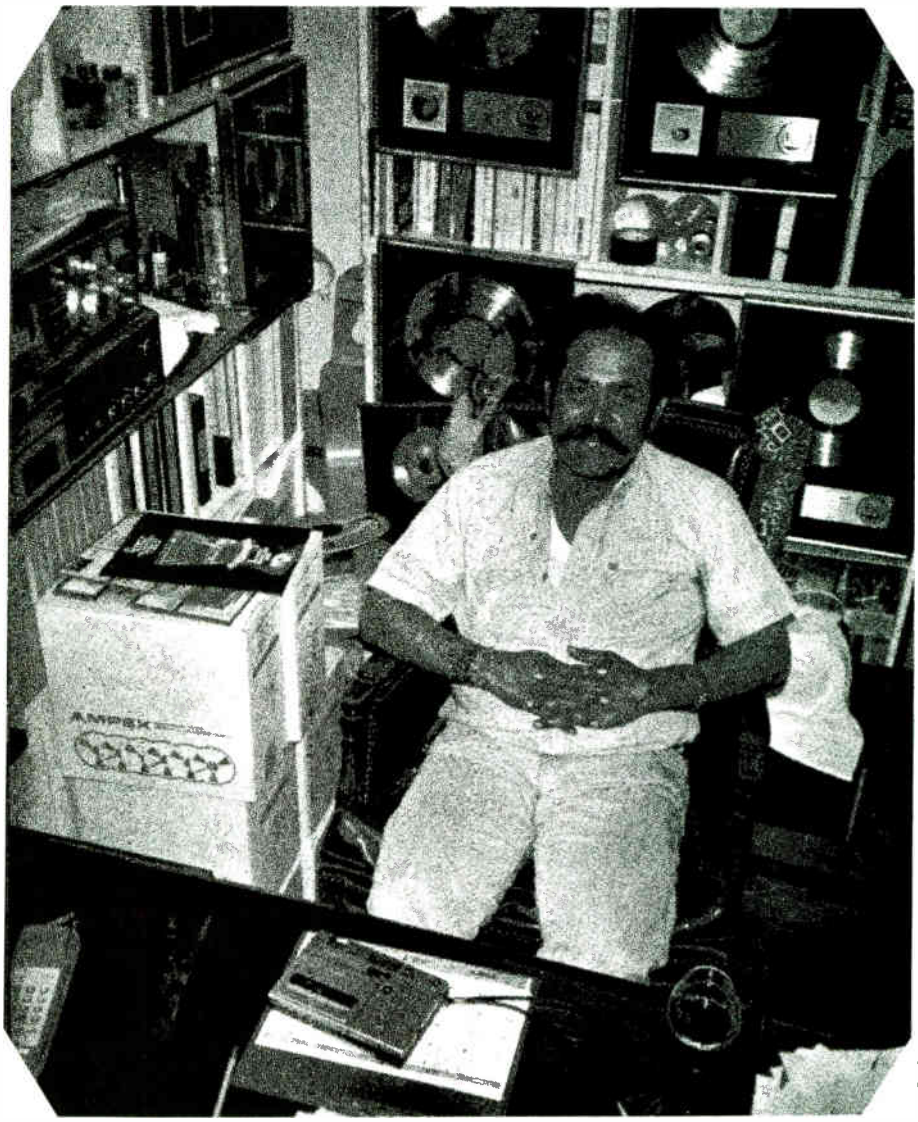

PHOTO: MR. BONZAI

Once upon a time long ago (in the '60s) a man named Geordie Hormel, from the famous food family, built a recording studio in a former Masonic Temple. Perhaps this surviving shrine of music, The Village Recorder, owes some of its longevity to its mystical foundations. The building is strong and large, and in the early days of the business, space was rented out as an ashram for Maharishi Mahesh Yogi's Transcendental Meditation group.

A few heavyweight musicians have also contributed to the history of The Village—the studio that Spam built. Geordie isn't around all that much these days, what with his home electronically equipped for super sessions. Manning the ship now is Michael Geller, a vigorous executive director. The Village Recorder is still rockin' around the clock with the likes of Eurythmics, Robbie Robertson, and Stevie Nicks.

In all the years gone by, and through all the sessions—ah, the recording log is encyclopedic—there is only one person who has remained along with Geordie. His name is Gilmar Fortis.

"Gil," as he is known fondly by the recording orphans who have lived at The Village, has remained for one reason. This man is nuts for music. His passionate appreciation keeps him young in a business that chews people up, grinds them to a pulp and spits them out on the sidewalk of life. Gil has no official title, but he is responsible for keeping life smooth in the studio.

Rather than lunching at a posh L.A. eatery, I requested that we meet in Gil's workshop/office/hideaway deep in the Village catacombs. His accent is as thick as a carpeted sombrero.

Bonzai: Where did you come from, Gil?
Gil: From a country that has many troubles now—El Salvador. All my family lives there, except my wife and son. I left my country in 1959 and haven't been back for 20 years. The reason I left more than anything else, believe it or not, was because of Bill Haley & the Comets.

Bonzai: You're kidding...
Gil: No. This is the truth. I was sitting on the beach one day listening to an English radio station that we caught on shortwave radio. That day I went crazy. I told my friends I was leaving to go to the United States. "Rock Around the Clock" drove me crazy. Bill Haley was my hero.

I was 19 and had just received my degree in Animal Husbandry with a certificate in Artificial Insemination. To leave meant a big change from being in the country with fields of corn and cattle. I heard Bill Haley and dropped everything.

Every night in my mind would be "Rock Around the Clock." After three months I went to talk to the American ambassador to tell him what was happening in my mind—the feeling, the impact. I told him and somehow it touched his heart. I wasn't bullshitting him. He was an American and I was telling him about the hit parade, about this music, about Wolfman Jack. I got my green card and came as a legal resident.

Bonzai: Did you have any idea what you would be doing?
Gil: Nothing at all. I didn't know a word of English. I couldn't even ask for food if I was hungry. I just wanted to meet Bill Haley & the Comets.

Bonzai: Did you meet him?
Gil: No, not to shake his hand, but I was ten feet from him in San Francisco. It was the greatest experience of my life, and since then the only thing I wanted to do was to be in

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a recording studio.
Bonzai: What was life like at first?
Gil: It was pretty hard for me. I worked in restaurants in San Francisco and then in Los Angeles because I heard that this city was the best place to work in the recording business. I tried to work for Columbia Studios, RCA, and at MGM, where Cherokee Studio is now.

Bonzai: Any luck?
Gil: No. Just to apply for a job in those days you had to wear a suit and tie. About 1962 I got a chance to work as a bouncer at Pandora's Box, a teen nightclub. I watched Cher perform there. I also worked at the Purple Onion.

Bonzai: And this put you near the music...
Gil: It was great, even to work for nothing, to be near the artists.

Bonzai: Did you have any other jobs?
Gil: Yes, I got a job with a company that made custom limousines for people like Elvis Presley—you know, maybe he wanted a TV set and a fountain with strawberry soda. I thought this would bring me close to artists, but I was given a job in the "squeak and rattle" department. Every day I would ride around in the back of limousines and listen for noises. Then I would tell the mechanics what was wrong.

Bonzai: Good training for the ears. When did you finally get a job at a recording studio?
Gil: In 1971, when I started working here with Geordie Hormel. It took me 12 years to get the job. The studio was very new and I began as a second engineer. A friend of mind had been working here and I had been visiting at night when I finished my job. I would watch and learn. I finally met and talked with Geordie. He was a musician, a producer, an engineer.

Bonzai: Did you move up to first engineer?
Gil: No, because I got too busy doing other things—taking care of the maintenance of the whole building and the studios.

Bonzai: Do you have a title?
Gil: Y'know, I never had the chance to ask.

Bonzai: How about "caretaker"? ... Or "curator"?
Gil: You can call me anything. I take care of everything from ordering tapes, whatever they need in the studio, construction...

Bonzai: Why do you have these gold records on your walls?
Gil: I guess nobody wanted them.
Bonzai: Have any artists ever credited you on their albums?
Gil: Oh, yes—Alice Coltrane, John Lee Hooker, Howard Roberts, Steely Dan—quite a few others.

Bonzai: Has life in the studio changed from the early days?
Gil: Yes, definitely. It was very different before 1980. The studio is always booked now, but before we would wait for the fall release times, or summer releases. We knew when the studio would be busy and when it would be empty for repairs and maintenance. Now it's occupied all the time—we have to do the work whenever we can find time.

Bonzai: Didn't The Doors record here?
Gil: I remember Jim Morrison was here by himself in 1969, when I used to hang around before I got my job. That's how I learned to know what the producers needed. I think he spent one of his last birthdays in Studio A. He closed the doors and didn't want anyone to come inside—just a few persons to bring food and wine. He was just writing. I tried looking in the garbage to collect his writings but I couldn't find anything. I hoped to meet him, but no.

Bonzai: How about the Stones?
Gil: In 1974—one of the greatest sessions I ever saw. It was for *Goat's Head Soup*. I talked to Mick Jagger for a few minutes. He was just a gentleman. I heard all the rumors that they would destroy the studio, but they were all gentlemen. It was quite an experience.

Bonzai: I can tell that you are still excited about recording.
Gil: I would never change my job for anything, even if they offered me the best-paying job in the world.

Bonzai: How long is your workday?
Gil: Now I work ten to six. For many years I used to work 90 hours a week. I would eat and sleep here, like it was my house.

Bonzai: Did anyone ever damage the studio?
Gil: A few times we had some trouble. We had one big star who used to ride his motorcycle from Studio C on the second floor all the way down the stairs to the lobby and then outside. He was Number One in the '73 charts. Sometimes he would go into the studio, move the microphones and guitars, and wrestle. I think the client should be able to do anything he wants.

Bonzai: You've seen people on the way up, and on the way down, haven't you?
Gil: I have had some sad moments and some happy moments. I have met so many wonderful people. I can't explain the feeling. People who are so big and they come here and they are just like we are now. One of the first sessions was with Eric Clapton, and Delaney & Bonnie, and Leon Russell. There were so many great people in just one session. I got to meet all those people—especially Joe Cocker, who has become a friend of mine. I called him last night to tell him about this interview, and to ask him what I could say. He said I could say whatever I wanted. He is one of my greatest idols. I think he is the greatest white singer of soul music.

Bonzai: And he's made quite a comeback...
Gil: I would say so. I think the thing he loves to do most is sing. I don't care what people say about his personal life. I have seen him perform so many vocals. To feel and sing—that is the important thing. I know exactly the way he feels.

Bonzai: Is Geordie still involved with the studio?
Gil: Not that much. He has a studio in his house, and I always disagree with that because it keeps him away from The Village. I wish he was here more often, because he is much more than just the owner. We have so much love for the studio, and will do anything to improve it, and if he is here we don't have to go to his house to talk to him about decisions.

Bonzai: Who has been recording here lately?
Gil: Oh, the Eurythmics—David [Stewart] is a wonderful person to be around. Stevie Nicks was here. Fleetwood Mac was here in '78 and I think they will be back together here this fall. We've had Lone Justice, Tom Petty, Robbie Robertson—a great person. He has an office here and is doing a few projects. He is such an artist, a producer, a writer.

Bonzai: Has Bob Dylan been here?
Gil: He did two albums here, in 1974 and '75. He tried to come back but unfortunately we were busy. He was all the way professional, no screw-ups. But everything had to be perfect. The same thing as the Stones—so professional, like Steely Dan.

Bonzai: Maintaining privacy must be an important part of your job.
Gil: It's pretty hard. A few weeks ago we had Menudo and it was very hard to keep people out of the studio.

Bonzai: Will you stay here for the rest of your life?
Gil: If I can.

Bonzai: How will things change?
Gil: I think it will get better, because young people are getting turned on to music at an early age.

Bonzai: What sessions were the most exciting?
Gil: The ones with the Stones, and when George Harrison was here it was very exciting. I once saw The Beatles at Dodger Stadium. I waited in line for 48 hours.

Bonzai: You really are a fan...
Gil: My whole life is music. I talked with George for a few minutes and shook his hand. I didn't want to bother him. He just looks straight into your eyes.

Bonzai: Do you think that anyone has ever actually made love in the studio?
Gil: [laughs] I would say. Not that I ever saw anybody, but a few times I happened to be working around and —what can I tell you...

Bonzai: Well, the studio is about the only place where you can make lots of noise and nobody can hear you...
Gil: When Crosby and Nash were here in '76, David Crosby told me that playing the guitar was greater than making love. He said you hold a woman the same way you hold a guitar. We used to argue about that, but I don't know—I don't play guitar.

Bonzai: Do you have any advice for people who want to get work in recording studios?
Gil: It's hard to say. I just kept insisting. It didn't matter to me if they said come back in a year. I was there the next week. I kept trying and drove them crazy. I pay attention to the new people working here and I can tell you right away when a person is going to become a real engineer, by the way they perform and behave. I can see one guy here now, an assistant engineer, and in a couple of years he is going to be great. I see the interest he has in the music, and the way he performs his job. He never complains about anything and he always pays attention to what the maintenance man and the other engineers are doing. He is always taking notes. He will be a first-class engineer, and we're happy that he is coming from our stable.

Bonzai: Is it harder now to get into this business?
Gil: It was hard for me, because at the time there weren't many Latinos working in studios. My friends and countrymen used to laugh at me because I couldn't find a job, but it was the only thing I wanted to do in my life. The moment I stop listening to music it will be over for me. ■

Nile Rodgers: "I'm not big on pre-production. I like to have spontaneity in the studio...Hearing it for the first time, I'm really excited."

Helen Keane: "I'm a jazz producer, and I don't pretend to know the pop field...But my approach—sound-wise—is as though we were doing a pop record."

Jeff Weber: "Making a great record is to capture the emotional performance of the moment. I really hate the thought that the technology makes the record."

Wes Farrell: "When I go into the studio, I believe that I'm going to cut a great record. That's always foremost in my mind."

Dan Aron: "I look for a good live studio, but first a good engineer. A good engineer in a so-so studio can come out with an outrageous product."

Steve Levine: "I don't try to make the band sound like me, which a lot of producers do. [I try] to make the best qualities the band has shine through."

PRODUCERS

A LOOK AT SIX VERY DIFFERENT CAREERS

NILE RODGERS:
NEW YORK'S HOTTEST PRODUCER?

by Bruce C. Pilato

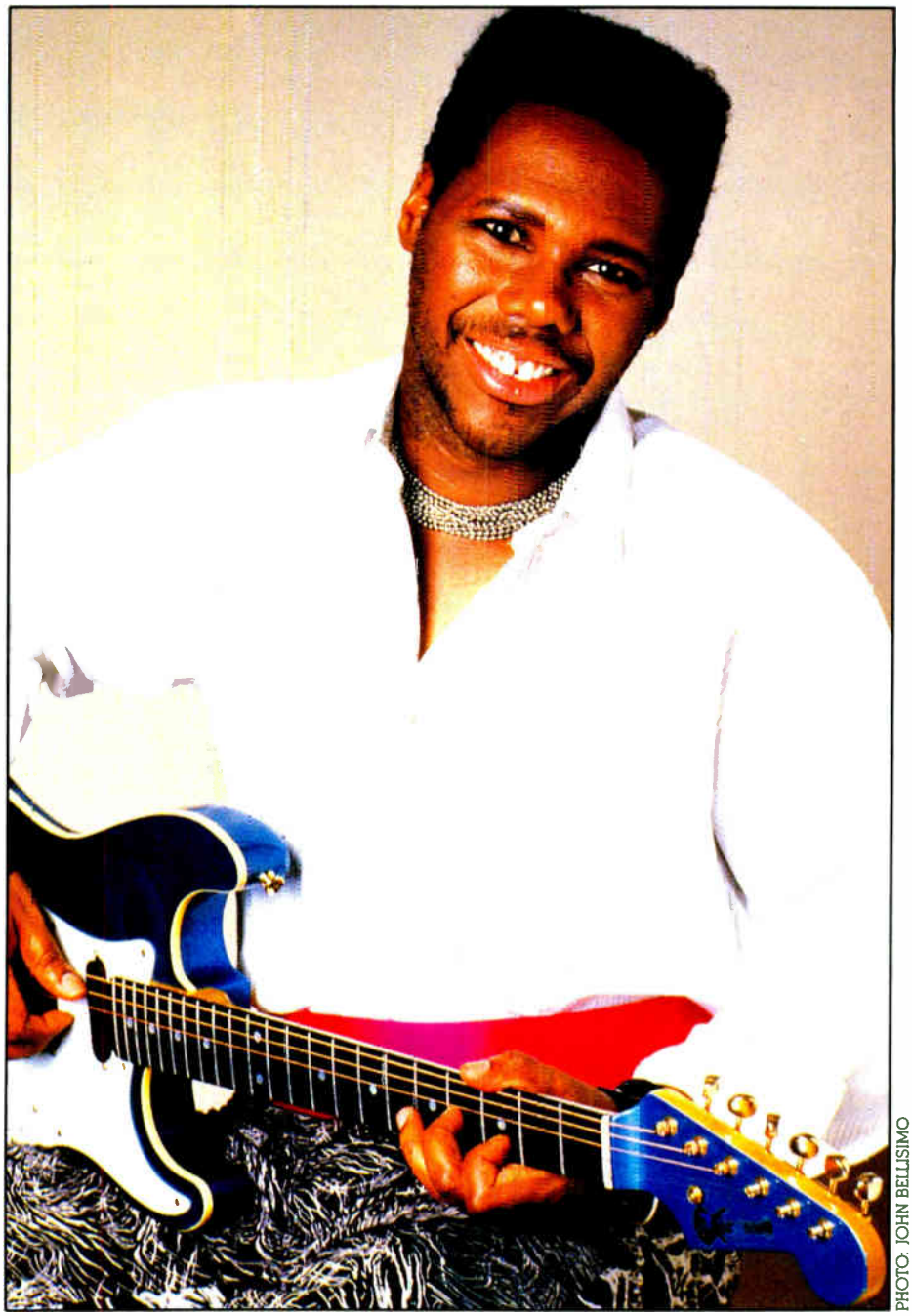


PHOTO: JOHN BELLISIMO

When Nile Rodgers says, "I feel comfortable with any musical situation," he is damning himself with faint praise. A New York session mainstay who learned on the job while playing guitar in the legendary Apollo Theatre house band, backing everyone from Aretha Franklin to Nancy Wilson, he and his partner, bassist Bernard Edwards, rose to the top of the charts in the late '70s with Chic, a studio band gone wild that helped define the high-style funk of the period. The duo achieved multi-platinum success as writer-player-producers with other artists as well, and in recent years Rodgers has served as a producer, writer and/or player on literally dozens of popular and pacesetting records. He produced David Bowie's *Let's Dance*, Mick Jagger's solo debut, *She's the Boss*, five tracks on Jeff Beck's *Flash*, as well as works by Madonna, Bryan Ferry, Daryl Hall and John Oates, Laurie Anderson, and even Johnny Mathis.

Rodgers struck out on his own in 1983 with *Adventures in the Land of the Good Groove*, and last summer he released a second solo effort, *B-Movie Matinee*. In this *Mix* interview he reflects on the ups and downs of his multifaceted career and comments on the differences between working on other people's records and doing it for himself.

Mix: With your schedule, how did you find the time to record for yourself?
Rodgers: With great difficulty [laughs]. What I did was steal hours. You know, Mick Jagger came in late all the time... Jeff Beck would come in at all hours, so I'd work when he wasn't there. I also worked after sessions.

Most of the work was done at the Power Station and Atlantic Studios, which is only a block from my house. I'd just run over there whenever they had free time.

Mix: Who is this "Tommy 'Rock' Jymi" who's credited with co-producing *B-Movie Matinee*? That can't be a person's real name—
Rodgers: He's me—my alter ego. Whenever I do something that's a little bit off-color or a little bit weird, I blame it on him [laughs].

Mix: Was this record planned with Warner Bros., or did you make it on

your own and then sell it?
Rodgers: I started it before I had a deal . . . When I'm working on my own product, part of the enjoyment is experimentation. I'm always looking for things to get into to make it exciting.

Mix: Was it set in your mind to go after Warner Bros.?
Rodgers: Yes. I was looking for a real *artist's* company. I knew I might not hit the mark with my first few albums, so I wanted a company that would hang in there with me and not say, "Oh, man, the record's not a hit—let's get rid of this dodo."

You see, when I do my own stuff, I don't know if it's really as commercial as the records I do for other people. But that's okay in a way, because I really am looking for different concepts to use when I do work with someone else.

Mix: At the 1984 New Music Seminar, Daryl Hall spoke on a Producers Panel about the difference between objectivity and subjectivity, and said a little subjectivity is necessary when an artist produces himself. Others on the panel disagreed, saying you need someone there to tell you when it's not happening.
Rodgers: I agree . . . In Chic, I had Bernard as a sounding board. We could sit down together and figure out what we were going to do. When you're on your own, you can go along with what everybody thinks you should do, or just figure it out for yourself. That's incredibly difficult. Even with all the experience behind me, I'm still just looking for an identity.

Mix: You and Bernard Edwards began working together in the Big Apple Band. Wasn't that basically a Local 802 pickup band?
Rodgers: No. Bernard organized it. He was the bandleader for New York City, a group we used to play behind. We sounded good together, so when they broke up we decided to stay together without the singers. Necessity was the mother of invention, so we learned how to sing and how to work the front of a stage, and we eventually put together Chic.

Mix: Your bio says you got the idea for Chic after seeing a Roxy Music concert in England. What exactly was the inspiration?
Rodgers: We were basically fusion-jazz players, and it came off as a sort of heavy, intimidating thing. Getting girls in the group would give us a lighter image.

Mix: It must have been quite a long time between the breakup of New York City and Chic's signing with Atlantic Records.
Rodgers: Oh, yeah. It took a few years. We recorded "Dance Dance Dance" in early 1976, and it didn't come out until July of '77.

We didn't form Chic to have a band—we did it to get a record deal. We were producers then, not band members. We started producing because every time we'd gone into the studio with a producer, instead of producing our record they'd compete with us as players. It didn't make any sense—we needed somebody to cool us out and make us play more uniform songs and patterns.

We weren't on the first cover. What happened was there was no one to represent the product, and it did well. Since we really were the band, all we did was call the people who made the record with us and we formed the group.

Mix: How many albums did Chic make before it collapsed?
Rodgers: We did six or seven, but the later ones didn't do well. Our last gold album was the one with "Rebels Are We" on it. Going from multi-platinum to gold to . . . well, it's weird.

Mix: Did the band get dropped [by Atlantic Records], or did it just break up?
Rodgers: We didn't get dropped. It just petered out. We put our last album on the shelf—just didn't finish it.

Mix: Will you ever finish it?
Rodgers: Nope. We didn't need to be in Chic. It was one of many productions. While we were in Chic we wrote and produced "We Are Family" and "He's the Greatest Dancer" for Sister Sledge, and Diana Ross' "Upside Down" and "I'm Coming Out" [on 1980's *Diana*]. We also had a record that did really well around the world, by a European artist named Sheila Devotion, called "He's a Spacer." And we did Debbie Harry's solo album [*Koo-Koo*], which didn't do very well.

Mix: Would you say it was the Debbie Harry album that opened the door for you to work with the likes of David Bowie?
Rodgers: No. I would say that the Deborah Harry album was one of the worst career moves we ever made. Not because the record wasn't good, but because it didn't sell. People have said to me, "Hey, how do you like being the guy who almost single-handedly ruined Debbie Harry's career?"

That was devastating for us. We thought that record was great, and nothing happened with it. That was too much to take. Then we got heavy into drugs and alcohol—your typical rock and roll story.

Then it got ridiculous. Bernard and I had a falling out. Not a major one—we've always had a love-hate relationship—but that's what happens when you're real depressed like that. Deborah's album was the beginning of the end. It was really a drag.

Mix: Did it become hard to find production work?
Rodgers: Actually, we stopped looking. Then people started to want to pay us less and things like that . . .

Mix: How did you work your way out of drugs and alcohol?
Rodgers: Bowie pulled me out of it. He said, "I've gone through this, and let me tell you, what's really happening is music—your career and your life. When somebody offers you something you just say, 'Oops, I don't do that any more.' Just do what you do best."

I got a little offended and said, "How do you know what I do best?" and he responded by saying, "I know what you do best: You make hit records." That was very emotional for me. He changed my life. I was in awe of this guy; I wanted to work with him all my life.

Mix: How did you meet Bowie?
Rodgers: I just met him at the Continental, an after-hours club in New York. We didn't talk much that night, but later some friends suggested he call me. At that time I had just gotten my deal with Mirage Records. He came over to my apartment, and we talked for awhile. He came back later and I played him my record, *Land of the Good Groove*, and he said, "Nile, if you make me an album like that, we're happening."

Let's Dance was huge. It brought me back, and it brought him back.

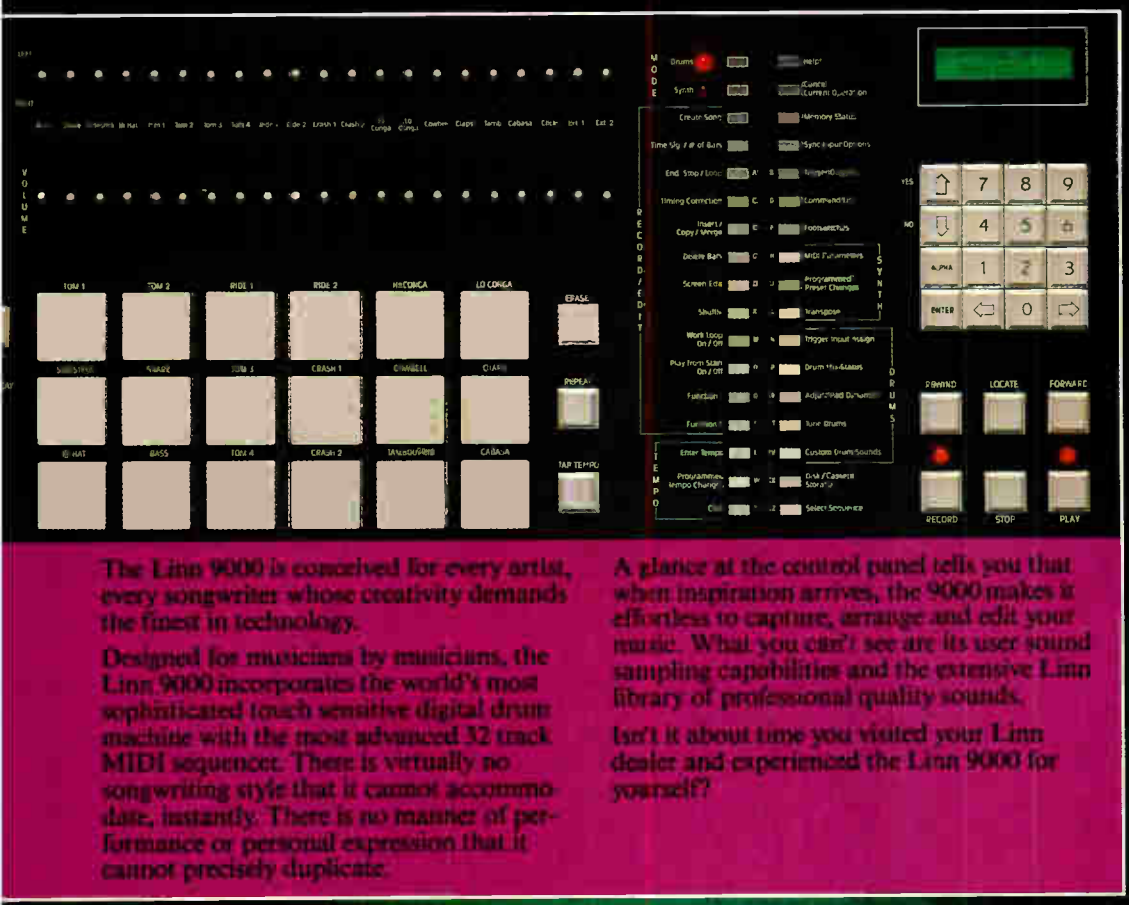
Mix: Let's talk about your methods. I understand you're not too big on pre-production.
Rodgers: I'm not big on pre-production. I like to have spontaneity in the studio . . . I'm hearing it for the first time and I'm really excited.

I do all my demos with just a guitar, on a cheap tape recorder—no drums, no nothing. I can write music out, so I just write down the notes I'm singing. Later on, I write down the lyrics and melody lines, and then I just go in and put it together.

I got started as an arranger—strings, horn charts, the whole bit.

Mix: Let's talk about some of your recent productions, starting with Mick Jagger.
Rodgers: Working with a real superstar of that kind of status was cool, but it wasn't as exciting as somebody like Duran Duran. That was a different sort of thing.

Mix: Jan Hammer [who played on the



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Jagger record] told me it was a very professional gig and that Mick had hired a lot of really heavy players thinking that would make the record better. He also said that much of what was recorded was never used.

Rodgers: Jan recorded in the Bahamas [with Bill Laswell producing]. I worked in New York. Our sessions were a little bit loose. It was professional, but it was all friends, guys I really respect and have worked with for years. Mick seemed pleased with what we did.

I was supposed to produce the next Stones record, but I just didn't have the time. I really wanted to work with Sister Sledge again . . . but I'm sure we'll work again.

Mix: You turned down the Rolling Stones to work with Sister Sledge?

Rodgers: Yeah. I heard he's pissed off that I did that, but I doubt that. Mick is too professional.

Mix: What about Madonna?

Rodgers: Her first album wasn't happening, chart-wise, but it was happening to me. They sent me a copy and I said, "This is dynamite. What do they need me for?" Then I met with her, and I realized she wanted to make another step in the business, to go from where she was to where she is now . . .

Madonna is so smart and so bright and aware . . . and so damn good. Every song on that album, every single vocal is one or two takes. Every track sheet is the same: she'd put her lead vocal on track 11 and double it on track 12. All you've got to do is put up the fader and let it play.

That album was basically the Chic rhythm section—Bernard, Tony [Thompson] and myself, and [keyboardist] Rob Sabino.

Mix: Robert Plant and the Honeydrippers.

Rodgers: That was great. There was nothin' to it. We just went in and played. They were all songs that we all knew . . . [Jimmy] Page did some [guitar] stuff, Jeff Beck did some stuff, and I did some stuff.

Nobody thought it was going to [sell three million copies]. In fact, we had so much fun making it that we didn't think the record was going to come out!

We did enough for two albums. The next Honeydrippers record has really great stuff on it, like "Treat Her Right." A lot of up-tempo stuff.

Mix: Duran Duran.

Rodgers: I did "Wild Boys" and "The Reflex," but I didn't do "A View to A Kill." I am doing the next Duran Duran album—or at least it looks like I am.

Mix: What about the Thompson Twins?

Rodgers: We've cut 16 tracks. Now, I

don't believe in that—I think it's the stupidest thing in the world—but they're into that and now I'm digging it.

Mix: They had finished the album once before you came in, right?
Rodgers: Yeah. We cut some new stuff, and we fixed some of the old stuff, too.

Mix: How do you feel about Bernard's work with the Power Station?
Rodgers: It was great. I was doing Jagger downstairs while they were doing that upstairs. It was killing me to go up there and hear those drum sounds! The Jagger record is more traditional-sounding, and I was dying. I kept taking Mick upstairs and saying, "Listen to this! Don't you want your drums to sound like that?" And he said to me, [imitating Jagger] "Naaahh. I just want them to sound like real drums, ya know?"

Mix: Do you and Bernie plan to work together again?
Rodgers: Yeah. We're good friends. You know, our fights are stupid, and they never really mean anything. The next day, we're together again and laughing.

Mix: If *B-Movie Matinee* takes off, do you think you'll tour?
Rodgers: Oh, yeah. I really want to tour. I love to play live, and I'm organizing a band. Unfortunately, I have a lot of production jobs backed up.

I want to develop myself as an artist. I want to know what I'm doing, so I probably wouldn't tour until the next album—unless, of course, this album becomes a monster.

Mix: When I listen to *B-Movie Matinee* I hear serious songs such as "Face in the Window" and "Wavelength," as well as simple dance tracks such as "Plan 9" and "Let's Go Out Tonight," which have little lyric depth. Did you have trouble making up your mind about what kind of record you wanted to make?
Rodgers: Sequencing is always a tricky part of making a record. This album was about B movies, and I didn't know if it was better to have all of the "movie" songs together or to spread them around. I ended up going with what I thought was the best musical progression.

Mix: "Stay Out of the Light" is an off-the-wall dance drama that tells the story of *Raiders of the Lost Ark*. Are those the actual voices from the movie soundtrack?
Rodgers: No. If you only knew what we had to go through trying to get to use those voices! [director Steven] Spielberg was cool, but [producer]

George Lucas was going to sue us. [The track] sounds off-the-wall now because we had to erase most of the stuff that tells the story. We had [a vocalist] do dialogue, rapping and all kinds of stuff. The record ended with the Nazi saying, "I'll show you what I'm accustomed to, Dr. Jones." We had to leave out the "Dr. Jones."

I also had to pull an entire song, "The Terminator." [Ed. note: Rodgers was engaged to write a song for the home video edition of the movie *The Terminator*. When the producers decided not to use it, Rodgers asked if he could include it on *B-Movie Matinee* and was refused.] These guys wanted me to pay an enormous fee, and give them more of the publishing than I had myself!

[Ed. note: According to Rodgers, the song may be used in a subsequent *Terminator* movie.]

Mix: What are your plans for the immediate future?
Rodgers: After I finish Laurie Anderson and the Thompson Twins, I'm going to do a film with Gregory Hines and Mikhail Baryshnikov, called *The White Knight*. Phil Collins is doing a tune, Lionel Richie is doing the theme, and I'm doing three dance numbers...

Mix: Are you happy at this point in your life?
Rodgers: I'm very happy, the happiest I've ever been. I'm playing better than I've ever played; I'm playing more instruments now, and I really feel confident about the way I play. My piano playing is better, and my singing is getting better. I'm more comfortable now.

HELEN KEANE: ON WOMEN PRODUCERS AND ALL THAT JAZZ

by Dan Daley

First, count the number of women successfully pursuing careers in record production. You're allowed to use the fingers on both hands. Now, enumerate the women producing in the field of jazz. You can put one hand down and still have enough fingers left over on the other to scratch your head and wonder why.

"I'm the only woman producer in jazz," says Helen Keane, whose career has spanned three decades and shows no sign of abating as it heads towards its fourth. She has produced some 30 records by piano legend Bill Evans (in addition to managing his career for 18 years), and the rest of her client list reads like a Who's Who of Jazz, including Joao Gilberto, Kenny Burrell, Morgana King, Tony Bennett, Paquito D'Rivera and Philly Joe Jones, among others. Her work has garnered seven Grammy awards and numerous nominations.

Asked why there are so few women in production, Keane points an accusing finger at record companies themselves. "They view women as secretaries," she says, leaning over the desk in her apartment/office for emphasis.

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people to harbor feelings of resentment towards their more affluent counterparts in rock. While Keane is not immune to such feelings, she directs them less towards the musicians and more towards the corporate mentality which she thinks fosters it. "I don't resent the money because I feel you should get it while you can," she said. "That's the American way, from music to baseball to boxing, so I really can't get too angry about the money they get.

"Where I do get angry is when the record company limits my budget and I turn in a major album, in terms of quality, in four days—and one of those days was *strings!*—and we mix in three days. I get angry because I know that the pop people don't know how to do that. They have no discipline in the studio. They've never been disciplined. There are incredible delays that go on in pop dates and the record company is picking up the tab at $250 an hour plus this and plus that, and they book block time and come in for a half-an-hour and then don't feel like playing. That's what angers me—the fact that money is being thrown away for no valid reason. And then I get pressured by the same company that throws all its money away on the pop stuff to keep my budget smaller. If I spend $5,000 over, I get heat for it." She also holds some pop producers accountable since she believes that artists take their work habit cues from the producer.

She acknowledges that jazz, along with classical music, has always been a stepchild in the industry, "but I've learned over the years that there is nothing I can do to correct that. I can make a little dent occasionally by screaming and yelling and writing memos to higher ups when a jazz artist plays a live date and then the fans can't find a record in the store. This has happened to Bill Evans, Kenny Burrell, any artist I've produced."

Attempting to cross over charts is one way that jazz artists can try to rectify this situation, but Keane opines, "I think if it happens, it's a fluke. I don't think you can deliberately do it, and what it does is water down what you're doing." Referring to an artist she is currently working with, Paquito D'Rivera, she says, "Paquito's music is very accessible. I feel that his music could at some point cross over, but we don't go in with the idea of doing that. He's a jazz player and he plays very intricate solos and there has been pressure put on us to simplify his solos, but we won't do it. You can identify his sound immediately. I'm going to change that?"

Her advice to women who want to enter production is to the point: "My feeling is to attack the recording studios [as engineers and assistants]. That way you're exposed to the process every day. But watch the producer as well as the engineer. That's the way, because I don't see women penetrating the record companies unless they can come in with an important artist the way I did and say 'This is the package and that's *it*.' "

Keane finds no time to be bitter about an industry that has excluded women for so long, and at the same time acknowledges the role luck has played in her career. She pays fortune back by doing seminars for women in music around the country. And the Grammy awards she has collected represent to her, "Not vindication, but the satisfaction that your peers are acknowledging what you do and that you're making a contribution to music. The satisfaction lies in feeling happy and honored by being recognized by your peers." ■

JEFF WEBER:
PRODUCER WITH A TWO-TRACK MIND

By Robyn Flans

Once upon a time there was this jaded writer—well, maybe jaded is too strong a word—not easily impressed writer, sitting with a possessed producer. He couldn't even eat the lunch put before him because he was simply too keyed up about the subject matter. After all, here was one more person to convince, which seems to be his *raison d'etre*. Passions aren't always blessings, though, so realizes producer Jeff Weber. He's constantly having to convince others of his, and often he's met with unwavering resistance. He has no doubt, however, that live-to-2-track is the way recording should be done. By the time I had finished my lunch, I, too, was a believer.

"I feel that making a great record is to capture the emotional performance of the moment. I really hate the thought that the technology makes the record," says Weber, who also does multi-track productions, "but in many cases, it does, due to finances and the fact that everybody can do everything on his own keyboard. I'm after the human element, and I love the emotion. That's why I like the 2-track. I've found that the only way to get an emotional performance from an artist is to put him in the situation where he can perform. He cannot perform in the studio environment. All the way through his life, that performer has been used to performing with others. He starts off writing and playing with someone. They move into a garage situation and play together. They move on to playing in bands together. The sophisticated technology dictates, 'No, you don't have to play together now. Everything is so great that we can take each individual part, compartmentalize it, break it down, analyze, digitalize, harmonize and flange. Then we can put it all back together and it's going to be more perfect than when we went in.' Unfortunately, in my experience, that's not true. Something happens. Some magic disappears. Some magic is created when everybody is together, the adrenalin is flowing and people are looking at each other. There is a magic that occurs that you cannot get in multi-track studios if you spend a million bucks, if you book 40 hours, 40 years."

Weber even went to one record company president and offered to do the work for free to prove his point.

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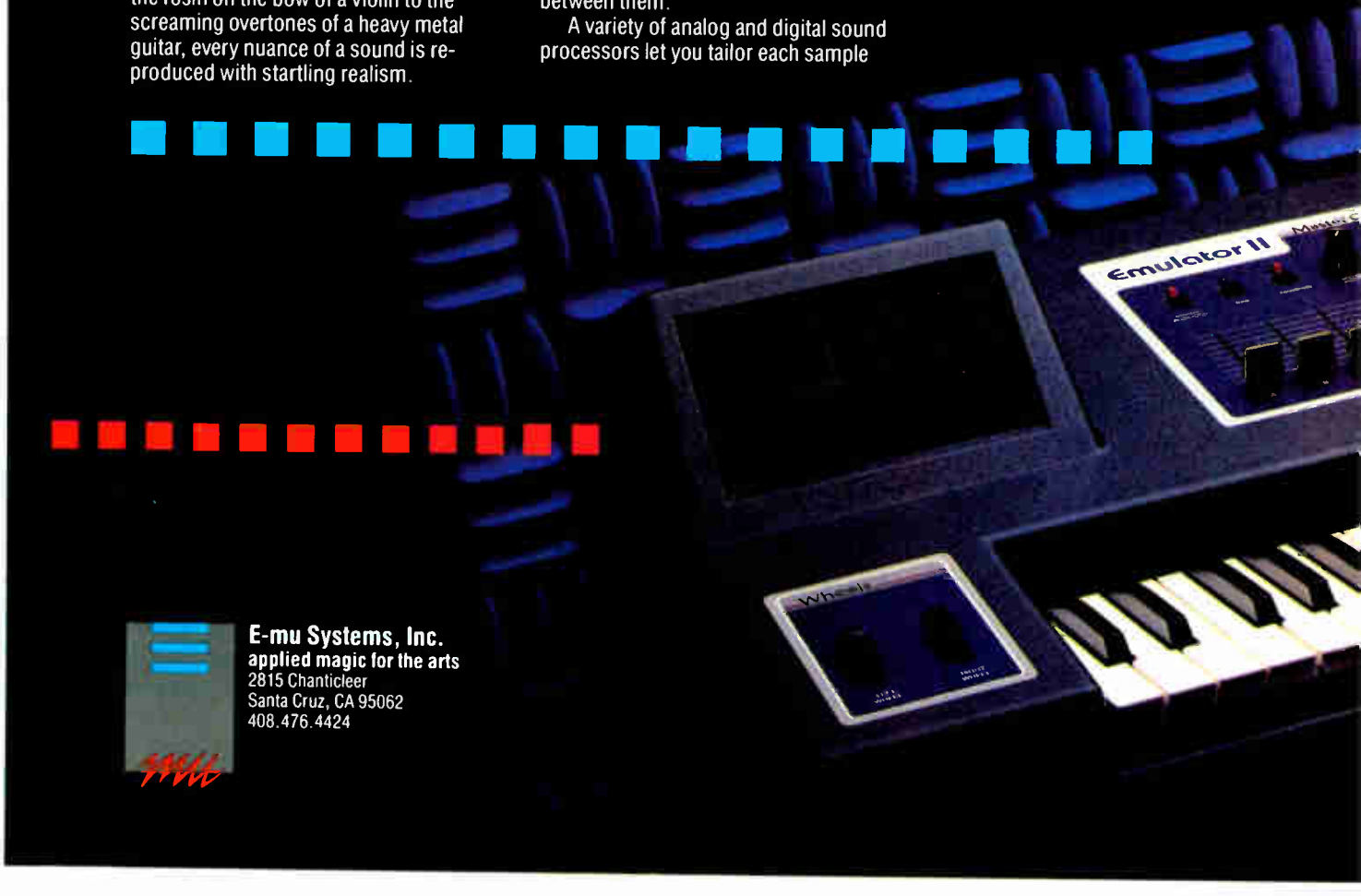

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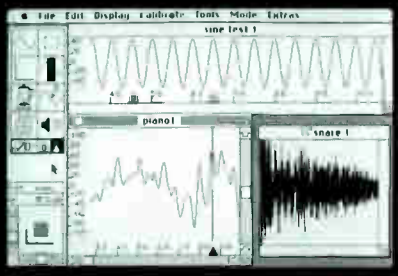

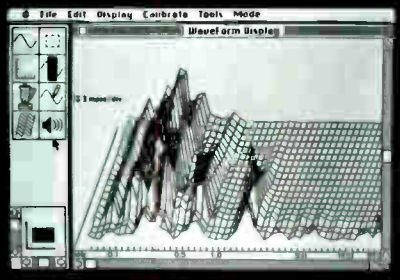

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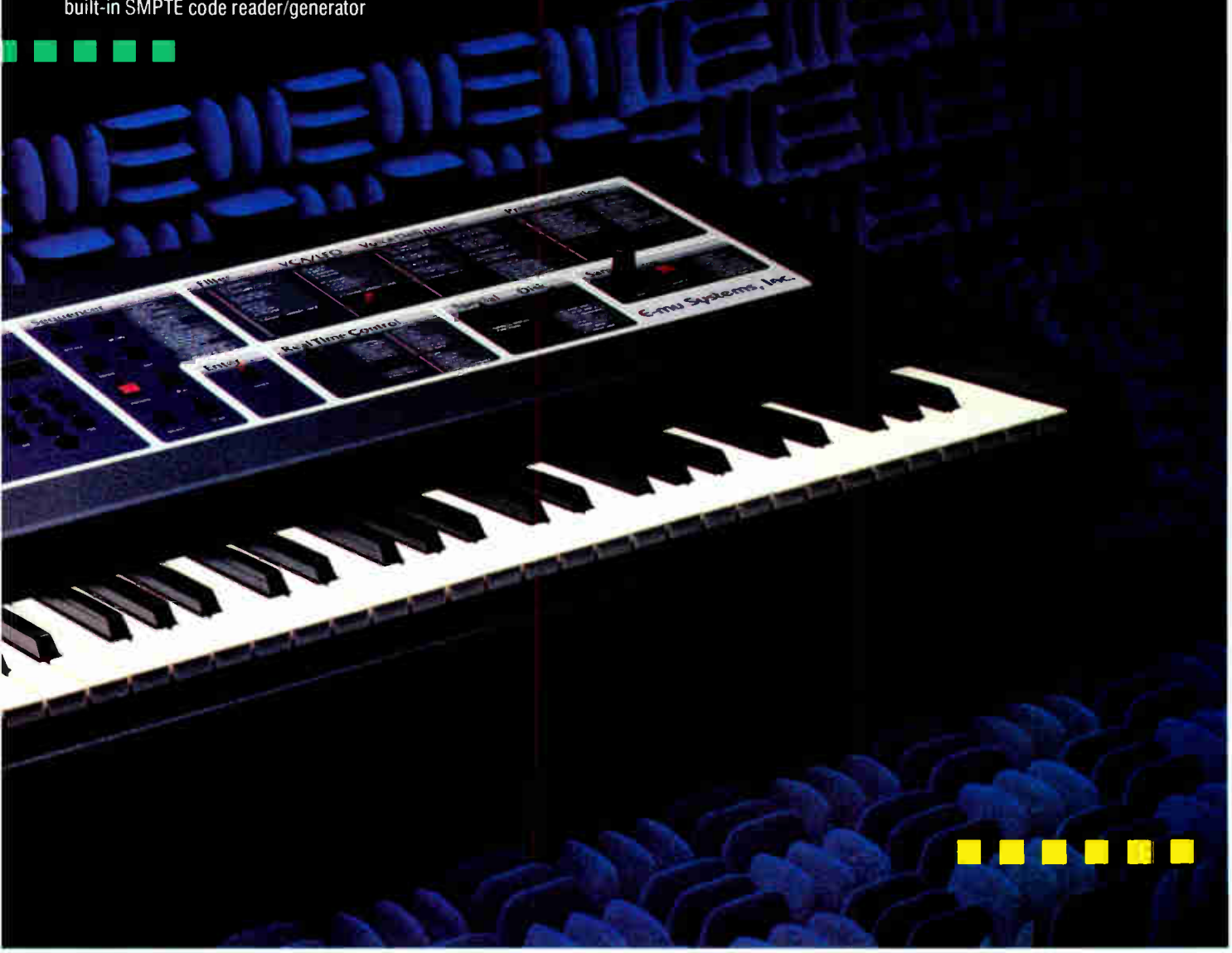

"I said, 'All you have to do is pay back the production costs a year from now. I want to show you I can cut down studio expenses by 95 percent, increase the sound quality of the product by twice, and I can take 99 percent less time to do it.' He was not impressed and said if I could convince the artist to do it that way, he'd back me 100 percent."

Tom Scott agreed to let Weber produce *Desire* in that manner, and the album received two Grammy nominations in 1982.

As an undergraduate at UCLA toying with journalism, Weber found his passion quite by accident. Passing a record store one day, he was overwhelmed by the music that drifted out the door. A salesman was trying to sell a stereo system to a couple, and while the system wasn't great, the demonstration record was fabulous. In an era of $3.49 disks, Weber laid out $10 for this direct-to-disk album, *Lincoln Mayorga and Distinguished Colleagues, Volume II* on the Sheffield label, now a collector's item.

After reviewing it for his college paper, Sheffield asked him to write the liner notes for their next LP, Thelma Houston's *I've Got the Music in Me*. Although the notes never went on the product, it was the beginning of an important association for Weber, which resulted in his becoming a production assistant. He ended up working on nine albums for them during 1975-1977.

While all this was going on, Weber was attending Southwestern Law School in Los Angeles. When he finished the curriculum, however, he took a job at *Cashbox* as a record and legal reviewer. By 1978, disappointed with the quality of recorded product, he proposed to Discwasher, the company that makes the record cleaning device, that he produce an album to serve as a demo for their products.

"Originally, I just wanted to make one record and go back to getting my legal shingle, as it were."

He never did. Due to his participation, Discwasher instituted an actual record label, for which he made seven albums, committing himself to the crusade of live-to-2-track recording. Since then, he has worked with such artists as Freddie Hubbard, Toni Tennille, Tim Weisberg, Lalo Schifrin, Nancy Wilson, McCoy Tyner, David Benoit, Grant Geissman, Maynard Ferguson and even the Utah Symphony Orchestra.

If Weber hadn't already managed to infuse me with his enthusiasm, the music would have. The samples he played for me spoke for themselves. They possessed all the rich dynamics of a live performance, yet without overdubs, edits, limiting or compressing. And being able to clearly hear the position of the instruments, the music becomes a visual experience as well as one that is moving. I couldn't remember the last time I heard such energy coming at me from speakers. At that point it became an enigma. Why is live-to-2-track so often met with resistance? Is it simply fear of the unknown, or is it something in the process itself that makes people wary? Weber was only too eager to discuss and detail the procedure.

"You're going to find that I do the same exact thing every producer does, but in reverse order. We go over the musical concept in light of what the label is looking for, what the market will bear, where that person should progress from his last album and where he wants to be five years from now, to determine what kind of music we'll be doing, what kind of musicians we'll use and how it's done. On the Tennille record [*More Than You Know*], we knew we didn't have time for rehearsal, so I decided that no one under 40 would be on it because we were doing standards. I wanted everyone who was on the record to have been there when the standards were written, and I didn't want anybody who was a fabulously great musician, but who could only memorize the notes. I wanted the feeling to be instilled on a natural basis.

"The technology is just there to aid the music," he continued, "so what I try to do is offer the client every possible alternative. On every record, I record in the digital domain and all analog formats. After the record is completed, I sit back and listen to the music, evaluate it in light of the technology, and decide what medium best serves it. We recorded Toni Tennille's album as a live 2-track recording. We did not record a multi-track version of it. We recorded live 2-track digital and analog 2-track in ½-inch and ¼-inch formats, at 15 ips and 30 ips. Then we sat back and listened to all the tapes and decided that, believe it or not, with the number of string players, and rich, full natural sound, we wanted the analog version as opposed to the digital version. Analog tape has deficient memory. After a certain amount of time, the harmonics—the highs and lows—tend to disappear, become softer and melt into their lower and upper more frequencies, so the things that create the musician or instrument's personality, are somewhat dulled. They lose their punch; however, analog has the tendency to be warmer. Digital, of course, has a tremendous memory. It retains things from now to whenever. With Tenille, it was a trade-off. We felt the music needed that warmth and didn't necessarily have to have any more punch than it did on analog. With Tom Scott's record, we wanted only the punch because that was going to create our market. We wanted people to have their senses

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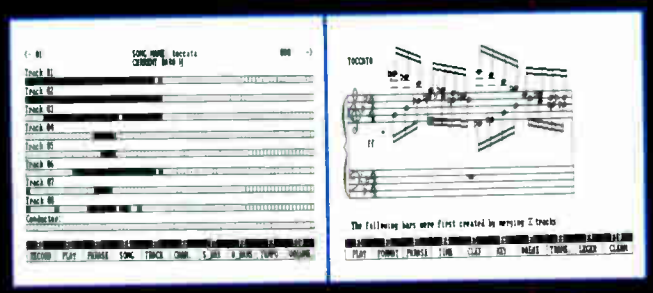

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exploded, which is why we kept the digital technology."

Every tune is broken down to determine where the instruments and vocals will be placed.

"We are actually mixing the record before we go in. From left to right is the panning—where each individual instrument is on the soundstage—and that has to be pre-set. We're placing certain instruments. If a particular keyboard is going to be a pad, its relative level of importance is not as important as the kick drum, which we want up there. So we will draw a schematic based on different elements. The strings need to be back at this particular point, up at this particular point. From top to bottom is where we get our hole for the vocalist, if there is one. We make sure that the highs and lows are equally proportioned, and that one group of instruments doesn't tread on another group of instruments from a sonic standpoint. If there are instruments which are in the same sonic spectrum, we vary the cadence, so one person might do quarter notes and the other might do 32nds or 16ths so it has definition. We want it all to be as if you were to go hear somebody live."

A period of rehearsal ensues for the vocalist and musicians, while Weber is working on the selection of mikes and soundstage. His preference is Ocean Way, which boasts the largest selection of tube mikes in the U.S., and has a 30' x 100' isolation room and a natural echo chamber. Since the demise of the Sound Stream digital machine, Weber favors the JVC, about which he says, "I've used them all, and I feel that the question of reality looms. What I put in, I get back. The digital character, the digital quality or the digital sonics that are added to each part of the music, are more tolerable with this machine on this particular day than the others. Things are changing so rapidly that tomorrow may be a different story."

Once the studio and the preferred hours of recording are chosen, they set up.

"If we have a 12-hour record, at least six of that is spent setting up. When the musicians walk in the room, we've already scoped out which microphones we're going to try, which is all subject to change, of course. We work on the headphone mix and I do the same things a normal record producer would do. Then we go and play. I have a score supervisor sitting next to me, who reads me the scores two bars ahead of time, so I know when to bring in the horns and strings, when there's a sax solo, and when the vocals come in. I'm listening to balance perspective and I'm also talking to the engineer. We'll tailor the mix on every take. The band will go through it one time while we're getting our preliminary fixes, and we'll go through it another time and put it on tape. Everyone will come in and listen. We'll go over the problems that are occurring and go back in. In two other takes, we've got it. That's it. Goodbye. See ya next time.

"We do it until we get it right, but we don't get it right by technically fooling with it. We get it right by burnin'. Everyone knows instantaneously if that track burns. It's a wonderful, tense, emotional situation; a comfortable tension. You want to be there, your palms are sweating, but at the same time, you're aching to go. This is what playing music is all about—playing music in a live situation with state-of-the-art technology and not hating your music at the end of the session. On every record I've done on multi-track, not only do the people hate each other, but they hate the music by the time the album is done. Here, they dig it and they think of things on the spur of the moment. That's what makes us our magic. The only thing I can't explain sitting here today, is that feeling. I can't define why it's better. It's like pornography," he smiles. "You can't define it, but you know it when you see it." ■

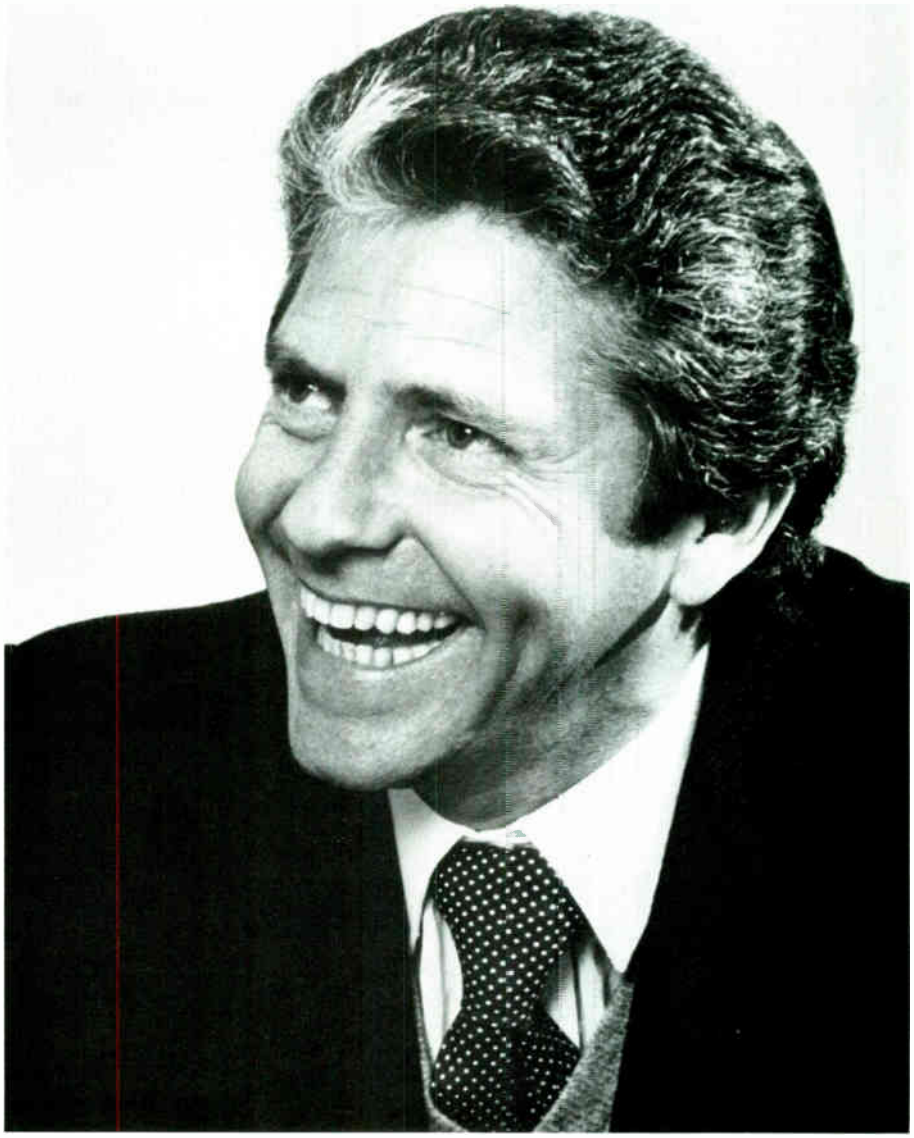

PHOTO: DOUG MILLER

WES FARRELL:
STILL LEARNING NEW TRICKS

by Brooke Comer

Wes Farrell has achieved phenomenal success as a producer, composer, and publisher. But the co-writer of "Hang On Sloopy," music conceptualist behind TV's *The Partridge Family,* and founder of Chelsea Records and Coral Rock Commercials, thinks of himself primarily as an artist. "When producing, I approach each project as if creating a piece of art," Farrell says. "I say, 'You be the colors and I'll be the brush, and I'll figure out how to paint the complete picture.' " His name is synonymous with hit music—from jingles to film scores—for a reason. Farrell has his technique *down.*

Granted, the man who originally

signed Neil Diamond, Barry Manilow, and Rick Springfield (and still owns a percentage of Springfield's contract), who launched Coral Rock (the jingle house that racked up Addy and Clio awards for such clients as Coca-Cola, General Motors and Kelloggs), and who could retire tomorrow on the publishing rights to hits like "Knock Three Times" and "Tie A Yellow Ribbon Round the Ole Oak Tree," doesn't have to look for a new deal. But Farrell, whose retirement in '79 lasted a month ("I was never so bored in my life"), hasn't stopped working since. "If I stop working, I stop learning and I'm dead," he explains. He's just finished recording Wayne Newton, and is currently working on three new projects—Z Toyz, a heavy metal group from Florida, folk-turned-rock act Roanoke, from Virginia, and Glitter, a pop-rock band from Florida.

Achieving acclaim in just one area is no easy feat, and Farrell, whose growth as a songwriter, producer and publisher occurred simultaneously, admits that it was no overnight success story. "I wrote a hundred bad songs before I wrote one good one," Farrell recalls. His adventure in the music industry began while attending college in Miami. "I went to black clubs for R&B and Latin clubs for Cuban music. I got hooked immediately. My interest in writing developed from the basic blues and Cuban performing artists I was listening to."

Farrell took his excitement and his possibilities to New York, where, "I wrote every day and night. I had a lot of songs that were accepted and recorded by different acts, and that kept me going. There were a lot of poor times, but I never worried about rejections. The songs that were accepted were enough gratification to keep me going. You have to survive long enough to express yourself to someone who finds what you're doing to be valuable and interesting." Self-conviction and directed energy paid off when he was asked to write a song for the B-side of The Shirelles' "Will You Still Love Me Tomorrow."

"I wrote a song called 'Boys,' and when it was later recorded by The Beatles and became an album inclusion on millions of records, I had a cash flow while I waited for my business to be a success."

A flourishing publishing industry, the result of fewer artists on the charts writing their own material, kept Farrell active in the early '60s, with R&B hits like Ronnie Douglas' "Run, Run, Run," which he wrote and produced and published. "Back then, one made demos," Farrell explains. "For the most part, artists didn't compose their own songs, and this kept the publishing industry bustling. I'd go into the studio with my

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compositions and make five or ten demos a week. I found people were copying my demos, so the natural extension was to produce. At first it was hell. If you didn't get four sides recorded in three hours with a $3,500 budget, it was hard to get record companies to allow you to produce again."

The structure of the music industry 20 years ago was conducive to self-motivated, multi-talented people like Farrell. Collaboration with other writers and composers also fostered his success. Farrell's objective approach to style lends to collaborative attempts. "I'm not that good at studying other people's styles," he admits. "I'm better at admiring them. When I do study style, it's for the moment."

An objective approach, according to Farrell, "is the single most important ingredient in a producer. You have to bring all those ideas that you see as being clear in making someone else successful. It's a matter of staring at the subject and giving it as much input as you can." Farrell is so sure of his method that he's rarely been disappointed, "unless I didn't know what I wanted. When I go into the studio, I believe that I'm going to cut a great record. That's always foremost on my mind."

Farrell, never one to sequester himself for long, is always scouting and finding new talent, in spite of his distance from any of the acknowledged music capitals. Coconut Grove, Florida, seems an unlikely home for one so active in the business side of the entertainment industry. But Farrell has his reasons.

"It's just as easy for me to get on a plane to Europe or New York from here," he points out. "What makes you happy is what makes you stay somewhere. There's a quality I've found in Florida that's lasting. Before, I was lacking that quality. You have to wear the suit that fits you." Florida may not be the hub of the music industry, but Farrell hasn't been deterred. "When I listen to an act, I look for that certain 'wow' thing, whatever someone has that defines them as individuals. No great success has come to something that sounds like a copy."

Farrell's approach to a hit tune starts in the studio. "I have a sensitivity to the frame value of a song," he notes. "I'd never get an award for the longest guitar solo. It's not something I relate to. To me, a song has to begin and end with a positive flow. That is what's allowed me to have pop hits that went country, and R&B hits that went pop. My music is basically everybody's music, that people identify with and feel friendly about. I've never done anything eccentric; I guess I'm plain and average in terms of what people like."

Still, he refuses to be complacent, and is always looking for new musical ideas and new sounds. "To understand something new, you've got to know exactly what you want to get from it and experiment to get it," Farrell says. "When I was first introduced to synthesizers, drum machines, and various new electronic instruments, I was fascinated with their possibilities, and disappointed by the results. There were too few musicians available who had mastered the art of playing and programming their instruments. Today, that is not the case and most studio musicians have a thorough knowledge that allows them to express the potential of their instruments.

"It wouldn't be natural for me to produce a totally electronic track without acoustic drums," Farrell adds. "I miss looking at the drummer. I use percussive techniques around and about, things you can't play. I don't like click tracks. I know they're important, but I'd rather the record have a natural flow, and electronic music requires a click, or you're dead. When it comes down to feeling, no synthesizer can replace the depth and emotion of a live musician. In the second half of this year's releases, I've heard more people playing and I'm not surprised."

According to Farrell, "It only takes 30 seconds of listening to know if something's going to be a hit. You have to be after something and believe in it enough and put all you can into it. As a producer, you have to find a style you're comfortable with and then take some risks and believe in your product. If you be-

lieve in it, you'll have a sense of encouragement on a constant basis." ■

DAN ARON: DON'T CALL HIM A JINGLE PRODUCER

by Brooke Comer

Dan Aron's childhood dream was to replace Alan Freed as the King of Rock and Roll. Instead, he turned his musical aptitude into No Soap Productions. The New York City-based music house designs custom audio environments for radio and TV spots. Some of the sounds that sell Prell shampoo, A&W root beer, Dr. Scholl's, National Car Rental, and Mountain Dew came out of No Soap. While the less discriminating might call No Soap a jingle house, Aron does not.

"There's a fine line between jingles and advertising music," he insists. "When we started in the business 15 years ago, Bette Midler and Linda Ronstadt were doing the Cantrece Panty Hose ads for us. That set a tone for music in advertising, but a lot of jingles and good music today don't meet those standards. However, there *is* an overlap between jingles and good music and that's in the writing and arranging."

Aron's strength in the industry is his ability to put together a project that's ear-catching without being insipid. It's a process that involves close attention not only to arrangement, but to assigning the right writer to a job and overseeing the technical procedure by selecting the right studio and engineer.

Aron works with a variety of writers whose styles are significantly different. "When I assign a job, I look for someone who's especially right for that gig," he explains. "Joe Beck is a wonderful orchestrator with a strong jazz background, Red Nienkirchen is more pop-oriented, Jimmy Wisner is an eclectic, Jay Leonhart comes from a different space, John Klett is bizarre and brilliant, and there are more."

Even though there's no scarcity of excellent writers in the business, Aron believes that with luck and good material it is possible to break into the clique. "There's a constant demand for new material, and that makes this a wonderful business for anyone who wants to break in. Once you get a degree of establishment in the business, you get a lot of calls. You can become a monstrous house in a week if one of your national spots is a hit. Advertising people are loyal to a point, but they're always looking for a new way to break through the audience consciousness. A lot of the music you hear in ads today is predictable. New wave is old hat. When some acoustic drums pop out at you on TV, it's a surprise because Linn and Simmons are dominating the sound

Dan Aron

of the business. I think the next trend will be a partial return to acoustics."

With his instinct for music that attracts a listener's attention, it's no wonder Aron set his sights on Alan Freed. He didn't abandon that goal for a long time, but shifted his talents toward shaping sounds into audio designs. "I was a DJ in college," recalls Aron, who produced and DJ'd "The Sound of the Blues" for WHRB, Harvard's radio station. "I still thought that would be my career. I was also on the air in New York for a few years, but I didn't like working in a format. If I could have gotten onto WNEW-FM it would have been heaven. Instead I fell into music for advertising. I could easily have gone into record production, too. If someone from Atlantic had asked me to produce R&B acts, I probably would have jumped at it. But at this point, the whole idea of doing a five- or six-minute cut is mind-boggling.

"And at least in this business you know you're going to get paid for your work. In the record business, you may get a production fee for the album, but you don't know if it's going to sell. If you know that a Prell commercial is going to run network, there's less risk."

Free from the risks and politics of the record industry, Aron has control over many facets of a total project. He casts from his office, "then I send a cassette to the agency and they tell me who they like. If it's a radio gig, I basically work as a director. Sometimes the client will have the score and lyrics or we'll supply them. I start out at the agency looking over the board with the writer and producer finding out what needs to be done, then I'll figure out who's going to write for it. My writers are all versatile but there's always someone who's right in the pocket. I always ask the writer how they hear it. I don't know anyone who doesn't have something of a concept from listening to the radio or MTV. I'll put one or two writers on the job, get a scratch track down or do a live presentation for the agency. Once we've got it together enough, we do a live presentation over the phone for the creative director. Then we record the guide tracks for shooting and then the shoot can be done. I also work as a contractor for music sessions, using Paul Evans as my singing contractor. Jingle players are an extremely diverse group but some are stronger in some areas than most. Steve Gadd can play anything but if I want a real downtown rock solo I might use another drummer whose natural style is downtown."

The advent of stereo TV brings sound specialists like Aron new dimensions to work with. "Stereo TV is a spinoff of what I'm already doing. I take a little bit of everything, sound effects, music, radio imagination and fuse them together. Radio has been there all along but stereo sound will make TV advertising more fun and more effective. The problem with stereo radio is that no one turns on the radio and sits down to listen. People move around because there isn't a visual element to draw their attention. Whatever imaging you do in stereo gets screwed up. With TV, you're right there. The degree to which you can fuse music and effects to make the action come out from all around you is amazing. We've worked out a methodology to create these effects quickly. I don't have the money Lucasfilm has, but what I do requires imagination mostly, applied to my experience in radio."

Making sound work with a picture requires Aron to "build" sounds and heighten reality. "Sound can give a scene its aura, and if it's the right aura, sound can steer a scene," Aron says. "I start with the literal sound, recording things as they are, and move toward the abstract. Then, after I've gotten that literal sound down, I build on it by using the characteristics of that sound. For instance, when I did a Wilkinson Bonded Blades spot, we dealt with a visual of a blade being taken from its container by the razor handle. To make it larger than life, we added doors opening and closing, hammers, and metal against metal, so that the result was a strong sound, implying a razor capable of dealing with a tough beard. But we began with the actual blades. You have to be careful not to overdo it, though. You can expand too much and it's important to know when to stop gilding the lily. Sometimes simple is better."

Directing sound into shapes is a creative venture accomplished in the studio, so Aron keeps a close eye on studio technology, equipment and engineers. "I look for a good live studio, but first a good engineer," he notes. "A good engineer in a so-so studio can come out with an outrageous product. I like to have an engineer around who's flexible and inventive, someone who can be another sounding board, and who can come up with ideas, too." With his background in radio production, Aron has considerable knowledge of studio technique, and likes to get involved, especially with the mix: "Basically, I do my own mixing with the engineer assisting. I'll modify the mix with him and if there's a certain move I want to do with the reeds, then I'll grab the faders and put it in the computer."

Creative instinct guides Aron in the studio, but without an understanding of instrument capabilities, his creativity and his final product would be limited. "What I'm trying to do is establish an environment, and make the audience feel that they're in a specific place," he explains. "I produce an image that you can see in your mind. TV makes it more

exciting because with a picture already there, so much the better. I don't think it will take anything away from the imagination. The elements of sound can only assist the image." In order for Aron to successfully manipulate those elements, he has to know what his equipment can do. "I'll tell the engineer that I want a boxy sound, like a flange kind of thing but boxier, and he'll set it in the back of the room so we can go to the [Eventide] 2016 for room reverb toward the rear and still have definition. That way it'll be distant yet present. If you know the potential of the equipment, it becomes easier."

When Aron selects a studio, he looks for a live room and plenty of outboard equipment. "I don't like working in a real dead room and I like plenty of outboard equipment," he says. "I stopped working at one New York City studio because the outboard gear just wasn't there. If you don't have your harmonizers, flangers and enough processors, delays and reverbs, you're limited as to what your possibilities are. You can get a nice straight-ahead sound in some of those studios, but you can't experiment as fully as if you had a full array of equipment. I need variety because I won't always know how I'm going to get a certain sound until I get in and play with it."

Most of the New York studios have kept up with Aron's ever-changing needs. "I love Clinton's upstairs room; it's outrageous for orchestras. Chelsea is another good one. Phil Bulla, their staff engineer, can get an unbelievable good, fat sound that's very contemporary. I recently had a really good experience at Sigma Sound with engineer J.C. Convertino. I'd never tried Sigma, but Joe Beck encouraged me and I was amazed. We had 20 guys playing live in Studio 7 and we only had to overdub strings on a couple of them. The solid sound was very impressive."

Among the challenges that Aron has faced was the task of getting a voice to come out of a bottle underwater. He knew he'd use a Harmonizer and a Lexicon reverb and some processing, but he wasn't sure how he'd use them until he got into the studio. "We ended up using a flanger on the Harmonizer and we got a pick-up ratio of 60 percent with some reverb on it, so it really sounded like something you'd hear from inside a bottle. When the client wanted something stronger, like a tidal wave with a voice coming out from underwater, I put it through the Lexicon and added a little echo and some burbles. How did I get the burbles? I took a little straw and blew it into a glass of water, recorded it at 30 ips and took it down to 15, until the burbles sounded just right."

He isn't the King of Rock and Roll, but Aron may very well be the King

of the Burbles. "When I'm doing a commercial, even a radio commercial that doesn't have any music on it, I make it into something that's got a little guts, a little drive, something that can relate emotionally to people. That performance, or aura of a sound is really what it's all about." ■

STEVE LEVINE:
AN ENGLISH PRODUCER'S SURFIN' SAFARI

by Robyn Flans

Steve Levine is amazed that the hit album, *The Beach Boys,* is even out. To put it lightly, it wasn't the easiest project in the world to pull off.

"The whole band suffers from excessive ego problems, and one is jealous if the other does more vocals than the other one," he says candidly. "Carl [Wilson] would be happy to be here on time, but then Alan [Jardine] would turn around and say to me, 'You're using Carl too much.' All that matters at the end of the day is the album got done and it is very, very good, even though I got a lot of grey hairs and aged a lot. I got very close to Carl and hope to do his solo album, and I got on very, very well with Bruce [Johnston] as well.

"The others had moments when it was very happy and jolly as well. There was one instance where Brian [Wilson] was incredible with me because I had a really bad argument with Alan, so much so that I was actually standing outside in tears. I had arrived at 10 and Alan arrived in a really foul mood and just chewed my head off over some ridiculous piece of crap. Brian was out there and said, 'What a wanker, he's always doing something like that,' and he went in, had a chat with him and came back out and hugged me. That was really sweet. For a second, there was Brian being real."

From a musical standpoint, Levine was sticking his neck out when he agreed to produce the Beach Boys' album. It definitely requires a lot of chutzpah to try to update a musical institution while retaining those world renowned qualities. Levine accomplished just that, however, which is his main objective with any recording.

"I don't try to make the band sound like me, which a lot of producers do," he says. "There are producers like Trevor Horn, who is actually a very good friend of mine, who have very distinctive styles. It's very much a Trevor Horn record and the band is secondary to the product. But, there are those bands who would not be where they are if it were not for the production styles of Trevor Horn. My particular method, however, is to make the very best qualities the band has shine through. There

PHOTO: ART ZEESMAN

are instances where I have to put a particular style in it because it may be a solo artist, like David Grant, but with something like Culture Club, there is a large amount of integrity within the band, so my job is to get the very best out of them. Also, as my technical knowledge is available, I feel that I should make the very best recording I can possibly make. I think my records sound very good, clean and clear.

"It's difficult to pinpoint exactly how I attain this [clarity]," the 29-year-old Englishman continues, "because I only know that way of doing it. I think a lot of people EQ a lot of things for the sake of it, so they end up with a huge mish-mash. The arrangement of the instruments is as important as the way they sound. If you fill up a multi-track with lots of instruments, it will sound like a mess. What I try to do is layer the overdubs, musically, as well as technically, so that everything has a space in the track.

"Suppose you have a synthesizer playing a mid-range part. If you double it with a guitar, you're not going to hear either of them. You'll just hear a noise. Many producers tend to have four or five instruments all in that same area, so you can't distinguish anything. It doesn't matter whether they're recorded simultaneously or as separate overdubs, their harmonic and frequency contents are all the same, so it's just a mess. What I do is have the synthesizer or guitar do a mid-range part and then possibly, if another part is necessary, I'll have it moving musically higher or lower, or technically higher or lower, so everything has a specific area like a jigsaw puzzle and nothing is overlapping too much.

"I also record the majority of things in stereo. Most people would just mike a guitar and put it on one track. I tend to have stereo mikes on the amplifier and then have stereo perspective mikes in the room, not necessarily for ambience. Your ear would hear the wider range. Then I have the combination of perhaps those four mikes and possibly another mike or even a DI'ed signal as well. Those would be laid out on a stereo pair of tracks, so when you stand in the room and you listen to the guitarist play, you hear big sound. Too many people don't go out and listen to what it sounds like. I try to capture that sound. If we're using a guitar amplifier, 99 percent of that sound should be made by the guitar, what pick-up is being used, and what the amplifier is doing. There shouldn't be that much necessity to add a lot of EQ. There may be a necessity in the track to add a little echo if you want it to sit further back. Or perhaps you want it more forward, so you'd add some chorusing. I'm trying to record in stereo for left and right, but also with echo and different delay things to put it further back or bring it forward in the mix. The result is that when you come to mix the record, it is very easy because you've already recorded your perspectives of everything."

Levine finds Barcus-Berry Electronics Model BBE 202R helpful. "It's a stereo unit and I was able to use that instead of equalizing. The other thing I found with digital is that it records everything so precisely that if you EQ lots of instruments with the same types of frequencies, you end up getting a blurring effect by the very nature of EQ, plus you've got lots of stereo things. You get phase errors. The Barcus-Berry corrects phase errors, for a start. Secondly, it makes the sound take on a new dimension and makes it brighter, but not necessarily EQed brighter because it is restoring things that are supposedly lacking in the original signal. Then you don't have to EQ it, which is a big plus because you don't have the harshness you get with EQ. I have still not found an equalizer which is totally perfect for every application. Certainly there are some boards which EQ things really well. I find the top-end of an MCI board far more acceptable to my ear personally than I would, say, the top end of an SSL. I find the SSL a little harsh. On other things, like bass

drums, the SSL is fine, which on an MCI is a little more difficult because the EQ is not as severe. Everything has plusses and minuses, but overall, I found the BBE fills the gap because it does tend to help everything, particularly since I'm using stereo perspective."

His basic equipment set-up includes two Sony digital multi-tracks with remote controls which he runs locked together to give him 48 tracks. He uses a Sony PCM-1610 system for mixing, two 5850 U-matic machines converted for digital use, a 1100 Sony editor and a PCM-F1 for location recordings such as the snare drum sample they recorded at a racquetball court for the Beach Boys' "Getcha Back". His musical equipment includes a Fairlight; Yamaha's Rack, RX15, QX1, DX1; Kurzweil 250; Emulator II; Prophet 5, 8 and 6; Roland Rack System; and a Minimoog. On the processing front, he uses a Yamaha, a Quantec Room Simulator, AMX reverb, his famous AMX delay, which is the only one ever made with 25 seconds of storage in it, and a variety of gates, compressors and limiters.

"On the microphone side of things, I have a fairly wide selection. I have a Sanken, which is very good for piano, vocals or drums. I have a Neumann TLM-170, an AKG tube and some Sony mikes. With vocals, I use the special cable made by Hitachi, which is a linear crystal cable and really does make a difference."

The Beach Boys' vocals was an ambitious undertaking.

"On Bruce, who has a slightly thinner voice, I used the Sanken. With Carl, I used the TLM, exclusively. I hate to shatter illusions, but in most cases, the harmonies were done individually because they just could not stay in tune. The backing vocals on "I'm So Lonely" were done all around one microphone. Carl did his part first and then they did their's. The 'oohs' in the verse of 'It's Gettin' Late' were done with Bruce, Brian and Carl. Michael was always at meetings, so in most cases, he had to be done separately. He was always done separately in the old days anyway, because his voice is so low and rumbly. In many cases, we had to put Carl on first or Bruce, or Carl and Bruce because their tuning was impeccable in every case, and then track on Alan, Michael and Brian where they were required. Some days Brian was incredibly in form and other days he was next to useless. 'Maybe I Don't Know' is Brian actually doing three harmonies on the chorus because he was in such good form and it was quicker that way. There's quite a lot of Brian on 'It's Gettin' Late' as well. Those high bits on 'Getcha Back' took ages to do, and I must say that Terry Melcher gets credit for virtually forcing Brian to get those. Brian was very reluctant to do them because they were such classic Beach Boys things."

Before producing *The Beach Boys*, working nearly a year on one project seemed inconceivable to Levine, who came from a more rigid studio environment. Starting out as a tape operator at CBS in London, Levine slowly graduated to doing demos and finally engineering "the more dodgy sessions, because they don't let you do anything that's decent." Working with all styles of music, from jingles to classical, however, proved to be invaluable.

"I learned how to mike an orchestra and how to get a drum sound in ten seconds for a jingle. A couple of producers did actually let me do some creative things, like when I actually met Bruce Johnston in 1977. He was booked to produce the band Sailor who were very successful in Europe. He brought over an engineer and CBS booked their standard engineer, who he didn't get along with at all. I was the assistant and Bruce said he preferred working with me, which caused all sorts of problems with CBS. Actually, he said if he couldn't have me with him, he was going to leave. They let me work with him and I built an enjoyable relationship with him. He then said I should do more in the field of production because he could see I had more of an interest in that."

The following year, Levine decided to attempt just that. He and another engineer, Simon Humphry, put together some tracks. They pitched the most outstanding one to CBS, who passed on it,

—PAGE 225

—FROM PAGE 101, MAGNETIC REC'GS

pioneering telephone engineer who became known as "The Danish Edison." Equally little is known about his invention—the telegraphone.

Poulsen came from a good family; his father was a judge in the highest court of Denmark, and there can hardly be any question as to his intelligence. But, as with many famous inventors, he was not a particularly good scholar. The only subjects which captured his interests were physics and drawing, which he pursued night and day. After being coerced by his father, Poulsen became a medical student in 1889, and one year later obtained his first university degree. This, however, was to prove the end of his academic study for he tried without success to be admitted into a major technical school; it was the mathematics that he couldn't manage.

Finally, he gave up the struggle and obtained an appointment as a mechanical workshop apprentice in Arkus. During his childhood, and as an apprentice, he was very interested in electricity and the work of the Danish scientist H.C. Orsted, the discoverer of electro-magnetism. In 1893, at the age of 24, Poulsen was employed as a mechanic by the Copenhagen Telegraph Company as an assistant to the country's only telephone engineer. In those days, any boy who was interested in electricity thought of telephone work as the highest aim in life, just as in a generation before, telegraphy had been the career for young scientists.

When amplifiers came into general use in the mid-1920s, magnetic recording was ripe for rediscovery, allowing a sufficient playback volume to be produced.

While on a fault finding job in his workshop in 1894, in a very simple experiment, he discovered the principle of magnetic recording.

It was not until after meeting P. O. Pedersen that any practical result came from Poulsen's many ideas. Of these, the most famous are the telegraphone, the first magnetic recorder, and the arc-generator, which, until about 1920 was the most widely used and for many years, the only apparatus for generating continuous waves—the forerunner of wireless radio transmissions.

Poulsen's telegraphone was exhibited at the Paris Science Exposition of 1900, where it won the Grand Prix and was as much a sensation as Bell's telephone had been at the Philadelphia Centennial 24 years earlier. People flocked to see it and one could hardly pick up a journal of the day without finding reference to it. The only regrettable feature of the original device was the necessity of using earphones, but everyone assumed that this difficulty would soon be overcome. In actuality, it took 25

years to await the development of the electronic amplifier. When it became obvious over a number of years that this obstacle was a basic one, magnetic recording dropped out of sight.

When amplifiers came into general use in the mid-1920s, magnetic recording was ripe for rediscovery, allowing a sufficient playback volume to be produced. Seeing its potential, Kurt Stille, a German entrepreneur came onto the scene with the distinct mission of the "selling of magnetic recording." His powers of persuasion were remarkable and he succeeded in obtaining financial backing from a group of substantial German financiers, thus organizing the Telegraphie Patent Syndikat. This company was the first to be set up for the sole purpose of selling licenses to manufacture magnetic recording equipment.

About 1930, the Patent Syndikat sold a right of manufacture to a Mr. Blattner, a motion picture promoter, whose chief interest in the medium was to use it for the purpose of sound recording for talking pictures. During this period, several movies were produced with a soundtrack recorded onto a synchronized steel wire, using the device known as the Blattnerphone.

Blattner thereafter sold out his interest to the Marconi Company, which resulted in the production of the Marconi-Stille wire recorder. This apparatus was often in use by the BBC for the recording of national and sporting events for later transmission during evening hours. This amazing machine accommodated approximately one half-hour of play/record time, using three millimeter tungsten steel wire at the normal operating speed of 90 meters per minute or about five feet per second.

Due to the fact that the magnetic recorder was basically immune to vehicular motion, it was seen as a practical wartime device for use in air, land or water. Thus, over the next few years, the wire recorder had undergone several improvements in size reduction and increased playing time. One such developed model was the German textophone, which was placed on the market at about the same time that Hitler came into power. The Nazis needed all the recording equipment they could get and ordered huge numbers for the German government.

One other German development was the magnetophon. In 1927, Fritz Pfleumer had conducted numerous experiments with magnetic recording mediums consisting of paper and plastic tape coated with powdered magnetizable materials. The material's grain size was rather large, resulting in a tape which somewhat resembled sandpaper. The magnetophon, which incorporated this tape, had been designed as a dictating machine, but was reportedly inferior to the textophone. It was first demonstrated in 1935 at the German Annual Radio Exposition in Berlin and, despite its mediocre performance, was somewhat of a hit.

During World War II, the Germans continued to work on the development of magnetic recording, despite serious shortcomings of manpower and material. The performance was made noticeably better with the development of the "ring-head," which vastly improved the tape-to-head transfer, but was still not as good as the shellac records of the day. This was true until Walter Weber of the German Broadcast Service, while experimenting with ideas on how to reduce the offensive background noise inherent in tape, accidentally fed a very high frequency into the record head while recording program material and noticed an enormous improvement in reproduction fidelity. All the machines in the broadcast service were immediately converted to incorporate this new "high frequency bias" and the magnetophone became overnight the world's finest recording medium.

by David Huber

—FROM PAGE 12, SESSIONS

PHOTO: ©1985 ALLEN HANSLEY

Jim Ed Norman (L) with Steve "Ray Krebs" Kanaly of Dallas *at Omega Audio in Dallas.*

SOUTHWEST

At ***Dallas Sound Lab's*** Studio A, ***Kirk Covington,*** local rock/jazz-fusion artist, worked on vocal tracks on his upcoming self-produced album entitled ***Jags & Diamonds.*** DSL's ***Rusty Smith*** engineered the project...***Larry Kronen*** of Kronen Audio is engineering and producing an album by guitarist ***Jon Dwyer*** at ***Winnie the Pig Studio*** of Santa Fe, NM...Activity at ***Tim Stanton Audio*** in Austin included ***Tomas Ramirez & Jazzmanian Devil*** cutting four songs, and ***Paul Ramsey & Studio 103*** recording basics for an EP release...***Jim Ed Norman,*** award-winning country producer and executive vice-president for Warner Bros. Records in Nashville, used Omega's Dallas 24-/46-track studio for cutting tracks for a new record featuring the casts of Los Angeles-based Lorimar Production's hit television series, ***Dallas.*** Engineering the sessions were ***Scott Hendricks*** and Omega's ***David Buell*** ...At ***Planet Dallas Studios, The Escorts*** recorded rhythm tracks for their debut EP with ***Preston Skaggs*** producing and ***Leesa Bowman*** engineering. Also ***The Tribe*** produced and recorded their upcoming EP...***Bill Ervin*** has been tracking at ***NoMountain Recording*** in Midland, TX, for his upcoming album, with ***Nick Carlton*** engineering...

SO. CALIFORNIA

Producer ***Peter Coleman*** finished mixing the upcoming ***Nick Gilder*** project for RCA Records at ***Mama Jo's*** in No. Hollywood...***Sound Image Studio,*** No. Hollywood, had producer/engineer ***John Henning*** in with ***Joey Travoita*** working on a soundtrack for the musical ***Rockola***...At ***Artisan Sound Recorders,*** disk mastering engineer ***Greg Fulginiti*** mastered LPs for ***Dio*** with ***Ronnie James Dio*** on Warner Bros.; ***The Explorers*** soundtrack, with ***Bruce Botnick; Weird Science*** soundtrack; ***B.B. King & Untouchables*** on MCA Records; and ***Silverado*** soundtrack with ***Bruce Broughton*** on Geffen...At ***Bijou Studios*** in Hollywood, ex-Detroiter ***Conley Coy*** mixed tracks for an upcoming single by his group ***Coys Toyz,*** for label shopping. Co-producing with Conley was ***Dennis Parker***... At ***Group IV Recording*** in Hollywood, composer ***Lalo Schifrin*** conducted his music for the soundtrack to New World Pictures' feature film, ***Black Moon Rising.*** Recording and mixing was by engineer ***Rick Riccio,*** assisted by ***Andy D'Addario***...Recent projects at ***Crystal Studios*** in Hollywood have included ***Lisa Hartman*** cutting tracks; and ***Sparks*** recording a song for the film ***Fright Night***...At ***Craig Harris Music*** in Studio City, producer ***Tim Hauser*** and arranger ***John Barnes*** were in to add vocal effects to ***Manhattan Transfer's*** "Ray's Rock House." ***Craig Harris*** provided Synclavier-performed samples and resynthesis from the group's sampled vocals ...Producer ***Paul Rothchild*** was in ***Producers 1 & 2*** doing a digital compilation album of classic ***Doors*** material...Producer ***T-Bone Burnett*** was in ***Sunset Sound*** laying tracks for a new ***Elvis Costello*** LP. ***Larry Hirsch*** engineered with ***Paul Levy*** and ***Stephen Shelton*** assisting...***Ricky Nelson*** was in at ***Capitol Records' Recording Studios*** working on a mix for his new single. Composer and arranger ***Jimmie Haskell*** produced the session with engineer ***Lee R. Miller*** behind the board...***Knott's Landing*** actress ***Troy Beyer*** was in ***Skip Saylor Recording*** cutting tracks for Zakia Records. ***Robert Hill*** produced, with ***Skip Saylor*** behind the board...

STUDIO NEWS

Marshall Industries of El Monte, CA, is now leasing its new video and A/V production facility, Marshallvision, to outside producers. The facility features a studio area with more than 30,000 watts of lighting equipment and full cycloramas, a projection booth with complete support equipment, an audio control booth and a voice-over booth...Just outside of Woodstock, NY, the combined efforts of ***Acoustic Spaces*** and ***Bija Productions*** are nearing the turn on the ***Dreamland Recording Studios*** complex. Extensive outboard gear, teamed with a rebuilt 40-input automated API and more than 6,000 sq. ft. of facility space, is some of ***Mr. Vercelletto's*** most comprehensive design work...Residents of San Marcos, TX (near Austin), have watched the painstaking restoration of their former city hall and fire station as part of a multi-million dollar recording, video and film complex that will be one of the most advanced facilities of its kind in the state. The appropriately-named ***Fire Station Studios,*** already houses an extraordinary array of digital and analog recording equipment, state-of-the-art laser disk processors and an entire soundstage. Even the fireproof vault, originally built in 1915 to protect property deeds and other permanent records, has been adapted for long-term, temperature-controlled storage of master tapes. For more info, call Kelly Fero at (512) 444-4841...***Otari*** recently upgraded the high-speed duplication system at the ***Music Annex*** in Menlo Park, CA, with the Dolby HX-Pro Headroom Extension Process. The five slave ***DP-80 Otari*** system is capable of running 7.5 ips masters at 64:1 duplicating speed. This new capability now makes Mu-

sic Annex the only facility in the U.S. to offer this service...Soundcraft New York, the east coast office of Soundcraft Electronics, Inc. has announced the sale of a TS 24 console to ***Saturn Sound*** in New York City. The console is a fully automated 40-channel TS 24, the first of its kind to be sold in the Manhattan area. It features an Audio Kinetics Mastermix disk based automation system...***Cotton Row Recording*** (Memphis, TN) has added a Trident Series 80 console (32x24x32) to its 24-track studio. Features include a separate monitor section which allows for a total of 56 channels during mixdown...***Studio North,*** Baltimore, MD, recently installed an Emulator II to its already extensive keyboard collection...***Thunder & Lighting Audio*** of New Castle, DE, has bought a 40x8x2 Audio Arts MTX 88 House desk as well as an M16 Monitor desk...***Northeastern Digital Recording*** has opened an office in Boston. The address there is 1108 Boylston St., Suite 303, Boston, MA 02215. Tel. (617) 353-0963...***Sweetwater Sound*** in Fort Wayne, IN, now has 24-track capability, with an Amek "Matchless" mixing console and a Soundcraft Series 760 recorder...***Breezeway Studios*** in Waukesha, WI, has added a Sony PCM-F1 Digital 2-track mixdown system, Kawai 6'8" grand piano, Aphex Type B Stereo Aural Exciter, and much more...***Monfort Electronics Marketing,*** Indianapolis, has relocated its offices and warehouse to 8788 Robbins Road, Indianapolis, IN 46268. Ph. (317) 872-8877...***Creative Arts Studio*** in Spartanburg, SC (better known as "Marshall Tucker's Studio") was recently purchased by Duane and Joey Evans and has reopened under the name of ***EBS*** or ***Evans Bros. Studios.*** After remaining dormant for more than a year during the shake-up of the Tucker Band, the refurbished studio opened under its new owners in April...In Studio A, ***MixMasters Audio Production Specialists*** of San Diego completed installation of a new Neotek Series 3C recording console with 36 inputs and 32 outputs. In addition to Neotek's top console, new equipment includes a second digital reverb; the Lexicon 200, and a dbx 900 effects rack...***OTR Studios*** in Belmont, CA, recently purchased an AMS RMX-16 Digital Reverb. The unit is available to clients at OTR Studios or as a rental unit for other recording studios...

—FROM PAGE 221, LEVINE

but they were offered an album deal by another company on the strength of that one track.

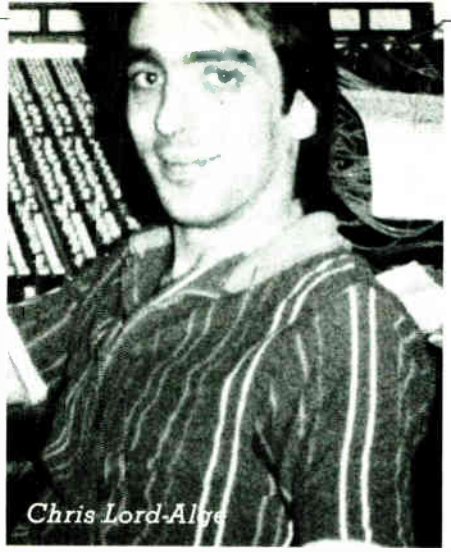
"I went back to CBS and told them we had gotten a deal with another company, and they said fine. About a week later, for some reason, they just went mad and said it was unacceptable and a conflict of interests. We eventually got sacked from CBS, which saddened me initially, but obviously it was the best thing they ever did. It threw me out to the big, wide world."

Culture Club changed his life. He came in contact with the group through someone at EMI and produced two sides for the band. EMI chose not to take up the option, but Virgin signed them. It was their third single, "Do You Really Want To Hurt Me," that got the ball rolling for Levine and established him as one of the most technically up-to-date producers around.

"Programming has gotten off to a bad start because people like Martin Rushent have made it sound like robots. It doesn't have to be like Giorgio Moroder and Human League. The entire track of 'Maybe I Don't Know' is programmed, apart from Gary Moore's guitar, and it doesn't sound like it. It sounds like a great rock band playing live," he says, adding that the only real drums on the entire album are played by Ringo Starr on "California Calling."

He says his finest recording to date is the new Quarterflash album, recorded at Miraval in France.

"One of the reasons is the continuity element of working in only one studio. While the Beach Boys album is very, very good, I think purely on a technical merit Quarterflash does have the edge. That's good for me that each project I do improves from the last one. Each time I do something, I learn more things about improving little areas, and I progress. I will never be satisfied." ■


Chris Lord-Alge

BEYOND MASTERING

The 12-inch Dance Single

by Rosanne Soifer

It doesn't take reading (or writing) a long-winded essay or perusing a year's worth of both *The Gavin Report* and *Billboard* to realize that different segments of the music listening population have different tastes. What used to play in New York may not necessarily play (or get played) in Peoria. But this is starting to change.

The 12-inch single—or extended play—is more or less altering the demographics of the record business. Rock-oriented artists are cutting "dance" versions of their already top sellers and reaching a primarily urban minority audience who ordinarily wouldn't have given them a second look (or listen). This trend has led to several thought-provoking developments. First, the big rock/Top 40 adult contemporary records sell even more as these tunes find themselves on the club and dance charts. Second, there may now exist *four* versions of one tune: the original album cut, the 12-inch, the 45 for AM airplay, and the video—which may be based on one of the recorded versions or be a different one entirely. A third point (and a slightly disturbing one) is that the actual number of *new* songs on the market is slowly diminishing because of this phenomenon.

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Joanne Georgio, who owns Unique Recording in New York City with Bobby Ely Nathan, says the first 12-inch dance track came out about ten years ago. Entitled "Never Can Say Goodbye," it was sung by Gloria Gaynor and epitomized the then-popular disco style. Produced by Meco Monardo who also had a Number One version of the "Star Wars Theme" on the charts a few years later), Gaynor's record included a rhythm-heavy "disco break" that was perfect for dancing, if slightly less appealing on a strictly aesthetic level. Says Georgio, "After that, everyone else just followed suit." Dance music has experienced fluctuations in popularity since, but now is helping to break new artists. Since so many dance tunes are coming from youth-oriented dance films (such as *Breakin', Footloose, Flashdance,* and all the way back to *Saturday Night Fever*), the artists are obtaining massive popularity more quickly than their counterparts a decade ago. "The 12-inch," says Georgio, "does for dance artists what MTV has done for those in rock."

The actual commercially available 12-inch, says Chris Lord-Alge, started a few years ago with "Rappers' Delight" by the Sugar Hill Gang. Lord-Alge, an engineer/producer, works mostly out of Unique Recording, and has remixed the 12-inch versions of Springsteen's "Dancing in the Dark," Diana Ross' "Swept Away," the Stones' "Too Much Blood," and the Cars' "Hello Again." His current projects include the *Rocky IV* soundtrack 12-inch with Dan Hartman, and remixes on U2, Pink Floyd, and Jeff Beck. Lord-Alge says, "The 12-inch is essentially the essence of the 3½-minute, 7-inch (the 45) with an intro and a solo, extending the song out to at least 5½ minutes."

Synthesizer and percussion additions also make a difference. So do multiple edits, which make the record sound like it's skipping when it really isn't. A multiple edit lengthens a phrase and adds tension, and is particularly effective over a dance club's sound system.

Lord-Alge sees remixing as an expansion of the producers' job. "Everyone's doing it," he says, "not just urban dance acts. Behind every Top 10 record there should be a serviceable record for the clubs."

The club charts help determine what will be played on dance-oriented radio stations. The charts themselves have an interesting history. Beginning with the disco era in 1974, the club charts appeared in *Billboard* for the first time with such artists as the Ohio Players, Donna Summer, KC & the Sunshine Band, and Van McCoy. (McCoy, a veteran songwriter and producer, had a Number One hit with "The Hustle," one of the early 12-inch singles.) Separate club and sales charts were visible in *Billboard* for awhile, but then merged—and for all intents and purposes, the club charts disappeared. Why? Club influence on breaking new records had temporarily faded, since the separate "disco" concept of music had been homogenized and assimilated. But in 1985, *Billboard* started publishing separate sales and club charts again, possibly in recognition of the fact that clubs are breaking new songs once more. About 30 of the Top 50 songs appear on both charts, but not necessarily in the same positions on both. If a song

The Making of a 12-Inch Record: Roughly broken down into chart form, the typical "growth pattern" of a song, from a 3½-minute 7-inch cut to a 5½- to 7-minute 12-inch, can be diagrammed as follows:

3½-minute, 7-inch single	5½- to 7-minute, 12-inch dance single
intro: approx. 20 seconds	intro: approx. one minute
first verse	first verse
first chorus and other verses	first chorus and other verses
second chorus	second chorus — "breakdown" of approx. 1½ minutes added
third verse	if no third verse, Lord-Alge repeats the first verse slightly differently, usually editing it down to just the drum and vocal lines.
fade through the end	double the length of the fade *or* (1) stretch it out via multiple edits *or* (2) hit the song's bridge once more before fading

shows up on the club charts, but not on the sales charts, this may mean that it's popular locally, but has not received enough (if any) airplay to generate substantial sales—thus qualifying it for the sales charts.

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To find out a little more about how 12-inchers are musically and technically produced, *Mix* spoke with Lord-Alge at Unique Recording's Studio B.

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Mix: When a record company tells you they want a 12-inch version of a tune, what do you do first? Do you work directly off the album cut?
Lord-Alge: The labels send me the master tapes directly. I lock up the tune with SMPTE on 48-track and copy the master, rather than printing on the master directly. I do this for safety reasons, plus I want to keep the final remix and the artists' master separate. Remixes always end up 48-track, so even if the master itself is 48, I erase some on the copy I make.

Mix: How do you decide what to add and what to erase?
Lord-Alge: First of all, I have to determine what the market is. Who will the song reach? On Springsteen's "Dancing in the Dark," for example, that's a rock tune that was to cross over to the urban dance market. I added a background vocal riff at the end of the first verse and had three union singers come in to record it. The singers would put their vocals on the available tracks and then I'd edit them down to two tracks. The riff was "flown" in the recurring parts throughout the song.

Mix: What about percussion dubs?
Lord-Alge: This was live as well. I had percussionist Bashiri use congas and Simmons toms throughout the whole tune. This way I could turn him "on" and "off" as needed rather than have him record little one second fills here and there. With "Dancing in the Dark," I took the drums one step further on the dub mix. [Note: The dub mix is defined by Lord-Alge as the B side version of a 12-inch that contains bits too "crazy" for the A side—which receives the radio airplay. Club DJs like the dub mix for this very reason, and often segue its intro into the A side by using two turntables.] I put the drums through what's known as a syncopated delay, which changes the beat to almost a march tempo, but is still in time with the song.

Mix: Did you overlay any other instruments?
Lord-Alge: I used the bell sound on the Yamaha DX7 to reinforce the melody line; it followed Springsteen's vocal fairly exactly. What's important here was that there was no pre-production involved—in other words no rehearsal. The synth lines were spontaneous. Guitar solo dubs are possible from top to bottom *if* the original record doesn't have decent solo work—which of course was *not* the case with "Dancing in the Dark." I try to get someone from the original performance to do them. What really happens is that the solo transforms itself into an effect.

Mix: Do you ever "import" outside sounds?

Lord-Alge: All the time! On Diana Ross' "Swept Away," I took a solo from another piece that was laying around, flew it in backwards and scratched it. Sometimes I draw on my own collection of taped sounds or take other parts of the master tape such as background vocals and parts of lead vocals and use them. Drum sampling is also very popular. I brought in my own sampling for "Dancing in the Dark" with a kick and snare pattern. Via the AMS sampler, I combine my sound with that of the song's to create something entirely new and different. You need two sampler units—one for the kick and one for the snare. This can also be done with all other instruments. In other tunes, I've sometimes added in instruments not in the original recording if it would help in highlighting something.

Mix: In other words, the sampling process changes straight sounds into an effect, like you said before, and can almost re-compose a song.
Lord-Alge: Yes—and at this point there's no copyright law that covers the Emulator, which is used for most sampling.

Mix: What's the overall recording process used on a 12-inch?
Lord-Alge: It's totally automated, using an SSL. I record approximately five hours of straight passes of the song, using half-inch mix tape and gradually start adding in my own overdubs. Seventy-five percent of the time you sift through all the parts and then join the best. A four-minute segment of a song, for example, might combine 40 or 50 passes.

Mix: What equipment did you use for remixing "Dancing in the Dark?"
Lord-Alge: I did it at Power Station here in New York. The equipment consisted of an SSL console, three AMS digital samplers, two Emulator IIs, two AMS digital reverbs, ten digital reverbs of various makes, ten delay lines of various makes and *miles* of half-inch tape. ■

by Neal Weinstock

PHOTO: ©NATIONAL BROADCASTING CO., INC.

The APOLLO rises again

125th Street, Harlem, USA: From long before Ella Fitzgerald debuted there to Diana Ross' first performance and beyond, the number of stars who got their start on Amateur Night at the Apollo Theater is legendary. The promotion line from the golden days of MGM, "More Stars Than the Heavens," could as easily been used by the Apollo. No performance hall in the world has had as much meaning to the popular music industry. Probably not a single major black act missed the Apollo in its more than 50-year history, and of lots white performers have played it, too. But then, the Apollo closed down a few years ago.

Harlem hit the depths when the Apollo closed. It was just about the time this writer first moved to the neighborhood, using outsider's eyes to determine: oh well, another desolate piece of inner city. The Teresa Hotel across the street, where many musicians stayed and where Fidel Castro once harangued the multitudes from the balcony: closed. The big Loew's movie theater next door to the Apollo: closed. Shops and eateries were closing up, and even the few legendary small clubs that were left on 125th, like the Top Hat and the Baby Grand, went long stretches without a live act. Empty lots proliferated, and the shooting galleries of 116th Street started to establish branch offices on the main drag.

It wasn't all just because the Apollo was closed, but as the empty hulk of the theater became increasingly dilapidated, it sure looked like the Apollo was the keystone of it all.

Percy Sutton thought so, anyway. The former president of the borough of Manhattan had just lost an election for mayor of New York around the time of the Apollo's closing; he decided to quit politics and devote himself to running a couple of radio stations he'd picked up along the way. One, WBLS, quickly became one of the country's top stations for a few years, with a strategy of mixed black and white pop. Sutton's Inner City Broadcasting piled the profits into buying more stations: WSKG Detroit, KRE-AM and KBLX-FM in Berkeley, KGFJ-AM and KUTE-FM Los Angeles, KSJL-AM San Antonio, and WLIB in New York. He has a license to wire a substantial part of the borough of Queens for cable TV, too. A performance hall began to look like the perfect centerpiece for this empire. So Sutton became the lead partner in the Apollo Theater Investment Group, bought the building three years ago, and started issuing press releases.

Unfortunately, wishful press releases were about all that came out of the Apollo for awhile. Sutton's group had a very big task in front of them. It's probably fair to say that nobody else would have had the will and the ability to pull it off, but things looked doubtful for this effort at renaissance. There was no way the Investment Group could marshall enough belief in the viability of a large hall on 125th Street. Whites had always been a large part of the Apollo's audience, and in a newly gentrifying New York, not too many seemed brave enough to stroll 125th. And could ghetto kids afford the admission prices that would be necessary these days? The Investment Group was a brave name, but raising the scratch didn't look like good business.

However, Sutton's group may not have known enough about show business to call it quits. The business Sutton thinks of himself as being in is communications, and it is as an integral part of a larger network of communications properties that the Apollo finally came to be reborn. As such, it may be a keystone again, not just of a street, but also of a set of businesses.

"When we first opened the Apollo again last September," says Sutton, "we didn't pay for any advertising at all. And we filled the theater, every show, just by promoting it on our radio stations." But if live music were all there was to this renaissance, it would have been far less interesting to Sutton. "We began with the idea of originating a 24-hour satellite network from the Apollo, for cable television," he says. "As cable did not develop, we changed direction. We would produce live shows, other people would produce live shows, we would have studio space for our

Above: Patti La Belle joins Stevie Wonder as he sings on NBC's Motown Returns to the Apollo.

own productions, as well as rental space for others."

Currently in construction is a full 24-track audio studio, full post-production suites for video, offices, and many more improvements to the vast main hall. Sutton expects to have all of this work done by sometime this fall, with a major series of concerts scheduled, too. But we're ahead of our story...

"That anniversary show [a three-hour cavalcade of stars shown on NBC this spring] cost us $3.8 million," says Sutton. "That's a good bit more than it should have cost us, and no, we haven't earned it all back yet. But we're new to this business, and that show involved so many stars' schedules to work around, and so much one-time improvement work on the theater. We'll do much better next time."

Construction work has now been going on at the Apollo for more than a year, financed, basically, by the shows that have also gone on there. Certainly the NBC special was a major boon to construction. But there have also been more Amateur Nights at the Apollo, and many other shows from last September through June.

Amateur Night at the Apollo must have always been a wild affair. The Apollo audiences were always famed as the world's toughest, and Sutton says these days, if anything, they're tougher. We talked with audio engineer Danny Kapilian, who more than agreed: The performers, too, were tough. A house band would give way to two or three other bands on Amateur Night, backing some of the 25 acts. Most of those 25 would have a cassette as back-up, typically "recorded right off a boom box with a microphone to the speaker, or so it sounded," according to Kapilian. The vocal track would, of course, still be on most back-up tapes, and he would get the tape on the fly, at the last minute (or later), and have to equalize what he could with the house's 32 by 8 Yamaha PM 200 board—while the crowd roared for the act to come on. This madness ended in June, but Kapilian is sure it will probably be the same when the house opens up for Amateur Night again in the fall.

"We closed for the summer this year," Sutton says. "The Apollo *always* closed for the summer. But next summer, and summers after that, we won't close. There'll be too much studio business going on." Several productions are in the works, he explains. If a network series or two don't come out of the Apollo, Sutton will be more surprised than anybody. Broadcast network series, that is. Not only is Sutton quite cautious about his own cable construction in Queens, and about an Apollo Entertainment cable network, but, while he has had overtures from MTV about shooting at the Apollo, co-producing, or buying Apollo's productions, his sights are higher. "We'll be producing a show for one of the major networks, a 90-minute show, beginning in September of 1986," he says. "We will begin producing that product in the summer of next year. We've got another thing called, 'Apollo Goes to School,' that we're marketing right now. That's a dance-oriented—you might call it a combination of American Bandstand and Soul Train. Then there's another thing called, 'I Always Wanted to Play the Apollo,' where we have two stars together on stage, a major white star and a major black star, one who would have played the Apollo and the other who wouldn't have, and bring them together onstage...."

And there are several other programming ideas besides. All rely, to a considerable extent, on the good-will that show business people have toward the name and tradition of the Apollo. So a reasonable question is whether this new regime from outside of the industry can make that reputation their own. Uncertainty about this caused the alliance with Motown for the spring NBC special, but Sutton found this to be a mixed blessing. "We won't be going into that

The Apollo in Harlem of the late '40s.

sort of partnership deal again," he says. "We don't really need it."

These new Apollo people are not entirely unsavvy about the music business, with Inner City running some very classy radio operations. As much an expected key to the Apollo's success, in Sutton's mind, is the crossover strategy that has worked so well for his stations.

"While MTV was very difficult for black performers for the first few years, we were building very mixed audiences on radio. WBLS, a 'black' station, has 52 percent white listeners. It's about 50/50 at our FM station in Los Angeles, 75 percent white in San Francisco, and 85 percent white in Detroit. In San Antonio, our listeners are only four percent black. Now our AM stations all have black urban audiences. But the differences and the similarities, between what the groups want to listen to, are very interesting... MTV played to a prejudice that didn't exist... I think they've recognized that somewhat, and have adapted, in the newer network they've got, too [VH1]. They've had tremendous success, but this probably made their success less than it could have been."

Sutton, former attorney for Malcolm X, former Freedom Rider, current associate of Jesse Jackson, easily makes that translation from social goals to successful demographics. That sort of supple thinking is going to have to eventually supplant the Apollo's venerable reputation as the source of its success.

Perhaps more certain than the Apollo's own production plans are the plans of outside producers to work there. Even with all his programming ideas coming to fruition, Sutton says the theater still would be used at only one-fifth of capacity. "And we've had many producers come to us about using the theater for their own shows. That's going to be an important part of the business. But not until we finish our renovations."

All of which means the pace of renovation is speeding up. A few shows after the NBC special, everything died, including renovation, as other planning took priority. Now construction begins again, as we write, on the studio facilities on the theater's upper floors. The pace of building should be feverish as this story is published, with the concert series scheduled for the fall going on at the same time. Sutton is fully cognizant that, these days, people are much more interested in concert venues that have the right sort of video available.

With an uplink to nearby satellite broadcasting facilities at another studio (MTI) a mile away, a fully installed four-camera video set-up around that classic vaudeville stage, and several video and audio post-production rooms all expected to be ready approximately now, the Apollo is about ready to enter the modern era of show business in earnest.

Just from the few months the theater was open over the winter, the neighborhood difference is palpable. The Apollo opening was enough to fill smaller clubs again, to reopen and spruce up restaurants. The giant movie theater next door is now scheduled to reopen, and people in Harlem are starting to worry about gentrification. If in New York for the AES conference, take the A Train up and catch a show... ■

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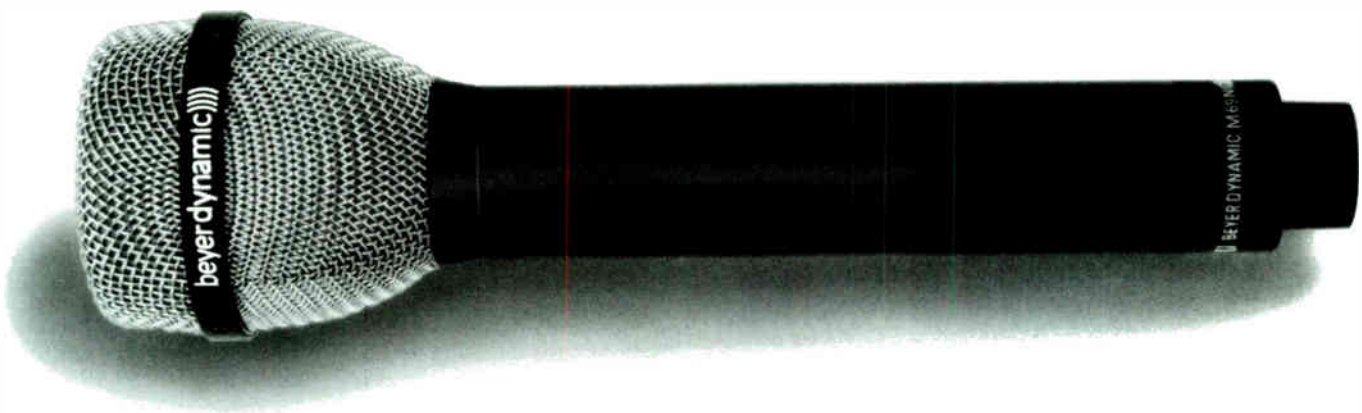
You've undoubtedly seen the curiously distinctive "flat-top" shape of the Beyer M 69 being used by leading artists in a variety of contemporary musical styles and situations. And since the M 69 is a German precision microphone, you might assume that it is priced well beyond your means.

We happily acknowledge the "professional" consensus about the M 69's superior sound and performance, but we must also point out that it is definitely *not* expensive–$165* to be precise. Competitive mics at this price point are hard-pressed to match the integrity of design and construction offered by the M 69, not to mention its extraordinary dollar-for-dollar value–a critical factor in these cost-conscious times.

The M 69 has an exceedingly high output and its full, balanced sound is characterized by a strong, smooth midrange. A clean hypercardioid pattern insures excellent suppression of feedback and the ability to handle excessive sound pressure levels in heavily amplified applications. And because the M 69 was designed to perform without susceptibility to off-axis "coloration" or changes in frequency, it produces a smooth, consistent sound that can be used for miking vocals, acoustic and electric guitars and drums with uniformly excellent results.

The elegant and articulate sonic profile, ruggedness and supreme versatility of the Beyer M 69 is achieved *without any* compromises in quality through design. Beyer firmly believes that the highest standards of performance are not necessarily a function of the highest price and we will gladly match the M 69 against *any* competitively-priced microphone to prove our point.



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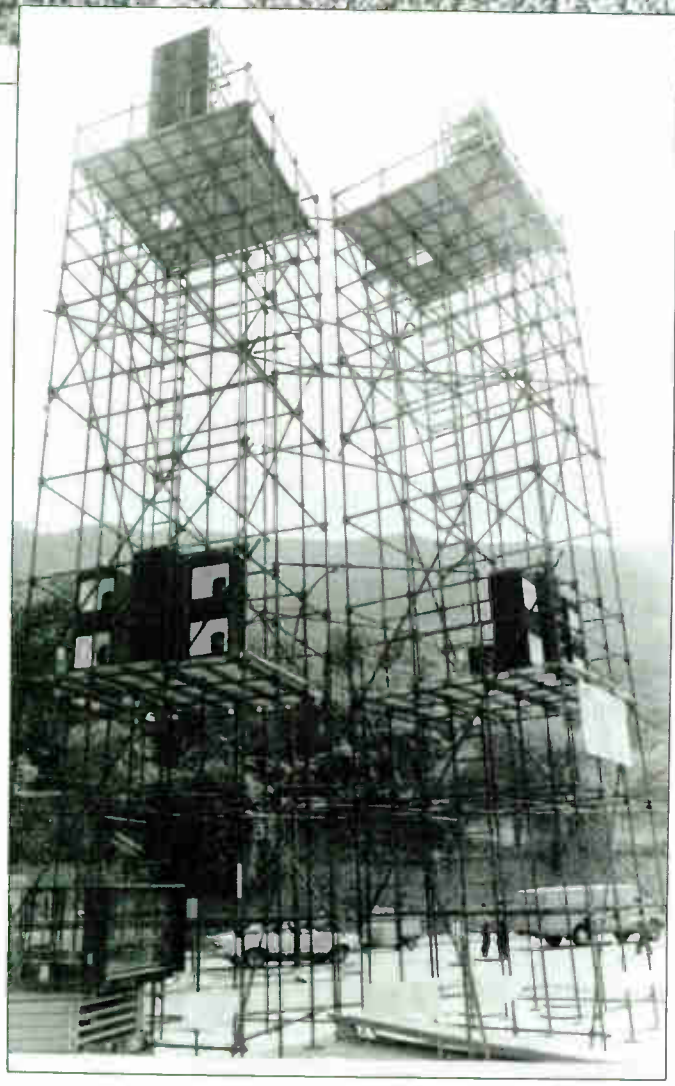


(Above) To the left of the tower in the center, the right tower is found nestled against the hills.

(Right) General view of main tower. At the bottom of the tower lies the lift used to raise the speakers.

Letting the Pontifical Message Through

by German J. Landaeta

On February 24, 1985, His Holiness Pope John Paul II celebrated a pontifical mass on "La Planicie de Montalban," Caracas, Venezuela. The entire downtown area was closed to vehicular traffic at midnight on the day of the event, and more than a half-million people came, by mass transit or on foot, to attend.

"La Planicie de Montalban" is the only large open space in the central part of the city. Some estimates indicated that virtually the entire area might be filled with people. The majority of these people would have no line of sight to the pavilion where the Pope would be standing, and the farthest point on "La Planicie de Montalban" from the pavilion was over 500 meters away. The event clearly required an unusually large and carefully designed sound system.

The job of designing this system was given to C.A.N.T.V. (Compania Anonima Nacional Telefonos de Venezuela). The equipment used was provided and installed under the supervision of Mr.

Kono of EPROTEL and Mr. Plaza of Plaza Sound.

LOUDSPEAKER PLACEMENT

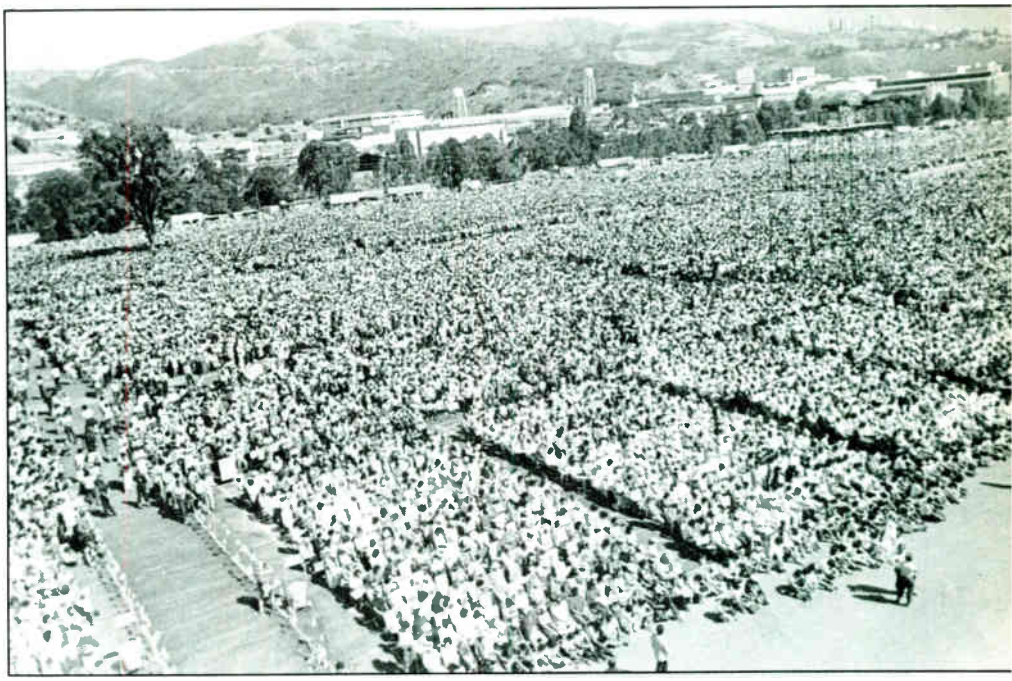
The Papal pavilion was located on the west side of "La Planicie," which offers good views of the pavilion to a large number of spectators due to a natural amphitheater formed by a hill to the east.

The main arrays each consisted of: four horn-loaded low-frequency cabinets, each containing two 15-inch woofers; eight long-throw high-frequency horns, whose radiation pattern covered a span of 20 degrees vertically and 40 degrees horizontally; and four 40 by 60 degree high-frequency horns.

The 40 x 60 horns were aimed downward about 20 degrees from the horizontal, to cover the areas near the towers. Areas farther out were covered by the stacks of long-throw horns. Placing the drivers in this manner reduced the vertical dispersion substantially, but the on-axis sound pressure level increased by 12 dB, and the possibility of feedback was reduced. The prevention of feedback was quite important because the main towers were firing as much as 300 meters, yet were located just 16 meters from the platform where the celebrant stood.

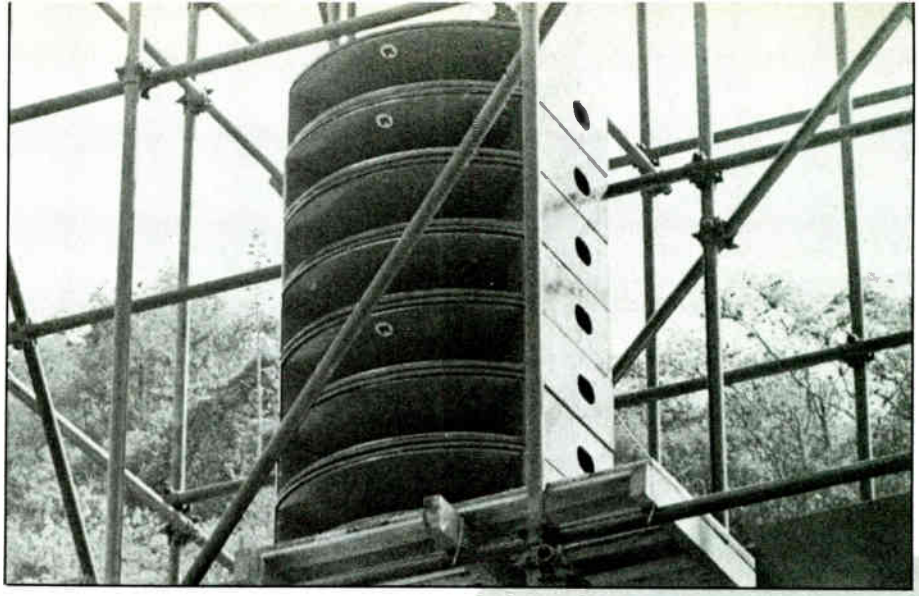
Because there was music both before and during the mass, the sound system had to deliver high power levels over a wide bandwidth. The main arrays had a theoretical maximum output of 95 dB SPL at 225 meters, using conservative assumptions of both directivity and driver power handling.

The two main towers ("right" and



Looking out at the Pope's audience at the Planicie de Montalban in Caracas. This view shows much of the area to be covered, as seen from the highest point of the right tower.

—PAGE 234



(Above) Detail of eight JBL-2350 mid-frequency horns in the right tower. The horns were installed as complementary equipment to cover the area in front of the choir.

"left") could cover the western part of "La Planicie," but left 45 percent of the total area uncovered. Of immediate concern was the area behind the hill directly to the east of the pavilion. To cover this area, a ten-meter supplementary tower was erected, which supported two bass bins, two stacks of four 20 x 40 long-throw horns, and a single 40 x 60 degree horn to cover the area near the base of the tower.

An identical tower, the left tower, was placed 300 meters to the west of the pavilion. Remaining dead spots located at the far right of the pavilion were handled by installing a secondary tower 563 meters from the main array.

The control center for the system was set up under a tent on the roof of a kiosk 92 meters from the pavilion. Microphone lines to the control center and cables to all loudspeakers in the area of the pavilion were run underground. To accomplish this task, two stainless-steel pipes were used, one for the audio lines and the second one for AC power.

DISTRIBUTED SOUND

There is, of course, more to covering an area this size than having enough loudspeakers and amplifiers. A listener standing at about 150 meters (approximately 500 feet) from the main tower hears the sound delayed by about 453 milliseconds (the distance divided by the speed of sound, 331 m/second). This amount of delay would hopelessly garble speech, and its effect on music would be even worse. A system of this size requires extensive use of time delays to cure these problems.

Any sound system, whether or not it uses time delay, must meet two criteria. The first of these is intelligibility. The brain will integrate two highly correlated sounds and treat them as one if they arrive at the ears within about 40 milliseconds of each other. It is therefore necessary to adjust the time delays so that there are no two speakers which deliver the same sound to a listener more than 40 milliseconds apart.

The second criterion for a good sound system is naturalness. In an auditorium, where the sound system is used to reinforce sounds from the stage that are audible but too soft, a clever designer will adjust the time delays so that the sound arrives at any listener first from the stage, and then from the speakers. The brain will then locate the sound on the stage on the basis of the first arrival, and assume that the sound from the speakers is part of that first arrival. This is called the precedence, or Haas effect. However, in an outdoor installation of the size we are dealing with here, there is no possibility of a significant amount of sound from the original source reaching the listener. What takes place of the live sound in the designer's considerations is the signal from the two main towers flanking the pavilion. Delays were therefore calculated so that the first arrival would be from those towers.

In order for this to be true for all listeners, it was necessary to direct all the sound from the pavilion. If this were not done, the supplementary drivers would be feeding simultaneously to listeners whose path lengths from the main towers differed by more than 28 meters, or 85 milliseconds. There would then be no single value for the delay of the supplementary speaker that would provide natural sound for all within its range. As the system was actually installed, with all the speakers pointing away from the pavilion, a spectator in the sound field of one of the supplementary speakers has that speaker between him or her and the main towers so that the difference in arrival times

from the two sources remains sufficiently close to the value provided by the time delay.

DIGITAL DELAY

The equipment used for the time delays was the Eventide JJ193. Ideally, a single Model JJ193 System with two or three extension chassis would be used in a system of this size. Since JJ193 extension chassis are connected via a digital bus, no signal degradation would occur as additional chassis with more delay and outputs are added. A Lexicon Model 102B with a single output module was used to provide a 20-millisecond delay for monitor speakers at the choir/orchestra and at the lectern, which stood at the front of the pavilion. This delay was necessary to fill in the time it took for sound to arrive from the tops of the main towers, about 60 milliseconds. The monitor speakers covering the altar and the Papal chair were far enough from those locations to provide sufficient delay acoustically.

The tower delay assignments were as follows: 0 ms at the main towers; 764 ms at the right tower; 900 ms at the left tower; and between 900 and 1600 ms at the secondary tower. After having gone through more than a full second of delay, and having been converted from analog to digital and back three times, the signal still had a bandwidth of 12kHz, a signal-to-noise ratio of 84 dB, and total harmonic distortion of less than .12% at any frequency.

DIGITAL REVERB

There was choral music during the mass, and a concert involving chorus, orchestra, and soloists beforehand. In order to provide a somewhat more church-like sound for the music than would ordinarily be obtainable in a virtually anechoic outdoor environment, Ursa Major provided a model Star Gate 323 digital reverberation unit, which was inserted in the echo loop of the main console. The Star Gate 323, a programmable reverb system, offers different programs to simulate the sound of plates or acoustic chambers. It also has programs for simulating the reverberation of concert halls, both large and small. Times for 60 dB of decay are separately adjustable for the lower and upper parts of the frequency range, as is the crossover frequency between the two. There is also a control to set the frequency where treble roll-off of the reverberated sound begins, another which places the listener forward or backward in the acoustic space, and a pre-delay control which determines the time delay between the direct sound and the first reflection in the onset of reverberation.

For the choral and orchestral pieces, the large concert hall program was called up, and the following settings dialed in: bass decay time: 2.8 sec; mid-range decay time: 2.2 sec; crossover frequency: 780 Hz; treble decay: 3.7 kHz; depth: 2 (on a scale of 0 to 7); and pre-delay: 24 milliseconds. The output of the Star Gate was used sparingly in the final mix by engineer Plaza, who was reluctant to let the sound become too reverberant for fear that it would sound unnatural outdoors. Nevertheless, the chorus sounded noticeably fuller and better blended, with a slight accompanying sense of room "acoustics," when heard from in front of the pavilion. Both the frequency response and the level of the music were satisfactory as well. With 5,400 watts of amplifier power available and drivers being used conservatively, the system was never driven into audible clipping.

PROBLEMS AND SOLUTIONS

Due to the emphatic way in which the Pope pronounces some sibilant sounds, dynamic microphones were used. It is important to note that the use of this type of microphone was a special request from the Director of Engineering of the Vatican Radio Station.

For a job of this size and complexity to have come off as smoothly as it did, is a testimonial to the skill and experience of all involved, although some problems had to be overcome. One of the biggest was the high frequency interference produced by a powerful

—PAGE 236

Equipment for Caracas Sound System

CONSOLES:
Soundcraft 400B 32x8x2 (main)
Soundcraft 400B 32x10 (monitor)

MICROPHONES:
22 Sennheiser MD-441
4 Sennheiser MD-431

AMPLIFIERS:
10 Crest 5000
16 Crest 3500
4 Crest 2500

OUTBOARD:
Ursa Major Star Gate 323 digital reverb
2 Loft 400-B four channel noise gates
2 Klark-Teknik DN360 equalizers
UREI 539 equalizer
UREI 537 equalizer
4 MXR 172 equalizers
2 Audio + Design Recording Easy Rider comp/limiters
6 MXR 136 comp/limiters
Eventide JJ193 Option 4 delay
Lexicon 102B delay
5 Loft 602S crossovers
UREI 525 crossover

MAINS:
20 JBL 4560 bass bins
48 JBL 2350 mid horns w/2441 drivers
30 Renkus-Heinz CHB 250-9 (90°x40° horns) w/SSD-5600 drivers
16 Renkus-Heinz CBH 250-6 (60°x40° horns) w/SSD-5600 drivers

MONITORS:
4 JBL 4602
8 Renkus-Heinz SMS-1582-CB
2 Renkus-Heinz MS-1216-CB

INTERFACE GEAR:
Wireworks MBD27-150 splitter
Wireworks M15-200 300-foot, 15 line snake
Rapco 16-300, 300-foot, 16 line snake

—FROM PAGE 235, SOUND ON STAGE

radio station located nearby. The interference was so strong that the membranes of the high frequency drivers started heating up quickly. The problem was solved by placing noise filter capacitors across the input of the HF drivers and by rearranging the grounding system.

Those who followed the Pope's visit after his Caracas stopover agreed that the sound system in Caracas was the best-sounding and most reliable one of the tour. ■

by Bruce Nazarian

Drum Machine Secrets EXPOSED!

Understanding all of the capabilities that are built into an instrument is the easiest way to get the most from it. But sometimes, no matter how clearly the owner's manual may explain things, there are some capabilities that remain hidden from the casual user. This month we'll take an in-depth look at some of those "hidden" capabilities, using the LinnDrum as an example. I'll also pass along some hints for efficient drum machine programming. For instance, did you know:

- that you can program patterns of any length, not just two bars?
- that these patterns can easily be in odd meters, like 9/8 or 13/16?
- that you can change the tuning of the Tom-Toms, Congas, Snare and Sidestick with an external control voltage from a synthesizer?
- that by using the alternate sound chips that are available, you can make your machine sound like a TR808, DMX, DrumTraks, or almost anything under the sun? (It's inexpensive, too.)

We'll get to all of these subjects in a bit. First, let's start off with a few basic tips on how best to use your drum machine's memory.

Programming Efficiently

Every drum machine has certain limitations. In programming, the amount of computer memory available will determine both the number and length of rhythm patterns or "songs" that may be created and stored. Programming in small patterns (2- or 4-bar) is better than attempting to create lengthy patterns of eight or more bars. There are two logical reasons for this. First, 2- or 4-bar patterns are much easier to edit, both in "real-time" and "single-step" modes. (If you have ever tried to single-step through an 8-bar pattern while you are in "1/192 note" mode, you know what I mean!) Second, you'll use the drum machine's memory more efficiently by repeating short rhythm patterns than by creating and storing longer ones with less repetition. It is very feasible to create an entire drum track using only 2-bar patterns, repeated at the correct times.

There is more flexibility built into most drum computers than meets the eye. I have heard so many times: "My drum machine can only do 2-bar patterns..." It just isn't true! If you need a pattern that is one bar, or three beats long, you can generally program that length into any pattern you want. Almost all digital drum machines have this function, and some of the analog ones do as well (TR808, etc.). (LinnDrum users should reread the section on the "Record Length" function in the owner's manual.) In addition to programming flexibility, the LinnDrum provides tuning inputs for the Snare/Sidestick, and Tom/Conga sounds, plus External Trigger inputs, which allow other events to "play" the LinnDrum. These inputs open up a whole world of useful (and bizarre) musical effects if you just know how to use them. Here's a brief explanation to start you exploring...

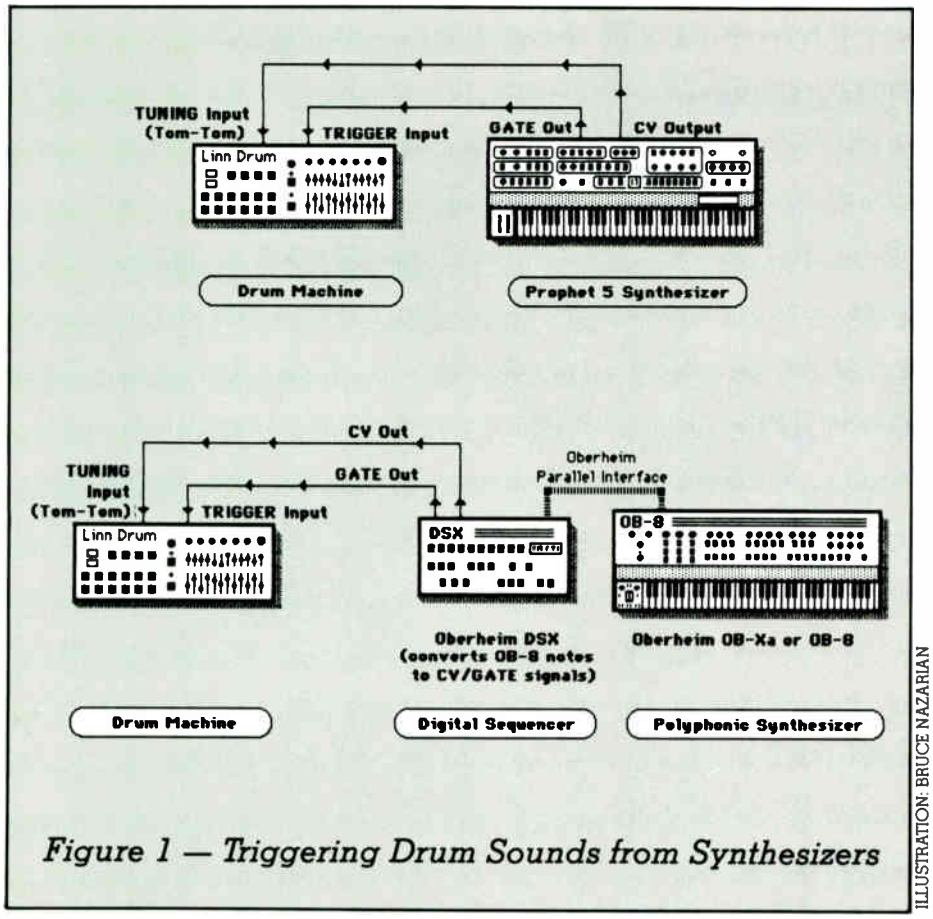


Figure 1 — Triggering Drum Sounds from Synthesizers

ILLUSTRATION: BRUCE NAZARIAN

Remote Triggering of Drum Sounds

If you have an analog synthesizer laying around, like a Prophet 5, Roland SH101, or even an old ARP 2600, you can play your LinnDrum remotely from the synthesizer, with keyboard control of the relative pitch. Most analog synthesizers produce a Control Voltage that "tracks" the key being played on the keyboard: the higher the key, the higher the voltage. This is usually on a one-volt-per-octave standard. In addition, when you press down any key, the synth produces a Gate signal, used to trigger the synth's internal circuitry. If your synth has outputs for these two signals, you can borrow them to drive

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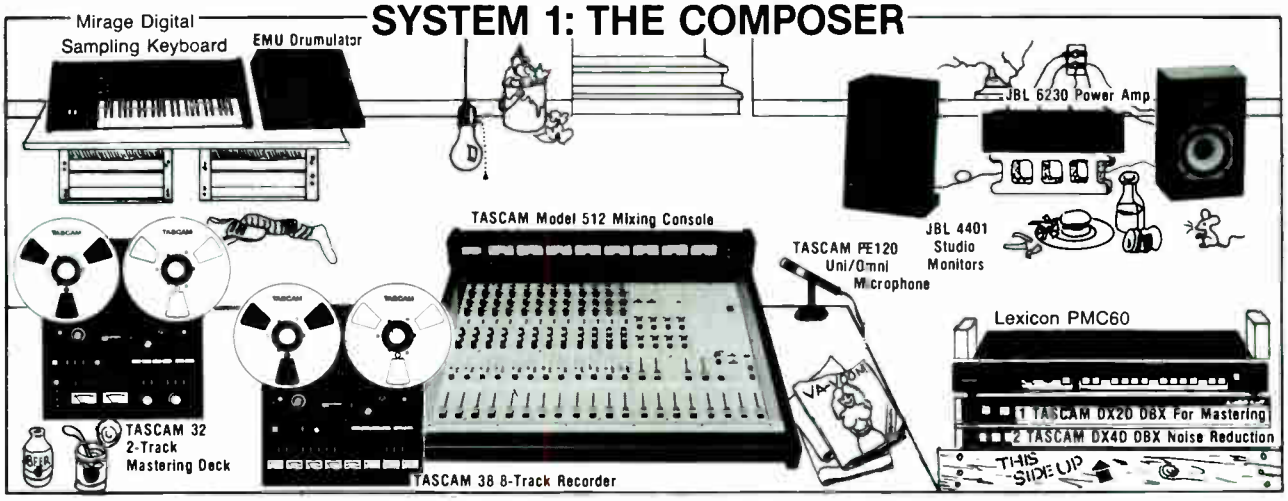

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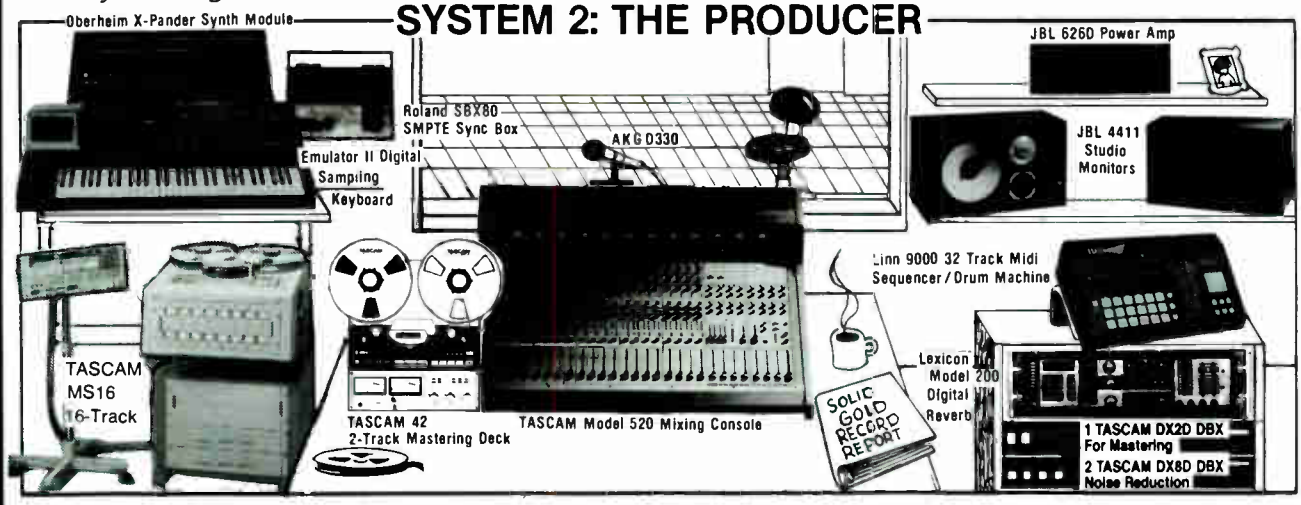

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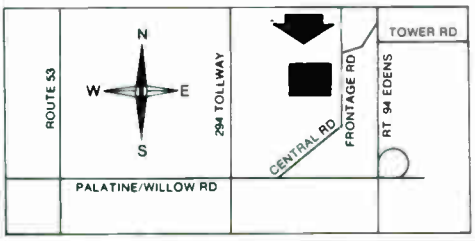

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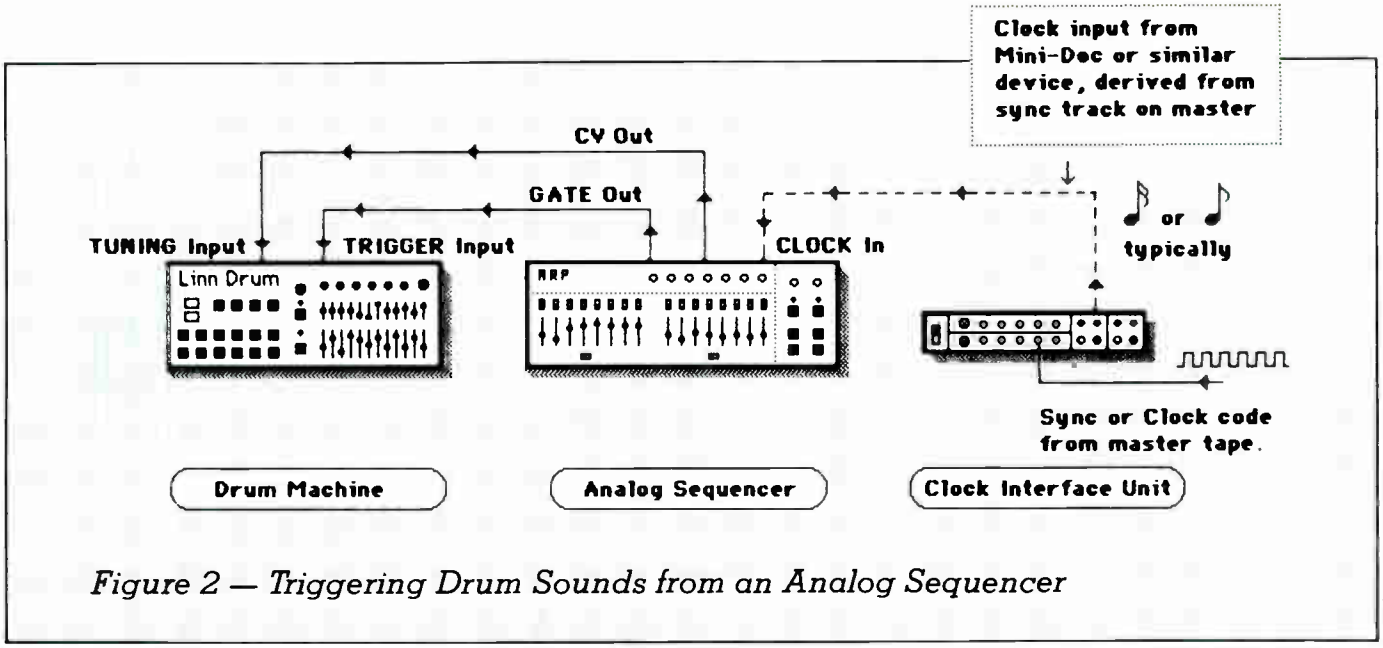


Figure 2 — Triggering Drum Sounds from an Analog Sequencer

ILLUSTRATION: BRUCE NAZARIAN

your drum machine.

Referring to Figure 1, connect the synthesizer's Control Voltage output into the Tuning input for the sound you want to play (let's use Tom/Conga for this example). Connect the synth Gate output into any of the five External Trigger inputs. (Note: a Moog S-Trig output may not work for this application because of its "falling edge" polarity.) Play the synthesizer keyboard repeatedly while striking one of the three Tom-Tom keys on the Linn. Here's what is happening: When the LinnDrum senses the synth Gate pulse at the External Trigger input, it will scan its keys to see if any are being pressed. If it finds one, it will "assign" that key to the External Input that triggered it. If everything is connected correctly, playing a note on the synthesizer will trigger the LinnDrum Tom-Tom sound; the pitch of the Tom-Tom will be determined by the synthesizer's Control Voltage output, which follows the notes you play on the synthesizer keyboard. (Note that this method makes no provision for controlling the dynamics of the desired sound.) If you like, you can sequence a part on your analog synthesizer and use it to trigger your drum sounds. Or how about using that old analog sequencer you retired when you got MIDI-fied? Figure 2 shows a method of interfacing an analog sequencer to rhythmically sequence a drum part with pitch changes.

I've used this trick to get 16 distinct pitches during a Tom-Tom roll, and even to play a melody with the Handclap sound! To really take maximum advantage of this marvelous feature, though, you will need to consider...

Sound Chip Swapping

Most digital drum machines store their digitized sounds in computer chips called "EPROM" (Erasable, Programmable Read-Only Memory). Part of the beauty of digital drum machines is that changing a sound is as easy as replacing the EPROM chips that define these sounds. A growing number of "alternate sound chips" are rapidly becoming available. If you want a different drum sound, you just change the chip. Want electronic drum sounds from your digital drum? A barking dog? Breaking glass? James Brown yelping (eee-yow!) or a classic Curly Howard routine (Hey Moe! Hey Moe!)? Just change the chips! (Some units, like the Oberheim DMX, require replacing complete cards, not chips.)

A Warning

Before you go on a sound chip buying spree, never try to remove or change a sound chip without installing "changeable" sockets in your instrument. These are actually locking Integrated Circuit sockets. They will allow you to insert and remove your sound chips quickly, without any damage to their fragile little legs. These sockets are cheap insurance for your sound chip library. (Check with your dealer to find out what sockets are correct for your drum machine.) An additional warning: If you do swap sound chips, make absolutely certain that they are placed in their sockets correctly. Sound chips have a definite front and back end, and improper placement in a socket can fry the chip, or damage the internal circuits of your drum machine!! If you have any questions, ask a qualified technician first!

Sound Smorgasboard

Now that you can swap any sound chip into the tuneable sockets, you can make maximum use of your Linn. To make a Monster Cowbell, for example, just mount the Cowbell chip in the Snare socket, and tune the pitch down to suit your taste. An additional advantage of mounting a sound in the Linn Snare socket is that you get the three programmable dynamic levels (Snare 1, 2, 3). You can swap any single chip sound into the Snare socket and obtain the same tuning and dynamic control, so let your imagination run wild.

The Silent Chip (...shhhh...)

A "Silent" chip? Yep! This is a special-purpose chip that produces no sound. The Silent chip eliminates the "clicks" normally heard when the Linn plays an empty socket. Adding a Silent chip to your sound library will allow you to put one-chip sounds (Snare, Sidestick, Bass, Percussion) into the two-socket sets normally used for Toms or Congas. This gives you multiple pitches, but at the expense of dynamics. To try it, mount the Cowbell chip in the socket marked Tom 1, and a Silent chip in the Tom 2 socket. You can now use the three Tom-Tom tuning controls on the Linn front panel to tune the Hi, Mid, and Lo pitches of Cowbell. You can use this same technique with Claps or Clave, or whatever sound you may want. How about small, medium and large barking dogs? Three pitches of gunshots? Try this trick with the Temple Block sound chip. It lends itself nicely to this application, as it is a single-chip sound that really needs multiple pitches to be effective.

Some Last Words

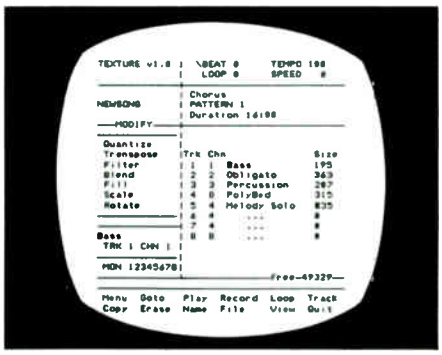
Musically, there is no absolute right or wrong way to use a creative device like a digital drum machine. It is another in a growing number of modern music instruments that can be used to enhance your creative imagination. With hundreds of affordable alternate sounds now available for the LinnDrum, DMX, and with user sampling of drum sounds just around the corner, your imagination is the only boundary to expanding the sound and versatility of your digital drummer. ■

MIDI SEQUENCERS FOR PERSONAL COMPUTERS

Hybrid Arts' MIDIMATE System

by Lothar Segeler

Sequencers are growing up. ARP's first sequencer in the mid '70s was able to repeat a short "sequence" of music over and over again that had been programmed manually. Today's sequencers are powerful digital recorders for storage, edit, and recall of MIDI data. You can use them not only with keyboards, but also guitar synths, drum machines, lighting controllers, delay lines, and there is certainly more to come.



Screen from Roger Powell's Texture™ composition software, from Cherry Lane Technologies.

Generally, sequencers have been hardware based and dedicated to only one function: sequencing. And they usually do it well. The design is functional and transportation is easy. But what happens if technology progresses? Your machine is most likely to be replaced by a more advanced model.

But with the software-based sequencer, which is built around a personal computer with disk drive, monitor and a MIDI interface, you can update your system with advanced software easily. And it can also be used for other musical and non-musical applications, like sound storage, music printing, lyric sheets and invoicing, etc. The monitor screen can supply you with a lot of useful information that makes your sequencing easier. Detrimental aspects include the number of connections and less portability.

There are about 20 different software programs available, and they're as different as the computers that they're written for: Commodore 64, Atari, Apple II, IBM-PC and, just recently, Macintosh. Each software/computer combination also requires a specific MIDI interface. The purpose of this article is to cut through this thicket of information and shed some light on various features that are not only helpful in preproduction and in the studio, but make a computer-based sequencer a cost-efficient tool that offers the user greatly increased creative control. The listing at the end of this article gives you a brief summary of the points discussed here for most of the programs available.

Most sequencers still use the traditional terminology of tape recorders, and refer to "tracks" rather than "sequences." There are 2- to unlimited-track sequencers available, but most importantly, each track should be assignable to one of the 16 MIDI channels. The number of MIDI channels is basically the limitation of how much different information can be sent to the outside world.

Note memory is largely a function of the computer being used and its internal memory. Dr. T's "Keyboard Controlled Sequencer" for the Commodore with 64k (k being the abbreviation for kilobyte, a measurement for computer memory) can load about 3,300 events, whereas "Sequencer Plus" from Octave Plateau for the IBM-PC promises to hold up to 60,000 events with a 640k system. Events should not be confused with notes, because each note can consist of a number of MIDI events, especially when using aftertouch or modulation wheels. Your software should record all data, but filter them out when not needed, to save memory. A memory counter

SEQUENCER SOFTWARE

Product	Manufacturer	Computer	Interface	Tracks	Memory	MIDI Implement. AT	PB	CC	PR	Error Corr	Step	Link	Loop	Punch	Note Edit	Sync to Tape	Loc	ffw	Merge	Transpose	Tempocontr in progr play	rit	Mute	Solo
12 track	JMS/Cherry L.	C	JMS	12	7600	s	s	s	s	+	-	*1	+	+	+	+	-	-	lim	+	+	-	+	-
Keyb. Contr. Sequ.	Dr. T	C	S P Y K	16	3300	s	s	s	s	+	lim	+	+	lim	+	+	+	-	+	+	+	+	+	-
MIDI Sequencer	Musicdata	C	M P Y K	16	8500	-	+	+	+	*2	-	+	+	+	-	*3	-	-	-	+	-	-	+	+
Model 964	Sequential	C	S	6	6000	+	+	+	+	+	-	+	-	-	-	+	-	-	lim	+	+	-	+	-
Studio 1	Syntech	C	S P Y Sy	8	6300	s	s	s	s	+	+	+	-	auto	-	+	+	+	+	+	-	-	+	+
Connections	Cherry Lane	A	R	8	18000	s	s	s	n	+	-	-	+	auto	-	+	+	+	+	+	+	-	+	+
MIDI/8+	Passport	A C	P Y	8	5000	s	+	+	+	+	lim	lim	+	+	-	+	-	+	+	+	+	-	+	-
MIDI/4+	Passport	A C	P Y	4	5000	s	+	+	+	+	lim	-	+	+	-	+	-	+	+	+	+	-	+	-
KSQ-800	Korg	A C	K P	4	6000	s	+	+	+	-	-	-	+	*4	-	+	-	-	+	+	+	-	+	-
Four Track	Yamaha	A C	Y P	4	5200	s	+	+	+	-	-	-	+	*4	-	-	-	-	+	+	+	-	+	-
MUSE	Roland	A	R	8	6800	s	s	s	s	+	-	+	+	+	-	+	+	-	+	+	+	-	+	-
Texture	Cherry Lane	I	R	8	180000	s	s	s	s	+	lim	+	+	+	+	+	+	-	+	+	-	+	+	-
Personal Composer	Jim Miller	I	R	32	50000	s	s	s	s	+	-	lim	+	+	-	+	+	-	+	lim	+	+	+	-
Sequencer Plus	Octave Plateau	I	R	64	60000	s	s	s	+	+	lim	+	+	auto	+	+	+	-	-	+	+	-	+	+
MPS	Roland	I	R	16	60000	s	s	s	s	+	lim	+	+	auto	+	+	+	-	+	+	+	+	+	-
Total Music	Southworth	Mac	Southw.	128	200000	s	s	s	s	+	+	+	+	+	+	*5	+	-	+	+	-	+	+	+
MIDIMac	Opcode Systems	Mac	Opcode	32	96000	s	s	s	s	+	-	+	+	auto	-	*5	+	-	-	+	+	+	+	-
MegaTrack	Musicworks	Mac	MacMIDI	unlim	72000	s	s	s	s	+	-	+	-	+	-	*5	-	-	+	+	-	-	+	+
MidiTrack II	Hybrid Arts	At	H	16	40000	-	+	+	+	+	+	-	-	+	-	+	+	-	+	+	+	-	+	+

Abbreviations:

A - Apple II
At - Atari
C - Commodore
I - IBM PC
Mac - Apple Macintosh
H - Hybrid Arts
JMS - JMS
K - Korg
M - Musicdata
P - Passport
R - Roland
S - Sequential
Sy - Syntech
Y - Yamaha
+/- - available/unavailable
s - switchable on/off
lim - limited available
**1 - with Sequence Chain Program*
**2 - in record only*
**3 - with MIDI Synchronizer*
**4 - punch in only*
**5 - MIDI sync only, additional synchronizer required*
AT - aftertouch
PB - pitchbend
CC - controller changes
PR - program changes

seems like a good idea, too, so that you know when you are running low.

One of the great advantages of a sequencer over a tape recorder is its capability to correct timing errors. Just like your drum machine, it can quantize the tracks to the nearest note value you specify. But watch out! Error correction for sequencers is a little bit more complicated than for percussion boxes, because you are dealing with MIDI data that record a note-on and a note-off event. If both events are error corrected to a timing value which is more than twice of your note length, the corrected note will be turned on and off at the same time, resulting in a click at the synth's output. Better sequencers keep the note length intact and correct the note-on event only. Non-destructive editing would enable you to audit the corrected track first before accepting it, because once corrected, it cannot be "uncorrected" anymore. Because this feature is used so often, it should be easily available without having to go to a time-consuming "edit mode."

Your preference for a sequencer will probably be influenced heavily by the way you enter the data. Of course, there is real-time programming, which works just like when you're recording with tape. In step-entry you record note by note and don't have to worry about tempo, because you advance it manually. This is extremely helpful in difficult scored passages. (Try to play a fast harp gliss on a keyboard in the key of A major!) Pattern mode lets you enter individual sequences on different "tracks," which you can loop and then link together onto one track to form a complete song, the same way that you are used to with drum machines.

Punching in on MIDI tracks can cause problems similar to those encountered with error correction. If you punch in between a note-on and -off command, that note will never be turned off and will sustain indefinitely. Better programs take that into consideration and only chop off the note at the punch point, just like any erase head would do. Some sequencers even provide cue point settings for automatic punching.

The real beauty of the computer-based sequencer is apparent when editing on the screen. All your MIDI data can be checked and changed from pitch to time, length, velocity, aftertouch, modulation, pitchbend, program change, etc. You can see them all on the monitor and control your parameters, which results in greater freedom of expression. Being able to audit your edit against the original will give you even more flexibility.

The engineer's nightmare is "sync." Computer-based sequencers are no exception. With as many interfaces as there are, many different sync codes

are encountered. All programs now feature internal sync and some kind of external sync, be it MIDI, FSK or square wave clock. This way you can sync the sequencer either directly or through an appropriate "sync-box" to the tape machine. That makes the sequencer not only useful to do overdubs on the multi-track, but can also give you first generation synthesizer sounds when used in mixdown.

Computers are fast, and with an autolocate function you can have instant access to any point of the composition because there is no tape to be moved. Still, some sequencers go so far in their analogy to conventional recording that they provide buttons for "fast forward" and "rewind." But at least one of those two functions should be available; otherwise you always have to listen back from the beginning of the song, though you just want to audit a change you made in the ending.

With a sequencer, your signal doesn't deteriorate, no matter how often you bounce. Only digital data is transferred, and not the actual sound. If you can bounce and retain the MIDI channel assignment, you can even control several different synthesizers from one track, which can convert a 2-track sequencer into a 16-channel recorder.

Want to transpose? No problem—most sequencers transpose over a wide range and are only limited by the boundaries of your instrument. Some programs allow you to enter the transposition from the MIDI keyboard. MIDI-Mac can even do multiple transpositions, so that you can hear one line in different octaves simultaneously.

Tempo can be programmed before or after the recording. In most cases it can be altered during playback, and in some instances you can program even *ritardandos* and *accellerandos,* which can give the music a special touch. Mute and solo switches are another way of making the life of the player/programmer easier.

Some programs offer music printing capabilities. Imagine being able to get a score of what you just played, or even hear what you just wrote. The quality of most programs could be improved, and I'm sure it will be, judging by the speed that new products surface.

The listing here can only serve as a brief guide and cannot substitute a real test under your own working conditions. Features and needs are so varied that a single program could not meet everyone's demands. But it's likely that there is one package that is just right for you. And if there isn't, there probably will be tomorrow.

I would like to thank Andrea Bella and Stephen Cullo of Diner Dog Music for their help and letting me use their IBM PC and Roland interface. ■

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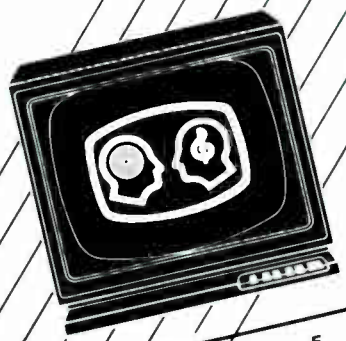

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November 21-23, 1985

Sheraton Premiere Hotel, Universal City, California

AGENDA

Thursday, November 21st:

12 noon to 8:00 PM — Registration
8:30 PM to 10:30 PM — Welcome to the Conference Party
10:30 PM to ???? — Hospitality Suites

Friday, November 22nd:

9:00 AM to 6:00 PM — Registration
9:30 AM to 10:00 AM — Continental Breakfast
9:45 AM to 10:00 AM — Welcoming Remarks
SAM HOLDSWORTH, Publisher, Billboard Magazine
JIM McCULLAUGH, Conference Director & Home Entertainment Editor — Billboard Magazine

10:00 AM to 11:15 AM — ***"Video Music: From Promises To Profits"*** Leading home video companies, distributors and retailers discuss the facts, figures, myths and realities of how music video product is fairing in the world consumer market place.

11:15 AM to 11:30 AM — Break

11:30 AM to 12:45 PM — ***"The Multi-Channel Matrix"*** A status report on cable, broadcast television, pay-per-view, syndication and other mushrooming transmission avenues for music video.

12:45 PM to 2:30 PM — Buffet Lunch
Exhibits & Hospitality Suites
Independent Productions Screenings

2:30 PM to 3:45 PM — ***"RPM To Frames Per Second"*** The continuing evolution of record label video activity is examined.

3:45 PM to 4:00 PM — Break

4:00 PM to 5:15 PM — ***"Rolling The Credits"*** Producers, directors and other behind-the-scenes creative contributors discuss state-of-the-art video craft.

5:15 PM to 5:30 PM — Break

5:30 PM to 7:00 PM — ***"Movies And Music"*** Sponsored by A.F.I. Leading motion picture directors discuss video music.

7:00 PM to ???? — Exhibits & Hospitality Suites

Saturday, November 23rd:

9:00 AM to 6:00 PM — Registration
9:30 AM to 10:00 AM — Continental Breakfast
10:00 AM to 11:00 AM — ***"Releasing The Final Print"*** Legal issues, unions, licensing and everything else you wanted to know about negotiating the music video deal.

11:00 AM to 11:15 AM — Break

11:15 AM to 12:30 PM — ***"Programming For The Depth Of Field"*** New vistas in music video programming...clips...short form...long form...experimental.

12:30 PM to 2:30 PM — Buffet Luncheon
Exhibits & Hospitality Suites
Foreign Productions Screenings

2:30 PM to 3:45 PM — ***"Cutting Room Floor To Cutting Edge"*** The progressive advancement of music video marketing, promotion and exploitation.

3:45 PM to 4:00 PM — Break

4:00 PM to 5:15 PM — ***"On Your Mark"*** Artists discuss the growing importance of music video and their role in it.

5:15 PM to 5:30 PM — Break

5:30 PM to 6:45 PM — ***"Listening To The Screen"*** The increasing significance of music in film and television.

6:45 PM to 9:00 PM — Break

9:00 PM to 11:00 PM — ***Video Music Awards Presentation***

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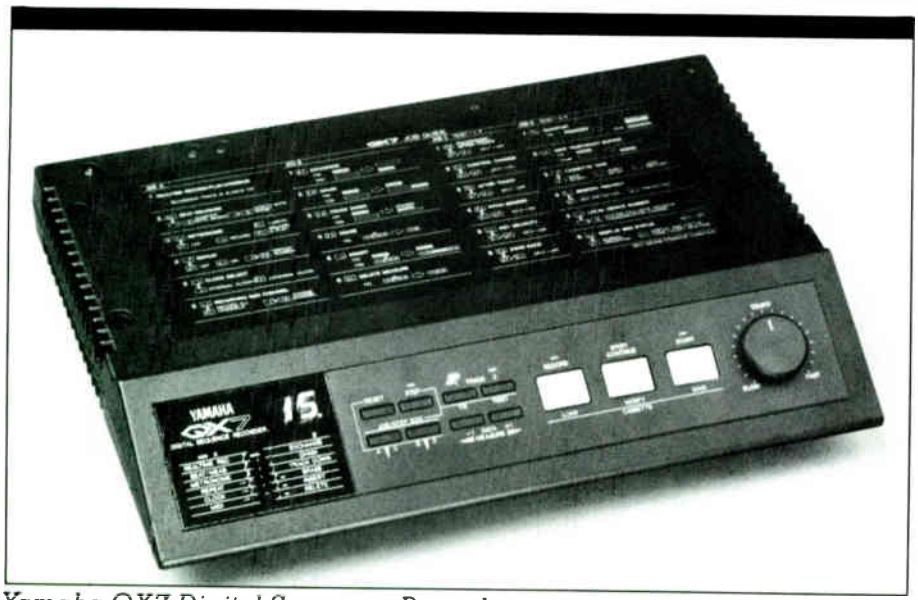

Yamaha QX7 Digital Sequence Recorder

COMPUTERS!

by Craig Anderton

The music industry always slows down the month after NAMM...but it doesn't stop entirely. One interesting rumor is that DeltaLab (now a division of ADS) is readying a complete line of new products including a rack-mount sampler, pitch transposer, digital reverb, and multi-effects unit, some of which are slated for introduction at the AES show in October. Another rumor is that Yamaha is very close to finishing a guitar-to-MIDI interface.

In the world of computers, July produced a blockbuster item: Commodore's introduction of the much-heralded, much-hyped, much-delayed Amiga computer at Lincoln Center in New York. This was one of those situations where software for the demonstration was still being written literally hours before the presentation, but by all accounts the Amiga is quite a machine. Projected to sell for $1,295, the Amiga's main calling card is extraordinary color graphics capability (one engineering trade journal compared the graphics to those of a full-fledged $20,000 color workstation). However, the sound capabilities are also impressive. First off, the Amiga performs true 12-bit sampling—although of course, sampling long sounds consumes the available memory at a rapid clip. (With sampling programs now available for the Apple II and Macintosh, one can't help but wonder whether personal computers will eventually usurp the sampling keyboard market.) Stereo four-voice music generators supply the sounds for music and speech synthesis; the latter provides for male and female voices. Each generator's frequency range covers approximately 0 to 6,000 Hz, and waveform/envelope information is obtained from memory-mapped data concerning the sound. If nothing else, the sophisticated sound and graphics makes the Amiga a sort of "instant rock video" machine.

Commodore, once the darling of the home computer world, has tumbled along with the rest of the giants and is banking everything on the Amiga. They're going to have to sell a lot of computers to earn back the rumored $40 million spent on development, but we are dealing with something truly impressive here. Shipments are supposed to commence in September, and (always a good sign) software support seems to be falling into place.

Speaking of fun with microprocessors, I'm very impressed with those cute little MIDI 2-track sequencers (such as the Korg SQD-1 and Yamaha QX7) that are starting to appear. Back in the pre-MIDI days, many musicians built up multiple tracks of sound by using a 2-track tape recorder to "bounce" tracks from one channel to another. Of course, this is a bargain-basement approach that is fraught with problems—noise and distortion build-up on every bounce, plus pre-mixing has to be done with great foresight and precision since a bounced track cannot be unbounced.

MIDI mini-sequencers serve an analogous purpose, but you don't have to worry about noise and distortion anymore (remember, you're bouncing *data* between tracks instead of the actual sounds). By recording parts that are "stamped" with different MIDI channel information, the sequencer's MIDI output can drive multiple instruments on playback. These sequencers even overcome the pre-mix problem, since you may vary each instrument's individual level control during playback to set the proper mix. Typically, most sequencers will record not just note on/off data, but also velocity, modulation, program change, and the like.

The improvements over tape don't stop with fidelity, however. Once a sequence is recorded, you can perform all sorts of editing tricks such as copying measures, deleting measures, and of course, punch-in and punch-out.

The under-$500 Yamaha QX7 2-track sequencer has a MIDI System Exclusive function that lets you dump data into the $3,000 Yamaha QX1. Although this may seem like overkill, there is at least one useful application: If a band uses the QX1 in its work, each band member can work out parts on

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the much less expensive QX7, then get together and load all their parts into the master sequencer.

Korg's 2-track SQD-1 has some really nifty features, including sync-to-tape and a built-in "Quick Disk" that stores approximately 30,000 notes (a considerable amount of storage). The unit offers extensive editing capabilities (copy, delete, blank, etc.), and even includes several "filter" switches on the back that allow the sequencer to ignore certain types of MIDI data. For example, if you want to save memory, you could get these switches to ignore memory-hungry aftertouch data.

So what's wrong with mini-sequencers? Well, if you start packing lots of data (including modulation and such) into lots of channels, you're going to devour memory and also run into those infamous MIDI delays. But for working out songs, or getting into MIDI recording at a rock-bottom price, these babies are the ticket.

New and noted: Syntech has refined their excellent Studio I MIDI software so that it now includes an "echo" feature (not echo as in repeat, but echo as in computer terminology where one device "echoes" what's happening with another device). Prior to this enhancement, the keyboard being used to program the synthesizer was the one you heard making the sounds—and this made life difficult for those using expander boxes, which have no keyboards. Echo allows MIDI data from the keyboard used to program the sequencer to feed other MIDI instruments as well...Akai is now shipping a line of rack-mount MIDI processing units: The ME10D MIDI Echo (in this case, the repeating kind of echo), ME15F Dynamics Controller (multi-unit fader and MIDI Thru box), and ME20A MIDI Arpeggiator. List price for each is $149.95. Also expect Akai's under-$800 AX60 six-voice synthesizer to surface soon; it features lots of slide pots for easy programming, individual envelope generators and LFOs for the VCO, VCA, and VCF, plus some built-in special effects. One drawback is that the keyboard is non-velocity, but a very big advantage is that the AX60 can double as an editing system for the Akai S-612 sampler...J L Cooper will soon introduce a MIDI mixer. No, not a MIDI-controlled mixer, but a unit that combines MIDI data to produce a composite MIDI data stream. He built one for Toto and the rest, as they say, is history. (I could have used one of those mixers myself about a half-dozen times in the past few weeks.)

That's the "MI Update" for this month. How about some more manufacturer participation? Send your press releases, rumors, and news to Craig Anderton, c/o *Mix*. ■

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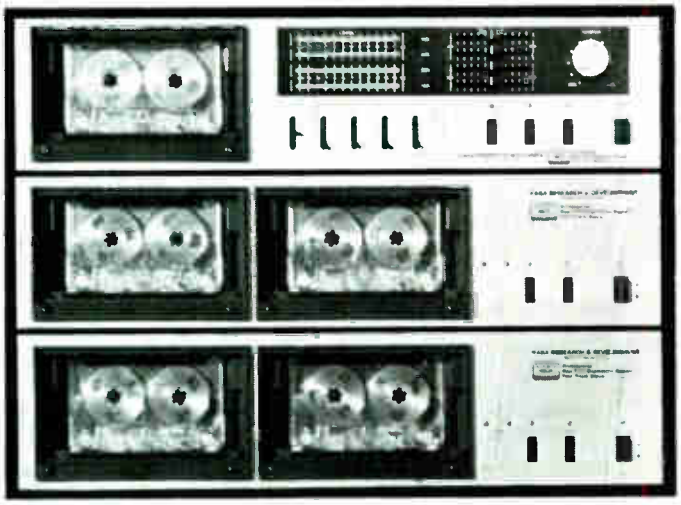

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MCA recording artist Reba McEntire accepts her award as the Country Music Association's Female Vocalist of the Year.

Reba McEntire's Country Comfort

by Alanna Nash

It's been a big year for Reba McEntire. Last October, the Country Music Association named her Female Vocalist of the Year; the California-based Academy of Country Music repeated the honor in May, and somewhere in between, 30-year-old McEntire got her first private telephone line.

"Heck, we've been on a party line all our life, except here recently," McEntire says from her manager's Nashville office. "But I've always lived out in the country [currently on a 14,000-acre ranch in Stringtown, OK], and I've never been ashamed of it. It's three hours to an airport, and 140 miles to Tulsa. I love it."

Indeed, says another big name female country singer, half of what makes Reba McEntire so appealing—and successful—is that "she's secure about what a lot of other country artists are *insecure* about, and that's being country."

If McEntire has always been secure about it, the record company moguls who shaped her career in the last ten years were not always sure that the public *wanted* a genuine Oklahoma cowgirl who sang twangy, shitkicking country music. So until last year, McEntire was pushed and pulled through a variety of styles and images, culminating with her *Just a Little Love* album, a passel of contemporary country songs and MOR arrangements that tried to drown McEntire's throbbing soprano under a blanket of strings.

Finally McEntire yelled, "Whoa!" If she was going to stay in the business at all, she had to sing the kind of music that made her want to be a singer in the first place—gut-wrenching, emotion-packed, traditional country music, the kind her idol Patsy Cline sang. Eventually she found the songs she wanted, and last year, with a straight-ahead, no-strings approach, recorded *My Kind of Country*, the first album to present Reba McEntire as McEntire hears herself. The LP yielded two Number One hits, "How Blue" and "Somebody Should Leave" (bringing her total of Number One singles to four), and the awards came rolling in. Even *Rolling Stone* took notice, naming her fourth in the country category, behind John Anderson, Ricky Skaggs and George Strait—all traditional artists—in the magazine's annual critics' poll.

"Making this drastic change from contemporary music to the more traditional country, well, it could have been a big, bad major boo-boo," McEntire says, sipping on a soft drink. "Everybody thought they were doin' the right thing with me, cuttin' the contemporary stuff, because I *do* have a big range in my vocals. But just because you've got a wide vocal range, that's no reason to go singin' somethin' you're not comfortable with.

"I'm an honest person and when I'm doin' country music I feel like I'm bein' honest with those people out there. When I say I don't want a lot of back-up singers, or anything but a fiddle—instead of a violin—on my records, that's exactly how I want it. That's what I like so much about [producer] Jimmy Bowen. He wants your records to be almost like your stage show. He sets it up so that when you're facing the speakers at home, the steel guitar's on the left and the piano's on the right. So when the people leave my show and go home and put on my records, it's not such a big difference, like, '*That* was the girl I just got through hearin'?' It's a lot better. They can get it all together."

While critics almost universally praised *My Kind of Country*, some pointed out that McEntire's voice occa-

sionally took on the shadings of Dolly Parton, Brenda Lee and Loretta Lynn. However, on her ninth and newest album, *Have I Got a Deal for You*, which marks McEntire's first co-production effort (with Bowen), the singer comes squarely into her own, her plucky soprano soaring with a confidence it's never had before, and her exquisite phrasing serving as a textbook for country female singers for years to come.

"In one way, though," says McEntire, "there's a lot more of that Dolly influence on this new album, with all her little trills and just the looseness of her vocal cords. When we were makin' the album, Jimmy said, 'Get out there and *sing*. Have a good time.' And I just felt so completely at ease with the musicians that he selected. It wasn't like they were studio pickers and I was a vocalist come in to cut an album. After about the first hour, we were like a band and a singer that had been together for three or four months. It gave me a lot of freedom."

The number of producers McEntire has worked with almost equals the number of records she's put out. With Bowen, "I didn't have to stop when somebody told me I was flat or sharp, and nobody said, 'Don't do this, 'cause you won't be able to match it.' Jimmy just said, 'Go out there and sing your tail-end off.' And that's what I did."

Have I Got a Deal for You, MCA/Nashville's first totally digital release, is also McEntire's most personal album to date. Her brother, Pake, who challenged Reba to roping, riding and jumping contests when the two were growing up in Oklahoma, sings all the harmony, and the LP features two Reba McEntire originals—as many as McEntire has recorded on all her previous albums combined.

Unlike a lot of singer-songwriters, however, McEntire was more interested in quality material than in getting her songs cut. "I went out and listened for songs, and then I put all the tapes—including the ones I'd written—together in the order of an album sequence," she recalls. "Then when Jimmy and I was listenin' to 'em together, he said, 'I like this one ["She's the One Loving You Now"] because of the tempo.'

"I said, 'You really like it?' and he said, 'Yeah.' I said, 'Me and David [Anthony] and Leigh [Reynolds, the guitarists in her band] wrote it.' So he bragged on it a little bit, and then *my* song, the one I wrote by myself ["Only in My Mind"] came on and he said, 'Good chorus.' So I said, 'Okay, I wrote that,' and he told me he was proud of me. It wasn't like, 'Oh, well, if you wrote it, everybody'll think that's the only reason we recorded it.' Because he gave me the okay before I told him it was mine, I had the guts to put it in. I feel pretty good about it."

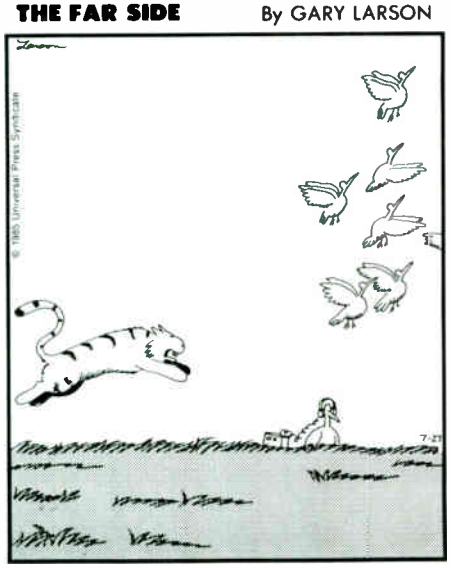
Despite all the good fortune that seems to be coming her way lately, McEntire says she tries to keep a level head about her success, "just so the tail doesn't get to waggin' the dog." Asked where she thinks she is in her career now, she answers, "about half-way," and matter-of-factly admits that "there are other women singers whose voices I like better than mine, Wynonna Judd [of the mother-daughter duo, The Judds], for example."

Nevertheless, *Billboard* magazine recently deemed McEntire "the finest woman country singer since Kitty Wells." The spunky redhead calls that "a great compliment," but says she doesn't find it scary. "I feel I was blessed with a voice that God gave Mama, and since Mama was busy havin' kids and couldn't use it, she passed it down to me. So no—you can't be frightened when you're just doing what you're meant to do. I live every day pretty much one at a time, and I pray a lot. And somehow it's all just worked out."

Gramavision Records: Happy On the Fringes

by Josef Woodard

As a child, ears glued to the hit parade and eyes to the trade magazines, Jonathan Rose thought it would be fun to run a record company. "I used to



record songs off the radio and edit them with a razor blade and scotch tape," he remembers. Many years later, his Gramavision Records is more than a childhood fantasy fulfilled: In its six-year existence, the jazz/new music label has grown into a textbook case, proof that an indie jazz label can prosper and develop a formidable identity in the 1980s.

That identity, given a considerable measure of clout by a 1983 distribution pact with Polygram, revolves around the notion that the most intriguing aspects of the jazz scene lie on the fringes. And Gramavision focuses on the periphery with a stout sense of dedication. Toward the classical pole, albums by Anthony Davis and James Newton have taken the A Train to Lincoln Center. On the street level, Oliver Lake and Jump Up and Jamaaladeen Tacuma liberally mix their chops with the rhythmic adrenalin of funk and reggae. Guitarists John Scofield and Kazumi Watanabe plumb a fusion vein, while Bob Moses' madcap inventions for casts of many seem to spring from a stylistic well all their own.

The diversity of Gramavision artists would seem to dispel any concept of uniformity or fixed attitudes across the roster. "The image is always going to become more eclectic," says Rose, "but you'll always find string composition, fine performers, well-produced records—a certain clarity of sound that we strive for, not as monotype as ECM or Windham Hill."

Those other two indie success stories inevitably come up. Like ECM's Manfred Eicher and Windham Hill's Will Ackerman, Rose is a small-label architect who has craftily maneuvered his personal musical vision into a viable force in the precarious instrumental corner of the record industry.

The term architect is more than metaphoric in Rose's case. Holding a Masters in regional planning as well as a combined degree in psychology and philosophy (valuable tools in running a record company), Rose renovated the landmark American Thread building in New York's SoHo district that now serves as home base to Gramavision as well as a host of other tenants. "This was designed to be a living/working building," he explains. The company's offices and modest-sized but well-equipped studio—where much of Gramavision's recording is done—are but a flight of stairs away from Rose's living quarters. It is also, Rose notes, "the first building in the world that comes with a computer terminal in every space, with access to a central data base."

Rose's do-it-yourself acumen and undaunted persistence paid off, albeit not right away. "I tried many different ways to get into the record business, none of which got me further than the very edge of it. I guess after I'd been trying so long, people began to think I *was* in the business," he grins.

Before Gramavision got its financial foothold, Rose worked in the construction and music trades concurrently. "When I put out my first single and then my first album, I was working on a construction job from seven in the morning until four in the afternoon," he recalls. "My radio promotion was limited to the distance I could drive in a car and be back by the next morning, so I'd drive to Rhode Island and meet the guy at WROP at midnight, then come right back."

His first projects, the soundtrack to the film *The Europeans* and an album by saxist Tony Dagradi, failed to move. It was *Calling*, by the Paul Winter Consort, that first pushed Gramavision towards solvency. "For a long time it was just me," Rose explains. "Originally, the record company was just a space under my living room table filled with boxes of records. I chose the name Gramavision; I felt it was large enough for me to grow into."

Rose adhered to a loose but stringent set of criteria in selecting musicians for his label. "The idea was always to emphasize composition—it really didn't matter to me whether they were jazz composers, classical composers or pop composers. What endures about Beethoven, The Beatles, and Duke Ellington is powerful composition, accompanied,

Jonathan Rose/Gramavision

PHOTO: JOSEF WOODARD

of course, by powerful performance." The other important objective is longevity. "There's a catalog life in Gramavision records; I felt I would be making classic records. It was taste tempered with economics."

Gramavision's reputation built fairly rapidly to a respectable level, with albums such as Anthony Davis' groundbreaking *Episteme* garnering rave reviews if not staggering sales. But the records caught the ears of the audiophile subculture as well—this was obviously a label with a penchant for fidelity and sonic crispness. "We use very little equalization," says Rose. "Tonal qualities come from microphone selection and placement." Most Gramavision disks are mastered at Teldec in Germany and hand-pressed on pure KC-600 vinyl; cassettes are recorded on BASF chromium dioxide tape.

The Gramavision story is not without glitches. Some observers began to wonder about the label's musical perspective when the disco-tinted work of Jay Hoggard and Pheeroan Aklaff appeared a few years ago (to sour reviews and, incidentally, healthy sales). "What it really came down to was that there was a brief period in the beginning when I

didn't rigorously control the music, when I gave too much leeway," Rose confesses. "I wasn't monitoring the boundaries at all, and what I got back was music I hadn't expected. But that wasn't where our future was, and we haven't done anything like that since."

The label is now covering various Third Stream jazz/classical strains and avant-garde big band outings as well as the more swiftly moving fusion and avant-funk. In the future, Rose hopes to record more new classical music and ethnic music, but he is taking the expansion slowly and surely, and resisting impetuous marketing moves.

Although it's clear that Rose belongs in the sphere of record company auteurs—having founded Gramavision and overseen its every turn and quiver—his mode of operation differs from that of many autonomously run labels. "In many ways, ECM was an inspiration for me because of the uniformity of its records," Rose admits. "But they're having a problem now. You can't put out two or three hundred records and have so many sound the same. Your catalog loses distinction." Rose believes ECM's homogeneity is due in large part to Manfred Eicher's pervasive involvement.

"I developed a different attitude toward the creative control of the label. We put our resources and emotional support behind someone, and to the extent that I can I add, but artistically I stay away. I'm much more concerned with boundaries: Are they going to do something I'm not going to be able to market? Is it not really mature or musically well-considered? As long as they stay within the boundaries of what I think is reasonable, I'll leave them alone.

"For instance, Anthony [Davis] said he wanted to move from being a jazz musician to being a classical musician. You can't achieve that kind of transformation overnight, so we sat down and figured out how we could do it.

"Jamaaladeen [Tacuma, the flamboyant harmolodic-bred bassist] wanted to have a dual career—jazz with Jamaal and new music/funk with Cosmetic. We had to create separate identities for him so each success could build on the other."

Rose does keep an ear on the sonic quality of all Gramavision product. "Most of the musicians we work with have such beautiful and unique sounds—I especially love the acoustic instruments," he says. He tends to favor subtle control of the sound field through discreet manipulations of panning and mixing rather than "EQ, EQ, EQ. I like to record everything as clean as I can. There are all sorts of things you can do with phasing and reverberation. We have an EMT Gold Foil, an EMT 124, and a Quantec which I use to distinguish different spheres of sound. I try to make

it subtle, because you don't want it to sound like the oboist is in the bathtub and the guitarist is in the Taj Mahal.

"Some of the music we do is harmonically dissonant—or it's not but it sounds like it is. If the worlds of sound aren't properly integrated, then the incongruities can be disturbing. I want to create a separation so you can hear every instrument distinctly, but I also want to create the right blend so that everybody is in the same sonic world."

Gramavision's fortunes took a quantum leap when Polygram assumed distribution responsibilities two years ago. After having grappled with several other shaky avenues, landing at Polygram amounted to hitting bedrock for Rose. "I had approached them earlier without success," Rose remembers, "and then I heard they were looking for a label so I approached them again. Barry Feldman, who brought us into Polygram, was probably just sitting there saying, 'God, I need a contemporary, independent, strong, high-profile new music label to cap my pyramid'—and then *I* called. It just happened to work out.

"We rounded out Polygram's historical-to-contemporary perspective, and we've tripled our growth every year, so we were clearly an investment with a future." The merger "gave us financial stability and a classical marketing system, which is essential for a lot of the records we sell—and it gave us major distribution muscle for more popular records. And it increased our international profile immediately—right away we had deals around the world, because distributors figure that if Polygram America is taking us on, we're worth it."

The Dead in the Studio, 1967:

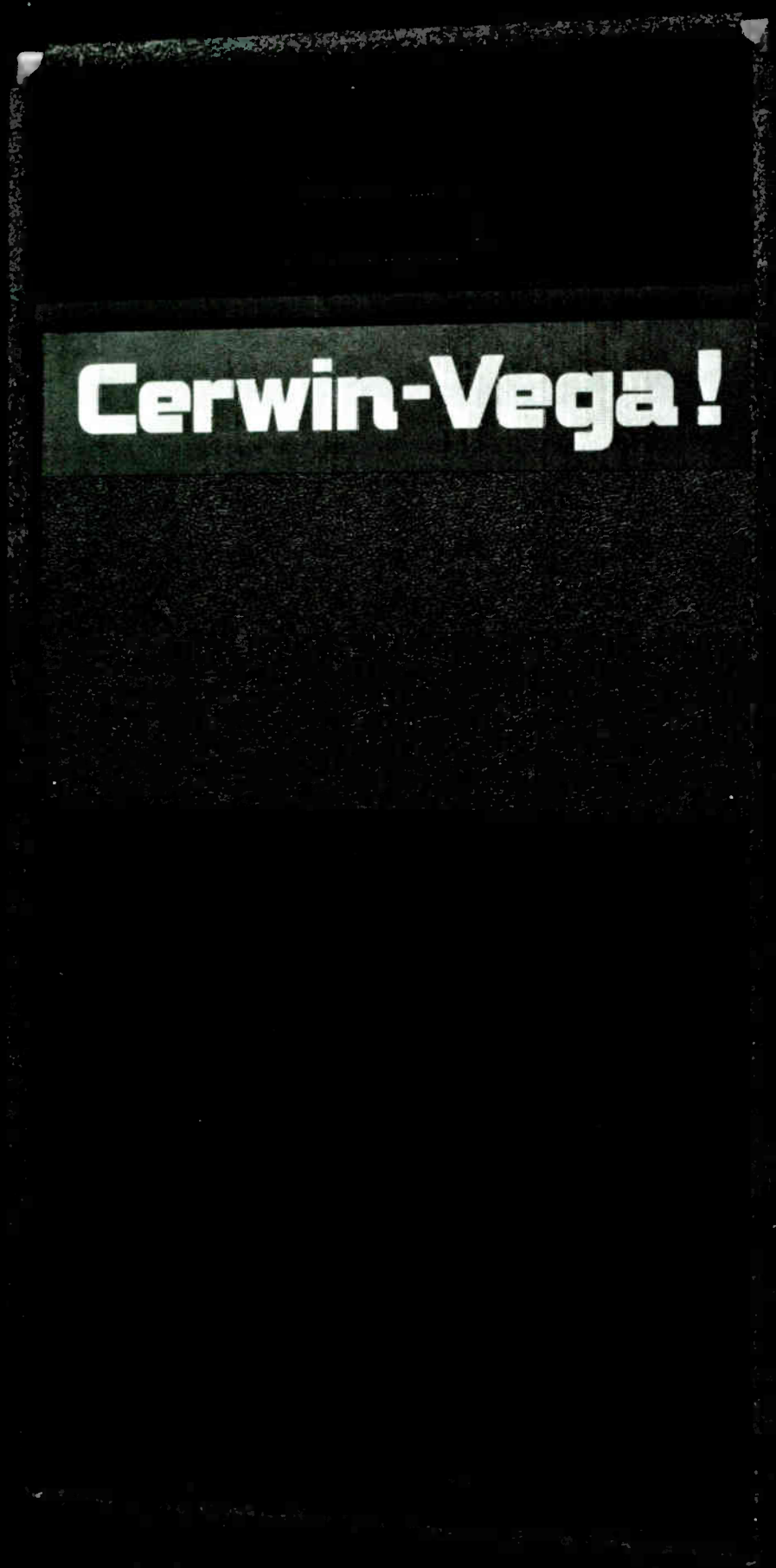
Looking for the Sound Of "Thick Air"

by David Gans

The Grateful Dead are known primarily for their live performances. As *The Rolling Stone Encyclopedia of Rock & Roll* puts it, they "concentrate on live shows rather than the recording process...they prefer the moment to the artifact." The Dead's concert popularity reflects this attitude, with attendance figures consistently charting high while their records do steady if unspectacular business.

The Dead's records "rarely come within shouting distance of the Top Ten," writes David Gans in his new book, *Playing in the Band* (with photos assembled by Peter Simon). Still, they have released nearly 20 albums (more than a handful of them live and/or double disks) in their 20-year history. In this excerpt from *Playing in the Band*, band members talk about the reasons why their records don't reflect the essence of Grateful Dead music, and tell a few stories from their earliest recording experiences.

Playing in the Band, subtitled "An Oral and Visual Portrait of the Grateful Dead," is a largely first-person look at the band's unique music. Author Gans, who is *Mix's* music editor, interviewed band members extensively and also pored over material published and broadcast over the years. Photographer Peter Simon gathered hundreds of pictures, most of which have never been published before. The result is a 192-page, 8½" x 11" paperback with more than 250 photos and a 32-page color section. *Playboy* said this book "is for anyone who has ever wanted to spend some time hanging out and rapping with the Grateful Dead; we came away from it feeling we knew them better in useful ways and understood their music better, too..."



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"What we do is play for people, for warm human bodies. We don't play so good for machines."

—Jerry Garcia

Since their 1967 debut, *The Grateful Dead,* the band and individual members have released more than 50 disks, the only common denominator among them being their experimental nature. Something new is going on at one level or another—or several—in everything the Dead do. As with songwriting and performing—and everything else they do, really—recording is something to experiment with and experience on its own terms, not merely a means to an end.

They've recorded in dozens of studios, including a couple of their own; they've tried unconventional and experimental techniques with both live and studio recordings and on several occasions combined material from both kinds of sources; they've cut 'em fast and they've cut 'em slow. And everybody in the band agrees that although many of the Dead's records have been satisfying—if not to listen to when completed, then at last as recording experiences—only in a few instances have the Grateful Dead managed to capture on vinyl what they create in concert.

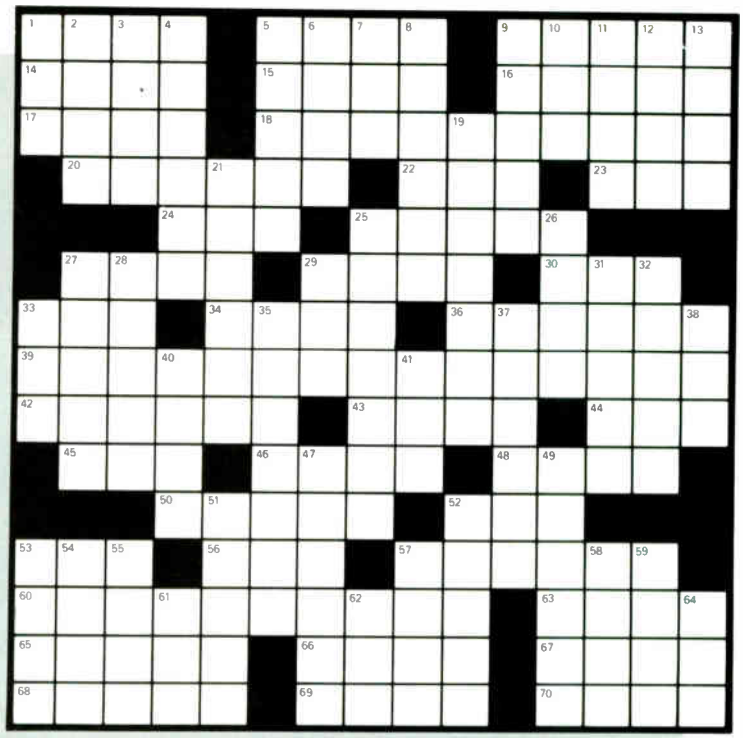
Jerry Garcia: The record is one of the forms that music can take, but it's not a reflection of what *we* do. If you're an artist, lithographs might be what gets you off the most, but if you have to do a gouache you do a gouache. So we just treat recording as what it is.

I prefer playing live. It's definitely a richer experience: You play a note and you can see where it goes, what the response is. That's true in the studio, too, but you're doing it with other musicians. What we might be interested in as musicians might not relate to anybody else. Having a group of musicians in a studio is not unlike having a room full of plumbers.

Phil Lesh: Our performances on record are always merely adequate. We don't really *dive into it* in a recording studio. You know what happens when you start to dive into something? It comes out so much like music that it can't be a record. You get ahead of the click [metronome] track, and you may go back to it or even behind it a little bit. You can't have that if you're going to overdub things later—according to conventional "wisdom," that is.

Garcia: I try to psych myself up in the studio—getting a nice, tasty stereo mix in the headphones and closing my eyes and kind of imagining, projecting myself into an audience situation, but it doesn't work. It *has* to be a two-way street: The audience is hoping to get off, and we're hoping to click.

MIXWORDS



"STUDIOLIO"

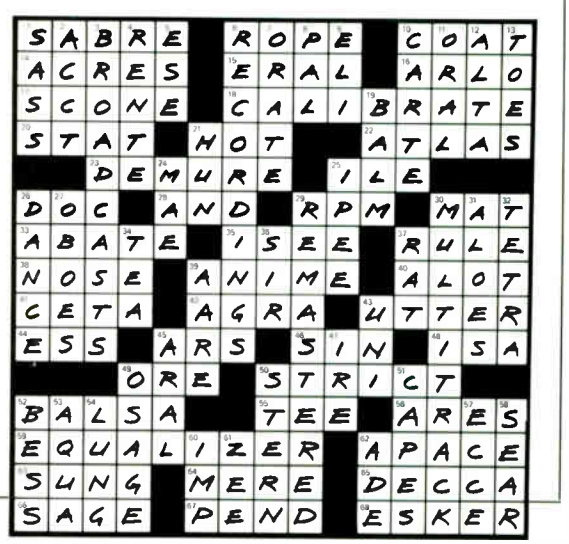
ACROSS

1. _____ Zeppelin
5. Low-tech fuel
9. Pat or Daniel
14. "_____ and Coconut," Nilsson hit
15. Years, to Nero
16. "_____ of a Lonely Heart"
17. Smell
18. "_____" studio, all-direct room
20. Short, purposeful journey
22. "_____ got a gal. . ."
23. How Phil Collins got from Wembley to JFK
24. More than a single, less than an album
25. Garage band of the '60s
27. So long, to Nigel
29. Raymond or Aaron
30. Silkworm
33. Spoil the finish
34. Gator's cousin
36. Pour
39. Science of sound perception
42. Gaped
43. Spheres
44. "A Boy Named _____"
45. Chemical suffix
46. Goofs
48. Word with for, what or how
50. Declines
52. Collection of sayings or stories
53. Common carrier
56. L.A. buses
57. "_____, in the name of the law!"
60. An audio atmosphere
63. Flower
65. The present occasion
66. Petrie dish mix
67. "_____ Eulenspiegel"
68. Gas
69. Buddies
70. River between France and Belgium

DOWN

1. _____-plug, in model plane engines
2. Astronaut Sally
3. "Omnia vincit _____"
4. Draw forth (with "out")
5. Insignificant ones
6. Oklahoma town
7. Nancy's sister
8. More orderly
9. Played bass, in a way
10. Word with night or barn
11. TV series, "The Bold _____"
12. Famed T-Man
13. Former (archaic)
19. Add tracks
21. "Fort _____"
25. Relieves
26. Denomination
27. Sample
28. Indo-European forbear
29. Neckwear
31. Elevate
32. Become liable
33. G.I. Gendarmes
35. 4D's prey
37. Jewish sect
38. Literary monogram
40. Gaffers, grips, best boys, et al.
41. Conjunctions
47. Porter
49. Prince protegee
51. Actress Eve
52. Those who only imitate
53. Annapolis campus
54. "What can a _____ boy do . . . ?"
55. Sing, sang, _____
57. Iridescent stone
58. American author
59. Heap
61. Cpl. or Sgt.
64. Type of camera

SOLUTION TO SEPTEMBER



We used to talk to Bill Walton, the basketball star, about being *on*—hitting it just right. There's a great correlation between music and professional sports. They're both improvisational.

Bob Weir: It might be a viable direction for us to come up with a bunch of material, go in, and just jam like we do on stage and put out records like jazz people do—and not expect to sell very many of them but end up with a pretty fair catalog.

Bill Kreutzmann: Industry people laugh at us and say, "Those guys are nuts—they're not out there trying to get top singles." It's easy to say we don't care. We *do* care, a lot—but not about what's supposedly important, like how many records we sell. None of that ever worked for us...but the Deadheads sure have!

Garcia: Our first album was done in like three nights and mixed in one day in L.A. We really didn't much care about it while we were doing it.

At that time, we had no real *record* consciousness. We were just going to go down to L.A. and make a record. We had a producer—Dave Hassinger—we had chosen because he'd been the engineer on a couple of Rolling Stones records that we liked the sound of...

We played some pretty hyperactive music—

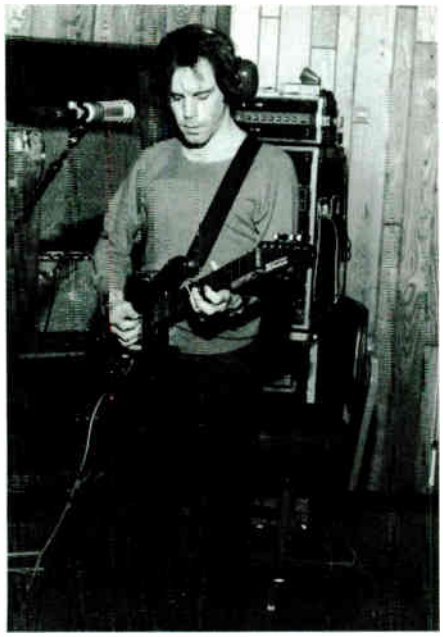


PHOTO: DAVID GANS

Rhythm guitarist Bob Weir at Fantasy Studios in Berkeley earlier this year.

Lesh: That Ritalin-and-hashish sound...

Garcia: That record has its sort of crude energy, but the temp was way too fast. I can't enjoy it, really. The songs were simply what we were doing on stage—but on stage the tunes lasted longer because we like to play a lot. When you're dancing and getting high, you can easily dance to a half-hour tune and even wonder why it ended so soon.

The second record [*Anthem of the Sun*] went the whole other way. We were going to work on it, make sure it sounded good, really get into recording and go on some trips with it. We recorded for a couple of weeks in L.A., experimentally, and accomplished absolutely nothing.

Then we went to New York...and got our producer [Hassinger again] so excited that he quit. We were being so weird, and he was only human, after all, and didn't really have to go through all that...

Weir: The first album was recorded on a 3-track. With eight tracks for the second one, the possibilities seemed limitless. So we started getting kinda nuts.

Tom "TC" Constanten, Lesh's buddy from Cal and Mills College, was brought in to add a little "prepared piano" to the suite that was to constitute side one of the album.

TC: The final part of "That's It for the Other One" was an overlay of several live performances, whence it gets that incredible depth; it's a remarkable effect. They wanted to take that up and swirl it into an explosion, and out of the

PHOTO: DAVID GANS

Engineer David Luke adjusts a mike for percussionist Mickey Hart at Fantasy Studios.

ashes of that would stealthily enter the warm, misty waves of "New Potato Caboose."

At one point I dived into the piano, having pulled the string on a gyroscope and put it against the sounding board. The sound is not unlike that of a chainsaw being taken to it. I wasn't able to see it because of the sightlines in the studio, but I'm told that Hassinger cleared his seat by fully a foot and a half when he heard it. They managed to calm him down, however, and actually the piano wasn't damaged at all.

Lesh: We didn't really want to scare him half to death—we just forgot to tell him. That kind of stuff was normal, to us.

Weir: We were recording in New York. Things were going kinda slow, because we were getting crazy. Dan Healy was engineering, at our insistence and Hassinger's reluctance, and the two of them weren't getting along particularly well.

There was a great deal of confusion and hassling over just doing the songs ("No, I want it weirder!" "The boys in the band want to get *out there!*"), and Dave Hassinger wanted to get the record done within the budget, et cetera, like any good producer should.

I had a song called "Born Cross-Eyed." We'd more or less done the basic track and some overlays, and I was describing how I wanted the song. There was a little bit of tension in the studio, but I was oblivious to it; I was into brown rice at the time and wasn't taking any drugs—zero—but I was pretty spaced, anyway.

I was describing how I envisioned the song, and [Dead soundman Dan] Healy and Hassinger were hassling over something. The song got quiet at one point, and so I announced, "Right here I want the sound of thick air." I couldn't describe it back then, because I didn't know what I was talking about. I do know now: a little bit of white noise and a little bit of compression. I was thinking about something kind of like the buzzing that you hear in your ears on a hot, sticky summer day.

So I said, "Dave, right here I want the sound of thick air."

David Hassinger threw up his hands and said, "Thick air. He wants the sound of THICK AIR. *Thick air!* He wants the sound of thick air"—over and over again, as he's walking out of the studio.

That was the end of Dave Hassinger and the Grateful Dead. It wasn't exactly my fault, but I think I was the straw that broke the camel's back.

Garcia: So Phil and I, mostly, worked and worked for about six months. We assembled live tapes and went through the most complex operations you can go through in a recording studio.

And Dan Healy, who is real fast on his feet, was able to come up with some crazy things.

Lesh: We worked for about six months at Columbus Recorders, smoking a lot of pot and putting all these 2-track tapes of gigs together. We used stuff from the Great Northwest tour with Quicksilver, where we played our asses off with this material—*really* hot. We lost generation upon generation upon generation from overdubbing; that's why it's so funky sounding. But that adds to that sort of pillow of sound. *Anthem of the Sun* is my favorite Grateful Dead album, because that really describes it,

for me. That one and *Live Dead.*

I have to admit that remixing *Anthem* [in the early '70s] was a mistake. The next time it comes out, we'll go back to the original mix. Oh man! That mix is a work of art.

Mickey Hart: We started "Born Cross-Eyed" on the second beat and left the one completely blank. That made everything in the song seem off-kilter. It's a rhythmic and aural illusion; it tricks the ear.

Lesh: "Born Cross-Eyed" also has the only recorded example of my trumpet playing, a little Miles Davis "Sketches of Spain" bit I overdubbed in the break where Weir sings, "...from time to time..."

Work on the Dead's third album was well under way with 8-track tape recorders when the first 16-track machines became available. They used one at the Avalon Ballroom without a mixing console, correctly assuming that the shortest path from microphone to tape would yield the cleanest recording. The result, *Live Dead,* was the first live record ever made with 16-track equipment.

On the other hand, the band thought nothing of scrapping the 8-track work they'd done in the studio and starting over with the new gear. One of their experiments was "Barbed Wire Whipping Party," which included a 16-track cascade—sound recorded on one track was played back a split second later and rerecorded on the next track, then played back another split second later, and so on. "We all had microphones and headphones and hoses coming from a tank of nitrous oxide," Garcia recalls, laughing. "When you'd say something, it came back 16 times. You can imagine how confusing that was on nitrous oxide—immediately it turned into total gibberish."

"Barbed Wire Whipping Party" was not included on the album *Aoxomoxoa,* but plenty of weird stuff was. Another piece that was heavily influenced by nitrous oxide is "What's Become of the Baby," a deeply psychedelic lyric that Lesh calls "a raunch classic."

"I had a concept in my head, but I had no idea of how to do it technically or how to communicate it," Garcia recalls. "I wanted to contain the whole band just playing music inside the voice, where you'd hear some kind of Grateful Dead randomness replacing the voice, a guy opening his mouth and the Grateful Dead coming out. I know how to do it now, but it was impossible then."

(Playing in the Band *is available from Mix Bookshelf, 2608 Ninth Street, Berkeley, CA 94710, for $14.95 plus $2.00 postage & handling.)* ■

David Grisman:

Dawg Music Updated

by Bill Milkowski

The scene is David Grisman's suite at the Blackstone Hotel in Manhattan. Huddled around the TV set are Grisman, myself, and a couple of the players in Grisman's new band, fiddle player Jim Buchanan and drummer extraordinaire Hal Blaine. We are all staring, slack-jawed, at the gruesome climax of *The Fly,* in which the little insect with the human head is seen trapped in a web as a spider prepares to dine. It's understood that journalism is going to have to wait until this important moment has passed.

Here it comes: "Help meeeeeeee! Help meeeeeeee! Pleeeeeeeease help meeee!" shrieks the tiny voice. End of film, beginning of interview.

Grisman, who has been called "the Paganini of the mandolin," though he more humbly prefers his nickname, "Dawg"—is sporting a purple T-shirt emblazoned with the image of John Coltrane and his tenor in full flight. Pinned to the shirt is the grinning face of Boris Badenov, the pint-sized villain of Rocky and Bullwinkle cartoons. The juxtaposition of serious and comic be-

PHOTO: JON SIEVERT

The master, performing sans drummer with the David Grisman Quartet, circa 1982.

speaks the man's eclectic nature, which is also readily apparent in the hybrid music Grisman calls Dawg.

His Christmas album for Rounder Records a few years back also fit into this theme. Pictured on the cover was a slyly smiling Dawg, in full Santa Claus regalia with mandolin in hand, in a cozy living room surrounded by a few of his favorite things: a statue of W.C. Fields by the fireplace, the three Marx Brothers on the mantel, several gift-wrapped mandolins under the tree. On the bookshelves are such character-revealing titles as *Bix: Man and Legend* and *To Be or Not to Bop*, concerning the lives of Bix Biederbecke and Dizzy Gillespie, respectively, and biographies of Eubie Blake, Duke Ellington, Salvador Dali, Lenny Bruce and Federico Fellini. Eclectic guy, that Grisman.

Dawg says his major influences include bluegrass pioneer Bill Monroe and the godfather of soul, James Brown. The title cut from his latest album, *Acousticity*, is in fact an homage to James Brown. Urban bluegrass? Dawg funk?

"People have called my music 'bluegrass without banjos,' but I've never looked at it as something that excludes anything," says the versatile virtuoso. "I like all kinds of music, from bluegrass to Beethoven, and I try to incorporate that into my playing. As for what to call it, I agree with Shakespeare. What's in a name? I've heard the term 'new acoustic' music, which I don't really like because if it's new today, what's it gonna be next month? And I've heard it called jazzgrass. I dunno . . . I just call it Dawg music."

Acousticity, Grisman's tenth album and his first for fledgling Zebra Records (headed by one-time Warner Bros. jazz rep Ricky Shultz), is perhaps Grisman's most eclectic offering yet. While his *Hot Dawg* LP with violinist Stephane Grappelli evoked the '30s sound of the Hot Club of France and *Quintet '80* went out on a limb with Coltrane's "Naima," *Acousticity* blends bop, funk, tango, samba and calypso ("Dawgalypso") in a vibrant mix. And this time around, Grisman has the musicians to cut such an eclectic repertoire.

Fiddler Jim Buchanan is the token country boy, from the heart of Virginia. His Nashville credits include work with Mel Tillis and with Jim and Jesse and the Virginia Boys.

Guitarist Jim Sholle gives the group its urban edge. The native New Yorker has recorded with jazz artists including Sonny Stitt and Esther Phillips, as well as serving a stint with the Duke Ellington Orchestra. In the portion of Grisman's show where he introduces the band members one by one, Sholle usually navigates his way through a Charlie Parker tune. Then he can turn around and strum some fer-real country hoedown stuff.

Rob Wasserman has been heralded for his solo bass recitals and albums. He can play his upright melodically like a horn soloist, or he can walk a solid bass line like a blues player. He's open to it all and versatile enough to cover all the bases.

And then there's Hal Blaine. Simply put, the man is a legend in the music business, albeit a behind-the-scenes one. His presence in the group marks a major departure for Grisman, since no previous Dawg ensemble has included drums or percussion.

"I don't really like drums for bluegrass," Grisman admits. "I'm a purist in that respect. That country beat can get to sound real hokey on drums. But I haven't been strictly bluegrass since I was a college student at New York University in the early '60s. Now the tunes I write are more like Latin or funk or swing or some other style of music that is more suitable for drums.

"I had been using the same instrumentation for so long," he continues, "so I thought it was time to make a change. I always thought that at some point I would start reintegrating a little bit with regular musical society, so to speak. The mandolin and fiddle, and all the acoustic instruments I've used—it's not a familiar sound to the average listener. It's unique, or maybe even a little weird, to them. So while people who are already into my music may find this new album different, listeners who have never heard this kind of music before will find it a little more familiar because of the drums. I obviously want to reach a wider audience, and drums is something that fits into that plan without altering or compromising my music too much."

Blaine does fit in well. A master timekeeper and a selfless team player, he figures he's played on 45,000 tracks to date, including some 230 gold records and 250 movie soundtracks. He's drummed on seven sides which won Song of the Year Grammys: "A Taste of Honey" by Herb Alpert and the Tijuana Brass, Sinatra's "Strangers in the Night," "Mrs. Robinson" and "Bridge Over Troubled Water" for Simon and Garfunkel, "Up, Up and Away" and "Aquarius (Let the Sun Shine In)" for the Fifth Dimension, and the Captain & Tennille's "Love Will Keep Us Together." Blaine tried retiring from the business a couple of years ago, he says, but special projects kept calling him back to the studio...

In concert, Blaine's blithe call-and-response with Grisman on *Acousticity* has been a highlight of the show. It's a spirited game of one-upmanship, with Grisman feeding Blaine a melodic line and the drummer confidently returning the lick and flashing a grin, as if to say, "Oh, yeah? That the best you can do?" They go back and forth in this manner, and that's no mean feat. Keeping up with a flash like Grisman is difficult enough for a stringed instrument or a horn, but matching those intricate melody lines is particularly challenging for a drummer.

"Hal is such a great pro," says Grisman. "He's always been one of my favorite drummers. When I got the idea to work with drums on this record, I thought of him right away. He's so versatile, he can handle anything. On the one hand, he's a commercial drummer—he makes things sell, and he's tapped in to what people want to hear. But he's also playing some interesting stuff. Listen to the drums on 'Bridge Over Troubled Water.' It's very *musical* drumming."

Grisman has been championing the much-maligned instrument since he was a teenager in Passaic, New Jersey. "I had a piano teacher once who told me the mandolin wasn't a real instrument," he recalls with a chuckle. At 40, he is an international ambassador of the instrument. In addition to his performances, recordings and other commitments, he also publishes a newsletter, *Mandolin World News* (P.O. Box 2255, San Rafael, CA 94912).

If only that piano teacher were around to hear Dawg unleash some Beethoven or bebop or samba or swing on his tiny, eight-stringed axe. I love to see fools eat their words.

1986 Musical America Directory

Over 600 pages in length, and published in a special deluxe hardcover edition, the *1986 Musical America International Directory of the Performing Arts* will be available in mid-December. The directory includes hundreds of performing arts groups, including: orchestras, opera and choral companies, dance groups, ballet and mime companies, concert halls, music schools, music publishers, managers, publications, professional organizations, and music competitions. Each listing includes the address, phone number and the names of key contact persons. For more information, contact: The 1986 Musical America Directory, Circulation Dept., Eighth Floor, 825 Seventh Avenue, New York, NY, 10019. ■

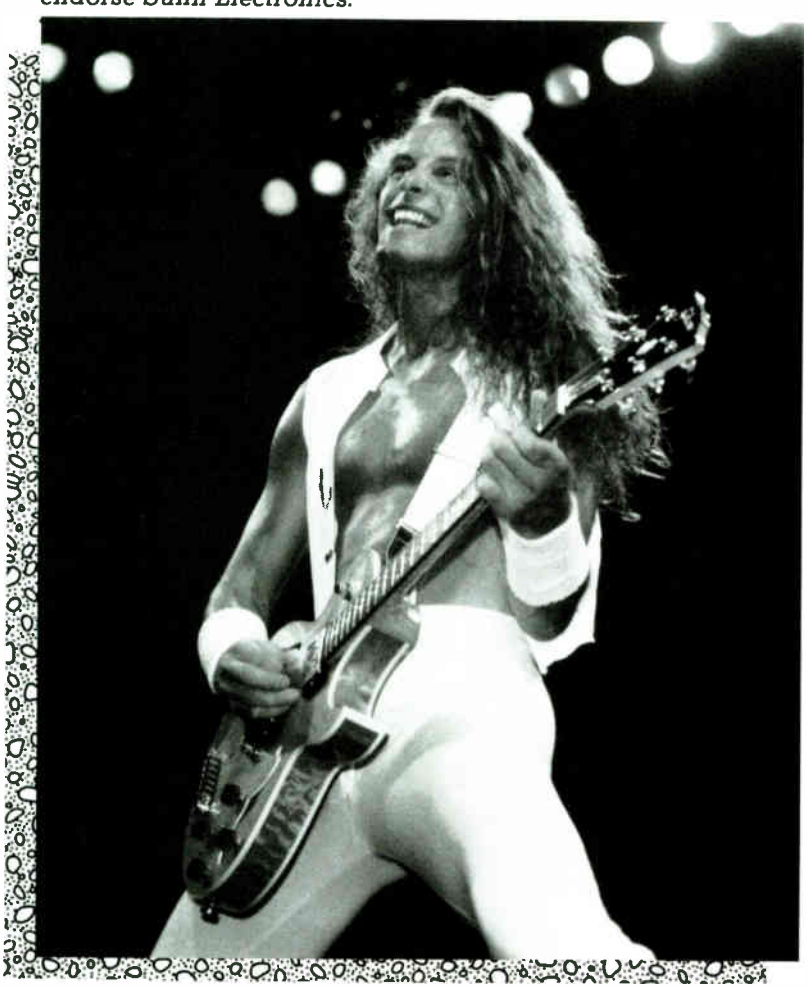
Artist Endorsements

THERE IS MORE TO THEM THAN MEETS THE EYE

by Brooke Sheffield Comer

The relationship between an artist endorser and a manufacturer might appear to be a superficial one—the artist receives a cash incentive to promote the product in clinics, advertisements, and public appearances. However, a series of interviews, conducted by *Mix* with major manufacturers and their endorsers at the Spring '85 NAMM show, revealed that the relationship between the two is actually quite intricate. A well-known artist can draw attention to an instrument by associating himself with it and thus stimulate sales. But in most cases it is the product itself that attracts the artist first. Concern for the quality and performance of an instrument allows artist endorsers to have creative input into design and capabilities, thus enhancing the product line, as well as the artist's own musical statement. Because more artists endorse products as a salute to quality rather than for monetary motives, relationships with manufacturers become, or originate, as personal friendships rather than business arrangements. That rapport between artist and manufacturer is the key element in a successful endorsement project.

When he's not out killing small animals, Ted Nugent finds time to endorse Sunn Electronics.



Ted Nugent's relationship with Sunn Electronics has mutual advantages both to Nugent's explosive sound and to the company that made it possible. Before Nugent designed and endorsed his own Ted Nugent Sunn Penetrator Amp, he would connect, "an outrageous amount of Fender and Marshall amps together. "That's how I got my thick, fat sound with all kinds of bite," Nugent explains. "But I had to use an amazing amount of different amps to get it." Gene Prescott of Sunn caught a Nugent show in Texas and noticed the complex network of amps.

"He approached me and told me that Sunn could make one amp that did everything my collection of amps was doing unto itself," Nugent says. "I said, 'fantastic, I'll believe it when I see it, let's get to work.' They wanted to put it out last year at the '84 NAMM show, but I didn't think it was quite right at that point so they held off. Now it's on the market and I'm amazed by the sound. It really kicks ass, and it'll offend someone somewhere, I'm positive," he laughs.

Nugent had total input into the design of the amp that bears his name. "My endorsement is a response on my part to a tradition in the quality and accuracy of a piece of electronic equipment," he says. "I've turned down hundreds of endorsement offers to work with the product I believe in. Sunn's Ted Nugent Penetrator Amp is a completely new animal. It's got the highs and the crispness of a Fender Amp, and the bottom and the gravel growl and desirable distortion of a Marshall so you can really dial in your own sound. I have confidence that any signature guitar player could plug in my amp and sound like themselves. I like to shoot for a distinctive sound. This amp affords me the sonic ability to accomplish anything from out and out collisions to rampant semis to sexy little subtleties, and everything in between. Sunn's technicians worked diligently with me because they know when I

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One reason Sunn technicians had no trouble interpreting Nugent's sonic needs was the guitarist spent so much time actually demonstrating his needs to Sunn. "I played with the technicians and showed them examples of what I've done in the studio using all the outboard gear on my guitar, and I had them listen to tapes," he says. "I usually articulate what I want in exaggerated phonetics. I'll say 'I want the sound of two dinosaurs going at it at midnight,' and they'll say, 'oh, yeah, that!' or I'll say, 'I want four semis abreast driving sideways up your ass,' or 'give me two gay chainsaws having it out,' and they know exactly what I want."

Though he does have a contract that specifies his exclusive endorsement of Sunn products, the relationship is more than just business. "When I endorse someone, they endorse me," Nugent explains. "I'm the race driver and Sunn is Ford Motor Company, but I don't have to take a standard Ford. They'll build a race car to my specifications because I drive in a certain style in a certain kind of race. So Sunn, by supplying the amp, provides the curves. We're both in the race together."

There are no requirements in Nugent's contract requiring that he appear at clinics and trade shows, "but I'm a big-hearted son of a bitch," jokes Nugent. "Gene Prescott and I have become friends so its not just a cut-and-dried business deal. As I go through life, I find that if the person I'm dealing with is a dip, and I can't have a human relationship with them, then I probably won't have any relationship with them. I have an instinct for people, and I can smell trouble about six years away."

Because of the exclusive clause in Nugent's contract, Sunn is the only amp he'll endorse (though he can and does endorse other accessories, such as Dean Markeley strings). "I think that's only fair when you go the whole limit with a signature series," Nugent says. "For instance, when I was supplied by Fender amps [Nugent did an endorsement for Fender in '76 prior to his relationship with Sunn], I was also in communication with Jim Marshall, because the product wasn't a 'Ted Nugent Fender Amp.' The terms of the endorsement were just 'Ted Nugent plays Fender Amps,' and I augmented that sound with any and all equipment that I thought would enhance the sound because that was the arrangement we had. Sunn's technicians are always on red alert for my sonic demands when I need something new." One of Nugent's new projects with Sunn involves a "little recording amp we're putting together, with it's own chorus, echo and effects built right in."

Nugent plans to design more projects with Sunn, so his contract with Sunn is long-term. "I don't know the exact time length," he admits, "but I know it's a couple of years minimum. To design a project, it takes that long just to get the ball rolling. I wouldn't be interested in a one- or two-year contract because it takes longer than that to get organized, and get the sounds right. You could work for a year and not get quite what you want and have to re-do everything. I always want to pursue what I'm working on to whatever degree is necessary to perfect it and keep the quality up, so the time length in my endorsement contract has to be fairly long."

• • •

When Brian May signed an endorsement contract with Guild, the guitar manufacturers were interested in more than the attention that Queen's guitarist would bring to their product. Guild's arrangement with May allowed the company to add the BHM-1 to their signature series. Copied from May's original, handmade guitar, the Mahogany BHM-1 is equipped with three custom-designed DiMarzio pickups (May also has an endorsement deal with DiMarzio), a specially adapted tremolo from the Kahler company, and a power booster. May benefited from the arrangement when his rare guitar became accessible to the public. Ever since May designed and built the "Red Special" at age 17, with the help of his electronics engineer father, "people asked me where they could get a guitar that sounded the same. I had no answer except 'build your own.' A few people did, but I think there are only about a dozen very close copies in the world. I wanted a manufacturer to patent the design because there are a lot of things in my guitar that were completely new when I made it and haven't been copied yet. The system of switching hasn't been duplicated to my knowledge."

Guild approached May after reading an interview in which he mentioned that he'd like to see his design patented and reproduced. "Our agreement isn't just an endorsement," says May. "The deal was 'make it my way or I'm not interested.' It's named after me, the Brian May model Guild guitar, and craftmanship wise, it's really superb. Guild is a very classy company. They introduced me to DiMarzio before we signed the contract and took care of details. Guild is really known in the acoustic field but they wanted to move into electric guitars, and thought this would be a good vehicle."

May feels that having his own guitar on the market is sufficient compensation from Guild, though of course he does receive a percentage of the sales. "I'm thrilled to have something out

PHOTO: NEAL PRESTON

Queen's Brian May built his own guitar with the help of his father.

there with my name on it," May says. "That's the biggest profit I get out of the deal, having people pick up my guitar, play it and like it. I've always wanted that to happen. I'm not interested in a lump sum." According to May, there are no real requirements in his contract with Guild. "They do ask me to attend clinics and I generally say yes, but there's no obligation. I could just hide away, and I may do it, though at the moment it's fun for me to be at trade shows. The real basis of my contract was that they would make the guitar to my specifications, which was a technically complex goal."

One of the ironies of the BHM-1 is its expense. "I built my guitar because I couldn't afford to buy one," recalls May, who spent two years as a student in Middlesex, England trying to get the sound and feel he wanted. "When Guild approached me in '83, one reason I was so happy was because I could finally get some spares for myself. I couldn't find anything else on the market that produced exactly what I wanted, which is why I've used my guitar and nothing else for 20 years. Fender goes up the top and out the bottom somewhere, and Gibson doesn't give me the articulation that I need, though both companies make excellent guitars. My guitar talks, and so does Guild's version. We aimed for perfection and didn't cut any corners. Maybe I should have said, 'Let's aim for price,' but instead I said, 'Let's aim for perfection.' " The price of perfection, reflected in the BHM-1, is $1,200.

"It's more of an elitist instrument than

I intended," May says, "but it's really different. Not only does the guitar have its own sound, it has a variety of them as a result of the wiring, which was obvious to me when I was making it, but no one to my knowledge has duplicated that wiring system yet. I put phase changers in all the pickups, so you can have any combination of the three in-phase or out-phase which gives you a lot of combinations. I also designed a terminal, a unit I made from scratch and used rollers to eliminate friction from the bridge, which I think was the first time anyone did that."

Because the BHM-1 is flat in frequency response with deep lows and high highs, there's no characteristic trebly or thick sound. "I got this variation from a different switching system," explains May. "The early solid body guitars were built to stop things feeding back, but I built my guitar with the premise that it was a good idea to have it feeding back in the right way. I started off with a Spanish guitar shape. I felt there was a reason for the curves of an original Spanish guitar and that the shape didn't need to be distorted in any way. Pickups help a lot, but the body of a guitar is really what gives it a unique sound."

Though May likes a thick neck, he agreed to modify the Guild model with a fairly thin neck to accommodate people with small hands. "It would have been impossible to duplicate my vibrato system, so we got Kahler to make a more or less standard one with a couple of changes to suit the Guild. The BHM-1 has a stronger spring under it and since the standard Kahler is very light, we needed some force to move the spring and help keep it in tune. I was quite impressed with the engineering since that's the sort of thing I like to do myself. Dave Storey, from Kahler, and I were experimenting with tremolos at the same time, using rollers and going for something that could move the strings not just a couple of tones, but a whole octave."

DiMarzio took a departure from anything they'd done before when they designed May's pickups as part of their endorsement agreement. "Larry DiMarzio went to enormous lengths to get me exactly what I wanted," May notes. "My pickups are wider, but compatible in shape with the Stratocaster pickup. They're slightly fatter sounding because the pickup is wider and picks up sound over a greater length of string. You also get a mixture of harmonics instead of just one or two. DiMarzio built a device into the pickups which spreads the field and makes it behave as if it were a fatter design. They experimented with magnets until we finally got the sound I wanted."

* * *

When Alvin Lee's '58 Gibson became too valuable to take on the road anymore, he looked at "hundreds of hollow bodied guitars that looked like mine, and out of the hundreds I tried, I chose a Tokai," he says. Thus began Lee's artist endorsement relationship with the company. "I knew it would be a good, basic guitar that I could customize to my needs," explains the former leader of Ten Years After. "I met Jack Nead when he was a dealer years ago for Gibson. Recently, I told him that I was looking for a good hollow bodied guitar so I could put a line out, and Jack told me about the Tokai, which I tried and found much to my liking. I decided to endorse the product and put out the Alvin Lee model Tokai guitar. This is going to be my first and only endorsement, though." Not only did the shape and sound of the Tokai attract Lee, but his rapport with the staff and technicians at the company helped him choose the product.

Lee's contract with Tokai is "more than an endorsement," according to Lee. "I design the guitars and Tokai builds them," he explains. "When you get involved in designing and building an instrument, there's more responsibility than just playing it and telling the public how much you like it. The details of construction become very important. As a part of your music, you have more incentive to see that the instrument meets consistently high standards." Lee's attention to quality control will take him to Japan in the near future to visit the plant where Tokai guitars are made. "I believe that Tokai is capable of making better guitars than some manufacturers who have been around for years, and by visiting the plant in person, I'll have a better idea of how the process might be innovated or improved. I think that insight is very important."

In return for sharing his name and design concepts with Tokai, Lee will receive a percentage of the profits of the sales from the Alvin Lee model. "And I suppose they'll give me a guitar or two, too," he adds. "I don't mind making a little commission. There aren't any clauses that say I have to appear at trade shows or clinics, but I don't mind doing a few promotional appearances. Since I have my name on the guitar, it's in my best interest to do what I can to promote it. I spent a lot of time working on the electronic design before they shipped my chromatisms to Japan and copied them with ultra precision. Taking guitars apart and changing their sound is a hobby of mine, so I enjoyed working with the Tokai. I think what first appealed to me about this particular guitar was the size, because it's exactly what I'm used to.

"I like the idea of having several exact copies of my guitar lying around in case I lose one of them," he adds.

Simmons whiz kid Josh Freese

"I'm also hoping to do a whole new line, too. The Alvin Lee model is a guitar I personally like, but being involved in trade shows has shown me that there are a lot of technically innovating ways to go. I'm glad my contract with Tokai is long-term because I think they're capable of creating anything I can dream up, so all I've got to do is plenty of dreaming."

* * *

Simmons Electronic Drums has an artist development program designed to meet the diverse needs of Simmons artists. Perhaps because Simmons is "the new kid on the block" in terms of sound and design, artists of all ages and genres are attracted to the product, and a comprehensive development package is designed for each endorser.

"We have numerous ways of finding endorsers," explains Dave Levine, director of marketing and artist relations. "Some are famous and need no introduction, and others come to public attention by endorsing Simmons. When an artist expresses interest in endorsing Simmons, I always check into his background. I ask for a bio or press kit and verify all his information, then we set up a program of clinics and promotions geared to that particular drummer's abilities. We have no actual contracts because we don't give away products. Our artists earn products, however, by doing promotions for Simmons, or they can buy at a discount from a dealer. There's no exclusivity clause, because I don't want to dictate to anyone what he will or will not play."

Josh Freese is one of Simmons' endorsers who is coming to national attention through his promotions. "I was playing an acoustic set when I first heard about Simmons," says the 12-year-old. Freese began playing at age 7 when he discovered an acoustic kit in the attic of his home. "I asked my dad if we could bring it down so I could practice." Freese, whose entire family is musical ("My dad plays tuba and a lot of other instruments and my younger brother is starting on keyboards"), worked for two years until he took a formal lesson. "I was surprised to find out how little I really knew," he admits. "I'd been playing along to records and I thought I was really good. But finding out I *wasn't* made me work that much harder."

Studying drum rudiments and stick control gave Freese the foundation to carry his natural sense of rhythm one step further. At a local trade show, Freese caught the attention of his drum idol, Vinnie Colaiuta, and drum industry executive Phil Hulsey. Informal coaching from them gave Freese an introduction to the inside of the music industry. He also studied with Disneyland staff drummer Matt Johnson before trying out a Simmons kit at an Anaheim trade show. "I was playing for another drum company and I found the Simmons booth during one of my breaks, and I just started to play," explains Freese. "I was curious because of all the things I'd heard other drummers say about Simmons, and what I'd seen on TV. After I finished playing, the Simmons rep called me over and we began to talk about the endorsement. I've been involved ever since."

Though Simmons doesn't have an exclusive clause in its dealings with artist endorsers, Freese thinks "they might mind a little bit if I played another drum in public or did an advertisement. I always play a Simmons," he adds, "except when I play jazz. Sometimes I play in my dad's Dixieland band at local clubs. But I promised to be pretty loyal to Simmons for the next year and maybe longer. If another drum manufacturer came up to me and asked me to endorse their product, I'd wait awhile because I'm doing so much with Simmons now. I get approached by a lot of snare drum and stick companies and I do endorse Hot Sticks, but Simmons doesn't mind about that."

As a part of the Simmons artist program, Freese has access to Simmons technicians, who can help him get any special sounds that he wants out of his SDS 7. "It might cost me a little money, but Simmons can get me anything I want in terms of sound," says Freese.

"We try to customize our drums to the artist," adds Levine. "When you're turn-

ing out 300 drums a day, you can't create a specific design for each individual, but we are receptive to everyone's needs. There's always something someone wants that will double the price or create technical complications, but we're willing to work and try to achieve that special effect. Soundwise we have sampling capabilities so we can give an artist any sound he wants."

With more than 65 Simmons service centers in the USA and 20 internationally, replacement and back-up parts are available to Simmons artists no matter where they are. "If an artist is in L.A. and needs a checkup or servicing, he'll be placed at the top of that day's work schedule," says Levine. "If necessary, we can rush equipment overnight to any destination in the country." Simmons artists not only find a network of technical support behind them, but publicity and promotion services are also a part of the artist program. "By participating in Simmons drum clinics and doing print advertisements and TV commercials, our artists get public exposure. We help to keep artists in touch with the media with up-to-date files, which are maintained by our staff and available to the press. No Simmons artist goes unknown for long."

Not all Simmons artists begin their endorsement programs as performers. What Dave Levine calls "the right musical climate" creates stars out of non-drummers. Texas Tim Root worked as a Simmons programmer before he went out on the road to promote the company. "He's our only staff artist on salary," explains Levine. "Over the last six months he's been on the road doing clinics and promotions at over 60 stores and he's become a Simmons star. It's a tough gig, but he's done a great job. He's not the only artist who's involved in testing equipment, either. We had Chad Wackerman take our drum rack along when he went out on the road three months before we put it on the market, to make sure it would hold up and survive. He actually found a few points that we enhanced to make the rack more road-worthy."

Simmons' artist program is growing as the company grows, and given the talent and youth of artists like Josh Freese, there's a lot of potential for future developments between Simmons and company artists. "After all," Levine points out, "we're only three years old. Gretsch just celebrated its 100th birthday."

* * *

Lee Oskar is an artist endorser who won't have any conflicts with his manufacturing company. Oskar is both the endorser *and* the manufacturer of the Lee Oskar harmonica. "I decided to develop my own harmonica to maintain an availability of quality equipment," says Oskar. "The harmonica is

PHOTO: JIM HAGOPIAN

Lee Oskar found quality harmonicas so scarce that he started manufacturing them himself.

of the road for a long time and eventually it's going to go one of two ways. Either it will become obsolete, or it will go where I'm trying to aim it—to an exciting place in the music instrument marketplace, where it can achieve the recognition it deserves. I intend to create a state-of-the-art instrument and do for the harmonica what Les Paul did for the guitar." Oskar, who played with the group War and on a number of solo albums with noted musicians, collaborates with Tombo Musical Instrument Company to produce and distribute the Lee Oskar Harmonica.

Oskar's success as a manufacturer/promoter is no doubt enhanced by his three-decade relationship with the harmonica. "When I was a 6-year-old in Copenhagen," says the Danish native, "we had a German guest who brought me a harmonica. Harmonicas were the fad of that year, just as Hula-hoops were the fad of the next year, and yo-yo's the year after. But I continued to play the harmonica, despite my family's attempts to steer me towards violin or piano. It was a spontaneous decision on my part and I stayed with it.

"People live in a world of stress today," he continues. "Life can be a roller coaster existence, and there aren't many methods of self-expression that are as accessible and satisfying as playing the harmonica. Harmonicas were more popular before the advent of stereos and TV, when people had to

entertain themselves. Now, they're more willing to be a consumer audience, conditioned to feel that they can't enjoy playing music unless they're professionals. I encourage people to play for themselves."

Oskar began his own line of instruments in part to keep harmonicas from becoming obsolete, he says. "If you don't promote something, it can go out of style," he warns. "If I went to a retail store to get an instrument I needed, if I was lucky it would be in the right key. But most of the time I couldn't find the keys I did need in stock. I had to get ten harmonicas to find one good one. I was becoming desperate and I found an alternative, manufacturing my own line. As a professional musician, I had to have reliable, accessible instruments, and this seemed to be the only solution. I found Tombo Musical Instruments, which made a harmonica that I liked, but it wasn't quite the type I used. I sat down at my drawing board and came up with several designs, flew to Japan, and met with the technicians. At that point I decided to go the whole way and not only manufacture, but market my harmonicas. That way I could create or re-create as it were, the market for harmonicas."

Oskar's current design for his harmonicas "is only the beginning in terms of what I want to go for in terms of making the instrument marketable," he says. "Good action is very important for tuning. A harmonica must be easy to tune, with interchangeable reed plates so there's no air leakage. It's the quality that makes this a superior instrument."

Despite the declining number of harmonica players, Oskar hopes to rejuvenate the market by stimulating harmonica awareness in people who have never played the instrument, as well as re-awakening it in former players. "The market isn't readily visible," he explains, "because people who play non-professionally aren't in the public eye."

Though such prominent artists as Huey Lewis, Bob Dylan and Bruce Springsteen use harmonicas, Oskar finds that New York retailers have an attitude that "we don't need another harmonica line in our store." But he's trying to change that. "I see harmonica departments in the long run, back to back with guitar departments and keyboard departments. The harmonica has all the versatility of the sax, the guitar, and keyboards. I can play jazz on it, or rock, or blues. But it's been underestimated over the years and it's gotten an image as a funny toy. rather than a serious instrument. Now we're giving it an image as something eye to eye with a guitar, though ultimately it's what you do with an instrument that determines its marketability."

What artists like Bruce Springsteen do with Lee Oskar harmonicas could have a lot to do with the instrument's marketability. "We've arranged for Springsteen to use some of our harmonicas, and we're in the process of setting up an endorsement program," he says. "We'd like to have him endorse the product so we're making it convenient for him to use our instruments, right down to supplying harmonica roadies who know the instrument well and can tell if it's in tune. So far we've made an arrangement with Micky Raphael [of Willie Nelson's band] to endorse us, and as the program develops, we'll have more artists, too. No one will be exclusively contracted to us, because as an artist myself, I know that one needs freedom to try other instruments. It's essential for an artist endorser to get different feedback, and if another instrument's performance is superior, I want to know about it."

* * *

Dennis Berardi, president of Kramer Music Products, prefers to call Kramer endorsers "friends." "We're a young company," he explains, "and most of the people who work here are young, too. When an artist endorses our product, they join the Kramer team." Berardi is a former artist himself, having played drums with a multitude of bands including The Duprees.

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May	**Northeast Recording Studios**
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THE RECORDING INDUSTRY MAGAZINE Mix

Kramer was a struggling young company when Berardi met Edward Van Halen and showed him Kramer's tremolo bar. Van Halen's enthusiastic response put him on the Kramer team and Berardi credits the guitarist's support with the success that the company has enjoyed ever since. "I was fortunate," Berardi admits. "I was flying out to Los Angeles with a new tremolo bar and I happened to sit next to a man in a Van Halen jacket. We began talking, and it turned out he had done some work with the band through Warner Bros. I told him about my tremolo bar and he asked me if I'd like to show it to Edward. I said, 'Would I ever!' When we got to L.A., I met Edward and told him Kramer's marketing strategies and the type of guitars we wanted to come out with. He was interested and we got along well. We joked that Kramer would be as big as Fender or Gibson one day, and a lot of that has come true."

Though Van Halen began his relationship with Kramer by endorsing the tremolo bar, "realistically it wasn't quite what he wanted after playing it a few months. We named it the 'Eddie Van Halen Tremolo Bar,' but when he wanted something else, we went to Floyd Rose and got the best tremolo bar in the world, the only one that works and stays in tune. After that, Edward began to endorse the whole guitar with the Floyd Rose Tremolo. He had one guitar that he'd made himself out of different parts. Then, two years ago, he didn't take that guitar out on the road with him, just four or five Kramers. There isn't really an Eddie Van Halen Guitar, but he was involved in designing the guitar they call a Barretta. He designed the neck, the body shape, the positioning of the pickup with one knob, everything. The reason he didn't want an Eddie Van Halen model on the market was because he wants to endorse the whole line—not just one guitar—and the input we've gotten from him is amazing."

The contract that Kramer and Edward Van Halen have is "just friendship," according to Berardi. "Edward believes in what we're doing. He isn't paid and he's under no obligation to attend clinics or conventions. The problem with other guitar companies is they've been taken over by corporations. Fender was purchased by CBS, and they lost complete touch with the marketplace. Edward liked our attitude and people; he could relate to us. A lot of people will endorse one guitar, another amplifier and some strings, but Eddie is Kramer all the way. He endorses nothing but Kramer."

As far as payment goes, Berardi remembers giving Edward about ten guitars in the past three years. "What could I offer Edward Van Halen in

terms of money?" he asks. "He's not in it for the money. I think he related to the fact that we were a struggling young company that was on the verge of going bankrupt four years ago, and he had a lot to do with putting us where we are today. He was once struggling, too, looking for a lucky break. A lot of endorsers pay their artists, but we give them guitars, and no one is given any cash incentive to join the Kramer group."

Kramer products are tested by artist endorsers before they hit the marketplace, a form of input that is invaluable to the company. "If I see something new or hear about something new, I'll send it right out to Edward to test," says Tom Anderson, a Kramer representative in L.A. "What he tells me in response has a lot to do with whether or not we handle a product. Edward Van Halen's faith in Kramer has allowed us the means to risk faith in lesser-known acts.

"When Queen'sRhyche called us and asked for guitars a few years ago, they were virtually unknown, but I had a feeling about them," explains Berardi. "I gave them six guitars and they're doing very well now. We also work with Grim Reaper, Lee Fox from Scandal, and George Lynch from Dokken. Lynch traded in his Charvel for a Kramer Barretta. I think it's really important for a company like ours to look for up-and-coming artists. Older bands and artists are already set in their ways and they're not as likely to change their instruments."

• • •

Steve Morse endorses Ernie Ball Strings and also plays in a band with Sterling Ball, Ball's two brothers, Albert Lee, Jim Cox, John Ferraro and sometimes Chad Wackerman. Calling his rapport with the Ball's "more than a business relationship" is an understatement. "Steve is really a friend," Sterling Ball insists. "He's writing a book that we're publishing called *Steve Morse's Rock Techniques* and he's a good testing ground for our new products. When we came up with RPS [Reinforced Plain String] he had the first try along with Alan Holdsworth, and their input was of great value to us. He's also a great person to play guitar with. Our band, which plays along the California coast and around San Francisco, really packs an audience. It's more than just a customer band, it's a group of friends." Playing together cements the rapport between the Balls and Morse beyond any contractual agreement.

Morse has been using Ernie Ball products for 15 years, though he's only been an endorser for about three. "One thing that appealed to me about the Balls is the fact that they're so well adjusted," says Morse. "So many people change with success, but despite the notoriety of their products, no one at

Ernie Ball Strings endorser Steve Morse

Ernie Ball has let that go to his head."

Morse's affiliation with Ernie Ball is stronger than that of most artist endorsers, not only because he's a member of the "family" band, but also because he's on salary, not as an endorser, but as a "springboard" who gives a lot of technical input into the company. "People don't understand about his salary and they think we're paying him to promote us," Ball says. "But Steve will fly to California from his home in Georgia at his own expense and work with us punching a clock. He helped us design the mechanism for a stereo foot pedal. We recently finished a seminar tour all over the United States and Canada. Steve was not only working as a clinician, but he was the company pilot, and he flew us everywhere during the course of the tour."

Morse puts his Ernie Ball strings on a Fender guitar with a Telecaster body and a Fender Stratocaster neck, with five different pickups. "It's a kind of Frankenstein," Ball reveals, "and most people would be intimidated by so many combinations of sound. Steve changes the controls with his little finger while he's playing." In addition to his combination guitar, Morse uses a Roland interface on his Yamaha DX7, "but I always use guitar sounds when I'm playing. I think that's a pretty common way of altering a guitar's sound. I'd like to have every new product there is, but the ones I'd like are in the price range of a house. I use a Kurzweil and a sequencer for parts. When I don't have time to show a part to the keyboard player, I'll punch it into the sequencer and play some parts myself. I'd hate to write music that way but it did work for a section of one song."

Though Morse is active as a consultant and technical advisor for Ernie Ball, he thinks of the arrangement as a mutual support system. "I'm pleased to be able to do anything I can for Ernie, and I know the people at Ernie Ball would do the same for me," he reveals. "We're more like a family than business partners." ■

THE STARSHIP FLIES with New Pilots

L-R: Mickey Thomas, Dennis Lambert, Grace Slick, Peter Wolf, Craig Chaquico, Jeremy Smith, Pete Sears, Don Baldwin

by Blair Jackson

Forget *Dallas, Dynasty* and *Falcon Crest*. The Starship, who've been flying through the world of rock in one incarnation or another for two decades now, have weathered enough crises and melodramas to fill ten seasons of prime time soaps. The Jefferson Airplane's first lead singer got pregnant; there were countless battles with the record company; Marty Balin was knocked unconscious by a Hell's Angel at Altamont, then he tired of touring and quit; the bassist and lead guitarist quit to make Hot Tuna a full-time band; with the group in limbo, Balin returned; a late '70s riot at a Starship show in Germany destroyed most of the group's equipment, and an alcoholic Grace Slick bowed out of the band; Marty quit yet again and the group's fortunes sagged once more; drummer Aynsley Dunbar was relieved of his duties for still unspoken-of offenses; Slick came back to share vocals with Mickey Thomas, but just last year co-founder Paul Kantner left in a huff, complaining about the band's overtly commercial direction. Further, he sued the band to claim ownership of the name and walked away with the "Jefferson" part. So why is this band smiling?

Well, strangely enough, the group is probably the most unified it has been in years. The group is leaner, *sans* Kantner and keyboardist/bassist David Freiberg, who was removed in a bloodless coup, and the surviving quintet seems to be carrying on with a new sense of purpose. They're coming off an album, *Nuclear Furniture*, that was one of their most successful in recent years, and which established them as favorites with a whole new generation of fans. And everyone is delighted with every aspect of their new record, *Knee Deep in the Hoopla*. Surely disaster is lurking around the next bend, no? Probably not. This Starship knows where it wants to go and how to get there. They want hits...now...on *your* radio.

With all due respect to the new Starship, whose new invigoration is for real, and not just some public relations ploy designed to hype the new album, it should be noted that with the departure of Paul Kantner, the group lost its last real connection with its Jefferson Airplane roots. Sure, Grace Slick is still aboard, but her revisionist, anti-'60s tack in interviews has to make one wonder why she bothers singing her old hits at all. Kantner was the group's conscience in a way, the one member of the band who always cared more about art than hits; who believed that social responsibility came before seducing radio programmers; who still waved his '60s banner unashamedly while he continued to update his own songwriting to match the times (Listen to "Out of Control" on *Nuclear Furniture*). Much as they try to sound contemporary, the current line-up of the Starship has much more in common with late '70s commercial AOR bands like REO Speedwagon, Journey, and Toto than Wham! and Depeche Mode. Their sound has the trappings of modernity —the synthesizer pulse and angular guitar attack—while their songs have all the classic elements of hit singles. This is straightforward, pleasing pop that isn't going to change the face of music but will certainly make a lot of people smile—and isn't that what it's all about in the long run? To quote Nick Lowe, this is "pure pop for now people."

The Starship has always functioned as a somewhat cumbersome democracy, but there was an encouraging unanimity in the group when it came time to pick the team that would produce the new album: Austrian-born Peter Wolf, who wrote the Starship mega-hit "No Way Out" and plays a mean keyboard; and British engineer Jeremy Smith. With veteran hit writer/producer Dennis Lambert (who acted as executive producer for this Starship

project), they helped turn around the career of The Commodores last year, and from all indications, they've successfully worked their magic on the Starship, too, pushing the group to produce its slickest and perhaps most commercially viable album to date. These sorts of turnarounds don't happen without some sacrifices, but to their credit, the players never balked at the sometimes radical suggestions made by their top-notch production team.

Basically, the producers—Wolf in particular—forced the Starship to rethink their approach to making records. In the past, Starship albums were always dominated by the songwriting of the individual group members, with Kantner, bassist Pete Sears, Slick and guitarist Craig Chaquico usually landing a couple of tunes each on a record, just like clockwork. This time, however, Wolf, Smith and Lambert actively sought material by outside writers.

"They didn't have any trouble at all with the suggestion that we bring in some outside material," says Wolf in his accented English. "We all had a long talk and I told them, 'You have nothing to prove. Just make sure that the songs you record are completely valid for the record. Put the best material you can find on the record.' People don't really care *who* wrote a song. They just want to hear good songs, and not one hit song with a lot of filler.

"I write a lot of songs, too, and I know that not every one of them is great. If you write five a year, not all of them are going to be fantastic. Even someone like Lionel Richie, who is about as good as you get, had a couple of dogs on his last album. So we really tried to look at what would be best for the group as a whole, without getting into the politics of who wrote what. Paul's philosophy was that if you have ten songs on an album and five writers in the band, each got two songs on the record. That's stupid. I don't think it's right because if one writer has three great songs and another has none really, why should there be two bad tunes on the album? So we just looked for the best we could find and, instead of recording 20 tunes and then selecting nine or ten, we really worked hard on songs we thought had a real chance to be on the record."

According to Wolf, part of the job he, Smith and Lambert faced on the project was "to make the band realize what kind of music they really liked, and what they were capable of doing—what they could do if they got out of their regular approach." Adds Smith, "It was a question of opening up horizons. A band that's been together a long time tends to work in a set way. I think it's very dangerous to stay in one place with blinders on, whether you're an artist, an engineer or a producer."

The ways in which the producers affected the group's approach went far beyond the simple selection of material, however. Every facet of the group's sound was examined, and changes were made in almost every area. Working primarily at The Plant in Sausalito (with additional work at the Sound Castle in Los Angeles and Fantasy Studios in Berkeley), Smith and Wolf first went to work getting the drum sound they were looking for. Over the course of four days they decided that drummer Don Baldwin's stage set wasn't right for the record, so they had Pearl send components to construct a new studio set. And in addition to using only conventional drums, this time out some tracks called for Baldwin to trigger electronic percussion.

Pete Sears had, for several years, been both the primary bassist and keyboardist for the group. But Wolf is a highly accomplished keyboardist himself, so he took on that role in the recording of the album, and Sears played bass. Jeremy Smith even got Sears to use a new Yamaha broad bass, "which sounds very different, very new," according to Smith. "Pete took to it immediately and I think you can really hear the difference on the record."

On the keyboard front, Wolf brought in the largest complement of synths the Starship has ever used on a record, including a Synclavier II, a rack of Yamaha DX7s, a QX1, the new KX88, a Jupiter 8, Minimoog, Prophet and Chroma. "We did most of it right in the control room," Wolf says. "We just took the furniture out and put the keyboards in. It's much easier to do that way, because Jeremy and I can communicate a lot better if we're both right in there."

Guitarist Craig Chaquico had his typically huge arsenal of 32 axes in the studio, "but we tried to use the guitar in a different sort of way," Wolf explains. "Instead of the old Starship approach where you have long parts with a similar guitar sound, we tried to vary things more and come up with some different types of sounds for Craig."

For his part, Chaquico was "worried that somebody so into keyboards was producing the album and that it would go in a totally keyboard vein," the guitarist says. "But I was really surprised with Peter because he left a lot of room for guitars. If we'd done one of these songs a couple of years ago, there might've been one loud guitar part through the whole tune. Now the guitar is featured more in a few specific places, rather than being something that happens in the whole song, which can get boring. Now there's a lot more dynamics in the arrangements and more of a layered approach, instead of everything constantly playing and getting real mushy."

Chaquico also says that working closely with Wolf changed his approach to soloing for this record. "Peter has given me interesting alternatives for my solos," he says, "different places to start a solo from, different notes, even, that I probably would not have thought of. I'd never had quite that kind of input before, and it helped me a lot."

The team of Wolf, Smith and Lambert is relatively new, blossoming really just in the past year. In addition to The Commodores' last album (which yielded their biggest hit in years, "Nightshift"), Jeremy and Dennis worked with Barbra Streisand and on the new Maurice White album, and more projects are in the works. Lambert, of course, has had a long, illustrious career as both a writer and producer. His role on the Starship record was primarily advisory, helping suggest songs and acting as a sounding board for Smith and Wolf. In addition, he had considerable input on the vocals, "helping to make sure that we got the ultimate performances from Grace and Mickey," Wolf says. Much less has been written about the careers of Smith and Wolf, a pair of studio pros whose careers are clearly in their ascendancy.

A native of Vienna, Austria, Wolf has something of a child prodigy, beginning his piano lessons at the age of 5. He played his first Beethoven concerto at 9 and was widely regarded as a top prospect in the world of classical music. But in the early '60s, while still a pre-teen, his interest turned to jazz, much to the disappointment of his parents. By the time he was 16, he had won a top prize at a European jazz festival and toured as a member of the Art Farmer Quartet.

"I remember one day I finally told my father that I wasn't going to go into the family business, that I wanted to make my living playing music. He kicked me out of the house," Wolf remembers with a chuckle. He made his living playing jazz in bars and small nightclubs, a baptism by fire if there ever was one.

"I have a lot of friends who had no pressure on them to make a living at music and so they didn't have the drive to stick with it," he says. "All of a sudden, when you have to play for a living, you really start *playing*, because if you're not good, you're going to lose that gig fast."

The acoustic piano remains his first love among keyboards, not surprising given his grounding in the bebop and modern stylings of influences like Bill Evans, McCoy Tyner, Herbie Hancock and Weather Report kingpin Josef Zawinul. Wolf and fellow Austrian Zawinul are longtime friends ("He's been like a father figure to me," Wolf says admiringly), and Wolf still puts his mentor above all other active players. "I know what I can do, what Herbie can do, what others

can do, and nobody can touch him," Wolf says. "The guy is a genius. It's outrageous how good he is!"

At 22, Wolf took the big step of moving to America. "I'd gone as far as I was going to go in Europe and I loved the challenge of trying to make it in a new place," he says. "I sold everything I owned and moved to L.A.," where the young keyboard wizard found a spot in the latter day Mothers. Following that stint, he became an in-demand session player, frequently using his strong background in music theory and composition to help artists with arrangements. From that point, people started hiring him to play keyboards and do arrangements in what was basically an associate producer's role. It was in that capacity that he first worked with Jeremy Smith, under the guiding hand of Dennis Lambert, on The Commodores' album for Motown. (Wolf also put out an album with his wife Ina for a Motown rock subsidiary, Morocco Records.)

Wolf's first connection with the Starship organization came when he worked hand in hand with Grace Slick on her last solo album, *Software*. Grace brought him to the attention of her Starship bandmates, and then a song he and his wife wrote, "No Way Out," became the biggest single from *Nuclear Furniture*. It was not a surprise, then, when the group turned to Wolf to help produce *Knee Deep in the Hoopla*. In addition to co-producing, arranging and playing keyboards on the album, he had a hand in writing a pair of songs, "Sara" (written with his wife), and the record's first single, "We Built This City on Rock and Roll," co-written with Lambert and Elton John's lyricist, Bernie Taupin.

Of his partner Jeremy Smith, Wolf says, "He has a fabulous sense of what's right and what's wrong in the studio. He's the ultimate mirror or sounding board, and everyone always feels completely at ease with him. That's a great quality in an engineer."

Smith, too, was a musician as a youth, playing drums in several now forgotten British rock bands (one did put out an album produced by Vanda & Young, who went on to produce AC/DC and others). In the process of recording, he became intrigued by the world of studios, and with engineering in particular. "I thought Elton John was making the best-sounding records at that time [early '70s] so I really studied those records, which were made at Trident [in London]. I decided that I wanted to work in *that* studio with *those* engineers. Six months later I landed a job there, making tea under Robin Jeffrey and Ken Scott, and learning how to work in the studio primarily by watching these great engineers and assisting them however I could. It was a fantastic learning time for me because there were so many great records being made at the studio then. Bowie was doing *Ziggy Stardust*. Richard Perry was in with Harry Nilsson. Elton John made *Madman Across the Water* and *Goodbye Yellow Brick Road*. So apart from working with fantastic engineers, I got to work with some of the greatest artists of our time."

Smith came to America in 1978 to co-produce the band Nova. He spent six months living in Colorado working with the group and then moved to Los Angeles, which has been his home base ever since. Among his more noteworthy credits was engineering Phil Collins' Oscar-nominated tune, "Against All Odds."

It is somehow fitting that at this pivitol juncture in the Starship's career they would bring in two relative newcomers to produce their album. The band desperately needed some fresh input, and in Smith and Wolf they've found a team that is bubbling with energy and new ideas. "The Starship is a great band," Wolf says. "They're extremely professional and they're all great players. All Jeremy and I wanted to do was bring out their strengths and I think we did that. This record is going to surprise people, I think, and that's good." ■

VOICES

Todd Rundgren Breaks New Ground Again

by Iain Blair

For some 17 years, Todd Rundgren has been busy singing, writing, playing, engineering, producing and performing—and generally to the beat of his own drummer. From the early days with his first band, The Nazz, and their Top 40 hits "I Saw the Light" and "Hello, It's Me," through to his most recent projects with Utopia and his solo career, Rundgren has always pursued his own eclectic, innovative and often eccentric musical vision.

The latest in this long list of imaginatively titled (his last solo effort was *The Ever Popular Tortured Artist Effect*) do-it-yourself albums is Rundgren's appropriately named *A Cappella*. This new album is *exactly* that—ten tracks featuring nothing but Rundgren's vocal chords, either performing "straight" or creating instrumental sounds using voice activated rhythm tracks.

Mix caught up with Rundgren at Warner Bros. (to whom he's just signed after a long stint with the now-defunct Bearsville Records), where he was relaxing prior to several Los Angeles-area gigs on his current tour with Utopia. Despite a slight throat infection, he exercized his vocal chords a little more as he explained the history of *A Cappella.*

How did the idea of recording an all-vocal album evolve?
It was something I'd been thinking about for quite awhile—the idea of using the human voice as the only instruments on a record, and as I gradually wrote material for it, it began to take shape.

How did you set about writing material for the project?
It was a mixture of songs that were written specifically for a cappella and this album, and other tracks that I could have recorded more traditionally using instruments but which lent themselves to this sort of approach.

Did you have all the material organized before you started to record?
It kind of evolves as you go along. When I go in the studios to make a record, I poise myself to do it—meaning I don't necessarily write out all the material first and have every single part and line all ready in place. It's more that I gradually refine the overall concept of the album in my head to the extent that when I do actually start physically recording it, I'm completely unblocked. So I'm not left wondering whether I should be doing this particular thing or that. I know pretty much what I'm aiming for and the sort of directions I should be going in.

It sounds almost instinctive, intuitive.
You're right, it is. It even gets to the point where I just become continuously musical during the entire project. I even dream songs, and have to wake myself up and make sure that I remember those ideas and inspirations until it's time to go in and record. This happens all the time to me—it's the way I make all my records, so in that sense, it wasn't a particularly special method of working. I always believe in totally conceptualizing the overall ideas first so that by the time I'm in the studio, the ideas and songs are never a problem.

When did you record it?
Most of it was done in the early part of last year, at my own home studio in Woodstock.

Did it take longer to record than a more conventional album?
Not really. I finished most of it within a five to six week period, and my albums

> "On the one hand, hardly anyone's ever attempted to do this sort of thing before, but on the other I don't know that it really distinguishes itself beyond the fact that it *is* just working primarily with the voice and all its possibilities."

traditionally get made pretty fast—faster than that, in fact.

How did you go about building up the tracks?
Some songs, like "Honest Work," were pure a cappella, so I'd just go in and sing the various parts and that was that. But on other tracks, I'd start by putting down different types of percussive, rhythmic sounds. And all those voice-activated rhythm tracks were done on an Emulator which I used to sample a variety of sounds; that was all I used. Everything else was done on standard studio equipment, believe it or not.

You didn't use your Fairlight?
No, for the very simple reason that I got it just after I finished recording this album! It's great, although I actually use it as more of a compositional tool than anything else. Anyhow, after I'd sampled the vocal percussive sounds on the Emulator, I'd play the pattern and just have it repeat on a loop and start building up the track from there. That was the basis for all the tracks featuring a percussive background. but the thing was, there was no central synching—no way to sync any of this together. So I'd start with a basic rhythm track, but after that, everything had to be played by hand—it wouldn't be played by the sequencer. So for instance, I might get a bass drum/snare kind of pattern locked down, and then whatever other percussion I wanted on top of that would have to be played manually, or by mouth, as the case might be.

Wasn't this very time-consuming?
Well, that was the way I was used to doing it. I've never exactly been Mr. MIDI, so to speak. And before I acquired my Fairlight system, I simply didn't have that facility to get down and edit note by note. So in terms of what I was used to, the methods of working on *A Cappella* were no more tedious than those I'd used on all my other projects.

Apart from the tracks that were built-up on the Emulator, were there any where you just sang the rhythm tracks?
There were a few, yes. Usually I'd have a rhythm reference track to work off, because it would obviously be impossible to just stand in front of the mike and lay down a snare beat or cymbal sound over the course of four or five minutes. For instance, the very first track on the album, called "Blue Orpheus," has no high-hat on it at all. It's actually me just blowing air through my teeth imitating a high-hat sound, and that was essentially a one-take thing. In fact, on that particular cut, the only thing I had down on tape to bounce off was a couple of bass drum patterns. Those were actually sampled sounds, but the high-hat wasn't, so it was an interesting mixture. There were also a couple of tracks where I'd do a few quasi-cymbal things, such as crashes, and just record them straight without sampling.

So there was really no consistent approach to all the tracks?
Exactly. I just tried different things and kept the things that worked the best. Overall, it's not easy to talk about any "one method," as it wasn't recorded all one way. There was probably a different approach taken on every song to a certain extent. Some were fairly simple and straightforward—I'd play the piano part, sing over it, and that would be it. Other tracks were much more complicated in terms of the way they were constructed, and then of course there'd be all the stages in between.

After putting down those basic rhythm tracks, how did you proceed?
In most cases, it was just a matter of getting all the vocal parts right after I was happy with those percussive tracks and a bass line. Occasionally, there might be something where I'd use a chordal structure with the Emulator, but the majority of all the tracks are purely singing.

Did it take you a long time to figure out all those separate vocal parts?
Not really, because I'm so used to doing all that anyway. It's really just the same as doing it with regular instruments, meaning that you start by thinking up all the separate lines and parts in your head first, and then figure it all out on a keyboard or guitar or whatever you happen to be playing. So it's the same mental process for me.

Were there many variations in the number of tracks you'd record for each song?
Absolutely, it really varied. A song like "Honest Work" was just three tracks—three voices, that's it. Others were far more complex and all the tracks got used up. For instance, there's a number called "Miracle in the Bazaar" which is composed of a lot of different textures and weird sounds that had to come in and out at specific points, so that was probably the most complex to do, especially in terms of mixing. The thing is, if you're using a basic set-up of rhythm instruments, you just set your levels and leave them—you don't mess with it throughout the course of a mix. But a track like "Miracle in the Bazaar" took a lot of messing around, splicing various bits of tape, and faders going in and out. That got pretty complicated.

Did you engineer the album yourself?
Yeah, which is the same way I do most of my records. What it means basically is just a lot of hard work—and in this case, a lot of singing as well!

What about mixing? Was that equally demanding?
Not really. That was basically the easiest stage of the whole project, and it was also probably one of the easiest albums I've ever mixed, except for those few cuts like "Miracle in the Bazaar" where the textures get pretty dense. I've always been a voice specialist in terms of production, so recording and mixing *A Cappella* was pretty natural for me in that respect. So I don't regard having done it as a "feat" in any way. The "feat" anytime you make a record, at least for me, is coming up with good material. That's the truly important part, having something worthwhile to convey in the first place.

Do you view the album as very different from your previous albums, if not in your working methods, at least in its

intention and direction?
I don't know, to be honest. I suppose on the one hand hardly anyone's ever attempted to do this sort of thing before, but then on the other I don't know that it really distinguishes itself beyond the fact that it *is* just working primarily with the voice and all its possibilities. I think it comes back to what I mentioned before—good songs. That's still the bottom line for me. The material *has* to be able to stand on its own, regardless of what you eventually decide to use for building up the tracks and constructing layers of sound. So from that standpoint, my criteria and the working approach I take on a project like this would always be the same. I have to start with a subject that I feel inspired by, that I have something to say about, and then blend that with a general musical approach and concept that pleases my ears.

Are you pleased with the results?
Yeah, I'm pretty pleased. It turned out the way I wanted and hoped it would, and that's probably partly colored by the fact that I was slightly displeased with my last album.

Why was that?
Well, I thought that as a solo album, *The Ever Popular Tortured Artist Effect* would be an easier album for the record company to accept, but it didn't really hold up for me—and I didn't work as hard on the basic material for that LP as I did for *A Cappella.*

But this album isn't exactly commercial.
[Laughs] It could be said it's not, but then that's only according to what the formula is. There's always the chance and possibility that by doing something a bit out of the ordinary, you'll define your own little niche. It's never been part of my modus operandi to really consider the commercial aspects of my writing and recording too much—I do it all for completely different reasons that are totally selfish.

Would you ever take this album out on the road?
Oh yeah, it'd be a lot of fun and relatively easy to do—I'd just need a lot of singers, probably about eight or nine, and perhaps some sort of sampling device. But I wouldn't want to try and just perfectly recreate and imitate the album live. I mean, I *could* go out and do a solo show complete with tapes, etc., but it'd just be the same old thing. I think it would be exciting to tour with eight singers live on stage—that'd be more powerful and effective than a thousand heavy metal guitars. So, it is a possibility, but I think I'd like to see what happens with the album first, and if there's any real interest at all, then I'd consider expanding the idea into more of that sort of vocal extravaganza.

You're also currently on tour with Utopia. What's happening in that area?
After this tour ends, we're all going off in different directions to work on our own solo things for awhile.

Does that mean the end of the group?
No, it's more a case of "suspended animation." [Laughs] Quite frankly, it's simply too much trouble to break up—it'd be an enormous headache, dividing up all that community property. I think we'll just wait till someone wants to hear us.

You helped pioneer the do-it-yourself approach to recording, but you also seem to have acquired a reputation over the years as something of a high-tech stylist.
Yeah, and I'm not quite sure why! [Laughs] It's certainly not because of any predilection for technology on my part, because if it was, I'd be Mr. Digital! Like I said, the whole of *A Cappella* was recorded using totally standard studio equipment, except for the Emulator, and a lot of people would consider that to be a standard thing now. It was done like that partly because I simply didn't have equipment like the Fairlight system at the time. But even in terms of the very latest recording techniques, I have yet to record a digital album, which often surprises people.

Why haven't you?
Simply because to me, it just seems like more trouble than it's worth, and you don't gain that much. Of course at some point, it may well become the studio standard, and then I'll have no choice and that's the way I'll do it. But I *don't* pursue technology for its own sake. On the other hand, I definitely don't have any fear of technology—that's probably the distinction. So if I choose not to use the very latest box of tricks or whatever, it's usually because it's just a hassle—or a lack of money! If I can't afford it, I don't use it.

So you don't leap on every new gizmo that appears on the market?
Not any more. I certainly used to. For instance, I got very heavily involved in synthesizers fairly early on, and really jumped on all that. But things don't change so fast now, and I'm much more wary. It all goes back to the same thing—that you can very easily get distracted by all the toys and the amazing tricks they can do for you, and completely forget about *writing* the songs. That's one of the drawbacks to all the modern dance music for me—the essence is essentially all those toys and boxes clicking away. ■

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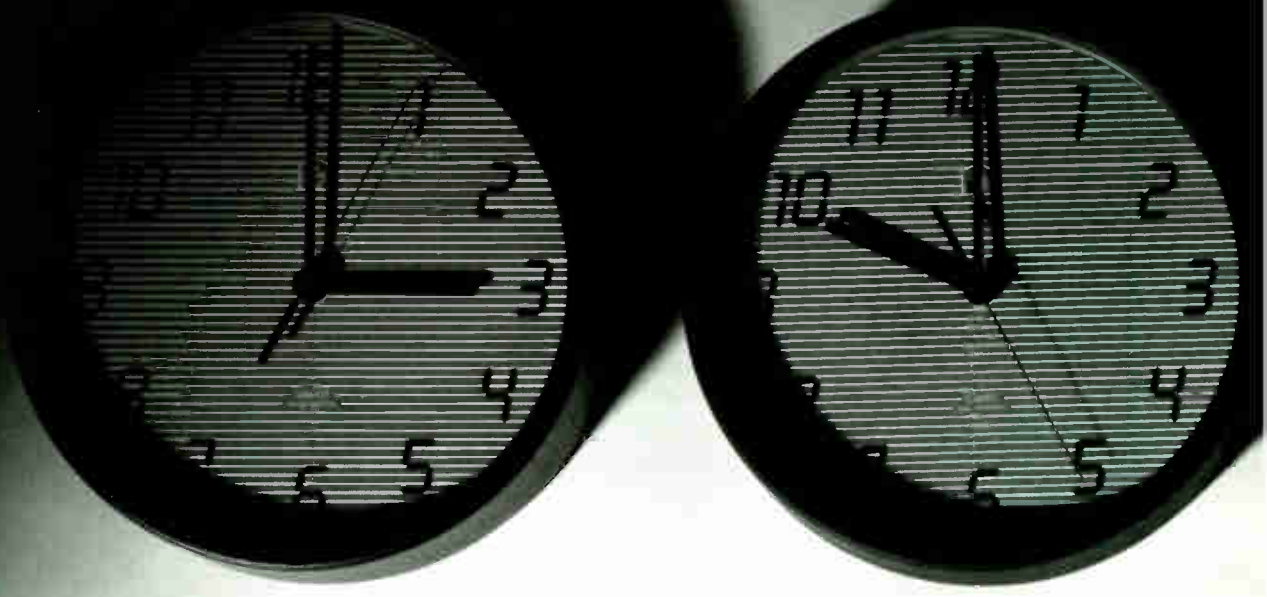

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The ability to synchronise video and audio recorders is an increasingly vital facility required in studios all over the world. As much as three-quarters of today's audio recordings involve a visual aspect, and recording is more international than ever before. Basic tracks in New York, string and brass overdubs in London, dubbing in Los Angeles ... modern international productions need an international standard for machine synchronisation, and there's really only one: Q-Lock by Audio Kinetics.

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VIDEO NEWS

by Elizabeth Rollins

PEPSI: SERIOUS ABOUT POP

Pepsi is serious about this pop business...The bottling company is sponsoring ***Pepsi's Walk Through Rock,*** a multi-media exhibition that began last month and is scheduled to hit 24 cities this year. Eighteen videos are supposed to transport viewers through the rock era with a combination of historical footage and recent pop clips. The first 11 videos in the series chronicle the '50s through the '70s ("Elvis and Rockabilly," "Surf Music," "The Beatles," "The British Invasion" are some of the titles). The next six videos cover the music video boom of the last five years with the big-six record company distributors showing their own material in six separate booths. Motown shows the 18th video, which combines historical and recent footage.

Jane Altschuler and ***Richard DeLighter*** of the newly-formed ***Real Productions*** in NYC produced the 18 segments. The team earned their rock video regalia by producing the PBS program, "The Everly Brothers: A Rock and Roll Odyssey," and the Cinemax program, "Album Flash presents The Everly Brothers." Post-production was done at Panevideo, NYC; audio at New York Sound; Paintbox at Broadway Video; opening and closing credit graphics were done at Xenon, Los Angeles.

PRODUCER'S RESOURCES:

New reference book for producers: The first edition of ***The Production Company/California*** is available through Production Books, Inc. in Hollywood for $17.95. This sourcebook lists production companies (and describes their specialization, if any), union association affiliations, directors, and many other aspects of production.

What producer has not had to wrangle with spending hours tracking down that one piece of missing footage, or just the right still frame—only to find one-time usage fees are too high anyway? A Washington D.C.-based company called ***Picture Management Systems*** (PMS) is trying to combine centralized library resources with satellite technology to help eliminate the producer's wild goose chase. ***The Photo Store*** is the name of the 25,000 shot, general-interest stock photo library the company has edited on video specifically for use in the television industry. On August 20th, PMS sent out a sample feed via satellite to cable and broadcast stations, ad agencies and independent producers. The idea was to let potential clients get a first-hand look at the caliber and variety of material, so they would consider the advantages of buying an annual unlimited editorial or commercial usage contract. Subject matter ranges from shots characterizing computers, industry, medicine, and weather, to head shots of 80 percent of the members of the U.S. Congress. Abstracts for backgrounds are also available. Will subscribers be getting the entire library itself via satellite in the future? Photo Store president Michael Pettypool says until the reliability and quality control of a satellite feed can be proven, his company will stick to the more old-fashion method of mailing out whatever video format subscribers request (one-inch, quad, ¾-inch and videodisc).

...Some might argue that satellites have evolved to that point already. Next month when the Space Shuttle blasts off from Kennedy Space Center, it'll be carrying the first Ku-band high power satellite for RCA. These two-ton commercial spacecraft operate at a higher frequency than the C-band predecessor, with 16 channels at 45 watts in the 14/12 GHz band. ***RCA's Astro-Electronics Division*** designed the Series 4000 Ku-band, and they claim it's the most powerful domestic satellite in use. So what does that mean to tube-bound earthlings? A stronger downlink signal lets smaller earth station antennae pick up a better picture. Also, since Ku-band frequencies aren't shared with terrestrial microwave systems, they're subject to less interference from other transmitters in major urban centers.

FACILITIES

It's not just for Carson anymore... Five weekly TV series have committed to production in stereo at ***The Post Group's*** two new 24-track audio sweetening rooms. On August 1st, the ever-popular Hollywood video post-production facility opened Post Group Sound in a separate building next door. ***Jeff Cooper Architects*** of Calabasas, California designed the acoustic diffusion system for both control rooms. Studio A has a modified Neve 8128 48-track console and B is equipped with a Neotek Elite 28x26 stereo console. One of the first Otari center track time code 2-track MTR-20s, along with a couple of MTR-90 24-tracks are controlled by a CMX unit. A snappy outboard list includes Adams-Smith synchronizers, Lexicon Super Prime and 224X digital processors, Quantec QSR room simulators, Dolby and dbx processing—plus, UREI 813 studio monitors and Sony BVH-2000 and BVU-800 VTRs....Meanwhile, elsewhere in Hollywood...for 21 years ***Skyline, Inc.*** has been renting sound recording and radio communications equipment. Through an agreement with M. Leach engineers, Skyline recently began to offer ¾-inch video editing (using Sony 5800s and a 3M special effects generator/switcher), an 80x50 foot soundstage with four RCA TK-710 cameras, portable camera and VTR packages and limited tape duplication facilities...***Rock Solid Productions*** in Burbank has moved to a bigger facility in the Burbank Production Plaza, 801 South Maine Street. Upgrades include: two Betacam edit bays, an off-line room, a 42' x 82' soundstage with dressing rooms, a scene shop, insert stage, and satellite transmission capabilities...***Solid Sound, Inc.*** in Ann Arbor, Michigan, just added audio-for-video capability to their services. New equipment includes: Adams-Smith synchronizers and time code gear, Sony ¾-inch video, NEC Monitors, and an Otari tape recorder...After having put a chunk of money into renovating their facility during the past year, ***Atlantic Video*** in Alexandria, VA (just across the Potomac from Washington, D.C.) has signed a 1.2 million dollar production deal with cable start-up, ***The Discovery Channel.*** Discovery, which went on line June 17, is free to cable subs and offers science, technology, nature, history and travel programming...Chicago animation house ***Test Spot, Inc.*** got the nod from producer ***Jon Small*** and ***Picture Vision, Inc.*** to do about 20 minutes of animation in Billy Joel's one-hour Greatest Hits home video release. Two-time Clio-winner ***Frank Langguth,*** owner of Test Spot, directed the animated sequences. ■

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The MIX BOOKSHELF Catalog is a selection of the best audio/video/music books and tape courses currently available from more than 40 leading industry publishers.

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203) **VIDEO USER'S HANDBOOK, 2ND ED., Peter Utz** A complete hands-on manual for all levels of video production for more effective use of equipment, simple problem solving and complex troubleshooting. Includes descriptions and instructions for studio video gear as well as information on audio, lighting, editing, and graphics. 500 pp.(P) $19.95

301) **THIS BUSINESS OF MUSIC (REVISED AND ENLARGED), Shemel & Krasilovsky** This highly comprehensive 1985 reference provides detailed explanations of legal, practical, and procedural problems of our industry. Part 1 — Recording companies and artists; Part 2 —Music publishers and writers; Part 3 — General music industry aspects. Includes over 200 pages of contracts, forms, and licenses. 646 pp.(H) $19.95

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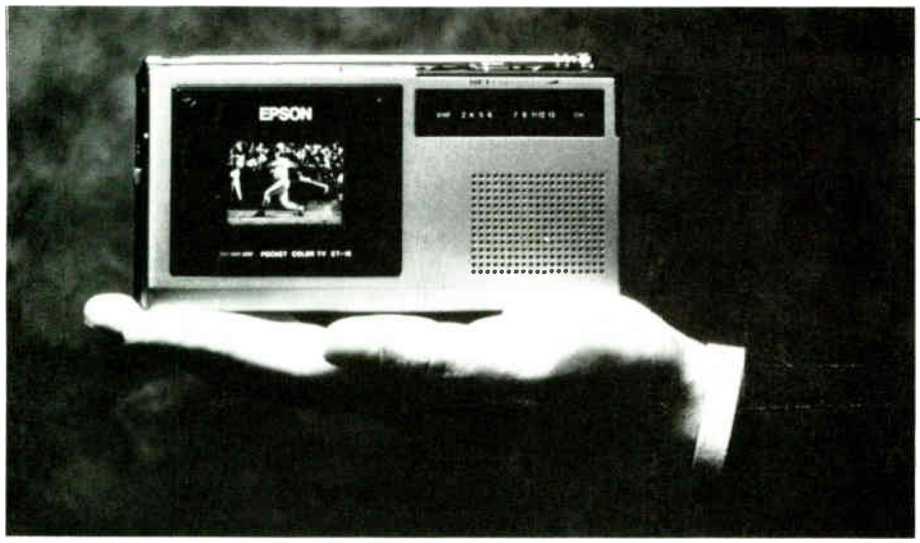

The Epson Elf, the world's first flat screen LCD television, weighs in at just over one pound and has a two-inch diagonal screen.

TECHNOLOGY TRANSFER:

FROM THE STUDIO TO THE LIVING ROOM

by Lou CasaBianca

As we move into the last half of the '80s, the number of technological advances moving from the research lab to the studio and into the home continues to increase. The incorporation of microprocessors into an ever-expanding array of devices has put computer power at the touch of a finger. The following is a review of some of the latest "next generation" of mind stretching enhancements which have matured in the studio and have or will soon be reaching the living room.

TELEVISION RECEIVERS

The most pervasive improvement in television is digital signal processing circuits. The same concepts used in digital video effects, such as ADO (Ampex Digital Optics), have reached the consumer world in the form of a second or third image inset in a larger picture. Sets coming soon will be built with enough random access memory to store an entire frame of video, which will then be able to be processed. Toshiba has created a ghost-canceling circuit. Sony has developed scan doubling by displaying both fields in a frame, the viewable 484 lines of the nominal 525, providing a much sharper image. Sony's 30-inch and Mitsubishi's 35-inch jumbo CRTs for projection TV have benefited from these developments.

VIDEO STILL CAMERAS

The newest video application is the video still camera. Sony, Canon and many other major manufacturers have developed cameras built around a solid state image sensor called a charge-coupled device (CCD) which records video frames on a 1.85-inch floppy disk with a standard 24 full frames or 48 fields per disk. Images may be viewed on a TV screen with a disk reader or on paper with an inkjet or thermal transfer video printer. Printers range in price from a few hundred for black and white (Mitsubishi) to nearly $1,000 for simpler color units (Toshiba). Output images can be used for storyboarding or video graphic images.

Currently the best CCDs can deliver a resolution of 500 x 582 pixels. Inevitably it will equal the 1,000 x 1,000 or even 1,500 x 2,000 pixels of 35mm film. A CCD has a circuit density that is the equivalent of a 256-kilobit dynamic RAM chip and is designed to handle a 50-decibel dynamic range. A color TV picture requires about 250,000 picture elements, or pixels (500 lines of 500 pixels), with a resolution of 8 bits each.

FLAT SCREENS

Seiko, Epson, Casio and others have developed liquid crystal display, small, flat-screen television sets. Despite its greater power requirements, the CRT will probably continue to dominate for the next five years because of its lower costs and higher picture quality. Sony uses a sideways CRT in its Watchman sets in black and white, soon to be in color. Matsushita (Panasonic) has demonstrated a flat CRT array with a matrix of miniature electron guns and deflection assemblies. The weak link in the resolution chain, at this point anyway, is the VCR. In fact, high quality television sets can handle images that are of higher quality than can now be delivered by most VCRs.

VCRs

Outside of color television, by far the most successful application of electronic technology for the consumer market has been the video cassette recorder. The first to succeed was Sony's Beta format. Japan Victor's VHS (Video Home System) has been successful in becoming the dominant of the two surviving home video formats. Recording time was the initial point of differentiation, and then stereo became a factor. First, stereo tracks were added in conventional tracks along with the edge of the tape, and then in high-quality frequency modulated (FM) form in the video track area.

The ½-inch VCR will probably not be improved for consumer use. Betacam and VHS M-format are not compatible and are economically way out of reach for the consumer. These formats achieve higher quality results by speeding through a typical 120-minute tape in 20-minutes, with recorders running about $10,000.

8mm VIDEO

It's possible that 8mm will ultimately provide a better image than ½-inch, even though the cassette is about the size of a typical audio cassette. Sony has pushed ahead with 8mm as a possible replacement for its lagging Beta format. Mounted in the head drum with the record/playback heads, Sony's 8mm recorder has a flying erase head which will perform better as an editing machine than the fixed head Beta or VHS VCRs.

The new 8mm recorders will use digital stereo and provide six hours of digital sound on a one-hour tape. The additional time may be used for editing or cueing purposes. Picture quality of the 8mm format is now comparable to VHS and Beta. Kodak and Polaroid were the first to market 8mm in this country, but they'll be followed by Sony and others this year.

COMPACT DISC

When tuner and amplifier distortion figures dropped below one percent, and after the Quad debacle of the 1970s, consumer audio seemed to have reached its final qualitative evolutionary step. The expansion into cassettes, and now Compact Discs, has created true alternatives to the long-playing record. New uses for the CD include up to 1,500 frames of imagery or text to accompany the audio. A lower quality variation in the encoding format will extend playback time to as much as 32 hours.

The next big step in audio from the studio to the living room will be in digital recording. Digital sound adapters for VCRs have been used for a few years. There appear to be two formats on the horizon, one using rotary heads like a VCR, and the other using fixed recording and playback heads. The rotary head version will probably be 8mm video with additional electronics. Industrial optical recorders made by Matsushita and Nakamichi can record only once and cannot be erased. Consumer read-write optical disks are still a number of years off.

SEMICONDUCTORS

The big boom in chips has been in the 256K dynamic random access memories (DRAMs). Over 90 percent of the world market is supplied by Japanese companies. One megabit RAMs are promised by the end of this year. A megabit DRAM will pack 2.2 million devices on a 60-mm^2 surface. Static RAMs (SRAMs) do not require the constant replenishing required in dynamic RAMs and are less expensive and easier to tie into other circuitry. Memory designers have innovated new manufacturing techniques in electronically erasable, programmable, read-only memories (EEPROMs). Called a flash EEPROM, its bits can be erased simultaneously in about a tenth of a second, compared to about 15 minutes. The price on 256K EEPROMs is expected to drop from tens of dollars to the $2 to $3 range. The development of electron-cyclotron resonance (ECR) plasma etching in the production of chips allows for etching to proceed at lower levels of energy causing less damage to the surface of the wafer. These advanced production techniques will enhance the production of application-specific integrated circuits (ASICs).

OPTICAL MEMORIES

Researchers have spent years attempting to develop a semiconductor-based laser to both read and write on a videodisk. A read-write optical disk was announced at the National Computer Conference this past summer. Expected to be marketed within the next two years, the demo showed a 3.5-inch optical disk drive built into an IBM PC.

The floppy seems to be going in two different directions. If IBM adopts the 3.5-inch microfloppy, it will probably become the interim standard. Several companies are working on a 5 megabyte high-density version. The near term economical configurations will probably be 60-MB (5.25-inch half high) and 20-MB (3.5-inch) drives.

The competition for the legendary Fifth Generation of computers is built around the continuing quest for speed, capacity and artificial intelligence. U.S. researchers have standardized on LISP, a language that grew out of time-sharing systems developed at MIT. LISP is a symbol processing language providing great flexibility in defining functions and program structure. The Japanese have based their research around PROLOG, a language widely used in Europe, which is a more formal language based on logical programming.

In next month's "MVP" we'll review the impact of the new technology in the area of computer graphics. ■

—FROM PAGE 92, DIAGNOSTIC SYSTEM
ient to perform such a task than to have it scheduled for you in the middle of an important session by an ailing piece of gear. Still, the time and manpower needed to properly measure and analyze all of the critical specifications of a recording console on a regular basis is well above the levels tolerable to most studio managers and their clients.

THE COMPUTER CONNECTION

Contrary to their apparent ability to hold a conversation with the people operating them, computers do not have a mind of their own—they must be told what to do by a computer program whose architect is a human programmer. While the field of artificial intelligence (AI) has made tremendous gains in the past few years, the computer's ability to make independent decisions is still in its embryonic stage. The computer is ultimately limited by its ability to store information—a storage capacity which is a tiny fraction of that of the human brain—as well as the aptitude of the programmer in anticipating human response. Where computers excel is in their ability to perform split-second mathematical computations with absolute accuracy, and in their ability to perform the same task over and over again without complaining. (This explains the popularity of the pocket calculator and the automated factory.)

Both of these inherent strengths are utilized to their fullest advantage by Village Recorder's computerized diagnostic system. According to Ken Klinger, the studio's director of computer operations, the idea of a computer-based diagnostic system had its beginnings on the exhibition floor of an AES Convention:

"Some years ago I was at an AES show, and the fellow who made the Sound Technology 1510A [a microprocessor-based multiple function test device] was there and I asked him how it worked. He told me that there was a computer chip inside that controls its functions. I responded that if there were a computer chip inside, it would probably be interesting and useful if one could connect a computer up to this device and get its output, and if possible, control the unit. His eyes immediately lit up and he went to work to add what is called a General Purpose Interface Bus [GPIB, also known as the Hewlett-Packard Interface Bus or the IEE-488]."

It is that specialized data bus, based on an internationally standardized protocol, which makes computerized diagnosis and analysis feasible. After acquiring a Sound Technology unit and discovering its extensive diagnostic capabilities, Klinger went to work on writing a program which would allow those capabilities to be placed completely under computer control. With the problem of interfacing a computer with the microprocessor inside the Sound Technology unit solved by the provision of the IEE-488 data bus, another major obstacle confronting Klinger was how to allow the unit access to multiple channels within a console, a tape deck, or any audio device for that matter.

For this purpose, a custom relay switching network box was built to Klinger's specifications (he had previously been in charge of maintenance at The Village Recorder). The seemingly antiquated mechanical relays were chosen by Klinger for basic switching functions over electronic switching devices which possibly could introduce distortion into the signal path.

The final challenge faced by Klinger was finding a computer to run the program and to decide what computer language to write it in. The computer eventually chosen is the *de facto* standard of the industry for business applications—the IBM-PC (and its work-alike clones)—equipped with an IEE-488 interface card. (Even though the program was written on the IBM-XT, in the studio, it will run on a PC-compatible Compaq portable with dual floppy disk drives. In fact, the program has the ability to discern what machine its running on and make the proper adjustments).

The language selected for the program is the ever-popular BASIC, in both its compiled and interpreted forms. Compiler BASIC was chosen for those modules of the program where speed was of critical importance; interpreter BASIC was used in those modules which required the ease of error-trapping inherent in interpreter-based programming languages.

THE HUMAN CONNECTION

Hooking two machines up and allowing them to share data is an impressive accomplishment. Translating the output of a machine into a form that can be easily understood and assimilated by a human being is a much more difficult task. That is why a given computer program's "user friendliness" has become an extremely important factor to those who use computers on a regular basis. The Village Recorder's diagnostic program is a product of thoughtful human engineering, allowing the user to communicate with the computer without having to know the language of the computer. This "transparency" of function was an important design factor according to Klinger who even went to the trouble of putting messages in the program instructing the user to call him and to relay certain error codes when failures occur.

The program also contains extensive help menus that guide the user through the various functions supported by the program. Impressive screen graphics, including various charts and graphs, are utilized effectively to increase the program's transparency and to make its output more easily understood.

PROGRAM ARCHITECTURE

There are two basic modules which comprise the Village Automated Audio Test Program—the testing module and the analysis module. In the test mode, the rack containing the portable Compaq, the Sound Technology unit and the proprietary switching network are wheeled into the studio and the equipment to be tested is connected. The program diskette is then inserted into the Compaq's "A" drive and the data disk is inserted into the "B" drive.

Each individual piece of equipment has its own data disk which is specially encoded with the types of tests to be performed, the number of channels to be tested, and the tolerance levels needed to pass the tests which are acceptable for that type of equipment. The data disk is also encoded with the date and time of each test, providing an accurate long-term record of all the equipment's operational characteristics.

These standard tests can be easily altered or overridden from the main menu, allowing the operator to perform only those tests or check only those modules he or she deems necessary. The analysis module allows one to scrutinize all of the data generated by the Sound Technology unit, which includes frequency response (over 40 frequencies), noise level (at 11 frequencies), crosstalk (at seven frequencies) and second and third harmonic distortion (at seven output levels). The basic analysis mode displays all of the channels and all of the test data on strictly a pass/fail basis enabling the maintenance engineer to repair just those channels with problems. A more sophisticated analysis mode displays all of the measurements on a channel by channel basis with a full-page report and detailed graph.

THE FUTURE OF MACHINE-ASSISTED MAINTENANCE

The Village Recorder Automated Audio Test Program represents a breakthrough in recording studio-based Automated Test Equipment technology. Though not inexpensive, their system is within the price range which would be considered affordable by many recording studios. The hardware, exclusive of the Village's proprietary software, would cost in the neighborhood of $10,000. As the price of microprocessors and computer memory continues to fall, this type of ATE technology can be made available, at least on a less sophisticated level, to even the smallest studio in the relatively near future. ■

—FROM PAGE 298, FEEDBACK

engineering in which both commercial and classical recording are emphasized. Production and maintenance skills are also stressed. The student is required to write a thesis. The prerequisites to admission are a Bachelor of Music degree, an introductory course in recording, basic math, acoustics, audio electronics, orchestration, and electronic music.

The main facility is state-of-the-art 24-track, with digital and analog recorders. A major asset to students admitted into the program is the limited enrollment. There has never been more than four students per year. For further information write: McGill University, Faculty of Music, attention: Dr. Wieslaw Woszczyk, 555 Sherbrooke St. West, Montreal, Quebec, Canada H3A 1E3.

Sincerely,
Serge Perron
McGill graduate

Dear *Mix*,

Richard Dean's article in your April "International Update" column and Barry Roches' reply in your June issue both contain errors concerning the computerized switching capabilities of Solid State Logic's new SL 5000 M Series Audio Production System. For those who are still tuned in, I'd like to set the record straight.

A proprietary SSL hybrid is used to accomplish 100 percent of the switching function in the SL 5000 M Series. All switching is totally electronic. The front pan controls are physically momentary, with switch status indicated by LED-driven light pipes that are flush mounted into each button. This arrangement allows all local and central switches to be operated and read by either a human operator or a computer.

In the SL 5000 M Series, the computer that looks after the switching is called the "Instant Reset™ computer," which scans and recalls all channel pots and switches but does not automatically reset them. It is different from the DSPs "total reset" function, which resets all channel functions, but not instantaneously.

SSL's Instant Reset looks after all multi-track, audio subgroup and clean feed routing functions; it controls all source and phase selections; all insert switching; In and Out switching for all equalizers, compressor/limiters expanders and gates as well as stereo linking and keying for these; it determines which cue sends are stereo pairs, which are mono, their pre/post condition and whether they are configured for PA feeds or foldback; it includes VCA Control Group assignments, fader assignments for audio subgroups and Independent Main Outputs; Solo Isolate functions; studio and control room monitor selection; outside source selection and talkback configuration, metering characteristics; image width controls—in fact, it quite literally resets every switch in the entire system instantly.

Any of 48 complete switching setups can be called from RAM at the touch of a button. Preview and editing functions are provided, as is disk storage for complete libraries. Moreover, the system accomplishes this for any of the virtually thousands of custom configurations which may be specified with the SL 5000 M Series.

The Instant Reset function is designed to give broadcasters the flexibility they need to handle complex live program changes and drastically different format requirements with no time penalty. The Total Recall function is accomplished outside of the audio path, allowing the use of continuously variable pots rather than stepped rotary switches, whilst preserving the sonic integrity of the signal.

Solid State Logic tries very hard to offer the industry products which are both innovative and practical. We have never claimed to offer "total instant reset" of all functions, but it is clearly unfair and inaccurate to imply that the SL 5000 M Series merely mimics the six-year-old technology of the Neve 8128. We appreciate this opportunity to correct the record, and would be happy to answer any questions that your readers may have about these systems.

Sincerely,
Doug Dickey
Solid State Logic
Oxford, England

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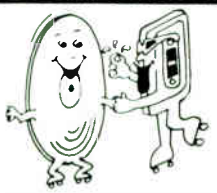

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FEEDBACK

Dear *Mix*,

What if the problems associated with digital recording (high cost, non-compatible formats, and maintenance) could all be eliminated with one new piece of equipment? What if this new marvel also allowed us to record with unlimited tracks? What if one person could easily carry this equipment around and the same piece of gear could serve as a cassette duplicator after the master tape was made?

This seemingly impossible list of things can be done with the latest technology. Here's how. According to *Billboard Magazine*, some 40 manufacturers have gotten together to adopt a standard for the digital audio cassette. By building modular multi-track recorders that use the digital audio cassette as the storage medium, manufacturers can supply the industry with recorders that are cost-effective and compatible.

First I will describe this new modular multi-track recorder and then I will explain its many capabilities. If you walked up to one of these new multi-tracks in a studio, you might mistake it for just a bank of cassette decks. A 24-track version would indeed consist of 12 2-track cassette decks. The decks might be stacked in one column of 12 or side-by-side in two columns of six. Each deck would hold one digital audio cassette as defined by the 40 manufacturers. The decks would probably be a little larger than ordinary cassette decks because these decks would contain digital circuitry for two tracks of audio and time code circuitry that would tell the deck what point on the tape to shuttle to. A small cable from each deck would go over to a modular remote control that would allow the remotes from many decks to plug together forming a master control unit. This control unit would have a master time code generator/display and conventional tape shuttle controls to command play, fast forward, etc. The control unit would also be able to generate a time code address indicating where along the tape all the decks in the system should be. The master control unit would function as the master, and all the decks would be slaves. The control unit would be capable of commanding any reasonable number of decks. When the master control unit output the same time code number over and over, the decks would know to go to this point on the cassette tape and park. If the control unit generated a progression of time code that was counting forward at play speed, the decks would know to sync to this and play. If the master code fast forwarded, the decks would know to also fast forward. The same operation would apply to fast rewind.

With each deck handling just two audio tracks in the form of a standardized digital audio cassette, the following advantages are realized:

1. The decks are small and mass-producible. Perhaps the cost might drop to $2,000 per deck. Think of it, 24-track digital for around $24,000!
2. The digital cassette tapes would all be interchangeable. All compatibility problems would dissolve. The same decks could function as real-time digital cassette duplicators for the production of end-consumer cassette copies!
3. Maintenance problems would be eliminated! If a deck goes down, pull it out of the system and replace it with another.
4. If you run out of tracks, bring in more decks or simply pull out some of the cassettes and load in fresh cassettes. A little ponging later and all is well. Think of it, with even just a few decks, it's like having unlimited track space!
5. Maybe you don't like the order the tracks appear in. Just pull the cassettes out and insert them back in the decks in the corrected order!
6. Maybe you're a small studio just starting out. Buy two decks (4-tracks) and expand as you can afford, but guess what? You are still compatible with every other digital audio cassette studio! In fact, you're going to get some of their business! You see, clients may need a big studio for doing rhythm tracks and mixing, but your 4-track will be just fine for working out many, many overdubs. When they are ready to mix, they will simply take the cassettes done in your 4-track and add them with their rhythm track cassettes. This is total compatibility such as was never achievable with analog formats!
7. The tape costs will probably be low for the modular multi-track because the studio will be using the same tape the end consumer uses. Two hours per cassette is the anticipated play time.
8. If you want lots of tracks, the modular multi-track is your cup of tea. Huge systems will be relatively commonplace because they will be easily assembled.
9. If you need to do a remote recording, the decks will be very portable and you only need to take as many decks as you need for the job.
10. It will be easy to make multiple originals with the system. Store one set away in the closet for safety purposes.
11. Clients will be able to play tracks in their own digital home or car players for evaluation purposes.
12. The SMPTE time code will be an inherent part of the system, allowing sync-up to video and automation equipment.

As impressive as this list is, I'm certain that there is even more the system will do as various manufacturers take a stab at their version.

It is possible to apply the modular multi-track design to conventional analog cassettes. In fact our Nakamichi ZX-9 cassette deck outperformed our 2-inch 24-track machine in a recent A-B comparison. This was accomplished by using Dolby C, the best metal tape, and a special deck alignment.

As far as I know, we at Sun Valley Audio were the first to come up with this invention. We have disclosed the device in the United States patent office.

We have several reasons for disclosing the invention in this letter. One is to try to find any other individual or group who might pre-date us with this type of equipment. Two is to further establish the existence and date of the invention. Three is to let the industry know of the idea. Our intention is to license whatever rights we may establish to interested manufacturers.

If you would care to correspond with us, our mailing address is: Sun Valley Audio, Box 285, Sun Valley, ID 83353.

Sincerely,
Lance W. Parker
Sun Valley Audio

Dear *Mix*,

In your July '85 issue of *Mix*, Ken Pohlmann mentions in his article: "A Winning Strategy" that the University of Miami will be the first to offer a Master's degree in Sound Engineering. I would like to bring to your readers' and Mr. Pohlmann's attention that the Master of Music in Sound Recording program at McGill University in Montreal, Canada has been in full operation for six years.

Since there was no mention of the McGill program in the listing of recording schools and programs in the same issue of *Mix*, please allow me to give a brief summary here.

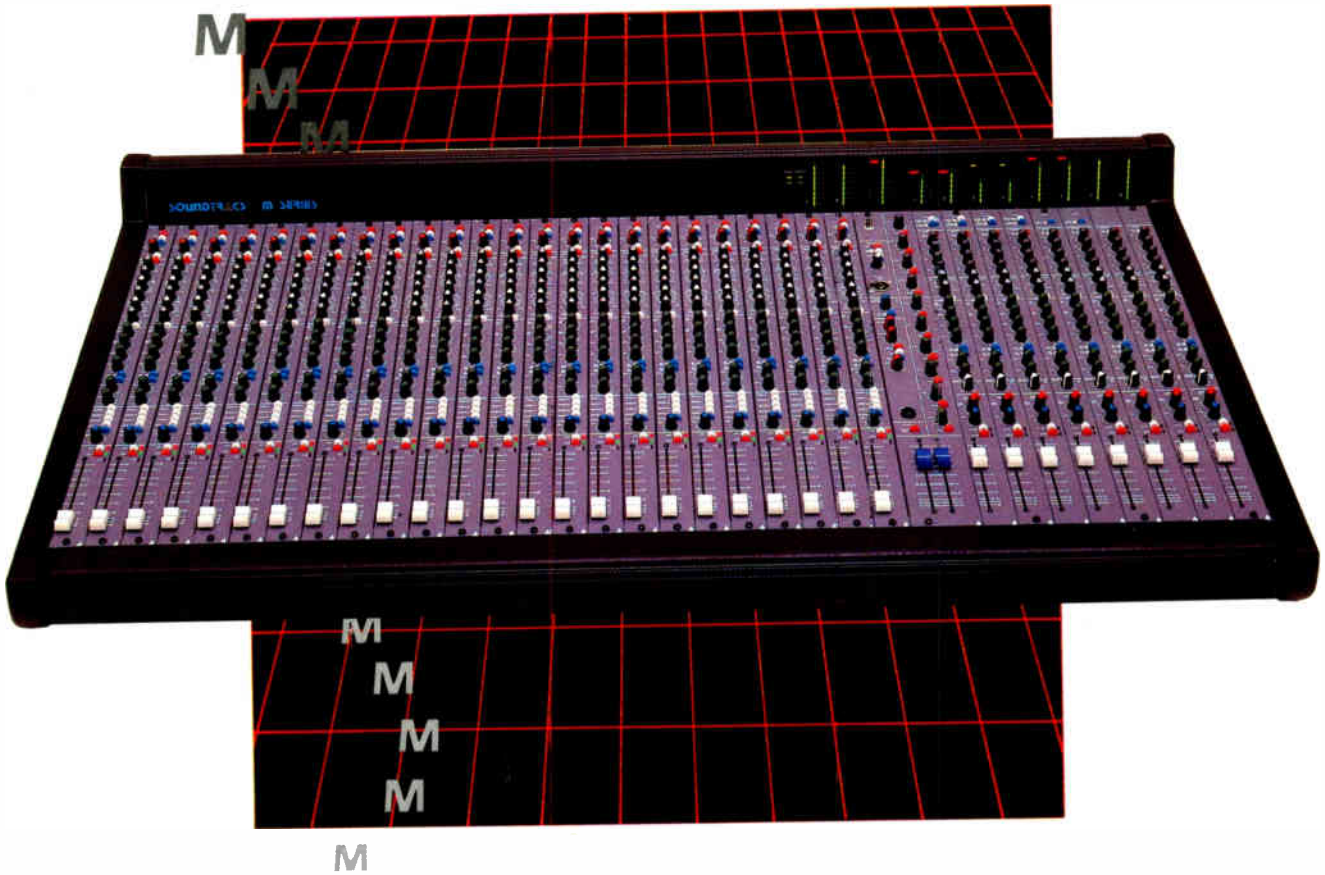
It is a two-year program in recording

—PAGE 293

MR Series now available with 16-track monitoring. See the entire range at AES New York Booth 216/241.

M SERIES

NO MORE SLEEPLESS NIGHTS!



No nonsense eight buss mixing console designed for live sound reinforcement, theatre or eight track recording. Unique facilities such as +30db input headroom, 4 band equalisation, six auxilliary sends, switchable pre or post fade and settable using hand set jumpers to pre or post equ. By four matrix on each sub group pre or post fade. Stereo return to masters. Fader reverse. Eq on group output, permanent access to all eight busses for effects returns with eq option. Full monitoring of groups. A total solution to an eight buss mixer that will not fail on you; So **NO MORE SLEEPLESS NIGHTS!**

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WE'VE GONE TO GREAT LENGTHS TO MAKE SERIES 600 THE ULTIMATE 16 TRACK CONSOLE.

The new Series 600 has been designed as the universal 16 track console. From ½" personal recording facilities to the professional 2" studio standard.

In analogue recording, the tape is the weakest link. Therefore, it's vital that whatever you put onto the tape is of the highest quality – whichever tape format you use.

½"

At Soundcraft we've used all our latest technology in circuit design to ensure that the performance of Series 600 outshines any other 16 track console.

We've included internal line matching links and switches which enable the user to re-set the console from the professional +4dBu standard to –10dBV for ½" and 1" multitrack.

1"

In addition to 16 equalised monitor channels which are separate from the input modules, Series 600 includes 16 LED bargraph meters, switchable peak/VU, plus two conventional VU meters on the mix buses.

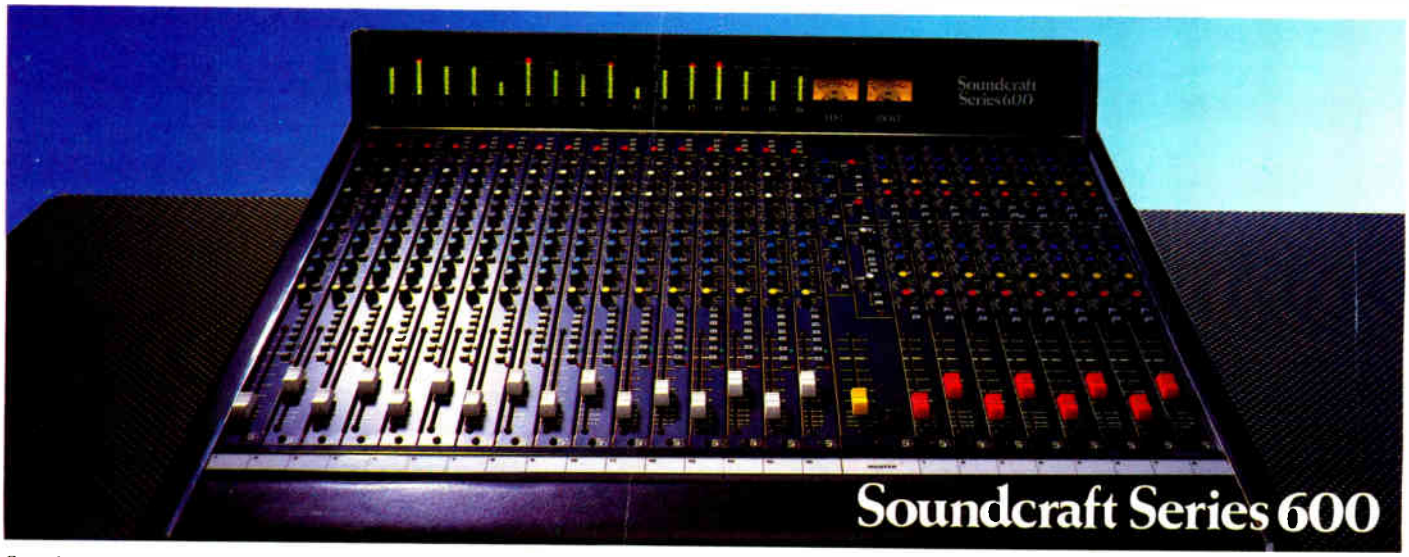
Four auxiliary sends on each channel can be routed to six auxiliary buses. And the master module contains extensive monitoring facilities, including access to three two track sources for playback.

2"

All line inputs and outputs (except input channel direct out) are balanced, utilising Neutrik XLR connectors. An external 19" rack mounting power supply allows for clean and stable DC voltages to the console.

Series 600 also incorporates many more features than you'd expect from a console so reasonably priced.

So, whichever tape format you use, you should go to great lengths to ensure your console is a Soundcraft Series 600.



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