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THE RECORDING INDUSTRY MAGAZINE

# Mix

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# Mix

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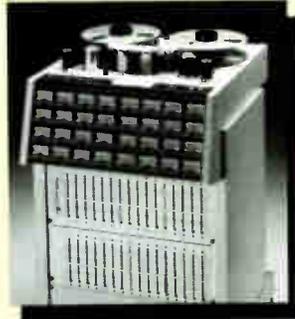
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- and much more!



This month's cover: One of two 48-track Studer/56-track SSL-equipped rooms, Studio B at Larrabee Sound (West Hollywood, California) also boasts an extremely well-stocked outboard rack. Some recent clients completing single re-mixes at Larrabee include: New Edition, Don Johnson, Aretha Franklin and Keith Richards, Patti Labelle, Madonna, Klymaxx, and Huey Lewis.

Photo by: Steve Broaddus  
Corner photo: Rupert Neve



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**E**very once in a long while

we get to watch the development of a new industry and its corresponding consumer market. In recent years we've seen the personal computer emerge and find its place in our lives. We've observed the MIDI breakthrough, allowing musical instruments and computers to become close friends. Over the past few months we've also gotten a glimpse of another potential monster of technoculture.

Last February, when Philips and Sony agreed on a standard way to format the 600 Mbyte compact disc to accept text, graphics and computer programming, in addition to audio data, they set off a chain reaction that will very likely trigger an advanced generation of home entertainment and information. They call it CD-I, or Interactive Compact Disc.

Unlike its close relative, the CD-ROM, which has already bitten off a chunk of the information marketplace thanks to its talent for storing and retrieving information, CD-I is pointed straight toward the consumer. It may be a few short years away, but CD-I figures to be the one that ties together the home computer, stereo and video system.

Timing is everything, as my partner Penny likes to point out. So why run such a big spread on CD-I if it's still years away?

Because this is the opportunity time, the time for planning, the time of the wide open creative frontier waiting to be explored, that's why. Many production people looking toward the future will find their place in this new field.

CD-I's won't be just an improvement of past products. They will be new concepts, demanding sensitive, highly trained and creative production professionals. They will also challenge the various media production industries to work together in new and exciting ventures.

As this is our annual AES issue, featuring the latest technology from the professional audio industry, we feel it is also a fitting time to tune in a little closer to this early stage of the CD-I chain reaction. In our special CD-I supplement, we feature some of the latest thinking and developments with an emphasis on opportunities for communications production professionals.

Keep reading,

David M. Schwartz  
Editor/Publisher

# CURRENT

## **AES Convenes in L.A.**

The Audio Engineering Society's annual U.S. Convention and exhibition kicks off November 12 at the Los Angeles Convention Center and the L.A. Hilton Hotel and goes through November 15. A record 150,000 square feet of exhibit space will accommodate approximately 200 exhibitors and an expected attendance of 15,000.

The Hilton Hotel's Pacific Ballroom will house the Technical Papers presentations, grouped by topic areas: November 12—"Perception," chaired by Diana Deutsch; "Architectural Acoustics and Listening Conditions," chaired by Ted Uzzle. November 13—"Audio Recording and Signal Processing," chaired by John Eargle. November 14—"Audio Reproduction, Transducers and Sound Reinforcement," chaired by Cal Perkins. November 15—"Audio Measurements and Instrumentation," chaired by Henning Moeller.

Among the newer aspects of the AES Convention are the "Hands-on Workshops" featuring industry leaders with a forum of experts in open discussion, including actual operation of hardware and software for most of the workshops. Among the 24 such scheduled sessions are "The Economics of Operating a Recording Studio," with Nick Colleran; "Ramifications of CD-ROM and CD-I on the Recording Industry," with Rhonda Kohler; "Stereo TV Mixing," Bill Burnsed; "Computers in Audio," Ed Lever; "Time Code: A Tutorial," Steve Krampf; and "Preservation and Restoration of Audio," William D. Storm.

For those looking to sample the facilities of Southern California, the AES has arranged Technical Tours of film, video, media, music and sound reinforcement centers. Included in these visits are Compact Video, CBS Television Center, Post Group, Crystal Cathedral, Universal Studios, Disney Productions, Fred Jones Recording, Lion Share, Motown Records and Sound Castle.

Other highlights will include a keynote address by Stan Cornyn, president of the Record Group, who is actively involved in raising awareness for the CD-I format and developing its opportunities for the recording industry.

For a complete schedule of AES events, as well as registration information, contact the Society at (212) 661-2355, or write AES Convention Services, 60 East 42nd St., New York, NY 10165.

## **AMS Calrec Merger**

AMS Industries and Calrec Audio Limited, both British-based manufacturers of professional audio recording and broadcast products, have announced their plans to merge their operations. Calrec, primarily noted for their elaborate mixing consoles and the high performance Soundfield microphone system, will be relocating their operations to the new Advanced Music Systems headquarters in nearby Burnley. Officials from AMS, whose products include high quality digital audio processors and recording systems, noted that both companies "have been and are currently heavily involved in research and development of digital audio techniques and a sharing of skills and understanding will be beneficial to the enlarged group and also the industry."

## **RIAA Moves to Washington**

The Recording Industry Association of America has announced plans to move its offices from New York City to Washington, D.C. in early 1987 and to seek a political specialist as president to replace Stanley M. Gortikov, who has held the office since 1972. Gortikov, who will move to chairman of the board, says that the move to Washington "reflects the industry's growing need for closer contact with Congress and many government branches. The commercial and creative health and growth of our member companies are

increasingly linked to Washington objectives."

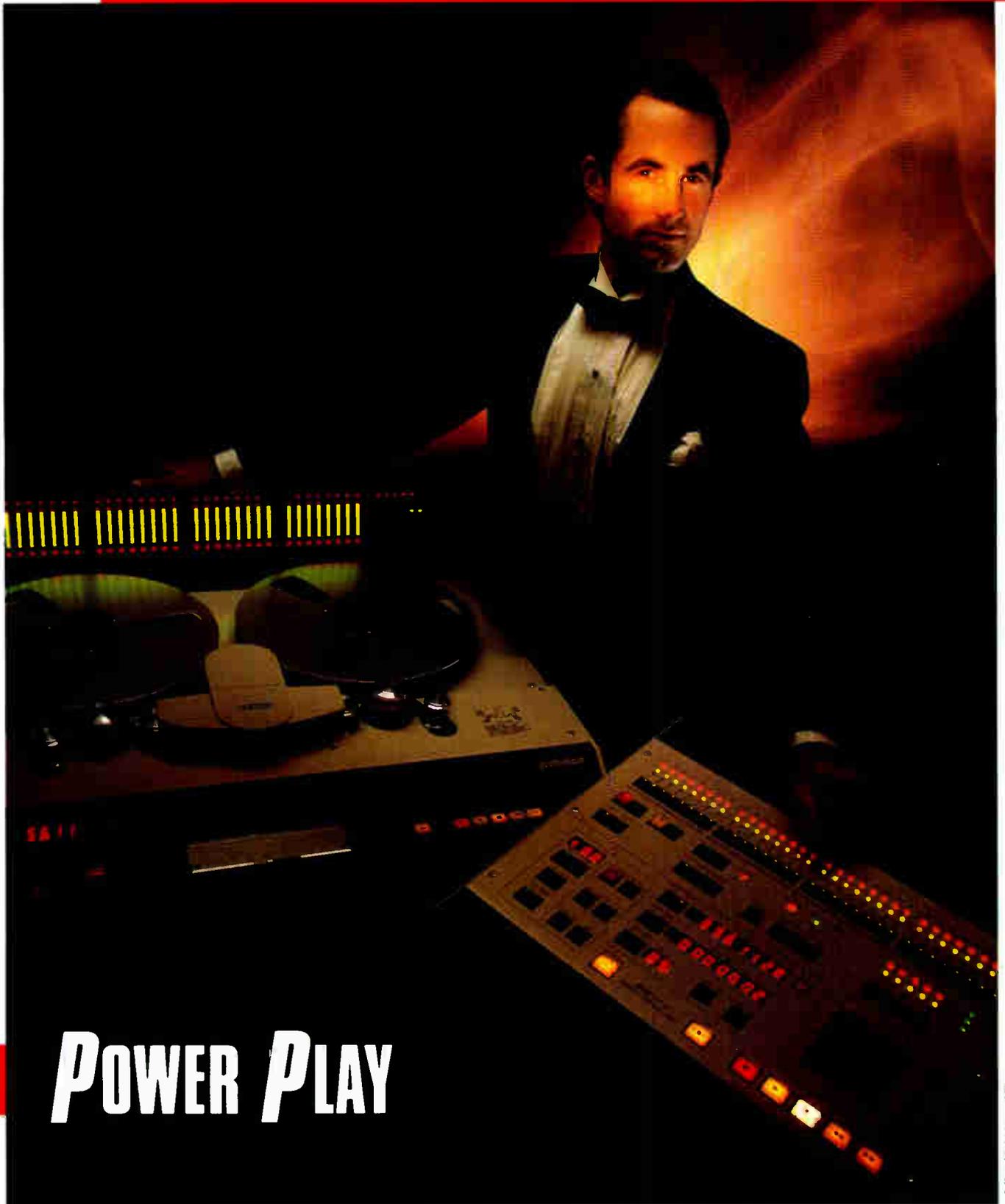
## **Sony Reorganizes Marketing**

Sales and marketing for Sony Corporation of America's nonconsumer products have been reformed into two new organizations, the Communications Products Company and the Information Systems Company. Headed by William Connolly, president, the Communications Product group will be responsible for sales to the broadcast, institutional video and professional audio markets. The Information Systems Company, presided over by J. Philip Stack will take responsibility for information products, government sales and new business development.

## **SMPTE Liason with SBE**

A joint effort has been established between the Society of Motion Picture and Television Engineers (SMPTE) and the Society of Broadcast Engineers (SBE) for a "more formal and meaningful exchange of ideas between the societies." Under the arrangement, each group's liason committees will hold regular meetings, exchange Society literature and promote cross memberships.

Though the SMPTE has many members in the film industry, over the past several years the Society has become heavily involved in television-related engineering activities. The SBE serves the total broadcast industry. The purpose of the SMPTE, according to an excerpt from Article II of the Society's Constitution, is to "advance the engineering and technical aspects . . . and to gather, receive, prepare, and disseminate scientific information concerning the motion-picture, television, and the allied arts and sciences." Similarly, the stated purpose of the SBE is to "diffuse and increase operational and scientific knowledge in broadcast engineering and its allied arts, in both theoretical and practical applications." ■



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**OTARI**

# INDUSTRY NOTES

**Hamilton Brosious**, Chairman of **Audiotechniques**, NYC, has formed **Hamilton Brosious Associates** to provide financial and management services to the professional audio and video industries. They can be reached at 195 Willowbrook Ave., Stamford, CT 06902, (203) 359-3506. . . **Studer Revox America** has moved its New York City field office to 161 Avenue of the Americas, Suite 901. . . The 1986 **National Video Festival** will be December 4 through 7 at the **American Film Institute**, 2021 North Western Ave., Los Angeles, CA 91601, featuring panel discussions and independently produced projects. For info, contact **Steven Ricci**, (213) 856-7787. . . **NARAS** is looking to hire a National Education Coordinator for creating and administering NARAS' entry into educational programs and developing articles, seminars and video programs. Those interested should contact the offices at (213) 849-1313. . . **Peter Birnstein** has been promoted to regional service manager for the Western region, **Sony Broadcast Products Co.**. . . **Dolby Laboratories** have announced the appointment of **Syntec International Pty Ltd** as their distributor for studio products in Australia. . . **Steve Sarafian** has been appointed Eastern regional sales manager of **Lyon Lamb Video Animation Systems, Inc.**, with offices in Burbank, CA, and now Red Bank, NJ. . . **Camera Mart** has relocated to a larger West Coast branch at 1900 W. Burbank Blvd., Burbank, CA 91506. . . **Audio Intervisual Design** has been named a dealer for **Sony Professional Audio**, representing all Sony digital products, as well as all Sony analog consoles, recorders and microphones. . . **Robert Schuman** has been named operations manager of **Mediatech East**, the New York division of the videotape duplicator and distributor. . . **Otari Corporation** is forming an MTR-90 users group and is urging such people to get in touch with **Wende West** at Otari, 2 Davis Dr., Belmont, CA 94002, (415) 592-8311. . . **Tri-**

**Comm Productions**, of Hilton Head Island, SC has added **Carol Fetter** as producer and marketing director and **Mark Mooney** as director. . . **Susan M. Kraus**, director of media relations for the **National Association of Broadcasters** since 1983, has been promoted to vice president, media relations, in the department of public affairs and communications. . . **Daniel Korda** has been named marketing manager, facilities management, and **Jay H. Zacks** appointed to director of manufacturing by **Discovery Systems**, the Columbus, OH information technology company with an optical disc manufacturing facility in Dublin, OH. . . **Christopher Emery** has been promoted to video products manager for the magnetic tape division of **Agfa-Gevaert, Inc.**. . . **Stephen M. Kalhorn** has been appointed executive vice president of **American Gramophone Records**, in Omaha, NE. . . **Star Case Co.**, of Munster, IN has appointed a fresh team of U.S. rep firms. For specifics, contact **Bernie Fryman** at (219) 922-4440. . . **JRF/Magnetic Sciences** has joined with **Globe Precision Products PTE Ltd.** to establish the first company in Asia (outside of Japan) to sell and service audio magnetic heads in Singapore. . . **Harmony Gold**, L.A.-based production and syndication company, has purchased **Intersound**, a fullservice audio and video post-production facility with locations in L.A. and Rome. . . **Rapco Cable and Lighting** has completed and moved into their new production facility in Jackson, MO. . . **United Video**, of Tulsa, OK, has appointed **Thomas A. Broge** as vice president of new business development. . . **Ron Ladd** was recently named vice president of **Media Design Associates, Inc.** of Boulder, CO, developers of interactive video disc programs and videotape instructional series. . . **Songwriter/producers Preston and Alan Glass** have formed **Glasshouse Productions** to work music projects out of their offices in San Rafael, California. . .

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## NORTH CENTRAL

*INXS* took over *Studiomedia* in Evanston, IL blocking out their 16- and 24-track rooms to record new songs before embarking on their U.S. tour. *Scott Steinman* and *Dave Appelt* engineered, assisted by *Mike Weyna* and *Sam Fishkin*. . . At *Sound Suite* in Detroit, producer *David M.* finished tracks with *Was (Not Was)* vocalist *Sweetpea Atkinson*, with engineer *Mike Brown* at the board. . . Inspirational singer/songwriter *Danny Vann* put down tracks at *Studio A* in Dearborn Heights, MI with producer *Ivy Hunter* and *Eric Morgeson* at the board assisted by *Bill Brooks*. . . At *Spectrum Sound Studios* (St. Clair Shores, MI), producer *Michael J. Powell* worked on *Billy Meadows* and CBS's *Regina Belle*. . . At *Sparrow Sound Design* in Chicago, *The Deja Vu Big Band*, with pianist/leader *Les Stahl*, recorded several selections for a new 45 release. . . Orphan recording artist *Jimmy Lifton* and producer *Bruce Nazarian*, rendez-voused at *Gnome Studios* in Detroit, and have been collaborating on several new projects. . . At *Tone Zone Recording* in Chicago, *Tom Tom 99* and engineer *Goh Hotoda* were busy on a variety of projects, which included work for *Berniece Williams*, *Bobby Hill*, *Johnny Moore*, *Stefani*, and *Cynthia Campbell*. . . At *Seagrape Recording Studios* in Chicago, *Sonny Harris*, associate of *Tom Tom 99*, was in doing lead vocal sessions engineered by *Ron White*. . . Artist *Sandy Torano* was in *Paragon Recording Studios* in Chicago recording two of his new songs for Atlantic Records, "Solitaire" and "I Need to Know." Torano is producing the project, *Chris Cameron* is playing keyboards, and *George Warner* is engineering. . . At *Solid Sound Inc.*, Ann Arbor, MI, solo artist *Dave Britton* with engineer *Rob Martens* finished mixing Britton's second album. . . The *Bon Ton Soul Accordion Band* has been in *United Recording Studios* in Kansas City working on a new album project, with *The Bon Ton* and *Dave McQuitty* producing, *Mike Green*, *Dan Billings* and *Dann Haworth* engineering. . .

## SOUTHEAST

At *Reflection Sound Studios*, Charlotte, NC, *Wednesday Week* cut an LP that will be released in January on Enigma Records. It was produced by *Don Dixon* and engineered by *Steve Haigler*. . . Memphis-based group *The Bluebeats* started a demo of original

material with *Niko Lyras* producing at *Cotton Row Recording* in Memphis. . . *Judy Rodman* recorded lead vocal tracks at *Master Mix Studios* in Nashville with producer *Tommy West*. The session was engineered by *Warren Peterson*, assisted by *Vicki Hicks*. . . At *Cheshire Sound Studios* in Atlanta, the *Georgia Satellites* completed their upcoming album for Elektra Records, with *Jeff Glixman* producing and engineering, assisted by *Cheryl Bordagaray*. . . *Stargem* in Nashville hosted one of the hottest new artists in country music, *Randy Travis*. He cut 12 tracks with producer *Kyle Lehning* and engineer *Joe Bogan* at the studio. . . *Hummingbird Recordings* in Melbourne, FL cut tracks for *Rory Pastorius*, and *A.W.O.L.*, with engineering by *Scott Peters*; *The Scare*, and *Greg Roberts* were engineered by *John Foley*. . . Rock band *Gypsy Queen* recorded an album at *Quadraxial Studios* in Miami, FL with producer *Jack Douglas* who has produced gold and platinum albums for big-name artists like *Aerosmith*, *Cheap Trick* and *John Lennon* and *Yoko Ono*. . . At *Terminal Recording Studios* in Jackson, MS, *Faye Hunter* worked on demos with *Randy Everett* producing. . .

## NORTHWEST

*Boz Scaggs* recently recorded vocal overdubs at *Russian Hill Recording* in San Francisco for his new LP. The sessions were engineered by *Bill Shnee*, assisted by RHR's *Gary Clayton*. . . At *Music Annex Studios* in Menlo Park, *Don Harriss* was in to produce his first solo album with *Russell Bond* engineering in Studio A. . . *MVP* was at *Prairie Sun Recording* in Cotati, CA working on new material with *Mark Vigil* and *Steve Fontano* co-producing. Featured musicians are: *Bill Church* (*Van Morrison*, *Montrose*, *Hagar*) on bass, *Chuck Ruff* (*Hagar*) on drums, *Mike Money* (*EMB*) on keys, *John Nieman* (*EMB*), and *Kevin Shelfant* on background vox. . . At *Kenjo Recording Studio* in Fresno, CA, producer *Robby Roberson* and engineers *Shelby Cash* and *Steve Beumgartner* worked with the group *Hud Rose* on their new LP entitled *Country Rose*. . . At *Steve Lawson Productions, Inc.* (Seattle), engineer *Terry Date* worked in Studio A with *Metal Church*, the Seattle heavy metal band, on its Elektra release album. . . Album projects underway at *Dave Wellhausen Studios* included the innovative new band *Terra Incognita*, the *Love Urchins*, *MX-80*, *The Nightcats*, *Tanya Zatkin* and *Paris Slim & the Continental Rockers* all engi-

neered by *Dave Wellhausen*. . . At *Triad Studios* in Redmond, WA, *Eric Tingstad* and *Spencer Brewer* completed a new album for Narada records with *Craig Anderson* lending talents on the Emulator II. *Lary Neffzger* engineered. . . At *Jopheir 12 Studio* in Los Gatos, CA, *Susan Foster* completed recording her first single in support of "March for Peace Movement." The project was engineered and produced by *Jeff Tracy*. . . At *Starlight Studio* in Richmond, CA remix work by Razormaid Records' *Joseph Watt* was done for *Berlin*, *Depeche Mode* and the *Pointer Sisters*. . . At *Studio D Recording* in Sausalito, CA, *Van Morrison* was in mixing for a possible live album. Also laying down tracks were *Matinee* and *The Bob Banks Project*. . . Recent activity at *Sound-track Studios*, Sunnyvale, CA, included independent recording artist *Keta Bill* (*Ronnie Montrose*, *Sheena Easton*) in pre-production for her self-titled debut album. Co-producing with Bill were producer/director *Gregory M. Ercolino* and arranger/instrumentalist *John Sanders*. *Bruce Tambling* engineered. . . At *Different Fur Recording* in San Francisco, *Michael Hedges* recorded an original soundtrack and album for Windham Hill Records and Rabbit Ears Production. *Mark/Doris Sotnick* produced and *Howard Johnston* engineered. . . At *Villa Recorders*, Modesto, CA, recent activity included a new album project by *Donnie Rae* with session players *David Rea*, *Segovia Bader*, and *Bill Hendrickson* laying down the basic tracks. *Fred Eichel* was the engineer and producer. . . At *Hyde Street Studios* in San Francisco, *Bonnie Hayes*, *Linda Tillery*, *Vicki Randel* and others were in completing Hayes' latest album in studio D. Engineering the project was *Tom Size*. . . *Narada Michael Walden* has been busy at his *Tarpan Studios* in San Rafael, CA. Projects in the works are *Whitney Houston's* next album and a new album by *Sheena Easton*. Tracks for *Aretha Franklin's* next album have also begun. All projects are being engineered by *Dave Frazer*, with assistance from *Dana Chappelle*. . . At *Astral Sounds Recording* in San Jose, CA recent sessions included a demo by *Grey Matter* with *Greg Bright* engineering and *Shasta*, who is working on his second LP. *Jeff Tracy* engineered both projects. . . At *CD Studios* in San Francisco, *Boys Cry Wolf*, a four-piece band from Santa Cruz has been laying tracks and overdubs for a four-song project. *Bill Cutler* is producing the sessions with *Gary Mankin* engineering. . . The Los Angeles local band, *Shattered Glass*, was in tracking for an album project on independent label *Walshmoore Records* with producer *Donovan Walsh* and engineer *Dr. Richie Moore*. . .



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World Radio History

## NORTHEAST

In from England, RCA recording artists, *The Blow Monkeys* completed tracks to be included in their second album at *D&D Recording* in NYC. *Michael Baker* and *Axel Kroll* of Simple Simon Productions produced. *Douglas Grama* engineered and *Mike Rogers* assisted. . . . At *Z-Studios* in NYC, *Jellybean* produced *Stacy Lattisaw's* new single on Motown, "Nail it to the Wall," with *Michael Hutchinson* engineering. . . . At *Intergalactic Music* in NYC, *Jenny Burton* completed ten tracks for her new album for Atlantic Records. *John Luongo* produced with *Gary Hellman* engineering and *Andrew Spigelman* assisting. . . . At *Inner Ear Recording* in Queens, producer *Billy Clock-el* was in with his band *The Jumbo String Band* cutting material for the band's new release. . . . The *Big Mo Recording* truck (based in Wheaton, MD) provided audio-for-video of *Carl Anderson* and *Gloria Loring* in concert at Carter Barron Amphitheatre in Washington D.C. . . . Actress *Rebecca DeMornay* worked at *Barclay Productions* in NYC, putting down preliminary vocal tracks for Cannon Films' upcoming musical, *Beauty and the Beast*. Keyboard and vocal sessions were engineered by *Bruce Coughlin*, with *Richard Regner* assisting. . . . At *Unique Recording Studios*, NYC, recent activities in-

cluded producer *Keith Diamond* recording *Michael Bolton's* next LP for CBS Records. Guest guitar players are *Bruce Kulick* from Kiss and *Paul Pesco* (Madonna, System). *Bob Rosa* and *Peter Robbins* engineered, *Ed Bruder* assisted. . . . *New Liberty Productions* recently audio-sweetened and mixed a documentary for *The Prison Literacy Program* at *Sigma Sound* in Philadelphia. *Randy Abrams* engineered the sessions with assistance from *Scott Mac Minn* and *Armand Pocaroba*. . . . *Robbie Robertson* was in at *Giant Sound* in NYC, working on the music for the new Martin Scorsese film *The Color of Money*. *Todd Kasow* produced, *Tom Swift* engineered and *Jeff Cox* assisted. . . . At *Reel Platinum Studios* in Lodi, NJ, producer *Dom Scarpulla* cut tracks for the new *Oasis* LP. . . . *Charlton Heston* was in at *Lion & Fox Recording* in Washington, D.C. to record narration for the film *Keeper of the Keys*, commissioned by the Taiwanese government to highlight U.S.-Taiwanese relations. Producer/director *Irving Schecter* utilized L&F's 24-track audio-video interlock for precise on-the-fly cues to Mr. Heston. . . . Activity at *Power Play Studios* in Long Island City, NY included producer/writer *Peter Warner* working with female vocalist/co-producer *Rainy Davis*, both of whom collaborated on this year's dance floor hit "Sweetheart." The duo are back to finalize *Rainy's* upcoming album, with engineer *Julian Herzfeld*. Second engineers were *Mike Kruzynski*, *Jerry*

*Santos*, and *Ricky Rios*. . . . At *West 55th Street Studios* in NYC, *Richie Havens* completed a 24-track digital album for release on compact disc produced by *Doug Yaeger* with *Jerry Soloman* at the board. . . . *Sadler Recording Studio*, NYC, has completed four *Blinkins* children's audio books patterned after the TV cartoon and two *American Tale* programs to be co-released with Stephen Spielberg's movie of the same name. They were produced for Putnam Publishing by *Nick Petron* and engineered by *Rick Klejmont*. . . . *Westrax Recording Studios* in NYC completed recording a soon-to-be-released album featuring *Jonah Jones* on trumpet and his quartet for G.P. Productions, *Ben Arrigo* produced, and *Jeremy Harris* and *Jesse Plumley* shared engineering duties. . . . Recent *Effanel* (NYC) remotes included *Joe Jackson* at Vancouver's Expo '86 and *Bob Dylan*, *Tom Petty* and *The Grateful Dead* for Farm Aid II. Engineering was by *Randy Ezratty* assisted by *Mark Shane* and *John Harris*. . . . At *Inner Ear Recording* in Queens, jazz trumpet player *Dave Gordon*, was in producing an LP for singer/songwriter *John Holmes*. . . . At *Shakedown Sound* in NYC, the *Latin Rascals* were in mixing the *Fat Boys'* "Big and Beautiful" for Sutra Records, and editing *Miami Sound Machine's* "Body to Body" for Epic. . . . Arista recording act *Krokus* was recently at *Sheffield Audio-Video Productions* in Phoenix, MD recording tracks for a new album. Engineering and producing was *Tony Platt*. . . . At *Greene Street Recording* in NYC, *Kurtis Blow* wrapped up his latest PolyGram LP, *Kingdom Blow*; *Rod Hui* co-produced. Guests on the album include *George Clinton*, *Bob Dylan* (making his long-awaited rap debut on "Street Rock") and *Trouble Funk*. . . . In *Quadrasonic's* (NYC) Studio B, Capitol's recording artist *Freddie Jackson* was in doing vocals for two songs off of his forthcoming album, produced by *Paul Lawrence* and engineered by *Steve Goldman*. . . . Independent artists recently utilizing *Trod Nossel Recording Studios* in Wallingford, CT included: *Bill Wrinn*, *Brad Ard*, *Vlad Morosan*, and several others. . . . At *I.N.S. Recording* in NYC *Joey Gardner* and *Robert Clivilles* were in mixing "Broken Dreams" for Tommy Boy artists *TKA*. *Lee Evans* produced the tune with *Robert Kasper* engineering except for the vocal tracks and the mix which are being engineered by *Steve Linsley*. . . . While in Philadelphia as part of their world tour, *UB40*, the British reggae/pop band, stopped in at *Modern Audio Productions* for help with some sound effects. . . . Recent activity at *Platinum Island Recording Studios* in NYC included *Rick Derringer* and band cutting tracks with *Derringer* producing and *Tom Edmonds* engineering. . . . At *Secret Sound* in NYC, *Design For Living* was in finishing up their second EP with producer/engineer *Jay Henry* behind the console. Also, *Sly Dunbar* and *Billy Patterson* produced two independent projects with *Jay Henry* engineering. . . . *Evergreen Recording* in NYC had *Jorge Maldonado* cutting tracks for a new album, *Jay*

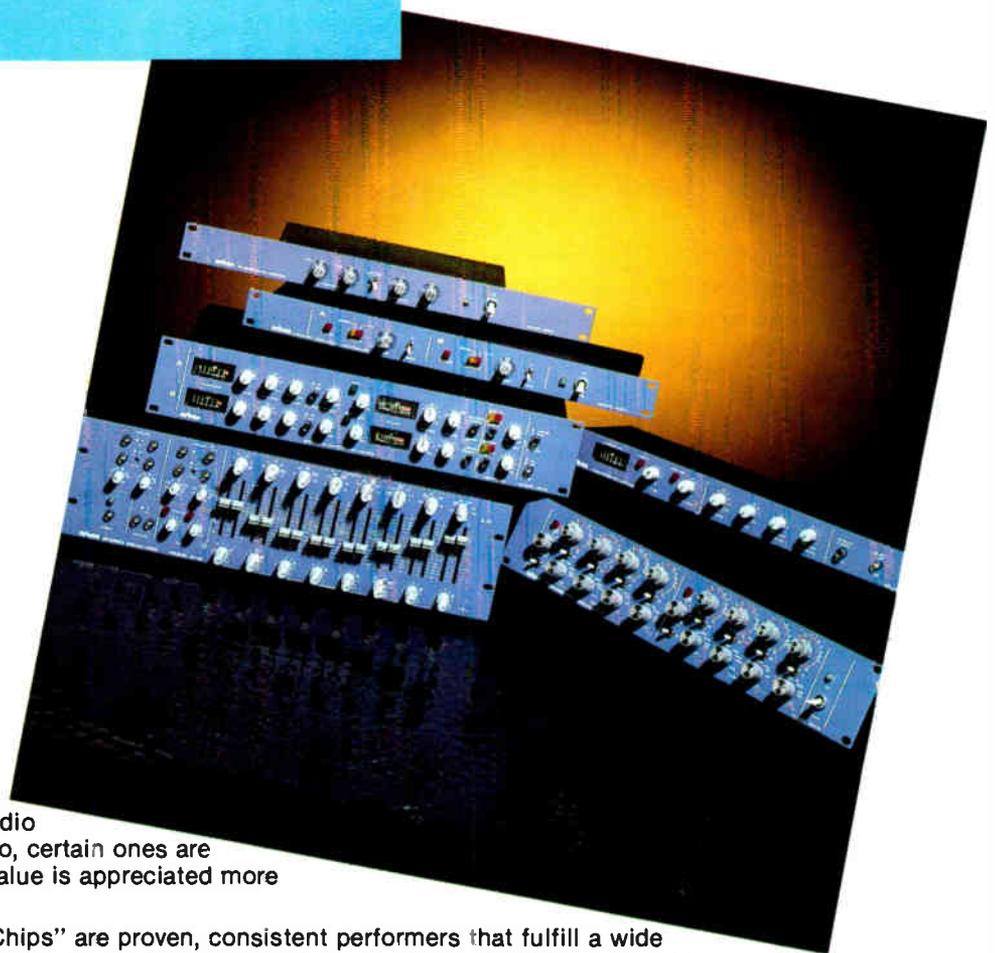
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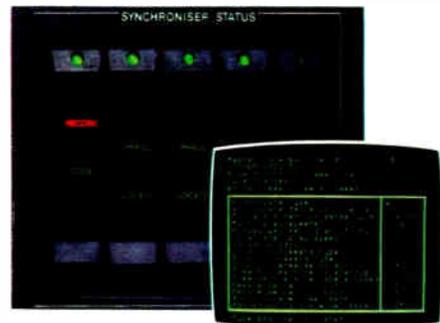


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tape location by timecode, foot/frames, cue numbers or key words, and complete session list management. And that SSL alone offers extensive fader, group and mute automation and mix manipulation plus optional programmable parametric equalisation and panning, multi-repeatable Events Control, and Automatic Dialogue Replacement.



*Henry* engineered the project, assisted by *Gary Clugston*. . . At *Sound Heights Recording Studios* in Brooklyn, *Louie Max* recorded tracks for *Rockin Hot*. Behind the console was *Vince Traina* with *Lofredo* and *Gary Collins* assisting. . . At *Boogie Hotel Studios* in Port Jefferson, NY, Atlantic Artists *Zebra* completed their third album; *Randy Jackson* produced and *Dan Nash* engineered. . .

## SOUTHERN CAL

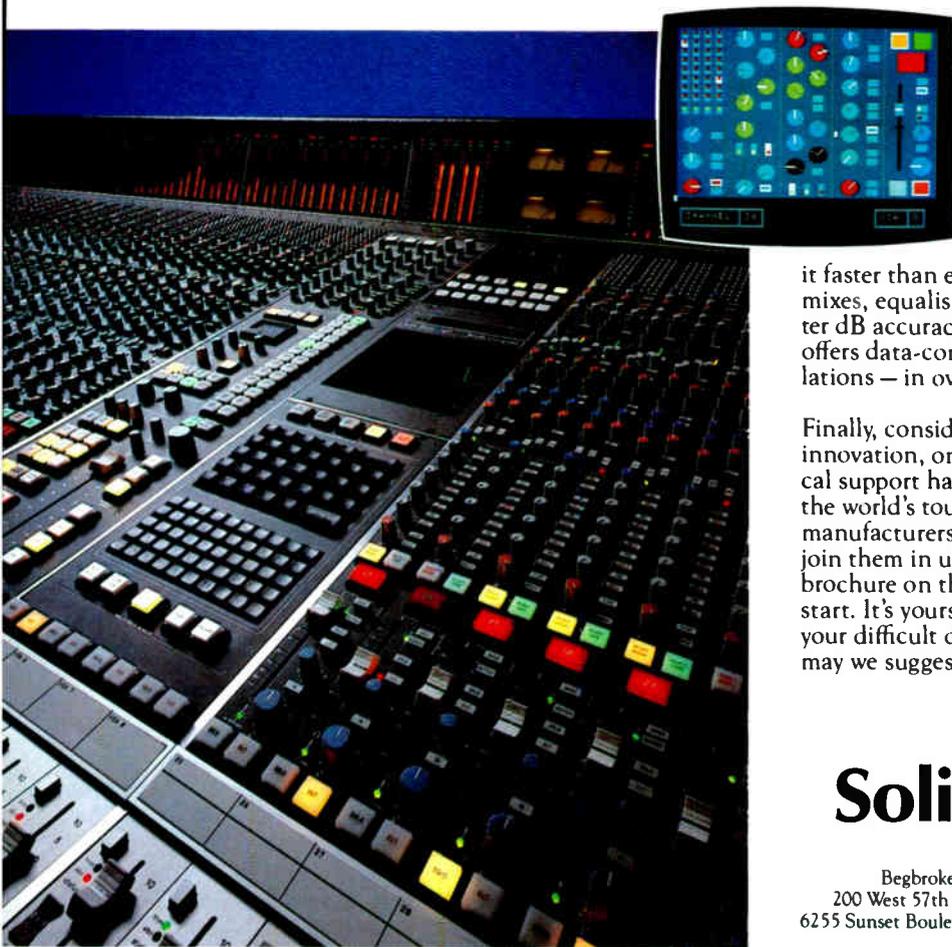
*Robbie Robertson* was in at *The Village Recorder* in West Los Angeles working on new tracks with *Daniel Lanois* producing and *Jim Scott* engineering with *Jeff Demorris* assisting. . . Female solo artist *Jackie Padgett* has been signed to an exclusive recording agreement with *Encore Productions* in Burbank, CA. Recording will begin in May with renowned veteran studio musician, *Nathan East*, and his brother, *Marcel East*, producing. East, who has recorded and toured with some of the top artists in the music industry (*Eurythmics*, *Eric Clapton*, *Lionel Richie*), marks his debut as producer with this project. . . At *Group IV Recording* in Hollywood, engineer *Dennis Sands* was at the board with composer *Alan Silvestri* scoring Disney's *Flight of the Navigator*; the busy duo also scored *Amazing Stories*. . . The *Nitty*

*Gritty Dirt Band* was in *SDR Studios* in Van Nuys with engineer *Dwight Marcus* and producer *Jim Duncan* mixing the band's live performance for *Westwood One*. *Jeff Park* assisted. . . At *Skip Saylor Recording* in L.A., *Van Dyke Parks* and *Ry Cooder* cut tracks for *Van Dyke Parks* on Warner Bros. Records. *Skip Saylor* was behind the board with *Tom McCauley* and *Joe Shay* assisting. . . The music for a *Jay Leno* TV special was recorded at *Encore Studios* in Burbank by NBC Productions. *Jack Conrad* produced while *Les Cooper* engineered. . . *Burton Cummings* finished tracking and mixing his new songs at *Studio II* in Culver City, CA with *Jason Wolchin* engineering. . . At *Sound Image Studio* in Hollywood, producer *Curtis Nolen* worked on Motown Recording act *General Kane* with *John Henning* engineering. . . At *Yamaha Studio* in Glendale, CA, *Randy Crawford* was in recording, produced by *Victor Flores* and engineered by *Keith Cohen*. . . At the *Sunset Sound Factory* in Hollywood, *Glen Campbell* worked on a gospel record for *Word Records* with *Marty Paich* producing and *Tom Knox* engineering. Also, *Tom Waits* was in doing overdubs for his new album with *Biff Dawes* engineering and *David Glover* assisting. . . At the *Village Recorder* in West L.A., *Sheila E.* was in doing overdubs and mixing with engineer *David Leonard*, assisted by *Jeff Demorris*. . . At *Capitol Recording Studios* in Hollywood, *Chill Factor* was in mixing an LP, "*Hock*" produced with *Ray*

*Blair* engineering. . . At *Mama Jo's Recording Studio* in North Hollywood, CA, Geffen Records artists *Wang Chung*, finished overdubs and mixing with producer *Peter Wolf* and *Brian Malouf*, assisted by *Steven Ford*. . . British pop singer *Graham Grace* completed his first American album, *Shining Knight* on *Palace Records*, in *Studio B* at *Westlake Studios* in West Hollywood. . .

## SOUTHWEST

*Red Sky* recently finished cutting tracks for *Hot Day/Cold Wave* at *Goodnight Dallas*. Also, freelance engineer *Tom "Gordo" Gondolf* completed mixes on tracks by *4 Reasons Unknown* with producer *Gordon Perry*. . . Rock/bluesman *Stevie Ray Vaughan* spent two weeks at the *Dallas Sound Lab* to sweeten material recorded and videotaped live at the *Montreaux Jazz Festival*. . . Recently in working at *L.A.W. Studios* in Las Vegas was *Tommy Smothers*, in studio B working on his animated series, *Ted E. Bear*. *Rita Coolidge* laid down some vocals for an upcoming Disney movie in studio A, produced by *Artie Butler*, engineered by *Lee Watters*; and *The Imperials* finished mixing their tunes in studio B, also engineered by *Watters*. . . At *Planet Dallas*, Irving band *Tazmain* rocked the rafters putting down tracks for their album project. *Rick Rooney* engineer-



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it faster than ever to recreate headphone and monitor mixes, equalisation, or entire console setups with quarter dB accuracy and rapid verification. And SSL alone offers data-compatibility with more than 300 installations — in over 80 cities around the world.

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ed... *Michael Dunafon* cut tracks at *Charley Pride's Cecca Sound* in Dallas with *Bob Pickering* producing and *Rick Webb* engineering... *G. Brian Tankersley* of Myrrh Records has been at *Rivendell Recorders* in Pasadena, TX working with *Kim Boyce*, a new Myrrh artist and former Miss Florida... Jazz singer *Karen Nelson-Bell* was in *Powerhouse Recording Studio* in Las Vegas working with owner/engineer *Paul Badia* on music from the film *700 days*...

### STUDIO NEWS

New MIDI at *MediaSync* in Cambridge, MA includes a Yamaha DX7 with the TX-816 (eight DX7s) and TX-216 (two DX7s) racks; Oberheim's Matrix 6R and Xpander synthesizers; Roland's MKS-20 MIDI digital piano and MKS-80 Super Jupiter; and a Syntovox Vocoder... *InHouse Studio* in Cambridge, MA has been renamed *MediaSync Studio*, but remains dedicated to MIDI and the integrated studio environment. *MediaSync* now offers digital mastering in two formats—the dbx-700 or the Sony PCM-F-1, (CD-standard). They've even added more MIDI-controllable devices... *New Age Sight & Sound* in Atlanta, GA has opened Studio B, equipped with a 24-track Otari MTR-90. The MTR-90 locks up with New Age's digital equipment to create a hybrid 48-track analog/digital

system... *Metzsound* in Chicago has announced the opening of an all new 16-track, 1500 sq. ft. recording studio. Equipment includes a Sunn-SPL 2216 console, modified to include a 16-channel monitor mix, custom microphone preamps, and five sends. The tape machines are an Ampex-MM 1100-16 track modified according to the Studer A 800 concept, free punch in and out, transformerless 50Hz-20kHz ±2dB; TEAC A3440-4-track; Pioneer RT 2022-2-track; Revox A77-2-track; and much more... Just open in Manhattan *West 55th Street Studios* owned by *Rita Leone* and *Bill Tesar*. They have combined a large studio and control room with the latest in MIDI technology. The studio features an Otari MTR-90 24-track, a Studer 2-track, a Sony 701 digital 2-track, Harrison console plus Westlake studio monitors and a host of outboard gear... *Reflection Sound Studios* (Charlotte, NC), has added a Sony APR-5000 master recorder, a Lexicon PCM-70 effects processor, and two Valley People 440 limiters to the equipment in Studio A, all rewired with Monster Cable Series One and Mogami Cable... *LedgeVU Recording* in Marlborough, CT recently purchased the new Akai S900 sampler as well as two Yamaha SPX-90 multi-effects processors... *Fred Jones Recording Services* in Hollywood, CA has added a Prophet 2000 digital sampling keyboard to its music and effects room... *Lahaina Sound Recording Studio*, in Maui, HI is first in their state to purchase a Sony PCM 3324 digital recorder. The 48-

track facility has also added a Lexicon PCM-70 and more to complement their Solid State Logic 4000E console... *Gate Five Studios*, in Sausalito, CA has completed its new Studio B. This rehearsal studio was built specifically for the performing/touring musician and comes complete with a full PA system and 4-track recording setup... *Normandy Sound*, of Warren, RI has installed a Solid State Logic 4000E Series, 48-frame mixing console with total recall... *Crosstown Audio* (Atlanta, GA), formerly *Crosstown Recording* (Kalamazoo, MI) opened their new audio sweetening/mix-to-picture facility this month. For information contact: *Brandon Wade*, 2135 DeFoor Hills Rd. NW, Suite 1, Atlanta, GA 30318; (404) 237-5959... *Music Technilab* of Warren, OH, has added Sequential's Prophet 2000, a digital sampling keyboard, to their array of electronic music synthesizers... *Galaxy Productions* has outgrown its Elk Grove, IL location and moved into a new facility in Schaumburg, IL. The new space is about triple the size of the previous facility, with room for more offices and a larger studio... After many months of overflow from the mother studio *Indigo Ranch, Studio II* has made itself available to the general public. It features the only other "Indigo-type" custom console. Call (213) 558-8832 for details... *Unique Recording* recently upgraded its Manhattan facility by purchasing four new Studer A800 24-track recorders to replace existing recorders in Studios A and B.

# NFL FILMS

★ FROM GOALPOST TO GUITAR ★



by Dan Daley

Driving south on the New Jersey Turnpike, there is a point at which the tank farms, the brimstone-belching refineries and the general post-nuclear lunar landscape that have given the Garden State such a bad rap give way to a more pastoral setting. It takes a few minutes and a few miles before you notice that you're in the country. The traffic lightens as the gamblers veer off east toward Atlantic City and the blue suits head into Trenton, the state capital, for another sort of roulette. A few miles later, as the signs for Philadelphia evoke visions of cheese steaks, the exit for Mt. Laurel, New Jersey, looms up ahead.

There's been a quiet revolution here. The images of Montana and Namath now share space with those of Springsteen, Cyndi Lauper and Journey.

A land of industrial parks, diners and singing lawns, Mt. Laurel looks to be another well-planned, dull and safe slice of industrial exurbia, a place where you can set your watch by when the coffee-and-danish truck rolls around.

Beyond the big sign that reads "NFL Films" on the right side of the road, a huge stucco-brick complex sprawls out over 70,000 square feet of space on five acres. This is the latest home of NFL Films, a wholly-owned subsidiary of the National Football League. The core of the complex was built in 1980, with an additional section recently completed. Traditionally, NFL Films has been the primary supplier of football-related visuals for in-

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dustry and the media—like those weekend preview shows and round-ups of the week's matches.

But there has been a quiet revolution going on behind these walls over the last two years. The images of Namath and Montana and Dorsett are sharing space with those of Bruce Springsteen, Cyndi Lauper, Journey, Ronnie James Dio and other rock luminaries who have done production and post-production work on rock videos at the facility. It doesn't stop there: NFL has made substantial inroads into the commercial film and video business with spots and industrial films for corporations like General Electric, Eastman Kodak, Hilton Hotels and Okidata.

From a single film editing room, where those sports specials and shows were done, NFL Films has grown into a virtual labyrinth of high-tech caves. Film-to-tape facilities include two Rank Cintel Telecines, and the video department grows rapaciously with sophisticated character-generating and animation equipment. A 24-track Studer- and SSL-equipped recording studio occupies the second floor of the new 22,000-square-foot, \$10 million building addition. After racking up 35 Emmy awards over the years, NFL Films appears to be setting its sights on picking up a few Grammys, too.

It's a fast-growing maze of "zipper-zappers," as NFL Films' vice-president and director of video operations, Jay Gerber, likes to refer to the new-fangled computerized whiz-bangs that infest the complex. "In the space of a couple of years, we went from a \$1 million investment to a \$10 million one," says the avuncular Gerber. "That's the extent to which we introduced video into this company in terms of dollars and expansion."

Explaining NFL Films' relationship with the parent company, he says, "It's a multi-function service, really. We service the National Football League and all its teams with an audio/visual product. We also act as consultant to the league in any audio/visual matters. Besides that, we're self-funding; we'll produce product that is sold around the country and around the world related to pro football. We also service the networks in relation to their football needs."

Gerber leads the way through a tour of the plant, along the way providing a running patter of information in quick bites, and sounding not unlike a tour guide on some fantastic Walt Disney dream-city-come-true. It's plain to see he relished being here, and enjoys the familial atmosphere that pervades the place.

Gerber is a hands-on sort. He began his working career as a podiatrist from 1958 to 1960 in Florida. A stint in the army got him hooked on photography, and after the service he got his foot in the door (sorry!) and went into that full-time, shooting commercials and fashion. He moved into motion pictures after a few years, continuing to shoot and produce commercially-oriented films. In the mid-'60s, he "bribed a cameraman to let me shoot a roll of film at a Baltimore Colts game," he says. The footage was so good he landed a job as a camera operator and spent the next 17 years working the main camera at the Superbowl. Gerber was among those who pressed for NFL Films to make the move to video. Not an easy task, he said of a company that had built its base on film. All of this has led to the new corporate fascination with video and post-production, with Gerber at the helm.

The tour starts in the original sec-

tion of the building. "I call the two sections 'East' and 'West' rather than 'new' or 'old,'" he says. East remains dedicated to film work, with editing rooms branching off "Production Alley," a long corridor lined with football team pictures and logos and a few employees sporting team jerseys. The film-to-tape transfer equipment is in evidence here and reflects the depth of the commitment NFL Films has made to video. Gerber points to the 70,000 feet of film of the '85 Superbowl that went to tape and says, "That's something unique for the company. We never did that before and it shows how strongly video is taking a creative hold of film production."

Most of the equipment in the complex is off-the-rack. But any modifications needed can be made by NFL Films' own machine shop. There is also a unit that devises and writes the company's own computer software (they have even built their own computers for special applications), another that develops and stores its own incidental music library. And there are four kitchens. It's easy to get the sense of self-sufficiency that one might experience on an ocean liner at sea. There is even a water purification plant on-site from which they recover and re-use the silver nitrates from the developing process. East is rounded off with a small shooting stage featuring an Ultimatte keying system, film storehouses ("That's where we keep the blood and sand stuff," says Gerber. "The stuff from the early days of leather helmets."), more editing rooms, and graphics generation departments.

Crossing through the sky-lit, California-esque atrium that divides East and West, Gerber points out, "We ran into a situation with the video in East when it became so busy that we needed more machinery, more people, more room." Rather than simply expand, NFL Films built an entirely new building, connecting the two via the atrium. "We call it our hotel lobby," he smiled.

West is built around a core that contains what Gerber calls the building's machine room, a computer facility with wire-ducted floors that has a NASA "clean room" ambience to it. All video and audio points in the building can send and receive feeds to and from it through tie-lines. In addition to video production sites, including an interformat edit suite, the first floor of West houses offices, a lounge, a screening room and well-appointed conference rooms. It's evident that West has been groomed to be the showcase wing. "Where East is a more in-house-type facility, West is a

### **NFL Films Sidebar: Selected Equipment Listing**

The on-line edit room features the Sony BVE 5000 editor, Dubner CBG-2 graphics generator, Sony BVH-2000 and BVU-820 video decks and an Audio Kinetics Eclipse audio interlock.

The two film-to-tape suites offer the Rank MK3C III with Dubner color correction, digital noise reduction and Scene Detector, a 4-track Magna-Tech dubber with both 16mm and 35mm capabilities, Ultimatte and the Lexicon 1200C

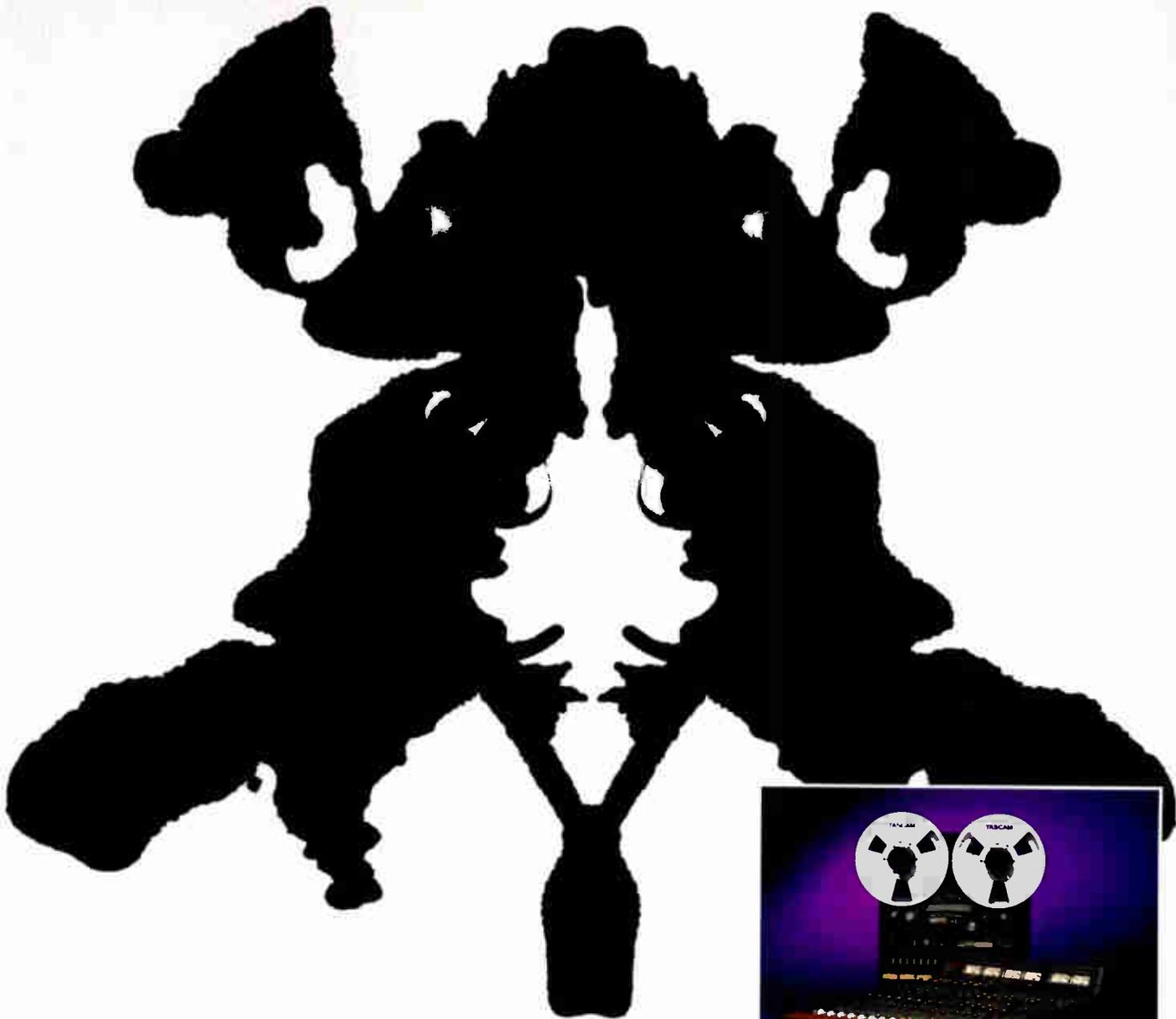
Audio Time Expander/Compressor with pitch compensation.

Graphics and animation systems include the Dubner CBG-2, Sony BVH-2500 deck, Paintbox and Abekas generators.

Audio includes the SSL 6000E console with full automation, Studer A-800 24- and 2-track decks, Studer A-80VU 4-track deck, Dolby and dbx N/R, three Orban stereo synthesizers, an A&D Panscan, a Yamaha REV7 digital reverb, Eventide 969 Harmonizer and a Valley People Gain Brain.

—Dan Daley

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*Audio sweetening and recording studio at NFL Films Video. Art Rosato is at the producers' desk, Warren Kleiman is behind the Solid State Logic 6000E.*

facility doing more service work with the rest of the world and very little inside NFL work," explains Gerber. "We're trying to dedicate the facility to clients other than NFL and sports, with more client-orientation."

That football connection might initially turn off some clients who've never dealt with them before, he concedes. "We have a reputation for the best sports photography in the world, we've proven that and we enjoy that reputation. But when we talk to people about doing a Datsun commercial or a rock video, they scratch their heads and say, 'Aren't you the guys who do football?' But that connotation is also a double-edged sword; it also connotes respect and professionalism and creativity."

The second floor of West is dedicated to audio. Just past the environmentally-controlled tape vault is the studio. Gerber introduces Alan Saperstein. Nominally the director of NFL Films' Entertainment Division, he is described by Gerber as Audio's "guru," and Saperstein says of himself, "I'm in charge of everything *but* football." A former musician and audio engineer, Saperstein walked into NFL Films with an audacious premise. "I basically came to NFL Films and said we can do live rock concerts better than anyone else. Give me a shot. So for the first two months I was dry—nothing was happening—and then I walked in with Cyndi [Lauper] and Billy [Squire]. The artists believed we could do it and we've had a lot of success with it since."

The audio studio at Mt. Laurel was originally intended only to be a sweet-

ening room, which fit in with the primarily post-production approach NFL Films had in mind, according to Saperstein. It was his idea to build a studio capable of handling a broader spectrum of work, he said, adding that because of the stature of artists he brought in for video work, he had no problem convincing NFL Films to give a shot at widening audio's role.

After screening a number of designers, Saperstein selected Russ Berger to design the room, asking him to keep in mind rock as well as video and commercial applications in the design process. Chuck Childs was brought in to do the wiring. The end result sports an SSL 6000 fully-automated console, UREI 813 and Yamaha NS-10m monitors and a six-bay outboard section whose tenants include a Lexicon 224 digital reverb. The room's walls and ceilings are floated—the walls weigh in at nine tons apiece—to prevent disruption of video work downstairs. The recording room is cozy and utilitarian, with two sections divided off from the main room for live source separation. There is an Audio Kinetics' Eclipse model synchronization unit connecting the SSL and the autolocators. "Having our synchronizer and our machines all on-line is the key to the sweetening process," says engineer Virce Caputo. He added that since this was the first sync installation of its type in the United States, certain performance bugs turned up initially, but were ironed out with help from both Audio Kinetics and SSL.

After the isolation and sync problems were solved, another—albeit

less common—difficulty became apparent. Nearby, RCA maintains and operates a top-secret radar installation. It's housed in what's called a "dry ship"—an entire naval vessel, hull and all, dragged and emplaced ashore just west of the turnpike. Every now and then, according to Caputo, military aircraft zoom by, testing the ship's radar equipment and operators. The military has never been characterized by its sensitivity to art (or by its prowess in commerce, for that matter), and there was some interference at first. "RF-wise, you can really get hurt by that stuff," says Caputo. Additional shielding was employed on most circuits to compensate and both the equipment and the Republic are again safe.

Saperstein has ambitious plans for his turf at NFL Films. He believes the company is capable of making a contribution to the musical culture as well as its bottom line, and feels the combination of high-tech audio and video at attractive rates and his desire to develop new artists while servicing the established ones bodes well for the company. The possibility of NFL Films actually producing artists, perhaps on their own label at some future point, is also under discussion, he says. "I have the contacts, we have the facilities, and together we can take the chances."

Back on the first floor of West, Art Rosato sits at a desk, scratching at his blond beard and poring over a production schedule. Rosato is the man who directs Bruce Springsteen's concert videos. Though not an employee of NFL Films, the amount of work he's been doing for the past several months at the facility, editing a series of 43 Springsteen videos shot over the course of the last tour, entitles him to an office.

Rosato, a New Jersey native like The Boss, spent ten years working with Bob Dylan in various capacities ranging from tour producer to drummer. He has also worked on films with Dylan, including the singer's *Renaldo and Clara*. As he put it, he was Dylan's staff for a good portion of those years. A combination of an audio engineering background (he had a studio in Santa Monica that Dylan dubbed "Run Down Studios") and the film work led him into video. After the first video coordinator on Springsteen's monumental 1984-85 tour didn't work out, manager Jon Landau called Rosato to fill the gap on the tour's Australia leg. He's been with Bruce ever since.

"When we finished the tour last year, all the video tapes were sent to the East Coast because that's where



## **"TOMORROW'S STANDARD\*"**

**STANDARD** (stan' dērd), *n.* 1. Something established as a rule or basis of comparison in measuring or judging quality, value, capacity, extent, etc. 2. Something used by general agreement as a type, model, or pattern.

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Bruce is," says Rosato. "They asked me to put together a Christmas present for him of highlights of the tour." Out of that came Springsteen's next single and video, "My Hometown." "I had a good performance of that in concert," recalls Rosato. "Then they wanted the rest of the footage looked over. I was doing this on a couple of rented machines in New York. When it came time to do a finished piece, I suggested doing it at NFL. I knew about them since they had done some work with Journey I was familiar with. And when Bruce played Philly, they [NFL] asked me to come over and take a look. It was just a shell then, but I could see what they were trying to do. So I filed it away in my mind."

NFL Films' low-pressure location attracted Rosato; it presented him with an alternative to an abrasive New York he prefers to avoid and that let him set his own pace. "The equipment up there is great and all," he says of the Big-But-Noisy Apple, "but the atmosphere you work under—When we did the audio for 'My Hometown' at a studio there, I'm in the room with an engineer. Then there's an assistant; that's OK. But then you get other people dropping in and it goes on all the time and it becomes an event. And this is only one song; I've got a lot of songs I'm working on. And in New York when you book time, you have that time only; there are people booked in behind you and people are always checking: "You guys done yet?"

But what really seems to attract him to NFL Films is its similarity to the laid-back environment of his adopted Southern California. "The wild thing about it is that I grew up in New Jersey but I lived in California for 20 years and it's always quiet there, so I'm used to it. I'm not burnt out at the end of a day at NFL."

Rosato says there are similarities between Dylan and Springsteen in the way they think; Dylan's artistic capriciousness is legend: "If he didn't like what he started, then he'd just say stop. We still have a TV special sitting on a shelf. Bruce is the same kind; he likes that control. No matter how far things have gone, if he doesn't feel right, he'll say cut it off. Look at *The River*. He wrote that in the studio. Obviously to anyone who can think that way, money doesn't mean anything in terms of art."

Rosato finds he has a lot of leeway with Springsteen's videos. The Boss' input is minimal, he says. "If he didn't like it he would have told me a long time ago. He never tells me to change angles or anything like that. The extent of my direction to him is, 'Just



*"The people make the facility. You can have the best equipment in the world, but you have to have the right people behind it. Sure, it's a cliché, but we're serious about it here."*

—Jay Gerber  
(pictured above)

don't wear white.' That's it, and he'll follow it. I shouldn't have to tell him what gestures to make onstage. He's the artist. It's like taking a picture of a painting. You say it's a great painting but I wish it had another brush stroke right here. You don't do that to an artist."

His *laissez faire* video approach is the appropriate one, according to Rosato; he considers his role more of a documentarian than a director, but the nuances are still there. "My job is to document what he's doing. People think that Bruce is Bruce; you turn the camera on and walk away. But it's a lot more than that. Some directors will just follow the star. They'll miss the whole band, miss the solos, leave at the wrong part of solos. People think Bruce has a back-up band. Well, that's not the case. It's Bruce and the E Street Band, and the 'and' is just as big."

Meanwhile, around the corner from Rosato, Jay Gerber is sitting at his desk, occasionally glancing at a video monitor across the room on which a rock video is being edited. Gerber can check in on any of the projects

going on in West by flipping a switch tapping him into the edit suites.

He seems to keep a watchful eye on things, but at the same time he has an easy relationship with the staff. There are very few closed office doors at NFL Films. "The vision here," he says as he leans forward across the neat desk, "is to expand our horizons and our creativity in production and post-production. We've gained a great deal of experience and recognition in the production world for our achievements in sports photography. This has come about because of a very comfortable relationship that the company has created with its people, with its creative force, and the way we generate the creative image. The people make the facility. You can have the best equipment in the world, but you have to have the right people behind it. Sure, it's a cliché, but we're very serious about it here. Our people are allowed to express themselves creatively first."

The new commitment to video gives NFL Films "a whole new marketplace," says Gerber, while expanding the creative incentives for the company and the staff. This new marketplace was in the front of his mind as he oversaw the choices of technology for West. "The way you add technology is to look at your client needs and look at the marketplace. That's what we're doing; we're expanding technologically to get into marketplaces that we hadn't catered to previously." As an example, Gerber mentions digital graphics: NFL Films has added Paintbox, a sophisticated graphics generator, along with an illustrator and an animator on staff.

The laid-back Hollywood palm-tree-and-margarita vibe of the atrium linking East and West perhaps reflects the direction that NFL Films—and much of the industrial media world—will be pointing towards in the future. As TV sports becomes less an exercise in analysis and more a spectacular orgy of "zipper-zappers," Gerber easily acknowledges the influence of showbiz on the shirt-and-tie league. "This is an entertainment complex," he states plainly. "That's what the whole audio-visual marketplace is today: an entertainment-type business. And it's an entertainment-oriented client that's out there, from records to film to video to commercials."

And NFL Films is jumping into this world in a big way, as evidenced by their equipment and their attitudes. The everything-under-one-roof philosophy is already paying dividends. Just ask Tony Dorsett. Or Bruce Springsteen. ■



# DEFINE YOUR SOUND

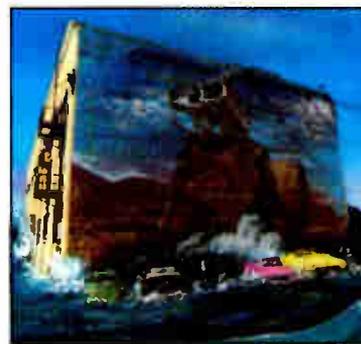
## to·tal re·call

(tōt'1 · rē'kōl)

*vt.* **1.** complete re-  
memberance **2.** to  
call back in total  
**3.** a summons to  
return in entirety

World Radio History

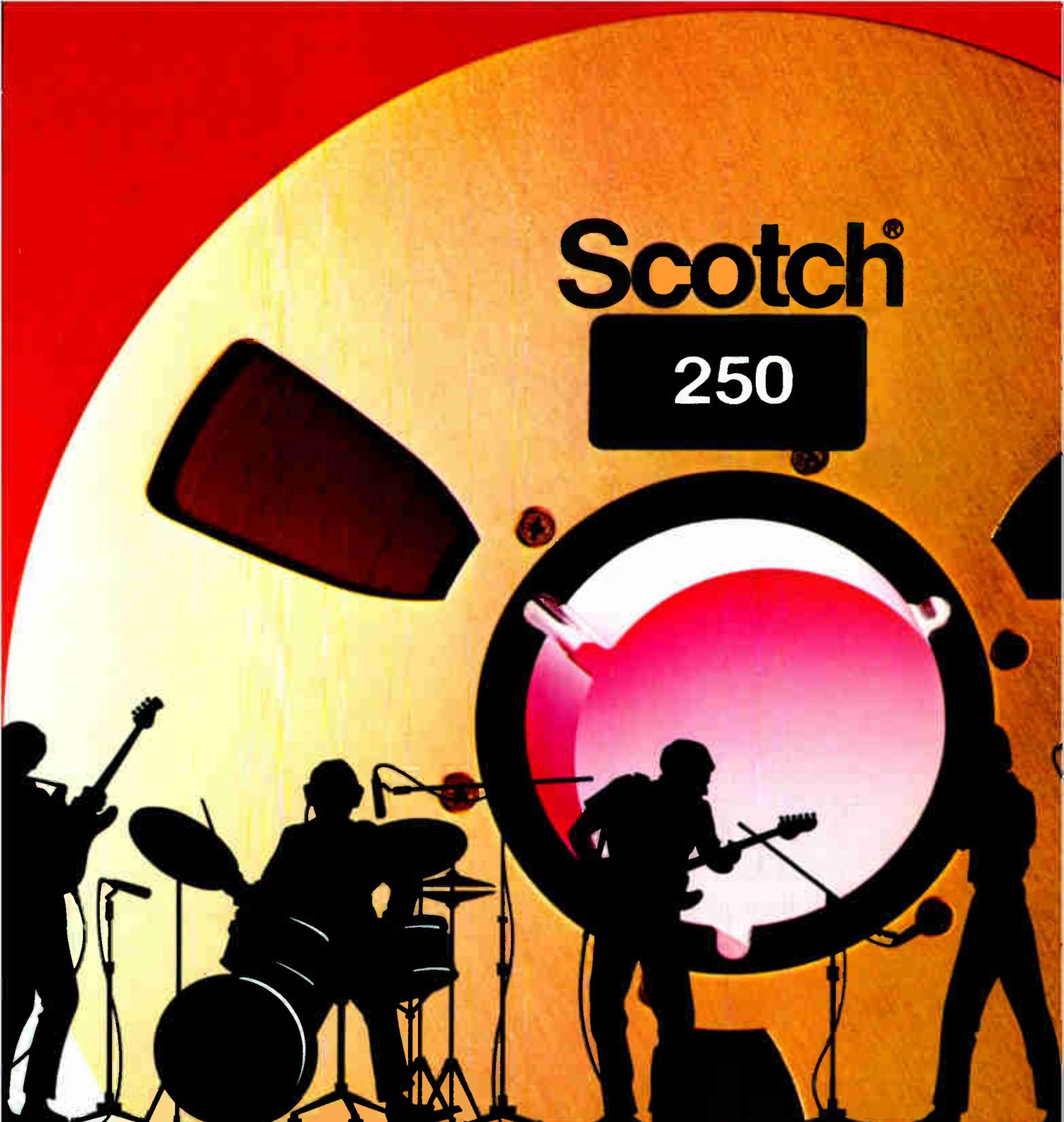
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# 3 PROFILES

two. Now, fine custom-engineered sound is finding its way into restaurants, onto boats, into discos of all sorts, and even art galleries. Herewith are profiled three designers of sound reproduction whose work, each on a different cutting edge of sound reinforcement, exemplifies the explosion.

## Jack Weisberg

Jack Weisberg runs a sound reinforcement company, Weisberg Audio, that has backed pop biggies on tour and designed sound systems for movies, videos, clubs, festivals, theaters, and hotels, for decades. "But that's

*Jack Weisberg of Weisberg Audio*

only a way to make money," says Weisberg. His passion these days is designing loudspeakers.

Weisberg's speakers are more than visually obvious; their appearance is much of their function. He likes them to be "instruments in their own right, to change sound in interesting ways." Imagine walking through a vast, weird concrete gateway, or a strange black cubist fantasy, with sound radiating out in odd patterns, whirlpooling here, thumping oddly there, directionality and phasing a constant surprise. These are examples of Weisberg's sound sculptures. They've been part of dance and theater productions, been installed in the Museum of Modern Art sculpture garden and also in Heaven, a giant club in a former church in Pittsburgh.

"I got into audio in the first place because I was a hi-fi nut as a kid," says Weisberg. "I read everything I could on it and started out by building my own speakers. At a certain point, I noticed that the shapes of the speakers looked interesting in themselves, and got interested in that aside from sound and combined with sound. So I loved sound, I wanted to make my living in it, and designing interesting speakers took something of a back-seat. It was a hobby through all the years of backing up groups like the Beach Boys and Hall & Oates, and I just kept designing these things, and they kept getting bigger and bigger. People have always been telling me I ought to do more with it, and just last year, really, I decided that it was time to devote a lot of energy to it."

## Peter J. Starr

Most top acoustic designers in New York have been around since the '60s; Peter J. Starr is 27 years old, so he is not part of the old club, but he is quickly coming to be recognized as a top designer.

Peter and his brother, Julian ran the radio station at Hunter College in Manhattan. By the time Peter graduated in 1982, the pair had made valuable contacts among equipment suppliers. Peter was in a band in upstate New York, and Julian had ambitions to be a DJ. They began to supply DJ systems in 1981 and formed Starr Brother Audio along with Anne, Pet-

by Neal Weinstock

The only places you used to be able to find high quality sound reinforcement systems were studios, temporary concert setups, nightclubs in a few major cities and the odd home or



PHOTO: WEIS/BONO

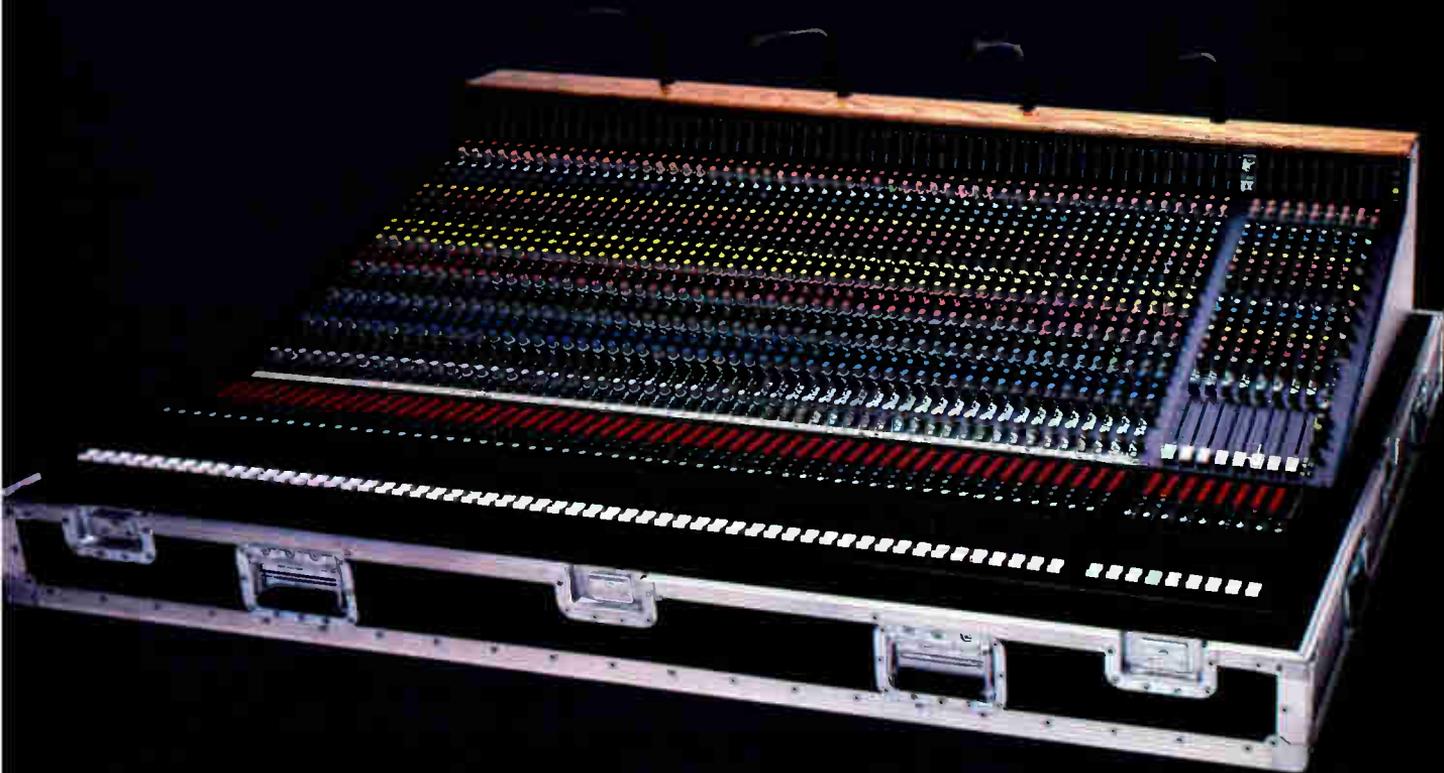
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(L to R) Felix Robinson, design engineer; Peter J. Starr, president; Anne M. Starr, VP marketing

er's wife. Julian soon quit to go into broadcasting, and is now a top-rated jock in Albany. He was replaced by Felix Robinson, an engineer who had been part of the group Angel through the '70s. Designer Richard Dalbec has also worked with the company on all its major jobs.

Peter's company, Starr Brothers, was taking small design jobs and repair jobs on other people's designs, and he says, "We started to see the need for good work." The repair jobs were a great education, showing them what was going wrong with everybody else's work. "It was almost always the same things," Peter says. "People using equipment that was improper for the applications. Blown speakers and amps . . . We learned quickly that the most important thing is the proper marriage of the sound system to the room."

Starr's first big break was a job designing the sound system for a new wave place called the "Cavern Club," in Manhattan's Tribeca. The Cavern Club's chi-chi soon gave way to "Gotham West," a hot and heavy Latin club in the same spot. The owners also ran an Upper West Side money factory called "Broadway 96." Starr Brothers designed the audio for this huge place, which had been a monstrously rowdy Latin club for years, and became even wilder with Starr's big sound. "There were fights every night, shootings . . . It was not the kind of place I would ever bring my wife." He became a

partner in the two clubs. Here, Starr's path and this author's first crossed in some small way; it was my old neighborhood, and I can vouch for the busloads of Hispanic kids seemingly dressed for a prom waiting in lines around the block while the big beat boomed over the still-to-be-gentrified corner that Saul Bellow described in *Mr. Sammler's Planet* as hell on earth. Now the area is chic, but Saul and the prom kids and Peter and I have all moved on. Despite or because of the "absolute fortune" they raked in, the partnership broke up.

Starr Brothers, however, was able to build on the success, moving up to such diverse design jobs as an audio/video system in every room of one of the King of Morocco's little hideaways, the classy and classic East Side expense-account palace Quo Vadis (a completely hidden system here, so as not to distract from the frescos), work for Fordham University and Revlon and a Marriott hotel. "Shout," a '50s- and-'60s disco in an old Broadway theater, is one of the jobs he came to be most proud of, along with a just-finished new Danceteria location in Connecticut (the original continues in Manhattan).

Starr Brothers makes all of its own enclosures and mates speakers carefully with electronics and rooms. Peter is proud of the "sweet" sound he feels he is uniquely able to combine with a powerful, accurate system, whether it is one meant for a club, restaurant or

other commercial application.

"We don't ever wind up having to do the kinds of service calls on our systems that we did on other people's at the beginning," says Peter. He also testifies that he is now generally involved in jobs he does not mind bringing his wife to.

#### **ROR: Audio Research**

Ted Rothstein and Shimon Ron are the two original wild and crazy guys. They've been bumming around the industry for 20 years, inventing brilliant new circuitry here, designing a studio there. Along the way, one or the other has been chief engineer at Electric Lady, Bearsville, and a host of other studios in this country, Iceland, Columbia . . . well, the international credits are a bit lopsided, because Rothstein is the world traveller; Ron, having made the trek from Israel to here (though he treks back for army duty when need be) is happy to stay put.

"He rescued me, I was a bum sleeping on studio floors," says Rothstein.

Electronic design and music have always been Rothstein's life; at 16 he was playing at Birdland, the legendary 52nd Street jazz spot. "Between sets they made me sit in the underage section where they served no alcohol," he says. He was designing his own circuits then, too, but his life after college would follow somebody else's design: he avoided the draft by serving as an electrical engineer designing F-111 fighter planes. When the first

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draft lottery was held, his number came up 314, so Ted quit his job making machines of war and went to work in audio. A friend's father owned Me-

dia Sound, a now legendary studio.

From there on Rothstein bounced from one engineering job to another. "Audio was primitive compared to

what we were doing on those F-111s. People thought I was a magician," he says. He claims to have invented the parametric equalizer ("though George Massenburg also came up with one at about the same time and he was the first to call it that") and the first portable board ("the size of a suitcase") with 24 tracks in and out. Simon Ron says he found him sleeping on a piece of cardboard at the studio.

Ron had come to New York in 1964. His wife was pregnant and he was out of work, but he knew how to fix tape recorders. He got a job with Fine Recording. At Fine's two studios in Bay-side, Queens and in the Great Northern Hotel (now defunct) in Manhattan, Ron mixed Broadway soundtrack albums by the score, Doc Severinson albums, Beatles albums. "In '65 we were on top. We were the first to move from mono to stereo, the first 4-track studio, then the first 6-track. But Fine started going down as the industry exploded."

Ron went to Bell Sound, which was bought by A&R. He stayed there till Jimi Hendrix stole him away to be chief engineer at Electric Lady. He brought in Rothstein to design the studio's first 24-track board in 1973. Eventually Rothstein became chief engineer at Bearsville, where he was able to return the favor and bring Ron in when Electric Lady folded.

Ron says, "I was fired from Electric Lady. At the end Stevie Wonder and I were going to buy the studio and call it Electric Lady/Wonderland, but the guy who controlled it by then—he was the executor of Mike Jeffries, the last owner's estate—was 74 years old and only liked classical music and didn't like Stevie because he smoked pot then. He once threw Jimmy Page out of the studio for smoking pot. So it didn't happen."

As the '80s rolled around, these two veterans of the studio wars decided it was finally time to make some money at what they did. "We weren't working for money," says Rothstein. "We were just trying to put smiles on people's faces." They hired themselves out to design studios for several of architect John Storyk's projects, including his phenomenally successful nightclub boats that cruise around New York, Fonovision International in Bogota, and also the defunct failure that was Metropolis Studios. They designed studios for Pink Floyd, Mijoori Studios in Iceland, and the Minskoff theater people at home in New York. But for the past few years, most of ROR Audio Research's income has come from marketing mini speakers to studios, restaurants, and homes.

"Crazy Eddie is a friend of mine," says Ron. Makes sense. ■

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# The producer's choice . . .



AMEK ANGELA  
M42 OBJ 28/24

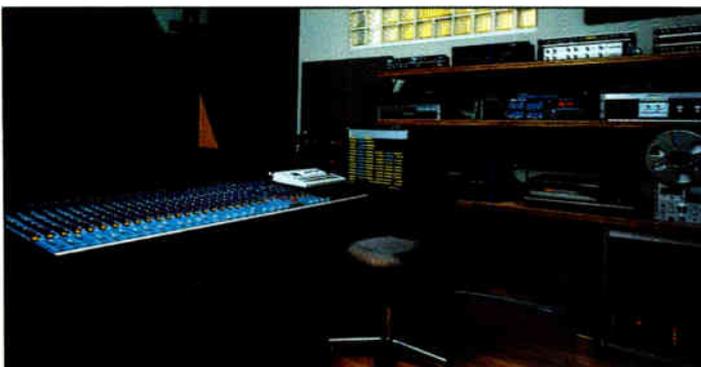
Maybe it is AMEK's reputation for reliability. Or maybe it's the ANGELA's wide variety of frame configurations and the ease of access to all of the console's controls. Or it could be the fact that an ANGELA gives you all of the features of a computerized console without the excessive cost. The real reason AMEK has supplied so many ANGELAs to today's leading producers is its outstanding sonic quality.

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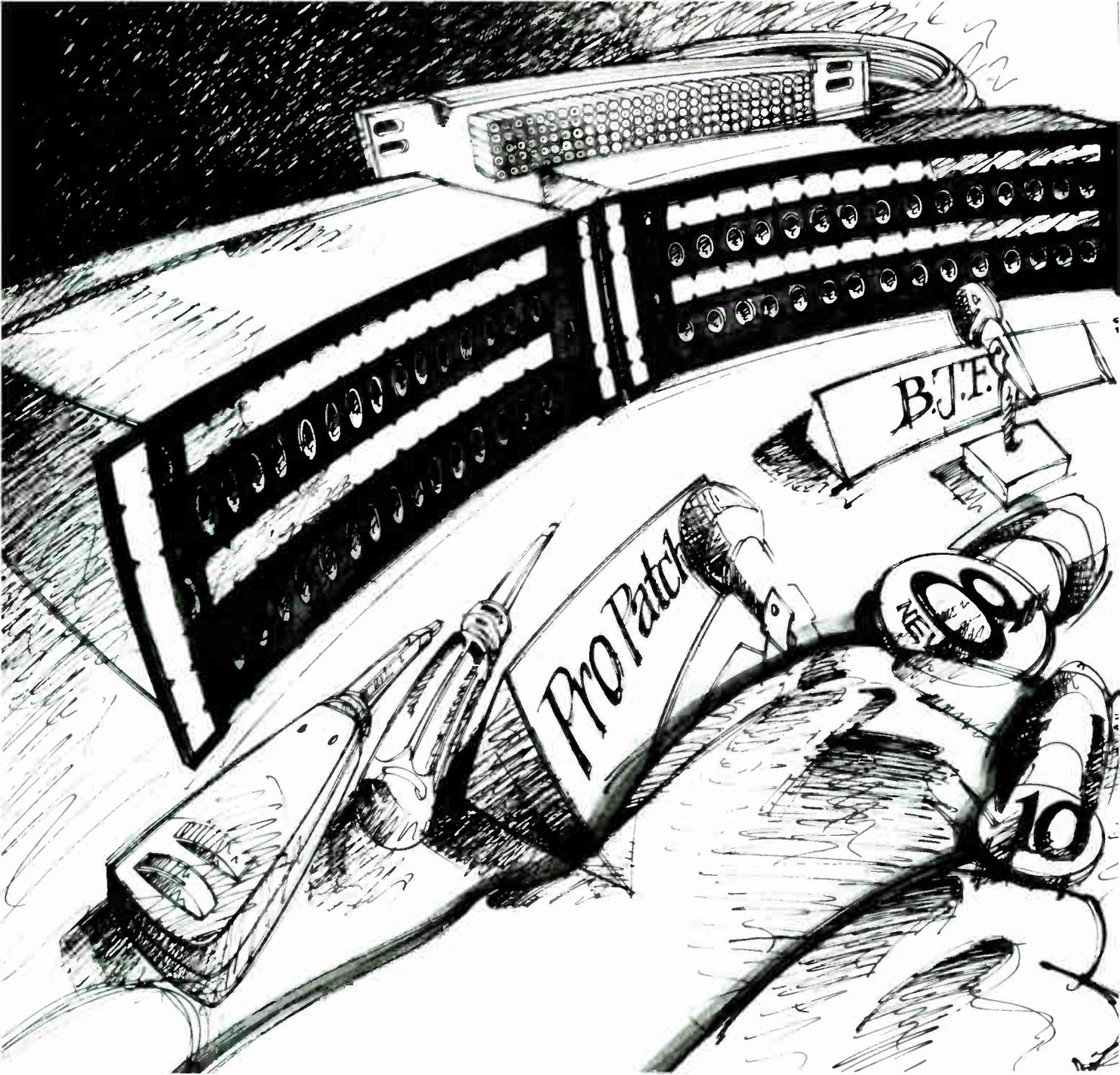
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**QUESTION #1:** "OK, Panel, I need patchbays that keep my racks neat and tidy, without a lot of cabling clutter. And I need to install them quickly and securely. Any suggestions?"

**PROPATCH:** "Sure — try ADC ProPatch Mark II patchbays. They're fully enclosed, and all the terminations are QCP punchdowns on the back of the box. Fast installation is one reason we're the panel of experts."

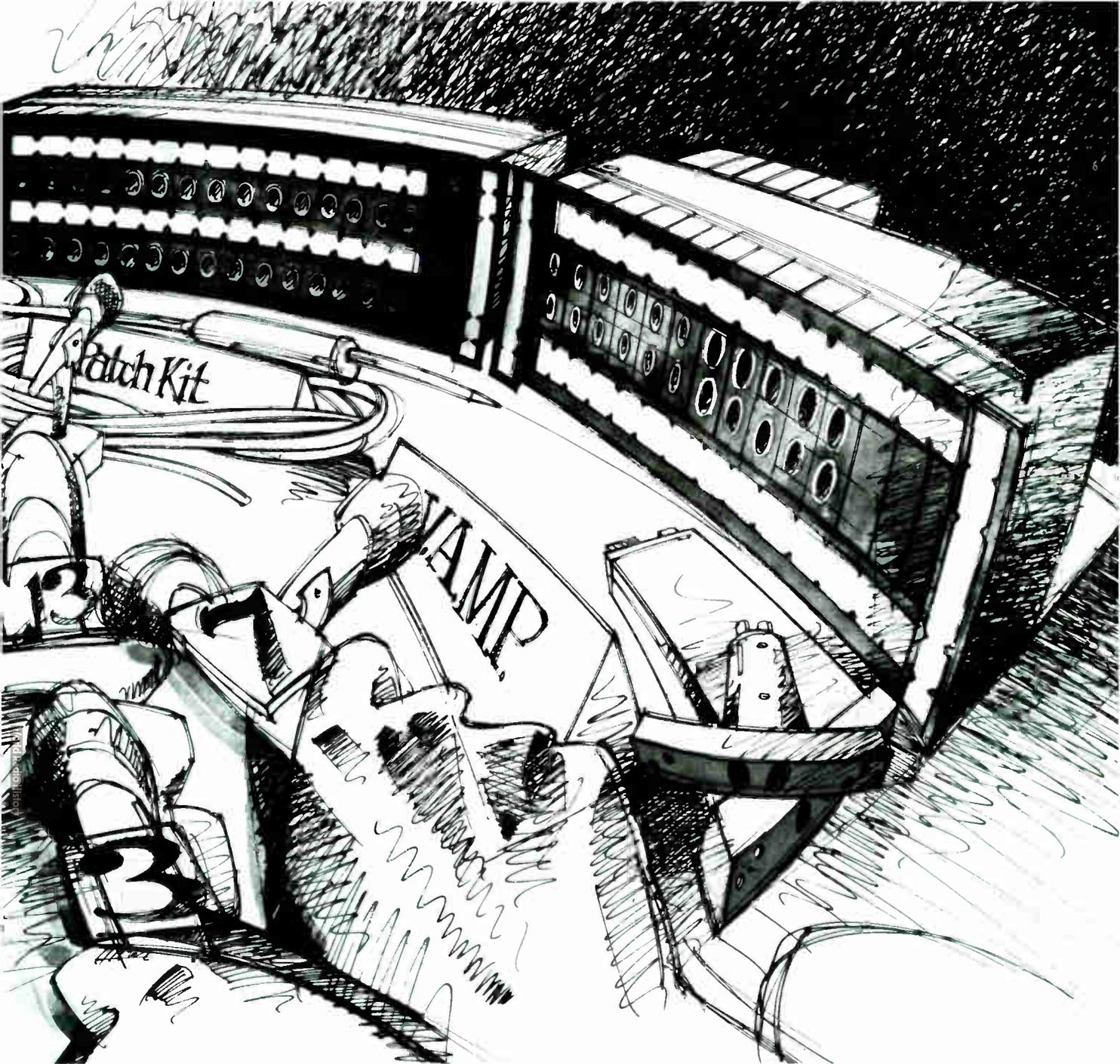
**QUESTION #2:** "This one's tougher, Panel. I need to terminate

my patchbays in the bottom of the rack, but I want my jacks protected."

**BJF:** "No problem. ADC's Broadcast Jackfield (BJF) Mark II series gives you the best of both worlds. They feature Ultra Patch termination panels with QCP punchdowns on the end of a harness. So you can terminate your cabling wherever it's most convenient. The patchbay chassis supports the cable harness and covers the jacks."

**QUESTION #3:** "What about when your budget's tight? I need quality patchbays, but I've got a small facility and I can't spend a lot of money."

**PATCH KIT:** "Our Patch Kit is

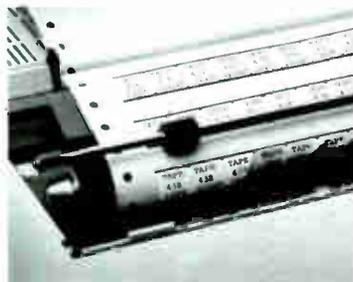


exactly what you're looking for. It's Broadcast Jackfield Mark II chassis without the cabling. Just add your own cable and you'll have it made. And you'll save money by doing it yourself."

**QUESTION #4:**

Let's see you answer this one. Panel. I have a small off-line suite and I need to patch a few audio circuits AND a few video circuits. If you want me to buy two dozen circuits at a time, forget it."

**VAMP:** "Don't buy more patching than you need. Buy an ADC Video/Audio Modular Patchbay (VAMP)



instead. Because it's modular, you can install the number of video and/or audio modules you need — no more, no less. And it's expandable."

**QUESTION #5:**

"I'm convinced, Panel. You're great patchbays. But doing designation strips drives me crazy."

**MODERATOR:**

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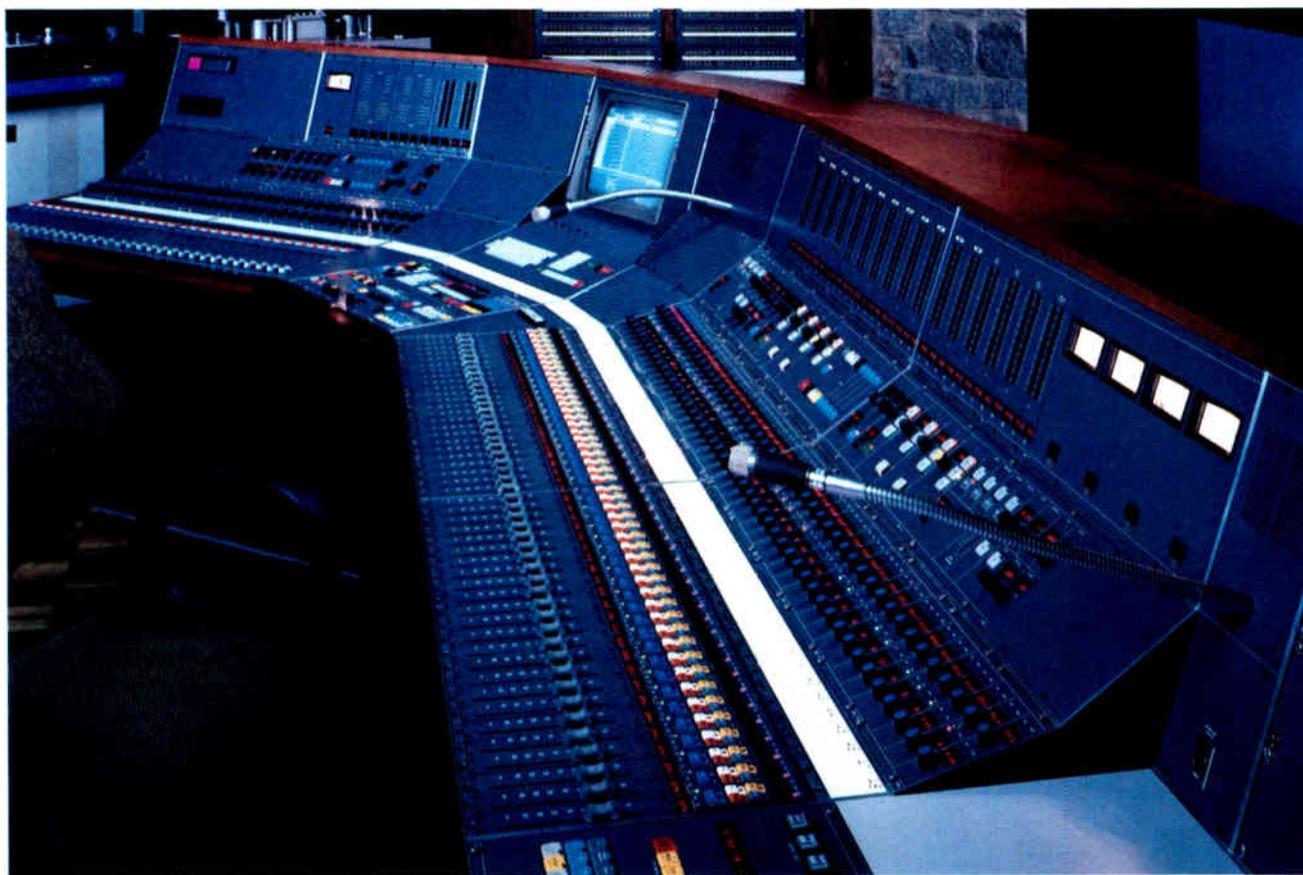
SAILS won't discolor, smear or tear and they're removable. You don't even need special software to print on them. You'll find SAILS on every ADC patchbay. Any more questions?"

**QUESTION #6:** "Just one. Where can I buy ADC patchbays in a hurry?"

**MODERATOR:** "Call us at (612) 893-3010, and we'll give you the name of your nearest ADC stocking distributor. Like everyone on our panel of experts, he really delivers."

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# TRENDS FOR THE FUTURE OF DIGITAL AUDIO



by Paul S. Lidbetter  
*Digital Systems  
Development Manager  
Neve Electronic Laboratories Ltd.*

Although digital audio is perceived by many to be a recent phenomenon brought to the fore by the advent of the compact disc, it has been in commercial use for nearly a decade. During this period its use has spread from distribution applications, using Pulse Code Modulation (PCM), to the many

digital systems in use today.

The audio path from studio or broadcast microphone can now be implemented digitally through recording, mixing, editing, and mastering processes to the compact disc or transmitter, with associated advantages.

Many concepts used in digital audio today are the result of research performed in the last 50 years which could not be applied at the time due to the lack of available technology. In

*Neve DSP at CTS Studios*

fact, the concept of PCM was proposed in 1937 by A.H. Reeves but was limited in use by the lack of digital storage capacity for audio applications and the absence of digital processing ability. It was developments in these two problem areas that allowed the advance of digital audio towards the concept of a fully digital studio.

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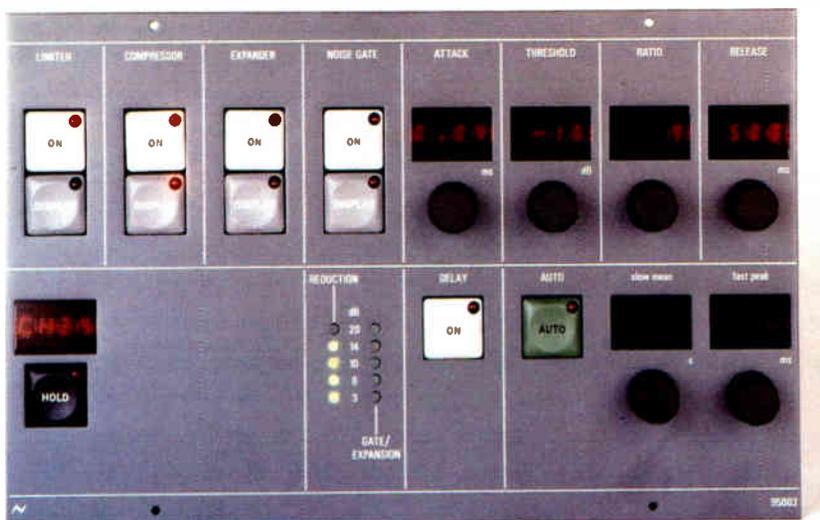
- Music Composition Language (MCL) text based composer.
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# ...THE INDUSTRY STANDARD.



*Neve DSP dynamics facilities*

During the 1960s, improved availability of digital logic circuits and the speed in integrated circuit development provided the computational environment to allow further research and the ability to design digital audio processing devices. Although much research into digital processing in the late 1960s was in areas other than

systems and to the digital audio tape machines available today.

The application of the commercial digital studio is at present limited to those installations having a Neve digital console. Thus present experience is small but nevertheless invaluable in being able to see how the console and studio environment will evolve.

Many concepts used in digital audio today are the result of research performed in the last 50 years which could not be applied at the time due to the lack of available technology.

high quality audio applications, the two requirements of storage and processing capability provided solutions for digital reverberators and delay lines.

Another notable step was the demonstration of a digital audio recorder by the BBC in 1972. Both of these achievements were significant; with the subsequent developments in integrated circuit complexity and materials research they led to the development of the audio processing

The evolution of digital consoles must provide the user with increased performance, control capability, and compatibility with existing equipment by adhering to standard formats where possible, and addressing the design to studio requirements. It is important to realize that the initial development of the digital console was technology-led, in that technology was applied to provide audio processing and operator conven-

ience through complex digital control processing. The evolution of the product must be driven by the user's requirements for a studio environment, and not just for the sake of technology. For instance, it is not good having a processing and control system that provides ease of use, built-in effects, on board storage of audio, etc. if the overall audio performance within a studio environment is unsatisfactory.

I believe there are two areas that will evolve differently: namely music recording studios and broadcasting installations. Although both will become digital, their studio environment requirements differ, mainly due to the use of labels and other intelligent systems. A recording studio is self-contained and will not need to label audio electronically in the near future, except perhaps for basic information such as title, sample rate, pre-emphasis etc., which may be used by the CD mastering processes to set up equipment automatically. One comment from a studio was "what's wrong with writing on the tape box?"

If we consider the broadcast situation, intelligent data will define the audio from basic parameters to actual audio parameters, such as the amounts of equalization and dynamic range control. This data will be passed not only between equipment within a studio but between studios and countries. This is a little more difficult to do than just writing on the tape box.

In broadcast, there is a need for a digital console, not only to incorporate the intelligent handling of label information from sources but also to generate and reformat new data for the destinations. There are many complex issues concerning the effects of transparent handling of labels, which are possibly corruptible by the processes of editing, sample rate conversion, mixing and equalization, and storage. The next generation of consoles must make provision for the acceptance and creation of status and user bits even if their operation is not specified, with a view to incorporation of the intelligent audio path in future products.

Storage requirements will become increasingly important for effects, editing, and possibly tape transport replacement. Several storage-based editing systems are available commercially aimed primarily at video post-production.

Thus, if storage requirements increase, and costs reduce significantly, thereby producing a further boost to the evolution of digital audio, the concept of a multi-track recorder with electronic editing within the console becomes a possibility. It will

—CONTINUED ON PAGE 260

# THE IBANEZ SDR1000: *a closer look*



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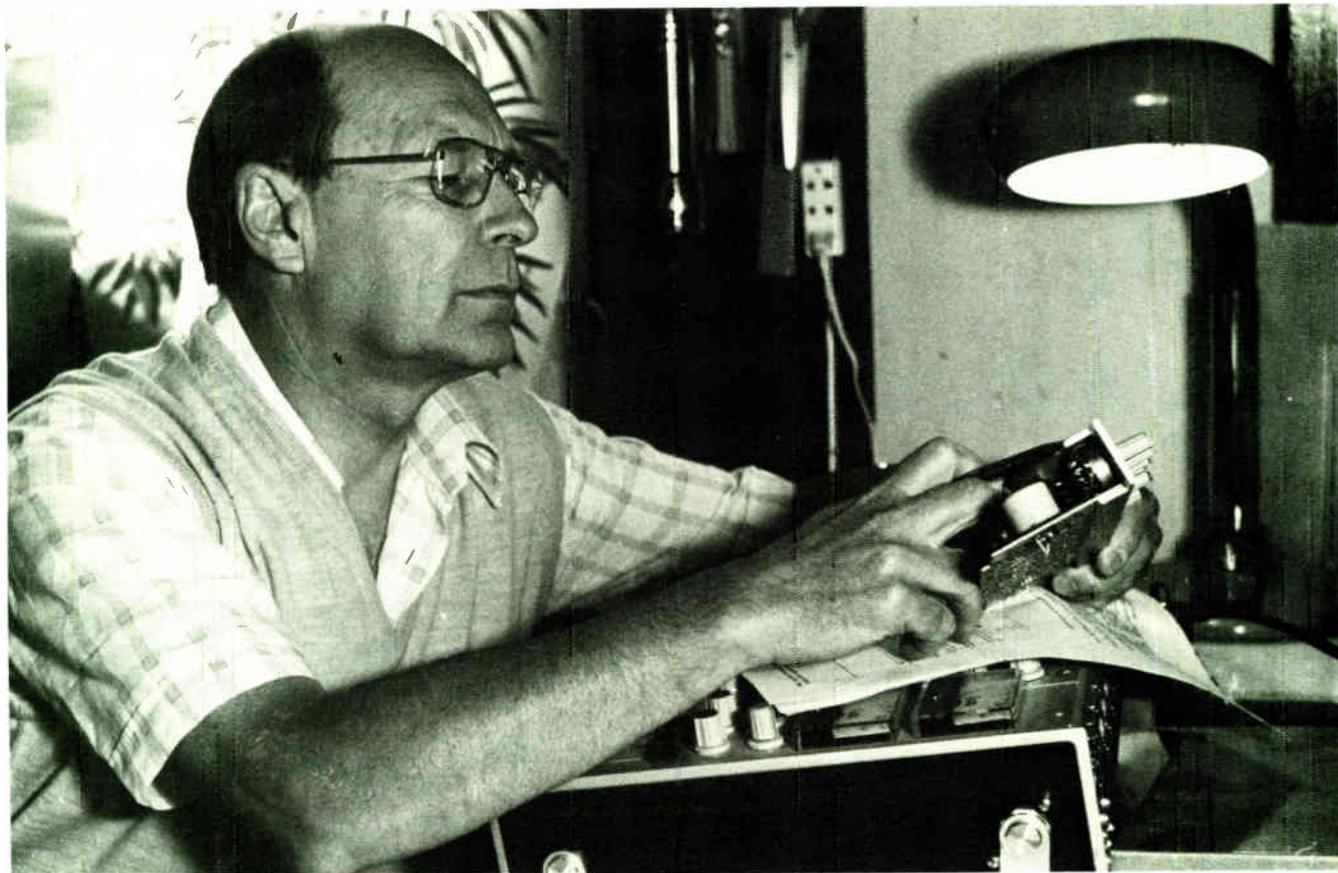
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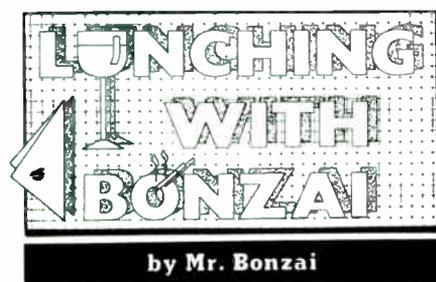
World Radio History



*Rupert modifying an "on air" desk at a community radio station, 12,000 feet up in the Andes.*

# RUPERT NEVE

## SOUND AND VISION



Neve is a legendary name in the audio world, associated with the finest in mixing consoles. But what of the man, Rupert Neve?

At our lunching, Mr. Neve informed me that he was a descendant of Felipe de Neve, the founder of Los Angeles. As a springboard to conversation, I had requested a brief biography. He gave me a telegraphic page-and-a-half. In it I learned that he was English,

but had spent the first 18 years of his life with missionary parents in Argentina. He was cutting 78 rpm vinyl disks in the late '40s. He had started his own business and was manufacturing loudspeaker systems, amplifiers and tape recorders by the late '50s. The Neve company we are familiar with was launched in 1961, achieved fame and fortune, experienced phenomenal growth and was sold in 1972. Mr. Neve remained onboard as a consultant until 1985, when he launched his new company, Focusrite Ltd.

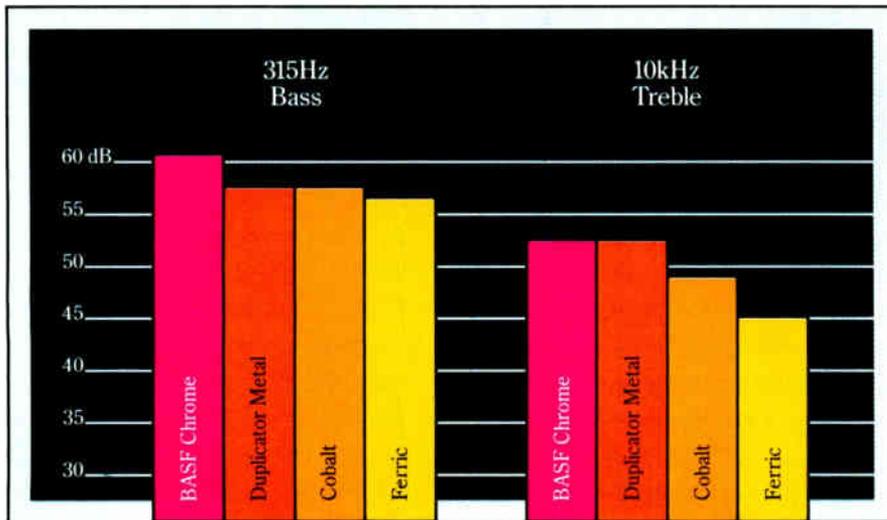
Mr. Neve is a very softspoken gentleman who considers his words thoughtfully and speaks at a civilized, unruffled pace. He is currently restoring old Neve consoles and marketing a new "super module." The "Neve" sound may be a mysterious quality, but Rupert Neve is as straightforward as a country doctor.

**Bonzai:** What was it like for an English child growing up in Argentina?

**Rupert:** Well, it was my home. People don't realize that if they take children overseas, and stay for a length of time, where they live is home. My parents always talked about home as being England, but home to me was Argentina. It took me a long time to feel differently.

I came back to England just towards the end of the war to join His Majesty's Armed Forces, as it was called then. I can always say that we didn't win the war until I came home and joined up. But I was just in on the tail end of the conflict. I didn't like what I saw, at all. Of course, England in wartime was a very difficult place to be. The Argentine was so free and easy. I think you have the same sort of thing here in this country. You're not constrained with a lot of petty rules and

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**DYNAMIC RANGE** is the spread between maximum output level (MOL) and noise (tape hiss). It is a major criterion of tape quality because it shows the true capacity for music. Tapes with high output and high levels of tape hiss are really no better than low output tapes with low noise. It's the difference between output and noise that matters.

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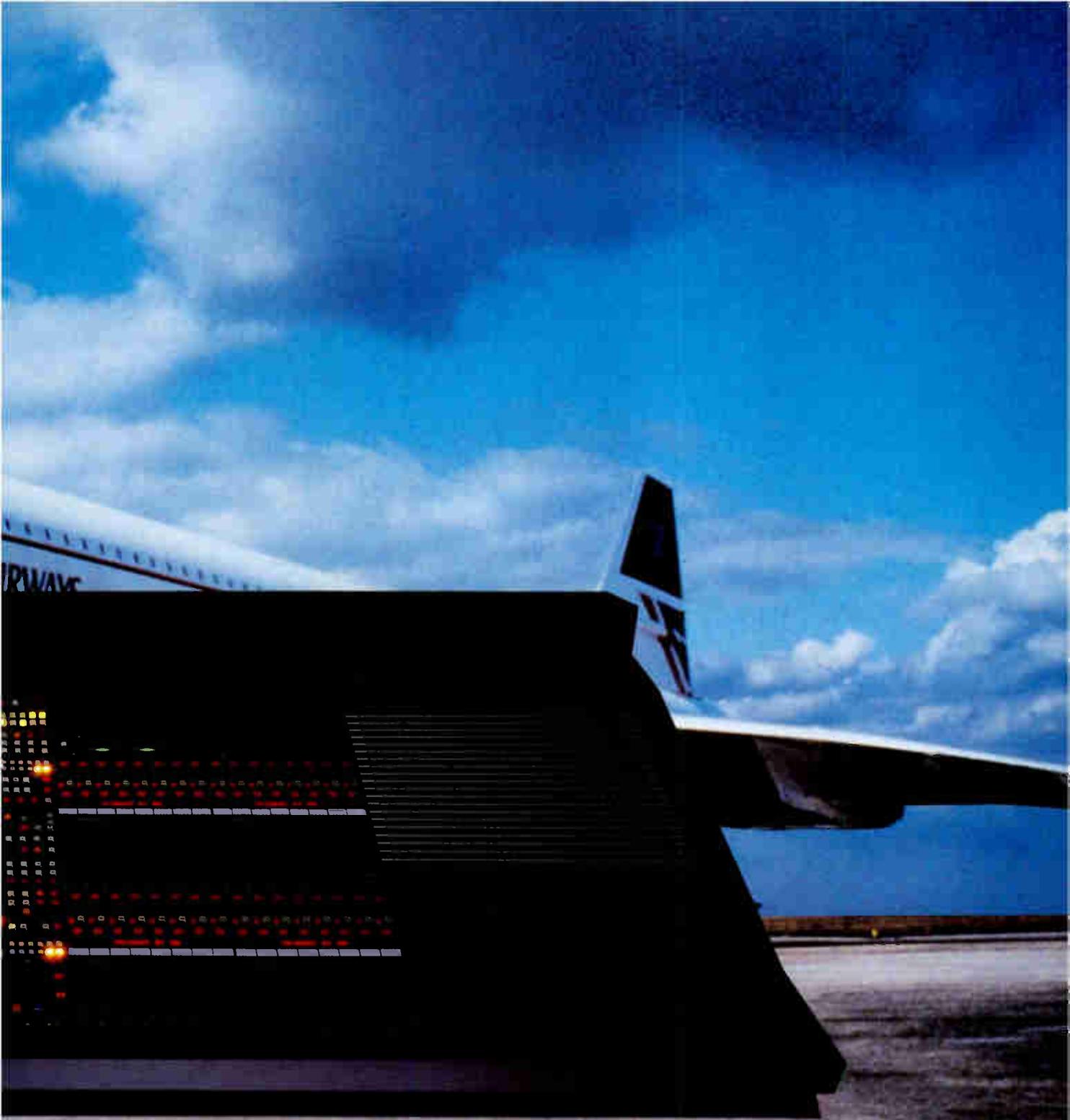
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# BRITISH TECHNOLOGY

## THE DI-AN.



World Radio History

British Airways Concorde

regulations, and little social do's and don't's. If you want to do something, you do it. At first I found England to be very, very constricting—and I was terribly homesick.

**Bonzai:** What was your first intimation that you would be involved in the audio field?

**Rupert:** I first became involved in audio at the age of 13. During the war, the retailers in Buenos Aires could not get hold of equipment, which was mostly imported from the U.S., with a little bit from Europe. There was a real dearth of stuff. There was some junk manufactured locally, such as radio receivers — those little AM radio sets in wooden cases that have long since disappeared. As for anything that would pass for hi-fi, we used to have what were called radiograms, which were the nearest you could get to reasonably good quality record playing equipment: a 10-watt amplifier, a record playing deck of some sort, the old plow pickup weighing several tons, and a couple of speakers, but it was the best there was. I began building little systems and selling them when I was 14.

**Bonzai:** An early start . . .

**Rupert:** I think those early starts are important in order to get a feel for what sound is about, what audio electronics is about.

**Bonzai:** Looking back on all your years in the industry, what do you think your most significant contribution has been?

**Rupert:** Well, it's hard to say that there's any one contribution. I think I fell into the professional field in the early '60s at a time of opportunity which has never existed since. It was just when the idea of stereo was taking root. In the late '50s, the record companies began recording everything 2-track stereo in case stereo really caught on. The studios were finding this to be a very expensive thing to do, and very impractical. They were looking for some better ways of doing it. Big companies were producing audio consoles in a very stylized format. There was Siemens of Austria, and Neumann, and one or two other German firms. There was PYE and EMI in England, and one or two firms over here. The time was ripe for someone to come in who was willing to be flexible. If the customer said, "We want to do it this way—is it possible to do this, that, and the other?" there was mutual stimulation. I would get excited by what was wanted, and would add, "Yes, and we can also do some other interesting things." Customers became excited. The big



companies couldn't operate like this. I think that was the beginning—it opened up a new area in the audio industry. This doesn't answer your question directly, but I found that there was a new market and I, if you like, was able to stimulate that market—and the market stimulated me.

**Bonzai:** Although you've been involved with such products as speakers and recorders, it's consoles that people know you for . . .

**Rupert:** Yes, we started more or less willy nilly, and we made a console. The first one was for Recorded Sound, Ltd. in London, 1961. It was a valve console and I think it took me six weeks to build this 10 into 2, with equalization on each channel, which was unheard of in those days. And we went on from there. People were asking, "These transistors—will they ever be as good as the valves?" I just didn't know. I was an old valve man—well, a young valve man, then.

**Bonzai:** Valve isn't a common term here . . .

**Rupert:** Yes, we still call them valves, and it's tubes here. The valve had some limitations of life, microphony, hum, and problems of this sort, but nevertheless, it was the best we had at the time. People were asking if the transistor would ever be as good, because transistors in those days were noisy, unreliable, and inclined to get into thermal runaway. People didn't know how to design the circuitry, and with great fear and trepidation, I started trying to use these transistors. After some months of messing around, we found that we could actually get very good performance from some of them. Fold feedback around them and you could do things that you couldn't do with valves, or tubes. So, I began to get interested in this.

I remember in the mid-'60s I was asked to give a lecture at the Salford College of Technology, which is now Manchester University. I took some of

our earliest modules with me and I was trying to think of something significant to say to this learned group. I'm not an academic and I was talking to academics. What do you say to people who are thinking in highly elevated terms all the time? I was just the guy on the bench making things. But I felt these modules could be a way forward to the future. Is this the way that professional audio is going to go? It gives you the flexibility of being able to move things around and adapt to different requirements. We had high performance—even then we were getting distortion figures which were nudging the distortion figures of today: .01 percent distortion at 1dB below clipping level. I showed graphs and measurements, because they weren't users. The audience didn't get excited about this lecture, but later I met some of these people after they had graduated and moved around the industry—and I still meet people who were at that lecture—and many tell me that's where it started for them.

The situation made me think in strategic terms about what we were doing—and it began to interest me that we could probably begin to explore and impose this idea of the modular, high-quality, transistorized audio amplifier. And that's where I think it really took off.

**Bonzai:** Could you recount the history of the Neve company, and your subsequent departure?

**Rupert:** Yes, I'm an engineer, and not a businessman. I am also an enthusiast, which is a very dangerous combination in business. We had astronomical success for a number of years. It really took off—doubling and trebling of the output every year. The accountant said we couldn't continue at such a pace. And it happened. We built a factory at Melbourn, just outside of Cambridge. A year later we built another factory in Scotland, because the planners said they didn't want to give us an extension down at the first site. Then we explored how to market in the U.S.—a third of the world market. We decided to set up in Bethel, Connecticut. All these expansions cost an awful lot of money. I hadn't realized how long things take before they come to profitability. We ran out of money.

By the end of '72, I had to either get a big loan from a merchant bank and have strings attached, which I found distasteful, or we had to sell out. So we sold out to a small British public company, which had people on the board whom I knew and felt I could trust. We had a very good relationship and I entered into a consultancy agree-

ment with them which obviously contained non-competition clauses. As the years went on we drifted apart somewhat, and they went into an area of technology, digital and so on, which I knew nothing about. I'm not a digital man at all. I still have a great deal of respect for the Neve company. The product they make is absolutely a worldbeater, first class. The quality of construction, workmanship and so on, is of the very highest order—in fact, higher than when I controlled the company. They've been able to tidy up all of the things that the entrepreneur may overlook. They've done very well, and they've done a good job in preserving the ethos, the name, and that sort of thing—which enables me to go around this country, and throughout the world, and be greeted in the way that I am. It's amazing, fantastic—but it has nothing to do with me. It's the name which has been built up for its product . . .

**Bonzai:** But now you have a new adventure underway: Focusrite Ltd, and a new line of console modules utilizing transformers. What are you up to?

**Rupert:** My relationship with the old company and the agreement is finished. I still have to do something; I still have to earn my living. I have a

consuming interest not only in the business of making money, which is a high priority with everyone in the western world, but in using that money as effectively as I can.

I'm a Christian, many of my staff are Christians and we have set up, as in the old days, a charitable trust. Our goal is to promote the education of Christians so that they can use the media more effectively. A lot of the stuff that you hear from Christian organizations is totally unprofessional and very ineffective. It always worries me. We take the idea from the developed world, where a Christian, if he knows what he's doing and he's well-trained in program production and so on, can be more effective.

If you take that idea into third world situations, you find communities of underprivileged people who are uneducated, illiterate, and so on, but have just the same spread of I.Q. and abilities as any society. You've only got to show them a few things and help them to get started. It's amazing how rewarding it is. I think radio can play a key role in education. Radio by itself can't do it, but radio with the backing of the development agencies and health people can work wonders. So, we're trying to educate the actual agency people who don't know what radio can do—

trying to create two-way, interactive communication.

You put up a transmitter in a little village somewhere, and have the community feeding in and radio feeding out again, expanding over the years with the help of the development people. You teach people how to tell a story. Verbal communication has been a tradition down through the ages. In the marketplace, there is someone who tells the story and the folklore, and it goes down from generation to generation. Now he can tell the story on the radio. Maybe you have a little drama group and you configure the story so the listener recognizes himself as one of the characters. Maybe it's a farmer and he hears a story about a farmer who has found a new seed, or adds something to the soil and has better crops. Then he goes to market and finds a stall with a yellow bag of fertilizer with a green slash. Remember, he's illiterate so you can't expect him to find the right bag by reading the label. And while he's at the market, he sees the development agency there and they are willing to help him. He tells them he heard about it on the radio. You know the way media builds on itself. You integrate not only radio, but if there is literacy, you can also use printed material. You get the collab-

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World Radio History

oration of people who want to work in these areas. There have been a number of developing countries where we have been able to help in quite a significant way.

**Bonzai:** This is the humanistic side of your endeavors. Is it being fueled by your new audio products?

**Rupert:** Yes, my work relates to fundamentalism ethic and rationale. It's difficult to put into words. You used the word humanistic—I wouldn't want that word to get overused. I work because I am a Christian, and I believe in the love of God flowing out to all men. I try to follow in the footsteps of Christ to the extent that I am able to, inadequately though that may be. I try to work that out through my life and my work. I want to build a financial base not to get rich myself, but I need a platform from which to do these other things. That platform is provided by the new company, Focusrite Ltd., which has started to build modules which are similar in their concept to the modules that I talked about earlier, the ones we put into the consoles in the old days.

I found people were coming to me and saying, "These old consoles still have enormously high market value. They're still wanted. Can we find some more modules for them? Can we update them? Can we refurbish them—bring the whole performance back to where it was or even better?" I'm talking about the Neve consoles. After discussions with the Neve company, they said yes, they don't see that as competition, although I am now free to do whatever I like. But I didn't want to offend them. You have a child that grows up and maybe he doesn't go in the direction that you would like to see him go in—but you don't go and stab him in the back. I see it as like a father/son relationship.

**Bonzai:** Can a totally new console be built from these modules?

**Rupert:** Yes, and the idea is that there is a whole range of modules which I am now producing, utilizing channel amplifiers, with very high grade performance. We have very high grade equalization and the modules are very flexible.

**Bonzai:** And you are using transformers . . .

**Rupert:** Oh, yes, I am a transformer man.

**Bonzai:** Isn't this bucking the industry trend?

**Rupert:** Well, in the studio world you're looking at a console by itself, and only interfacing with items in that same room. You may not need trans-

formers, but even there you have to go to certain pains to avoid ground loops, RF loops, and various problems associated with the transformerless console. The problems have been largely overcome, but people still run into troubles. If we're talking about the broadcasting world and other areas of professional audio, then you still have to use transformers to get the isolation you need and those transformers have to be of a very high quality.

To give you an idea, the transformers that we used in the old audio modules would have a distortion performance which frankly stopped being in the low distortion area at about 20 to 25 Hz, and the bandwidth was such that anything over about 25 kHz was rolling off quite rapidly and there were resonances out of band which actually affected the transient response. Today, the transformers I'm using will have absolutely no increase in the distortion at 25 to 30 Hz—only at 20 Hz do we get low enough in frequency to be able to even measure that transformer distortion. We're talking about figures of .01 percent lower at 1dB below clipping. And then at the top end, we are going up to—well, the new modules speak for themselves: 1dB down at 100 kHz, 3dB down at 175 kHz, and that is purposefully rolled off. The transformer will go up to half a megaHertz, so it is totally transparent, but it makes for an extremely flexible device. It's totally stable and there are no problems with any kind of ground loops.

**Bonzai:** Is this revolutionary? Revolutionary? Will it shake up other manufacturers?

**Rupert:** There is a swing back towards the use of transformers. A lot of people are finding that the older Neve modules, even though the performance wasn't quite as good as we're now getting—really did something. There was a Neve sound that was talked about a great deal and it is still talked about. We're not impairing that Neve sound in any way, but transformers are definitely a contributing factor.

With Air Studios, for instance, our first order came for a console. We're not intending to build consoles, not yet, but we had to build a small console for them. We were discussing this and I said if you want to I will give you a direct balanced input, transformerless console. We talked around it a bit and they said no, we'll go for the transformer input. I believe they were right in their judgement. So, it's not going to shake up too many other people. There are those who don't believe in transformers and they will produce

consoles that are very good, which have high performance, and they'll do it their way. I'll do it my way.

**Bonzai:** Looking into the future, would you like to make some broad forecasts for the industry? How will things develop in the next five, ten, 20 years?

**Rupert:** I think, and I may be stating the obvious, that from the gigantic monster consoles of today, we shall see a reduction in size as we go in for assignable facilities. The operator will have a much more compact grouping of controls in front of him and he will assign all kinds of equalizers, outboard equipment, special devices, and they'll be put into memory and treated in the way which you can now accomplish with digital control of audio.

Whether digital will extend into audio itself—I have mixed feelings. Clearly, with the present sampling rates and so on, you cannot get the ultimate in performance. The great jump has been, and will go on and expand, in the delivery system. The customer with the compact disc is getting a replica of your master. That's never been possible before. Previously, there have been so many layers in between. I have my doubts about whether every studio will want to have a digital signal processing console. Everybody is throwing their hats in the air and saying, "Isn't it wonderful what we can do with digital?" I think in the next five years, we shall see a stabilizing and crystalizing of opinion, and a continuing education to search for better and better quality.

**Bonzai:** What is your relationship with music?

**Rupert:** Well, I am not a musician, but I enjoy listening to music and particularly to medieval English church music and that tradition. Living near Cambridge, we have a tremendous wealth of music there—King's College Chapel Choir, St. John's Chapel Choir—the best in the world. Try recording a choir with anything other than the very best equipment you can muster, in terms of microphones, processing, etc., and it's going to sound a mess. A lot of the equipment which we get away with in a pop studio would never be able to record a choir in the natural setting. But if your equipment will handle that sort of thing, it will handle anything.

**Bonzai:** If you had lived in an age before audio electronics, what role would you have played in society?

**Rupert:** I think that's impossible to answer, because I think that one is prepared through the environment in

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which one finds oneself, and in the time in history in which one finds oneself, to do a particular thing. Your education and the rest of it leads to a particular end. I am an entrepreneur at heart, so I would be out doing something. I'm a rebel—I would be doing something different. If somebody says this is the normal way of doing it, I want to find another way. Those principles would still apply, but I don't know specifically what I would have been doing.

**Bonzai:** Can you describe that "eureka moment" when you were struggling with some sort of design and the solution appeared miraculously?

**Rupert:** No, solutions don't appear miraculously—they are the result of a lot of hard work, a lot of burning the midnight oil, and a lot of intense frustration from doing it the wrong way until you find the right way. I am a Christian, but I don't make any claim whatever to a divine hot wire to God through which He gives me an answer. But, of course, He does actually do that, but not so that you notice it. You look back afterwards and say, well, OK, we got by and what we did was good—but you realize how really ill-equipped you were to do the thing, and how many mistakes you could have made.

I look back on the initial stepping from valves into transistors. I knew nothing about transistors, and as I find almost every day when I see the kinds of rocks that I avoided, I realize I didn't avoid those rocks by myself. That's where I believe in God's guidance. I don't think He turns the page of the book for you and points out the circuit. There is nothing miraculous in that sense, but if you are prepared to put in the hard work, you get results.

**Bonzai:** How will your new modules reach the marketplace?

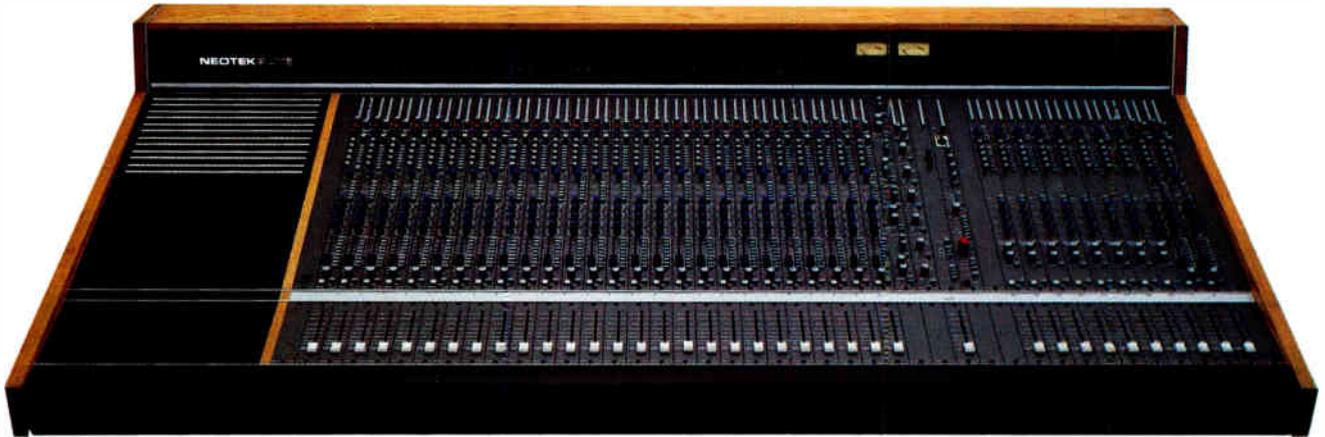
**Rupert:** We're exploring possibilities of distribution and representation. In the U.S. we're going to distribute through Jor-Dan Studios in Wheaton, Illinois—people we've known for some time. They will be setting up the Focusrite Corporation in the U.S. We're looking for ways of distributing in various areas, and will be working with Audio Intervisual Design on the West Coast. It's still very early, and I don't want to get into consoles immediately, but there have been contacts.

**Bonzai:** I imagine it will be difficult to avoid . . .

**Rupert:** It's an interesting situation. Our first contract was with Air Studios. Neve has enjoyed a good relation-

—CONTINUED ON PAGE 126

# flexibility...



Audio consoles were once designed for particular applications. You decided up front what type of clients you were going after, and then picked a console accordingly, keeping your fingers crossed that the clients would approve.

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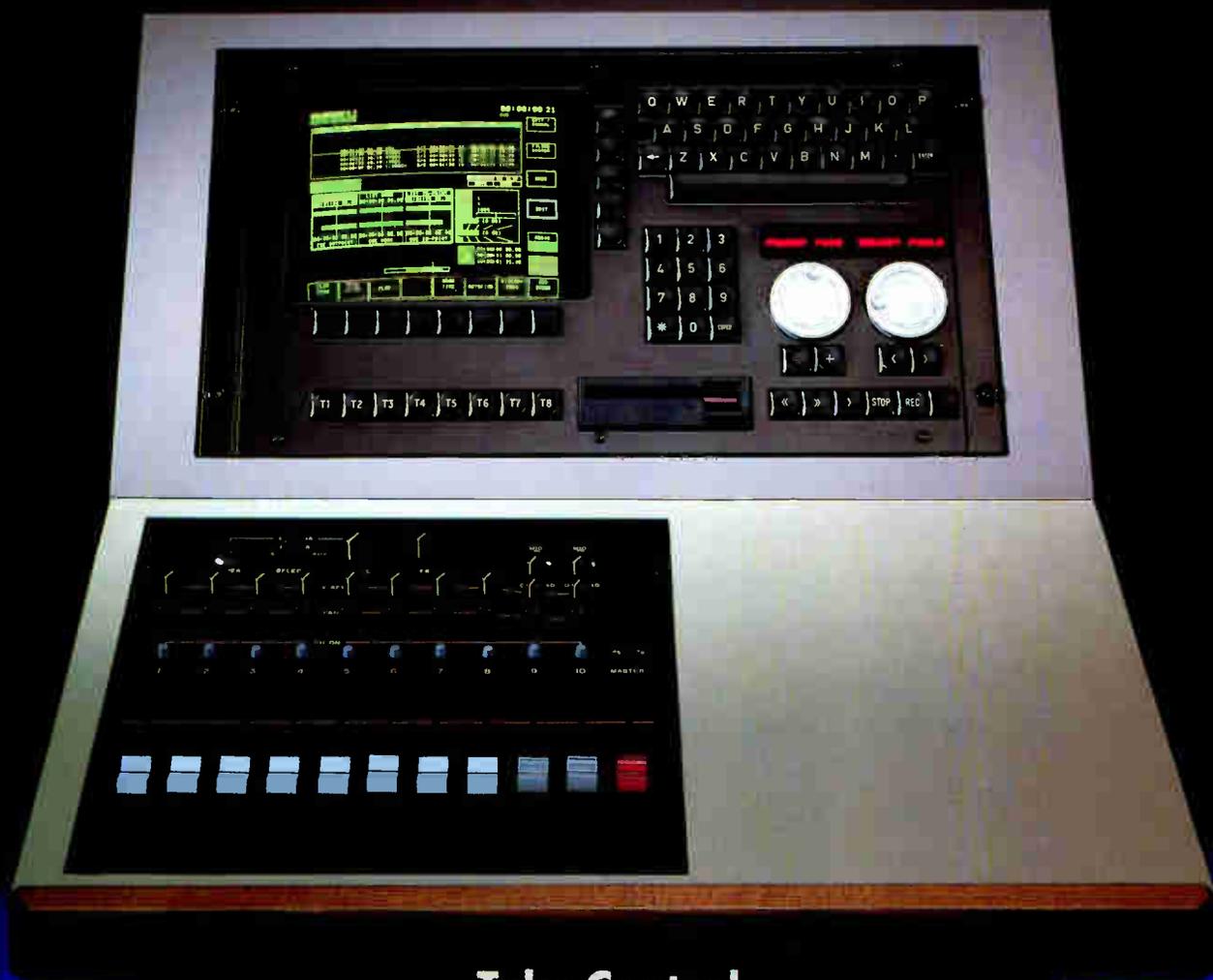
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# CD-I A COMMON MEETING GROUND FOR THREE INDUSTRIES

by Bryan Brewer

Record labels, book publishers, and software companies have each created consumer markets based on different physical media, as well as different primary distribution channels. You go to a record store to buy a tape, a CD, or an LP. You go to a bookstore to buy a book printed on paper. You go to a computer store to buy a program on diskette.

CD-I has the potential to change all this. Never before have audio, text, pictures, and software been accommodated so well in a single consumer medium. Sure, you can find talking books on tape, program source code printed in magazines, or sound effects as a part of computer game diskettes. But CD-I will do all of these—and in spades.

The key to CD-I's multi-media power is the incredible amount of information you can cram onto a compact disc—over 600 megabytes of digital data. Software has always been digital, and along with it came ASCII code for text. Consumer audio entered the digital realm with the CD. And digital pictures and animation will arrive with CD-I. (Full digital video on a CD-I disc is still a few years away, awaiting refinement of data compression techniques and advances in storage density.)

The CD-I digital equivalents of typical versions of a computer program, a text book, a picture book, and a music album each require an increasing order of magnitude of data storage. The space for a program on an IBM diskette is roughly 400k (or 0.4 megabytes). A good long book might take up ten times that amount, or 4 megabytes of ASCII text. A CD-I "picture book" of 400 high quality still frame video images would occupy about 40 megabytes. And a typical album of music uses about 400 megabytes of the CD's storage.

Of course, there will be variations in these figures, both in the amount of information stored as well as alternate CD-I formats for pictures, text, and especially audio. The main point is the

difference in magnitude of digital storage requirements for these traditional forms of consumer items. This wide range in digital storage is what allows for such varied combinations of the four CD-I content media.

## The CD-I Publisher/Producer/Developer

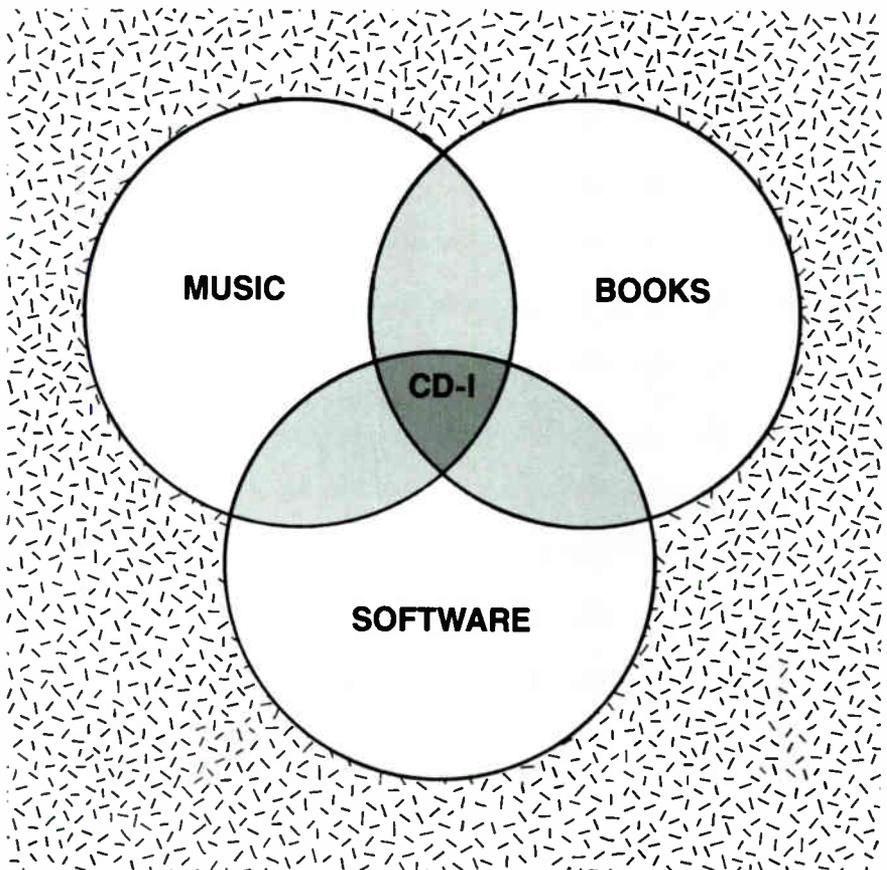
How will publishers, producers, and developers approach a medium that can accommodate the contents of a book, a music album, and a computer program—all stored on a single disc and all integrated through program control? To understand each industry's point of view, first consider some key points about CD-I.

As mentioned above, CD-I is multimedia, representing a quantum leap for each type of separate content. Books can now have sound and interaction. Music can now have pictures

and program control. And computer programs can now have high-quality sound and animation. In this area, CD-I offers true synergy for all these media.

CD-I is also inherently interactive, and here is where the software industry has an advantage. Program control and interaction are the stock-in-trade of software developers. Book publishers and record labels are faced with a whole new area that is mostly foreign to them. However, the possibilities for manipulating text and audio on CD-I have potentials that have heretofore never been tapped in a consumer medium.

For text, this potential is the ability to use software to search for specific combinations of words and phrases in large text databases. The first inkling of the power of this technique can be found in *The Electronic Encyclopedia* from Grolier on CD-ROM. This capa-



## COMPARISON OF CD-I CONTENT

	SOFTWARE	PUBLISHING		RECORDING
	Programs	Text	Pictures	Audio
<b>Primary publishing media</b>	Diskette	Paper	Paper	Tape, CD, LP
<b>Primary distribution point</b>	Computer store	Bookstore	Bookstore	Record store
<b>Typical consumer item</b>	Computer program	Book (text)	Picture book	Music album
<b>CD-I storage for item</b>	0.4 megabytes	4 megabytes	40 megabytes	400 megabytes
<b>Price range for consumer items</b>	\$20- \$200	\$5 - \$20	\$20 - \$60	\$5 - \$15
<b>Annual sales to consumers (1985 retail)</b>	\$770 million	\$9.9 billion		\$4.4 billion

bility will provide speedier access to reference and how-to material that will appear on CD-I. It will also play an important role in CD-I computer games that will interpret typed input from the user.

The implications of interactive audio could be even more far-reaching. CD-I will be the first consumer electronics product to actually talk—in real human voices—to the user. This kind of audio support, as well as the complete range of music, sound effects, and synthesized audio, will add a new dimension of realism, drama, and excitement to the user interface.

Of course, it remains to be seen whether or not consumers really want to interact very much with their CD player or their TV. There is a lot to be said for passive entertainment.

Several other CD-I concepts color each type of content's role in the media fix. For example, the operating system for CD-I is being planned around "real-time" playback. While the display of text and pictures can occur at various rates, audio is inherently real time, and will thus be in the driver's seat for real time coordination of program events.

CD-I is also a read-only environment. You cannot record data on a CD-I disc (although you could on a floppy disk attached to a CD-I player). Publishers and record producers are comfortable with read-only media, whereas

many software developers have difficulty adjusting to this limitation.

And finally, CD-I is an all-digital medium. This is the natural environment for software, but the other types of contents usually require some conversion to digital format. Text must be typed or scanned or read from typesetting tapes, and this presents a little problem, since most text is stored in ASCII code in some form or another. Audio is usually recorded in analog form, and must then be converted to digital PCM format. Also, the lower fidelity levels of audio must undergo a further encoding process to be stored in ADPCM format.

Digitizing pictures presents perhaps the greatest obstacle in terms of time and cost of preparing content for CD-I. Availability of video scanners and DYUV encoding equipment will present a production bottleneck, at least in the early stages of CD-I development.

### Industry Outlook

What we have, then, are three very different perspectives on CD-I from these industries. The primary concern of book publishers is copyright protection of their textual material on CD-I. Unlike easily copied music albums and software diskettes, books and large data bases have until now been more protected from wholesale piracy.

CD-I will change that, putting this material in electronic form into the hands of users who could "auto-plagiarize" the text (to quote Gary Kildall) for their own convenience or profit.

And their concern is very reasonable. After all, they have the largest of these three consumer markets (almost \$10 billion in 1985) to protect. And their material is subject to the greatest compacting on the disc. 600 megabytes is a floor-to-ceiling bookcase worth of text.

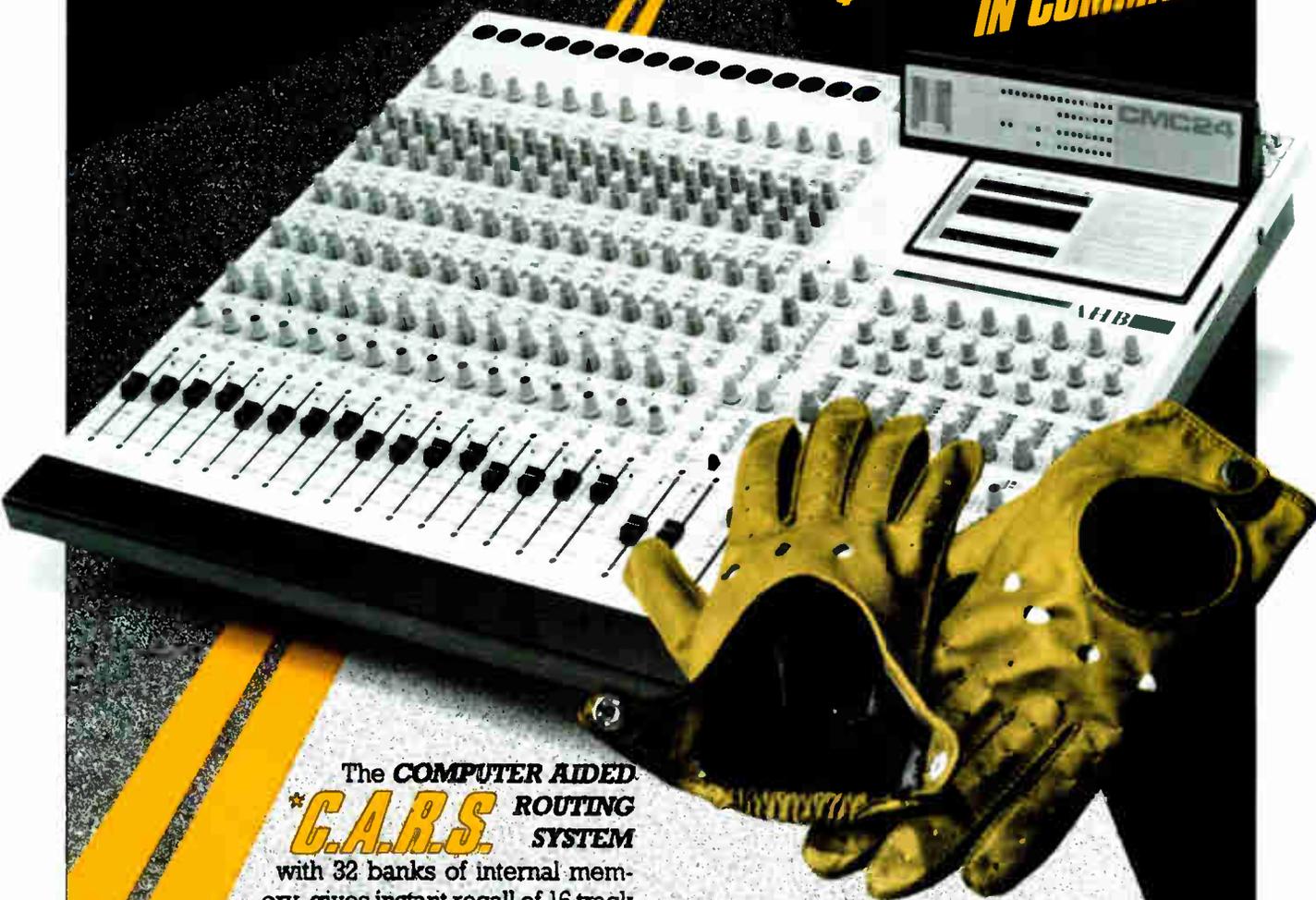
Next in market size is the recording industry, with virtually no experience in software. These less conservative types are wondering how interactive text and pictures can make music appealing enough to consumers to buy CD-I products. Record labels also feel threatened by software companies and publishers whom they feel will preempt "their" compact disc.

The software industry's main response has been to bristle at the imposition of a single standard for the CD-I hardware and operating system. This industry has grown up on a multiplicity of standards, and has a deeply ingrained ethic of constantly pursuing technical improvements even at the cost of consumer confusion. (This factor weighs heavily in the home software industry's relatively small market size of less than \$1 billion.)

And all three groups lament the lack

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of full-motion video capability on CD-I. However, according to an article by Larry Lowe in the May/June 1986 issue of *Video Computing*, CD-I will be "capable of playing motion video in a window up to 1/3 by 1/3 of the screen. Although this won't satisfy movie watchers, it will provide a measure of flow to the program interaction that is wide open to creative exploitation."

None of these constrained points-of-view is likely to prevent these industries from participating in CD-I software development. But understanding the biases inherent in each may give you added insight in dealing with the frustration that is inevitable when a new technology and creative developers meet on the playing field of business.

### **Here Come the Discs**

What, then, can we expect from the first wave of CD-I programs, scheduled to appear by the end of 1987? Many of the initial applications will adapt existing audio cassettes, books, and software programs by adding the complementary CD-I elements lacking in their current incarnations.

From the audio recording arena, we can look for "music plus" CD-I discs. One could be an album of music that also includes text and pictures covering the artist's background as well as the album liner notes. Another could provide graphical accompaniment to the music, showing animation or video stills like a slide show. Or a record company could put out its catalog of music discs on CD-I, with interactive access to complete information about each album, including a picture of the album cover, liner notes, and even an excerpt of the music.

Publishers are likely to concentrate on reference and "how-to" material for practical application in the home. The "multi-media" encyclopedia is a favorite example which can be used for a variety of materials. (How about the *Whole Earth Catalog* on CD-I, with Stewart Brand's voice guiding you to the information you want?) Imagine auto repair discs that take you step by step through various procedures using audio instruction and pictures. Or a picture book of thousands of video stills, each with a caption or some short narration. In all of these examples, the interactive aspect of CD-I will give the user control over direct access of the desired information.

Software developers can be expected to add CD-I audio, pictures, and animation to computer games and educational programs. For example, a flight simulator program could be far more realistic with video stills of cockpit views as well as audio simulations

---

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have audio, text,  
pictures and  
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accommodated  
so well in a  
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of control tower dialogue, engine noises, and, of course, crashes. Adventure games will take on added dimensions of realism and drama using audio and pictures. And training programs can be designed to accommodate different learning styles based on verbal, visual, aural, and kinesthetic modes of perception.

These extensions of existing materials are natural first attempts at using a new medium that combines audio, text, pictures, and software. But the discs that will really sell CD-I will probably come in a second wave of products after the basics of CD-I development have been mastered. More and more creative people will recognize the extreme importance of forming cooperative alliances with people in recording, publishing, and software. From product development all the way to sales, appropriate cooperation among elements of these three industries will have a synergistic effect on CD-I.

### **CD-I Hardware and Software**

When you put all the fantastic "CD-Ideas" aside for a moment, one fact remains: CD-I is a consumer product, where marketing distribution, and pricing reign supreme, and the consumer will make or break the medium on the basis of these factors. Each of these areas holds some major concerns for CD-I.

In the marketing arena, the big question is how CD-I hardware will be positioned on the consumer mar-

ket. The same manufacturers who now make audio CD players, such as Sony, Technics, Toshiba, etc., will (along with Philips) introduce the first CD-I players. Most likely, these units will be sold in hi-fi stores as "super CD players." But the accompanying software will include computer games and book-oriented titles that may well confuse the consumer as to just what kind of a machine CD-I is. Is it also a computer? Well, yes, but don't mention that too loudly. Is it also a "reader" or "viewer" of text and pictures? Yes, but we don't know exactly who will buy one of those. The marketeers for CD-I have their work cut out for them.

Now consider where you'll buy a CD-I disc. Naturally, record labels will want you to buy all your CDs (including interactive ones) at your local record store. Here the recording industry has a tremendous advantage in already existing consumer awareness of the compact disc as well as established distribution channels. But it may make just as much sense to buy an interactive CD in a computer or software store. Or even in a bookstore. Just as CD audio spawned CD-only "record" stores, CD-I may launch the CD-I store, where trying out the disc before you buy may be the key element in consumer purchases.

And given that the marketing and distribution of CD-I works well, how much will the consumer have to pay for this new technology? Best guesses for the hardware are in the \$1,000 range, maybe more. After all, this gear will have a lot of computing power built into it. As for the discs, well, anything goes. Consumers now pay as little as \$4 or \$5 for a book and as much as \$200 for home software. Pricing of CD-I discs will likely be all over this spectrum until the market dictates the real value of these programs.

### **The Bright Side**

Despite these problems, I believe CD-I has a bright future. Record labels, publishers, and software companies will develop the programs for this medium and they will find a way to sell them. As software development tools and techniques mature, the costs of producing discs will come down. And the same kind of price drops will happen for the hardware, although not nearly as dramatically as we have seen for CD audio. And the synergism that will surely result from intelligent cooperation among the associated industries will result in better products that meet real consumer needs.

And to put a little icing on the CD-I cake, consider one practical result of combining text, pictures, audio, and software on the same medium. Each

of the media can be copied from a CD-I disc to another medium—floppy disk, audio tape, video tape—even a photocopier. But if you create a CD-I disc that uses several of these elements in a truly integrated fashion, the prospects of unauthorized copying of the material diminish greatly.

By truly integrated I mean that any of the elements is essential to operation and enjoyment of the program, but only in combination with some of the other elements. For example, an adventure game might use audio for clues. Or an interactive fiction book might require software control. Or an educational program might show sound and pictures in synchronization. Separate copies of the audio, text, or programs would be useless.

To have a useful copy of a truly integrated multi-media CD-I disc, it must also be on compact disc. But the recordable CD is not in sight yet. And when it does appear, it is likely that the media—the “blank discs”—may be costly and delicate, and may also have data integrity limitations that dictate their use primarily for audio and other data whose integrity is subject to graceful degradation.

The result is that it will be difficult, if not also economically unfeasible, to copy the entire contents of a CD onto another CD. And, not only will the recordable drives be scarce but the price of the recordable media may well be more than the cost of the original CD-I program.

What we have, then, is one of the perceived weaknesses of CD-I—its read-only nature—transformed into one of its inherent strengths. And this merely by recognizing that businesses that produce such truly integrated multi-media CD-I programs will be far more motivated to invest in their development if they are assured that unauthorized consumer copying will be negligible. This will be analogous to the days in book publishing prior to cheap copy machines. It won't last forever, but it may provide enough of a window of opportunity in the economic motivation of publishers at this early stage. With any luck, these three industries will cooperate to create a rich heritage of CD-I products that will assure this medium of a prominent place in the historical spectrum of communications technology. ■

*Bryan Brewer is president of Earth View Inc., a Seattle-based company specializing in interactive applications of the compact disc. He is also a contributing editor of Digital Audio magazine, where his regular monthly column, "CD and Beyond," is in its third year of publication.*

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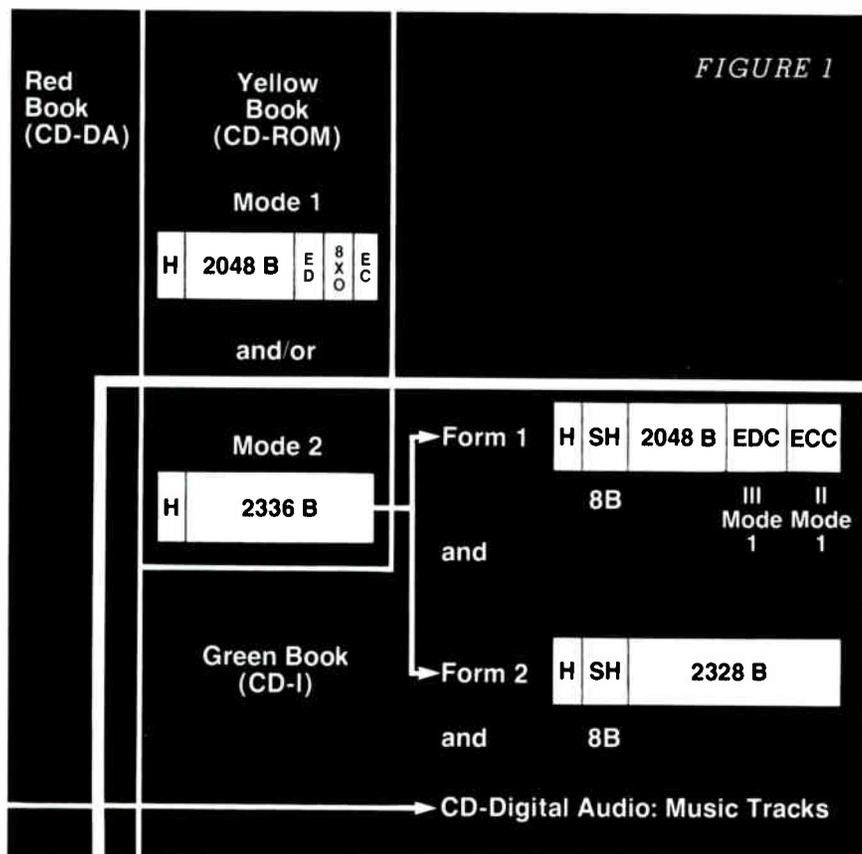
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# INSIDER - AUDIO



CD-Audio discs. In addition, CD-I players are able to play regular CD-Audio discs; it is thus an upscale CD system.

The CD-I format defines both hardware and software standards, much like the CD-Audio format. Although CD-ROM can also store text, graphics, etc., CD-I specially defines an integration of those functions. Because CD-I is an interactive medium, its information may be accessed through a dialogue procedure. The system can present the user with alternatives, which he can then use to steer his way to the desired information.

The specification for the CD-I standard is detailed in the "Green Book," available to all CD-I licensees. CD-I is a specific application of CD-ROM with rigidly defined implementations, as in the CD-Audio format. The CD-I standard defines the following:

How various types of information such as video, audio, text, executable code, and graphics will be distinguished and identified on the media.

How each type of information will be encoded, including specification for several formats of high, medium or low resolution video, audio, graphics, data compaction, etc.

## CD-I

## A TECHNICAL OVERVIEW

by Ken Pohlmann

A single CD-I disc might contain almost 20 hours of audio, 7,000 color pictures, 300,000 typed pages or any combination of the three.

What is CD-I? How is it different from CD-ROM? What will happen to good old, regular audio CD? If we start calling it CD-A would that make things more confusing or less?

As if we didn't have enough to worry about already, those and other tough questions have been added to the list, thanks to the introduction of the CD-I format, another spin-off to the CD family. Let's check out this newcomer and assess its impact on you, me, and those millions of suddenly-obsolete audio CD players out there.

CD-I (Compact Disc—Interactive) is a special application of the CD-ROM format. Rather than store specific data such as computer software on a CD-ROM, or music on an audio CD, CD-I allows storage of a simultaneous combination of audio, video, graphics, text, and data, all functioning in an interactive format. CD-I is thus a multi-media extension of digital audio found on

How logical layout of files will be handled on the disc.

How hardware will read discs and decode the contained information.

CD-I is specified in detail because it is targeted for the mass consumer market as a user-friendly, standardized system. It is thus important for all present and future CD-I discs to be interchangeable and play in all present and future CD-I players.

CD-I systems are single media systems, containing both operational program and the information itself, so that no secondary mediums such as floppy disks are required for boot-up, etc. In addition, CD-I is intended to piggy-back on other electronics products such as CD-Audio players, television, etc., for multimedia presentation. CD-I applications can be divided into five categories:

Automotive: maps, navigation, tourist information, real time animation, diagnostics.

Education and training: do-it-your-

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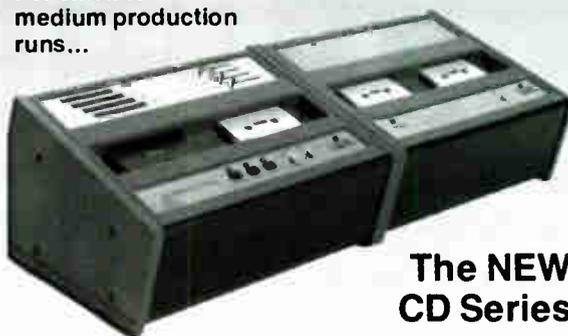
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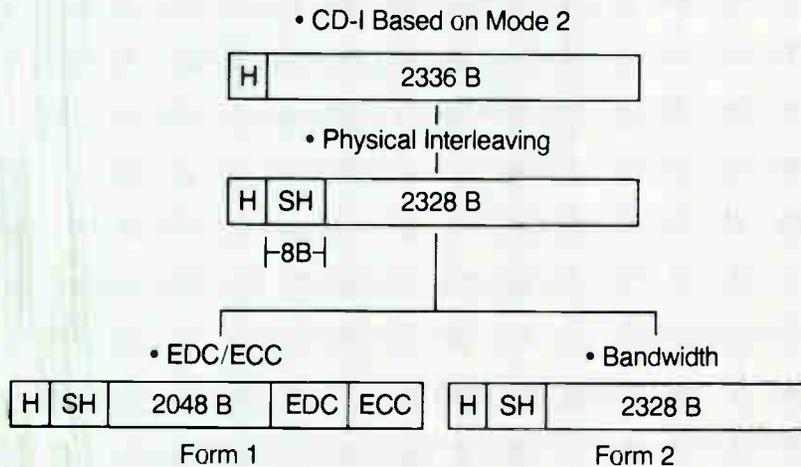
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**FIGURE 2**



self, home learning, interactive training, reference books, albums, talking books.

Entertainment: music plus (music with text, notes, pictures, etc.), action games, strategic games, adventure games, activity simulation, "edutainment."

Creative leisure: drawing and painting, filming, composing.

Work: document processing, information retrieval and analysis.

These applications require flexibility in audio and video quality levels, to best suit the application at hand. Thus audio fidelity can be selected, as can video resolution and color coding. Longer playing times are achieved by dividing a disc into channels, the number depending on the quality of the audio and video programs. In addition, real time requirements for interactivity necessitated the adoption of executable object code as the coding method for application software. Multimedia applications also call for physical interleaving of the three basic types of data (audio, video, and text/binary) to insure synchronized presentation of different data types. Finally, the disc must provide efficient storage for both data that degrades gracefully (audio and video) and data that does not (text/binary). The former thus requires maximum bandwidth while the latter requires extended error detection and correction.

The CD-I data format may be considered as a subset of the CD-ROM data format. A CD-I system is designed to read CD-I discs, compatible CD-ROM discs, and CD-Audio discs, as shown in Figure 1. The CD-I format provides for this three-way compatibility. The CD-I format uses a sub-header, and two physical formats (referred to as Forms), as shown in Figure

CD-I is not a peripheral, but a self-contained system. To ensure universal disc/drive compatibility, dedicated hardware and interfaces are specified.

2. The sub-header is used for real time physical interleaving of data, while the two Forms define two levels of data integrity.

Form 1 is intended for text, computer data, and highly compressed visual data; extended error detection and correction (EDC/ECC) is used. The extended error code used is the same as for CD-ROM Mode 1. In Form 1, user data occupies 2048 bytes, and 280 bytes are reserved for extended error detection and correction codes.

Form 2 is intended for real time audio and video; EDC/ECC is omitted. In Form 2, user data occupies 2328 bytes.

To differentiate one kind of CD-I data from the other, a sub-header is placed immediately after the regular 16-byte CD-ROM sync/address/mode header. Depending on the kind of data in that block, the data is directed to the appropriate circuitry for reproduction, display, or processing. In Form 1, the 8-byte space usually found between them is omitted, to compensate for the eight bytes used by the sub-header, this gives 2048 bytes, as shown in Figure 3. Otherwise, in Form 2, 2328 user bytes are available which is eight less than in CD-ROM Mode 2.

The compatibility hierarchy of the CD family may be summarized: when only a physical format compatibility is required, then specific discs may be associated with specific systems. At a second level, with professional text-oriented contents, a bridge exists between CD-ROM and CD-I, based on the Mode 1 format. For the consumer marketplace, a further level of compatibility is required, so that all CD-I discs are compatible with all CD-I systems. In addition, CD-Audio discs may be played on CD-I systems. To summarize, CD-I discs are based on the CD-ROM Mode 2 format. CD-ROM/CD-I compatible discs are based on the CD-ROM Mode 1 format. The CD-I system is capable of reading both, as well as CD-Audio discs.

The CD-I format calls for a total storage capacity of approximately 650 Mbytes. Because a CD-I disc is recorded with constant linear velocity, a constant readout of 75 sectors (or frames) a second is achieved. This results in a data transfer rate of 153.6 kbytes per second for Form 1 (and Mode 1) and 176.4 kbytes per second for Form 2.

To allow for extended video information, data compression techniques are used to reduce the storage space required to encode the audio program. The CD-I format offers four levels of music quality, to be selected according to the need for fidelity. A CD-Audio mode uses linear 16-bit PCM encoding for the same stereo fidelity as regular audio CDs. Alternatively, 8- or 4-bit adaptive delta pulse code modulation (ADPCM) is used for three levels of varying fidelity: Hi-Fi music mode which approximates LP quality, Mid-Fi music mode which approximates FM quality, and Speech mode for AM quality.

Music program is divided into channels (each with about 72 minutes of playing time). The 16-bit PCM channel is stereo, the three ADPCM modes can be recorded in either stereo or monaural. The number of channels increases as the fidelity level decreases, as shown in Figure 4. Of course, there are always twice as many mon-

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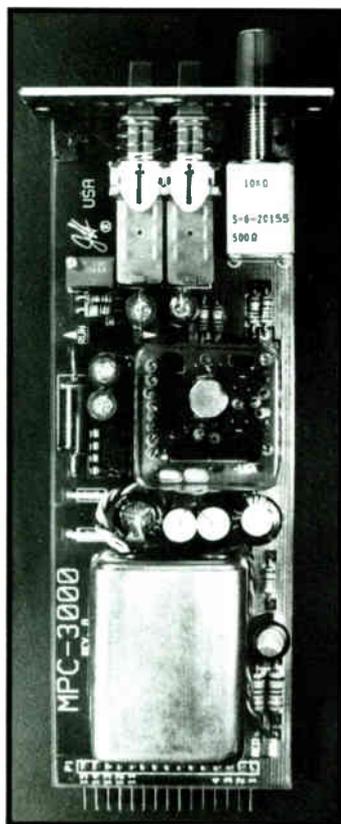
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Fiction works could be provided with a labyrinth of plot deviations, differing each time the book is read or steered at the discretion of the viewer.

aural channels as stereo channels. For example, in Mid-Fi Mode, there could be four stereo channels or eight monaural channels. In Speech mode, a disc could have up to 16 72-minute monaural channels. There is a one- to three-second pause when switching from the end of one channel to the beginning of the next channel.

The audio information on a disc might share its storage capacity with video information. Given the different quality levels, one hour of audio leaves greater or lesser storage space for video information, as shown in Figure 5. Likewise, the amount of video information depends on its quality level.

A CD-I disc can store video material, with varying quality levels for resolution pixel coding. Two standards of video resolution are supported: normal resolution of 384 X 280 pixels, and high resolution of 768 X 560 pixels. Normal resolution corresponds to best achievable resolution with normal television receivers, while high resolution is the best achievable with future enhanced or digital receivers. Pictures are generally non-interlaced, although interlacing can be used.

The CD-I specification provides for the world standard disc, useable on any television (NTSC, PAL, SECAM). Picture coding provides for three pic-

ture qualities: studio picture quality, and two graphic pictures. Natural pictures use YUV coding; they occupy about 325 kilobytes per picture without interlacing (650 kilobytes with interlacing). All natural pictures are compressed with DYUV coding (4:2:2) to 108 kilobytes. At a data rate of 174.6 kilobytes per second in Form 2, one full frame natural picture is transferred in just over 0.6 seconds.

The first graphics mode is designed for end-user manipulation applications; it is based on absolute RGB (red-green-blue) coding, and supports either 8-bit/256 colors, or 15-bit/32,768 colors. A 15-bit RGB graphic would occupy about 215 kilobytes per picture. No compression is used in this mode.

The second graphics mode is designed for animation and is based on CLUT (color look-up table) graphics which permit 4-bit/16, 7-bit/128, or 8-bit/256 color full screen animation. The CLUT 8-bit mode requires 108 kilobytes per picture. Compression can reduce this to typically less than 10 kilobytes per picture. With compression, the interleaving of sound and CLUT picture results in the ability to provide full screen animation with a picture refresh rate of 17 frames per second, in Form 2.

Text encoding can be visualized

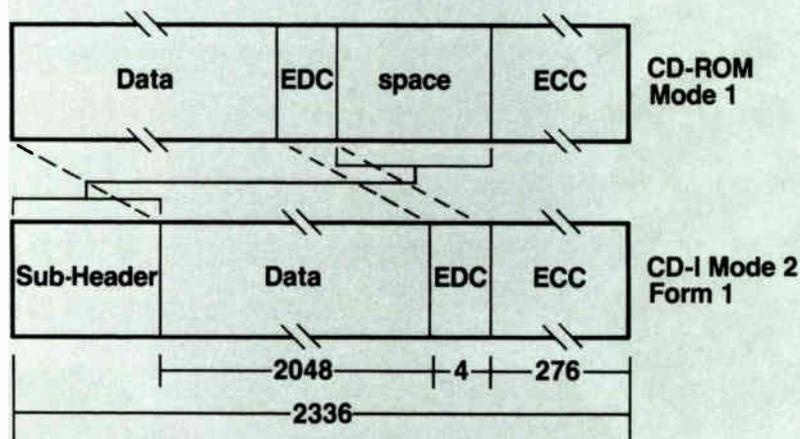


FIGURE 3

either as a bit-map process, or by character encoding via systems software. The bit-map process requires five bytes per character, resulting in a maximum of 120 million characters per disc (if only 16 colors are used in an 8 X 10 matrix). These characters cannot be manipulated under program control. Up to five overlaying planes are defined, with both transparency and translucency for all except the background plane. One plane is reserved for external video, and another for the cursor.

Character-encoded text can either be system text or application text in standardized form, using one byte per character, giving a total of 600 million characters on a disc. Application text can be encoded with two bytes per character, specifying factors such as color, font type, character size, etc. resulting in a total of 300 million characters per disc. In both cases, it is possible to manipulate text via software, for example, copying text from disc to external storage.

In the normal mode, text is limited to 40 characters on 20 lines. The high resolution mode allows 80 characters on 40 lines. Compatibility is maintained between the two text formats. A wide range of visual effects are defined, including cuts, scrolls, overlays, dissolves, fades, etc.

Audio Level (Coding)	Stereo/Mono	# Channels
CD-Digital Audio (PCM)	S	1
Hi-Fi Music (ADPCM)	S M	2 4
Mid-Fi Music (ADPCM)	S M	4 8
Speech (ADPCM)	S M	8 16

FIGURE 4

CD-I is not a peripheral, but a self-contained system. To ensure universal disc/drive compatibility, dedicated hardware and interfaces are specified. A CD-I player contains a CD-ROM disc drive as the system's input, decoder chips for text, graphics, video, and au-

dio, and microprocessor controllers; it could be interfaced to your television, and stereo. Although a CD-I player could be interfaced to a personal computer, it would not be cost-effective, and misses the medium's intent; a CD-ROM drive alone would make a better



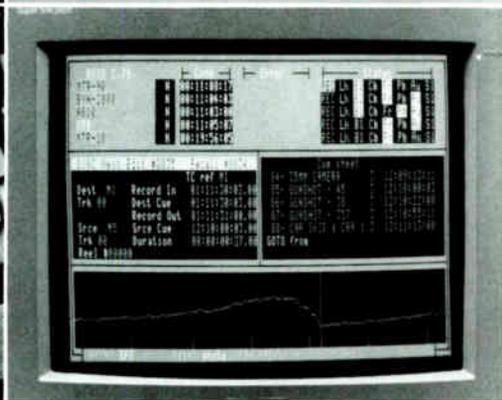
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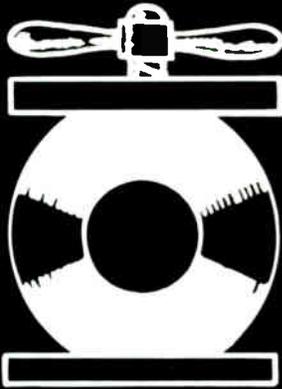
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computer peripheral. The CD-I system uses the Motorola 68000 microprocessor family. The CD-I real time operating system (CD-RTOS) is based on the OS-9 real time operating system. All CD-I players can search, retrieve, process and output any information stored on any CD-I disc.

Because the CD-I format recognizes 16-bit PCM data (the first audio quality level), a CD-I player can play regular CD-Audio discs. An audio CD player cannot play CD-I discs. As specified in the High Sierra Group proposal, CD-ROM Mode 1 discs can operate on CD-I systems. On the other hand, a microcomputer with a CD-ROM drive is not always capable of processing the information on a CD-I. Hopefully, universal players will appear, able to play any kind of CD: CD-Audio, CD-ROM, and CD-I.

The CD-I disc layout and file structure specifies a number of criteria. A CD-I disc must have at least one CD-I track on the disc. If CD-Audio tracks are also present on a CD-I disc, then the first CD-I track must contain at the very least the disc label information. It is recommended that all CD-I information be placed in the first track and that the second and subsequent tracks be used as CD-Audio tracks. In this way, if a CD-I disc is played on a CD-Audio player, the CD-I track can be skipped.

The CD-I disc label contains information about the disc type and format, as well as identifying the disc alone or as part of a collection. The disc label also gives information about the disc size and position of the file

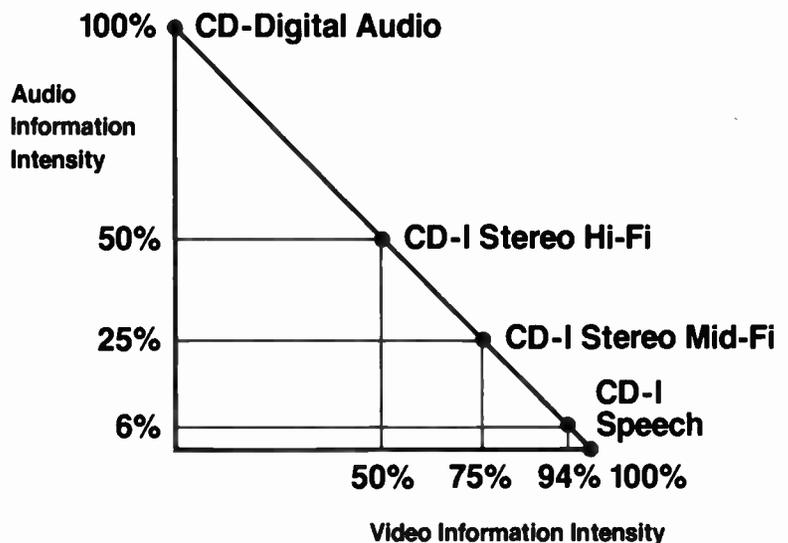
directory and bootstrap, which is required to initialize the CD-I player. All CD-I discs must start with the disc label in block zero. Also track one must be a CD-I track and contain at least the CD-I disc label. The CD-I hierarchical file structure allows for reading files in a single seek operation.

Obviously the scope of the CD-I specification is considerable. The system's designers anticipated that a number of diverse players with different performance features and levels would be developed. Thus to insure basic compatibility, the CD-I specification provides a *minimum* set of requirements for CD-I systems:

The basic system must be able to read the following: CD-Audio tracks (according to High Sierra Group Level 2 format); CD-ROM Mode 1 tracks; CD-I tracks.

The basic system must be capable of: decoding CD-Audio and CD-I audio information; connection to a single TV with a Normal resolution and any coding or a resolution of 768 X 480 pixels, with a 4-bit pixel depth and CLUT coding; decoding DYUV; decoding RGB (5:5:5); decoding 8-bit CLUT; decoding one dimensional run length; handling special effects (eg. cut, scroll, etc.); all multiplane overlays; performance equivalent to or better than a 68000 processor operating at 8 MHz without MMU, 10 MHz with, and OS-9 based CD-RTOS with a 16-bit data bus; carrying two DMA channels; storing at least 512 kilobytes in system RAM and have a direct RAM expansion slot; at least 256 bytes of non-volatile memory.

**FIGURE 5**



A single CD-I disc might contain almost 20 hours of audio, 7,000 color pictures, 300,000 typed pages, or any combination of the three. Thus CD-I applications promise to be diverse. For example, a CD-I dictionary might contain a word and its definition, as well as spoken pronunciation, pictures, and additional cataloging to synonyms, antonyms, word relationships, origins, or translations into foreign languages.

A single CD-I disc could contain a biography of a composer, providing textual information, pictures, recorded examples of his music, played while the score is displayed, and a complete catalog of his musical works, as well as available recordings.

Another application is the "teach-yourself" or "how-to-do-it" field; the CD-I's ability to convey text, pictures and diagrams, combined with sound make it ideally suited. For example, the sound of a motorcycle engine in various stages of tuning could be reproduced on the disc. Or a hobbyist's book on ornithology could reproduce bird calls.

Tourists could obtain a multi-media preview of favorite vacation spots. Fiction works could be provided with a labyrinth of plot deviations, differing each time the book is read, or steered at the discretion of the reader himself.

The CD-I format thus presents considerable opportunities for hardware, software, and publishing industries to provide consumers with new forms of interactive entertainment and education. However there are not many existing, readily transferable programs that take advantage of the video, graphics, audio and text capabilities supported by this new standard. There is thus a considerable amount of creative work ahead.

In summary, the CD-I format is amazing. It changes the CD picture in at least three ways: it takes up the considerable slack left by promised yet unfulfilled and clearly impossible sub-code applications on audio CDs. It establishes a much-needed standard, application-specific product for the CD-ROM format. And it obsoletes the audio-only CD player. That's right. CD-I players will do everything audio CD players can do, and much more. Audio CD discs are okay, because they supply a specific kind of program (music) for the CD-I playback format. In short, the CD-I format establishes a simple fact: storage is storage, and if you are careful enough in setting up the data format, it simply doesn't matter what kind of information, or mixture of information, you store. And that, I think, will prove to be the most revolutionary thing that has ever happened to the audio world. ■

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## TRACING THE ROAD TO CD-I

by John M. Woram

Here it is November already (for you, that is; for me, it's a hot summer day in mid-August), and time for another *Mix AES Show Special Issue*. Well, special issue or not, in August it's hard to relate to what's going to be seen on a convention floor several thousand miles and a few months from here and now. In fact it's even hard to pretend that one has a clue as to what will be seen—other than the assurance of yet another round of "major breakthrough" announcements.

While waiting for those announcements, I can still talk about a few major breakthroughs here, by looking backward instead of forward. In fact, it might not be a bad idea to take a look at consumer audio, long regarded as being a giant step behind the pro. As we shall see (and hear), digital audio may soon change that perception forever. And if it does, what does that mean for the audio pro?

At home, all those wonderful people whose bucks keep the audio industry going are beginning to show signs of taking the most recent consumer breakthrough—the compact disc—for granted. That means that starting immediately, if not sooner, the consumer will expect to hear music on disc, and nothing else: no snaps, no crackles, no pops, no wow, no flutter, no warps. Just the music please.

According to the keepers of statistics, the CD has enjoyed the most spectacular sales growth of any consumer electronics medium. So attention AES exhibitors: take a record buyer to lunch soon, and let him know how much you value his friendship—and his appetite for new records. That appetite could help you convince your pro clients that they need your own latest breakthrough.

What is it about the compact disc that has made it such an overnight

success? The easy "magic of digital" answer doesn't quite make it, for CD is not the first recording breakthrough that has made it to the marketplace. It's hard to believe, but earlier innovations have also made dramatic improvements to reproduced sound, yet all have taken a far longer time to gain such wide approval.

Of course not every breakthrough was an improvement in sound quality. Back in the days when Ken Pohlmann was still a mere lad, and CD stood for cylindrical device, the introduction of the FD (flat disc) was considered a breakthrough by many, but certainly not by all. Edison and others had already experimented with the FD and—for good engineering reasons—dismissed it as technologically inferior to the cylinder. He objected to the fact that the stylus tracking speed was not, and never could be, optimized. As everyone knows, the stylus starts slowing down as soon as playback begins, and reaches its lowest speed at the innermost groove.

Of course Edison was an engineer, not a marketeer. And he was right: the disc was technologically inferior, but it could be mass-produced and sold cheaply. So Edison lost this round, and the disc eventually drove the cylinder into ancient history.

Until recently, subsequent breakthroughs have actually been refinements in FD recording and playback techniques. But through it all, the basic medium has remained the analog groove cut into a rotating disc. The 78 rpm record was the accepted format for that medium until about 40 years ago, when Columbia capitalized on a still earlier RCA development: the 33 rpm record. At RCA, the groove width on the slow-spinning disc was about the same as on the 78, and sound quality was not very good either, even by comparison. In the early 1930s, the new format didn't have much going for it, and it was soon abandoned.

In 1948, the technology was dusted off at Columbia, groove width was reduced, and the LP was born after a gestation period of almost 20 years. RCA was not pleased, no doubt realizing Columbia's 33 would cut into RCA's 78 sales. So, it subtracted 33 from 78 and announced yet another breakthrough... the 45 rpm record.

There was probably more to it than that, although in *From Tinfoil to Stereo* it's reported that, at RCA "... an order had been given to produce any new type of record of good reproducing quality, as long as it had a different speed and was not interchangeable. ... A record player was to be developed to go with it which would not play the Columbia or any other standard LP record." From such as this, high-tech breakthroughs are sometimes made.

For a time, the two companies slugged it out in the marketplace. RCA actually released classical music on 45 rpm multi-disc albums, while Columbia tried out 7-inch 33s for shorter selections. The record store (and buyer) had to contend with triple inventories: 78s for the old-but-not-yet-dead existing market, 33s from Columbia and its followers, and 45s from RCA. For a while, both proclaimed the inferiority of the other's software. Both eventually compromised their lofty standards: RCA albums have been LPs for years; Columbia singles have been spinning at 45 rpm for just about as long.

The next biggie was stereophonic sound. By now the war of the speeds had been resolved in favor of peaceful coexistence, and the 78 was long gone. But once again it was dual-inventory time. Stereo was no overnight sensation, and it took a long time for record labels and record buyers to abandon the familiar mono market. Part of the long transition period was attributable to the consumer's reluctance to buy a second channel's worth of hardware, and then to have to find the space in which to put it.

While the consumer was getting used to stereo, the pro had gone far beyond, starting cautiously with "just one more track" for a grand total of three on half-inch tape. And then it was four, until Les Paul and Mary Ford wanted eight, and you know the rest.

By the time the recording industry had become comfortable with 16-tracks on 2-inch tape, it was time for yet another consumer breakthrough: quadraphonic sound. As usual, Columbia and RCA didn't agree on how to do this. Meanwhile, radio had long since established itself as the prime mover of hit singles. No air play, no hit: it was as simple as that.

This time around, it was Columbia's turn to have the better technology. But as usual the marketplace pre-

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vailed. Some of the earliest discrete four-channel records were sonic disasters, due to a combination of software and hardware problems. On the other hand, early matrixed quad discs lacked separation and suffered greatly when transmitted over radio. So the record producer could be pretty much assured of what would happen to a quadraphonic production. It would cost a lot more, and sell a lot less. As for airplay, forget it.

Not surprisingly, the consumer was confused by all the claims and counter-claims, with each side loudly proclaiming the superiority of its not-quite-ready-for-prime-time player. The record buyer was not impressed, spent his money elsewhere, and that was the end of the quad.

Almost. Somehow, despite all the confusion, the notion that stereophonic sound may not be the ultimate listening experience managed to survive. And so the idea, if not the hardware, lives on. Just about everyone is experimenting, or has experimented, with various listening enhancements, in an effort to squeeze another sonic dimension into the record groove.

Which brings us more or less up to date, and to the latest breakthrough—the compact disc. Again, history repeats itself: as some worked out the means to put digital data onto a spinning disc, others were working on alternative technology. Instead of rotating the disc under a laser "stylus," why not pass the laser over a stationary surface, to read the data pretty much as a credit card or bar code may be scanned? But this time it was Sony and Philips who made it to the marketplace first, and so the music continues to go round and round instead of just lying there. However, the stories persist of the potential superiority of an Audiophile card. Maybe Tom Edison would sympathize.

But CD now or AC later, it seems that at last the consumer has the capability to enjoy sound quality that equals—and sometimes surpasses—that heard in the studio control room.

As for the claim to equality, higher fi is now more or less a matter of D/A conversion. Wow, flutter, tape hiss, noise reduction and all the other stuff that used to separate the pro from the consumer is no longer much of a consideration. Now all the action is at the chip level, and who but the consumer has the buying power to fill up all those super tankers bringing low cost hardware out of the East?

In terms of overall sound quality, the rest of the home listening system may be superior in quality, if not in durability, to studio-grade hardware. So the consumer may get to hear a better show than the producer does.

Of course that's providing the quality is there in the first place. If it's not, the consumer will hear that too, since there's little extraneous noise behind which mistakes can hide.

For a time, the record buyer thought the magic of digital would bring with it an assurance of good sound. But as in the early days of quad, some pioneer CDs sounded wretched. Now everyone could hear the real meaning of bad, and some thought that what they heard was digital's fault. And sometimes it was, for even in the studio, where all sorts of wonderful things are supposed to happen, a new recording technology does not reach perfection overnight. Both design and recording engineers needed at least a few shakedown sessions in order to figure out how to make the most out of what was now available.

By now, the false starts are beginning to be forgotten, and the consumer is looking forward to more and more digital delights. That means the pro will have to move just a little faster to keep up with the demand for higher fi.

And that brings us to November and the Los Angeles Convention Center. Come on in and see all the new toys. And then it's time to start speculating about what the next round of major breakthroughs is going to look like.

CD-I, for instance. It was introduced at the Microsoft CD-ROM conference in Seattle earlier this year. Some were impressed, some were confused, and some were both. The CD-I format is a sub-set of CD-ROM, allowing a mix of audio, video and computer data on the same compact disc. That's a neat hi-tech trick indeed, and now all that's needed is a way to produce an audio/video/computer data program that the folks can afford to buy, even if the hardware is given away (which I'm told is unlikely).

As anyone who has ever financed an LP production can testify, it ain't cheap. Add video and the price goes even higher. Then throw in whatever is required to make the whole works interactive, and the budget should be well past the threshold of pain. How about it, producers... are you ready to pay for all this?

But putting all these trivial money matters aside for the moment, is the consumer going to sit still long enough to interact with the CD, even if the software is given away? (I think this too may be unlikely.)

Once you've got the answers to all of this, you'll know just what to expect in the way of future breakthroughs. While you're waiting, go past the Dolby booth and have a look at SR. ■

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although for this interview he is wear-  
ing a loud Hawaiian shirt.

His office is still in the WEA building  
in Burbank, although his company  
incorporated in 1984 and eventually  
affiliated with Philips. "It's more of an  
historical tie than anything else," says  
Cornyn, who first began working for  
Warner Bros. Records in 1958. "I'm  
sure some day we'll buy our own fur-  
niture and move into a separate office  
—when the time is right."

Over the years, Cornyn rose in the  
ranks of Warners' creative services  
department until, in 1980, he was ap-  
pointed senior VP of the Warner, Elek-  
tra, Atlantic (WEA) Record Group, with  
the mandate to oversee special proj-  
ects, such as cassette packaging and  
compact discs.

By 1984, he had begun giving  
speeches goading the record industry  
into aggressively developing the en-  
tertainment goldmine that he saw bur-  
ied in those laser pits on every CD.  
Here's what he has to say two years  
later about who's been listening, and  
who's actually creating CD-I product.

**Mix:** Although your company, The  
Record Group, and AIM (American  
Interactive Media) both share the same  
parent company, Philips, and each  
has the same mandate to develop CD-  
Interactive software, each label has a  
singular identity. Can you describe  
The Record Group's identity?

Cornyn: Yes. I think we're very much  
a producing, creative record label. I  
say record label based on our back-  
ground. We deal with independent  
producers and we deal with ourselves  
in terms of the creation of product,  
just as a record label will have staff  
producers who will create product for  
the label in-house. And we also have  
the ability to go outside of the house  
and deal with independent producers.  
At this stage there are not a whole lot  
of independent producers who know  
what they're doing about CD-I, so we  
tend to skew ourselves toward the in-  
side. That will change as time goes  
on. But that's what we're about, that  
creative side of the whole thing.

I'd say in the first ten productions  
there's a very awkward mix of inside  
and outside, but none of them can be  
done totally outside. All of them have  
some degree of internal cooperation  
and involvement. Some of them are  
done almost totally inside, because  
about CD-I, I think no one on the out-  
side is totally competent at this point.

**Mix:** You said before in one of our  
conversations that you're not looking  
for the big business interests, but that  
you're looking for Shakespeare.

Cornyn: I think that in the creation of  
a new medium, the thing you have to

do is differentiate that medium from  
any other medium; that's a critical  
thing to do. The first person who can  
differentiate is the first person who  
can imagine in that medium, who can  
execute in that medium. You can build  
all the theaters you want in the world,  
but until you have Shakespeare there,  
you're not going to get a very big  
audience because people generally  
pay for the extraordinary in terms of  
imagination. That's what they want,  
and that's what Shakespeare will bring  
to this. Our job it to try to find Shake-  
speare, or be Shakespeare, depend-  
ing on where you are. I think that's the  
critical element in developing CD-I  
as far as we're concerned. Others will  
say other things are critical. But that's  
our Bible.

**Mix:** Would you be interested in doing  
any conversions of other existing soft-  
ware at all? Do you have any pet proj-  
ects that you've run across that you  
think are particularly wonderful or  
that would adapt themselves to CD-I?  
Cornyn: A few. But "conversion" to  
me is such a mechanical term that it  
bothers me. I think one could call  
*Gone With The Wind* a conversion  
from the novel. But that's not enough.  
There had to be cinema there, there  
had to be magic there with Gable and  
Vivian Leigh, and all of that. Just to  
hand it to the camera department is  
wrong. You really need to restructure  
it, re-imagine it from the beginning.  
Therefore I could say that there's mar-  
velous subject matter that has been  
treated before, but just to assume that  
a hit in one medium—especially a  
linear medium—can convert over...  
well, to take Jane Fonda's exercise  
tapes and convert them to CD-I, I think  
I'd have a lot of questions to ask about  
why this is better in this medium than  
before. What have you added to this  
thing?

I think there are some things that  
would convert rather ridiculously. Just  
because it's a hit in one medium  
doesn't mean it will be a hit in another.

**Mix:** Have you met any of these ge-  
nuses? Have any come along and  
planted the seeds yet?

Cornyn: They don't have to be ge-  
nuses. It's a very complex process  
we're dealing with. I don't know at this  
point if it's fair to ask any one person  
to embody all of the process that's  
necessary. It's fairly important to know  
how to make pictures look good in  
CD-I on the television screen. That  
takes a good deal of talent, and I'm  
not sure that that person necessarily  
knows how to write funny jokes, or  
whatever the other things are. It is a  
collaborative medium, and the best  
we're able to do is to find a bunch of

highly talented people with skills and interests that fit together. Maybe out of all of them with a huge amount of luck, you'll find something that is a little Shakespearean. And that's what we're trying to do.

I'm really not sanguine that Shakespeare comes along every two minutes. Or we wouldn't be using the word "Shakespeare." There will be people who come along and amaze the world, but it's not something you count on. In the meantime, you do what you can to keep it together, and that's what we're doing.

**Mix:** You mentioned before that it's a type of hybrid person who is required to put a good CD-I together. It's a combination of an instinctual sensitivity to content and to what will succeed in the medium and also a thorough knowledge of the technological parameters.

"I'm really not sure the traditional players will be the ones to create this industry."

**Cornyn:** Yes, or an appreciation. I think one has to immerse oneself in what CD-I can do, and out of that comes an ability to react to subject matter that is different than someone who doesn't know what it is. I think that's highly important. In a sense, it is a hybrid of technological awareness and creative imagination, and a combination of those two will have a better chance at sparking something interesting than the lack of it.

That's what we do all along. We just spent from 9:30 until 2:30 today in one meeting with six of us trying to argue through projects and make sure the guy who's doing the computer programming is talking the same language as the guy who's doing the script.

**Mix:** And who are the people on your team?

**Cornyn:** Al McPherson, who is in charge of all production; Walt Klappert, who does all of the computer programming; George Lydecker, who does both audio and studio work; Larry Israel, who is in charge of all graphics, the look of the programs; Marc Blank, who is supervising producer, oversees a

whole bunch of productions; and Frank Huttinger, who like Marc is also a producer—more of a line producer than a supervising producer. Sometimes they include me in the meetings, too.

**Mix:** What happened when you spoke at the VSDA (Video Software Dealers Association convention in Las Vegas August 24-28)? Was there a show of interest in CD-I from any of the new video software labels?

**Cornyn:** I don't think that's to be expected. They are preoccupied with the tape medium. They're preoccupied with movies. I think that's ultimately going to be a worry to them—95 percent of their market is used for movies. Another four percent of it is Jane Fon-

da, and she's not getting any younger. And after that, where do you go? If you run out of movies—and one does—television ran out and at a certain point had to make movies of the week rather than depend on studio product. And they never found them to be hugely successful. If all of the activity is to be put into what they call "made fors," such as the Jane Fondas or exercise, or how to repair your roof, or whatever it may be—they don't have much going on in the way of market share there. What they're reduced to is making these non-movie products at such a low price so that they can make a profit. I think they have a worrisome equation; although there's a huge, huge euphoria in the home video area

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right now—I think it's a good time to sell, rather than buy in that industry.

It may have some signs about it of peaking. I didn't want to be the bad guest and lay all of this out in front of that whole audience, but it seems to me there's a set of problems that they're not able to address, therefore they blink them away. Product is very important to them. However, even this—the fact that they should start thinking about an interactive disc—is a bit of a strain for them, especially since that audience is largely retailers, not program producers. I think one of the biggest responses I got was when I said that the equation they need from the outside is not miniaturization, but new content. Where are the hits? Where's tomorrow? Do we have to wait until Dustin Hoffman makes a new hit movie? Is that what this industry is based on? The answer to that question right now is, "Yes it is."

**Mix:** At the Gavin convention (in February, 1986 in San Francisco) you said the record industry has been slow to pick up on the implications of what we have within our technological grasp right now. Since then, have you gotten a surge of interest from the record industry?

**Cornyn:** There's certainly not been a panicked rush to my door to find out what all this is about. The question is to the identity of that business. Is it a record business or is it a music business? It's probably both... or neither... *all* the cliché answers to that question. A couple of things can be said about that business. One, it is preoccupied with music, largely rock and roll and hits. And second, it has never felt the need to venture into the worlds of technology. Technology usually comes lumbering up to its doorstep, knocks on the door and says, "How would you like to put me out in cassettes," or "How would you like to put me out in 8mm or compact disc" or whatever it may say.

The record industry sits back and says, "Well, maybe some day. Come back when you've got a lot of players out there," and that process goes on. Given that CD-I is a departure from that, that it requires new repertorial thinking, things are a little different. So the point I made at Gavin is that here is CD sitting in the grasp of the record business—which truly needed something in its grasp the way home taping and the way the LP cassette radio was going—so here they are, with this great gift certificate for the future handed to them called CD, and they trade it in on a pair of jockey shorts instead of taking advantage of the whole wardrobe that comes with this gift certificate!

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“The computer industry is going to jump on the CD and CD-I. They see it as a way out of some of the computer problems of today.”

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That's typical, considering the history of the business, and I'm just saying that it could be that the record industry is going to wake up with a surprise on its hands ten years from now when other industries have said, "CDs are very attractive and we're going to distribute a new kind of CD through book stores," and so forth. It may still continue to do rock and roll and the record industry may be happy with that, but it has not thought through the possibilities of what it might have in the future.

**Mix:** And what of the computer industry?

**Cornyn:** The computer industry is going to jump on the CD and CD-I. They see it as a way to differentiate themselves from the computer problems of today, which are very klutzy pictures that look like they're made out of Lego blocks, and sound as if it's coming out of a kid's five-cent toy, and storage problems which CD-I has practically none of. Given that, they will be very pleased with all of this, and want to move into this area, I think, more aggressively than anyone else.

I think that they, too, have something to learn about this. They're not very much into the kind of program that I think is natural for CD-I, which has to do with real time programming and that sort of thing. But I think it's the record industry, which now owns 100

percent of compact disc, which has a market share failing coming along.

**Mix:** Some people in the computer industry have said they've been somewhat alienated by your—well, you do have a bit of a Hollywood approach. I wonder if your having to deal with such drastically different industries...

**Cornyn:** First of all, I don't *have* to deal with them. They invite me to speak, so I do speak sometimes, when I'm invited to speak before them. And I speak about what I believe in. I believe in entertainment, mass market product. I don't believe that other people are wrong, but I have a right to believe in what I want to do. So, if there is a reaction to my being "Hollywood"—it's very strange for me to think of myself as "Hollywood"—so be it. I'm not trying to be all things to all people.

When somebody asks me, "What kinds of programs do you think will work in this?" I respond with the kind that I think *will work*. If somebody asks me, "Could you do a good program on how to repair a 1971 Jeep?" I could probably come up with a reasonable program, but I'd never want to do it. It's two things. One, it's dull on the face of it. Second, I think that the number of people with 1971 Jeeps in their driveways is limited. But there are people who think that way. Niche markets, they call it. Fine. The world is big. Let 'em do it.

**Mix:** There's no one else to do it with, really. Who will be other key players in the CD-I field?

**Cornyn:** It's an unborn industry. I think it's very much like the days before Atari came out with their video game system, and if you went around asking, well who's right for producing this system, it was very difficult to find who they were. They were people in garages, but they were not an industry by any means. It will be somewhat difficult for traditional businesses to respond to the thing. Just as when Atari was booming, you saw companies like Parker Brothers try and come in, and get booted pretty badly. Again, it should really come out of your soul and your heart and your willingness to try to do something new.

I'm really not sure that the traditional players will be the ones to create this industry. First of all, they have a lot of vested interest in where they are, and they do those things very well. But I'm not sure that the *Los Angeles Times* should try and produce CD-I. They know very well how to produce newspapers and other things. Unless they feel it's a natural place to go, then maybe they should stay home and let new people create the industry.

I don't know where all the funding for those people will come from, whether they're going to be able to get the money to produce all these things—and that could be somewhat of a crisis for the future.

**Mix:** One of the major players is, of course, Philips, the company that's financing both your company and AIM. Sony is also jumping headlong into it by making the agreement to make the hardware. How aggressive have they been? Have they expressed any interest in developing software?

**Cornyn:** Sony? Not with us. They may have other plans that don't include us. I'm sure that other hardware companies will be looking at this and they should obviously ask themselves, "If we're making all of these players, who's making the programs to play on them?" Well, Philips has been a leader in asking that question, and done a remarkably good job in trying to answer it. I trust they won't be alone.

**Mix:** What is your concept of what a CD-I player will be? What will it look like and how will people use it?

**Cornyn:** I think initially it will look like a piece of hi-fidelity equipment, very much like a CD audio player, because our feeling has always been that this is an upgraded CD audio

system that you have. That will drive the market. People will come in wanting to buy, as they did at a certain time with TV sets, and they found out that there was one that had pictures in color. That might be better than one with black and white, which was what they were used to. Maybe a couple of hundred dollars more for color; you make your decision.

I think the same kind of thing may happen with CD. People will come in and ask for a CD player, and find out that there's one thing that also puts pictures up on the television screen, does interactive programming, etc., etc. Therefore, I think that the first ones will be an outgrowth of the existing and booming CD-audio market. So your player will probably sit on a shelf across from you in a room where your other audio equipment exists.

**Mix:** Will you have a keyboard, or a light pen or . . . ?

**Cornyn:** You will have a remote control of some kind. You'll have to have one. What it is is up to the player manufacturer. It must by definition do one thing, which is point and click to a spot on the screen. So that can be done with a joystick, a mouse, a trackball, whatever. So that must be there. Now whether it has a wire between it and the player, or it works with infra-

red, that's up to the manufacturer.

**Mix:** And up to the budget of the person who's buying it . . .

**Cornyn:** Yes, and additionally you can also use a keyboard to input words and numbers. I don't know what it will be. But there will be all kinds of different approaches to it.

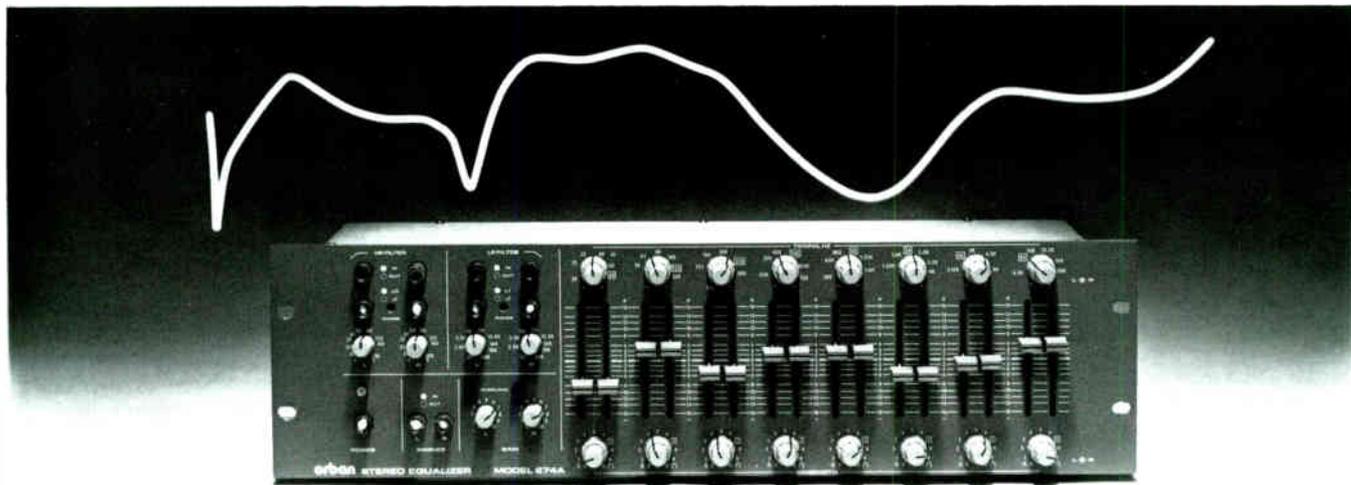
**Mix:** Some people have been saying that with such an immense data base that can be compacted on this kind of a disc, you're going to want to save your "trip" so to speak—the route you take. Right now you can't record on optical media, so would you bundle with a magnetic drive?

**Cornyn:** There certainly is the possibility that you would have a floppy disk outboard of this system to store things.

**Mix:** Are any of your programs being designed with this in mind?

**Cornyn:** Not really. One program would have some advantages with storage, but it would work well without it. I think that what we clearly want to do is design for the base case of players that will be out there. And so our programs will work on every player that will be out there. Again, I'm not in control of all the players that will be

—CONTINUED ON PAGE 262



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## A LOOK AT INTERACTIVE PRODUCTION

by Lou CasaBianca

**T**his month's MVP is an overview of the compact disc-interactive video production process, work station design, and the application of interactive as part of this *Mix* special issue coverage of this important new technology.

Music video is undergoing its inevitable shake-out period. The radical chic glow of what was once considered a revolutionary art form has begun to dim in the shadow of more and more of the same—the same look, the same predictable scenarios and, unfortunately, the same lack of imagination. Not that long ago, music video was going to “save the record business.” In fact, the buzz created by MTV and music videos significantly affected the sales of records by artists placed into heavy rotation on the channel.

Several years prior to the expansion of music video television, the compact disc was released to a consumer marketplace really not too sure what the new format was about. With the notable exception of the Philips-Polygram Group, which co-developed the format with Sony, most of the major labels moved into CD reluctantly at the beginning. Recently, some of these same companies have presented the CD as the new saviour of the record business. The vinyl LP has been surpassed in sales by audio cassettes, and the CD format is enjoying an impressive upward sales curve. Enter interactive compact disc—music, video, graphics and computer control delivering multimedia and interactivity for a few extra hundred dollars more than the standard compact disc. CD-I

Interactive video  
has the potential  
to affect and  
appeal to  
audiences with a  
broad spectrum  
of interests and  
levels of  
expertise.

will require new machines. Existing compact discs will play on the new machines, but the new CD-Is will not be playable on the old machines. Do we need another new format? If so, what does CD-I have to do with music video or the record business? How do you produce an interactive laser disc? What's different about producing for CD-I, compared to record or video production? Independent of the application, we need to know: what are its capabilities? how does it work? and what does it cost?

First, let's review interactive video disc production process. What is interactive video? Basically, interactive video is a program that can be controlled by the person using it. CD-I allows the user to access audio, text, graphics, video and software, with five levels of audio fidelity: 72 minutes of digital stereo (digital), 144 minutes of hi-fi stereo (LP record), five hours of mid-fi music (FM quality) and ten hours speech (AM quality). Double the time in mono.

This is accomplished by a means of a video program (laser disc) and a computer running in tandem. The computer programming controls the video program and the person in front of the screen controls them both. Interactive video is a new and virtually untapped area of technology, especially in its application in entertainment and education. At the same time, it has the potential to affect and appeal to audiences with a broad spectrum of interests and levels of expertise. Interactive technology will generate a dramatic impact on both the home

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The first programs will create standards or templates that will influence the development of this technology for years to come. Interactive producers will be hybrid project managers—part record producer, part film director and part systems analyst.

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and professional marketplace. Business executives who must deal with communications between offices and clients, and in-house or sub-contracted production units, form an industrial base of users who want programs to meet specific corporate needs. Musicians, producers and directors will now be dealing with a new form of communications between artist and audience: part record, part film, part computer game. Remember, except for experimental programs, virtually no programming has been developed for the CD-I format yet. The first programs will create standards or templates that will influence the development of this technology for years to come. Interactive producers will be hybrid project managers—part record producer, part film director and part systems analyst.

Ken Pohlmann's "Insider Audio" this month describes many of the interesting features of the CD-I, including its audio, video and graphic capabilities. What follows, then, is a look into the not-so-distant future at what interactive production will entail, beginning with a brief review of the hardware and software involved in the process.

**Computer/Software:** The Motorola 68000 used in the system is also the microprocessor used in the Apple Macintosh, and Commodore Amiga other personal computers and graphic workstations. Microware's OS-9 has been adapted as the standard for CD-I, called the Compact Disc Real Time Operating System (CD-RTOS). Real time control is the key element in the operation of the system in a computer controlled audio-driven playback environment. Some CD-I machines will be capable of supporting a modem, printer and external floppy disk drive.

**Design Workstation:** At this point, neither Sony nor Philips have released

a prepackaged workstation designed specifically for CD-I authoring. The tools needed to produce for this format do exist as separate elements, however, until the playback machines are available in about a year or so, there is no way to play back a disc mastered and replicated for CD-I. Interactive video disc is the most analogous format for the development of interactive video production skills. The Sony VIEW (Visual Information Enhanced Workstation) System is an authoring workstation, with a personal computer (Sony SMC-2000) which talks to an integral video disc player (Sony LDP-2000) through asynchronous (bi-directional) communications. Computer-to-peripheral two-way free communication is a required electronic environment for the sequence and the accuracy of program design operations to be guaranteed. Each byte or word of computer data has its own address or slot position. This capability is provided by an interface "board" or "card," about the size of your hand. Loaded with chips, the board controls the computer's memory and operation, and special functions like controlling a videodisc player or videotape machine. While the VIEW system was designed for interactive laser disc authoring, the design process will parallel the techniques which will be used for CD-I. There are several software packages for the Macintosh and PC compatibles designed for interactive courseware development that can serve as learning tools for interactive production.

**Task One—Preparation and Design: (Phase I)—Program Concept:** The producer/director and the artist collaborate to establish the interactive laser disc design requirements which will present music, lyrics, graphics and live action video as integrated entertainment. **Tone:** The "tone" of the materials will adhere to an "entertain-

ment" based approach, with the introduction in the "Guided Tour" category, and logically evolve to higher levels of complexity as needed. **Style:** The artist's graphic look that has been established in print and video presentations can be carried across to CD-I for "layback" on the laser disc. **Method:** The level of interactivity will start at Level I for general "unattended" presentation purposes, and then evolve to Level III for interactive presentation and transactional sessions. **Content:** The materials for the disc will draw from new and existing graphics, slides, original art work, photography and other sources, as well as the original video created for the project. The output of this task is the general project statement that orients and directs the production effort from that point forward.

**Task Two—Design Specification:** Once the program concept is established in Task One, a detailed specification is developed that lays out the total structure for the CD laser disc program in a component-by-component format. This format will detail the sequence and interrelationships of every portion of the program. Each component is in turn specifically defined in terms of purpose, content, objectives, method, media, and time. This detailed structure permits an accurate assessment of the tasks required for completion, thereby making possible planning of costs, resources and time for completing the project. The design specification document that results from Task Two serves as a "blueprint" for the entire development effort from scripting and programming, to editing, software design, and implementation. Management of the development process is facilitated since any changes to the design or the development of the program are referenced to and controlled by this central document.

After this point in the process, parallel development efforts can begin. On one hand, Tasks 3 through 6, which all focus on script and video development can proceed, while the development of the delivery system, including software and laser disc mapping, can take place simultaneously. Periodic check and review meetings of the entire development team will insure that the work will continue to track according to the design specification, or that any necessary changes will be implemented.

**Task Three—Scripting: (Phase Two)**—This task is the first disc production activity to be undertaken and is the essential aspect of the process. In almost every way, it follows the traditional method of scripting by developing a video treatment that explains

in an overview what the visual storyline and production style will be. The treatment is then followed by a complete video script. The major difference between interactive video scripting and "normal" video scripting is that both the treatment and the script must carefully and categorically follow the guidelines established by the design specification developed in Task Two. It is important that the artist's/client's project members and the interactive program designers and scriptwriters work closely to insure that the design and the script mesh precisely.

**Task Four—Pre-production:** This task is identical to the pre-production activities of regular film or video production. Cast members, if needed, are selected, locations set, and production crews are deployed as in normal film and video productions.

**Task Five—Production:** Producing an interactive laser disc in many ways is very similar to producing any electronic media presentation, such as a slide show or video program. However, what makes the process very different is the integration of computer programming and technology into the production and operating process. Conventional video is a passive medium; in interactive video, the viewer becomes a user and controls the actual pace and direction of the program. The user becomes the director of the program. Careful planning can allow for one disc to be used with several different computer programs to create various interactive video programs. Within seconds of entering a program a user who has never touched a computer before can be fully involved in creating the interactive program appearing on the screen.

It is important that the video disc designers and/or scriptwriters be present during production to monitor the special requirements for interactivity, such as clean breaks in dialogue that will serve as access points for random access in the final program or special emphasis and attention to details in production that might slip past the normal supervision of a director or location crew not totally cognizant of the interactive intent. The technical values in production (and post-) must be more rigorously adhered to than in "normal" video production, and therefore require more engineering support.

**Task Six—Post-production:** This task is again analogous to typical video production. All editing, special effects, and graphics creation and inclusion are completed in this task. The main departure from normal practice is that the results of this task are not necessarily the final video product. The final "master" tapes are produced

in Task Ten, Premaster Editing. Technical values must be monitored rigorously, and experience is an extremely valuable commodity. Once the requirements for a first round test or check disc have been completed and the production of a test disc is scheduled.

**Task Seven—Interactive Video Delivery Systems Specification:** This task involves the identification of the hardware and the software components required to implement the design specification. In this case the system architecture is composed of the CD-RTOS, a derivative of OS-9 operating system, and the Motorola 68000 CPU. The software will be programmed in accordance with programmer's

design specifications and producer's structural and programmatic requirements. The specific standards for this application are contained in the Philips/Sony CD-I Green Book. Software for this task is generally confined to only those routines needed to adequately program the operation of the laser disc.

**Task Eight—Software Development:** This task involves development of the computer programming that will be used to run the final interactive laser program. The specific "language" used in the development process is directly dependent upon the format requirements of the CD-RTOS

—CONTINUED ON PAGE 81

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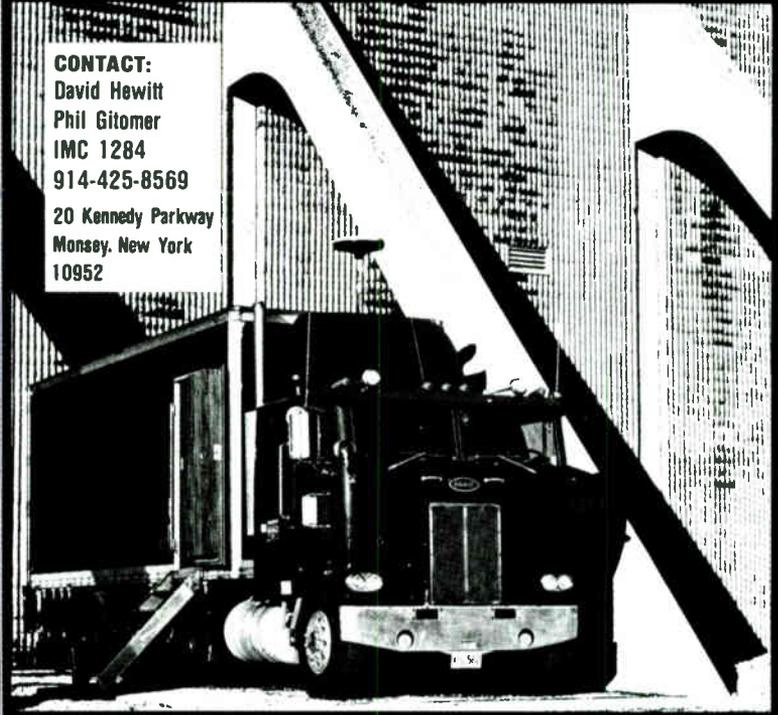


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## THE LANGUAGE OF INTERACTIVITY

**Access time**—The time it takes to find, retrieve and display a piece of recorded information. Access time is usually measured at its worst, the longest time to get from one piece of information to another. This is generally a matter of minutes on videotape, two or fewer seconds on video disc players, and milli- or micro-seconds in a computer. (See **RAM**—Random access memory.)

**Address**—The position on a computer data storage medium, or on a videotape or disc, at which a given piece of information is recorded. This location is identified by a numeric code, similar to a post office box number. It can be described generally (the relative address) or specifically (the absolute address).

**Audio still frame**—The commentary, music or sound effects accompanying a single still image (artwork or a slide). The soundtrack may be recorded using some version of compressed audio for greater economy.

**Authoring**—The preparation of a computer program, often using a structured "authoring language" or "authoring system" that allows people without formal training in computer programming to prepare applications for computer-based systems.

**Authoring language**—A high level computer program, itself often based on a computer programming language like BASIC or Pascal, that facilitates the preparation of computer programs by reducing the number of instructions involved and translating these into a language resembling everyday English.

**Authoring system**—A collection of authoring programs that allows users without formal computer programming skills to prepare applications programs, often working in everyday language, and without the painstaking detail of formal computer programming.

**Blanking**—During the time it takes for a video disc to search from one sequence to another, the video image is turned off. This results in a blank screen or screen blanking. The search interval between sequences is referred to as "blanking."

**Branch**—An instruction to diverge from one sequence in a program to another.

**Check disc**—A disc that is used to evaluate video material prior to the replication of release copies; similar to the answer print id in the film industry.

**CAD/CAM**—Computer-aided design and computer-aided manufacturing.

**CAI**—Computer-assisted (or computer-aided) instruction.

**CAL**—Computer-assisted (or computer-aided) learning.

**CD—compact disc**—A relatively new audio/video/computer format that digitally encodes sound on a 12 cm laser disc. The sound is decoded by optical laser for exceptionally high quality audio playback. This format was originally envisioned as a home electronics update or replacement for vinyl LP sound recordings.

**CD-I—compact disc interactive**—A new technology released in 1987 that combines the data storage capabilities of CD-ROM with the storage standards for audio and video. It will provide 660 megabytes of memory. It can carry still graphics and motion video as well as audio. This could mean a possible 7,000 natural still pictures, up to 32,768 colors for user-manipulated graphics and up to 256 colors for full programmed animation. It can deliver 2, 4, 8 or 16 channels of audio information, as much as 16 hours of monaural or eight hours of stereo sound. CD-I machines will be able to play standard CD programs.

**CD-ROM—compact disc read-only memory**—This format uses the CD format as a computer storage medium and can handle 550 megabytes of data on a disc about the size of a traditional 5¼-inch floppy. This format introduced this year can deliver the complete Encyclopedia Britannica on one disc with room to spare. CD-ROM will be used as an adjunct to mini and personal computer memory systems.

**Compressed audio**—A system of recording and transmitting audio information in highly compact form by encoding and decoding conventional signals digitally, or by converting audio signals into video signals, for more compact storage. Sometimes called still frame audio (SFA).

—CONTINUED ON PAGE 82

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—FROM PAGE 79, MVP

specification and the system configuration. During this part of the process, software development and testing are carried out. This activity is generally an iterative process that involves testing and revision until the final operating characteristics and program are obtained.

**Task Nine—Laser Disc Mapping:** A video disc, unlike a videotape, is not necessarily laid out in a sequential order of presentation. Because of the special capability of the laser disc to randomly access any point in the program during branching routines, or other activities under control of the computer, it is generally necessary to lay the video program out in a format that facilitates the random access and minimizes the search time required for the laser beam to find the appropriate access point. Video disc mapping provides the first interface of the software programming specifications and the video material and can be the difference between the smooth, relatively "seamless" presentation or one that is choppy, discontinuous, and less supportive of the learning experience.

**Task Ten—Pre-master Editing:** This task in the development process represents the final step in the video production. The materials generated in the post-production task are re-edited on one-inch videotape to conform to the specifications of the video disc mapping process. These final tapes are then submitted for the disc mastering and manufacturing.

**Task Eleven—Disc Manufacturing:** This involves the disc mastering facilities (Sony, Pioneer, or 3M will be providing this service as the format comes on-line) converting the one-inch tape master generated in Task Ten and producing the final laser discs. The check disc can be mastered in 48-hour turnaround and can range from \$750 for a test disc, and about \$2,500 for a master disc and approximately \$20 for each additional disc pressed from the master.

**Task Twelve—Implementation:** After the discs are returned from the replicator, final interactive systems implementation takes place. This involves checking the hardware, software, and video components of the system for shakedown testing. It is not uncommon to make software revisions at this point, although the scope of these changes is more akin to fine tuning than major revisions, providing of course that the design specification developed in Task Two has been faithfully followed. When the software has been finalized, the interactive system is ready for formal introduction and use. ■

# B Burlington

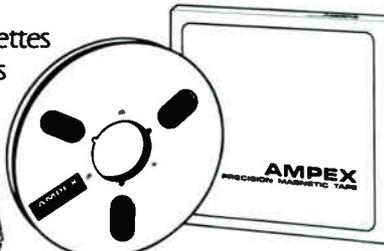
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—FROM PAGE 80, INTERACTIVITY

**Computer-generated**—Usually, text and graphics created, stored and produced entirely by a computer—either the elaborate equipment in a professional editing suite, or the external computer used in a Level 3 interactive video configuration.

**Constant angular velocity (CAV)**—A CAV disc revolves continuously at 1800 rpm, one revolution per frame, making each frame of the disc addressable, a requirement for interactive video discs.

**Constant linear velocity (CLV)**—A CLV disc or “extended play” disc maintains a consistent length for each frame, enabling longer playing time per side, but individual frame addressability is eliminated. Locations are referenced by minutes and seconds.

**Chapter**—A consecutive sequence of frames.

**Chapter stop**—A code embedded in the vertical interval of the video disc that enables certain video disc players to locate the beginnings of chapters.

**Cue**—A pulse entered onto one of the lines in the vertical blanking interval (VBI) that results in frame numbers, picture codes, chapter codes, closed captions, etc. on the disk.

**Delivery system**—In interactive video, the set of video and computer equipment actually used to deliver the interactive video program. A delivery system may comprise as little as a video disc player with onboard microprocessor, a monitor and a keypad, or may extend to an external computer, two or more monitors, and a variety of peripherals.

**Direct-read-after-write (DRAW)**—A record-once optical disc technology generally used for mass storage, archival data, in-house, confidential and check-disc purposes.

**Field**—A scan of 262.5 lines on the screen at 1/60 of a second, consulting one-half of a complete video frame. Each field scans every other line; i.e., field one (“up” field two (“down” field) scans even numbered lines. (See **Frame**; **Interlace**.)

**Frame**—A single, complete picture in a video or film recording. A video frame comprises two interlaced fields. Film runs at the rate of 24 frames a second; video at 30 frames a second in NTSC standard systems, 25 frames a second in PAL

and SECAM (European standard) systems.

**Full frame time code**—Otherwise known as non-drop frame time code, full frame time code (non-drop frame) is a standardized method (from the Society of Motion Picture and Television Engineers—SMPTE) of address coding a videotape. It gives an accurate frame count rather than an accurate clock time. (The latter is sometimes referred to as “skip frame” or “drop frame.”) Full frame time code is required for video disc premastering.

**Graphics table or tablet**—A sensitive board that acts as a canvas through which computer-generated graphics can be designed. A handheld input device, such as a light pen or a mouse, is used to draw freehand, to block out geometric shapes and to transmit instructions.

**The green book**—The Philips/Sony book of standards for CD-I technology.

**Interactive video**—The convergence of video and computer technology: a video program and a computer program running in tandem under the control of the person in front of the screen. In interactive video, the user’s actions, choices and decisions genuinely affect the way in which the program unfolds. The opposite of interactive video is linear video, e.g., a television program.

**Interchangability**—A video disc design strategy that includes information readable on consumer, industrial, and computer-controlled systems.

**Intermediate materials**—All media selected for assembly onto the video disc premaster, i.e., 16 mm film, videotape, 35 mm slides.

**Landing pads**—A range of frames within which a player can locate a frame or frame sequence. Landing Pad (LPD) also uses a command that modifies the number of times a player attempts to locate a frame following an unsuccessful search.

**Laser disc**—The name popularly used to describe the reflective optical video disc. (See **Reflective optical video disc**.)

**Levels of interactivity**—The potential for interaction determined by the capabilities of the video disc hardware.

**Level 0**—The bottom of the scale designed by the Nebraska Videodisc Design/Production Group to

describe interactivity in videodisc players. Level 0 represents domestic-standard players which have no potential for interactivity.

**Level 1**—The first practical level of the Nebraska scale of interactivity. Level 1 represents the basic features expected on consumer equipment: frame addressability, remote control, the “search” facility, still-freeze frame, forward and reverse motion, chapter stop, picture stop and quick scan, slow motion and step frame replay.

**Level 2**—The mid-point on the Nebraska scale. A Level 2 industrial player uses level 2 capabilities plus its own onboard microprocessor, can offer multiple choice, branching facility and scorekeeping, and improved access.

**Level 3**—Effectively the top of the Nebraska scale. Level 3 represents a level 1 or level 2 video player, industrial or domestic, linked to an external computer (mainframe, mini or micro). Level 3 offers by far the greatest versatility of any interactive configuration.

**Level 4**—A theoretical configuration wherein things not yet imaginable may be possible.

**Light pen**—A remote control device that allows the user to write or draw on the screen of a cathode ray tube with an extremely sensitive photo-electric pen. Light pens can be used to “read” the surface of the screen, to input information or to modify recorded data, and to interact with a teaching or training program.

**Mastering**—A stage in the production and a real time process in which the premaster videotape is used to modulate a laser beam onto a photosensitive glass master disc (from which all subsequent discs will ultimately be pressed).

**Menu-driven**—A program that is built around a series of menus, or tables of contents, which guide users through the options available to them.

**Optical disc**—A video disc that uses a light beam to read information from the surface of the disc.

**Overlay**—The facility to superimpose or key computer-generated text and graphics over a video picture, moving or still.

**Picture stop**—An instruction encoded in the vertical interval on the video disc to stop the video disc player on a predetermined frame.

—CONTINUED ON PAGE 259



## Between a shadow and a whisper

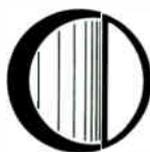
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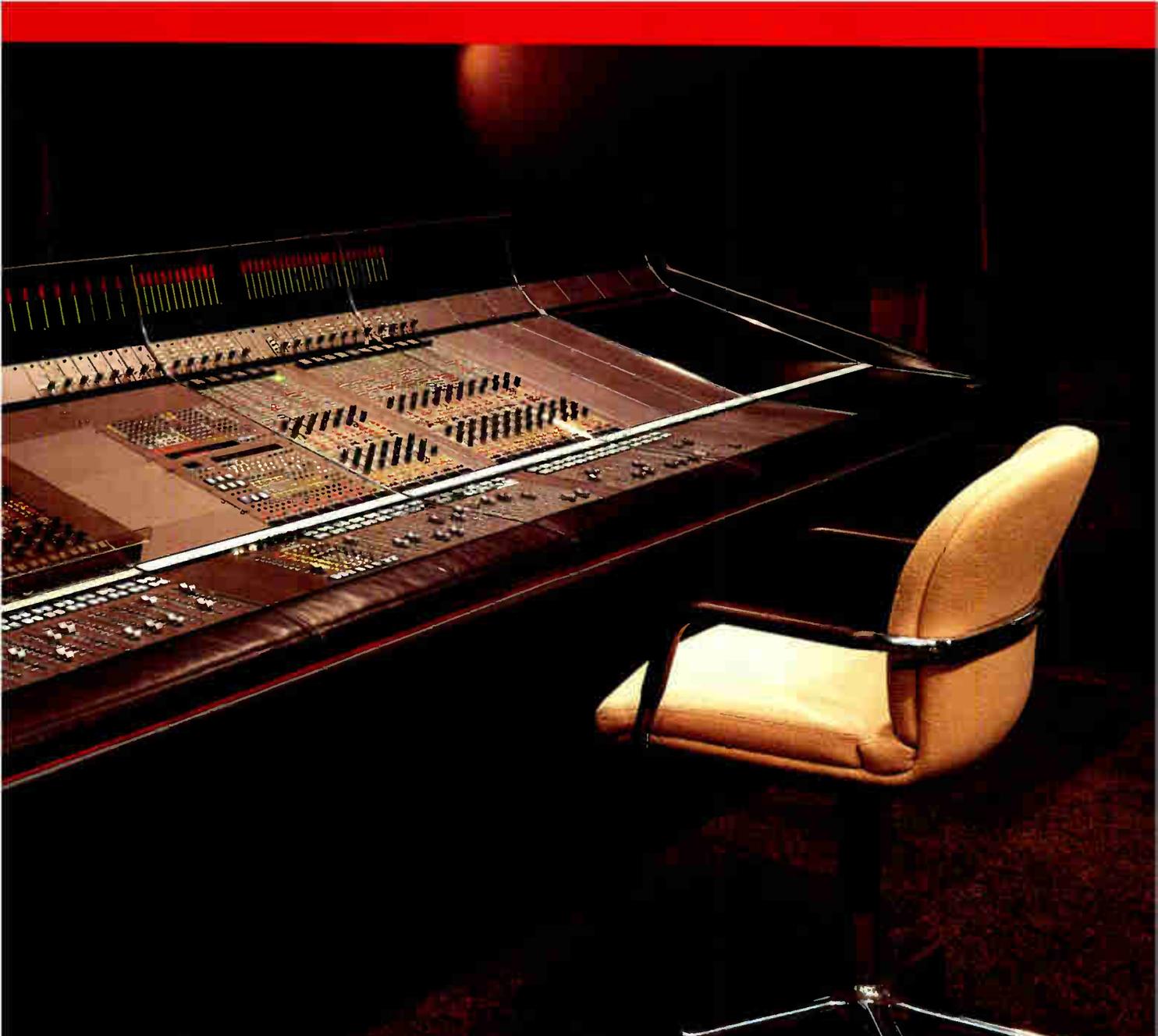
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Personal computer (L) with software "engine" from KnowledgeSet; CD-ROM drive (R) with Grolier's Electronic Encyclopedia.

# GROLIER'S ELECTRONIC ENCYCLOPEDIA

by Rachel McBeth

Members of the publishing community foresee the day that books, as we know them, will cease to serve as the primary source of reference information or reading pleasure. That's not to say that the printed word will go the way of, say, the 78 rpm disk. Rather, compact discs, which create a new dynamic between the seeker and provider of information, may usher in the next wave of practical data storage and retrieval.

This potential is currently being explored by the electronic publishing wing of Grolier, Inc., the world's largest publisher of reference works. Grolier introduced the first CD-ROM consum-

er product, the 20 volume Academic American Encyclopedia on a single optical disc in 1985.

Enthusiasm for the CD-ROM phenomenon is contagious, a fact that is not lost on Frank Farrell, president of Grolier Electronic Publishing out of Danbury, CT. "We're going for that wow reaction," Farrell says. Five years ago, Grolier acquired the marketing and editorial rights to the encyclopedia, (which had already been transferred to a machine readable format), and immediately made it available as an on-line data base. Libraries accessed the text through the Bibliographical Retrieval Services (BRS), and consumers had access via the major consumer services, such as

CompuServe and Dow Jones News/Retrieval. As a publishing firm, Grolier found the drawbacks of on-line systems to be two-fold: 1) payment via royalties is collected, which only compensates for a percentage of the encyclopedia's value, and 2) users are charged an on-line fee that tends to act as a disincentive to exploring the breadth of information retrieval. A solution was promised in local mass storage, appearing first in the form of 12-inch laser discs (which Grolier made available both in analog and digital formats, though they had no power to search for and retrieve information) and, beginning in December 1985, in the form of the microcomputer peripheral CD-ROM. A CD-I version, which will augment the encyclopedic text with graphics, is planned for release in 12 to 18 months.

Grolier's Electronic Encyclopedia in its current CD-ROM incarnation is an amazing tool for the curious. Besides its 31,000 articles totaling 60 megabytes of information, there is a 50 megabyte index that specifies the appearance of every descriptive word in the 9 million word data base. Combined with the floppy disk software "engine," which accompanies the CD-ROM disc, powerful searches can be performed on the encyclopedic text. The user can browse for articles under any chosen topic, search for specific words, and even search for word combinations within a chosen proximity (article, paragraph, no more than three words apart, etc.). To assist browsing, all articles have an outline that can be retrieved with one touch. In the words

Knowledge Retrieval System ©1986 KnowledgeSet Corp., Monterey, CA

F1 ABOUT KEYS	F2 SEARCH WORDS	<b>Search Option</b> Article Titles Bibliographies Fact Boxes Tables Article Text All Categories	<b>WORD SEARCH</b> TO FIND A TOPIC Enter search words at blinking cursor; then push SEARCH WORDS to find article titles Then push SHOW TITLES to select an article	<b>Relation Option</b> Negate Words In an Article In a Paragraph Words apart 20 Exact Order
F3 LOOKUP WORDS	F4 SHOW TITLES	Push SHOW TITLES To See Titles There are 50 occurrences in 26 articles		
F5 SEARCH OPTION	F6 RELATN OPTION	The word(s) THOREAU _____ along with _____ along with _____ along with _____ along with _____		
F7 NEW QUERY	F8 SAVE QUERY			
F9	F10 SELECT SEARCH			

KRS TITLE SELECT SEARCH WORD SEARCH SHOW TITLES ← ESC

The Electronic Encyclopedia Copyright ©1986 Grolier, Inc., Danbury CT

F1 ABOUT KEYS	F2 OUT- LINE	pacifism and non-violent movements		
F3 PREV PAGE	F4 NEXT PAGE	Perhaps the most successful campaigns of nonviolence were those led by Mahatma Gandhi in South Africa before World War I and in India afterward. Gandhi based his theories of civil disobedience partly on the writings of Westerners such as Tolstoy and Henry David Thoreau and on the Christian Gospels, and partly on Indian teachings of ahimsa. Out of these he developed his own approach, called satyagraha (truth-force), which in practice took many different forms: strikes, street demonstrations, withdrawal of cooperation, and symbolic breaches of law such as the manufacture of salt—all within the context of a movement based on self-discipline, self-sacrifice, and moral purity. Gandhi directed his nonviolent campaigns not only against British rule but also against abuses within Indian society such as discrimination against the casteless group called Untouchables. His campaigns were the most important factor leading to the British withdrawal from India in 1947. Because of Gandhi's movement discrimination against the Untouchables is now illegal in India, though it is still widely practiced.		
F5 PREV PARAG	F6 NEXT PARAG			
F7 MAKE COPY	F8 NEXT ART			
F9	F10 WORD SEARCH			
Push F1-F10				

KRS TITLE SELECT SEARCH WORD SEARCH SHOW TITLES SHOW TEXT ← ESC

of Farrell, the CD-ROM user's enhanced ability to find leads, references, and cross references within a matter of seconds "absolutely exponentially explodes" the value of the data base.

Grolier's CD-ROM disc was researched and developed by a heretofore unlikely merging of talent—"A hallmark example of how different kinds of people must learn to work together," says Farrell. In this case, three years ago the "staid" publishers of Grolier, Inc. joined forces with the "wild" technicians of the KnowledgeSet Corp., of Monterey, CA, to prepare the encyclopedia for release. KnowledgeSet devised a 21-part formula for the physical manipulation of the data that included formatting, extracting, creating files and an index for data retrieval, building cross references, encrypting the data so that it is specific to particular software, and ultimately downloading the final files onto a pre-mastering tape. At that point, Grolier teamed up with Philips to press the glass master in the Netherlands. The actual discs were then manufactured by Polygram in West Germany. One-and-a-half years ago, when these companies took the calculated technical risk of pressing the first glass master of a fully encrypted data base,

---

*The CD-ROM user's enhanced ability to find leads, references, and cross references within a matter of seconds "absolutely exponentially explodes" the value of the data base.*

---

there weren't any U.S. facilities with this specialized production capability. Farrell now expects that stateside manufacturing will provide many new options as it becomes "very competitive pricewise."

Grolier also took a substantial marketing risk by introducing the first product to a brand new consumer market. Farrell sees CD-ROM sales, naturally, as following the sales of CD-ROM drives. Those who are in the market of this type of storage and retrieval system are schools and libraries (who

are already tuned into advanced data storage systems), and what Farrell terms the "early adaptors or technically curious." So far there has been only nominal penetration of the consumer market mainly due to the expense of current CD-ROM drives (\$1500) and public apprehension of the new technology. The unveiling of CD-I early this year has added yet more confusion to consumer decision making. Farrell, however, sees the two products as having distinctly viable markets: CD-ROM as a microcomputer peripheral, CD-I as a freestanding system easily incorporated into the home entertainment niche. Farrell views CD-I as simply the "next product" in the expansive scope of laser disc technology. He is particularly excited by the capacity of CD-I to add the graphic element to the current text-only electronic encyclopedia, since there are 16,000 illustrations, two-thirds of them in four color, that can augment the articles.

Beyond CD-I, Farrell envisions what could be the ultimate learning device—"CD/AV"—a technology that will permit full motion video images, audio signals and data retrieval. He is also intrigued by the possibility of showing things that can't be seen by the naked

—CONTINUED ON PAGE 126

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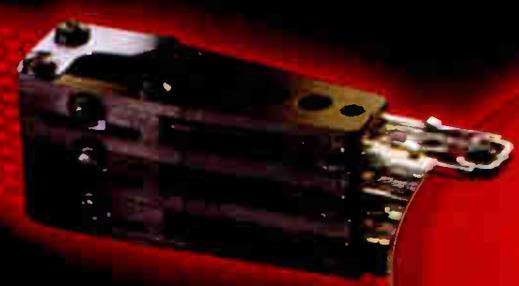
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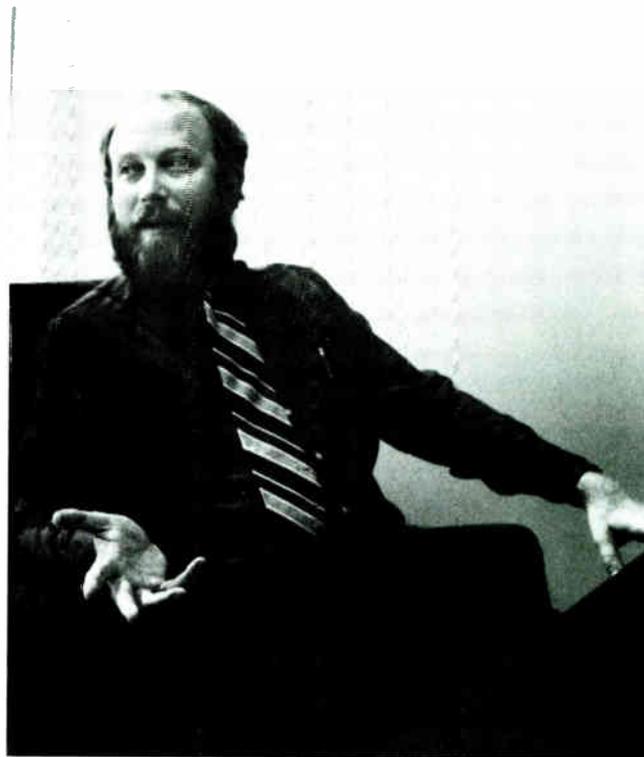
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World Radio History



*Dr. Bernard Luskin, President of AIM*



*Larry Lowe*

# *THE FUTURE ARRIVES AT* **AMERICAN INTERACTIVE MEDIA**

by Elizabeth Rollins

The spacious American Interactive Media (AIM) offices gaze down on West Los Angeles from an elegant new marble high-rise not at all like Stan Cornyn's sequestered digs tucked away in the funky WEA building in Burbank. The two CD-I software labels seem as distinctly different in their personalities as they do in their accommodations.

AIM is clearly shooting for the corporate sector to support co-venture software. The list of program development vice presidents and their departments alone tells you immediately where the areas of concentration are: Raymond Ashton, education, self-help, professional; Susan Baker, commercial, industrial, professional; Mark Fine, entertainment. AIM chairman and chief operating officer Gordon Stulberg is the president of Polygram Corp., USA, and is also president of Balcor Entertainment Corporation, and a consultant to Cox Enterprises, parent of Cox Communications. Stulberg has served as VP and chief studio operating officer with Columbia Pictures, and president and CEO of 20th Cen-

## **INTERVIEWS WITH Dr. Bernard Luskin AND Larry Lowe**

tury Fox, to name only a couple of major accomplishments on an illustrious resumé.

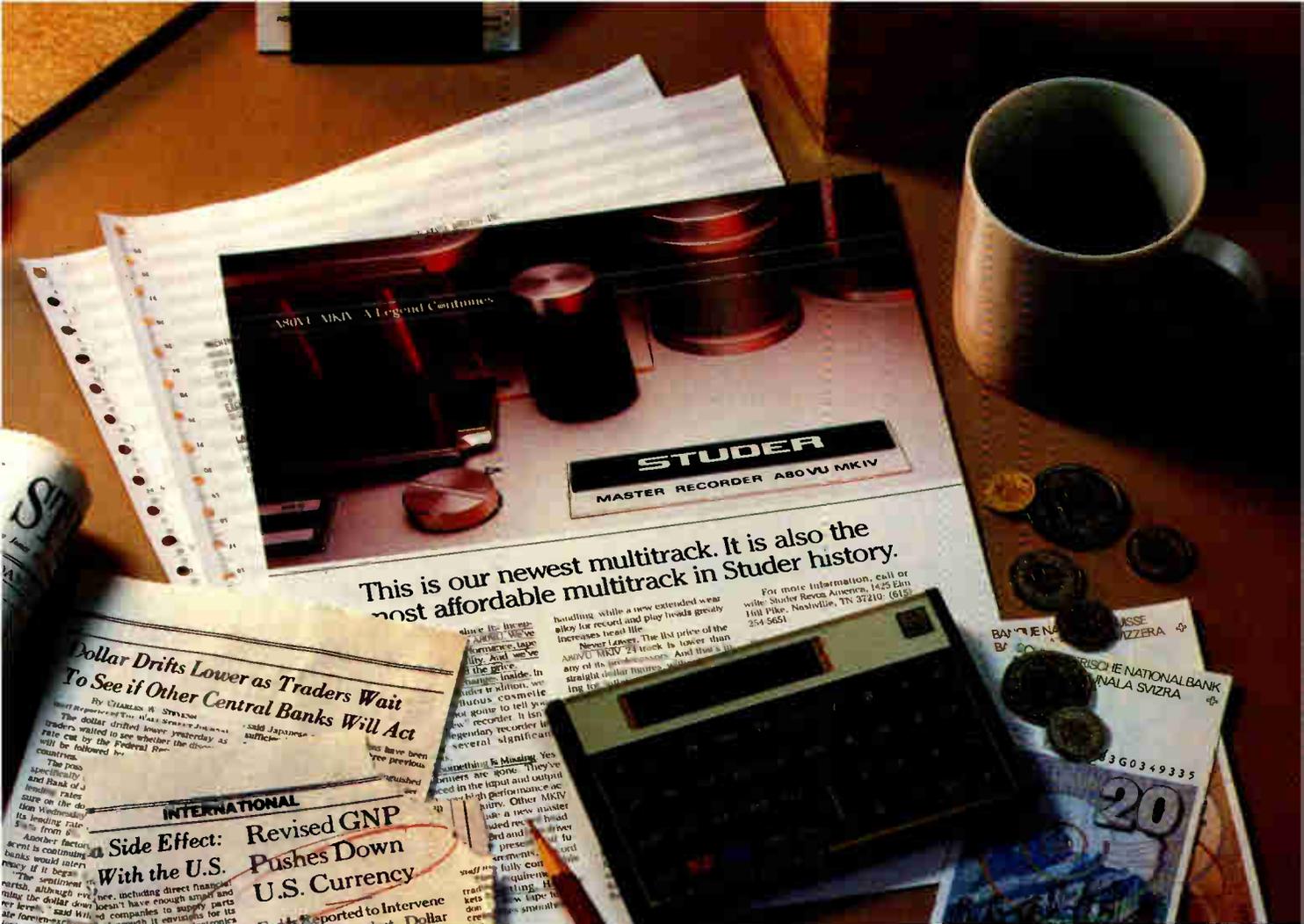
Dr. Bernard Luskin, president and CEO, has spent nearly 30 years in education. For two years before he took over at AIM, Luskin was executive vice president and treasurer of the American Association of Community and Junior Colleges; before that he was president of Orange Coast College in Costa Mesa, California (and a long list of other schools with which

he's been associated precedes that). Luskin has published seven books, and has the distinction of being the person who installed the first computer into a community college back in 1960. He's also produced video tapes and public television programs, and is licensed as a psychotherapist.

In early August when we spoke, Luskin explained that his company has been courting large "content providers" to develop software for CD-I. AIM is offering matching funds in the \$125,000 to \$150,000 range, and so far a working relationship with three companies has been confirmed: Time-Life, Spinnaker Software of Cambridge, Massachusetts, and public television station, WNET, New York.

**Mix:** How are you helping these companies once you sign an agreement about what you want to do together? What does AIM offer in these co-ventures?

**Luskin:** We're supplying about three or four things. Because we are a child of Philips, we have as current information that exists with regard to the technology. We're staffing up now, and we're going to have a CD-I authoring



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**STUDER** *REVOX*



facility here, where we will do authoring probably along with TRG (The Record Group) because TRG is owned by PolyGram also. Larry, for example, is making sure all the features of the authoring system work. We've also got knowledge of when and how the players will be launched in this country. We've got some money to match funds with these people who are interested in getting into CD-I. We've got a lot of intelligence because of all the planning we're doing about where CD-I is going. We're doing a lot of studying.

There will be mixed successes, there's no question about it. But if the player becomes ubiquitous, the product line is going to be very wide, and so it's sorting now into these families

of product that are going to come out. We're still learning, partly on our own intelligence, but partly on who's pushing with us. We have people who are being very aggressive on travel, people who're being very aggressive on children's programming, on self-help kinds of programming. We have more of an opportunistic interest in entertainment—games and so forth—that's a jump-on-the-bandwagon kind of thing. So we are being shaped by our own wishes, but we are also being shaped by the forces that are trying to work with us. That's what's happening. This is literally the birth of an industry.

I'm interested in sharing with the people who want to work with us. I

come from an industry that shares, not one that keeps everything a secret.

**Mix:** What kind of response have you gotten so far from the corporate sector?  
**Luskin:** Well in New York we invited the heads of about 75 of the major publishing companies. Sixty-eight came, which was just awesome! Part of it came from personal relationships.

We've been tumbling ever since that time, trying to respond to the extraordinary interest. A lack of enthusiasm has not been a problem. A lack of partners to commit capital has not been a problem. The software process will sort itself out; discs are being developed over in Einhoven, Germany. Larry (Lowe, applications engineer at AIM) is writing the content provider's guide, which will be the software process.

**Mix:** Your background is in education and I know that some of the most interesting CD-I software products will be used for this purpose. Can you talk about some of these projects?

**Luskin:** We're talking with Spinnaker Software about convertible educational software. If you look at the player from a psychological standpoint, it's a tremendous reading machine. Here's an opportunity for teaching reading by helping people to understand what they're doing with an audio format, yet still have the ability to present stills and text. It also offers the opportunity for people to have the same player at home that they have at school.

One of the programs we're looking at that we'll probably do is part of a whole art family. CD-I has extraordinary color diversity. Just as there are several paint programs in the small computer business—you'll be able to go to the player, make your greeting card or letterhead, and drop it off at the laser printer and print it.

There'll be a lot of children's product. We're going to do something in mathematics and spelling, and possibly a thing called *Homework Helper*, probably something in reading. That kind of product will go into the educational market in schools, and into the home as parents will for the first time have a sensible support in helping their kids. So children's programming provides kind of a family of products.

One of the things we're probably going to do is in the area of music. We're going to do a series in music that partly relates to the teaching of musical instruments, like guitar or drums. But the player is a wonderful practice device. It's a device for learning music, so a family will develop around that.

There's no question that there are going to be a series of new games,

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and there will be a lot of existing games that will be adapted for use with the computer, whether it's bridge or chess or any of the more exotic games, because they'll play on the player, and if you've got it, you may as well have access to all these games.

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We are being shaped by our own wishes, but we are also being shaped by the forces that are trying to work with us. This is literally the birth of a new industry.

---

Travel programs will be another family. We're looking at a tour of New York, of Paris, of the Louvre. Personal enrichment and self-help programs will be clusters of software that will be developed.

The genius of the CD-I player is not so much that it offers something entirely new, it's that it offers the butcher, the baker, the candlestick maker—the yuppie, or anybody—to do things at home more simply than they've been able to do before. The world will have access to paint programs, rather than just the computer buff.

**Mix:** You're shooting for a much broader consumer base than the personal computer market?

**Luskin:** There are 200 million people in the United States and the potential install base is 90 million television sets. Potential users of the CD-I player at home, with a lot of different applications, are far more into the television set milieu than the small computer or CD-ROM.

In the end, if the small computer business sells 150,000 units of a game, they think they had a big one! The

computer is really not taking off as a consumer product. It never will in enormous magnitude. It will always be a segmental market product or a professional kind of product because it's got complex peripherals on it. Simpler machines that do what computers do will be the consumer machines, like the typewriter that's got memory in it. The CD-I player is the same thing. It's a ubiquitous player that does lots of things, and out of this will come a new industry.

---

Larry Lowe started building computers in his garage, and ended up spending the next ten years in the industry. In 1976 he started a company called The Microworks, and helped develop the first video digitizer for the hobby micro market.

The 1982 World's Fair showcased the then new laser disc, and that was Lowe's gateway to video; he designed a series of those interactive video exhibits.

You don't need a degree in computer science to talk to this guy—he seems open to almost any level of question you dare ask. After a little while, you begin to realize why. It's because he loves what he's doing so much. Lowe appears to be one of those high-tech/no-tech humanists whose passion for his work starts him thinking about technology as an extension of human evolution—not just ones and zeros. Here's what he had to say about the nature of the CD-I format as it interacts with the projected hardware.

**Mix:** Can you describe the CD-I format as it is laid down on the disc?

**Lowe:** It's a CLV (constant linear velocity) system. The track spiraling and track identification is identical to digital audio. The highest level differentiation is that the first track on the CD-I disc must be the first track, which can be mixed stuff. All subsequent tracks could be, for instance, standard digital audio.

**Mix:** One of the drawbacks so far to the CLV layout with CD-ROM, for example, has been poor seek-performance. Is there a way to get around that?

**Lowe:** There's no way to get around it because you are building on that standardization, therefore you just *have it*. Now if the folks who build the hardware get faster motors and algorithms that go someplace, then you're going to improve it somewhat, but you're still going to have to change the speed of the spindle, and I don't see much improvement going on there. What you have to do is design your application so that that latency is handled by the operating system, and the interactivity between the application and the user

goes on at whatever rate the user needs.

One of the ways to do that is to go read everything off in advance that you think you might want to show depending on where you're at and have it in RAM [random access memory]. The guy presses the button, jiggles the joystick, whatever he does, and you respond to him immediately and go load in all the next stuff from the state you're in now, and try to stay one step ahead of him. So while he's reacting to what your screen did, you're out screwing around trying to find the next thing. RAM is really how we will deliver audio, visual and text information.

We will go and try to stay one step ahead: that's a design phase solution. There's another solution down at sort of the hardware operating system level, and that is the concept of interleaving of data. So, it turns out that the audio data becomes sort of the driving force. Our smallest unit is 2k bytes, plus some error correction and what not, and if you've got a certain audio level, you're going to have to get some of those either from RAM, or off the disk at a certain rate to the audio circuitry. Well if you're doing our lower quality levels, there's time left before you need to do another 2k block where you can be reading text, where you can be reading graphics and build up a graphic out of the gaps, and keep a steady flow of information to the audio processor, so the guy can hear AM speech, which is lower quality. But 2k blocks have got to be a thing, you don't mix 'em any lower than that.

In other words, if we've got 2k of audio, and the narrator is saying something that is 10k worth of information, "Hello—" well, when he gets through with that "He—" you've got to have that "--lo" ready to go. You've got some room in there where you can put other stuff, but it's driven by how often we need to refresh the audio processor to get continuous noise. We can then pull stuff out of the gaps, and build up the video screen and throw it at the guy whenever we're ready. We can sort that problem out. But for a continuous stream of noise to come out of the speaker, you have to have a continuous stream of data coming off the disc, or out of memory.

If it happens to be digital audio quality, *it's the whole stream*—it's every bit of information. We don't have any room left over. The first level down takes half as much. That's what they call "LP quality." There's "FM quality" after that, then "AM," and each is half again as much space as the one before it. So you read half of the stream, put it into a little buffer and it's going out to the audio processor, and you just take the next half and do something with it—

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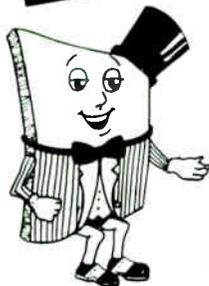
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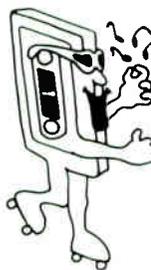
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could be a bunch of text, computer code, whatever.

It's not terribly important that you get *that* off at any specific instant. But you *know* that when you run out of audio you're going to have to have more ready.

**Mix:** And so that solves the problem of access time, in some ways...

**Lowe:** In some ways, because we're not going to access an audio record complete, and then go jump someplace else and access the video we intend to accompany it. We'll be building the video up as we're playing the audio out. So there's a bit of sleight of hand there.

The folks from the *Mix* audience have been working with digital audio, and now you see that video still frame has been added. But not only do we have video, we have text—massive amounts of data, computer software, 68000 object code—so we have to blend four worlds instead of just two.

That leads me then to a quick discussion of applications. The first ones we will tend to see will be people who are trying to transfer something they have in some existing form—transfer it over to CD-I where they will use one or two of the media that are available. That's all well and good—we're going to have to go through that phase just to see how to *make* these things. But the big win will come when we use applications that skillfully blend all those kinds; enough computer code to make it a really smart interactive process, enough text data so you... well, for example if you're doing a tour of a museum by still frame; you'd want to click on something and you could open up a whole book on that subject, but you don't have to read it if you don't want to. Visuals and audio matched, too, of course, to create an aesthetic.

**Mix:** We've talked about the audio driving the video, and many *Mix* readers are well acquainted, as you said, with digital audio. But what about the video—how is it digitized and compressed for CD-I?

**Lowe:** Okay, we have a digital D-Y-U-V picture which basically is an NTSC broadcast quality signal, digitized. Of course, we've never seen a CD-I picture to date because we're still building the silicon to play it back out. But you should be looking at a broadcast quality picture.

In much the same fashion as we have decreased the amount of information required to store the audio in these different levels and sacrifice some quality for more of it—we have a couple of graphics levels of RGB and we have one that's even more

compressed called Color Lock-Up Table (CLUT) and that has maybe not so much color resolution. The beauty of that is that you can get enough of that off the disc fast enough because it's so highly compressed that you can do real time animation and have a little audio to go with it. So a 16-color cartoon kind of real time playback is a capability.

The specific algorithms for encoding and decoding are all proprietary stuff. There are several chip makers who are building parts that will encode for us in the studio. We have a CD-I post-concept.

**Mix:** Okay, so you've got some film to tape transferred material for programming... then what...?

**Lowe:** You take the tape and digitize it and that's when it begins to get into the CD-I realm. At some point, that information is transposed into specifically the encoded format. That goes on at CD-I post phase. And that's the kind of hardware that people in the world are busy developing right now. See, we compress that image onto the disc because we want to store more on it, and we don't want to have to spend a lot of time *getting it off*. You can pull a little short, compressed set of error corrected data out, run it through a hardware chip in real time, and decompress it and expand it into the image. And that's the secret to getting our speed up.

**Mix:** Is it not just Philips and Sony who are working on this?

**Lowe:** Philips and Sony are working on the standardization, the specifications, the famous *Greenbook Standard*. Matsushita is in making one of the chips, and all of the chips will be available, when they all work, to any manufacturer to design into his unit.

Of course the 68000 processor that Philips intends to use is the 68070, which in itself is a very highly integrated part. It's got two channels of DMA, a memory management unit. It's got an integrated circuit communications bus so that it can act as a conductor of a little private line on a PC board and orchestrate all these other chips working without having to do a lot of work. So a lot of the work is taken off the 68000 so it can do its job, which is to listen to the user, respond to the user, manage the program.

We discussed the idea that you would design the record so that you know where you're going to be. Down in the guts of it a ways, the real time operating system, coupled with this DMA capability allows us to look at those blocks of information as they come out of RAM as long streams of information. As soon as the first cou-

ple of bits go by, an interrupt happens and the processor goes to an operating system interrupt handler and executes a very small piece of code, which bashes a couple of registers in the DMA circuitry, takes a whole next block of information, puts it somewhere, and having assigned that task to the DMA, the processor's right back to what it was doing!

In conventional video technology, we have a channel of video or film information, we have two channels of audio information and you can turn them on and off. There are three channels of information. With CD-I, there's one. So you've got to braid them together. And there's a lot of hardware and operating system cooperation to debrand them, and *make it appear they're happening simultaneously*. They really are not, because only one thing can be happening at one time. "For the next 2000 bytes, I'm gonna load nothing but audio data in. Oh my god, here's some more video data. I'm gonna load that in there now!"

It's an enormously complicated symbiosis among the data format of the media, the hardware capabilities of the processor, and the gymnastics of the operating system. That's why it's based on OS-9, because that's a very good operating system for managing events. It was developed by Microwave, originally, years ago, for the 6809 microprocessor, hence it's name, OS-9.

There were some rumbles in the computer industry. "Gee, why OS-9? The only thing that ever ran on it was the Tandy color computer." Well OS-9 has a kind of property that's very interesting. It's very much a modular system. So if you want to make a little bitty operating system out of it—a single board that sits in the corner and runs an air conditioner—you can. But if you want to add some more modules, disc drivers and some other things, you can run a small personal computer. It can, however, be expanded to where you can run 20 users, multi-tasking, and it has at that stage very much the flavor of UNIX, which is the standard really high-powered operating system. So it's like an accordion.

I suspect that it's the proper choice. I suspect that some people's opinions of OS-9 are based on limited experience. And indeed, it's been somewhat obscure. What you tend to get in the computer industry is once something is established as a standard, why bother to go to anything else? Or, why didn't you use MS-DOS or why didn't you use UNIX, or why didn't you make it IBM compatible? All these questions . . . but we're really inventing a brand new beast here. It's a whole new processor, we have incredible media that

we're working with, so a new operating system was in order.

**Mix:** So you agree with the decision . . .

**Low:** Agree or not, I'm going to take advantage of it. There are two kinds of people in the world. There are people who when you introduce something brand new, they give you a litany of all the things they see wrong. Hence, you don't want to adopt. The other kind of people look at all the things that are right, and they work around it. Nothing's ever perfect. So my attitude is, there's enough stuff there.

Like the video people who say, "Well we want to have 30 frames a second!" Well, we will eventually. CD-I is yet another step in a very methodical ser-

ies of optical media. Starting with digital audio, getting enhanced to data code with CD-ROM, CD-I combines lots of capabilities and we will eventually glue that on to the LaserVision format with an omni player.

Well, you can make two decisions at this point in time. You can say, "I'm so crippled as a designer that I've got to wait for 30 frames of video per second to get here because that's all I know how to do." Or, you can look at the fact that on one medium, you've got computer code, data, still frames and graphics, animation with text, audio . . . "I can design an intriguing application for that." There's plenty of stuff in CD-I for someone to do just amazing things! ■



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The TEC Awards were established by the publishers of *Mix Magazine* in 1985 to create a vehicle by which two major goals could be accomplished:

1. To bring recognition and honor to those people, products and companies which have made outstanding and significant contributions to the professional audio industry in the past year, and
2. To raise funds for scholarship programs within the industry and charitable organizations which work in the area of deafness and hearing impairments.

The TEC Awards nominees are chosen and voted on by the readers of *Mix Magazine*. For 1986, the nominees are as follows:

### 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.

#### Recording Technology

- Dolby Laboratories—Spectral Recording Process
- Lexicon—PCM70 Digital Effects Processor
- Mitsubishi—X-850 Digital Recorder
- Sony Pro Audio—PCM-1630 Digital Processor
- Studer—A820 Analog Recorder
- Yamaha International—REV7 Digital Reverberator

#### Tape/Disc Manufacturing Technology

- Harmonia Mundi Acustica—bw 102 Digital Audio Interface
- JVC—D-900 Digital Mixer/Equalizer
- Neumann—AME 591 Equalizer
- Philips/Sony—CD-Interactive Format Standard
- Teldec—Direct Metal Mastering

#### Acoustics Technology

- Acoustic Sciences Corp.—Tube Traps
- Brüel & Kjaer Instruments—Speech Transmission Meter Type 3361
- Meyer Sound Labs—SIM Equalization
- Monster Cable—Soundex Acoustical Panels
- Rapid Systems—FFT Peripheral/Software
- Scientific Design Software—Computer-Aided Speaker Design Program

#### Sound Reinforcement Technology

- Crown International—GLM Microphones
- Harrison—HM-4 Console
- Intersonics—Servo Drive Loudspeakers
- Meyer Sound Labs—CP-10 Parametric Equalizer
- Renkus-Heinz—Smart System Loudspeakers
- Yamaha International—PM3000 Console

#### Film and Broadcast Sound Technology

- AMS—Audiofile
- Droidworks—SoundDroid
- Fostex—Model 4030 Synchronizer
- Solid State Logic—SL5000 M Console
- Sound Ideas—CD Sound Effects Library

#### Musical Instrument Technology

- E-mu Systems—Emulator II
- Ensoniq Corp.—Mirage Multi-Sampler
- Fairlight Instruments—CMI Series III
- Linn Electronics—Linn 9000
- New England Digital—Direct-to-Disk Synclavier
- Yamaha International—TX816 DX Rack System

### OUTSTANDING CREATIVE ACHIEVEMENT

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

#### Recording Engineer

- Bob Clearmountain
- Neil Dorfsman
- Humberto Gatica
- George Massenburg
- Alan Parsons

#### Recording Producers

- Phil Collins/Hugh Padgham
- Mark Knopfler/Neil Dorfsman
- Michael Masser
- Phil Ramone
- Narada Michael Walden

#### Mastering Engineer

- Bernie Grundman (Bernie Grundman Mastering)
- Steve Hall (Future Disc Systems)
- Bob Ludwig (Masterdisk)
- John Macdonald (Digital Audio Disc Corp.)
- Glenn Meadows (Masterfonics)

#### Sound Reinforcement Engineer

- Paul DeVilliers
- Dan Healy
- Bruce Jackson
- Buford Jones
- M.L. Prociase

#### Broadcast Sound Engineer

- Biff Dawes (Westwood One)
- Jim Duncan (Westwood One)
- Ron Estes (NBC)
- David Hewitt (Remote Recording Services)
- Mark Schubert (Lincoln Center)

#### Film Sound Engineer

- Ed Anderson
- Bruce Botnick
- Dennis Sands
- Unger/Hahn/Marino/Baran
- Dan Wallin
- Billy Youldeman

### OUTSTANDING INSTITUTIONAL AWARDS

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

#### Acoustics/Studio Design Company

- Chips Davis LEDE Designs, Inc., Las Vegas
- Joiner-Rose Group, Dallas
- Lakeside Associates, Irvine, CA
- Perception, Inc., Los Angeles
- Valley Audio, Nashville

#### Mastering Studio

- Bernie Grundman Mastering, Los Angeles
- Digital Audio Disc Corp., Terre Haute, IN
- Masterdisk, New York City
- Masterfonics, Nashville
- Sterling Sound, New York City

#### Record Company

- American Gramophone
- CBS Masterworks
- GRP Records
- RCA Red Seal
- Telarc

#### Recording School/Program

- Berklee College of Music, Boston
- College for the Recording Arts, San Francisco
- Middle Tennessee State University
- University of Colorado, Denver
- University of Miami, Coral Gables, FL

#### Recording Studio

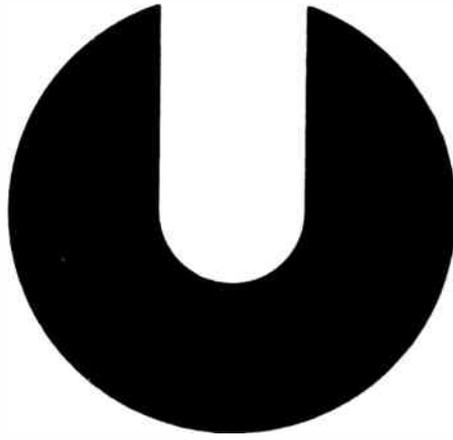
- Capitol Records Studios, Hollywood
- Cherokee Recording Studios, Hollywood
- Fantasy Studios, Berkeley, CA
- Larrabee Sound, West Hollywood, CA
- Ocean Way, Hollywood
- Power Station, New York City
- Universal Recording, Chicago

#### Remote Recording Facility

- Effanel Music, New York City
- Fanta Mobile Recording, Nashville
- Le Mobile, Encino, CA
- Record Plant, Los Angeles
- Remote Recording Services, Monsey, NY
- Westwood One, Culver City, CA

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Since a fundamental goal of the TEC Awards is to make a worthwhile contribution to the future of the professional audio industry, 100 percent of the proceeds from ticket sales to the awards ceremony will be distributed in the following manner:

50% will be given in the name of the TEC Awards to the House Ear Institute in Los Angeles. Founded in 1946 by grateful patients of Dr. Howard P. House, the foundation is a non-profit organization supported entirely by private donations and dedicated to uncovering the myster-

ies of the ear through research, and training ear specialists and professionals from allied disciplines in diagnoses, treatment, and rehabilitative techniques.

25% will be given in the name of the TEC Awards to the Audio Engineering Society Educational Foundation to establish a scholarship for a worthy student in the area of advanced study in audio or acoustics.

25% will be given in the name of the TEC Awards to the institution voted as winner in the Recording School/Program category, to establish a scholarship for a deserving student in the study of audio.

The House Ear Institute has volunteered its services to

administer the ticket revenue fund, which will be distributed to the recipients at the awards ceremony.

## TICKET INFORMATION

Ticket price is \$35. Individuals or organizations wishing to reserve a table for ten may do so for \$350. The total price of each ticket is tax deductible as a charitable donation. Seating capacity is limited and all seats and tables will be available on a first-come, first-served basis.

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(Left to Right): Composer and Academy Award winner Ralph Burns, Angel Balestier and Dennis Sands behind the board in Studio A for the film, *A Chorus Line*.

## GROUP IV RECORDING:

### A Quiet Leader in Film and TV Sound

by Tony Thomas

There are a number of different paths a studio can take working up the ladder to fortune and fame. It is the goal of some facilities to land as many big-name artists as they can for album projects, knowing that such a pian of attack assures both income and visibility. Others take a more scattershot approach, dipping into every kind of project conceivable to show their versatility to the widest range of potential clients. At Group IV Recording in Los Angeles, owners Dennis Sands and Angel Balestier have eschewed the glamorous track that most of the city's comparably equipped studios have taken, in favor of concentrating heavily on doing television and film sound work. As a result, Group IV's name might not be bandied around much at the Parties That Matter around town, but they

have quietly built a reputation among television and film production people for being one of the best in the business. Now celebrating their tenth year in the industry, Group IV is enjoying a steady upward arc that has allowed them to expand and update their facilities to accommodate the increasing demands of audio-for-video and film work. And talking to Sands and Balestier, one senses that their biggest years are still ahead of them.

Working under the tighter schedules mandated by film and television requires nerves of steel and a cast-iron stomach, especially when you have 50 or more musicians sitting there with their meters running waiting for you to get your mix together. Or when you're working with a composer when the film is overbudget and an hour late. Or when you're recording a score directly to mag stock and only have one expensive shot at getting a "keeper" mix. Sands and Balestier actually believe these types of situations are part of an average day's work!

Despite the fact that Group IV has maintained something of a low profile compared to studios that concentrate on album projects, their output has been anything but low profile. They have worked on music scores for such box office smashes as *Back to the Future*, *On Golden Pond*, *Romancing the Stone*, *Tootsie*, and *An Officer and a Gentleman*, as well as music for such prime-time television staples as *The A-Team*, *Dynasty*, *Dallas*, *Cagney & Lacy*, *Knots Landing* and *Hill Street Blues*. And the list keeps growing every month.

Balestier and Sands formed Group IV ten years ago, almost out of professional necessity. At the time, they were both working as independent engineers mixing for television specials and variety shows (which were still in public favor at that point). To do their work they would have to run from studio to studio, tapes in hand, often lugging some of their own equipment about, as well.

"Some of the studios we worked at didn't understand the difference between 2-track and full-track mono," recalls Sands. "Of course the networks knew, because everything would be phasing and cancelling out if they played a 2-track on a mono machine." Adds Balestier: "We even had to bring our own splicing blocks

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and splicing tape." To add insult to injury, Sands and Balestier often found themselves searching for a place to work in the middle of the night because they were frequently bumped from studios when "name" artists, on a whim, decided they wanted to work in the same studios.

It was at that point that Sands and Balestier decided to risk all and start their own studio. After all, they were practically carrying around a studio to begin with. Balestier, who by that time had racked up an impressive list of credits as a recording engineer with A & R Studios, Motown, TTG and MGM, working with everyone from Hendrix and Zappa to The Osmonds and Sonny & Cher, decided to give

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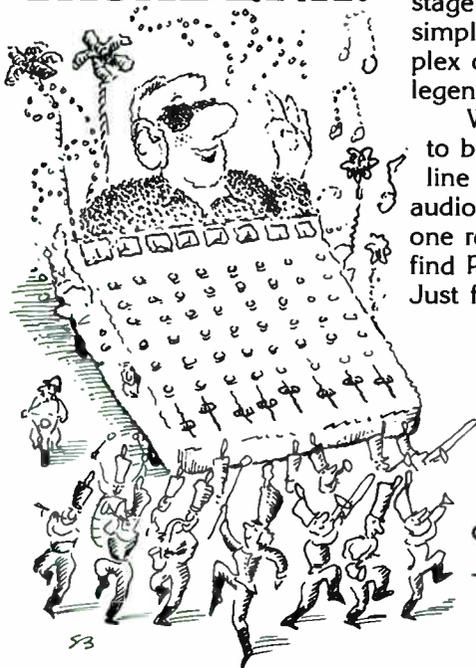
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up the mixing and go into administration, while Sands took over the reins of chief engineer of the new business. "I was basically burned out," says Balestier, who considered life in a nice quiet office more appealing than sitting behind a console all day.

Sands, on the other hand, relished the challenge of running the technical end of things and has since earned considerable recognition from peers for his accomplishments, including a Lyra Award for being scoring mixer on *Back to the Future*, an Emmy for tape sound for a Steve Lawrence & Eydie Gorme special, and most recently, a nomination in the Film Score Engineer category of *Mix's* TEC Awards (for *Back to the Future*).

In 1977, Sands and Balestier made the move to Group IV's current location on Wilcox Avenue in the heart of Hollywood, and opened a single studio spacious enough for the orchestral scoring sessions that take place there with great regularity. A smaller second studio was added recently to accommodate smaller sessions and the sort of MIDI work that is increasingly dominating film and television scoring. In addition, Group IV has extensive mag-film and telecine facilities—rarely found in album-oriented studios. And although the main studio is certainly well equipped to handle major album projects—LPs by Gino Vanelli, Shadowfax and others have been recorded there—Sands and Balestier have steered Group IV away from projects that would keep the studio booked up for months at a time.

"We've had projects like that offered to us; they wanted to tie us up for six months," Sands says. "That was when we only had one room. We turned it down. You see, our philosophy has always been to maintain the feeling of a very small, independent studio that caters to the needs of a wide variety of clients. In the film business, there aren't that many Steven Spielbergs and George Lucases. They can go anywhere and be catered to. But there are a lot of other people who aren't on that level. And on a big studio lot they aren't geared up to provide the same kind of personal treatment that a small studio like ours can provide.

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—CONTINUED ON PAGE 124

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# Angelo Arcuri



Angelo Arcuri (L) and Ronnie James Dio at work.

## On the Road and in the Studio with Dio

by Melinda Newman

"Everything always gets better live. On a good night I feel like I'm in the studio."

Not only has engineer Angelo Arcuri made heavy metal outfit Dio sound great live and on vinyl, he's done wonders for frontman Ronnie James Dio's pinball game. "When we're getting ready to record, Angelo does most of the initial work," says Dio, who's listed as producer on his three solo albums. "I'll tell him, 'Let's get this type drum sound together.' He'll say, 'Thank you very much,' and I'll go play pinball. When I get back to the studio, we're ready."

Though Arcuri didn't meet Dio until he began working with Black Sabbath, he's been firmly entrenched in the music business since, at the age of 17, he played bass for John Lennon on an ABC special. Little was he to know that after his band, Dog Soldier, broke up, he'd find greater glory behind the

studio glass. While working at the Record Plant in New York, he was one of the many assistant engineers who "burned out" on Springsteen's *Born to Run* LP under Jimmy Iovine's tutelage.

After working in the studio, Arcuri took his ears on the road as sound engineer for Derringer, Angel and Billy Squier prior to hooking up with Black Sabbath. He mixed house sound for two tours, The Mob Rules and the Live Evil outings, before Dio asked him to engineer his debut solo album. Although Arcuri had never engineered an album by himself, Dio figured that as a first-time producer, they'd learn together.

That album started a union that has taken Arcuri and Dio through three albums and as many live tours. With the exception of new guitarist Craig Goldie, little has changed in the three years Arcuri has worked with Dio and the other members of the band, Vinny Appice on drums, Jimmy Bain on bass, and Claude Schnell on keyboards. Arcuri took time out from the "Sacred Heart" World Tour to talk to *Mix* about the pros and cons of mixing live and in the studio.

**Mix:** You, along with Kevin Elson, are one of the few engineers who mixes in the studio and live. What's the most difficult adjustment in switching from one to the other?

**Arcuri:** The hardest part is getting my ears to adjust. Ronnie wrote a song for the *Iron Eagle* soundtrack and we had to record and mix it on days off, and the next day go do a show. I didn't like that because my ears take at least three days to calm down. It's 40,000 watts of power coming out at me live, and in the studio it's maybe 400 watts a side. I don't listen to anything when I'm not working because I just get barraged with it all day.

**Mix:** How do you deal with the inherent imperfection of live shows versus trying for perfection in the studio?

**Arcuri:** I don't think about those things because I learned basically everything I know live. So being that spontaneous has really helped me become faster in the studio. Live, you don't have another chance to put a track down or rewind or re-mix. In the studio, I don't think we can do this later. I mix as we're overdubbing because that seems natural.

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“I like to hear the vocals. I go to a lot of concerts and sometimes you have to strain to hear what is said. I like to mix the drums and vocals real big.”

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**Mix:** In concert, it seems as if Dio's vocals are mixed a lot higher than most guitar-oriented heavy metal bands.

**Arcuri:** That's right. I like to hear the vocals, I like to hear what the person is saying. I go to a lot of concerts and sometimes you have to strain to hear what was said. I like everything to be real clear. It's not because Ronnie tells me he wants the vocals to be the loudest thing. I just like to mix the drums and the vocals real big.

**Mix:** What type board do you use in concert?

**Arcuri:** It's a Midas Series E-44 channel. Actually, it's two boards: a 32-channel and a 12-channel with 12

sub-masters out and stereo. I fly 86 cabinets—that's  $\frac{3}{4}$  of the PA, and all the bottom end is on the floor so it sounds like a big stereo system. You realize it's loud, but it also sounds clear.

**Mix:** Dio has been recording a live album throughout this tour. How does the technique differ on days that you know you'll be recording?

**Arcuri:** The only thing that differs is we do an elaborate sound check. Ronnie will go into the truck with the other engineer and we'll do everything real slow. It takes about an hour just for Vinny's drum kit. Then Ronnie will come onstage and we'll do a couple of solos. We'll listen to it and make sure everything's fine. Then, during

the show, I'll mix the drums even louder so we'll get that big ambient room sound.

**Mix:** What microphones do you use onstage? How do they differ from what you use in the studio?

**Arcuri:** Basically, everything I use live are AKG mics, except for Vinny's seven tom toms. I use Sennheiser 421s live. That's a trip taking him live into the studio because live he uses concert toms that don't have any bottom skins, so we're able to put the microphones right up inside the drum and get that much more seclusion. I gate everything with noise gates and so does the monitor engineer onstage because he's just got so many tom toms. With all those microphones open all the time, all you pick up are bass and guitar out of his monitors. And the vocals are real loud out of his monitors because he's so high up, so we have to do all that.

In the studio, basically we use 421s on the toms, but we put them on top because he uses doubleheaded skins in the studio. He also plays on a wooden riser because it reflects the sound so much more. We put him in a wood room and just mic the drums, close mic, and place a couple of overheads, and a mic in front of him and behind him.

**Mix:** You recorded the latest album, *Sacred Heart*, at Rumbo Studios in Los Angeles. Before that, you recorded at Caribou Ranch. Is there any particular studio that you prefer?

**Arcuri:** It's really up to Ronnie. He doesn't like to work in L.A. because there are so many people here that the band knows and because of the nightlife. When the band gets distracted, it turns into a mess some days.

Caribou Ranch was great because we all lived there together. They had the Neves, the 48-track Studers, the Westlake monitors, everything we wanted. The studio room was huge, you could put an orchestra in there. The control room was huge, you could put a fireplace in it. It was the most comfortable place and the most relaxing time I've ever had doing an album. And I think we really got a great sounding record out of there.

**Mix:** Why did you record at Rumbo this time then?

**Arcuri:** Because we couldn't find anywhere else. We'd booked time at the Record Plant to do *Sacred Heart* and that sort of got messed up between who booked the time first, us or Kiss. We chose Rumbo because I called it and they had the console we were used to using—a Neve. And they had

## Dio Does His “Homework”

by Melinda Newman

Like any serious artist, Ronnie James Dio likes to do his homework before starting a project. Now, he'll have the luxury of doing the job in his new studio in Encino, California.

Reflecting his impish sense of humor, Dio has dubbed the studio “Stew-Dio.” It's a place where he plans to cook up some hot tunes of his own. “I've always wanted something that would be at my beck and call, something I could bring studio tracks home to and mess with at my command.”

Built around the Akai 1212 he traveled with for over a year, the studio is powered by a Crown VC 300A Series 2 amplifier and includes all the accoutrements the heavy metal hitter could want including a Studiomaster mixer for effects and Furman's Le Patch PB 40.

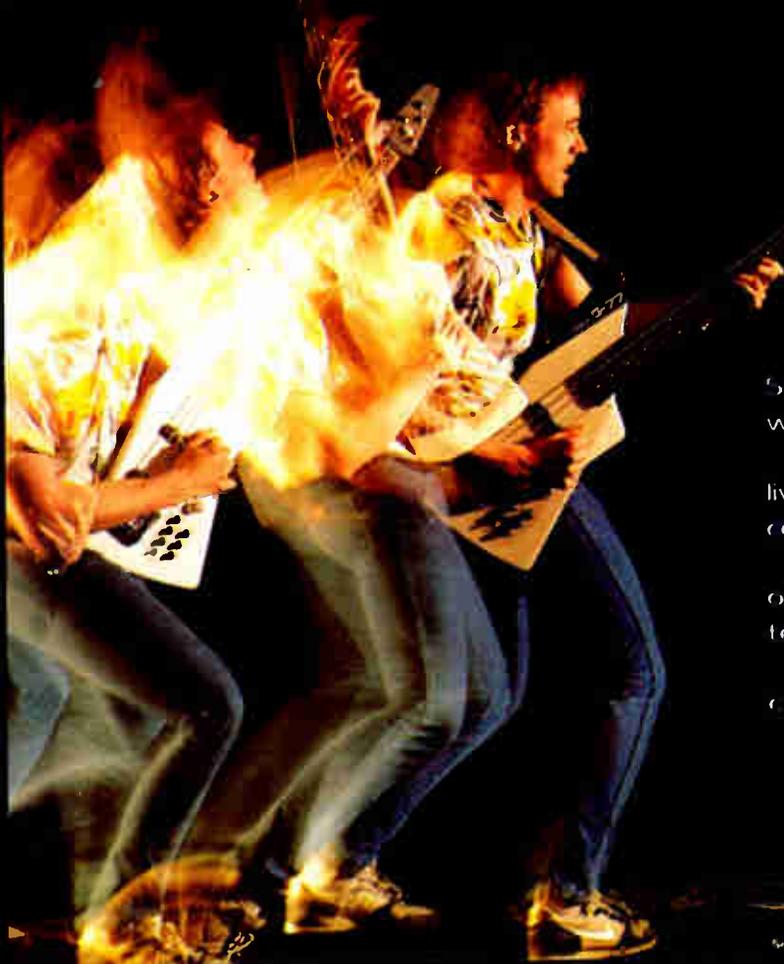
Dio and engineer Angelo Arcuri also made sure Stew-Dio contained some of the newest pieces to test their technological mettle, among them a Yamaha REV7 digital reverb and a FS1 Cyclosonic Panner. “The only other people that have used

one are the Eurythmics on this last album,” Arcuri says. “We used it on *Sacred Heart*.” Other outboard gear includes two Aphex Aural Exciters, four Yamaha Limiter Compressors, and an Ibanez Harmonics Delay unit. There's also a Macintosh computer for when Dio decides to MIDI to the keyboard.

Though the Akai 1212 was used on the road to record the B-side of a British-released single, Dio has no future plans to use it for master products. “This will be solely used to pre-plan my music,” he says. “It just gives me more scope. It enables me to take chances and find out if they work before I take them into the studio and waste anybody's time.”

Stew-Dio also won't be available for rentals, but Dio will open its doors to other artists with Niji Management, Inc. or fledgling performers whose talent he hopes to cultivate. “I want to keep this exclusively for myself and those I can help along the way,” he says. “The point of having a home studio is to always have it there when you want it and to be able to turn it on without having to drive anywhere.” ■

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the 48-track Studer and a Necam computer. Basically, it had everything we wanted and whatever else we needed, we could rent. We played a couple of tapes there and it sounded good, so we booked the time.

**Mix:** What outboard equipment did you bring in?

**Arcuri:** We really like the sound of the EMT 250 reverb. And on this last album, we also used a REV1 and 2 by Yamaha. They have a lot of good presets with it that come with the system. You can change it to any size room you want, but the model we had had great presets. Then we brought in extra noise gates for Vinny's drums. If he goes to the studio and then decides he wants to use a big kit, we're talking like ten tom toms, most studios don't have that many noise gates. I use a harmonizer and limiter, but most studios have those. As far as any type of digital delays and a lot of the stuff on the market, we don't really like to clutter up the sound.

**Mix:** What's been the biggest change in the studio that you've seen?

**Arcuri:** The biggest change to me has to be the Solid State Logic console. I mean that thing is a major breakthrough in technology. It's amazing. We used one on a song we did for the

*Iron Eagle* soundtrack called "Hide In A Rainbow." That one was really fascinating because we had to mix it in Dolby stereo on three speakers instead of two. We had a center speaker like they do in the theaters, and the two speakers on the sides. That's how we mixed the song and it was amazing. We were on the road, so we mixed it at the Dallas Sound Labs. We set up Yamaha NS 10Ms on music stands with one in the center. What you do is when you're panning things, you can't just take something over to the right a little, you have to put it in the right speaker or you have to put something all the way to the left. If you have something like the kick and snare drum, that's usually in the center, you have to put it right into the center speaker. So to make it sound bigger, we used an AMS digital delay and just delayed it. Then whenever we wanted to send something in the center to the left or right, we'd take the kick drum and just put a little bit of the AMS on it. I wish we could mix albums like that because there was just so much more we could do.

**Mix:** What about innovations in live sound?

**Arcuri:** Everything always gets better live. Studios have been a little more advanced than live sound, but the stuff

I have now is definitely the top of the line. As far as live mixing goes, all the racks and effects are basically the same things we use in the studio. When Jimi Hendrix was playing the Monterey Pop, they put up a couple of cabinets on the side of the stage and that was it. Now with my Harwell system, on a good night I feel like I'm in the studio. That's the biggest difference.

**Mix:** You've gone back in the studio with the same band for three albums. How do you keep it fresh?

**Arcuri:** It's hard to explain with his band; it's always fun with these guys. There are never really any down moments. Also, we never work in the same studio twice, so that gives us a freshness.

The band has really advanced over the last three years and it had to do with Ronnie. He's definitely one of the best producers I've ever worked with. He brings out the best. He makes me do things that I would never think of trying. He doesn't care if it can be done or if it's the right way to do it. He just says, 'Let's try this and see what happens.' Usually we do things like that and we come up with great things in the studio. That's the way this band works. They don't worry about the sound or how it's going to be mixed because they know I'm there. They depend on me. I don't mind. I love this band.

**Mix:** You're listed as engineer and Ronnie's listed as producer on all three albums. How much do your roles overlap?

**Arcuri:** Not much; our roles are pretty much what they say. Ronnie knows what he wants. When he's doing his vocals, I'm in the control room, but he's always basically producing. He's always there, he writes the songs, he writes the melody. I make my suggestions here and there, but Ronnie is definitely the producer. He's really finishing the picture of the band's sound now by adding a lot of keyboard parts here and strings and cellos. It really makes the sound a lot better to me. I like the way the band is going now.

**Mix:** It sounds like Ronnie's got a pretty clear idea of what he wants before you ever walk into the studio.

**Arcuri:** Yeah, we do, and that's because we're a good team. When we're home and he's getting ready to write for an album, he'll call me up and I'll go set up a portable studio and leave him alone. Then the band will get together and we'll lay down some tracks and decide where to go to record the album. That's the thing with Ronnie and me, we can go anywhere because we bring our ears with us. ■

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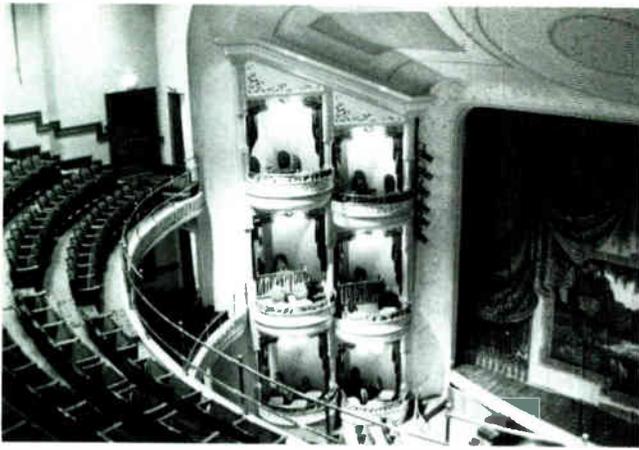
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PHOTOS: HANK LAM

View down to the stage from the top balcony.

# RENOVATING AN OPERA HOUSE

by Hank Lam

No one knows how many grand old theaters have been felled by the wrecking ball. At the turn of the century, a community just wasn't a community without a theater. By 1983, according to the League of Historic American Theaters, 902 pre-1915 theater buildings had been re-discovered. Today, more than 130 theaters have been restored. Between urban renewal, decay and/or transformation, the 4 million dollar plus job of finding and restoring an old theater is at best a supreme challenge, even before one considers the business economics of community support and the impact of home VCRs.

As an audio design consultant, my greatest desire had always been to participate in the reconstruction of an historical fine-arts theater. When we were awarded the contract to design the audio and video system for the 1894 Grand Opera House in Galveston, Texas, we were presented with the most difficult challenge in our firm's history. Qualifying as the contractor meant satisfying the needs of historical and cultural arts committees, architects, theater managers, and budgets—tempering the concerns of modern-day with the aesthetics of a 100-year-old acoustical marvel. And, as is so often the case, there were already other people's problems to clean up.

The restoration of an his-

torical building seems to always begin as an amateur endeavor, based more on the labors of love than economics. An audio consulting firm from New York had originally been contracted, and had proposed grandiose schemes for knocking out walls, the mounting of custom speaker enclosures in every conceivable space (70 volt distributed!), and the painting of "western nouveau" scenery on the ceiling, all for a high-dollar price tag. Therein lay our first problem: the design bill from the first consultant had already surpassed the estimated budget for the entire audio system! Money was now a budgetary obstacle.

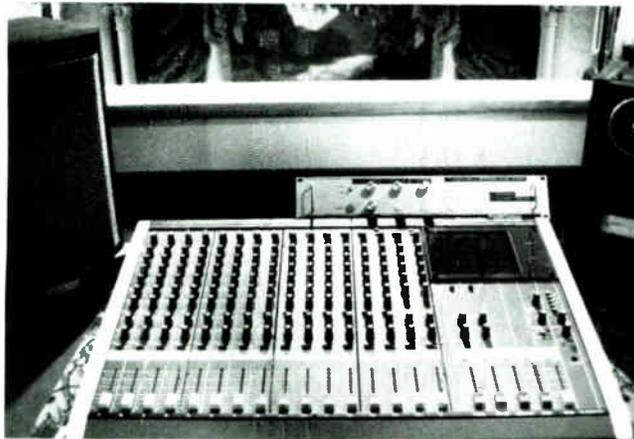
Problem number two was now to be expected. Since the renovation project had been "burned once already," the architectural firm of De-

Lara/Almond laid down the rules of the restoration: no holes and no visible enclosures. Here was a performance hall which could seat 1,000, was 48 feet high with two balconies, and measured 62 feet from the curtain to back seat wall, 70 feet side to side. You could hold a conversation on stage, and hear clearly throughout the house. Other contractors proposed elaborate stacks; we got the job because our original thought was "do you even need reinforcement?"

The stage manager, Bill Lundstrum, had the final word and knew his needs. His past experience with shows in the pre-renovation hall determined his requirements. This was an opera house, for fine arts and cultural events. Standard reinforcement volume levels would be held below 105dB, full

house. With the excellent house acoustics, no more than 12 mic lines would be required. Two onstage monitor channels were needed. Intercom lines would run throughout the house and fly floors, as would a backstage page system. The control booth would be located in the rear-center of the first balcony—the worst seat in the house. A stereo mix was to be available for recording, or for house amplification, in case of stereo tape playbacks. Finally, three independent speaker networks were to be built; one for lecture reinforcement (mounted in the stage

*The Ramsa WR-S612 16-channel mixing console on the mezzanine level.*





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# By dusting off old movie palaces and opera houses, entrepreneurs and civic groups are pumping new life into downtowns.

lip), one for stage source sound (placed on stage and moveable), and a ceiling mounted system, for film/tape playback. A centered ceiling cluster couldn't be installed, as only six inches existed between the fire curtain and the first fly rail. A patchable video system would be needed backstage/orchestra pit coordination, and for lobby presentations. Video feeds were distributed throughout backstage, on all floors, and at patron lounges.

All cables, audio and video, would be conduit run, for RF shielding and for access, as the structure was plaster and brick, to be permanently sealed. A.C. for audio and stage is on a dedicated leg, isolated from mechanical and lighting. The audio cables, boxes and snakes were custom fabricated by Whirlwind Systems. Star grounds run throughout. The multi-core snakes carry mic and line audio, and intercom. RG 6 video lines, speaker lines and 70 volt distributed audio were traveled separately, though in common conduit.

A Ramsa WR-S216 16-channel board provides line and mic mixing, phantom power, two channels of stage monitoring and record outs. The main consideration as to brand was the modular construction of the Ramsa (a fact not even mentioned in the promo sheets) in case of trouble. With Galveston 90 miles away from our office, if anything "blew," we wanted full operational redundancy. Output patchable as stereo or mono, operated at "0 level," the board feeds tape recorders, video distribution and a speaker monitor. The Ramsa is also normalled into a Ramko Research LA5-S distribution amp, allowing independent ganged level control over each of the three speaker nets, controlled at the sound booth. Speaker power is supplied by

five Carver PM 1.5 amps. Providing 450 watts per channel, the Carvers supply ample headroom, and enough gain to compensate for the line losses through up to 250 feet of 12 gauge speaker runs.

We did not recommend equalization for the house. Up to three speaker nets could be active at any one time, each on a different axis, and because the hall had good diffusion, we figured "keep it as clean and uncolored as possible." Architecturally, this was an original restoration. We couldn't change anything, anyway. We only had the seating and rear-wall curtains for absorption. Fortunately, this cube-shaped room was live—but not reverberant!

Speaker choice was dictated primarily by architectural consideration. For the stage lip lecture speakers, three EV Sentry 100s provide near-field reinforcement. The 100s ability to withstand high volume transients figured in their selection, since the lip enclosure space is now sealed. Available space was at a premium, and the 100s just fit into the pre-existing cavities between the stage floor and the orchestra pit ceiling. Because of the height of the hall, the ceiling slope, and the architectural limitations, no overhead speaker location existed which directly viewed the entire seating area. However, there were ceiling speaker cut-outs, viewing about 80 percent of the seats. The ceiling speakers EV Sentry 500s, chosen for their wide dispersion (100 x 100) horns. Combined with the hall's acoustics, apparent coverage is maximized. High end is down only in the "hidden" seats under the rear of the balconies. Though the stage has 100 percent line of sight coverage, the portable stage speaker selection was quite a bit more

difficult. The original choice was to employ a JBL Biradial studio monitor, on the assumption that, first, it was a studio standard, and second, if it didn't work, it had resale value! A meeting with Dennis Schulgen of Bertagni Electroacoustic Systems, though, had some interesting results. Dennis volunteered a pair of BES 300s. The architect and stage manager loved the low profile appearance. More interestingly and importantly, the 300s have a very low susceptibility to feedback. These are spherically radiating Soniflex panels. Though the sound is a bit down in the low mid range, their rejection of feedback is a considerable plus for any onstage speaker. The BES 300s are rated at 250 watts, 114 dB SPL, and the two covered the entire house perfectly. There are four stage outlets for the two stage monitor nets, volume controlled from the booth. Monitor choice is provided as per each artist's rider.

Intercom is Clear-Com, traveling two channels for stage management and lighting control. Power for the 70 volt page system is through a TOA 60 watt amp, fed by hand-held PTT mics and a flying Crown PZM for onstage monitoring.

Approaching 100 years old, the Grand Opera House had hosted Sarah Bernhardt, George Cohan, Anna Pavlova, John Phillip Sousa, and William Jennings Bryan. Reopening in January 1986, the Grand now hosts ballet, symphony, musical comedy, and opera, on international and community levels. By dusting off old movie palaces and opera houses, entrepreneurs and civic groups are pumping new life into downtowns, and in the process, are rescuing historic showcases for the performing arts. ■

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*The recently opened Studio B, with a Sound Workshop console, Yamaha monitors and Audio Kinetics synchronizer.*

—FROM PAGE 106, GROUP IV

excellent composers and they want to hear their music sounding good even though it comes out of the little speaker on the TV set. And you can get great sound out of a little speaker, so that's no excuse."

"One of the things that's really good for us," Balestier adds, "is to have our product out there consistently from week to week. If you do an album, you may work on it for six months and never get to hear it played on the air. In our business, the product is very visible."

The main drawback to doing television work is that, typically, there is always extreme time pressure, so Sands and the other engineers who work at Group IV generally choose to mix live. "Most of the work we do in television is mixed live," Sands says. "We use multi-track as a protection more than anything else. Television is probably the most demanding music mixing work you can do, mainly because of the time constraints. You

never have enough time. Usually, the score is the absolute last thing they do on a show. After that you do the dub. With episodic TV there is so little time to do all the editing and do dialogue, Foley, effects, scoring and dubbing. You very rarely have to mix afterwards.

"So they come in and do, say, a four-hour session per episode and in that time they might do anywhere from ten to 20 separate music cues. We mix it live and then at the end of the day the music editor leaves with the mag and then the next day they cut it in. We've had projects here where they finish the score on Friday for a show that airs Saturday. It gets pretty crazy."

To say the least. And that in part explains why Sands, personally, has been devoting more and more of his time to feature film work. Though that work is no less demanding and is certainly far from leisurely, "we do generally get a bit more latitude on film projects," Sands says. "On *Back*

*to the Future*, they took the time to really make it great. They wanted it right, so they took the time, and I think it shows in the finished product." On Sands' slate at presstime were a pair of upcoming features, *No Mercy* and *Critical Condition*.

Group IV's Trident/Studer Studio A has served the facility extremely well for several years, but Sands and Balestier are equally excited about the possibilities for their recently opened Studio B, with its Sound Workshop 50-input mixing console and custom four-channel monitor system specially designed for film. Group IV already does transfers and telecine work and ADR is next up on the horizon for this ambitious operation.

"Basically, we're looking to get into all aspects of audio for film and TV," Sands says. "It's what we do best. We have the equipment to do it well and more importantly, the people for it. They know what they're doing. They have to." ■



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—FROM PAGE 46, RUPERT NEVE

ship with Air, and a lot of their great work has been done with Neve consoles. It was sad to me to see the studio moving towards the competition because they felt the fashion of the producer side of the industry demanded it. But I discussed our plans with them and they got excited about what we are doing. It was nice—George Martin called me from the Channel Islands where he lives, and said "Rupert, it's just lovely to be back working with you again." George and our other friends there are tremendous people to be working with. Of course, we have many friends in the industry. It's one of the things that makes this a nice industry to work in.

**Bonzai:** I would imagine you depend on feedback from people who have gained reputations as masters of the equipment you design. How important is it to be in touch with the real creative use of the equipment?

**Rupert:** It's certainly important—that feedback from the users. Without going in for name dropping, I make it a

point to move around the studios. It's one of the things I haven't been able to do so much in the last five years. It was diplomatic—the old company felt they wanted to do it, make contact with the marketplace, and not be dependent on one man. Now I can come back into the marketplace. I'm known, I can get the feedback from the balance engineers. These are the people who really make it happen. The studio manager will say one thing, the owner another—but it's talking with the balance engineers that is vital. Often it's just the chance remark: "It would be great if we could do this. . . ." as if it's impossible and, in fact, it's quite possible!

**Bonzai:** Balance engineer?

**Rupert:** That probably dates me—the *mixer*. He's the man or woman who really has to use the stuff. It's the positioning of the controls, the way things actually happen when the engineer moves any control. It's of enormous importance to me to be in close contact with the creative audio people. ■

—FROM PAGE 87, GROLIER

eye. For example, by viewing images culled from computer generated models and graphics, x-rays, and microscopes, a "CD/AV" user may be able to take a guided tour through the human body and its systems. With Grolier transferring its current projects to digital data, this information can be delivered to whatever new disc technology

that develops, allowing the company a flexibility to merge with various market segments.

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- Hardware requirements:
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  - Sony CDU-1 and CDU-100
  - Hitachi 1502 S
- Search and retrieval software: KnowledgeSet's Knowledge Retrieval System™
- Software developer: KnowledgeSet (formerly Activenture Corp.), Monterey, CA
- CD-ROM mastering/manufacturing: Philips, Eindhoven, Netherlands/Polygram, West Germany
- CD-ROM database size: 110 megabytes (60 megabytes of text, 50 of index)
- Book equivalent: 20 volumes; 9,000,000 words, 10,000 pages, 60 pounds, more than two feet of shelf space
- Number of unique words in index: 141,387 (37 stop words)
- Length of product development: 14 months
- Ship date: Dec 22, 1985
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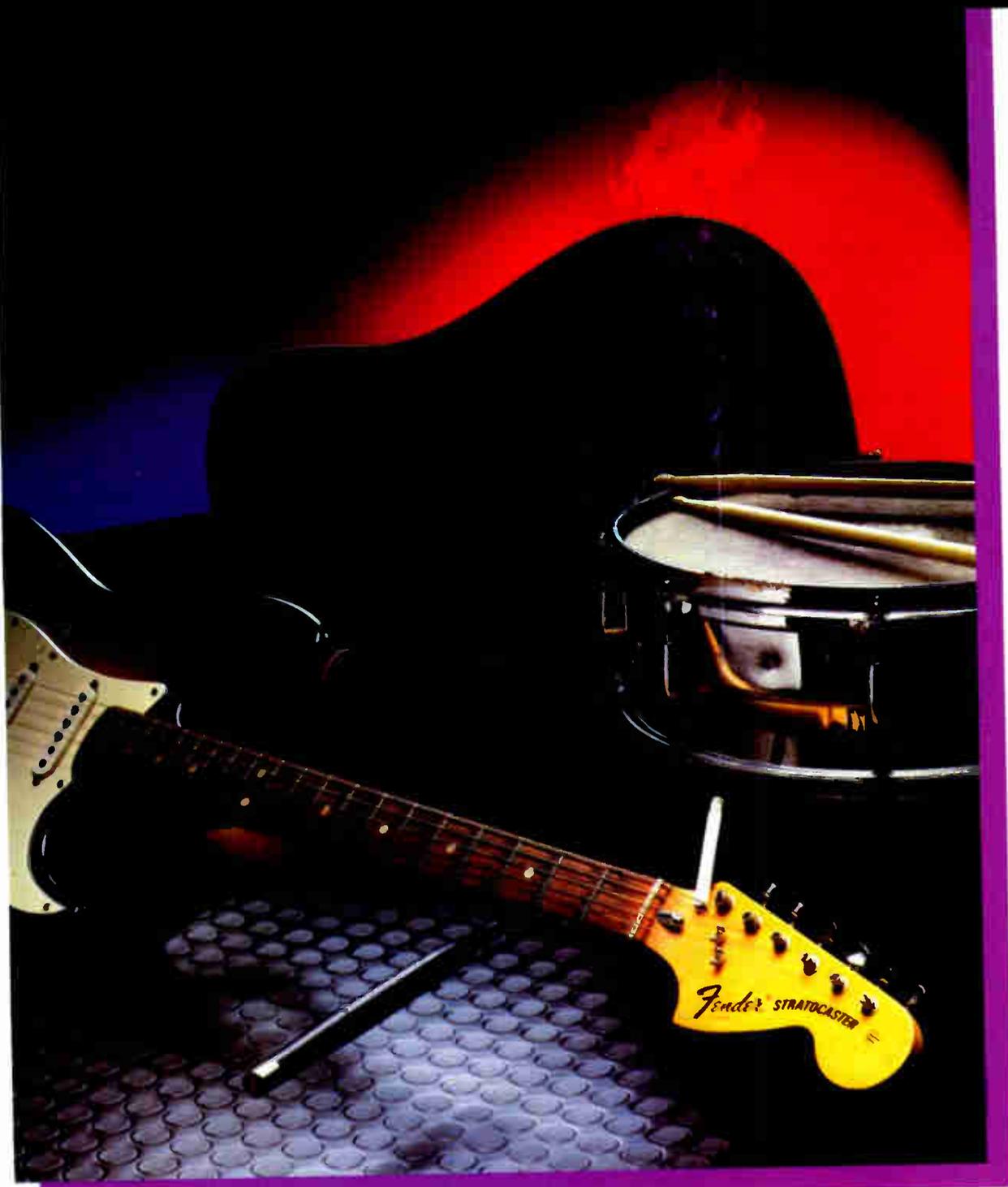
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4	3 Sec.	SMALL	WARM	26	1.8 Sec.	LARGE	DARK	46	10 Sec.	LARGE	BRIGHT
5	3 Sec.	SMALL	BRIGHT	27	1.8 Sec.	LARGE	BRIGHT	47	10 Sec.	LARGE	WARM
6	4 Sec.	MEDIUM	WARM	28	2.0 Sec.	MEDIUM	WARM	48	16 Sec.	LARGE	DARK
7	4 Sec.	MEDIUM	BRIGHT	29	2.0 Sec.	LARGE	WARM	49	18 Sec.	EX. LARGE	BRIGHT
8	4 Sec.	SMALL	WARM	30	2.0 Sec.	MEDIUM	WARM	50	20 Sec.	EX. LARGE	DARK
9	6 Sec.	MEDIUM	WARM	31	2.5 Sec.	LARGE	BRIGHT	51	GATED	100 MS	
10	6 Sec.	MEDIUM	DARK	32	2.5 Sec.	MEDIUM	WARM	52	GATED	150 MS	
11	8 Sec.	SMALL	BRIGHT	33	2.5 Sec.	LARGE	WARM	53	GATED	200 MS	
12	8 Sec.	SMALL	WARM	34	2.5 Sec.	MEDIUM	BRIGHT	54	GATED	250 MS	
13	8 Sec.	LARGE	WARM	35	2.8 Sec.	LARGE	DARK	55	GATED	300 MS	
14	1.0 Sec.	SMALL	BRIGHT	36	3.0 Sec.	MEDIUM	BRIGHT	56	GATED	350 MS	
15	1.0 Sec.	MEDIUM	WARM	37	3.0 Sec.	LARGE	WARM	57	GATED	400 MS	
16	1.0 Sec.	LARGE	BRIGHT	38	3.0 Sec.	MEDIUM	DARK	58	GATED	500 MS	
17	1.2 Sec.	MEDIUM	WARM	39	3.5 Sec.	LARGE	BRIGHT	59	GATED	600 MS	
18	1.2 Sec.	SMALL	BRIGHT	40	3.5 Sec.	MEDIUM	WARM	60	REVERSE	300 MS	
19	1.2 Sec.	SMALL	WARM	41	4.0 Sec.	LARGE	DARK	61	REVERSE	400 MS	
20	1.4 Sec.	LARGE	DARK	42	4.0 Sec.	MEDIUM	BRIGHT	62	REVERSE	500 MS	
21	1.4 Sec.	MEDIUM	WARM					63	REVERSE	600 MS	

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# N

# NEW PRODUCTS AMPLIFIERS

# 1 • 9 • 8 • 7

**AMPLIFIED MUSIC PRODUCTS CORP**  
9829 Independence Ave., Chatsworth, CA 91311  
(818) 709-0518

**Product Name:** AMP Model 8000  
**Contact:** Roger Smith, vice president  
**Date Product Introduced:** July 1, 1986  
**Product Description & Applications:** Model 8000 stereo power amplifier.  
**Basic Specifications & Suggested List Price:** 350W per side, 700W in bridge mode, balanced inputs.

**BENCHMARK MEDIA SYSTEMS**  
3817 Brewerton Rd., N. Syracuse, NY 13212  
(315) 452-0400

**Product Name:** MIA-4X4  
**Contact:** David G. May, operations manager  
**Date Product Introduced:** April 1986  
**Product Description & Applications:** The MIA-4X4 is ultra low noise preamplifier for both microphone and line level applications. The MIA-4X4 is a one unit rack mount chassis with four mic pres, XLR in/out and internal power supplies. Front panel controls include a +18 to +73dB gain control, a -20dB pad and +48 volt phantom power.  
**Basic Specifications & Suggested List Price:** Overall gain range of 75dB, noise figure of 1dB for all gains above 40 and THD of 0.02% @ 20kHz with 50dB of gain.

**BGW SYSTEMS, INC.**  
13130 S. Yukon Ave., Hawthorne, CA 90251  
(213) 973-8090

**Product Name:** SPA 3  
**Contact:** Shelley Herman, sales manager  
**Date Product Introduced:** June 1986  
**Product Description & Applications:** The BGW Model SPA3 is a complete package of electronics designed to power very high quality sound reinforcement systems using sub bass speakers, current technology midrange speakers and today's wide bandwidth compression drivers and horns. The BGW SPA3 is packaged in a 5/4-inch rack mount chassis and uses three BGW power amplifier modules built on heavy aluminum heat sink extrusions. Not required, allowing for quiet operation. Each of the three power amplifiers can be removed quickly if service is required. All discrete circuitry using BGW Ultra Case power devices and low feedback is employed.  
**Basic Specifications & Suggested List Price:** Price \$1799. Total power output: 850 watts (FTC); attenuation: precision stepped rotary decimal switches; crossover frequency specified ISO centers as requested by customer, specify slope as 24dB Linkwitz Riley, 12dB +12dB dual point, or 12dB; dimensions: 5/4-inch high rack panel 19wx13 1/2; 43 lbs.

**BGW SYSTEMS, INC.**  
13130 S. Yukon Ave., Hawthorne, CA 90251  
(213) 973-8090

**Product Name:** BGW Model 750D & E  
**Contact:** Shelley Herman, sales manager  
**Date Product Introduced:** January 1986  
**Product Description & Applications:** Studio standard monitor power amplifier. These all new third-generation power amplifiers feature exceptional improvements in each of the following areas: Sonic accuracy, ability to handle low impedance loads, power output, thermodynamic efficiency, performance, long term reliability, appearance, interface capability, indicators and metering, acoustic background noise, signal-to-noise ratio, weight, serviceability and speaker protection.  
**Basic Specifications & Suggested List Price:** Price: 750E, \$1699; 750D, \$1499. IHF dynamic power output: 350 watts per channel into 8 ohms and 850 watts per channel into 2 ohms. Hum and noise: 113dB below rated output. Damping factor 500. Slew rate: 40 volts per microsecond.

## Boulder AMPLIFIERS USING JENSEN 990 TECHNOLOGY

**BOULDER AMPLIFIERS/SILVER LAKE RESEARCH**  
*Boulder Modular System*

**BOULDER AMPLIFIERS/SILVER LAKE RESEARCH**  
3101 3rd St., Boulder, CO 80302  
(303) 449-8220

**Product Name:** Boulder Modular System  
**Contact:** Jeff Nelson  
**Date Product Introduced:** October 1986  
**Product Description & Applications:** The Boulder Modular System uses Jensen's 990 type amplifiers for lowest distortion and noise. Modules available include two stage phono preamps, input buffers, balanced line drivers, hi-fi/pro interfaces, distribution amplifiers and other arrangements that benefit from the 990 technology. Both the rack mount and single housings include a well-regulated power supply. The Boulder Modular system is the high quality problem solver for broadcasters and recording studios.

**Basic Specifications & Suggested List Price:** Ultra-low distortion is typically less than 0.0015% up to 2kHz and 0.005% at 20kHz depending upon the module. Module size 3.5hx4wx14d. Four module housing size. 3.5hx19wx14d. Rackears removeable. Prices vary with transformer options and module configurations.

**BOULDER AMPLIFIERS/SILVER LAKE RESEARCH**  
3101 3rd St., Boulder, CO 80302  
(303) 449-8220

**Product Name:** Boulder 100 Power Amplifier  
**Contact:** Jeff Nelson  
**Date Product Introduced:** October 1986  
**Product Description & Applications:** The Boulder 100 is an ultra-low distortion 1.75-inch rackmount 35 watt power amplifier for critical listening, editing, and broadcast monitoring. The totally discrete Jensen 990 is used for the first of two stages, with the second being an expanded high power 990. This small brother of the Boulder 500 high power amplifier has similar high quality construction and features including balanced inputs and mono capability.

**Basic Specifications & Suggested List Price:** The Boulder 100 delivers continuous power of 35 watts stereo into 8 ohms with THD of 0.0015% up to 2kHz and 0.005% at 20kHz. Price \$750

**CARVER CORPORATION**  
20121 48th Ave. W., Lynnwood, WA  
(206) 775-1202

**Product Name:** PM-350  
**Contact:** Will Lewis, pro division  
**Date Product Introduced:** August 30, 1986  
**Product Description & Applications:** Utilizing Carver's proven magnetic field power amplifier technology, the

new amplifiers feature "slow startup" to eliminate turn-on current surge, input muting during turn-on and protection mode, the ability to drive a 70 volt line, and the capacity to bring traditionally "outboard" electronics (equalizer, crossover, compressor/limiter, noise gate) "inboard" with plug-in modules.

**Basic Specifications & Suggested List Price:** Power: 8 ohms, 350 w/channel 20-20k Hz both channels driven with no more than 0.5% THD; 4 ohms, 450 w/channel 20-20kHz both channels driven with no more than 0.5% THD. Bridging: 600 watts into 8 ohms/300 watts into 16 ohms. Frequency bandwidth: 5Hz-80kHz. Damping: 200 at 1kHz. Gain: 26dB. Slew rate: 25V/microsecond noise better than 115dB below 350 watts A weighted. Weight: 19 lbs. Manufacturer's suggested retail price: \$849.

**CARVER CORPORATION**  
20121 48th Ave. W., Lynnwood, WA  
(206) 775-1202

**Product Name:** PM-175  
**Contact:** Will Lewis, pro division  
**Date Product Introduced:** July 30, 1986  
**Product Description & Applications:** Utilizing Carver's proven magnetic field power amplifier technology, the new amplifiers feature "slow startup" to eliminate turn-on current surge, input muting during turn-on and protection mode, the ability to drive a 70 volt line, and the capacity to bring traditionally "outboard" electronics (equalizer, crossover, compressor/limiter, noise gate) "inboard" with plug-in modules.

**Basic Specifications & Suggested List Price:** Power: 8 ohms, 175 w/channel 20-20kHz both channels driven with no more than 0.5% THD; 4 ohms, 300 w/channel 20-20kHz both channels driven with no more than 0.5% THD. Bridging: 500 watts into 8 ohms/370 watts into 16 ohms. Mounting: standard 19-inch rack with 3.5-inch space; weight 17 lbs. Frequency bandwidth: 5Hz-80kHz. Damping: 200 at 1kHz. Slew rate: 25V/microsecond. Noise better than 115dB below 175 watts. A weighted. Manufacturer's suggested retail price: \$649.

**CREST AUDIO**  
150 Florence Ave., Hawthorne, NJ 07506  
(201) 423-1300

**Contact:** Craig Hannabury, division mgr.  
**Date Product Introduced:** Fall 1986  
**Product Description & Applications:** A new line of amplifiers is being introduced incorporating features designed specifically for recording studios and fixed installations. All convection cooled, the new models are available in 50, 100 and 200 watt into 8 ohms per side configurations. The units are also the first power amplifiers to feature full function limiters on each channel.

**FENDER MUSICAL INSTRUMENTS**  
1130 Columbia St., Brea, CA 92621  
(714) 990-0909

**Product Name:** Fender 2235 Power Amplifier  
**Date Product Introduced:** Steve Grom, marketing dir.  
**Date Product Introduced:** August 1, 1986  
**Product Description & Applications:** 2235 is a high performance, low-cost power amp. A unique protection circuit allows maximum output levels into a reactive load yet provides protection from continuous short circuits. The 2235 was designed by Cal Perkins.  
**Basic Specifications & Suggested List Price:** \$699 list price. Power: 350 watts per channel @ 4 ohms; 700 watts bridged into 8 ohms; power at clip, single channel, 1kHz, 1% THD: 550 watts @ 4 ohms.

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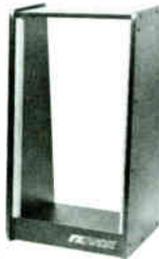
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## NEW PRODUCTS

### AMPLIFIERS

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#### HAWK ELECTRONICS

159 N. Oller Ave., Waynesboro, PA 17268

Product Name: M-250 Professional Power Amplifier

Date Product Introduced: December 1985

**Product Description & Applications:** The M-250 is a mid-powered stereo professional power amplifier engineered to provide very high performance operations at an appealing price, an ideal choice for studio monitors and high end drivers. Features include a comprehensive relay protection system, peak-power LED meters, high efficiency toroidal transformers with 115/230 volt operations, and a 3½-inch rack mount enclosure. A fully complementary wideband bipolar output stage and low-noise input give the amplifier high-speed performance with low noise and distortion.

**Basic Specifications & Suggested List Price:** Power: 100w RMS/8 ohms, 180w RMS/4 ohms. Harmonic distortion: <0.01% @1kHz; <0.05%, 20-20kHz. IM distortion: <0.01%. Frequency response: 5Hz-100kHz. SN ratio: 115dB. List price \$299, manufacturer direct, with one-year warranty.

#### HILL AUDIO INC.

5002 N. Royal Atlanta Dr., Tucker, GA 30084

(404) 934-1851

Product Name: DX 300, DX 800, DX 1500 amplifiers

Contact: Bruce Forbes, nat'l. sales mgr.

Date Product Introduced: August 15, 1986

**Product Description & Applications:** Total symmetry using a unique transformer coupled driver stage, and amplifiers feature identical ultra-linear NPN output devices connected in a "Super A" sliding bias configuration exhibiting a much more linear response than conventional amplifiers using NPN and PNP devices. The negative feedback is a very low 20dB and in addition, the transformer-coupled drive interrupts the DC voltage chain—eliminating all the circumstances in which a conventional amplifier can introduce DC voltage onto the speaker.

**Basic Specifications & Suggested List Price:** Power (20-20k Hz into 4 ohms): DX300, 250 w/ch; DX800, 375 w/ch; DX1500, 500 w/ch; size: occupies two 19-inch rack spaces; noise: 105 dB (A), 100dB (20-20k Hz); frequency response: 20-20k Hz, -1dB; IMD: 0.015% (60Hz/7kHz, 4:1); THD: better than 0.01% (20-20k Hz, within rated power); output connections: 4mm binding post, barner strip; inputs: XLR balanced, ¼-inch unbalanced, barrier strip.

#### JBL PROFESSIONAL

8500 Balboa Blvd., Northridge, CA 91329

(818) 893-8411

Product Name: Model 6215-Single rack space amplifier

Contact: Mark Gander, vice president marketing

Date Product Introduced: January 1986

**Product Description & Applications:** The Model 6215 is a professional power amplifier that has been engineered to meet the rigorous demands of musicians, sound reinforcement companies, broadcasters and touring groups. It is equally at home in fixed installations and studios where precise reproduction of complex waveforms must be accomplished. Output power is 35W/channel into 8 ohms, 45W/channel into 4 ohms, 90W mono bridge into 8 ohms. It has low negative feedback, individual stepped gain controls, and fully complementary output. Input connectors can be either ¼-inch TRS, XLR-type, or barner strip.

**Basic Specifications & Suggested List Price:** Output power: 8-ohm stereo (per channel) 35W; 4-ohm stereo (per channel) 45 W. Frequency response: +0, -1dB, 20 Hz to 20 kHz. Noise: at least 100 dB below rated output (15.7 kHz noise bandwidth, A weighted). Input: balanced bridging differential amplifier. Maximum input level: +20 dB (7.75 V RMS). Input sensitivity: 1.1 V for maximum output into 8-ohm load. Rise time: Less than 7 microseconds. Price: \$576.

#### JENSEN TRANSFORMERS, INC.

10735 Burbank Blvd., North Hollywood, CA 91601

(213) 876-0059

Product Name: Twin Servo Mic Preamp

Contact: Deane Jensen, president

Date Product Introduced: September 1986

**Product Description & Applications:** New self-powered stereo microphone preamplifier version of the Jensen Twin

Servo. This self-contained unit is manufactured by Boulder Amplifiers exclusively for marketing by Jensen Transformers. The already well-known circuit has been published as an application note since late 1983 and was made available September 1986.

**Basic Specifications & Suggested List Price:** Bandwidth: 145kHz. Bessel response exhibiting less than two degrees deviation from linear phase from 20Hz to 120kHz. THD less than 0.03% at 20Hz, less than 0.003% at 1kHz and above. Noise—128.7 dBu.



Lenco, Inc.  
MPA-Series Monitor Power Amplifiers

#### LENCO, INC.

300 N. Maryland, Jackson, MO 63755

(314) 243-3147

Product Name: MPA-Series Monitor Power Amplifiers

Contact: Jim K. Rhodes, product manager

Date Product Introduced: April 1, 1986

**Product Description & Applications:** The MPA-Series amplifiers were developed to address the special demands required of amplifiers employed in high-definition audio monitor systems. In achieving this, no compromises were made in design considerations and component selections. Special features—like the front-side cooling, audio pathways being restricted to circuit etch, power modules that are easily extracted for in-field inspection, and the live protection features—contribute evidence that this is a smartly-designed amp.

**Basic Specifications & Suggested List Price:** Power output: from 100 watts per channel (stereo), to 1000 watts (mono); (power ratings dependent on model and load impedance). Slew rate: 700V/μSec, 8 ohms; damping factor: 600, 20Hz-20kHz; power bandwidth: 1 Hz to 100 kHz, +0 -1dB; propagation delay: 100 nanoseconds, 8 ohms.

#### MEYER SOUND LABORATORIES, INC.

2832 San Pablo Ave., Berkeley, CA 94702

(415) 486-1166

Product Name: MS-1000 Amplifier

Contact: Pat Maloney

Date Product Introduced: September 1986

**Product Description & Applications:** The Meyer Sound MS-1000 power amplifier utilizes a FET output stage with bipolar drive circuitry. The signal path is complementary-symmetry throughout and is AC coupled. Since the input circuit is isolated and floats from earth ground, the amplifier may be driven from either single-ended or balanced sources with equal immunity from ground loops. A front-mounted accessory panel accommodates factory-installed options (VU meters, volume controls etc.), and the unit incorporates a number of loudspeakers and amplifier protection circuits.

**Basic Specifications & Suggested List Price:** Power output: 600 watts/channel continuous sine wave into 4 ohms. Frequency response: 10Hz to 100kHz. Input type: floating balanced, AC coupled, (pin 3 hot). Input impedance: 5k ohms unbalanced; 10k ohms balanced. Damping factor: immeasurable, estimated at 100,000. IM & THD: less than .01% (20Hz to 20kHz). Dynamic range: greater than 100dB. Gain: 10dB-30dB, variable.

#### PANASONIC INDUSTRIAL COMPANY

6550 Katella Ave., Cypress, CA 90630

(714) 895-7277

Product Name: RAMSA WP-9220

Date Product Introduced: June 1986

**Product Description & Applications:** Totally symmetrical differential cascode, instrumentation-type topology with minimum delay and high-speed parts. Low feedback, low TIM, selectable mono and bridge mode operation, UL listed, 5-year warranty, exceptional sonic performance

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operation.

**Basic Specifications & Suggested List Price:** Power: 200 watts (20 Hz to 20 kHz @ less than 0.05% THD), 8 ohms. Amplifiers 4 ohm rated. S/N 100dB full rated power 20 Hz to 20 kHz; damping factor 180@ 1 kHz, 8 ohms; channel separation less than 60dB 20 Hz to 20 kHz; gain 30dB, 8 ohms load rated power; input sens: +4 (1.228 volts RMS); forced cooled. Price: \$899.



PANASONIC INDUSTRIAL COMPANY  
RAMSA WP-9055

PANASONIC INDUSTRIAL COMPANY  
6550 Katella Ave., Cypress, CA 90630  
(714) 895-7277

Product Name: RAMSA WP-9055  
Date Product Introduced: June 1986

**Product Description & Applications:** Totally symmetrical differential cascode, instrumentation type topology with minimum delay and high-speed parts, low-feedback, low TIM. Selectable mono and bridge mode; UL listed; 5-year parts and labor warranty; exceptional sonic performance operation.

**Basic Specifications & Suggested List Price:** Power: 50W / channel (20-20k Hz) into 8 ohms @ less than 0.05% THD; S/N: greater than 100dB, 20-20k Hz; damping factor typically 100 @ 1kHz, 8 ohms; channel separation greater than 60 dB, 20-20k Hz; gain: 24dB; input sensitivity: +4 (1.228V RMS); slew rate: greater than 45V/microsecond (amplifier is intentionally nse time limited and will not slew); convection cooling; price: \$475.

PANASONIC INDUSTRIAL COMPANY  
6550 Katella Ave., Cypress, CA 90630  
(714) 895-7277

Product Name: RAMSA WP-9110  
Date Product Introduced: June 1986

**Product Description & Applications:** Totally symmetrical differential cascode, instrumentation-type topology with minimum delay and high-speed parts. Low feedback low TIM. Selectable mono and bridge mode. UL listed, 5-year warranty, Exceptional sonic performance operation.

**Basic Specifications & Suggested List Price:** 100 watts (20 Hz to 20 kHz less than 0.05% THD) 8 ohms; amplifiers 4 ohm rated; S/N greater than 100dB 20 Hz to 20 kHz; damping factor typically 180 @ 1 kHz, 8 ohms; channel separation greater than 60dB, 20-20k Hz; gain 27dB, 8 ohms 20 Hz to 20 kHz; input sensitivity +4dB (1.228 volts RMS); force cooled.

PEAVEY ELECTRONICS CORPORATION  
P.O. Box 2898, Meridian, MS 39301  
(601) 483-5365

Product Name: DECA-724  
Contact: Ken Valentine, product manager  
Date Product Introduced: June 1986

**Product Description & Applications:** 350 watt per channel stereo power amplifier with Digital Energy Conversion Amplification technology pioneered by Peavey Electronics. The amplifier features 90% transfer efficiency and is packaged in a lightweight, fan-cooled, two-rack space unit.

**Basic Specifications & Suggested List Price:** 350 watts at 4 ohms, 200 watts at 8 ohms per channel, 10 Hz to 40 kHz frequency response, less than 0.1% THD (typically less than 0.06%) at 350 watts into 4 ohms, 0% TIM, dimensions 19wx3.5hx16d, weight 35 lbs. Suggested list price: \$999.50

RAULAND-BORG CORPORATION  
3535 W. Addison, Chicago, IL 60618  
(312) 267-1300

Product Name: FD150 Dual Channel Amplifier  
Contact: Sales engineering department  
Date Product Introduced: November 1985

—LISTING CONTINUED ON NEXT PAGE

# BRYSTON

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## NEW PRODUCTS

### AMPLIFIERS

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—LISTING CONTINUED FROM PAGE 133

**Product Description & Applications:** The FD150 is a dual channel 150 watt per channel amplifier capable of 300 watts in a bridged mono mode. It is designed for 19-inch rack mounting and only requires 3.5 inches of vertical space. It incorporates front panel level controls and LED level indicators for each channel. The FD150 is intended for use in sound reinforcement, live music, and monitoring applications.

**Basic Specifications & Suggested List Price:** Power: 150 watts per channel into 4 ohms, 300 watts into 8 ohms mono. Frequency response: 10 Hz to 50 kHz +0.5dB. Distortion: less than 0.05%. Signal-to-noise: greater than 97dB. Damping factor: 300 at 1 kHz into 8 ohms. Size: 19wx3.5hx15d. Optional output transformer for 70V output.

#### SCS/SOUND CODE SYSTEMS

13932 Seaboard Circle, Garden Grove, CA 92643  
(714) 554-0903

**Product Name:** SCS Model 2600A MOS-FET Reference Amplifier

**Contact:** Tim Edwards, sales manager

**Date Product Introduced:** June 1986

**Product Description & Applications:** The Model 2600A is a high power amplifier for any audio applications from studio monitoring to concert sound reinforcement. Three primary objections focus upon achieving reliability (simplistic design + quality parts) and performance (high slew rate, high current output + high dynamic headroom = high fidelity) while maintaining a competitive retail price. The unique self-protecting properties of the power MOS-FET is used as a means to achieving these goals. No current limiting or thermal "cutouts" are needed. Front-to-back fan cooling cools the entire product.

**Basic Specifications & Suggested List Price:** Power per channel: 350watts/8 ohms and 600watts/4 ohms both channels driven. Mono bridged power is 1200watts/8 ohms. Slew rate is 70v/microsecond. Damping factor is 350 20Hz-20kHz. Distortion is 0.01% THD/1 kHz and 0.25% IMD at full power/8 ohms. Inputs are 1/4-inch RTS and 3-pin XLR connectors, both balanced/unbalanced at 7k ohms and 25k ohms respectively. Dimensions are 5 1/4x19x12 1/4-inches, weight 50 lbs. Two-year warranty.

#### SOUNDCRAFTSMEN, INC.

2200 S. Ritchey, Santa Ana, CA 92705  
(714) 556-6191

**Product Name:** 900X2 MOS-FET Power Amplifier

**Contact:** Roger Hagemeyer, vice president marketing

**Date Product Introduced:** September 1986

**Product Description & Applications:** This new ultra high current MOS-FET amplifier was designed for the utmost in reliability and performance under the most demanding conditions. Recognizing that load impedances in many commercial sound applications are as low as 2 ohms, this amplifier was designed to operate flawlessly at those low impedances. MOS-FET output stages offer true audiophile quality for excellent clarity and distortion-free reproduction. Switched compressor/limiter, recessed level controls, balanced or unbalanced inputs.

**Basic Specifications & Suggested List Price:** Continuous power per channel, both channels driven, 20Hz-20kHz @ less than 0.05% THD, 8 ohms-375 watts FTC; 4 ohms, 600 watts FTC; 2 ohms, 900 watts RMS per channel; mono bridged, 1200 watts FTC @ 8 ohms; 19wx5 1/4x16 1/2d. 63 pounds.

#### SOUNDCRAFTSMEN, INC.

2200 S. Ritchey, Santa Ana, CA 92705  
(714) 556-6191

**Product Name:** 450X2 MOS-FET Power Amplifier

**Contact:** Roger Hagemeyer, vice president marketing

**Date Product Introduced:** September 1986

**Product Description & Applications:** This new MOS-FET ultra high current power amplifier was designed using the same criteria and parameters as the 900X2, but

for those situations that require less power than the 900X2. Accepts balanced or unbalanced inputs via XLR, phone or barrier strip. Recessed level controls.

**Basic Specifications & Suggested List Price:** Continuous power per channel, both channels driven, 20Hz-20kHz @ less than 0.05% THD, 8 ohms, 250 watts FTC; 4 ohms, 300 watts FTC; 2 ohms, 450 watts RMS per channel. Hum and noise: -105dB. 19wx5 1/4x11 3/4d 30 pounds.

#### STANTON MAGNETICS INC.

200 Terminal Dr., Plainview, NY 11803

(718) 445-0063

**Product Name:** 310B Phono Preamplifier

**Contact:** Jean Kapen, mgr. advertising and promotion

**Date Product Introduced:** June 1986

**Product Description & Applications:** The 310B phono preamplifier is designed to correctly interface all Stanton and selected magnetic phonograph cartridges for optimum playback of disk records and calibration of audio systems. The 310B can be used in balanced as well as in unbalanced modes.

**Basic Specifications & Suggested List Price:** Output +26dBm max.; gain adj. 36-66 dB, active balanced or unbalanced, 0 ohms. Designed for loads 150 ohms or higher. Freq. response ±0.5dB from 20Hz-20kHz in flat or NAB positions of mode selector. Distortion: THD 0.5% @20dBm. Power req. can be set for 100-125VAC or 200-240 VAC, 50-60Hz, 5W max. Price: \$280.

#### STUDIO TECHNOLOGIES, INC.

5520 W. Touhy Ave., Skokie, IL 60077

(312) 676-9177

**Product Name:** Microphone preamplifier

**Contact:** Carolyn Cashel

**Date Product Introduced:** November-December 1986

**Product Description & Applications:** Microphone preamplifier. Self-powered dual microphone preamplifier designed to be an interface between analog microphones and digital recorders. The preamp is transformerless, in and out and balanced. The unit also offers phantom power, a useful signal indicator and a trim control.

**Basic Specifications & Suggested List Price:** Freq. resp.: ±5dB 10Hz-100kHz. Output level max: +30dBm into 600 load. Gain adjustable: 15-69dB. Input impedance: 5k ohms. Slew rate: 20v/μsec. Distortion: 0.002% THD all frequencies up to max. level. Common mode rejection: 70dB (20Hz-20kHz). Price: TBA.

#### THIRD GENERATION

3 The Cordwainers, Southend on Sea, England

(203) 376-0433 (Tek Trak, U.S. distributor)

**Product Name:** HP1000 Dual Power Amplifier

**Contact:** Michael Panasuk, president

**Date Product Introduced:** June 1986

**Product Description & Applications:** Dual power MOS-FET amplifier designed for high performance sound systems. MOS-FET technology eliminates initial power surge damage to speakers; power dissipation is reduced; delivers more efficient power output; achieves fast rise times, fast slew rates and high damping factors. HP1000 is rack mountable into three rack spaces. Comes with high efficiency cooling fan with automatically controlled on/off. Twin power supplies and independent fusing adds versatility.

**Basic Specifications & Suggested List Price:** Power: 1200 watts bridged into 8 ohms; 612 watts per channel into 4 ohms; input sensitivity: 0dBm (775 mV); input resistance: 7.5k ohms; THD: less than 0.02% prior to clipping; frequency response: 20Hz-30kHz (-1dB +0dB); signal-to-noise: 108dB; damping factor: greater than 300; slew rate: 45v/μs, weight: 45 pounds. Price: \$1445.

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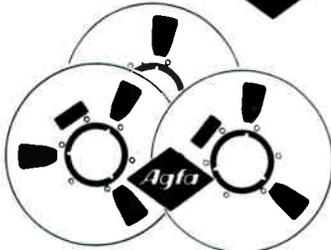


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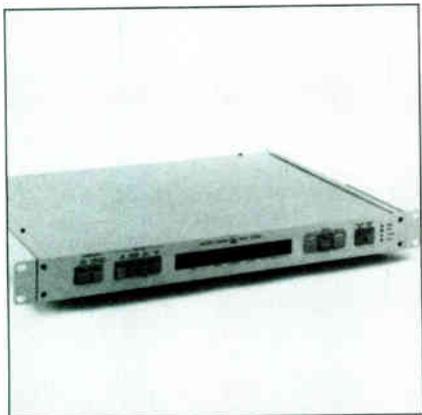
Circle #087 on Reader Service Card

# N

# EW PRODUCTS

## AUTOMATION AND CONTROL SYSTEMS

# 1 • 9 • 8 • 7



**ADAMS-SMITH**  
*Zeta Three*

**ADAMS-SMITH**

34 Tower St., Hudson, MA 01749  
(617) 562-3801

Product Name: Zeta Three

Contact: H.E. Adams, vice president sales  
Date Product Introduced: Spring 1986

**Product Description & Applications:** The Zeta Three is an audio/video/MIDI synchronizer designed for the professional musician. It generates, reads and synchronizes SMPTE and EBU time code and MIDI sync signals, synchronizes audio and video tapes, allows PC control of transports. Features include 1/4-frame accurate audio punch-in and punch-out, operation referenced to an external sync, and MIDI song pointer and drum machine trigger outputs.

**Basic Specifications & Suggested List Price:** Size: 1 3/4" x 17" x 14"; mounting: rack or desk top; transports controlled: almost all audio and video recorders designed for professional use; price: \$2995.

**ALPHA AUDIO AUTOMATION SYSTEMS**

2049 W. Broad St., Richmond, VA 23220  
(804) 358-3852

Product Name: The BOSS 8400 Automated Audio Editor  
Contact: David Walker, director of marketing  
Date Product Introduced: January 1, 1986

**Product Description & Applications:** The BOSS 8400 Series Automated Audio Editing System from Alpha Automation offers a creative and organized approach to sound recording, assembly, and editing. As the computer-based nucleus of a complete studio system, the BOSS can integrate and accelerate audio production and post-production tasks, eliminating drudgery, and providing flexibility in the design of sound. The BOSS 8400 Series includes the Master Processing Unit, a color monitor, a 95-key custom-keyboard, and two integrated software packages.

**Basic Specifications & Suggested List Price:** \$18,750.

**CHELSEA RESEARCH CO.**

133 W. 17th St. Ste. #PHD, New York, NY 10011

Product Name: Event Programmer/Counter EP-585  
Contact: Mike Stevens, president

Date Product Introduced: First Quarter 1987

**Product Description & Applications:** the EP-585 is a microprocessor-controlled "event" programmer which allows automated frame-accurate audio editing during a film or video post-production session. Six independently programmable relay-closure "event" outputs are provided for controlling various functions such as: mixing console tone-to-bus (sync-beep), master record-in/record-out or stop/start for non-sync effects sources such as reel-to-reel, cart, cassette tape machines, or CD players.



**CHELSEA RESEARCH CO.**  
*Event Programmer/Counter EP-585*

videod for controlling various functions such as: mixing console tone-to-bus (sync-beep), master record-in/record-out or stop/start for non-sync effects sources such as reel-to-reel, cart, cassette tape machines, or CD players.

**Basic Specifications & Suggested List Price:** Accepts sync from the following sources: bi-phase from the interlock system (such as Magna-Tech "8LB" Studio Interlock), BCD and Clock (Magna-Tech "9F" counter). Optionally reads SMPTE/EBU time code or MIDI timing clock. Rack-mountable chassis occupies 19 x 3.5 x 6. Power 110/220 VAC, 50/60 Hz. Suggested list price: U.S. \$3400.



**CIPHER DIGITAL, INC.**  
*CDI-4790 Softouch*

**CIPHER DIGITAL, INC.**

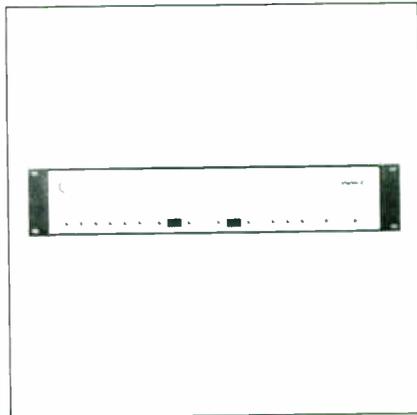
5734 Industry Lane, Frederick, MD 21701  
(301) 695-0200

Product Name: CDI-4790 Softouch  
Contact: Anthony R. Mattia, general manager

Date Product Introduced: August 1986

**Product Description & Applications:** The new Softouch Softpac is an inexpensive way to increase and store Softkey instructions for the Softouch. Each Softpac cartridge is capable of storing 500 instructions, up to 35 loops with offsets and more.

**Basic Specifications & Suggested List Price:** A new software package giving greater ease of use to the system operator also accompanies the Softpac. For more information call (800) 331-9066.



**CIPHER DIGITAL, INC.**  
*CDI-4880—Shadow II™*

**CIPHER DIGITAL, INC.**

5734 Industry Lane, Frederick, MD 21701  
(301) 695-0200, 1-800-331-9066

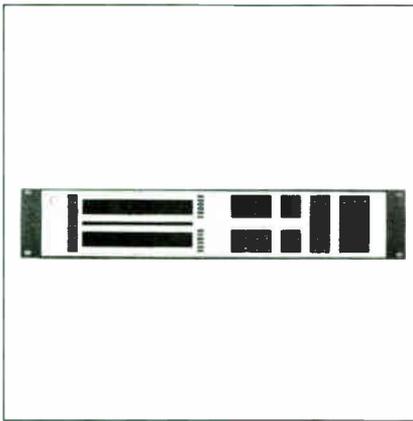
Product Name: CDI-4800—Shadow II™

Contact: Anthony R. Mattia, general manager  
Date Product Introduced: April 1986

**Product Description & Applications:** Timely today, consistent with tomorrow, the Shadow II is based on the same adaptive loop techniques used in its predecessors, the "Shadow." Universal transport adaptability makes the Shadow II capable of controlling virtually any audio, video, or film transport on the market. The Shadow II currently satisfies the requirements of professionals in the audio post-production, video post-production, and film industry.

**Basic Specifications & Suggested List Price:** SMPTE/EBU Time Code Standards, wide band reader, master record-in, RS-232/422 interface control, an enhanced code only master, a more powerful microprocessor, and new software. Affordably priced for today's professional at \$3,695.

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**CIPHER DIGITAL, INC.**  
CDI-750

**CIPHER DIGITAL, INC.**  
5734 Industry Lane, Frederick, MD 21701  
(301) 695-0200, 1-800-331-9066  
Product Name: CDI-750  
Generator/Reader/Event Controller  
Contact: Anthony R. Mattia, general manager  
Date Product Introduced: April 1986  
Product Description & Applications: Timely today, consistent with tomorrow. The CDI-750 is a full-function time code generator/reader with a unique 16-channel event controller. This intelligent, microprocessor-based instrument has the versatility to fill a wide range of time code requirements in a variety of applications such as TV studio, production, post-production, and audio studios. The CDI-750 is the only time code system you'll ever need. **Basic Specifications & Suggested List Price:** The CDI-750 reads time code at 1/30 to 80X play speed. Built-in character inserter, jam sync mode, 16 event controller, microprocessor-based, software controlled via front panel. SMPTE and EBU standards true time code regeneration of incoming code. Affordably priced for today's professional at \$3995.

## NEW PRODUCTS

### AUTOMATION AND CONTROL SYSTEMS

1 • 9 • 8 • 7

**CMX CORP.**  
2230 Martin Ave., Santa Clara, CA 95050  
(408) 988-2000  
Product Name: CASS 1E  
Contact: John Shike, product manager  
Date Product Introduced: May 1986  
Product Description & Applications: The CMX CASS 1E, an editor-only version of the CASS 1, provides editing and synchronization for audio sweetening. The CASS 1E is CMX keyboard and Edit Decision List oriented, with computer-controlled accuracy, over VTR, ATRs and other sources.

**Basic Specifications & Suggested List Price:** The CASS 1E can be upgraded to CASS 1 to provide audio console automation. Controls up to six machines; 14 relay GPI, price: \$18,000 plus synchronizers.

**CMX CORP.**  
2230 Martin Ave., Santa Clara, CA 95050  
(408) 988-2000  
Product Name: CASS 1  
Contact: John Shike, product manager  
Date Product Introduced: NAB 1986  
Product Description & Applications: The CMX CASS 1 Computer-assisted Audio Sweetening System is the only system combining audio synchronization with audio console automation. All editing information and console fader setups are retained by CASS 1 and all information is referenced to SMPTE time code. CASS 1 accepts information from, and outputs to, a standard CMX video edit decision list.

**Basic Specifications & Suggested List Price:** Central controller: IBM PC/AT based, 68000 co-processor; de-

vice interface: Adams-Smith 2600; up to six devices controlled, up to 14 GPI relay closures; TC standard: SMPTE drop/non-drop frame/EBU; edit accuracy: frame accurate; I/O devices: 5¼-inch floppy disk drive, 20MB hard disk, 8-inch floppy drive and line printer optional; console interface: 32 VCA ladders; price: \$32,000 plus synchronizer.

**DIGICOUSTICS CO.**  
452 Riverside Dr. #33, New York, NY 10027  
(212) 316-1228  
Product Name: Composer's Workstation  
Contact: Ted Sabety  
Date Product Introduced: June 1986  
Product Description & Applications: Fully integrated MIDI/SMPTE/tape synchronization package that links sequencer, data library, tape locator and mix automation into one system. Comes as plug-in board for IBM-PC or Apple II or Macintosh.  
**Basic Specifications & Suggested List Price:** Four MIDI outs, four MIDI ins, four MIDI thru. SMPTE in/out. RS-232, 9600 baud, requires 64 kb memory.



**FOSTEX CORP. OF AMERICA**  
FAME (Fostex Automated Media Editing)

**FOSTEX CORP. OF AMERICA**  
15431 Blackburn Ave., Norwalk, CA 90650  
(213) 921-1112  
Product Name: FAME (Fostex Automated Media Editing)  
Contact: Mark Cohen, vice president sales  
Date Product Introduced: June NAMM  
Product Description & Applications: Fame is a system to free the editor/operator of the numbers. All number activities are conducted by FAME, the operator is free to choose sights and sounds rather than numbers. The artist is able to operate many machines alone—no need for a programmer.

**GARFIELD ELECTRONICS/K-MUSE INC.**  
8954 Mason Ave., Chatsworth, CA 91311  
(818) 998-7555  
Product Name: The "Master Beat"  
Contact: G. Bob Connelly, vice president sales/mktg.  
Date Product Introduced: February 1986  
Product Description & Applications: The Master Beat, a comprehensive studio synchronizer, will read, write, regenerate and repair SMPTE codes as well as any clocks or clicks possible. The Master Beat is the "all-in-one" sync box. It can remember up to 800 events and save them to standard cassette tape as data information. Retail \$2,495, (available from K-Muse Inc., Chatsworth, CA).

**HARRISON SYSTEMS, INC.**  
P.O. Box 22964, Nashville, TN 37202  
(615) 834-1184  
Product Name: HDA-10  
Contact: Brad Harrison, vice president/marketing communications  
Date Product Introduced: June 1, 1986  
Product Description & Applications: 80 megabyte hard-disk automation system which is used in conjunction with recently introduced Harrison System's Series-10 console. The system stores all signal flow parameters and all function settings of the Series-10 for save and recall in "snapshot" mode as well as full "dynamic" automation mode.

**OPTIMIX**  
13 Rue Lacuée, 75012 Paris, France  
(33) 1 43 42 41 59  
Product Name: Optifile  
Contact: J.P. Lafont, president

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(213) 876-8733

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**Date Product Introduced:** March 1986

**Product Description & Applications:** Optifile is a disk-based console automation computer. This system incorporates a SMPTE/EBU code generator and a 3.5-inch disk drive. It uses only one track of the multi-track tape and has no cumulative delay. Software is menu-driven. Other facilities include sub-grouping, butt and insert joins, disk copying. Up to ten different mixes can be stored on one diskette. Procedures, time code, VCA and fader levels are displayed on a video monitor. Moreover, Optifile does not require changing the faders or the mute switches of the console. U.S. agent: Trident USA Inc., 308 No. Stanley Ave., Los Angeles, CA 90036, (213) 933-7555.

**RICHMOND SOUND DESIGN LTD.**  
1234 W. 6th Ave., Vancouver, BC, V6H 1A5  
(604) 734-1217

**Product Name:** Command/Cue™ Automation System  
**Contact:** Charlie Richmond

**Date Product Introduced:** July 1, 1986

**Product Description & Applications:** Provides both: real time and disk-based memory control of volume levels, fade up/down times, and switch settings in up to 4096 audio channels; virtually thousands of devices such as tape machines and intelligent peripherals may be controlled. Operation is extremely friendly and is optimized for both theater applications involving large input/output matrices with rapid cue changes and industrial/commercial systems with dedicated configurations requiring widely distributed real time control capabilities.

**Basic Specifications & Suggested List Price:** Numerous modules and accessories are available with exceptionally high technical specifications and a modular concept allowing systems for as little as \$2500 to be expanded to as many as 4096 channels with standard software. The system is expandable practically without limit or obsolescence.

#### SOUND AND VISION

689 Benson Way, Thousand Oaks, CA 91360  
(805) 496-1518

**Product Name:** SV-1000 Mini-Log  
**Contact:** Cornel Tanassy, president

**Date Product Introduced:** January 1986

**Product Description & Applications:** The SV-1000 is a universal tape controller that gives all reel-to-reels three search-to-cue points, auto-punch in and out, auto-loop and a precise digital tape counter and tracking system. The SV-1000 includes a jack for foot-switchable record in and out and a jack for a 5 Volt programmable trigger out.

**Basic Specifications & Suggested List Price:** Auto-record, auto-loop, auto-locate, three memory positions, trigger out. List \$440.

#### SOUNDMASTER INTERNATIONAL INC.

306 Rexdale Blvd. Unit 5, Toronto, ONT M9W 1R6  
(416) 741-4034

**Product Name:** Soundmaster Integrated Editing System  
**Contact:** Bob Predovich, director

**Date Product Introduced:** April 1986

**Product Description & Applications:** The Soundmaster Integrated Editing System incorporates Syncro, the next generation machine synchronizer that is totally programmable. Controlled by the IBM PC-based Soundmaster software, proven in hundreds of TV and film productions, Syncro communicates at speeds of 5 MHz. "Smart" machine-mounted interfaces allow for universal cabling. Modular construction facilitates rapid field expansion to 16 or more units. Each Syncro contains an 8088 and 8087 microprocessor, and onboard RAM to support edit list multi-tasking.

**Basic Specifications & Suggested List Price:** Features include: variable speed lock up from up to 1/3 to three times play speed, numerous programmable closures for external device tripping, the designation of the master machine via the keyboard, and simultaneous synchronization of all international time codes. Complete with: factory supplied cables and "smart" interfaces, suggested list price for three machine control is U.S. \$12,915 (FOB Toronto).

#### STUDER REVOX AMERICA

1425 Elm Hill Pike, Nashville, TN 37210  
(615) 254-5651

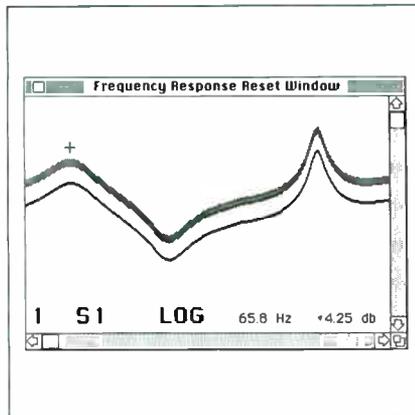
**Product Name:** Studer SC4008/SC4016 System  
**Controllers**

**Contact:** Thomas E. Mintner, vice president/gen. mgr.

**Date Product Introduced:** April 1986

**Product Description & Applications:** The SC4008 and SC4016 offer two different approaches to multiple machine control in audio/video/film production settings. Both systems work in conjunction with Studer TLS4000 bus-compatible synchronizers. The SC4008 follows the traditional approach for locking and controlling up to eight audio, video, or film machines. It uses an ergonomically arrayed panel of dedicated buttons for specific functions, with each button permanently labelled. In contrast, the SC4016 takes a new approach which eliminates the large array of dedicated buttons. The SC4016 instead employs simple display working in conjunction with eight "super

soft-keys" which are fully user programmable by function and "intelligently" re-label themselves on an internal LED matrix. This allows the system to be quickly reconfigured for different jobs or users. The SC4016 also uses the "virtual master" concept wherein any machine can be designated as the master. Various options are available, including additional "super soft-key" panels, floppy disk drives, and a CRT interface.



#### STUDIO MASTER SYSTEMS Studio Master Plus with CCL

#### STUDIO MASTER SYSTEMS

P.O. Drawer P, No. Miami Beach, FL 33160  
(305) 945-9774

**Product Name:** Studio Master Plus with CCL (Console Control Logging)

**Contact:** Seth Snyder

**Date Product Introduced:** October 1985

**Product Description & Applications:** Studio Master Plus with CCL (Console Control Logging) is a software and hardware package for the Macintosh computer. With it, you can scan and log all knob and fader positions in each mixing console module. Stored on computer disk, the settings can be restored simply and easily on any Studio Master Plus equipped console. Studio Master requires no modifications to existing mixing consoles. Studio Master includes billing, track sheet, tape label and word processing features.

**Basic Specifications & Suggested List Price:** Hardware: the CCL mixing console interface; number of input channels: unlimited; number of output mixing buses: 16 standard; number of dry relay contacts: 8 standard; frequency response: 20 Hz-20,000 Hz; frequency resolution: 1000 points. Software (includes Studio Master Plus with CCL): Studio Master billing system; Track Master track sheets and tape labels; Outboard Master outboard gear charting system. List price: \$12,500.

#### TIME LINE, INC.

458 Minneford, City Island, NY 10464  
(212) 929-1311

**Product Name:** Lynx Timecode/Synchronizer Module

**Contact:** Julie Goldscheid

**Date Product Introduced:** November 1985

**Product Description & Applications:** SMPTE/EBU based synchronizer/machine interface utilizing RS422 communications link. New biphasic interfaces available.

**Basic Specifications & Suggested List Price:** Lynx Module: \$2500.

#### TOUCH TECHNOLOGIES INC.

363 Adelaide St. E., Toronto, ONT M5A 1N3  
(416) 865-1877

**Product Name:** AVE Sync (Audio Visual Events Synchronization System)

**Contact:** Alan Hardman, director marketing communications

**Date Product Introduced:** May 1986

**Product Description & Applications:** The AVE Sync modular system provides computer control of audio tape machines, lighting dimmers and irises, projectors, log machines, and other motorized equipment. Programming is via an IBM-PC. Program sequences are stored in on-board RAM, and may be input at a later time off tape, providing an ideal way to run and store lighting, audio, and special effects sequences in sync with a "live" stage show's click-track/multi-track master.

**Basic Specifications & Suggested List Price:** Each module can simultaneously control eight independent sequences of variable duration with up to 24 lighting channels (0-10 Volts) and 24 relay closures. Serial interface: RS-232 (RS-422, 423 optional). Size: PCB 14.5x14x2-inch. Price: (U.S.) \$5,500 per module.

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# EW PRODUCTS

## COMPUTER HARDWARE AND SOFTWARE

# 1 • 9 • 8 • 7

**AUDIO SYSTEMS DESIGN INC.**  
1755 Jenkee, Florissant, MO 63031  
(314) 839-3814

**Product Name:** Speaker Cabinet Design Software  
**Contact:** Marc Treppler, chief engineer  
**Date Product Introduced:** April 1986  
**Product Description & Applications:** "Speaker" is a graphics-based speaker cabinet design program. The program allows persons unfamiliar with the theory of bass reflex speaker cabinets to design perfectly tuned boxes for their favorite loudspeakers. The program determines optimum cabinet volumes and port dimensions for any loudspeaker. In addition, existing cabinets and loudspeakers can be checked or optimized for proper tuning. Frequency response graphs of cabinets and loudspeaker combinations can be displayed on a printer or the screen.  
**Basic Specifications & Suggested List Price:** Systems requirements: IBM-PC or compatible, 64K RAM. The graphics are output in text mode and do not require a graphics cards.



**BOSE CORPORATION**  
*Modeler*

**BOSE CORPORATION**  
The Mountain, Framingham, MA 01701  
(617) 879-7330

**Product Name:** Modeler  
**Contact:** Jim Sanchez, applications representative; Mark Mayfield, marketing development specialist  
**Date Product Introduced:** April 30, 1986  
**Product Description & Applications:** Computer aided design program, utilizing the Apple Macintosh, for the prediction and analysis of sound system performance in any room or facility. Program offers users the ability to: predict the time arrival of sound; create shaded sound maps; view loudspeaker's characteristics as a three-dimensional object, rotate a geometric representation to show any view; zoom in on a particular area; take obstructing surfaces into account; and use the program with any manufacturer's products through its open data base.  
**Basic Specifications & Suggested List Price:** Leased for one year with a suggested retail price of \$1,800. Runs on the Apple Macintosh 512K and Macintosh Plus.

**CLUB MIDI SOFTWARE**  
P.O. Box 93895, Hollywood, CA 90093  
(213) 876-6725

**Product Name:** Prolib  
**Contact:** Richard Shore  
**Date Product Introduced:** May 1986  
**Product Description & Applications:** Prolib is a professional universal MIDI librarian that stores sound data from over 20 different MIDI-equipped instruments on your computer's disk. It provides a user with many

powerful patch-management features, such as patch arranging, auditioning, naming, printing and automatic instrument loading. Advanced features such as keyword searching, patch data comparisons, excellent hard disk support and on-screen help with instrument panel diagrams are also provided. Prolib is easily updated to work with additional instruments.

**Basic Specifications & Suggested List Price:** Prolib works on IBM PCs and compatibles with a Roland MPU-401 MIDI interface and is available for \$99.95. Price includes software, bound user's manual and customer support.

**DECILLIONIX**  
P.O. Box 70985, Sunnyvale, CA 94086  
(408) 732-7758

**Product Name:** Synthesra  
**Contact:** Dan Retzinger, owner  
**Date Product Introduced:** March 1986  
**Product Description & Applications:** Synthesra is a MIDI sequencer and controller program for the Apple IIe/II+. Designed to bring a complete MIDI system under the control of one "master keyboard." Up to 16 MIDI keyboards, drum machines, expanders, or other MIDI devices may be sequenced and controlled simultaneously. Synthesra supports unlimited keyboard splitting, and layering.

**Basic Specifications & Suggested List Price:** The Synthesra program includes an operators manual, quick ref card, and software on diskette. Requires an Apple II and a MIDI interface card. Price is \$120.

**DIGIDESIGN INC.**  
920 Commercial St., Palo Alto, CA 94303  
(415) 494-8811

**Product Name:** Soft Synth  
**Contact:** Susan J. Alvaro, sales  
**Date Product Introduced:** June 1986 NAMM  
**Product Description & Applications:** Soft Synth is a new additive digital synthesis program from the makers of Sound Designer Software. Each of 32 available partials may have individually assigned waveshapes, envelopes and frequency curves, and are combined to create an unlimited range of digitally synthesized sounds. Sounds may be sent directly to any of several host keyboards for playback, or to any Sound Designer program for looping, digital EQ, merging, etc.

**Basic Specifications & Suggested List Price:** List price \$295. Soft Synth requires a minimum 512K Macintosh with second disk drive and MIDI interface, and will work with the Emulator II, E-Max, Prophet 2000/2002, Mirage, Akai 5900 and 612 and Korg samplers.

**DIGITAL SOUND TECHNOLOGIES**  
301 E. Farris Ave., High Point, NC 27262  
(919) 882-1368

**Product Name:** Fast Finder—LinnDrum Disk Storage  
**Contact:** Jim Williams, owner  
**Product Description & Applications:** April 1986  
**Product Description & Applications:** The Fast Finder Disk Storage system using the Commodore 64 computer provides an affordable and efficient alternative to cassette storage of LinnDrum song/pattern programs. The sequential format of cassette storage makes the process of finding a particular song or pattern difficult and time consuming. Fast Finder eliminates these problems by utilizing the power of direct disk access and an easy-to-use computer filing system.

**Basic Specifications & Suggested List Price:** The Fast Finder features: extremely fast access to song/pattern programs; storing and loading of song/pattern programs to and from disk; delete and replace functions, a memo function, a print function, easy to connect and use. Fast Finder is available for only \$49.95 plus \$4 s&h.

**DIGITAL SOUND TECHNOLOGIES**  
301 E. Farris Ave., High Point, NC 27262  
(919) 882-1368

**Product Name:** Missing Link—MIDI for the LinnDrum

**Contact:** Jim Williams, owner

**Date Product Introduced:** August 1986  
**Product Description & Applications:** The Missing Link enables the LinnDrum's sounds to be totally controlled by an external MIDI sequencer, a set of MIDI drum pads or a MIDI drum machine. The Missing Link also adds various sync functions to the LinnDrum. Two new features are added to the LinnDrum with the Missing Link—programmable pitch control for the toms/congas or the snare and velocity sensitive dynamics control for the LinnDrum multi-volume sounds.

**Basic Specifications & Suggested List Price:** The Missing Link is easily installed by the user and operation is simple. An inexpensive Commodore 64 computer is required. No video monitor or disk drive needed. The Missing Link is available for \$250 + \$4 s&h.

**DRUMWARE**  
12077 Wilshire Blvd. #515, Los Angeles, CA 90025  
(213) 478-3956

**Product Name:** Soundfiler Librarian+  
**Contact:** Scott Morgan, president  
**Date Product Introduced:** June 1986  
**Product Description & Applications:** Soundfiler Librarian+ is a menu-driven librarian and visual editing system for the Akai S612 sampler and Apple II series computers. The program saves and loads sound samples to standard 5.25-inch floppy disks. Sounds can be named, cataloged, and printed for reference. The VES section includes waveform plotting, a visual looping editor, and a crossfade looping function. Sounds can be played from the Apple keyboard and externally triggered via the cassette port.  
**Basic Specifications & Suggested List Price:** Soundfiler Librarian+ is \$125 and requires Apple IIe or 64K II+, one disk drive, Passport compatible MIDI card, and an Akai S612.

**ROS SOFTWARE**  
P.O. Box 7321, New York, NY 10116  
(212) 594-6573

**Product Name:** Time Counter  
**Contact:** Andy Lasky, president  
**Date Product Introduced:** June 1986  
**Product Description & Applications:** Time Counter is a software product that allows your Apple II+ or Apple IIe to become a SMPTE time code reader, ten point event controller, time code locked frequency generator. Time Counter utilizes the Apple's cassette-in port to read time code so no extra hardware is required. Time Counter supports serial-, parallel-, or MIDI interface cards. Frequency or "click" are generated using the cassette out on the Apple. Events and event types can be saved on disk.  
**Basic Specifications & Suggested List Price:** Time Counter requires an Apple II+ or Apple IIe with at least 64K of memory, and one disk drive. No other hardware is required. Time Counter's suggested list price is \$140.

**SCIENTIFIC DESIGN SOFTWARE**  
P.O. Box 3890, Northridge, CA 91323  
(818) 718-1201

**Product Name:** Computer-Aided Speaker Design (IBM Version)  
**Contact:** Ted Telesky, president  
**Date Product Introduced:** January, 1986  
**Product Description & Applications:** Computer-Aided Speaker Design is a speaker design program which allows complete modeling of sealed and vented system, crossovers and other misc items. A complete data base of 650 drivers can be used to design systems.  
**Basic Specifications & Suggested List Price:** Requires IBM or IBM compatible computer with: two floppy or one floppy + one hard drive, color graphics cards, 256K memory. Price: \$149.95.

**STUDIO MASTER SYSTEMS**  
P.O. Drawer P, North Miami Beach, FL 33160  
(305) 945-9774

**Product Name:** Studio Master Plus with CCL (Console Control Logging)

Contact: Seth Snyder

Date Product Introduced: October 1985

**Product Description & Applications:** Studio Master Plus with CCL (Console Control Logging) is a software and hardware package for the Macintosh computer. With it, you can scan and log all knob and fader positions in each mixing console module. Stored on computer disk, the settings can be restored simply and easily on any Studio Master Plus equipped console. Studio Master requires no modifications to existing mixing consoles. Studio Master includes billing, track sheet, tape label and word processing features.

**Basic Specifications & Suggested List Price:** Hardware: the CCL mixing console interface; number of input channels: unlimited; number of output mixing buses: 16 standard; number of dry relay contacts: 8 standard; frequency response: 20-20,000 Hz; frequency resolution: 1000 points; software: includes Studio Master Plus with CCL; Studio Master billing system; Track Master track sheets and tape labels; Outboard Master outboard gear charting system. List price: \$12,500.

#### STUDIO MASTER SYSTEMS

P.O. Drawer P, North Miami Beach, FL 33160  
(305) 945-9774

Product Name: Studio Master

Contact: Seth Snyder

Date Product Introduced: November 1986

**Product Description & Applications:** Studio Master is a software package for the Apple Macintosh computer. It contains an automatic billing and invoicing system which keeps track of studio usage by the minute and materials as they are used. The Billing Menu lets you start and stop the session clock and change to a different studio rate if necessary. The Log Menu lets you look at and make entries into Studio Master's text logs, the maintenance log, the captain's log and the session log.

**Basic Specifications & Suggested List Price:** Number of studio rate categories: 25 standard; number of materials items: 25 standard. Includes: Track Master (track sheets and tape labels); and Outboard Master (outboard gear charting system). List price: \$2,500.

#### STUDIO MASTER SYSTEMS

P.O. Drawer P, North Miami Beach, FL 33160  
(305) 945-9774

Product Name: Track Master

Contact: Seth Snyder

Date Product Introduced: November 1986

**Product Description & Applications:** Track Master is a software package for the Apple Macintosh computer. It contains track sheet and tape label generation systems. To create a track sheet, the user selects the new sheet menu item. In order to make entries into the new track sheet, the user clicks on the track he wants with the Macintosh's mouse and then selects an instrument from the instrument menu. If the instrument you want isn't on the instrument menu, you can just type in the words you want on the keyboard. The tape label generation system works in much the same way as the track sheet does.

**Basic Specifications & Suggested List Price:** Track Sheet sizes supports: 16-, 24- and 32-tracks. Number of lines on tape label: 16 standard. Format for studio and band graphics: MacPaint. Includes Outboard Master (outboard gear charting system). List price \$750.

#### STUDIO MASTER SYSTEMS

P.O. Drawer P, North Miami Beach, FL 33160  
(305) 945-9774

Product Name: Outboard Master

Contact: Seth Snyder

Date Product Introduced: November 1986

**Product Description & Applications:** Outboard Master is a software package for the Apple Macintosh Computer. It contains a system that allows you to create a representation or template of a piece of equipment on the computer screen. After the template for a particular piece of equipment has been created, it may be used to store knob, switch and light bulb settings in a picture-like form. In this way, the settings can be documented for later use if desired. These settings can be printed out on paper or stored on computer disk for later use.

**Basic Specifications & Suggested List Price:** Objects supported: knobs, slide controls, buttons, switches, LEDs or light bulbs, digital readouts, lines, rectangles, text. List price: \$250.

#### TRIANGLE AUDIO, INC.

P.O. Box 1108, Sterling, VA 22170  
(703) 437-5162

Product Name: MIDI Arpeggiator

Contact: Jay Britton, vice president marketing

Date Product Introduced: March 1986

**Product Description & Applications:** The Arpeggiator takes incoming MIDI note data and sends out an arpeggiated version of this data. This allows synthesizers without internal arpeggiators to be arpeggiated. Attack velocities are preserved during arpeggiation and the output may be re-channelized. Four arpeggiation modes

are provided; up, down, up and down, and random. The arpeggiation tempo can be synched to the MIDI sync clock for unusual effects.

**Basic Specifications & Suggested List Price:** The duration between notes can be programmed in time from .01 to 2.55 seconds or in MIDI sync clocks for 1 to 255. Speed and arpeggiation mode can be changed in real time for live performance use. Runs on Commodore 64 with Passport or Sequential interfaces. Suggested retail price is \$59.95.

#### TRIANGLE AUDIO, INC.

P.O. Box 1108, Sterling, VA 22170  
(703) 437-5162

Product Name: MIDI Data Analyzer

Contact: Jay Britton, vice president marketing

Date Product Introduced: March 1986

**Product Description & Applications:** The MIDI Data Analyzer is a diagnostic tool allowing the user to see exactly what commands have been sent on a MIDI link. On command, the program collects MIDI data in its input buffer for later analysis on the screen or a printer. The analysis shows the data in hex and decimal and translates the data into plain English. The program finds wide applications in MIDI studios, equipment shops and development labs.

**Basic Specifications & Suggested List Price:** The buffer size is 2048 bytes. The MIDI out jack functions as a MIDI thru while collecting and the collected data can be played back as it is analyzed. The analysis shows implied commands and deciphers note names into understandable form (i.e., c#3). The suggested retail price is \$100. Available for Commodore-64 and Apple.

#### VIRTUAL SOUNDS

557 Tremont St. #11, Boston, MA 02118  
(617) 353-1815

Product Name: SampleMaker™

Contact: Bill Rosenkrantz

Date Product Introduced: September 1986

**Product Description & Applications:** SampleMaker is a software-based synthesizer which features most available synthesis techniques to generate a broad spectrum of sounds. A patch is edited graphically using a mouse to manipulate common synth data and a sample is generated which can be edited and downloaded to samplers via MIDI. Most current synthesizers can be simulated using various modulation schemes (amplitude, frequency) and additive synthesis. Samples and patches can be stored on disk.

**Basic Specifications & Suggested List Price:** Systems: Atari ST, IBM PC, and Macintosh computers (Amiga Dec. 1986); Prophet 2000/2002, Mirage, and Akai S900 samplers. Specs: 60 operators (each with EGs and LFOs for pitch and amplitude and oscillator with sine, square, sample, etc. waveforms); nonlinear waveshaping; arbitrary patch algorithm; sample editor included. Price: \$250.

#### VOYETRA TECHNOLOGIES

426 Mt. Pleasant Ave., Mamaroneck, NY 10543  
(914) 698-3377

Product Name: Patch Master

Contact: Fred Romado, vice president

Date Product Introduced: August 1, 1986

**Product Description & Applications:** Patch Master brings together: a system organizer for MIDI studios; a universal librarian for uploading and downloading patches, performance data and drum patterns; and a bank arranger for creating and arranging banks of sounds. Both simple and sophisticated. Patch Master removes all the hassles of dealing with cassette tapes, data cartridges, and gives you the sounds you want right there when you need them.

**Basic Specifications & Suggested List Price:** For IBM PCs and compatibles. Simultaneous setup of up to 32 instruments. Extensive context sensing HELP system. Menu-driven user interface. Individual help for each instrument. Full support of hard disk. Swap, copy and move functions. Price: \$149.

#### VOYETRA TECHNOLOGIES

426 Mt. Pleasant Ave., Mamaroneck, NY 10543  
(914) 698-3377

Product Name: Conversion Plus

Contact: Fred Romado

Date Product Introduced: August 1, 1986

**Product Description & Applications:** Allows songs to be moved between Voyetra Technologies Sequencer Plus program and Jim Miller's Personal Composer. Songs created in Sequencer Plus can be moved into Personal Composer, where they can be printed in standard musical notation. Likewise, songs entered into Personal Composer's notation system can be moved into Sequencer Plus for precise editing and manipulation. This allows users to take advantage of all the features of the two most powerful computer sequencers available.

**Basic Specifications & Suggested List Price:** For IBM PCs and compatibles. Converts all data, including controllers and program changes. Price: \$99.

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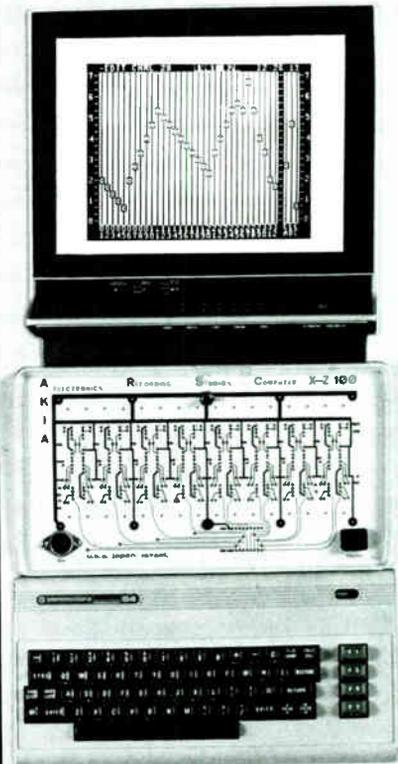
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# N

# EW PRODUCTS MICROPHONES AND PICKUPS

# 1 • 9 • 8 • 7

## ACO PACIFIC, INC.

2604 Read Ave., Belmont, CA 94002  
(415) 595-8588

Product Name: ACM48UE ENG Microphone

Contact: Noland L. Lewis

Date Product Introduced: 1986

**Product Description & Applications:** The new ACM48UE ENG cardioid microphone system will be demonstrated. Designed for mounting on the camera, the units may be utilized in stereo or singly for monoaural applications. Providing a 30Hz to 20 kHz response, the ACM48UE's low power requirement (12 VDC @2mA) is supplied by an internal 9VDC battery or the camera supply. A high level, low impedance output assures adequate signal.

**Basic Specifications & Suggested List Price:** Additional demonstrations include: the ACM48UP in a stereo application, the "Ghost" portable 48VDC phantom power supply, and the ACOustical Interface integrated Type 1 microphone system for measurement and precision recording applications

## AKG ACOUSTICS, INC.

77 Selleck St., Stamford, CT 06902  
(203) 348-2121

Product Name: WMS-185 Wireless Microphone System

Contact: Dave Tolbot, Sales Mgr., Acoustics Products

Date Product Introduced: September 1986

**Product Description & Applications:** The AKG WMS-185 Wireless Microphone System is a complete range of modular components. Interchangeable microphone heads include the C-535WL, D-321WL, D-330WL (handheld), the C-410WL (headset microphone), and the CK-67WL (lavaliere). An adapter can be used to connect virtually any audio source, (including keyboard, guitars, etc.) to the T-185 transmitter. The SR-185 receiver is available in two variations: diversity and non-diversity. It can be powered by 110 VAC or via an external DC battery supply for remote location applications. Systems include a mic head, transmitter, receiver, antennas and appropriate accessories for wireless operation.

**Basic Specifications & Suggested List Price:** The WMS-185 system operates in the 174-216 MHz frequency range. Approximately 90 dB of dynamic range is achieved through the use of a companding circuit. Complete specification are available upon request. Pricing for complete systems range from \$2,399 to \$3,454 depending upon configuration.

## AUDRA INTERNATIONAL

P.O. Box 38, Silverado, CA 92676  
(714) 649-2207

Product Name: Alphon PMM-1

Contact: Algis Renkus, owner

Date Product Introduced: 1986

**Product Description & Applications:** Miniature precision microphone: its primary application is for pick up of musical instruments where true sound fidelity even at highest sound levels is required both for on stage or recording studio needs. Price is \$180.

## BEYER DYNAMIC INC.

5-05 Burns Ave., Hicksville, NY 11801  
(516) 935-8000

Product Name: MC 740

Contact: Mike Solomon, marketing manager

Date Product Introduced: January 21, 1986

**Product Description & Applications:** Large diaphragm, multi-pattern condenser microphone with five polar responses, switchable 10dB attenuation pad, three position low frequency roll-off switch, internal shock mount. External isolation mount supplied with each model. Recommended PA and recording applications: vocals; acoustic string and wind instruments; brass; acoustic piano; ambient pickup, digital sampling.

**Basic Specifications & Suggested List Price:** List price \$1,000. Frequency response: 40-20,000Hz; output sensitivity: -40dBv; maximum sound pressure level: 144dB; impedance: 150 ohms; signal-to-noise ratio: 70dB.

## BEYER DYNAMIC INC.

5-05 Burns Ave., Hicksville, NY 11801  
(516) 935-8000

Product Name: M 380

Contact: Mike Solomon, marketing manager

Date Product Introduced: January 21, 1986

**Product Description & Applications:** Dynamic moving coil mic with large diaphragm, internally shockmounted and housed in a rugged diecast case. Unidirectional. Frequency response is extended down to 15Hz. Recommended applications: bass drum; floor toms; vocals; guitar amps; brass instruments. Excellent gain before feedback, high SPL capability, antique brass finish.

**Basic Specifications & Suggested List Price:** List price: \$260; frequency response: 15-20,000 Hz; output sensitivity: -46dBv; maximum sound pressure level: 140 dB; impedance: 200 ohms.

## CETEC VEGA

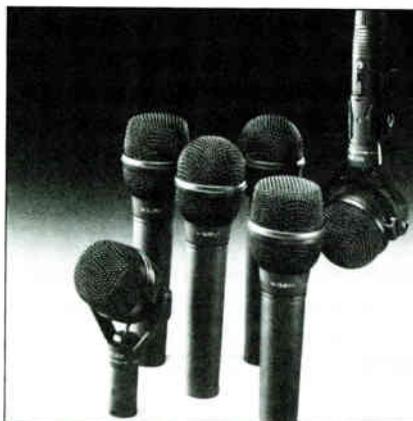
9900 Baldwin Pl., El Monte, CA 91731  
(818) 442-0782

Product Name: PRO 1 Wireless Mic System

Contact: Kenneth M. Bourne, director of marketing

**Product Description & Applications:** The PRO 1-B professional wireless microphone system consists of the Model T-37 bodypack transmitter (which accepts virtually any electret microphone using its miniature four-pin XLR connector) and Model R-31A receiver. The PRO 1-H system consists of the Model T-36 handheld transmitter (which uses the Electro-Voice BK-1 "Black Knight" condenser element) and R-31A receiver. The R-31A receiver features two LED bargraph displays—one for RF signal level and the other for audio level. A GaAs FET front end provides high sensitivity.

**Basic Specifications & Suggested List Price:** The PRO 1 systems feature professional-quality audio circuits and Dynex II advanced audio processor for 103 dB typical A-weighted S/N, typically 100 dB dynamic range, and 0.3 percent typical harmonic distortion. The systems can operate on any crystal-controlled frequency between 150 to 216 MHz. Suggested list price: \$1,499 (PRO 1-B); \$1,770 (PRO 1-H).



ELECTRO-VOICE, INC.  
N/D Series Microphones

## ELECTRO-VOICE, INC.

600 Cecil St., Buchanan, MI 49107  
(616) 695-6831

Product Name: N/D Series microphones

Contact: Alan Shirley, marketing services mgr.

Date Product Introduced: Summer 1986

**Product Description & Applications:** The Electro-Voice N/D series includes four vocal and two instrument dynamic microphones that employ a revolutionary neo-

dymium alloy in an advanced, state-of-the-art N/DYM magnet structure to provide the highest flux density available for sensitivity ratings 6 dB hotter than conventional dynamics and a uniform magnetic field that lowers distortion during peak sound pressure levels. Large-diaphragm design results in extended high-frequency response, and exceptional sensitivity combined with the inherently low noise of a dynamic transducer insures superior signal-to-noise for digital recording and sampling.

**Basic Specifications & Suggested List Price:** Vocal Models—N/D757: 25-22k Hz supercardioid, \$297; N/D457: 25-21k Hz hypercardioid, \$222; N/D357 25-20k Hz supercardioid, \$174; N/D257 35-19k Hz cardioid, \$126. Instrument Models—N/D408 30-22k Hz supercardioid, \$228; N/D308 40-20k Hz cardioid, \$186.



J.T. ENTERPRISES  
"Drum Bug"

## J.T. ENTERPRISES

6924 W. Arrowhead, Kennewick, WA 99336  
(509) 735-7430

Product Name: "Drum Bug"

Contact: Steve Hickman, president

Date Product Introduced: May 15, 1986

**Product Description & Applications:** 1 3/8-inch round sensor. Durable, triggering/miking device can be used direct into PA board as a mic, will drive high and low impedance lines, eliminates phasing problems, and bleed common with microphones and totally isolates each drum for equalization, eliminates stands and booms, shortens set up time, can drive synth controllers from an acoustic set, special damping keeps the unit from false triggering when sensitivities are set correctly; won't break when struck. Use on all drums, mounts easily.

**Basic Specifications & Suggested List Price:** Special epoxy resin seal is used for durability, heavy shielded cable and Switchcraft metal 1/4-inch female ends (also available with XLR end) mounts with special double-sided tape (used to put truck bodies together without rivets) but can be removed without damaging drum head. Suggested retail in U.S. \$50/each, extra mounting tape included.

## ELECTROSONICS, INC.

2100 Atrisco Dr. NW, Albuquerque, NM 87120  
(505) 831-1010

Product Name: VHF Pro-mini Wireless

Contact: Bruce C. Jones, sales/marketing manager

Date Product Introduced: September 1986

**Product Description & Applications:** VHF wireless microphone system for studio, stage or auditorium; all metal transmitter works with almost any microphone via five pin, locking inport connector; audio gain adjustment (modulation) LEDs on transmitter control panel allow quick, accurate

—LISTING CONTINUED ON PAGE 142

# SHURE'S "CASH BACK/TOUR JAC" REBATE OFFER

Special limited-time offer on 3 great microphones.

**1. \$10 REBATE**  
PURCHASE ONE SM57-LC OR ONE SM58-LC OR TWO SM48-LC's

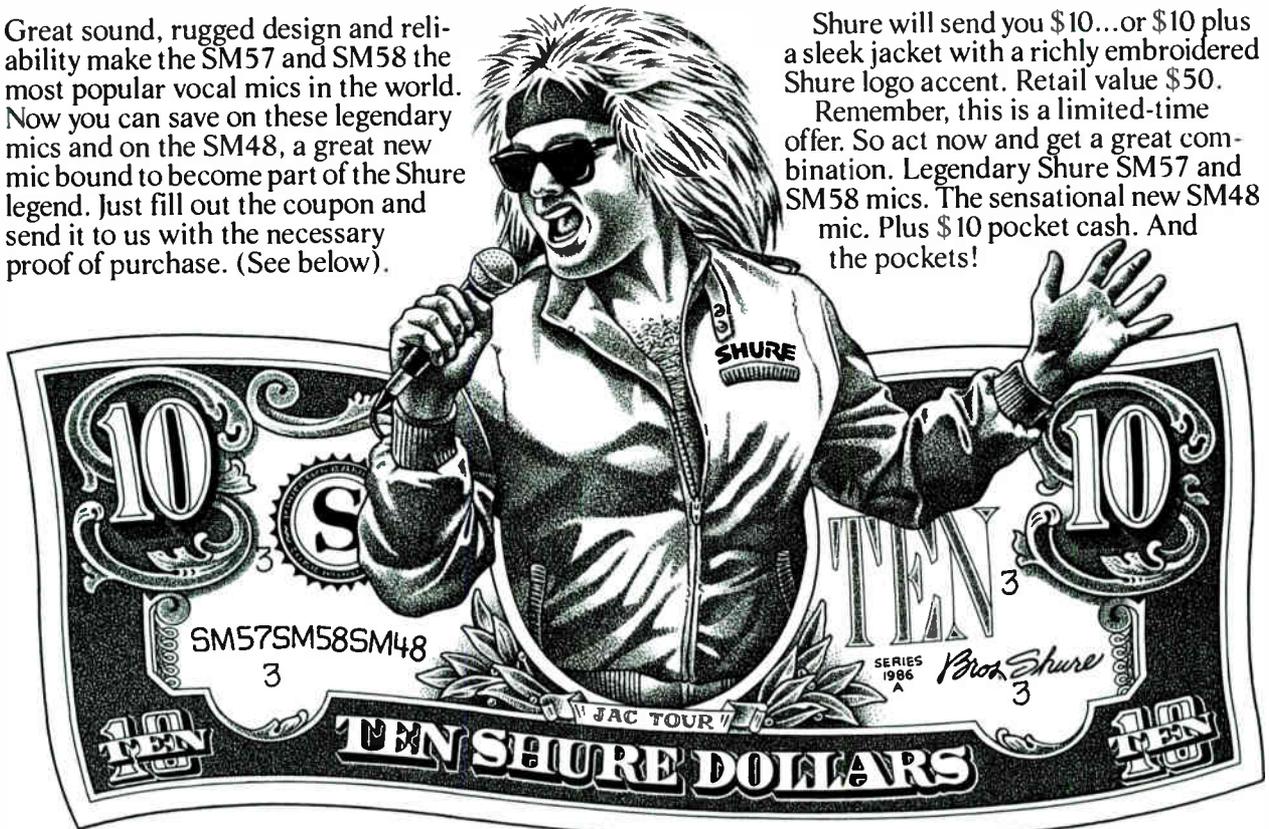
**2. \$10 REBATE + JACKET**  
PURCHASE TWO SM57-LC's OR TWO SM58-LC's OR FOUR SM48-LC's

**3. \$10 REBATE + JACKET**  
PURCHASE TWO SM48-LC's and either ONE SM57-LC or ONE SM58-LC

Great sound, rugged design and reliability make the SM57 and SM58 the most popular vocal mics in the world. Now you can save on these legendary mics and on the SM48, a great new mic bound to become part of the Shure legend. Just fill out the coupon and send it to us with the necessary proof of purchase. (See below).

Shure will send you \$10...or \$10 plus a sleek jacket with a richly embroidered Shure logo accent. Retail value \$50.

Remember, this is a limited-time offer. So act now and get a great combination. Legendary Shure SM57 and SM58 mics. The sensational new SM48 mic. Plus \$10 pocket cash. And the pockets!



Save now! Shure's "Cash Back/Tour Jac" Rebate Offer ends December 31, 1986.

To receive your rebate or rebate plus jacket bonus on selected Shure microphones, send: (1) A copy of your dated sale receipt (non-returnable) (2) The silver model number label from the end of the outer carton (one for each microphone claimed toward a rebate) and (3) This completed coupon (or facsimile thereof) to: Shure Cash Back/Tour Jac Offer, 222 Hartrey Ave., Evanston, IL 60202-3696.

Offer valid on purchases of SM48-LC, SM57-LC and SM58-LC mics between October 1, 1986 and December 31, 1986. All requests must be postmarked by January 3, 1987. This is a consumer (end user) offer only. Shure distributors and retailers are not eligible. This offer may not be used in conjunction with any other rebate from Shure. All rebates will be re-calculated by Shure for accuracy; rebate adjustments as determined by Shure are final. Shure is not responsible for late, lost or misdirected mail. Offer good only on purchases made in U.S.A. Void where taxed or prohibited by law. Allow 6-8 weeks for delivery of jacket and/or check; checks and jackets will be sent separately. No model substitutions permitted.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone ( ) \_\_\_\_\_

How many mics did you buy? (Indicate Quantity)

SM48-LC \_\_\_\_\_ SM57-LC \_\_\_\_\_ SM58-LC \_\_\_\_\_

Your Total Claim: \$ \_\_\_\_\_ cash \_\_\_\_\_ jacket(s)

Circle Jacket Size(s) and indicate quantity of each size:

S(34-36) \_\_\_\_\_ M(38-40) \_\_\_\_\_ L(42-44) \_\_\_\_\_ XL(46-48) \_\_\_\_\_

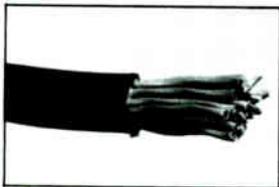
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## NEW PRODUCTS

### MICROPHONES AND PICKUPS

# 1 • 9 • 8 • 7

—LISTING CONTINUED FROM PAGE 140

settings; no dangling antenna wire (lavaliere mic cord is the antenna); receiver offers various outputs (XLR bal. mic level, 1/4-inch bal Hi-Z, RCA tape out); system is companded and operates smoothly with a "comparator" squelching system; narrow band receiver design permits hundreds of channels from 169 to 216 MHz.

**Basic Specifications & Suggested List Price:** Overall system: frequencies: 169-216MHz; range: up to 1,000 ft.; operating temp: -40°C to 50°C; freq. stability: 0.002%; freq. response: 40Hz to 15kHz (-3dB); deviation: 15kHz; dynamic range: >120 dB; distortion: <1% at 12kHz deviation. Receiver: sensitivity: 0.5 microvolt for 35dB quieting; S/N ratio: 110dB; adj. chan. rejection: 60dB; image rejection: >80dB; AM rejection: >70dB; IF bandwidth: 50kHz; \$899.50 suggested price.

**LECTROSONICS, INC.**

2100 Atrisco Dr. NW, Albuquerque, NM 87120  
(505) 831-1010

**Product Name:** VHF Pro-mini Wireless

**Contact:** Bruce C. Jones, sales/marketing manager

**Date Product Introduced:** September 1986

**Product Description & Applications:** VHF wireless microphone system for field tele-production and ENG; ultra-compact, all metal transmitter works with almost any microphone via five pin, locking input connector; audio gain adjustment (modulation) LEDs on transmitter control panel allow quick, accurate settings; no dangling antenna wire (lavaliere mic cord is the antenna); tiny receiver offers variable output (adjusts from -40dB to 0dB) via locking connector; system is companded and operates smoothly with a "comparator" squelching system; narrow band receiver design permits hundreds of channels from 169 to 216MHz.

**Basic Specifications & Suggested List Price:** Overall system: frequencies: 169-216MHz; range: up to 1,000 ft.; operating temp: -40°C to 50°C; freq. stability: 0.002%; freq. response: 40Hz to 15kHz (-3dB); deviation: 15kHz; dynamic range: >120 dB; distortion: <1% at 12kHz deviation. Receiver: sensitivity: 0.5 microvolt for 35dB quieting; S/N ratio: 110dB; adj. chan. rejection: 60dB; image rejection: >80dB; AM rejection: >70dB; IF bandwidth: 50kHz; \$899.50 suggested price.



MILAB INTERNATIONAL  
VIP-50

**MILAB INTERNATIONAL, SWEDEN**

11288 Ventura Blvd. Ste. 304, Studio City, CA 91604  
(818) 762-0342, IMC 2140

**Product Name:** VIP-50

**Contact:** Colin Waters

**Date Product Introduced:** November 1986

**Product Description & Applications:** VIP-50 is a transformerless condenser microphone, built on the basis of the unique Milab rectangular double membrane capsule. Each half of the capsule feeds its own separate input amplifier. The output signal from these is subsequently actively treated in order to create the various polar patterns. A choice of five polar patterns is offered. A switch activates a high-pass filter, rolling off lower frequencies by 6 dB per octave, beginning either at 200 Hz or at 500 Hz. The VIP-50 also incorporates a switchable 10 or 20 dB pad.

**Basic Specifications & Suggested List Price:** Frequency range: 40-20k Hz; noise level (IEC 179): 18 dB; max SPL: above 120 dB (0dB pad), above 130 dB (0dB pad); above 140 dB (20dB pad); sensitivity: 18 MV/PA; polar patterns: omni, broad cardioid, cardioid, super cardioid, figure-eight; output impedance: 2 x 180 ohm.

**THE MUSIC PEOPLE, INC.**

2074 Park St. P.O. Box 648, West Hartford, CT 06107  
(203) 521-2248

**Product Name:** Audio Spectrum Microphones—AS-350L

**Contact:** James R. Hennessey, president

**Date Product Introduced:** December 1985

**Product Description & Applications:** The AS-350L is a sophisticated vocal microphone that closely resembles the world standard; but looks can be deceiving. In testing, you will hear the difference. Hotter output level, and a sound that's crisper, cleaner, with a better presence peak make the AS-350L a new world standard in the making. Also available are black mic-clip holders and two 20-foot, hi-tech gray cables with a 6.5mm jacket.

**Basic Specifications & Suggested List Price:** List: \$140; professional user's net: \$71.

**NADY SYSTEMS, INC.**

1145 65th St., Oakland, CA 94608

(415) 652-2411

**Product Name:** 501 VR

**Contact:** Royce Krilanovich

**Date Product Introduced:** April 1986

**Product Description & Applications:** 501 VR is a compact portable VHF wireless receiver for use with video cameras. Works with NADY 501-HT handheld mic/transmitter and NADY 501-LT lavaliere microphone transmitter.

**Basic Specifications & Suggested List Price:** Operates on VHF frequencies between 151-216MHz.

**PANASONIC INDUSTRIAL COMPANY**

6550 Katella Ave., Cypress, CA 90630

(714) 895-7277

**Product Name:** RAMSA WM D-80

**Date Product Introduced:** November 1986

**Product Description & Applications:** Flat response, extended bandwidth microphone for instrument and vocal applications. Very smooth controlled off-axis response allows high gain without feedback. Mic will easily handle high SPL inputs such as snare, kick and tom drums.

**Basic Specifications & Suggested List Price:** Dynamic: 40 Hz to 18 kHz; unidirectional; sensitivity: -78 dB 1v/0.1 PA kHz; impedance 150 ohms @ 1kHz; price is \$190.

**PANASONIC INDUSTRIAL COMPANY**

6550 Katella Ave., Cypress, CA 90630

(714) 895-7277

**Product Name:** RAMSA WM D70

**Date Product Introduced:** November 1986

**Product Description & Applications:** High quality dynamic microphone designed for high performance live vocal applications, presence lift and tight low end, low feedback design, controlled off-axis response.

**Basic Specifications & Suggested List Price:** Dynamic; 70 Hz to 16 kHz; unidirectional; sensitivity: 81dB @ 100 ohms 1 kHz, 79dB @ 150 ohms 1 kHz, 76dB @ 250 ohms 1 kHz; selectable impedance-100, 150, 250 ohms @ 1 kHz; price: \$175.

**PANASONIC INDUSTRIAL COMPANY**

6550 Katella Ave., Cypress, CA 90630

(714) 895-7277

**Product Name:** RAMSA WM-D60

**Date Product Introduced:** November 1986

**Product Description & Applications:** General purpose dynamic microphone with on/off switch, selectable impedance output, low feedback due to well controlled directivity.

**Basic Specifications & Suggested List Price:** Dynamic; 60 Hz to 14 kHz; unidirectional; sensitivity: -74dB @ 600 ohms 1 kHz, -62 dB @ 20k ohms 1 kHz (1V/0.1 PA); impedance 600 or 10k ohms (selectable) @ 1 kHz; price: \$130.

**PANASONIC INDUSTRIAL COMPANY**

6550 Katella Ave., Cypress, CA 90630

(714) 895-7277

**Product Name:** RAMSA WM-D50

**Date Product Introduced:** November 1986

**Product Description & Applications:** High performance dynamic microphone, low feedback design, well controlled off-axis response, internal shock mount for extremely low handling noise.

**Basic Specifications & Suggested List Price:** Dynamic, 60 Hz to 14 kHz frequency range, unidirectional, sensitivity: -74dB 1V/0.1PA, 1 kHz; impedance 600 ohms at 1 kHz; XLR output connector; price: \$110.

**PANASONIC INDUSTRIAL COMPANY**

6550 Katella Ave., Cypress, CA 90630

(714) 895-7277

**Product Name:** RAMSA WM-P50  
**Date Product Introduced:** November 1986  
**Product Description & Applications:** Studio/performance quality high SPL condenser mic, 150dB SPL for 1 percent THD. P50 features HF and LF response tailoring for optimizing mic-to-vocal or instrument applications.  
**Basic Specifications & Suggested List Price:** Condenser; 30 Hz to 18 kHz; impedance 150 ohms (1 kHz); sensitivity -71dB (0dB=1 V/0.1Pa; open circuit V 1 kHz); SPL 136dB at 6V, 148 at 48V; THD 1 percent 1.5k ohms load; S/N ratio 49dB (A WTD @ 0.1 Pa); dynamic range 111dB (6V), 125dB (48V) @ 1 kHz; price: \$240.

#### PANASONIC INDUSTRIAL COMPANY

6550 Katella Ave., Cypress, CA 90630  
(714) 895-7277

**Product Name:** RAMSA WM-P40

**Date Product Introduced:** June 1986

**Product Description & Applications:** Wide bandwidth vocal and instrument condenser unit for recording and sound reinforcement features a selectable low frequency roll off. P40 is phantom or battery powered and has on/off battery switch integral to XLR connector. Battery life 2,000 hrs. on standard AA.

**Basic Specifications & Suggested List Price:** Condenser, 40 to 18k Hz, unidirectional, impedance 250 ohms @ 1 kHz; sensitivity -73dB (0dB = 1 v/0.1 Pa 1 kHz); 127dB SPL; THD 1%; S/N ratio 46dB (A WTD); phantom power or 1.5V battery; price \$130.

#### PANASONIC INDUSTRIAL COMPANY

6550 Katella Ave., Cypress, CA 90630  
(714) 895-7277

**Product Name:** RAMSA WM-S5

**Date Product Introduced:** November 1986

**Product Description & Applications:** Miniature condenser microphone: 122dB dynamic range at 1kHz; high SPL of 158dB; applications include instrument mixing of woodwinds, horns, percussion, etc.

**Basic Specifications & Suggested List Price:** Unidirectional; frequency range 70 Hz to 16 kHz; impedance 600 ohms @ 1 kHz; sensitivity @ 1 kHz -52dB ± 3dB; equivalent noise level @ 74dB SPL "a" weighted, 36dB; phantom power: 48 Volts; weight: 16 grams; price: \$225.

#### PANASONIC INDUSTRIAL COMPANY

6550 Katella Ave., Cypress, CA 90630  
(714) 895-7277

**Product Name:** RAMSA WM-S2

**Date Product Introduced:** November 1986

**Product Description & Applications:** High SPL miniature condenser microphone: acoustic guitar, sax, etc.

**Basic Specifications & Suggested List Price:** Unidirectional; frequency range 120 Hz to 15kHz; 250 ohms impedance at 1 kHz; sensitivity @ 1 kHz -56 dB (±3dB); dynamic range at 1 kHz 103dB; phantom or battery (1.5Vx2) power; weight: 16 grams; price: \$160.

#### PANASONIC INDUSTRIAL COMPANY

6550 Katella Ave., Cypress, CA 90630  
(714) 895-7277

**Product Name:** RAMSA WM-S10

**Date Product Introduced:** November 1986

**Product Description & Applications:** Miniature condenser headset version of WM-S2 microphone for vocal application.

**Basic Specifications & Suggested List Price:** \$200; specs same as WM-S2

#### PASO SOUND PRODUCTS

14 First St., Pelham, NY 10803  
(914) 738-4800

**Product Name:** "The Handlers" unidirectional dynamic microphones

**Contact:** David Moore, sales manager

**Date Product Introduced:** December 1985

**Product Description & Applications:** Paso Sound Products, Inc. Pelham, New York announces the introduction of the new "The Handlers" Series of Unidirectional Dynamic Microphones. Handling noise has been virtually eliminated through the use of a unique doubly redundant anti-shock suspension system. The front to back rejection ratio (greater than 21 dB) combined with a tailored frequency response provides a microphone with "Sharp" unidirectional characteristics, high intelligibility and drastic reduction in acoustic feedback. All models are packed into a handsomely styled die-cast zinc alloy enclosure which is velvitized and electroplated with a finish that is non-reflective and scratch and stain resistant. Four low impedance models are available to meet any sound application need, from general purpose to high grade to high performance professional. Each microphone includes a stand holder and a 15-ft. cable with optional male or female three pin audio connector.

#### PEARL-KARLBERG ENTERPRISES

333 E. State St. Ste. 206, Rockford, IL 61104  
(815) 968-2022

**Product Name:** Pearl TL-4

**Contact:** Stig Karlberg, president

**Date Product Introduced:** May 1986

**Product Description & Applications:** Studio microphone especially designed for extremely high quality recordings. The TL-4 has double rectangular membranes with two transformerless amplifiers with high output level. Using the two separate signals from the TL-4 in the mixer or directly to the tape recorder you can obtain omnidirectional, bidirectional, cardioid mono signals or stereo signal without any adjustments on the microphone itself.

**Basic Specifications & Suggested List Price:** Frequency response: 16-20k Hz; impedance: 150 ohms; pattern: one capsule, stereo A-B and MS, variable double cardioid; sensitivity: 120 mV/Pa; self noise: less than 20 dBA; amplifier self noise: 0.018 mV, A weighted; connector: 5-pin XLR; dimensions: 151x31x24mm; weight: 300 grams; price: \$795.

#### PEAVEY ELECTRONICS CORPORATION

P.O. Box 2898, Meridian, MS 39301  
(601) 483-5365

**Product Name:** PVM-38

**Contact:** Ken Valentine, product manager

**Date Product Introduced:** June 1986

**Product Description & Applications:** The response and modified cardioid polar pattern of the PVM-38 are specifically optimized for vocal applications. Its small size and light weight (7 oz.) present a unique balanced feel in handheld applications. Wind noise and breath distortion associated with close-up use are virtually eliminated through the utilization of a dual internal pop filter. The PVM-38 comes with an external foam pop filter, stand adapter, exclusive lite-type carrying case and a premium 25-foot cable.

**Basic Specifications & Suggested List Price:** Element type: dynamic (with hum compensation coil); polar pattern: cardioid; impedance: 300 ohms; freq. response: 50 to 16,000 Hz; Sensitivity: -56 dB (0 dB = 1mW/10 microbar); connector: 3 pin XLR; weight: 7 oz.; case (housing): slate grey die-cast zinc alloy; suggested list price: \$199.50

#### PEAVEY ELECTRONICS CORPORATION

P.O. Box 2898, Meridian, MS 39301  
(601) 483-5365

**Product Name:** PVM-45

**Contact:** Ken Valentine, product manager

**Date Product Introduced:** June 1986

**Product Description & Applications:** The PVM-45 features a "hypercardioid" polar pattern for maximizing off-axis signal rejection. This especially-tight polar response allows onstage miking of instruments without the "crosstalk" and "bleed" problems associated with simple cardioid microphones. With its specially designed pop filter and high directivity, the PVM-45 also performs well in vocal applications. Furnished accessories include an external foam pop filter, stand adapter, exclusive lite-type carrying case and a premium 25-foot impedance cable.

**Basic Specifications & Suggested List Price:** Element type: dynamic (with hum compensation coil); connector: 3 pin XLR; polar pattern: hypercardioid; impedance: 300 ohms; freq. response: 40 to 16,000 Hz; sensitivity: -56 dB (0 dB = 1 mW/10 microbar); connector: 3 pin XLR; weight: 7 oz.; case (housing): slate grey die-cast zinc alloy; suggested list price: \$199.50.

#### PEAVEY ELECTRONICS CORPORATION

P.O. Box 2898, Meridian, MS 39301  
(601) 483-5365

**Product Name:** Wireless Performer

**Contact:** Ken Valentine, product manager

**Date Product Introduced:** June 1986

**Product Description & Applications:** The new Wireless Performer is a high-band, long-range, wireless microphone system consisting of a single antenna, rack mountable receiver and the option of a handheld dynamic microphone/transmitter or a lavalier mic/belt-pack transmitter. These systems offer the unique advantage of an add-on module to convert the basic package to a true diversity system. Other options include an instrument belt-pack transmitter.

**Basic Specifications & Suggested List Price:** Operating freq: high-band (freq. range 150-216 MHz); distortion: less than 0.5% THD; audio freq. response: 80 Hz to 15 kHz; frequency stability: ± 0.005%; operating range: 1,000 ft. (ideal), 200-300 ft. (nominal); suggested list price: \$649.50.

# MALCOLM HILL ASSOCIATES

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**SANKEN MICROPHONE COMPANY**  
CMS-7 and CMS-7H

**SANKEN MICROPHONE COMPANY**

c/o Pan Communications  
1-5-10 Roppongi, Room 607  
Minato-Ku, Tokyo Japan  
(+81) (0) 3-505 5463

Product Name: CMS-7 and CMS-7H

Contact: Mr. Masao Konomi, president

Date Product Introduced: September 1986

**Product Description & Applications:** The Sanken cardioid CMS-7 and Hyper Cardioid CMS-7H are lightweight, handheld M-S stereo condenser microphones for indoor and outdoor TV and radio broadcasting and motion picture making. The first microphone of its kind to boast such small size and weight, they enable a single person to handle all outdoor stereo recording. Featuring a sharp stereo image, a clean, uncolored sound, and maximum immunity to noise interference, they are ideal for picking up ambient stereo sound fields, especially in difficult outdoor environments where wind, microphone, and cable-handling noises can be a problem. They also have stereo width control.

**Basic Specifications & Suggested List Price:** The CMS-7 and CMS-7H incorporate Sanken's original push-pull capsule design which gives it a sensitivity 6 dB higher than similar sized non-push-pull microphones. They have a dynamic range of 108 dB (maximum SPL=130 dB at 1% THD), a nearly flat frequency response from 50 Hz to 18 kHz, and inaudible self-noise (22 dB or less). They have a one-micron titanium diaphragm, which is light, strong, corrosion-free and immune to temperature and humidity changes. They are supplied by the CMS-MBB or CMS-MBB II specially designed power supply and matrix box run by battery or 48 V phantom.



**SENNHEISER ELECTRONIC CORP.**  
MKE 42 Pü

**SENNHEISER ELECTRONIC CORP.**

48 W. 38th St., New York, NY 10018  
(212) 944-9440

Product Name: MKE 42 Pü

Contact: Tony Caliero, product manager

Date Product Introduced: August 1986

**Product Description & Applications:** MKE 42 Pü goose-neck podium condenser microphone for use in conferencing, lectures, and speeches.

**Basic Specifications & Suggested List Price:** Freq. response: 50-20,000 Hz; sensitivity: 8 mV/PA (-62 dBV); length: 13 inches/(5½-inch goose-neck); directional characteristics: cardioid; price: \$399 (sugg. pro net).

**NEW PRODUCTS**

**MICROPHONES  
AND PICKUPS**

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**SENNHEISER ELECTRONIC CORP.**  
MKH 20 P48

**SENNHEISER ELECTRONIC CORP.**

48 W. 38th St., New York, NY 10018  
(212) 944-9440

Product Name: MKH 20 P48

Contact: A. Caliero, product manager

Date Product Introduced: September 1986

**Product Description & Applications:** Extremely low noise, transformerless, omnidirectional studio condenser microphone for both near field and diffuse field recordings.

**Basic Specifications & Suggested List Price:** Directional characteristic: omnidirectional; sensitivity: 25 mV/PA; equiv. SPL: 10 dB (DIN 45500, curve A, RMS); max SPL: 142 dB; freq. response: 20-20,000 Hz; price: \$650 (prelim. pro net).

**SHURE BROTHERS, INCORPORATED**

222 Hartrey Ave., Evanston, IL 60202  
(312) 866-2200

Product Name: SM89 Shotgun Microphone

Contact: Christopher Lyons, marketing coordinator

Date Product Introduced: August 1986

**Product Description & Applications:** Extremely lightweight (6.9 oz.) shotgun condenser microphone for location film and television production, spot news coverage, and theater sound reinforcement. Accu-Port design insures natural sound without comb-filter effects up to ±30° off-axis. Response tailored with 15 dB/octave rolloff below 60 Hz; switchable cutoff below 160 Hz compensates for adverse wind and noise conditions. Uses any 11 to 52 VDC phantom power supply. Constructed of aircraft-grade aluminum to withstand heavy-duty field use.

**Basic Specifications & Suggested List Price:** Frequency response 60-20,000 Hz; output impedance 150 ohms; open circuit voltage -52dB (0dB=1V/μbar); maximum SPL 126 dB (at 1kHz, 0.5% THD); S/N ratio 79dB (re 94dB SPL); phantom voltage 11-52 VDC; weight 195 grams (6.9 oz.); pro net price of \$900 includes foam windscreens for low frequency interference protection and tough nylon case with rigid PVC inner shell to guard against bumps and drops.

**SONY PROFESSIONAL AUDIO**

1600 Queen Anne Rd., Teaneck, NJ 07666  
(201) 833-5200

Product Name: C-535P/536P

Contact: Michael Feniello, product manager

**Product Description & Applications:** Compact, slim-line condenser mic designed for multi-mic recording. Both feature natural, well-balanced sound, excellent shock isolation and 10dB pad. C-535P's capsule faces out the top of the mic, while C-536P's capsule faces out the side of the mic body. Both operate on 48 VDC.

**Basic Specifications & Suggested List Price:** Frequency response: 30 Hz-16 kHz; pattern: cardioid; output impedance: 200 ohms ±20%; dynamic range: 116dB; connector XLR-3 12 C.

**SWINTEK ENTERPRISES INC.**

587 Division St., Campbell, CA 95008  
(408) 378-8091

Product Name: Mark 200D/C

Contact: Dana Hill, sales

Date Product Introduced: July 8, 1986

**Product Description & Applications:** The Mark 200D/C converts either a RTS or Clear-Com hard-wired intercom to wireless headset. The system utilizes the RTS or Clear-Com power supply and will supply two channels for all 300 Series RTS architecture.

**Basic Specifications & Suggested List Price:** Complete Mark 200D/C-s with remote transceiver, Beyer headset, carry case, \$1995 complete.



**SWINTEK ENTERPRISES INC.**  
Mark 1L/2L RFSD Switching Diversity Receivers

**SWINTEK ENTERPRISES INC.**

587 Division St., Campbell, CA 95008  
(408) 378-8091

Product Name: Mark 1L/2L RFSD Switching Diversity Receivers

Contact: William Swintek

Date Product Introduced: March 8, 1986

**Product Description & Applications:** The MARK 1L/2L RFSD receiver is designed for the pro audio market. Manufactured in the United States in all-metal cases. Unit features db-S companded audio with a RF switching diversity VHF/UHF receiver design with reduced RF bandwidth for multi-unit diversity operation.

**Basic Specifications & Suggested List Price:** The 2L/50A/RFSD diversity system including lavalier transmitter Sony, Beyer, or Countryman lavalier mic is priced at \$1895. Factory demo systems are available for evaluation. See us at booth #1416.

**TELEX COMMUNICATIONS, INC.**

9600 Aldrich Ave. S., Minneapolis, MN 55420  
(612) 884-4051

Product Name: Telex Wireless Microphones

Contact: Gary Fisher, sales manager

Date Product Introduced: 1986

**Product Description & Applications:** Designed for ENG broadcast and remote video production, the Telex ENG wireless microphone system includes the ENG-4 four-channel receiver and WT-400 two-channel transmitter. System operates between 165-216 MHz, with 4-channels, geographically selected for the least interference. Compact receiver is battery-operated or AC-adaptable. Receiver output connection is compatible with all standard Video Cam equipment. Portable, belt-pack transmitter designed for use with lapel microphones or adaptable impedance microphones.

**Basic Specifications & Suggested List Price:** ENG-4 receiver: frequency range: 165-216 MHz; dynamic range: (Ref 12kHz deviation) 104 dB; audio frequency response: +1 dB, 100-15,000 Hz; pro net price: \$1260; WT-400 transmitter: frequency range 165-216 MHz; RF power output 50 mW maximum, 45 mW typical; pro net price: \$798.

**TOA ELECTRONICS**

480 Carlton Court, S. San Francisco, CA 94080  
(415) 588-2538

Product Name: K-Series Condenser Microphones

Date Product Introduced: 1986

**Product Description & Applications:** K-Series Mics: a new line of condenser type microphones designed to be used when a high quality source signal is desired, such as digital recording, sampling, and processing techniques.

**Basic Specifications & Suggested List Price:** Models range from \$149.50 to \$499.50 (list price).

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# N

# EW PRODUCTS MIXING CONSOLES

# 1 • 9 • 8 • 7

## ACES (UK) LTD.

Featherbed Lane, Shrewsbury, Shropshire SY1 4NJ  
**Product Name:** Seca Console  
**Contact:** A.J. Talbot, sales manager  
**Date Product Introduced:** Late 1986  
**Product Description & Applications:** Seca 40 channel in-line console with partial automation. Available as a retrofit.  
**Basic Specifications & Suggested List Price:** (8) Auxiliary buses; logic-switched routing system; one button mix/record status; semi-parametric EQ; 12-segment LED bar graph metering; conductive plastic faders; price: £8000.

## ALLEN & HEATH BRENELL (AHB)

Five Connair Road, Orange, CT 06477  
 (203) 795-3594  
**Product Name:** Studio 12  
**Contact:** Chuck Augustowski, sales manager  
**Date Product Introduced:** November 13, 1986  
**Product Description & Applications:** Production mixer featuring six microphone input channels and six stereo line input channels. Full ducking facilities between input channels, as well as remote machine control. RIAA phone preamps included. Price to be announced.

## ALLEN & HEATH BRENELL (AHB)

Five Connair Road, Orange, CT 06477  
 (203) 795-3594  
**Product Name:** Sigma Series  
**Contact:** Chuck Augustowski, sales manager  
**Date Product Introduced:** November 13, 1986  
**Product Description & Applications:** Modular Series of mixing consoles from AHB that may be customized for various applications including 16- and 24-track recording, sound reinforcement, video production, etc. Standard 24 bus mainframes may be configured with various modules. Features include 4-band sweep EQ, six aux sends, two stereo cue sends, solo in place, PFL and AFL facilities, and microprocessor controlled muting.  
**Basic Specifications & Suggested List Price:** Pricing determined by configuration. Configurations range from 8 input by 8 output to 40x24.

## AMEK CONSOLES INC.

10815 Burbank Blvd., North Hollywood, CA 91601  
 (818) 508-9788  
**Product Name:** S9000  
**Contact:** Arnold Toshner  
**Date Product Introduced:** Late '86, Early '87  
**Product Description & Applications:** The new S9000 is the first dedicated sound reinforcement console from TAC. As a result of listening to the marketplace, TAC has incorporated all of the features designed as necessary by today's top sound engineers. These features include: a 40 input chassis, 4-band equalizer with parametric mids and swept hi and lo frequencies, 8 sends assignable to 16 dedicated aux buses, 8 mute groups, dedicated mute groups for the auxiliaries, and optional VCA grouping. An 8x8 matrix and full patchfield facilities are also standard.  
**Basic Specifications & Suggested List Price:** A 40 input S9000 will retail for \$45,000 complete with flight case.

## AMEK CONSOLES INC.

10815 Burbank Blvd., North Hollywood, CA 91601  
 (818) 508-9788  
**Product Name:** Classic  
**Contact:** Bob Owsinski, vice president sales/marketing  
**Date Product Introduced:** Late '86, Early '87  
**Product Description & Applications:** The Amek "Classic" is a traditional broadcast oriented console with straight-forward operation combined with utilitarian styling. The "classic" is eight bus into two stereo buses and features a 4-band parametric equalizer section. It is easily automated either from the factory or as a retrofit due to the separate fader panel. When VCAs are supplied, it is also

possible to implement the many audio-follows-video possibilities as both mutes and VCAs may be externally accessed.

**Basic Specifications & Suggested List Price:** Built to the same mechanical specifications of the Amek APC1000, the "Classic" features the narrow 30 mil module width enabling a huge number of modules to be present in a relatively small chassis. The console is available in 32, 48, 64, and 80 input configurations which occupy a space of only 74, 93, 113, and 132 inches respectively (including full patchfield).

## ATI-AUDIO TECHNOLOGIES INC.

328 Maple Ave., Horsham, PA 19044  
 (215) 443-0330  
**Product Name:** Vanguard Series  
**Contact:** Ed Mullin, vice president  
**Date Product Introduced:** March '86  
**Product Description & Applications:** Eight mixer, 12-input audio console with two microphone inputs and dual stereo program level outputs. All inputs independently adjustable for nominal inputs of -20, -10 or +4 dBv, balanced. All electronic switching from membrane switch panel, VCA level controls. Optional vacuum fluorescent bar graph metering, input expanders.

**Basic Specifications & Suggested List Price:** Twelve inputs to eight mixers to dual stereo and mono sum program outputs. Input levels -20, -10 or +4 dBv; PGM out +4 dBm balanced, +25 dBm peak;  $\pm 25$  dB 20 to 20,000 Hz; -125 dBm E.I.N. (mic); .15% maximum THD 20 to 20,000 Hz.

## AUDIO CENTRON

1400 Ferguson Ave., St. Louis, MO 63133  
 (314) 727-4512  
**Product Name:** AC-208RM  
**Contact:** Tony Moscal, training director  
**Date Product Introduced:** September 1, 1986  
**Product Description & Applications:** Eight channel, rack mount mixing console. Each channel has XLR balanced and 1/4-inch unbalanced inputs, plus an insert patch point, 50 dB variable trim, four bands fixed EQ, monitor and effect sends, 100mm faders. 8x2x1 stereo configuration with LED peak indicators on all inputs plus submasters. Assignable 10-stage LED output ladders, headphone monitoring, and extremely complete patch panel.

**Basic Specifications & Suggested List Price:** Frequency response: 20-20kHz (+0, -1 dB); equivalent input noise: -119 dB; THD: typically less than .03%; IMD typically less than .02%; residual noise: 80 dB below 1.23V RMS.

## AUDIO-TECHNICA U.S., INC.

1221 Commerce Drive, Stow, OH 44224  
 (216) 686-2600  
**Product Name:** AT4462 mixer  
**Contact:** Mark Taylor, Nat'l sales manager  
**Date Product Introduced:** 1986 AES  
**Product Description & Applications:** True stereo portable mixer. Two pannable mono inputs; two stereo inputs. Transformer-coupled mic/line inputs and outputs. Pre-fader cue. 12V phantom power. Stereo limiter, switchable for separate channel limiting. Slate tone and slate mic. "Modu-Comm" circuit sends monitor feed to talent's earphone over existing mic line w/no interference. "Leveler" sends audible signal only to headphones when limiting occurs. Dual VU meters. Gain reduction switching.  
**Basic Specifications & Suggested List Price:** Distortion: <0.3%, 20-20kHz at +10 dBm output; equiv. input noise: <-129 dBV; common-mode rejection: >65 dB/100 Hz/-30 dBV input; 90 dB mic-to-line gain; list price: \$1,595.

## BIAMP SYSTEMS, INC.

14270 NW Science Park Dr., Portland, OR 97229  
 (503) 641-7287  
**Product Name:** MixPak 6+  
**Contact:** Bill Mitchell, sales manager  
**Date Product Introduced:** January 1986  
**Product Description & Applications:** The MixPak 6+ is Biamp's latest design in self-contained powered mixers. The MixPak series is the only low cost mixer on the market with an exclusive channel designed for electronic keyboard and drums. The high impact ends and rugged steel chassis are designed for rigorous road use. The MixPak is also rack mountable for road racks or permanent install. The MixPak series is available in 6, 7 or 8 channel versions. All with a five year warranty.  
**Basic Specifications & Suggested List Price:** 250 watts at 4 ohms; 9-band EQ  $\pm 15$  dB; individual controls for reverb and effects on mains and monitors; hi and lo Z inputs; LED power meter; and Biamp auto-limit circuitry. 5+ is \$599; 6+ is \$649 and 7+ is \$699.

## BIAMP SYSTEMS, INC.

14270 NW Science Park Dr., Portland, OR 97229  
 (503) 641-7287  
**Product Name:** DJ 5001  
**Contact:** Bill Mitchell, sales manager  
**Date Product Introduced:** June 1986  
**Product Description & Applications:** The DJ 5001, top of Biamp's line of stereo mixers (which also includes the 4001 and 3001), is intended for use in fixed installations in clubs, bars, and restaurants. The DJ 5001 allows an operator to control up to nine signal sources including three turntables. The 5001 has two stereo pairs of outputs and one mono output, all balanced and floating. In addition, a transformer isolated output is provided for lighting controllers.  
**Basic Specifications & Suggested List Price:** Nine inputs, 4 outputs, 3 band EQ, switchable main processor loop, switchable DJ mic processor loop, separate DJ mic and floor mic with common bass and treble controls, beat sync, bass impact low frequency expansion, \$899 list.



**BOGEN, A LEAR SIEGLER COMPANY**  
**HI-TEK™ Model MMR-1/MM-SM6**

**BOGEN, A LEAR SIEGLER COMPANY**  
 50 Spring St./P.O. Box 575, Ramsey, NJ 07446  
 (201) 934-8500  
**Product Name:** HI-TEK™ Model MMR-1/MM-SM6  
 automatic mic mixer system  
**Contact:** Andrew Musci, product manager, commercial sound  
**Date Product Introduced:** May, 1986

**Product Description & Applications:** Automatic microphone mixer designed for noise-free mixing of up to eight microphones. Individual microphone circuits are "off" until activated by presence of a signal exceeding pre-set, adjustable threshold level. When activated, mic turns on automatically and NOM circuitry reduces system gain in proportion to number of active inputs, to avoid feedback. Modular design utilizes MMR-1 mixer system mainframe, one to eight MM-SM6 automatic mixer modules, output module, and other MMR-1 system modules if desired. Provisions for remote volume control, key output, three levels of priority.

**Basic Specifications & Suggested List Price:** Frequency response: 20 Hz to 20 kHz  $\pm 1$  dB; THD: 0.07% at rated output; noise (EIN): -120 dBm; gain: 35 dB; output level: +18 dBm into 600 ohms; mainframe dimensions: 19"x5 1/4"x7 7/8"; mainframe shipping wt.: 13 lbs.; suggested list price: MMR-1 mainframe, \$437.50; MM-SM6 input module, \$250 each; MM-SO1A or MM-SO2A output module, \$162.50.

**CARVIN CORP.**  
1155 Industrial Ave., Escondido, CA 92025  
(619) 747-1710

**Product Name:** MX-2488

**Contact:** Neal Taylor, sales manager

**Date Product Introduced:** August 1, 1986

**Product Description & Applications:** The MX-2488 is a 24-channel 8-output console for recording or production studios. It features an independent control room monitor mixing section with bus/tape source selection. Each input channel features 3-band continuously variable parametric EQ, (4) aux buses, solo & mute, mic/line switching and special low noise differential mic pre-amp circuitry. In all aspects the MX-2488 is a professional 24x8x2 console for the professional production studio.

**Basic Specifications & Suggested List Price:** Frequency response 15 Hz-25 kHz  $\pm 1$  dB; THD @ mic in 40 dB gain, 0.03%; THD @ line input +10 dBv output 20 Hz-20 kHz, 0.02%; EIN -128 dBv; output noise -85 dBv; crosstalk -75 dB; CMR -75 dB @ 1k, -60 dB @ 100 Hz; +48 VDC phantom power available at all inputs; max gain 74 dB from mic into sub-out; max gain 40 dB line in to sub out; 120V/240v 50 Hz or 60 Hz power source; weight 80 lbs.; 8.75h x 35.2w x 29d; price \$3,995.

**CONNECTRONICS CORPORATION**  
652 Glenbrook Road, Stamford, CT 06906  
(203) 324-2889

**Product Name:** Seck 1282

**Contact:** Richard J. Chilvers, vice president

**Date Product Introduced:** June 1986

**Product Description & Applications:** The Seck 1282 is a 12-input, 8-bus portable audio mixing console which has been developed from the very popular Seck 1882, which has been available and well received worldwide for the past 18 months. Already in use on the road and in small studios, the 1282 is attractively designed in black with a case depth of only two inches, allowing complete and easy portability.

**Basic Specifications & Suggested List Price:** Features include dual input amps, full in-line monitor section, 3-band EQ (with sweep midrange), insert points on all inputs and subgroups, four auxiliary returns with full routing and EQ, and a built-in communications section, allowing communication to tape and foldback buses. List price: \$3,450.

**DAX AUDIO GROUP**  
1231 SE Gideon St., Portland, OR 97202  
(503) 232-4445

**Product Name:** Models 1223 and 1623 mixing consoles

**Contact:** R.C. Stevenson, president

**Date Product Introduced:** January 1986

**Product Description & Applications:** Available in 12- and 16-channel versions. All input channels include input gain with peak LED, monitor, reverb and sends, 3-band equalization, pan and channel fader. Balanced outputs (XLR type) on sub 1, sub 2, mono and monitor.

**Basic Specifications & Suggested List Price:** S/N greater than 90 dB. Overall THD: less than 0.2%. Hum and noise: -120 dBV. Max input level: greater than 20 dBV all inputs. Max output levels: 18 dBV into 600 ohm balanced. Prices: 1623, \$1,499; 1223, \$1,199.

**DDA/DIVISION OF KLARK-TEKNIK**  
30 B Banfi Plaza N., Farmingdale, NY 11735  
(516) 249-3660

**Product Name:** AMR24

**Contact:** Jack Kelly, president

**Date Product Introduced:** AES 1986

**Product Description & Applications:** The AMR-24 is a

split-format, 24-bus recording console configured to allow the return of 60 channels simultaneously for mixdown. The 24 monitor returns incorporate all the aux buses, solo and mute facilities, as well as a 4-band equalizer. All buses are balanced, providing exceptional crosstalk elimination, and master switching is available for solo, mute, and input selection. The patchbay is constructed with metal TT jacks.

**Basic Specifications & Suggested List Price:** EIN: (DIN) -127 dBv; mix noise: (36 channels routed to mix, unity gain) -82 dBv; distortion: (input to mix out, mic or line) <0.05%; crosstalk (group to group) <-88 dBv @ 1 kHz (<-72 dBv at 20 kHz); (group to mix) <-82 dBv @ 1 kHz (<-70 dBv at 20 kHz). Price: varies with configuration.

**DE ARMOND, INC.**  
1545 Holland Rd., Suite M, Manmu, OH 43537  
(419) 891-1058

**Product Name:** DeArmond PA4150

**Contact:** Julie Tosh, sales manager

**Date Product Introduced:** October 1986

**Product Description & Applications:** The DeArmond PA4150 is a powered mixing console rated at 150 watts. It comes complete with hi- and balanced low-inputs, high and low each channel reverb each channel, a full patch bay, and complete master section. The unit also features tape-in for amplifying pre-recorded music.

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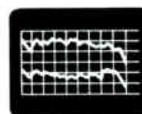
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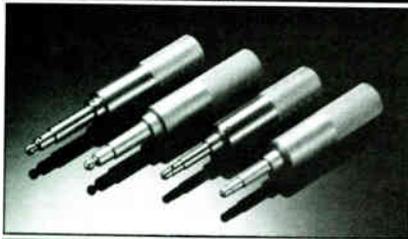
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CORPORATION

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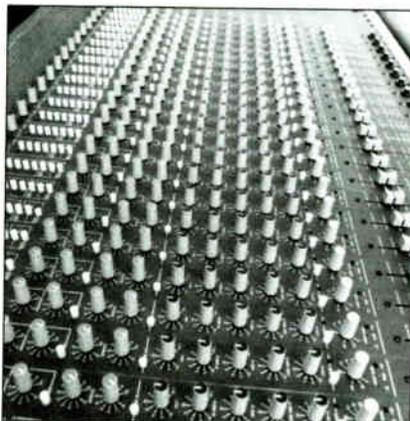
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## NEW PRODUCTS

### MIXING CONSOLES

1 • 9 • 8 • 7



DESIGN DIRECT SOUND/WALKER  
80 Series II

DESIGN DIRECT SOUND/WALKER  
6850-35th H.E. Ste. 1, Seattle, WA 98115  
(206) 527-4371

Product Name: 80 Series II

Contact: Bob Rice, president

Date Product Introduced: November 1986

**Product Description & Applications:** 80 Series II mixers feature 20, 28, 32, 40 & 48 inputs by eight group matrix modules, two effects subgroups and one talkback. Each input module includes 5-band EQ with optional sweep. Three LED overload meter, phase reverse, mute and line/mic switches, continuously variable input pad, two pre-EQ/pre fader monitor sends with two switchable. Output modules include multi-function, 10-segment LED metering, two monitor returns and two effects returns, and eight group returns.

**Basic Specifications & Suggested List Price:** Frequency response: 20 Hz to 20 kHz  $\pm 5$  dB; noise EIN: -129 dBV; mic input to matrix output: -86 dBV; THD: 0.02%; input dynamic range: +7 dB to +52 dB; maximum output bal. 600 ohm, +26 dBm; 10k ohm +24 dBV, unbal. 600 ohm +18 dBm; power supply 19-inch rack mountable.

### FENDER MUSICAL INST.

1130 Columbia St., Brea, CA 92621  
(714) 990-0909

Product Name: RAM Mixing Consoles

Contact: Steve Grom, marketing director

Date Product Introduced: June 1986

**Product Description & Applications:** RAM Pico: 12 and 16 inputs with stereo outputs. RAM Micro: 10 and 16 inputs—four sub groups, eight channel monitoring. RAM Mega: 18 and 24 inputs—eight sub groups, 16 channel monitoring.

**Basic Specifications & Suggested List Price:** RAM Pico: RP 12, \$1,049; RP 16, \$1,349; RAM Micro: RM 10, \$1,599; RM 16, \$2,099; RAM Mega: RM 18, \$5,999; RM 24, \$8,199.

### JIM GAMBLE ASSOCIATES

P.O. Box 7047, Tahoe City, CA 95730  
(916) 583-0138

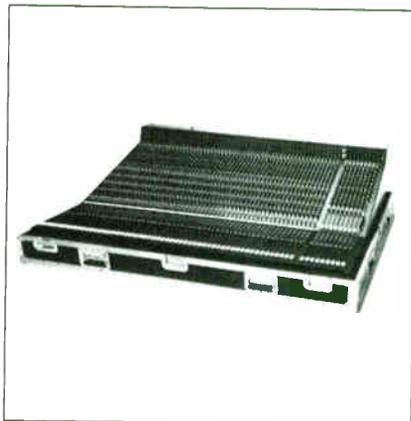
Product Name: Series EX House Console System

Contact: Mark Herman, sales

Date Product Introduced: August 1986

**Product Description & Applications:** Designed especially for live audio applications, the Series EX 56 channel House Console System provides maximum flexibility in a compact 62" mainframe. The 9/10 inch wide modules feature made-for-audio resistors, capacitors and super-ops. Each of the 56 input channels has four fully parametric EQs, 24 dB/octave adjustable low cut, eight effect sends, stereo aux and eight scene mutes. The Series EX provides eight stereo submasters with eight scene mutes, eight stereo matrix, stereo and mono outputs, intercom and cue. Each input, stereo submaster/matrix and stereo output/effect send has an LED VU meter with a range from -33 dBm to +24 dBm.

**Basic Specifications & Suggested List Price:** The signal path contains a minimum number of small value, high



JIM GAMBLE ASSOCIATES  
Series EX House Console

quality, non-polarized capacitors. Overall system response is 3 Hz-70 kHz  $\pm 3$  dB, +26 dB clipping point throughout. 1986 Series EX house console/rack system \$75,000 with deposit.

GRAHAM-PATTEN SYSTEMS, INC.  
P.O. Box 1960, Grass Valley, CA 95945  
(916) 273-8412

Product Name: Model 608 Edit Suite Audio Mixer

Contact: Tim Prouty, VP, sales/marketing

Date Product Introduced: April 15, 1986 (NAB)

**Product Description & Applications:** The Model 608 Edit Suite Audio Mixer has been designed for use in video tape editing facilities. Like its big brothers, the Model 612 and 616, the Model 608 offers full edit system control of transitions, as well as full manual control of audio levels and other mixer functions. The 608 is intended for smaller editing facilities and may be configured for a variety of installation and operating requirements.

**Basic Specifications & Suggested List Price:** Inputs: eight sources plus tone and external preview, >20k ohms (strappable to 150 or 600 ohms); processing loops: one post-fader loop per source unbalanced, 50 ohms output, 20k ohms input; audio level: switchable over the range -10 dBu to +2 dBu (unbalanced), -4 dBu to +8 dBu (balanced); input fader range: <-100 dB to +12 dB; output level: +24 dBu maximum signal noise ratio: 100 dB per input (20 Hz to 20 kHz); crosstalk: <-82 dB at 15 kHz.

### HILL AUDIO INC.

5002 #B North Royal Atlanta Dr., Tucker, GA 30084  
(404) 934-1851

Product Name: Multimix (new series)

Contact: Bruce Forbes, Natl. sales manager

Date Product Introduced: August 15, 1986

**Product Description & Applications:** The new series Multimix continues the tradition of maximum flexibility in a minimum size, eight rack space console. With the addition of direct outs; fully regulated 48V phantom power; stacking 1/4" jacks; PFL metering; +4, -10 switching; EQ defeat; 110-230V selection; ground lift; and all-new indented circuit construction, this unit remains the quintessential rack mount mixer for reinforcement, keyboards, drum submixing, and recording.

**Basic Specifications & Suggested List Price:** Max level: +21 dBm; headroom: -17 dB; gain: +70 dB; noise: -126 dB (A) EIN >-80 dB (residual); THD 20-20k <0.01%; IMD SMPTE <0.01%; frequency response  $\pm 0.1$  dB; impedance 10k; 19-inch rack mount, eight rack spaces; 4-inch deep with rack space power supply; 19x5. U.S. list price: \$2,099.

### KLARK-TEKNIK ELECTRONICS, INC.

30 B Banfi Plaza N, Farmingdale, NY 11735  
(516) 249-3660

Product Name: PMC402

Contact: Jack Kelly, president

Date Product Introduced: November, 1986

**Product Description & Applications:** The PMC402 is a four input, stereo output portable mixer designed specifically for high quality ENG/film work. Pan pots are included for each input channel as well as a switchable HP filter, limiter, solo, and of course, a sealed rotary level control. Microphone powering is either phantom (12V or 48V) or DIN AB. A 1 kHz oscillator can be slotted to either output. The VU meter can monitor tape return or output level and an external interface is included for connection directly to tape recorder.

**Basic Specifications & Suggested List Price:** Inputs: transformer balanced; battery: 12 "AA" cells; output level: +16 dB/600 ohms; weight: 6 lbs.; price: \$1,500.

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**MIDAS AUDIO SYSTEMS LTD**  
*XL Range of Consoles*

**MIDAS AUDIO SYSTEMS LTD.**  
54-56 Stanhope Street  
London NW1 3EX, Great Britain  
(01) 388-7060

**Product Name:** XL Range of Consoles  
**Contact:** Peter Cornell, sales manager  
**Date Product Introduced:** June 1986

**Product Description & Applications:** Audiophile standard component quality and circuit design combined with Midas' industry standard ruggedness and durability are carried forward to a new stage of refinement in the XL range of consoles. The comprehensive range of standard formats, including an extender console for cost-efficient expansion of any XL console. Provides today's engineers with a compact combination of high-reliability features and system flexibility that few can rival.

**Basic Specifications & Suggested List Price:** Comprehensive 4-band input equalization routes to eight sub-groups and eight auxiliary sends, each switchable on/off and pre/post fader via fader changeover facility (aux send/subgroup) to provide 8x2 stereo mix. Stage monitor of front-of-house, with two stereo and two matrix outputs and stereo in-place monitoring 32/8/2 + 4 costs £27,135 inclusive of power supply.

**NEOTEK CORP.**  
1154 W. Belmont Ave., Chicago, IL 60657  
(312) 929-6699

**Contact:** James Rondinelli, director of marketing  
**Date Product Introduced:** November AES

**Product Description & Applications:** NEOTEK will be premiering a new line of 24-bus mixing consoles. Based on the NEOTEK Elite, the new console will offer the level of technical performance traditionally associated with NEOTEK consoles, while maintaining a more attractive price. Please visit us at booths 540 and 542 at this year's AES.



**RUPERT NEVE INCORPORATED**  
*8232 multi-track recording and mixdown console*

**RUPERT NEVE INCORPORATED**  
Berkshire Industrial Park, Bethel, CT 06801  
(203) 744-6230

**Product Name:** 8232 multi-track recording and mixdown console

**Date Product Introduced:** April 16, 1986

**Product Description & Applications:** 32 channel/24 bus mixing with instant reset of all track assignments. Modules are constructed of five separate self-contained

## NEW PRODUCTS

### MIXING CONSOLES

1 • 9 • 8 • 7

sub-modules. Features include stepless high and low pass filters with 12 dB/octave slope, continuously variable Neve Formant Spectrum EQ with switchable peaking or shelving characteristics on upper/lower bands. Four mono and one stereo auxiliary outputs may be individually programmed to receive signal from either multi-track or mixdown paths. Any input channel may be programmed to become an effects return channel. Two stereo effects return channels with EQ are available as an option.

**Basic Specifications & Suggested List Price:** Headroom: +28 dB; gain trim:  $\pm 10$  dB on both mic and line; balanced transformer inputs with sensitivity of -80 to -20 dBu in 6 dB steps; output: +4 dBu (OVU) nominal level; maximum output: +22 dBu into 600 ohm (+26 dBu into 600 ohm when fitted with optional transformers). Overall performance: (Noise) microphone EIN -124 dBu; line: -76 dBu for any combination of input and output; distortion: better than .06% 100 Hz to 10 kHz; frequency response:  $\pm 5$  dB 20 Hz to 20 kHz.

#### RUPERT NEVE INCORPORATED

Berkshire Industrial Park, Bethel, CT 06801  
(203) 744-6230

**Product Name:** DTC-1

**Contact:** Anthony H. Langley, vice president sales

**Date Product Introduced:** October 1, 1986

**Product Description & Applications:** The new Neve DTC-1 has three stereo channels, two digital and one analog allowing real time crossfading, sampling at 44.1 kHz or 48 kHz. Four-band digital EQ utilizes a system of curves ideal to disc mastering. Features include digital dynamic controls with stepped trim, and instant reset, a snapshot memory linked to SMPTE time code for up to 200 snapshots per program. The DTC-1 is compact, transportable and is used in the preparation of master tapes for compact disc.



**RUPERT NEVE INCORPORATED**  
*V Series*

#### RUPERT NEVE INCORPORATED

Berkshire Industrial Park, Bethel, CT 06801  
(203) 744-6230

**Product Name:** V Series

**Contact:** Barry Roche, president

**Date Product Introduced:** February 1986

**Product Description & Applications:** Full 48 bus multi-track analog music recording console in 36, 48, or 60 channel frame sizes. The V Series has high input headroom, the unique Neve Formant Spectrum Equalization and eight mono/four stereo auxiliaries to give more effects paths for mixdown. An advanced mixed cue system and a centrally positioned monitor path status indication to enable rapid console status checks, a choice of metering options, an independently assignable path section allowing flexibility of insertions points, and a structural design enabling breakdown for ease of installation and re-location are only a few features of the V Series.

**Basic Specifications & Suggested List Price:** Microphone EIN is better than -125 dBu (20 Hz to 20 kHz) when sourced from 200 ohms; line input noise is better than -79 dBu (20 Hz-20 kHz); frequency response is flat +0.5 dB,

-1.0 dB in the band 20 Hz to 20 kHz, ref. freq. 8 kHz; Total harmonic distortion is better than 0.04% (20 Hz-20 kHz); and multi-track crosstalk is better than -80 dB (20 Hz-20 kHz).

#### ORION RESEARCH INC.

4560 W. 160th St., Cleveland, OH 44135  
(800) 82-AUDIO (in Ohio (216) 267-7700)

**Product Name:** AMU Series

**Contact:** Richard S. Hajdu VP marketing

**Date Product Introduced:** July 1, 1986

**Product Description & Applications:** The AMU is a software based mixing system. Operator control is through a traditional type panel, but all audio electronics are rack mounted. The console has up to 32 stereo inputs, four stereo program outs, four stereo aux sends, four stereo monitor buses and more. A standard feature is ReMem™ which enables storage, recall, and reset of all parameters (including EQ) for up to 32 full panel set-ups.

**Basic Specifications & Suggested List Price:** AMU-8: \$12,000-\$16,000; AMU-16: \$22,000-\$30,000; AMU-32: \$46,000-\$60,000. Prices include automation.

#### PANASONIC INDUSTRIAL COMPANY

6550 Katella Avenue, Cypress, CA 90630  
(714) 895-7277

**Product Name:** RAMSA WR-M10

**Product Description & Applications:** Multiple audio source mixer, two stereo faders, each accepts four stereo sources with fader start/stop control, four microphone inputs feature a variable comp/limiter circuit to control input overload. A mono priority circuit enables music to be lowered when microphones are keyed in for announcements, versatile mounting options include rack or wall mounting, security cover.

**Basic Specifications & Suggested List Price:** Electronically balanced mic inputs; balanced (main) outputs +4 dB 600 ohms; THD 0.3% (+18 dB output, 50 Hz to 15 kHz max); EIN -125 dB or less (150 ohms termination main A WTD); Maximum output +20 dB; crosstalk 65 dB @ 1 kHz; CMRR 60 dB @ 1 kHz; price: \$700.

#### PARASOUND PRODUCTS

945 Front Street, San Francisco, CA  
(415) 397-7100

**Product Name:** Parasound PDM-1950

**Contact:** Janice Mancuso, Trade Secrets 415

**Date Product Introduced:** September 1986

**Product Description & Applications:** High value, rack mount professional mixing console with six inputs (four mic, two balanced XLR) two additional stereo inputs switchable phono/line. Individual pan pots for each input. Peak reading LED output level meters, input rhythm beat meters with LEDs. Adjustable/assignable echo, six band EQ with custom frequencies. 18 dB mute talkover switch, premium quality, low-noise sliders w/position markers, headphone can monitor any or all six channels with variable output.

**Basic Specifications & Suggested List Price:** Crosstalk: >60 dB; line max output level 3V; distortion <.05%; output impedance 600 ohms; headphone output level 0-0.3 mV; signal/noise: mic 65 dB, phono 72 dB, line 80 dB; frequency response: Mic 20 Hz-20 kHz, phono 20 Hz-20 kHz (RIAA  $\pm 0.3$  dB) line 20 Hz-50 kHz; three AC convenience outlets; retail: \$449.95.

#### PULSAR LABORATORIES

3200 Gilchrist Rd., Mogadore, OH 44260  
(216) 784-8022

**Product Name:** Series 8086 touring console

**Contact:** Gregory Carr or Bruce Hensal (sales)

**Date Product Introduced:** August 5, 1986

**Product Description & Applications:** The Series 8086 is an eight-bus, fully-modular touring console. The 8086 can be ordered in frame sizes of 24, 32 and 40 inputs. The 8086 modules are engineered to accept a wiring harness allowing the use of a multi-pin connector. Other standard features include: eight discrete aux sends, (switchable pre/post fader); eight assignable aux returns; 4-band equalization on the output section (8 total) assignable to the submasters or effect returns; user defined module placement; VU meter bridge; 48V phantom on all inputs; high pass filter; mutes on inputs, subgroups and L/R; oscillator section; four band sweep equalization; and noise gate or limiter modules available. Pricing: \$10,500 to \$16,900.

#### PULSAR LABORATORIES

3200 Gilchrist Rd., Mogadore, OH 44260  
(216) 784-8022

**Product Name:** Series 8088/R recording console

**Contact:** Gregory Carr or Bruce Hensal (sales)

**Date Product Introduced:** September 1, 1986

**Product Description & Applications:** The 8088/R is a moderately priced 24-bus recording console with 24-track monitoring. The 8088/R can be ordered in 24, 32 or 40 input frames. Four-band sweep EQ is standard, 4-band parametric EQ is optional. Standard features include: 24

submasters and/or 24 returns; balanced inputs, tape send/returns, stereo and master outs; LED metering on all buses, aux and solo; eight effect sends and returns; channel, aux, tape and headphone mutes; stereo and mono solos; patching on inputs, tape returns and L/R; full control room and studio monitoring, 480 point balanced patch bay available; pricing: \$14,250 to \$25,250.

4-way mains EQ, effects loops, adjustable LED meters and versatile monitor system. All sliders are Alps 60mm studio grade, along with sealed rotaries for reliability and protection. Suggested list price is \$995.

**Basic Specifications & Suggested List Price:** Freq. response: 15-30k Hz, S/N ratio: 91 dB re +4 dBu, THD and noise: <0.03%, IM distortion: <0.01%. Built-in sub/ultra-sonic and RFI filters, RIAA accuracy:  $\pm 0.1$  dB. Dimensions: 7"H x 19"W x 5.25" rack depth. Weight: 14 lbs. Suggested list price: \$995.

**SESCOM, INC.**  
2100 Ward Drive, Henderson, NV 89015  
(702) 565-3400

**Product Name:** MIX-1  
**Contact:** Franklin J. Miller, president  
**Date Product Introduced:** October 25, 1986

**Product Description & Applications:** Six-channel microphone and line stereo mixer. Features include pan pots, gain controls (from mic to line), headphone amplifiers (1/4w per channel), transformer-balanced inputs and outputs, and battery or AC operation. Housed in an all aluminum briefcase enclosure with a removable lid for storage. Inputs and outputs are all XLR type. Has dual VU meters and slide controls for easy mixing.

**Basic Specifications & Suggested List Price:** \$895.

**SHURE BROTHERS, INCORPORATED**  
222 Hartrey Avenue, Evanston, IL 60202  
(312) 866-2200

**Product Name:** FP42 Stereo Audio Mixer  
**Contact:** Christopher Lyons, marketing coordinator  
**Date Product Introduced:** November 1985

**Product Description & Applications:** Portable stereo mixer for broadcasting, recording, and field production. Two transformer-balanced outputs (left and right) and four transformer-balanced inputs, each switchable for line or mic level operation. Center detented stereo pan pots and stereo master level control for easy stereo mixing. Pull-pot cueing feature allows individual channels to be removed from program bus without disturbing gain settings. Battery or AC operation (120/240 volt); phantom power for condenser microphones; mix bus jacks for stacking units.

**Basic Specifications & Suggested List Price:** Frequency response: 30-20,000 Hz  $\pm 2$  dB; equivalent input noise <-129 dBV; left/right output separation: 50 dB at 1 kHz; output clipping level: +18 dBm (600 ohm load); THD: 0.4%

or less; battery life approximately 10 hours continuous; UL listed/CSA certified; weight: 6 lbs. 8 oz.; pro net price \$750; accessory rack mount kit available.

**SONY PROFESSIONAL AUDIO**  
1600 Queen Anne Road, Teaneck, NJ 07666  
(201) 833-5200

**Product Name:** MXP-2000  
**Contact:** Michael Feniello, product manager  
**Date Product Introduced:** Late 1985

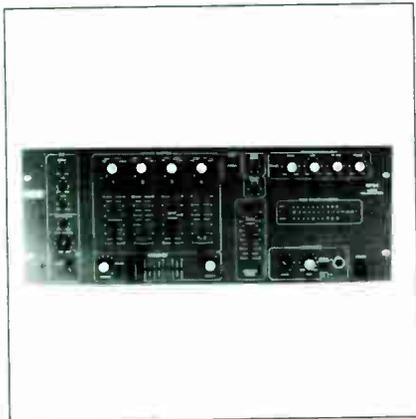
**Product Description & Applications:** MXP-2000 modular broadcast audio console meeting both production and on-air requirements. The frame has 20 universal slots allowing any module to reside in any slot. Modules include mic/line or dual inputs, group modules, monitor and communications modules, and a four-compressor dynamics module. Features include on-air switching, fader-starts, VCA subgrouping, PFL speaker and editor interface.

**Basic Specifications & Suggested List Price:** Equivalent input noise: -126 dB; frequency response: 20 Hz to 20 kHz; mic input headroom: 31 dB; summing headroom: 26 dB; max output: +28 dBu; crosstalk: -70 dB broadband; distortion each stage: 1M: 0.05%, THD: 0.01%.

**SOUNDTRACS, PLC-SURREY, ENGLAND**  
United States Office: MCI-Intertek, Inc.  
745 109th St., Arlington, TX 76011  
(817) 640-6447

**Product Name:** MC Senes  
**Contact:** Tom Burrows, product manager  
**Product Description & Applications:** 24 or 32 input mainframe by 12 output monitor console. All inputs feature 4-band EQ, 10 monitor sends plus two aux sends, and channel fader. All outputs have two bands full parametric EQ including aux outputs which can be used as additional monitor mixes making 12 mixes total. Console can be supplied with hardware or transformer split and a variety of multi-pin connections.

**Basic Specifications & Suggested List Price:** MC 24-12 suggested list: \$13,495; MC 32-12 suggested list: \$15,995. Options available include input and output transformers and multi-pin connectors.



**RANE CORPORATION**  
MP 24 Mixer Preamplifier Console

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

**Product Name:** MP 24 Mixer Preamplifier Console  
**Contact:** Terry Pennington, director of marketing  
**Date Product Introduced:** July 1986

**Product Description & Applications:** The MP 24 features nine stereo inputs—three phono and six line—accessible through four separate mixing buses with completely assignable crossfade capability. Some of the main features include dual mic inputs with 3-way EQ and loop, separate balanced/unbalanced stereo main, booth, zone and isolated light trigger outputs with level controls,

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Littlite/CAE, Inc.  
P.O. Box 430  
Hamburg, MI 48139  
313/231-9373

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**SOUNDTRACS PLC**  
91 Ewell Road, Surbiton, Surrey, England  
(01) 399-3392  
Product Name: Soundtracs CP6800  
Contact: John Carroll  
Date Product Introduced: September 1986  
Product Description & Applications: A fully modular analog mixing console with "on-board" programmable digital routing. Designed for commercial recording studios and post-production video facilities, the CP6800 has external disk storage and events controller in 19" rack. Available with either MC VU meters or high resolution LED bar graph metering the CP6800 has a maximum configuration of 44-12-24-2+2.  
Basic Specifications & Suggested List Price: Analog recording console with automation. Price according to configuration \$35,000-\$40,000.

**SOUNDTRACS PLC**  
91 Ewell Road, Surbiton, Surrey, England  
(01) 399-3392  
Product Name: Soundtracs FMX Series  
Contact: John Carroll  
Date Product Introduced: July 1986  
Product Description & Applications: A fully modular 19-inch rack mounted mixer with various permutations of input and output modules including: mono and stereo inputs, monitor input, subgroup/monitor modules, master modules for recording/sound reinforcement and stage monitoring. Applications include: sound reinforcement, 4/8 track recording, video post-production, broadcast "on air," stage monitoring, club installation.  
Basic Specifications & Suggested List Price: 19-inch rack width x 15 units high. External PSU 3 units high x 19" width. Price according to configuration \$2,500-\$4,000.

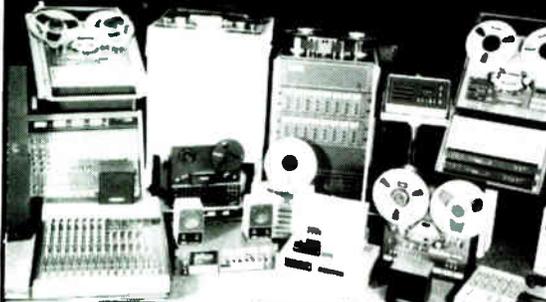


**STUDER REVOX AMERICA**  
Studer 963 mixing console

**STUDER REVOX AMERICA**  
1425 Elm Hill Pike, Nashville, TN 37210  
(615) 254-5651  
Product Name: Studer 963 mixing console  
Contact: Thomas E. Mintner, VP and general manager  
Date Product Introduced: November 1986  
Product Description & Applications: The 963 is designed for applications demanding critical audio quality and sophisticated production capabilities, yet where space is also at a premium. Based on a standard 30mm module width, the 963 comes in frame configurations from 16 to 40 inputs. Audio performance specifications exceed requirements for digital recording, even under "real life" conditions with many input faders open. Careful engineering of the reference grounding and bus mixing system ensures consistent specifications regardless of frame size. Standard features include full modularity, balanced insert points, external mute (video switcher) interface, patch bay, direct outputs for each channel, and solid state switching in all critical audio paths.  
Basic Specifications & Suggested List Price: Specifications available November 1986. Price for typical 28 input frame approx. \$59,000.

**3RD GENERATION**  
3 The Cordwainers, Southend on Sea, England  
(203) 376-0433 (Tek Trak, U.S. Distributor)  
Product Name: G168.2 multi-track recording mixer  
Contact: Michael Panasuk, president  
Date Product Introduced: June 1986  
Product Description & Applications: A total feature mixing console which stands up to the rigors of the road and the finesse of multi-track recording. It can be used for 8-track recording or in a 24x2 configuration for live performance. There are 16 balanced input channels, each with insert send and return, 4-band EQ, 3 aux sends, mute and solo switches, mic pad switch, mic/line, phase switch, channel route switches, input gain, Alps faders, peak indicator, and pan control.  
Basic Specifications & Suggested List Price: Price: \$3,815.

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**Capitol Magnetic Products**

**CORPORATE AND INTERNATIONAL SALES OFFICES:** 6902 Sunset Boulevard Hollywood, CA 90028 (213) 461-2701 Telex 4720854 Facsimile 12134676550

**EASTERN SALES OFFICE:** 2980 Avenue B Lehigh Valley Industrial Park #1 Bethlehem, PA 18017 (215) 868-1401

**CENTRAL SALES OFFICE:** 1400 Renaissance Drive, Suite 309 Park Ridge, IL 60068 (312) 298-1806

**WESTERN SALES OFFICE:** 3116 West Avenue 32 Los Angeles, CA 90065 (213) 254-9111 Facsimile 2132553392

**UNITED KINGDOM:** 1-3 Uxbridge Road Hayes, Middlesex UB4 0TG United Kingdom 561-0922 Telex 917029 Facsimile 15739623

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World Radio History

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# EW PRODUCTS

## MUSIC PRODUCTS

# 1 • 9 • 8 • 7

**AMPLIFIED MUSIC PRODUCTS CORP.**  
9829 Independence Ave., Chatsworth, CA 91311  
(818) 709-0518  
**Product Name:** AMP KD-400  
**Contact:** Roger Smith, vice president  
**Date Product Introduced:** July 1, 1986  
**Product Description & Applications:** Model KD-400 keyboard/drum amplifier.  
**Basic Specifications & Suggested List Price:** Model KD-400: 400 watts, 6 channels, 4-band semi-parametric EQ, tunable electronic crossover.

**ASSOCIATED PRODUCTION MUSIC**  
888 7th Ave. 12th Fl., New York, NY 10106  
(212) 977-5680  
**Product Name:** KPM 1347-CD  
**Contact:** Jerry Burnham, east coast sales manager  
**Date Product Introduced:** July 1986  
**Product Description & Applications:** *Compulsion* is the first compact disc from Andy Clark. It contains all the winning upmarket, jazz-funk, pop-industrial and high-tech ingredients that were mixed in KPM 1296 *The Next One* KPM 1308 *A Higher State*, and KPM 1314 *Open Your Mind*. Pick hits are "Power Profile" and "Two Steps Ahead."  
**Basic Specifications & Suggested List Price:** Compact audio disc—\$20. This disc utilizes index points for easy editing.

**ASSOCIATED PRODUCTION MUSIC**  
6255 Sunset Blvd. Ste. 724, Hollywood, CA 90028  
(213) 461-3211  
**Product Name:** KPM 1299/1333-CD  
**Contact:** Cassie Goraiab, west coast sales manager  
**Date Product Introduced:** July 1986  
**Product Description & Applications:** *Classical Fusion 1/2* includes music from two previous records: KPM 1299 *Classical Fusion* and KPM 1333 *Classical Fusion-2* employing a blend of classical and contemporary styles using symphonic and synthesized sounds with and without contemporary rhythm. Pick hits: "Before the Beginning" and "Newsweek."  
**Basic Specifications & Suggested List Price:** Compact audio disc—\$20. This disc utilizes index points for easy editing.

**CARVIN CORP.**  
1155 Industrial Ave., Escondido, CA 92025  
(619) 747-1710  
**Product Name:** Pro-Bass II series  
**Contact:** Neal Taylor, sales manager  
**Date Product Introduced:** June 30, 1986  
**Product Description & Applications:** The Pro-Bass II series amplifiers are professional bass guitar amplifiers. They feature parametric equalization, built-in compressor, built-in noise gate, graphic equalization, internal bi-amp capabilities, buffered effects loop, and precision movements on all controls. The PB-II series bass amps represent a professional rack-mountable bass amp for either studio or stage use.  
**Basic Specifications & Suggested List Price:** PB-II-300 (300 watts), PB-II-150 (150 watts), hi and low input jacks for either low or high impedance sources, headphone outputs, balanced pre-amp output, active parametric equalization circuit, (5) band graphic EQ, studio quality compressor, and studio quality noise gate. PB-II-300 (300 watt model) \$479; PB-II-100 (100 watt model) \$329; PB-II-300 (rack mount) \$449.

**CAPITOL PRODUCTION MUSIC**  
(A Division of Capitol Records)  
1750 N. Vine St., Hollywood, CA 90028  
(213) 461-2701  
**Product Name:** "Media Music—The Professional"  
**Contact:** David Nelson, sales

**Date Product Introduced:** Summer 1986  
**Product Description & Applications:** To aggressively pursue the new video and film markets, Capitol Production Music has unveiled its new production music package, "Media Music—The Professional," which consists of 35 newly-recorded LPs, specifically designed for contemporary video and cable markets. Another five albums will be released by the end of the year. A market survey of the regular "Media Music" package (of over 160 LPs) showed that approximately 200 million people in 20 countries hear "Media Music" daily.  
**Basic Specifications & Suggested List Price:** "Media Music" is available on needle-drop, per-production, or annual blanket rates. Users can purchase as few as ten LPs for \$100 or the entire LP package is included with blanket agreements. Capitol also offers the "Hi-Q" catalog of 400 LPs and tapes, designed for industrial, multi-image, radio, TV, and cable applications. Many titles are now also available on compact disc.



**THE CAV CORPORATION**  
The Aircraft Music Library & Syndication Music Service

**THE CAV CORPORATION**  
7 No. Washington St., Boston, MA 02114  
(800) 343-2514, 1 61 367 0510  
**Product Name:** The Aircraft Music Library and Syndication Music Service  
**Contact:** Mark Cuddy, vice president marketing  
**Date Product Introduced:** 1986  
**Product Description & Applications:** Release of nine new music production albums using new DMM mastering process: #13 Hits of the "Great Masters," classical; #14 "Fantastic Journey," futuristic styles; #15 "On A Serious Note," message; #16 "Road Challenger," exciting high tech; #17 "Lipstick," rock advertising; #18 "The Instructor," simple narration; #19 synthesizer effects; #20 "The Guitar Album," super acoustics; #21 "Ad Vice," Miami Vice sounding; plus Aircraft has just made available a complete collection of custom music tracks available for syndication with market exclusivity.  
**Basic Specifications & Suggested List Price:** The Aircraft Music Library is a high quality collection of "New Age" library that has the styles of music that you'll be needing in the '80s. There has never been such a distinctive library at such reasonable costs. Check out Aircraft, you'll discover that we offer the best package in selection, quality and price. Available on a monthly, quarterly, or annual subscription.

**COLOTTI ENTERPRISES**  
P.O. Box 639, Levittown, NY 11756  
(516) 221-0974

**Product Name:** Shelf  
**Contact:** Jim Colotti  
**Date Product Introduced:** July 1986  
**Product Description & Applications:** Shelf for the Ultimate Support keyboard stand. Gives you a place for your computer, sequencer, drum machine, sheet music, etc. Quickly and easily attaches to existing tier. Black textured baked enamel finish. For use with 48-, 54- and 60-inch stands.  
**Basic Specifications & Suggested List Price:** 42-inches wide x 13.5-inches deep. Made of sturdy, light weight 0.100-inch aluminum. Direct from factory price: \$49 (includes postage and insurance for continental USA only). Dealer inquiries invited.

**DRUMWARE**  
12077 Wilshire Blvd #515, Los Angeles, CA 90025  
(213) 478-3956  
**Product Name:** Tom Sound Cartridge  
**Contact:** Scott Morgan, president  
**Date Product Introduced:** July 1986  
**Product Description & Applications:** Drumware has released six sound cartridge sets for use with the Sequential Tom drum machine. The cartridge sets include: "Atomic Drums," "Analog Drums," "Rock Drums," "Percussion 1," "Percussion 2," and "Hippefex." In addition to the cartridge sets, Drumware offers an internal chip set, "Basic Drums" to replace the factory internal sounds.  
**Basic Specifications & Suggested List Price:** Each cartridge set holds seven sounds and has a retail price of \$99. The internal chip set has eight sounds and a retail price of \$75. A demo cassette is available for \$4.

**ELECTROMEDIA SERVICE, INC.**  
24166 Haggerty Rd., Farmington Hills, MI 48024  
(313) 477-6502  
**Product Name:** Trigger Advance Model TA-1  
**Contact:** David Carlstrom, engineer  
**Date Product Introduced:** July 21, 1986  
**Product Description & Applications:** A module for triggering synthesizers and samplers from a music track on a multi-track tape machine. With TA-1 trigger from an old track and record the replacement sound on another track in perfect time with the tune. A Trigger Advance is the only way around the lag in every digital instrument. The Trigger Advance, TA-1, is designed for permanent installation on an Otari MTR-90 II audio board. It is adaptable to other multi-tracks.  
**Basic Specifications & Suggested List Price:** Advance time on Otari MTR-90 II is at least 35 milliseconds. Nominal output level is 0.6 Volts, unbalanced. TA-1 module installed on the client's Otari MTR-90 II audio card, \$150. TA-1 module only, for installation by competent technician, \$100.

**E-MU SYSTEMS INC**  
1600 Green Hills Rd., Scotts Valley, CA 95066  
(408) 438-1921  
**Product Name:** Emax  
**Contact:** Suz Howells, adv. and promo mgr.  
**Date Product Introduced:** September 1986  
**Product Description & Applications:** The Emax sampling keyboard offers an array of functions similar to the industry standard Emulator II at a price affordable to most serious musicians. Emax features 19 seconds of sampling at a 28 kHz sampling rate (rates from 10kHz to 42kHz are also available), a full complement of analog processing modules, as well as sophisticated digital processing capabilities and a unique dual sample voice structure. A MIDI sequencer, arpeggiator, and RS-422 high-speed computer port are also included.  
**Basic Specifications & Suggested List Price:** Data format: proprietary, equivalent to 12-bit linear coding; frequency response: 20 Hz to 20 kHz; channels: 8, two samples per channel; data storage: 3.5-inch mini disk; analog processing: (1) VCF, (1) VCA, (1) LFO, (2) AHDSPR per channel; keyboard: 5 octave, pressure and velocity sensing, 16 velocity sensing curves.

# There's no telling what a drummer might do with a Mirage ...

If you're a keyboard player, don't ever let a drummer borrow your Mirage ... you might never get it back. If you're a drummer, ask a keyboard playing friend to lend you his Mirage ... "for a while." In either case, if you're into percussion, there's a score of good reasons to get your hands on a Mirage.



## The buzz on the buzzword

"Sampled Percussion" is a pretty catchy buzzword. Some high-end electronic percussion systems offer sampling as a creative option. Others offer a selection of sampled sounds on ROM's that plug into the system.

The Mirage can sample any sound in the percussion family — or any other family, for that matter. There's also a wide range of percussion sounds on 3.5" diskettes in the Ensoniq Sound Library, from acoustic and electronic drums to kalimba and Fu Yin gong.

## The Ensoniq Percussion Library

Sound Disk	Sound
4	Acoustic Drums, Electronic Drums, Orchestral Percussion
10	Tabla & Bayan Drums
11	Rack Bell, Kalimba, Wind Gong, Silt Drum
14	Cup Gongs, Che Cymbal, Crotales Orchestral Bells
16	Latin Percussion
18	Fu Yin Gong, Opera Gong
20	Ambient Drums

## How to become an Octaman

Most drummers will argue that playing percussion is no fun unless you get to hit something. We agree. MIDI features that can put you in touch with a Mirage are showing up on electronic drum kits. And our friends at Roland have come up with a MIDI percussion item that's simple and inexpensive — the Octapad\*.

As the name implies, the Octapad gives you 8 pads to hit and each pad can be assigned a MIDI channel and MIDI note number. Add a Mirage, a MIDI cable and a pair of drum sticks and you've got a potent percussion instrument.

Let's start by creating an electronic drum kit. Connect the MIDI out of the Octapad to the MIDI in of the Mirage and load Sound 2 (Electronic Drums) from Sound Disk 4. The Mirage now has 12 distinct electronic percussion

sounds ready to go, including full octaves of toms, ride cymbals and flanged crash cymbals.

Set the Octapad and Mirage to the same MIDI channel and choose any 8 sounds by entering the MIDI note number into the Octapad for each sound. The keyboard map shown here will give you a guide. You've now got an 8-piece electronic drum kit that's ready to record, sequence or play live.



## MIDI makes the magic

Now that we've gotten all these great percussion sounds into a Mirage, how do we get them out? Naturally, all the sounds can be played in real time from the keyboard. Since the Mirage can hold up to 16 samples, you can play a full drum set or complete percussion at any one time.

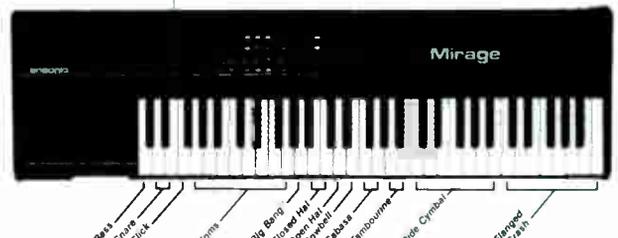
You can use the on-board sequencer to build up patterns, or use an external MIDI sequencer to create and edit complete songs. Just play the part on the keyboard or, if your sequencer has step editing, write the appropriate MIDI note number on the right beat and lock in a solid groove.

## Mirage means melodic percussion

You can follow the above procedure to use any of the Mirage percussion sounds with the Octapad — but why stop there. One of the strongest advantages of the Mirage/Octapad combo is the ability to play percussion using any sound in the Ensoniq Library.

By selecting MIDI note numbers you can easily program scales into the Octapad to use with Mirage steel drum, marimba, hammered piano, bass, harp, vibes or whatever. Because the Octapads are velocity sensitive, you'll be able to control the dynamics just as you would any acoustic percussion instrument.

If you want to get a bit more outside, try playing brass and orchestra hits, guitar power chords, sound effects and pipe organ through the Octapads — there are over 300 sounds in the



Ensoniq Library just waiting to get pounded.

## All this and a keyboard, too

As you can see, the Mirage isn't just a great keyboard, but a versatile drum machine, too. With some additional MIDI gear, it can be downright amazing. Visit your authorized Ensoniq dealer for a full demonstration. There's no telling where a Mirage and your imagination can take you.

ENSONIQ Corp.: 263 Great Valley Parkway, Malvern, PA 19355 ■ Canada: 6969 Trans Canada Hwy., Suite 123, St. Laurent, Que. H4T 1V8 ■ ENSONIQ Europe: 65 Ave de Stalingrad, 1000 Brussels ■ Japan: Sakata Shokai, Ltd., Minami Morimachi, Chu-O Building • 6-2 Higashi-Tenma, 2-Chome • Kita-ku Osaka, 530



\*Octapad is a trademark of Roland Corp. Mirage is a trademark of ENSONIQ Corp. The hollow log is not covered under any U.S. or international patents — yet. The Mirage Sampling Keyboard retails for \$1695 — the Mirage Multi-Sampler for \$1395.

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World Radio History

## EUROPA TECHNOLOGY, INC.

1638 W. Washington Blvd., Venice, CA 90291  
(213) 392-4985

**Product Name:** Dynacord ADD-one  
**Contact:** Woody Moran, president

**Date Product Introduced:** 1986

**Product Description & Applications:** The ADD-one, Advanced Digital Drums, is the first fully programmable percussion computer. Full MIDI implementation. Programmable 8 channel routing. Sample library expandable to 90 sounds in memory. Programmable to 128 patch positions of drum sets. Multiple sample triggering from single pads. Separate master and monitor outputs as well as headphone amplifier. 8 VCFs, 8 VCAs, 8 LFOs, 24 envelope generators and 8 programmable digital delays. **Basic Specifications & Suggested List Price:** Each individual channel features the following programmable parameters: volume, panning, pitch, pitch bend, pitch bend delay, filter frequency, attack, duration, trigger dynamics, trigger delay time, digital delay, filter resonance, filter resonance bend, EG (envelope generator) attack, EG duration, EG decay, EG pitch modulation, EG filter frequency modulation, EG filter resonance modulation, LFO pitch modulation and LFO frequency.

## EUROPA TECHNOLOGY, INC.

1638 W. Washington Blvd., Venice, CA 90291  
(213) 392-4985

**Product Name:** MDB Window Recorder

**Contact:** Woody Moran, president

**Date Product Introduced:** 1986

**Product Description & Applications:** The MDB Window Recorder is a 16-bit, high-resolution, studio sampler currently available in either 3 second, 6 second or 12 second versions. Other features include: overdubbing, variable playback rate for transposition, automatic record start and interfacing via MIDI in (for triggering and pitch control) and audio trigger input.

**Basic Specifications & Suggested List Price:** Any sound can be recorded and then isolated to within 22 microseconds accuracy, then transposed ( $\pm 1$  octave). The Window Recorder will record any sound information onto a constant bandwidth of 20Hz to 20kHz  $\pm 1$  dB and with a 98 dB dynamic range. The playback of the sound can be heard forward or backward, within a time interval determined by the user and displayed on the "window" (a 32 LED linear scale).

## FAIRLIGHT INSTRUMENTS PTY LTD.

15 Boundary St., Rushcutters Bay, NSW 2011 Australia  
(02) 331-6333

**Product Name:** Voicetracker

**Contact:** Amanda Reid-Young, marketing co-ordinator

**Date Product Introduced:** June 1986

**Product Description & Applications:** The Voicetracker is a unique pitch-tracking device which allows any MIDI or analog synth to follow a monophonic input (voice, woodwind instrument, etc.) with unparalleled accuracy and speed. The Voicetracker can extract all the musical features of the input sound (pitch, amplitude and timbre) and transfer these to the synth. A video display shows the characteristics of the voice in real time, and enables the Voicetracker to be set up for specific sounds and accesses other functions such as intelligent harmonies produced from a single note input.

**Basic Specifications & Suggested List Price:** Range: 5 octaves below middle C to 5 octaves above. Audio input: 1/4-inch stereo jack wired as balanced input. MIDI connections: MIDI in, thru, out. MIDI standard DIN 5-pin connectors. Standard MIDI output operations: note, key velocity, pitch bend. Assignable MIDI control outputs: amplitude, brightness, purity, attack.

## GALLIEN-KRUEGER

504-B Vandell Way, Campbell, CA 95008  
(408) 379-3344

**Product Name:** 2100 SEL

**Contact:** Jim Ross, marketing

**Date Product Introduced:** June, 1986

**Product Description & Applications:** The 2100 SEL is a stereo guitar head with 100 watts per side. It features two separate channels: one clean, the other a high-gain lead channel. Each channel features four bands of EQ. The 2100 SEL also contains five built-in effects: adjustable stereo chorus, reverb, noise reduction, compression, gain boost—all individually footswitchable (ex. noise red.).

**Basic Specifications & Suggested List Price:** \$999, including five position footswitch.

## GALLIEN-KRUEGER

504-B Vandell Way, Campbell, CA 95008  
(408) 379-3344

**Product Name:** 250ML Series II

**Contact:** Jim Ross, marketing

**Date Product Introduced:** April 1986

**Product Description & Applications:** The new 250ML Series II is an upgraded version of the popular 250ML; 50

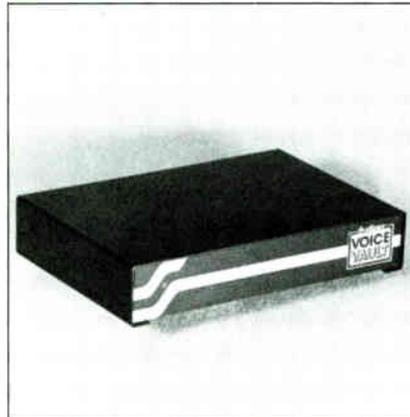
# NEW PRODUCTS

## MUSIC PRODUCTS

# 1 • 9 • 8 • 7

watts per side stereo with built-in chorus and echo effects, (2) 6 1/2-inch speakers, in a mic stand mountable package. The Series II unit includes a speaker on/off switch, a deeper package for knob protection as well as improved, more dependable circuitry.

**Basic Specifications & Suggested List Price:** \$729.



**HARMONY SYSTEMS, INC.**  
*SynHance Voice Vault DX Series*

## HARMONY SYSTEMS, INC.

P.O. Box 2744, Norcross, GA 30091  
(404) 662-8788

**Product Name:** SynHance Voice Vault DX Series

**Contact:** Douglas R. Kraul, president

**Date Product Introduced:** June 1986

**Product Description & Applications:** The SynHance Voice Vault DX is a hardware librarian for the DX7. It requires no modification of the DX7 and stores 512 DX7 voices, with performance data. Voices can be arranged into 128 named cartridges of 32 voices each. Furthermore, sets of 32 voice changes can be saved into 128 named "Songs," allowing the user to automatically step through voice changes with optional footswitch. Other features include 128-MIDI accessible voice, transmit channel setting, and additional MIDI features. All user interface is through the DX7's front panel and LC.

**Basic Specifications & Suggested List Price:** Voice Vault DX7-512R: 512 voices in battery backed up RAM, 128 cartridges of 32 voices, 128 Songs, table or rack-mountable, additional MIDI functions for DX7. Suggested retail: \$399.

## HARMONY SYSTEMS, INC.

P.O. Box 2744, Norcross, GA 30091  
(404) 662-8788

**Product Name:** SynHance M2Y MIDI merger

**Contact:** Douglas R. Kraul, president

**Date Product Introduced:** February 1986

**Product Description & Applications:** M2Y is a 2-input, 2-output MIDI merger. The M2Y is used to combine two MIDI outputs, and is useful in sequencing, live performance, and synchronization applications. The 1/2-rack size unit features separate control over each of two outputs via front panel switches or by MIDI messages. Automatic dynamic filtering prevents errors and data loss during overflow conditions. The M2Y can operate as a tabletop unit or can be placed in a standard 19-inch rack using an adapter.

**Basic Specifications & Suggested List Price:** Two inputs, two outputs, two MIDI thru/outputs. Front panel or MIDI control of each output. Boss Micro Rack compatible, rack mounting using Boss RAD-10 adapter. Suggested retail: \$199.

## HARMONY SYSTEMS, INC.

P.O. Box 2744, Norcross, GA 30091  
(404) 662-8788

**Product Name:** SynHance Voice Vault TX Series

**Contact:** Douglas R. Kraul, president

**Date Product Introduced:** August 1986

**Product Description & Applications:** The SynHance Voice Vault TX expands the number of voices that a Yamaha TX7 or TF-1 module can store, up to 512 voices. One Voice Vault TX can control up to four TX Series modules. Each TX series module has 128 MIDI accessible voices. The Voice Vault TX requires no modification to the TX series module. Two Voice Vault TXs can be mounted in a single 19-inch rack space, allowing a TX816 to have 1024 voices!

**Basic Specifications & Suggested List Price:** Voice Vault TX-512: 512 voices with performance, controls up to four TX7 or TF-1 modules. Each module has 128 MIDI accessible voices. Table or rack mountable. Suggested retail: \$499.



**KIMBALL INTERNATIONAL, INC.**  
*Bosendorfer 290SE*

## KIMBALL INTERNATIONAL, INC.

1600 Royal St., Jasper, IN 47546  
(812) 482-1600

**Product Name:** Bosendorfer 290SE

**Contact:** Vic Geiger, vice president

**Date Product Introduced:** April 1986

**Product Description & Applications:** The Bosendorfer 290SE is a computer-based piano performance reproduction system. This combination of old world craftsmanship (Viennese built grand piano) and state-of-the-art computer technology (by Kimball International) results in the world's finest piano in the world's first perfect repeat performance. Every movement of the keys, hammers and pedals is digitally encoded, stored on audio tape or floppy disk, and can be immediately played back exactly as originally performed or edited.

**Basic Specifications & Suggested List Price:** 9'6" Imperial grand piano by Bosendorfer; 97 note keyboard; optical sensors on all keys, hammers and pedals; playback stack assembly mounted under keyboard; dedicated 280 based computer; dual disk drive; computer keyboard; monitor; and cassette deck. Software programs include: record, playback, edit, merge, self-calibration, and diagnostics.

## K-MUSE INC.

8954 Mason Ave., Chatsworth, CA 91311  
(818) 998-7555

**Product Name:** Photon MIDI Converter

**Contact:** G. Bob Connelly, vice president sales/marketing

**Date Product Introduced:** January 1986

**Product Description & Applications:** A quiter to MIDI converter using beams of infra-red light to read the strings. The system at this time includes a Photon pick-up, a program cartridge and the 19-inch rack-mount converter box. K-Muse will offer its own guitars and basses in the future, but for now the Photon infrared pick-up will mount to most standard guitars and basses on the market. Retail for the Photon System (without guitar) is \$1,295.

## PHILIP KUBICKI GUITAR TECHNOLOGY

726 Bond Ave., Santa Barbara, CA 93103  
(805) 963-6703

**Product Name:** Factor 4 Fretless Bass

**Contact:** Geoff Richardson, director

**Date Product Introduced:** July 1986

**Product Description & Applications:** A fretless version of the Factor bass with a 34-inch scale neck, ebony fingerboard, multi-rock maple laminated neck, five-position passive and active electronic circuitry, ergonomically designed for weight distribution and playing comfort.

**Basic Specifications & Suggested List Price:** Stock finishes come in black, white, red, foam green, salmon pink, sky blue, yellow, hot pink. List price \$1287, including case. Custom finishes available in red burst and blue burst—list price \$1517 including hardshell case.

# NOW THAT DIGITAL IS HERE, A RECORDING STUDIO DOES NEED A PIANO THIS GOOD.

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Its expense, however, has tempted some studio owners to consider buying a lesser piano. A fact that many musicians accept with reluctance. When performers sit down at a Steinway piano, they know they are playing the best.

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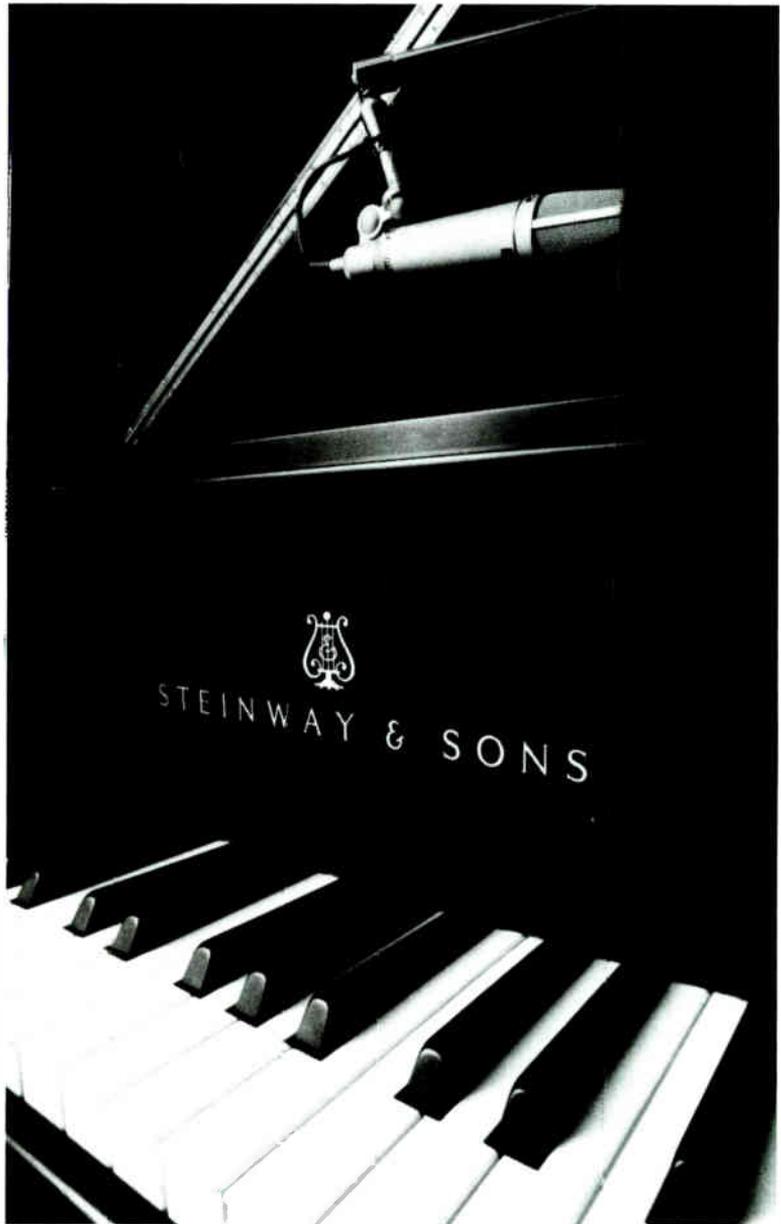
## LEASE A STEINWAY \$350/mo.

Steinway & Sons is now leasing new Steinway grands directly to recording studios. A model B leases for \$350.00 per month. This leasing includes an attractive option to buy at the end of the term.

For full details, contact Mr. Ed Bezursik at Steinway & Sons, Steinway Place, Long Island City, NY 11108. Or call him at: (718) 721-2600.

Be sure to visit the Steinway Suite at this year's Audio Engineering Society (A.E.S.) Show, Los Angeles Hilton Hotel, November 12-16.

STEINWAY & SONS 



In use at the recording studio: Kamoo Cultural Center, New York.

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## NEW PRODUCTS

### MUSIC PRODUCTS

**I • 9 • 8 • 7**

**KURZWEIL MUSIC SYSTEMS, INC.**  
411 Waverley Oaks Rd., Waltham, MA 02154  
(617) 893-5900

**Product Name:** Kurzweil 150 Expander  
**Contact:** Kurzweil Marketing Dept.  
**Date Product Introduced:** June 1986  
**Product Description & Applications:** The Kurzweil 150 Expander is a rack-mountable, multi-timbral sound source designed to work with any MIDI controller. It's a performance instrument that employs Kurzweil's Contoured Sound Modeling program to offer such sounds as concert grand piano, electric piano, harpsichord, jazz and rock organs, electric and acoustic bass, nylon and steel-string guitars. Extensive programmability for customizing presets; 3-way keyboard splitting; tuning, transposition, balanced, Timbre Shift.

**Basic Specifications & Suggested List Price:** 22 resident sounds, 60 preset programs, 16-voice polyphony. Additional ROM expansion sockets for future blocks of sounds. Programmable effects include vibrato, pitch bend, chorus, 8-band graphic equalization applied to each program, polyphonic pressure sensitivity. Full MIDI implementation.

**KURZWEIL MUSIC SYSTEMS, INC.**  
411 Waverley Oaks Rd., Waltham, MA 02154  
(617) 893-5900

**Product Name:** QLS (Quick Load System)  
**Contact:** Kurzweil Marketing Department  
**Date Product Introduced:** August 1986  
**Product Description & Applications:** QLS is a new high-speed computer interface for the Kurzweil 250 which interfaces to an Apple Macintosh computer via an RS-422 link running at 500 thousand bits per second. With QLS the K250 user can store and retrieve keyboard setups, sequencers, sampled sounds and other setup information up to six times faster than previously possible. QLS is completely operated from the Macintosh, and offers an extra-long cable for complete remote control from an offstage Macintosh.

**Basic Specifications & Suggested List Price:** QLS is compatible with all MacAttach data and sound files the K250 user may already have. QLS also offers librarian and editor functions, allowing the user to display and edit keyboards, instruments and sequences on the Macintosh screen. QLS is a powerful composition management system which increases the power of the Kurzweil 250 digital sequencer. \$495.

**MAARTISTS, INC.**  
383 Broadway, Jackson, KY 41339  
(606) 666-5915

**Product Name:** 64 Voice RAM cartridge, backlight displays  
**Product Description & Applications:** A 64 Voice RAM cartridge for the Casio CZ-101, CZ-1000, CZ-3000 and CZ-5000 synthesizers. It is the equivalent of four RAM cartridges in one package and comes with five-year lithium battery backup. Also, our backlight displays are retrofit displays for your synthesizer which allow the instrument to be "read" in no light conditions. Available for DX7, TX7 and a variety of other instruments.

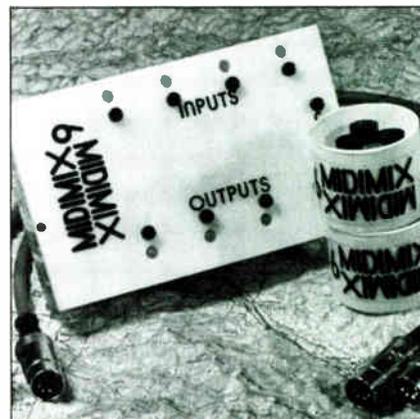
**Basic Specifications & Suggested List Price:** 64 Voice RAM suggested retail—\$49. Backlight displays suggested retail—\$59.

**MIDIMIX**  
258 "A" St. Ste. 11, P.O. Box 161, Ashland, OR 97520  
(503) 488-1023

**Product Name:** MIDIMIX 9  
**Contact:** James Noxon, president  
**Date Product Introduced:** January 1986  
**Product Description & Applications:** The MIDIMIX 9 MIDI mixer is a four input mixer for merging MIDI signals. There are four output channels, each programmable, giving four different mixes of the four inputs. An analog clock input is also provided to convert drum machine/tape tone to MIDI clock. A programmable divider allows use of various clock rates. MIDI start and stop can be generated also. The clock input can be mixed with the four MIDI inputs as need.

**Basic Specifications & Suggested List Price:** Price: \$249 retail. Four MIDI inputs, analog clock input, four MIDI outputs, one with extra jack. Programmable func-

tions: clock output filter, running status defeat, clock divide rate, input mute, output mute, five sources (four MIDI, one clock) in four mixes (four outputs) in eight pages of memory, special functions available.



**MIDIMIX  
MIDIMIX 6**

**MIDIMIX**  
258 "A" St. Ste. 11, P.O. Box 161, Ashland, OR 97520  
(503) 488-1023

**Product Name:** MIDIMIX 6  
**Contact:** James Noxon, president  
**Date Product Introduced:** January 1986  
**Product Description & Applications:** The MIDIMIX 6 MIDI splitter (\$35 + \$4 by mail) provides five buffered outputs from a single MIDI output. It draws power from the MIDI line itself, and therefore requires no power or batteries. It is also faster than any thru box or thru port, since it is isolated without using opto-isolators. It maintains ground isolation by using the opto-isolators in the instruments themselves.

**Basic Specifications & Suggested List Price:** One input, five output MIDI splitter, 1 3/4 x 1 3/4-inch diameter, propagation delay: less than 10 nanoseconds; list price: \$35 plus \$4 by mail, A mark @ 10 pcs.

**MONSTER MEMORY CO.**  
5757 Kirkwood Pl. N., Seattle, WA 98103  
(206) 526-0540

**Product Name:** Little Monster (SPX-2)  
**Contact:** Mark Horn, president  
**Date Product Introduced:** June 1986  
**Product Description & Applications:** The Little Monster (model SPX-2) expands the DX7's internal memory to 512 RAM voices. Installs extremely easily in five minutes without soldering, drilling or cutting—just pop the lid of the DX7 open, remove three chips and plug the Little Monster into the empty sockets—that's it! Allows transmitting on any MIDI channel—receive in OMNI or POLY mode. The cartridge slot remains usable. 150 terrific free sounds on data sheets included with each unit.

**Basic Specifications & Suggested List Price:** Size: 3 x 3-inches, installs internally; price: \$259. Only available through direct sales from Monster Memory Co.—exclusive U.S. distributors.

**MONSTER MEMORY CO.**  
5757 Kirkwood Pl. N., Seattle, WA 98103  
(206) 526-0540

**Product Name:** Little Functioning Monster (SPX-2F)  
**Contact:** Mark Horn, president  
**Date Product Introduced:** June 1986  
**Product Description & Applications:** The Little Functioning Monster (model SPX-2F), a different version of the Little Monster installs just as simply and allows storage of 448 sounds while simultaneously storing individual function parameter settings for each sound. The following function parameters are programmable for each sound: MIDI out channel, poly/mono, pitch bend, portamento, modulation wheel, foot control, breath control, aftertouch. Function values are automatically and simultaneously stored when voice data is stored. 150 free sounds included.

**Basic Specifications & Suggested List Price:** Size: 3 x 3-inches, installs internally; price: \$259. Available only through direct sales from Monster Memory Co.—exclusive U.S. distributors.

**MONSTER MEMORY CO.**  
5757 Kirkwood Pl. N., Seattle, WA 98103  
(206) 526-0540

**Product Name:** Monster Masher (MEX 1)  
**Contact:** Mark Horn, president

Date Product Introduced: June 1986

**Product Description & Applications:** The Monster Masher (model MEX-1) is a 19-inch rack-mounted mass memory storage device offering instant access to 96 banks of DX7 sounds—that's 3,072 sounds! Also, the unit can be switched to store 1,536 sounds while simultaneously storing each sound's function parameters. Ideal for use between a DX7 and TX modules. Extremely fast and easy to use—transmit 32 sounds in two seconds! Nonvolatile memory/roadworthy/error-free/no computer, no disks, no monitor necessary.

**Basic Specifications & Suggested List Price:** Size: 19 x 1 3/4 x 12-inches; weight approx. 5 lbs.; price: \$599. Available only through direct sales from Monster Memory Co.—exclusive U.S. distributors.

#### NEW ENGLAND DIGITAL CORPORATION

49 No. Main St., P.O. Box 546  
White River Junction, VT 05001  
(802) 295-5800

**Product Name:** Engraving Quality Music Printing for Synclavier

**Date Product Introduced:** Spring 1986

**Product Description & Applications:** Engraving Quality Music Printing: new music printing software supports a variety of output devices, including digital typesetters.

**Basic Specifications & Suggested List Price:** \$250.

#### NEW ENGLAND DIGITAL CORPORATION

49 No. Main St., P.O. Box 546  
White River Junction, VT 05001  
(802) 295-5800

**Product Name:** Sample-to-Memory option for Synclavier

**Date Product Introduced:** September 1986

**Product Description & Applications:** Sample-to-Memory Option: offers stereo sampling directly to RAM at 100kHz per channel.

**Basic Specifications & Suggested List Price:** Variable sampling rate between 50kHz and 100kHz per channel with 16-bit resolution. Price to be announced.

#### NEW ENGLAND DIGITAL CORPORATION

49 No. Main St., P.O. Box 546  
White River Junction, VT 05001  
(802) 295-5800

**Product Name:** Direct-to-Disk Multi-Track Recording System

**Date Product Introduced:** September 1986

**Product Description & Applications:** Direct-to-Disk multi-track recording option: as an adjunct to a Synclavier system, this provides up to 16 tracks of disk-based recording with 100kHz/16-bit fidelity. Up to 52 minutes of recording time per track is possible depending upon the number of Winchester disks attached to the system

**Basic Specifications & Suggested List Price:** 4, 8, and 16-track configurations available; sampling rate variable between 50kHz and 100kHz with 16-bit resolution; price to be announced.

#### OMNIMUSIC

52 Main St., Port Washington, NY 11050  
(516) 883-0121

**Product Name:** Omnimusic Compact Discs  
Contact: Kate Corrigan, dir. sales and mktg.

**Date Product Introduced:** April 1986

**Product Description & Applications:** Production music for audio visual and commercial productions. The six compact discs include industrial, sports, classical, rock and hi-tech themes. Annual unlimited use licenses and performance rights are available.

#### OMNIMUSIC

52 Main St., Port Washington, NY 11050  
(516) 883-0121, 1-800-828-OMNI

**Product Name:** Omnimusic Compact Discs  
Contact: Kate Corrigan, director of sales

**Date Product Introduced:** April 1986

**Product Description & Applications:** Six compact discs containing 145 different selections covering a wide variety of music for commercial and industrial applications.  
**Basic Specifications & Suggested List Price:** Package of six compact discs selling for \$75 plus shipping. Music may be licensed by needledrop rates or unlimited annual blanket basis.

#### PALMTREE INSTRUMENTS

5666 La Jolla Blvd. #81-M, La Jolla, CA 92037  
(619) 452-5199

**Product Name:** Airdrums

Contact: Pat Downes

**Date Product Introduced:** June 1986

**Product Description & Applications:** The Airdrums are a revolutionary gesture-capturing MIDI controller, played in live performance or in the studio. They can generate 12

—LISTING CONTINUED ON NEXT PAGE

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KORG DIGITAL DRUMS, SQD-1SEQUENCER

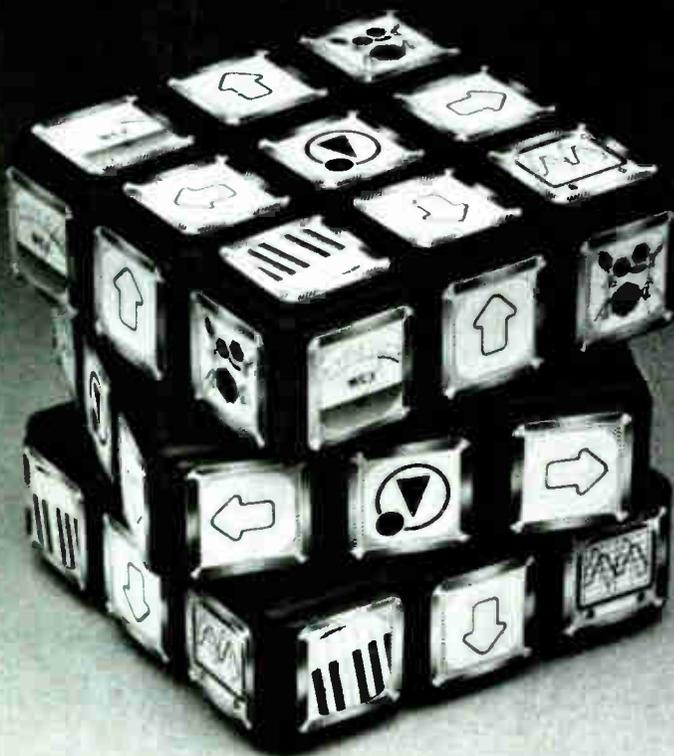
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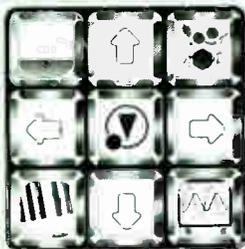
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**NEW PRODUCTS**

**MUSIC PRODUCTS**

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—LISTING CONTINUED FROM PAGE 159

different MIDI note triggers with velocity information as the two handheld tubes are freely shaken in different directions. The notes played for each trigger can be previously stored by the musician or can be selected in real time from note messages received at MIDI in for spontaneous and interactive performance.

**Basic Specifications & Suggested List Price:** Each tube is 1.1-inch diameter and 7.2-inches long. The control box (2.2 x 11 x 14.2-inches) has two displays and 54 switches for quick access to performance, editing, and set up functions. Four footswitch inputs, MIDI in, MIDI thru, and two MIDI out jacks are provided. \$1895 suggested list price.



**PEARL INTERNATIONAL, INC.**  
*Syncussion-X*

**PEARL INTERNATIONAL, INC.**  
P.O. Box 111240, Nashville, TN 37222  
(615) 833-4477

**Product Name:** Syncussion-X  
**Contact:** Todd S. Mauer, director of mktg./sales  
**Date Product Introduced:** January 1986  
**Product Description & Applications:** Syncussion-X is designed to produce "Total Percussion" sounds. Cymbals, gongs, timbales, congas, bongos, tympani, steel drums, orchestral chimes, xylophones... they're all included! The new Syncussion-X features: 1) new DWAP (digital wave analog processing), tone generator, kit flexibility, expandability (by using an optional PE-8 pad expander, a maximum of 16 pads can be connected), MIDI (in, out and thru), cassette memory, pad assignment system and unbelievably easy operations.

**Basic Specifications & Suggested List Price:** Tone generator: DWAP (digital wave analog processing) 2WG, 4VCF (LPX2, 4PX2), 4EG; simultaneously generated sound signals: 4 (SC-40), 2 (SC-20); pad input number: 8 (SC-40/20), 16 (SC-40/20 w/PE-8 pad expander unit); program memory: 8 pads x 32 or 16 pads x 16; preset timbre: 128; function: pad program preset call, pad copy, parameter edit (18 parameters, MIDI transmission); cassette tape (load, save, verify), MIDI recognized channel (Omni mode on/off); input/output: pad input 8, pedal input 2 (hi-hat, mute), output (separate out 8, mixed out R and L), pad expander, kit selector, MIDI (in, out, thru), headphone (stereo); dimensions: 19" (w) x 17" (d) x 3 1/2" (h); rack mountable (E1A 2U); weight 15 lbs. 6 oz. or 7 kg; Sugg. list: \$2,890.

**PEARL INTERNATIONAL, INC.**  
P.O. Box 111240, Nashville, TN 37222  
(615) 833-4477

**Product Name:** Drum X  
**Contact:** Todd S. Mauer, director of mktg./sales  
**Product Description & Applications:** Drum-X is a new type of programmable electronic drum capable of producing a wide variety of drum sounds... from acoustic to today's most requested electronic drum sounds. A natural rebound gives you a real acoustic drum feel, from delicate sticking to the heaviest back beat. The Drum X is the best of all worlds... acoustic sounds and feel plus electronic sounds... all programmable with one switching operation.  
**Basic Specifications & Suggested List Price:** Features:



**PEARL INTERNATIONAL, INC.**  
Drum-X

eight parameters in the tone unit provide a wide variety of sounds from acoustic to today's most desired electronic drum sounds. Eight complete sets (kits) of sound can be programmed and recalled by one touch operation. Each kit is composed of five pads and their respective sounds. By switching the kit number, the sound of all five (5) pads is simultaneously changed. Surface of the snare drum/tom tom pads is made of a double layer of rubber consisting of one hard (top) and one soft (bottom), to attain a natural stick rebound plus provide a smoother hand impact regardless of the degree of your sticking attacks. Sugg. list: \$1,399.

**PIGNOSE INDUSTRIES**  
1745 W. 134 St., Gardena, CA 90249  
(213) 770-4444

Product Name: Pignose 30/60 Amplifier  
Contact: Howard C. Chatt, president  
Date Product Introduced: June 1986

**Product Description & Applications:** The 30/60 features; FET circuits used in pre-amp for low noise, sensitivity and high impedance; overdrive circuit carefully designed for "classic tube" distortion; solid state circuitry and reliability; separate volume and master volume controls; jacks: input 1 and 2, line output, effects send and receive; a 3 pin AC cord, circuit breaker reset, slanted faceplate for easy access to controls; the classic "Pig-Skin Covering"; durable hardware; and last but not most important, Pignose Quality.

**Basic Specifications & Suggested List Price:** Power output 30 watts RMS @ 5% distortion, 60 watts peak; 12-inch speaker; 3-band EQ; weight 24 lbs.; dimensions 16x9x17-inches; suitable for guitar, keyboard or voice; price: \$269.

**ROLAND CORP US**  
7200 Dominion Circle, Los Angeles, CA 90040  
(213) 685-5141

Product Name: MC-500 MicroComposer  
Contact: Barbi Clark, communications  
Date Product Introduced: January 1986

**Product Description & Applications:** The Roland MC-500 MicroComposer is a 4-track, MIDI sequencing/editing device for the recording and playback of MIDI data. To date, it is the most complete recording, editing, and performance oriented package on the market. The MC-500 is a disk based system (3.5-inch DS/DD) and can record all MIDI data in both real time and step time. There is also a separate rhythm track/pattern area for recording rhythm patterns and tracks for MIDI drum machines.

**Basic Specifications & Suggested List Price:** The MC-500 features MIDI in, out (X2), and thru, tape synchronization, and approx. 30,000 note memory in RAM and over 100,000 notes per disk. The editing functions are extensive and include note editing (key number, channel number, velocity, CPT), copy, insert, delete, erase, change MIDI channel, change velocity, quantize (quarter to 32nd note resolutions), and MIDI filters for patch change, sys EX, MIDI channel, etc. Retail price. \$1,295.

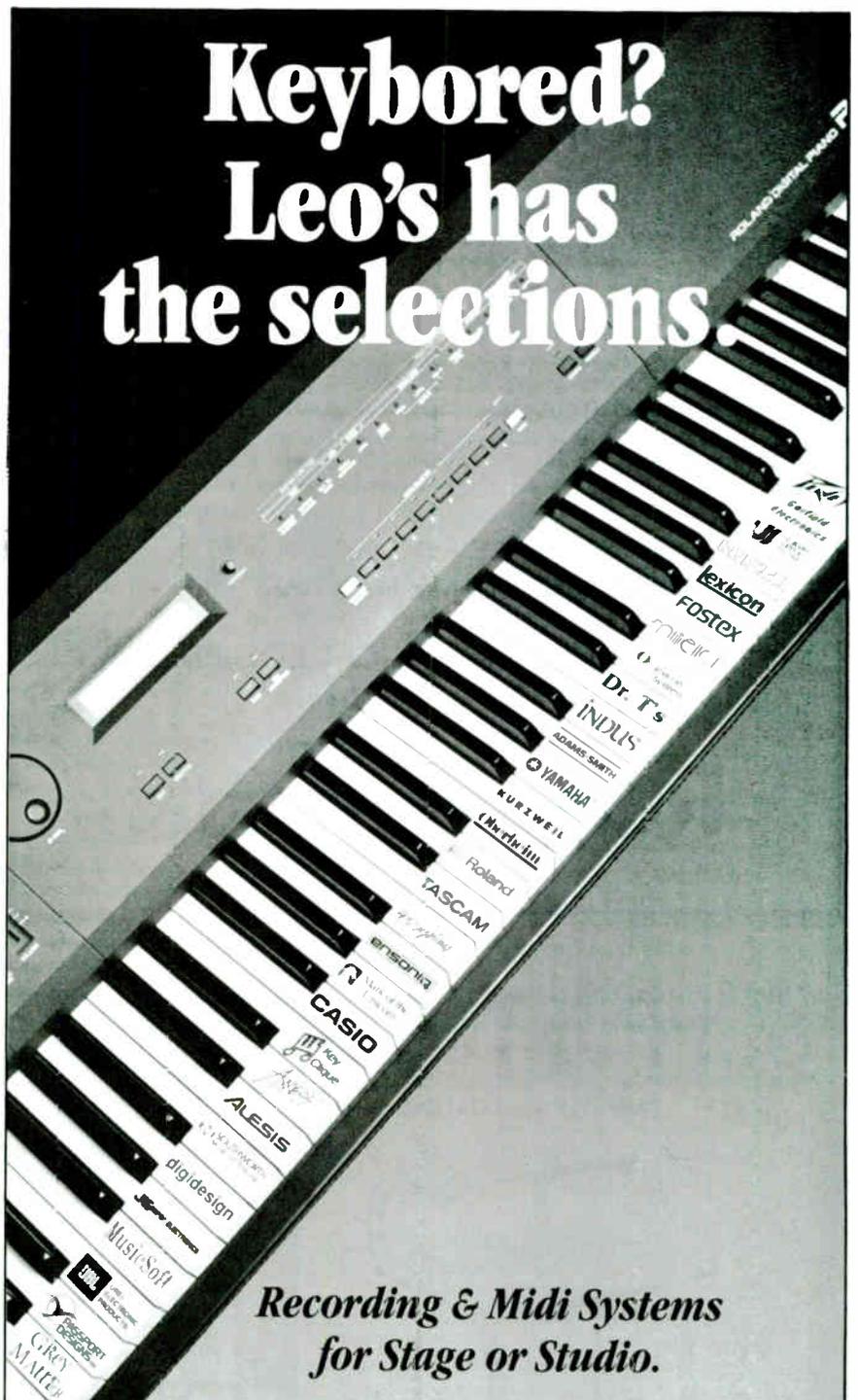
**SEQUENTIAL**  
3051 No. 1st St., San Jose, CA 95134  
(408) 946-5240

Product Name: Studio 440  
Contact: David M. Sesnak, product manager  
Date Product Introduced: August 1986

**Product Description & Applications:** Studio 440 combines into one instrument a 32-sound digital sampler, 40,000 note MIDI sequencer, SMPTE and MIDI based audio/visual post-production controller, and powerful 12-bit digital drum machine. Digital sampling equal to that of the Prophet 2000 in quality but with true stereo panning

—LISTING CONTINUED ON PAGE 162

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## NEW PRODUCTS

### MUSIC PRODUCTS

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—LISTING CONTINUED FROM PAGE 160

and eight individual outputs, one per voice. Sequencer portion parallels controls of a tape transport for ease of use. Introduces MIDI time code as an external clock source for clocking control, linking SMPTE and MIDI via this newly proposed timing standard.

**Basic Specifications & Suggested List Price:** 12-bit linear digital sampling; 32 sound locations; 512k words memory; 3 sampling rates (15.625 kHz, 31.250 kHz, 41.667 kHz); maximum playback bandwidth is 21kHz with 12.6 sec. duration; 8 individual outputs; stereo outs (programmable per voice); thorough MIDI implementation; SMPTE clocking with sub-frame resolution; tempo control with 0.1 BPM resolution; 40,000 note storage; 3.5-inch disk drive on board; SCSI interface for hard disk access; 8 pressure/velocity sensitive pads for drum inputs.

**SEYMOUR DUNCAN**  
601 Pine Ave., Santa Barbara, CA 93117  
(805) 964-9610

**Product Name:** Active EQ Modules  
**Contact:** Ron Colantonio

**Date Product Introduced:** March 20, 1986

**Product Description & Applications:** Designed to enhance the Seymour Duncan Convertible 100 Watt Amp System, two new Active EQ modules are now available. The Hi-Gain EQ and the Classic EQ include built-in four band equalizer with controls at 200, 750, 2k and 5kHz. The hybrid modules allow you to add EQ directly into your amp. Installed post-overdrive, you'll hear a full  $\pm 15$ dB tone range. Extra headroom, when playing with high output pickups, is an added benefit.

**Basic Specifications & Suggested List Price:** Classic EQ module used in the clean channel includes four bands of active EQ at  $\pm 15$ dB, frequency response is 100Hz-6kHz, gain is 30dB at 1kHz. Price \$140. The Hi-Gain EQ includes four bands of active EQ at  $\pm 15$ dB designed for post overdrive. Frequency response—40Hz-30kHz; Gain—30dB at 1kHz. Price \$150.

**SEYMOUR DUNCAN**  
601 Pine Ave., Santa Barbara, CA 93117  
(805) 964-9610

**Product Name:** 60 Watt Convertible Amp  
**Contact:** Ron Colantonio, marketing manager

**Date Product Introduced:** September 15, 1986

**Product Description & Applications:** The 60 Watt Convertible amp is modular in design with two channels that allow you to customize your sounds. High voltage J-FET and MOS-FET preamp eliminates microphonics, EL-34 power amp tubes add warmth. Front-mounted effects loop, 2-spring Accutronics reverb and three-band active tone controls circuit are standard. The custom 12-inch Seymour Duncan speaker is designed to deliver searing leads and crystal clear rhythms. This amp is strong, sturdy and a versatile performer.

**Basic Specifications & Suggested List Price:** Current source output has damping factor fixed at .1 into 4 ohms, .2 into 8 ohms for high peak power, 3 band  $\pm 15$ dB active EQ circuit in post-overdrive; output: 4 ohm/8 ohm/slave output; power @ 5% distortion is 60.9 watts. The rack-mountable head is low profile 3 $\frac{1}{4}$ -inch, 16 gauge steel, price around \$850. Combo is  $\frac{3}{4}$ -inch birch plywood case, price around \$950.

**SOUND IDEAS**  
86 McGill St., Toronto, ONT M5B 1H2  
(416) 977-0512

**Product Name:** Sound Ideas Sound Effects Library  
**Contact:** Brian Nimens, president

**Date Product Introduced:** Late 1985

**Product Description & Applications:** The world's first complete sound effects library available on compact disc. Imagine a library of over 3,000 stereo sound effects that guarantees you timeless state-of-the-art digital sound quality and direct access to any effect in seconds. Storage and handling are no longer major concerns since the full library complete with carrying case is provided on only 28 compact discs—each CD in its own numbered holder and all fully catalogued.

**TELEX COMMUNICATIONS, INC.**  
9600 Aldrich Ave. S., Minneapolis, MN 55420  
(612) 884-4051

**Product Name:** Telex Wireless Guitar System

Contact: Gary Fisher, sales manager

**Date Product Introduced:** 1986

**Product Description & Applications:** The Telex FMR-50G single channel wireless guitar system operates between 150-216 MHz, providing interference-free performance for distances of 500 feet. Four standard frequencies are available and up to seven systems can be operated simultaneously. The FMR-50G receiver includes an adjustable guitar output level and a carefully designed function display for easy audio monitoring. The WT-50G belt-pack transmitter plugs into any electric guitar and may be used with virtually all guitar pick-ups.

**Basic Specifications & Suggested List Price:** Overall system: RF carrier frequency range—150-216 MHz; dynamic range 98 dB (A weighted), 92 dB (unweighted); frequency response (+1 dB) 100-15,000 Hz, (+2 db) 50-15,000 Hz. FMR-50G receiver: RF sensitivity less than: 0.5 microvolts for 12 dB SINAD. WT-50G transmitter: RF power out-50mW maximum, 30 typical. System pro net price: \$850.

### 360 SYSTEMS

18730 Oxnard St., Tarzana, CA 91356

(818) 342-3127

**Product Name:** MIDI Patcher

Contact: Ralph Goldheim, sales manager

**Date Product Introduced:** March 1986

**Product Description & Applications:** MIDI Patcher connects up to 4 MIDI sources to as many as 8 destination through a computer-controlled switching network. Every musician using multiple keyboards and sequencers needs to re-connect his instruments, depending on whether he is recording to a sequencer, or playing back from it. MIDI Patcher does this, and stores 8 scenes of its front panel in nonvolatile memory so it is remember when power is off. A complete LED display shows all input/output connections. \$295 list.

**Basic Specifications & Suggested List Price:** MIDI inputs: 4; MIDI outputs: 8; memory locations: 8; dimensions: 1 3/4 x 19 x 5-inches, rack mount; U.L. listed power supply available for 100, 120, 220, 240 volts; \$295.

### 360 SYSTEMS

18730 Oxnard St., Tarzana, CA 91356

(818) 342-3127

**Product Name:** MIDI Merge Plus

Contact: Ralph Goldheim, sales manager

**Date Product Introduced:** August 1986

**Product Description & Applications:** MIDI merger, data filter, transposer. With MIDI Merge Plus, two MIDI signals can drive a single keyboard at once. Or it can mix keyboard MIDI outputs with sequencer MIDI to allow real time accompaniments. Transpositions can be programmed, and unwanted performance features can be removed from a stored sequencer performance. MIDI Merge Plus is rack mount, and carries a full LED display of all programmed functions.

**Basic Specifications & Suggested List Price:** Inputs: 2, each with a MIDI-thru jack; outputs: 2, identical. MIDI feature filters: pitch bend, modulation, aftertouch, program change, velocity, real time data, system exclusive. MIDI signal modifiers: transpose,  $\pm 2$  octaves; channel bump-up (raises MIDI channel by one number). U.L. listed power supply, and emergency all-notes-off-button. \$295 list

### 27TH DIMENSION, INC.

Box 1561, Jupiter, FL 33468

(305) 746-2222

**Product Name:** Dimension Music Library

Contact: William A. Kirkland, president

**Date Product Introduced:** 1986

**Product Description & Applications:** The Dimension Music Library is a 7-volume set of production music offered on a lifetime blanket (one-time buyout) basis. The library includes a variety of themes including: signatures, industrial, country, rock, ethnic, novelty, up tempo, medium tempo, slow tempo classical, and high tech. A selection of cuts are provided on the Holophonic process for added realism. New releases are added regularly.

**Basic Specifications & Suggested List Price:** Each volume has an average of 40 cuts, and is priced at \$125 on either compact disc or low-noise vinyl pressings. Reel-to-reel copies (at several tape speeds) are also offered. A cassette demo is available upon request.

### UNIQUE MUSICAL PRODUCTS, INC.

2031 S. Seneca, Wichita, KS 67213

(316) 264-5204

**Product Name:** Unique Keyboards

Contact: Bob Wiley, vice president

**Date Product Introduced:** June 13, 1986

**Product Description & Applications:** Unique Keyboards offers a complete line of MIDI products including a synthesizer, expander, and a MIDI master keyboard. The synthesizers feature digi-log technology, combining of digital waveform generators, and analog filters, VCAs, and VCFs. This combination of technologies provides the ability to achieve great acoustic and percussive sounds normally available from only digital synthesizers, yet also provides "fat and warm" string and brass sounds, inherent

with analog synthesizers.

**Basic Specifications & Suggested List Price:** Unique DBK: touch sensitive, digi-log hybrid, 100 patches, split and layer, stereo, easily programmed. Unique DBE: rack mountable MIDI expander, same features as DBK. Unique DBM MIDI master keyboard: 3 split points, built in 4-track MIDI sequencer, velocity and aftertouch, weighted action, tells all other MIDI products where to go.

### UNIQUE MUSICAL PRODUCTS, INC.

2031 S. Seneca, Wichita, KS 67213

(316) 264-5204

**Product Name:** Solton Programmer 24S

Contact: Bob Wiley, vice president

**Date Product Introduced:** January 1986

**Product Description & Applications:** The Programmer 24S is a completely programmable background computer for any type of music. It has four separate sections, digital drums, bass, piano/synth, and organ/strings, each having its own separate MIDI controls. In addition to these sections, there are 48 pre-programmed arrangements to fit most types of music. You may program 64 of your own patterns and up to 63 songs, complete with chord changes may also be stored in the internal RAM. Multiple audio outs, and sync choices are provided.

**Basic Specifications & Suggested List Price:** Programmer 24S: Programmable MIDI background computer,

playable from keyboard or optional bass pedalboard, in real time, or songs may be pre-programmed. Complete MIDI implementation. Perfect for "one man band" or studio use.

### ZOID LIGHT GUITARS

402 The Place Court, #A1, Tampa, FL 33606

(813) 251-3293

**Product Name:** Zoid Light Guitar

Contact: Daniel Rimsa, president

**Date Product Introduced:** October 1, 1986

**Product Description & Applications:** The Zoid Light Guitar is a radically new concept in electric guitar technology. The bodies are molded from a transparent thermoplastic that shines and glows like no wood guitar can. Internal light sources (LEDs, strobes, flat screen TVs, etc.) illuminate the body and transform the guitar into a light sculpture. Bodies may be molded into any shape and tinted any color. Imagination is the only restraint in the design of a Zoid Light Guitar.

**Basic Specifications & Suggested List Price:** Due to the unlimited design possibilities shape, color, visual images and hardware are specified by the client. Top quality hardware is used throughout every guitar with customized onboard electronics to suit any need. Prices start at \$700. Zoid Light Guitars, visually startling, beautifully alluring.



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*Lou and Laurie*

723 7th AVE., NEW YORK CITY 10019 (212) 730-1035

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# N

# EW PRODUCTS

## RECORDING DEVICES AND TAPE

# 1 • 9 • 8 • 7

### ACES (UK) LTD.

Featherbed Lane, Shrewsbury, Shropshire SY1 4NJ  
**Product Name:** MT 24 HS  
**Contact:** A.J. Talbot, sales manager  
**Date Product Introduced:** Mid-1986  
**Product Description & Applications:** MT 24 HS 2-inch, 24-track recorder.  
**Basic Specifications & Suggested List Price:** 9900 pounds.

### ACCURATE SOUND CORPORATION

3515 Edison Way, Menlo Park, CA 94025  
 (415) 365-2843

**Product Name:** AS200-A High Speed Tape Duplicator  
**Contact:** Ronald M. Newdell, president  
**Date Product Introduced:** Late 1985  
**Product Description & Applications:** High speed tape duplicating systems for 1/4-inch full track, 2-track and 4-track reel-to-reel tapes for educational, broadcast and industrial purposes.  
**Basic Specifications & Suggested List Price:** Frequency response: 40 to 18k Hz,  $\pm 2$ dB; program-to-program crosstalk: 75dB or better; distortion: less than 0.2% THD referred to 200nWb/m (electronics only); tape speeds: 60, 120 or 240 ips; wow and flutter: less than 0.08% RMS; reel sizes: 7.5, 10.5, and 14 inches; list price: master, \$11,950; slave, \$7950.

### ADVANCED MUSIC SYSTEMS

AMS Industries Park, Billington Rd.  
 Burnley, Lancs BB11 5ES, England  
 (0282) 57011

**Product Name:** Audiophile  
**Contact:** John Gluck, sales support  
**Date Product Introduced:** To USA May 1986  
**Product Description & Applications:** Audiophile is a record/playback/editing system using Winchester-type hard disks for digital storage. The system has eight outputs and offers up to eight hours of audio storage. Audiophile can provide mono/stereo or multiple channels of record/playback and editing. With its built-in synchronizer Audiophile can be locked to video machines, or provide additional digital tracks for multi-track recorders. Editing is electronic and accurate to microseconds.  
**Basic Specifications & Suggested List Price:** Digital coding: 16-bit linear PCM; sampling rate: 44.1 kHz standard; 50/48/40 kHz switchable; response: 20/20k Hz (48 kHz sampling); dynamic range: +90 dB; RS422 port for peripheral control; SMPTE reader/generator, built-in synchronizer

### AGFA-GEVAERT, INC.

275 North St., Teterboro, NJ 07608  
 (201) 288-4100

**Product Name:** Magnetite 62 "The Next Generation"  
**Contact:** Joe Tibensky, audio product mgr.  
**Product Description & Applications:** The leading audio cassette tape with extremely low noise, super high output, exceptional high end response. The revolutionary Agfa Magnetite formulation for IEC Bias I, 120 microsecond equalization, provides the highest quality music recording for the discerning professional user who demands maximum dynamic range, and the purest high-frequency response. Improved: MOL and SOL to the original Magnetite formula.

### AGFA-GEVAERT, INC.

275 North St., Teterboro, NJ 07608  
 (201) 288-4100

**Product Name:** PE 649  
**Contact:** Joe Tibensky, audio product mgr.  
**Product Description & Applications:** Premium iron oxide, high output, low noise, standard IEC Bias I cassette tape. Agfa's latest introduction planned for fall 1986 features extended headroom in both low and high frequencies. For the most critical and demanding music duplication

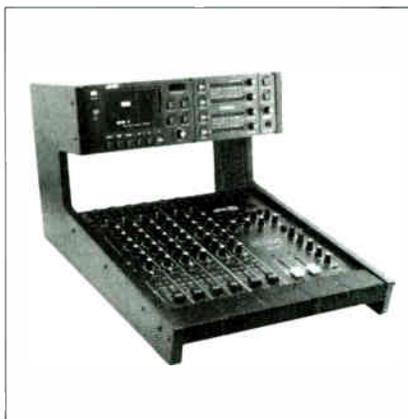


AMPEX CORPORATION  
 Ampex 467 Digital Audio Cassettes

### AMPEX CORPORATION—MAGNETIC TAPE DIV.

401 Broadway, Redwood City, CA 94063  
 (415) 367-3809

**Product Name:** Ampex 467 Digital Audio Cassettes  
**Contact:** Richard A. Antonio, nat'l sales mgr.  
**Date Product Introduced:** December 1985  
**Product Description & Applications:** Ampex 467 Digital Audio Cassettes are manufactured and qualified for 1/4-inch digital PCM applications. The cassettes are available in 30-, 60- and 75-minute play length. The cassettes are specifically designed for digital recording. Checkoff boxes are provided for important recording information and track sheets for listing song titles and times.



AUDIO MEDIA RESEARCH  
 System I

### AUDIO MEDIA RESEARCH

Route 2, Hwy. 503, Decatur, MS 39327  
 (601) 635-2244

**Product Name:** System I  
**Contact:** Larry Blakely  
**Date Product Introduced:** June 1986  
**Product Description & Applications:** 4-track cassette recording system with Dolby B & C, peak hold level indicators, zero stop and zero play, electronic stop watch, overdubber pedal remote (optional), 6x4x2 mixer section (4 patchable inputs provide up to 10 line inputs), monitor

mixer, 28 dB of headroom, 3 band EQ with sweep mid-range, insert "patch" jack, aux send and mute on each input, assignable pan pot, aux master send and assignable returns, internal headphone amp, metal construction.  
**Basic Specifications & Suggested List Price:** Suggested retail price: \$1398.50.



KENNETH A. BACON ASSOCIATES  
 Portable Real Time 2X Duplicator

### KENNETH A. BACON ASSOCIATES

24 Commercial Blvd., Novato, CA 94947  
 (415) 883-5041

**Product Name:** 4-track real time and 2x duplication system packaged for road use  
**Contact:** Kenneth Bacon, president  
**Date Product Introduced:** March 1986  
**Product Description & Applications:** Portable audiophile quality (20-20k Hz) system records multiple original 2- or 4-track masters and will duplicate cassettes in real time or 2x from any audio source. System makes possible on-site audiophile quality duplication.  
**Basic Specifications & Suggested List Price:** M4SRC (Master +4 copy positions) and 6SRC (6 copy positions) modules carry in 17x19 1/2 x 20 1/2 road case. M4SRC list is \$4,035; 6SRC list is \$3,955, combined they make 10 original master recordings and then duplicate at 50 C-45s/hour. A special AES show discount applies to systems purchased before Dec. 1, 1986.



KENNETH A. BACON ASSOCIATES  
 Portable 16x duplication system

**KENNETH A. BACON ASSOCIATES**  
24 Commercial Blvd., Novato, CA 94947  
(415) 883-5041

**Product Name:** Portable 16x duplication system  
**Contact:** George Rosenfeld, acct. exec.

**Date Product Introduced:** September 1986

**Product Description & Applications:** A road case designed to hold two Alpha 2000 series 16x cassette duplicators provides a rugged, shippable system for on-site cassette duplication at location conference recording jobs.

**Basic Specifications & Suggested List Price:** Master and three slave system carries in 17x17½x17½ road case; produces 75 C-60s/hour with frequency response of 30-13kHz. Mono system lists @ \$2925. Call (800) 231-TAPE or (415) 883-5041 for specs and limited time \$500 discount.

alignment display, ADR studio interface, and VDU.  
Suggested price: \$97,500.

**ELECTRO SOUND, INC.**  
160 San Gabriel Dr., Sunnyvale, CA 94086  
(408) 245-6600

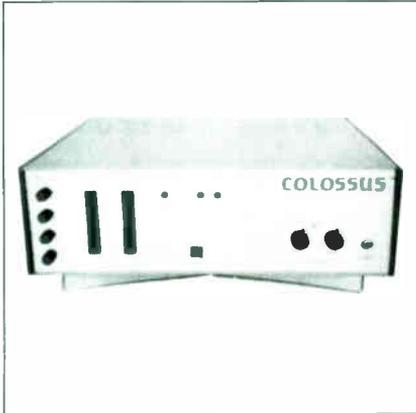
**Product Name:** Electro Sound 4800  
**Contact:** Mark Nevejan, vice president sales  
**Date Product Introduced:** March 1986

**Product Description & Applications:** 480 ips digitally controlled tape duplicating system: Master: 2-speed 480/240 ips master is exceptionally fast and gentle, utilizing two vacuum columns and three DC servos; computer controlled utilizing CRT display to choose particular function and then dial-in parameters. Slave: digitally-controlled, four independent banks for EQ, level, bias, tension, speed which are permanent, exact, and repeatable; patented "fast track head stack," complete head alignment (azimuth, wrap, zenith) in less than 20 minutes; dual capstan.

**Basic Specifications & Suggested List Price:** Dupe ratios: 128:1 @ 3¾ ips, (30-10 kHz, ±2.0dB); 64:1 @ 7½ ips, (30-18 kHz, ±1.5 dB); 32:1 @ 7½ ips, (30-18 kHz, ±1.5 dB). Dolby HX Professional. Suggested list: Master \$40,950 with high speed test signal generator, Slave \$19,950.



**ELECTRO SOUND INC.**  
*Electro Sound 4800*



**BY THE NUMBERS**  
*Colossus*

**BY THE NUMBERS**  
P.O. Box 8359, Incline Village, NV 89450  
(702) 831-4459

**Product Name:** Colossus

**Contact:** Brad S. Miller, president

**Date Product Introduced:** Production model July, 1996

**Product Description & Applications:** Colossus is a 4-channel digital audio processor, 16-bit linear video based system. Sampling frequency is 50 kHz per channel. The unit is 12VDC powered and weighs but 22 lbs. A companion double MS microphone is also available for surround sound recording. A digital standards conversion option (44.1) output is available. Four independent line in/out unbalanced are featured. Initial clients include Telarc International and Imax Systems Corporation. Ideally suited for location archival and post-archival master recording.

**Basic Specifications & Suggested List Price:** Sampling frequency 50 kHz per channel; frequency response 4 Hz-20 kHz (+0, -0.4 dB); distortion (THD) 0.004% at full output; dynamic range and channel separation exceeds 90 dB; quantization 16-bit linear video based data storage; line inputs 10k ohms unbalanced; line output 600 ohms unbalanced. Colossus \$15,000; DSC \$5,000; MS-4; mic \$8,500.

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**FOSTEX CORP. OF AMERICA**  
E-16 16-track recorder

**FOSTEX CORP. OF AMERICA**  
15431 Blackburn Ave., Norwalk, CA 90650  
(213) 921-1112  
Product Name: E-16 16-track recorder  
Contact: Mark Cohen, vice president, sales  
**Product Description & Applications:** 16-track recorder, the perfect post-production tool. Special FET amplifier for sync/repro improves signal-to-noise ratio; with Dolby C NR built-in, S/N figures are compatible with digital recordings. Totally microprocessor controlled, so this machine can run computer-derived edit decision lists. Gapless punch-out prevents a blank space from occurring immediately after the punch-out point. Synchronizer port will interface with all SMPTE based systems.

**FOSTEX CORP. OF AMERICA**  
15431 Blackburn Ave., Norwalk, CA 90650  
(213) 921-1112  
Product Name: E-8 8-track recorder  
Contact: Mark Cohen, vice president sales

**NEW PRODUCTS**  
**RECORDING DEVICES**  
**AND TAPE**  
**1 • 9 • 8 • 7**



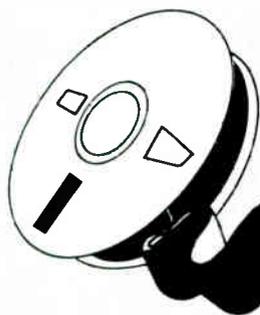
**FOSTEX CORP. OF AMERICA**  
E-8 8-track recorder

**Date Product Introduced:** June NAMM show  
**Product Description & Applications:** Newest evolution of the 8-track recorder, with 10 1/2-inch reels for 30 minutes of recording time at 15ips. Stripe an edge track with SMPTE time code, and you have seven remaining tracks and no need for a guard track. Totally microprocessor controlled so that it can run computer-derived edit decision lists. Gapless punch-out, a synchronizer port, Dolby C, built-in 2-position autolocator.



**INFONICS, INC.**  
Mid-Speed Cassette Duplicator

**INFONICS, INC.**  
2302 E. Michigan Blvd., Michigan City, IN 46360  
(219) 879-3381  
Product Name: Mid-Speed Cassette Duplicator  
Contact: Carol Lant, president  
**Date Product Introduced:** November 1985  
**Product Description & Applications:** The Infonics Mid-Speed cassette duplication system is designed to provide today's duplicator with the quality of real time and the economic productivity and fast turnaround needed to compete in today's market. The Mid-Speed system duplicates both stereo sides at one time on banks of four position slaves to give a productivity capability of 100 C-40 length cassettes per hour per slave with a frequency response of 20-20,000 Hz on Ferric or CrO<sub>2</sub> cassettes.  
**Basic Specifications & Suggested List Price:** Basic specifications include the 20-20,000 Hz frequency response, synchronized speed and flutter stability, cassette or 15 ips (1/4-inch or 1/2-inch) master capability, positive tracking and built-in alignment features, and custom low and high frequency control. Custom design applications available. Suggested list prices from \$9,000.



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**INTERNATIONAL AUDIO INC.**  
2934 Malmo Rd., Arlington Heights, IL 60005  
(312) 956-6030  
Product Name: Alpha 4000  
Contact: Mark Hannemann, chief R&D eng.  
**Date Product Introduced:** December 1985  
**Product Description & Applications:** The Alpha 4000 is a high speed audio tape duplicator that records in stereo. The Alpha 4000 is used by tape duplicators to quickly produce exact copies of church sermons, language lessons, music, speeches and sales presentations, radio broadcasts, radio commercials. The Alpha records on pre-loaded cassettes. A C-60 cassette will be copied on both sides in less than two minutes.  
**Basic Specifications & Suggested List Price:** Duplicating speed: 30 ips; frequency response: 35 Hz-11 kHz ±3dB; S/N ratio within 4dB of master, crosstalk 50dB min.; speed error 0.8% max.; wow and flutter 0.18% RMS max record bias freq: 1.4 MHz; power requirements 115 VAC, 60HZ, 0.8A; dimensions 13 x 14.5 x 8 1/2; shpg. wt. 25 lbs.; mfr. suggested list \$1,995.

**LEXICON INC.**  
60 Turner St., Waltham, MA 02154  
(617) 891-6794  
Product Name: Lexicon Random Access Recorder Editor Processor  
Contact: Virginia Casale, mktg. services  
**Date Product Introduced:** October, 1986  
**Product Description & Applications:** Lexicon RD1: A complete recording and editing system. The RD1 records multi-track audio in digital format onto a high capacity storage disk. Stored audio may be played, processed, and edited using the Lexicon workstation. The Lexicon workstation preserves a comfortable and familiar work environment to facilitate creativity and high productivity. Recorded material is preserved in its original form even after extensive editing and processing. Audio inputs and outputs may be either digital or analog format. Time code, pilot tone and lock up capability to external video and audio transports are provided. Audio material may be transferred to and from the system either by conventional means or by a removable high capacity optical storage disk.  
**Basic Specifications & Suggested List Price:** Price dependent upon configuration. Contact factory for details on price and specifications.

**MAGNEFAX INTERNATIONAL INC.**  
Route 1, Box 764, Rogers, AR 72756  
(501) 925-1818

**Product Name:** 7801 Tape Duplicator, LB82 Tape Duplicator, model 5000 Degausser  
**Contact:** Dennis Tallakson, president  
**Date Product Introduced:** 1986 Los Angeles AES Convention

**Product Description & Applications:** The 1986 AES will see the release of the new Magnefax 7801 duplicator. Based on the highly acclaimed 7574 model, the 7801 features a 24:1 duplication ratio, improved electronics, and a new record head positioning allowing optimum performance and improved alignment. Also introduced at the show will be the new LB82 model featuring a 32:1 ratio and new electronics. The Magnefax line of degaussers will be complemented by the 5000 model. The unit features a twin coil design allowing optimum degaussing pattern, a state-of-the-art user interface, and production line capabilities.

**NAKAMICHI U.S.A. CORP**  
19701 S. Vermont Ave., Torrance, CA 90502  
(213) 538-8150

**Product Name:** MR-2 Professional Cassette Deck  
**Contact:** Michael Wuellner, product specialist  
**Product Description & Applications:** The MR-2 offers uniform response from 20 Hz to 20 kHz in a two head configuration. Features include Nakamichi's silent transport mechanism, 1/4-inch line input and output phone jacks, output level control adjustable from -10 dBv to +4 dBm and Dolby B and C. The deck is rack mountable and the copy out jacks and dual remote ports make the MR-2 ideal for real time tape duplication.

**Basic Specifications & Suggested List Price:** Signal to noise ratio (A weighted RMS) is better than 68 dB with Dolby C noise reduction, better than 62 dB with Dolby B noise reduction (re 3% THD at 400 Hz 2x tape). Wow and flutter is less than 0.06% wtd. RMS, and total harmonic distortion is less than 1% with 2x tape.

**OTARI CORPORATION**  
2 Davis Dr., Belmont, CA 94002  
(415) 592-8311

**Product Name:** CTM-10 Cart Machine  
**Contact:** Steve Hill, marketing communications coordinator  
**Date Product Introduced:** Fall 1986

**Product Description & Applications:** Otari's new CTM-10 series of cart machines continues a commitment to reliability, performance, and value for professional broadcast and production applications. For durability and consistent performance, the CTM-10 has a milled alloy deckplate, DC brushless PLL capstan motor, dynamic braking, and Life+ heads. The CTM-10 has advanced features permitting maximum flexibility in minimum time; front panel adjustable azimuth, independent cue track erase/record, optically sensed automatic splice find, repeat play lockout, multi-frequency test oscillator, and more.

**Basic Specifications & Suggested List Price:** Active balanced inputs/outputs, 3.75, 7.5, and 15 ips internally selectable, mono and stereo heads standard on playback version, external control connector,  $\pm 6\%$  on-board variable speed, HX-Pro bias optimization, LED tape timer display, front panel indicators for all status modes (including all cue tones). CTM-10 (mono/stereo playback): \$2,770, CTM-10-M (mono record/play): \$3,945, CTM-10-S (stereo record/play): \$4,295.



**OTARI CORPORATION**  
DTR-900

**OTARI CORPORATION**  
2 Davis Dr., Belmont, CA 94002  
(415) 592-8311  
**Product Name:** DTR-900  
**Contact:** Steve Hill, marketing communications coordinator  
**Date Product Introduced:** Fall 1986

**Product Description & Applications:** The DTR-900 series of digital tape recorders is the logical extension of Otari's family of high-performance production recorder products, using proven Otari transport technology for high-speed lockup in synchronized production applications. Incorporating the extraordinarily powerful error-correction advantages of the PD format, tapes recorded on the DTR-900 withstand extreme wear and tear with no degradation of the original recorded signal while offering the sonic benefits of 16-bit PCM digital audio.

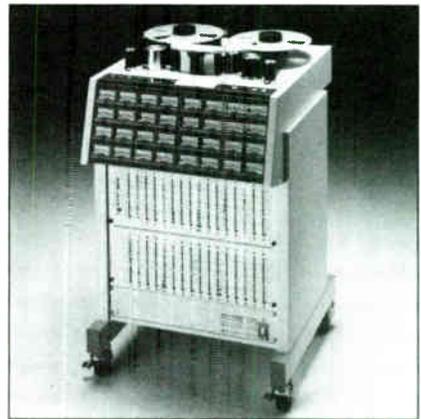
**Basic Specifications & Suggested List Price:** Formats: 32 channel, upgradable 24 and 16 channel versions. I/O channels: 32/24/16 PCM digital audio, 2 aux. digital, 2 analog cueing, 1 time code. Standard features: LED bargraph metering, transformerless balanced I/O, switch selectable pre-emphasis. Optional: plug-in synchronizer, SSL interface, mini-meter panel on locator. Prices: DTR-900-32, \$189,000; DTR-900-24/32, \$167,900; DTR-900-16/32, \$151,950.

**OTARI CORPORATION**  
2 Davis Dr., Belmont, CA 94002  
(415) 592-8311

**Product Name:** MX-80  
**Contact:** Steve Hill, marketing communications coordinator  
**Date Product Introduced:** Fall 1986

**Product Description & Applications:** The MX-80 tape recorder features affordable 32 track capability on a 2-inch format. Otari's proven microprocessor controlled constant tension transport technology with gapless and seamless punch in/out electronics make the MX-80 ideal for professional use in recording studios, video post-production, film scoring, and live remotes. Some standard features: remote session controller, HX-Pro (bias optimization, phase compensation, active balanced inputs and outputs, master bias presets, low frequency compensation, h.m.s./ips/% LED display.

**Basic Specifications & Suggested List Price:** 7.5/15 ips or 15/30 ips speed pairs field convertible, switchable



**OTARI CORPORATION**  
MX-80

+4dBm/-10dBv inputs and outputs, 250/320 nWB/m selectable reference fluxivity,  $\pm 20\%$  on-board crystal referenced variable speed, minimum  $\pm 50\%$  external speed contr., quartz PLL capstan motor, servo controlled DC reel motors, plug-in head assembly. MX-80-24: \$27,950, MX-80-24/32 (upgradable to 32 track): \$30,950, MX-80-32: \$34,950

**SONY PROFESSIONAL AUDIO**  
1600 Queen Anne Rd., Teaneck, NJ 07666  
(201) 833-5200

**Product Name:** TC-D5 PRO II  
**Contact:** Gus Skinas, product manager  
**Date Product Introduced:** 1986 AES  
**Product Description & Applications:** The TC-D5 PRO II is the successor of the TC-D5 stereo cassette field sound acquisition recorder. The TC-D5 PRO II has balanced XLR microphone inputs with attenuation, phono line output, external or internal DC powering, illuminated VU meters, built-in limiter with on/off switch headphone out with monitor level control, peak indicator and Dolby B noise reduction.

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**STUDER REVOX AMERICA**  
Studer A812 Professional Recorder

**STUDER REVOX AMERICA**  
1425 Elm Hill Pike, Nashville, TN 37210  
(615) 254-5651  
Product Name: Studer A812 Professional Recorder  
Contact: Thomas E. Mirtner, vice president and general manager  
Date Product Introduced: October 1986  
Product Description & Applications: The A812 is a mid-sized analog professional recorder designed for a variety of broadcast, video post, and music recording applications. Transport features include four tape speeds, 12½-inch reel capacity, and three servo-controlled motors. A dual-thumbwheel control for shuttle and cue functions facilitates fast editing. An extensive user-programmable function library offers, among other choices, varispeed, library wind, zero locate, rollback and locate start (3 sequences), and up to five locate start memories. The phase-compensated audio electronics are available with transformer or transformerless inputs and outputs. Options include serial interface for external computer control and center-track time code system.

## NEW PRODUCTS

### RECORDING DEVICES AND TAPE

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**Basic Specifications & Suggested List Price:** Specifications available November 1986. Price of 2-channel ¼-inch version is \$8,450.

**STUDER REVOX AMERICA**  
1425 Elm Hill Pike, Nashville, TN 37210  
(615) 254-5651

Product Name: Studer A807 Professional Recorder  
Contact: David Bowman, director of pro dealer products  
Date Product Introduced: October 1986  
Product Description & Applications: The A807 is designed for all applications requiring a combination of high quality and compact size. It is ideally suited for broadcast, location recording and general studio applications. Servo-controlled spooling motors and a brushless DC capstan motor are mounted on a rugged aluminum die-cast chassis. All transport functions and audio alignment parameters are microprocessor controlled, with advanced phase compensation in the audio circuits. Other features include three tape speeds, one-hand cueing, shuttle wheel, phantom powered microphone inputs, monitor speaker, RS-232 serial port, VU meters with +6/+9/+12 LEDs, aluminum splicing block, and excellent ergonomics for editing.

**Basic Specifications & Suggested List Price:** Specifications available November 1986. Price for the basic portable version is \$5,225.

**3M COMPANY, MAGNETIC MEDIA DIVISION**  
Bldg. 223-SN-01, 3M Center, St. Paul, MN 55144  
(612) 736-5209

Product Name: U-matic Digital Audio Tape  
Contact: Rich Collins, audio/magnetic film product manager

Product Description & Applications: ¾-inch PCM audio in 60 and 75 minute lengths, both featuring proprietary 3M Anti-Stat treatment.

**3M COMPANY, MAGNETIC MEDIA DIVISION**  
Bldg. 223-SN-01, 3M Center, St. Paul, MN 55144  
(612) 736-5209

Product Name: 800 Series Audio Open Reel Tape  
Contact: Rich Collins, audio/magnetic film product manager

Date Product Introduced: October 1, 1986  
Product Description & Applications: Four new products featuring dramatic improvements in print-through characteristics (replacing 206, 207, 208, 209 products).

**3M COMPANY, MAGNETIC MEDIA DIVISION**  
Bldg. 223-SN-01, 3M Center, St. Paul, MN 55144  
(612) 736-5209

Product Name: 275 Digital Long Length Tapes  
Contact: Rich Collins, audio/magnetic film product manager

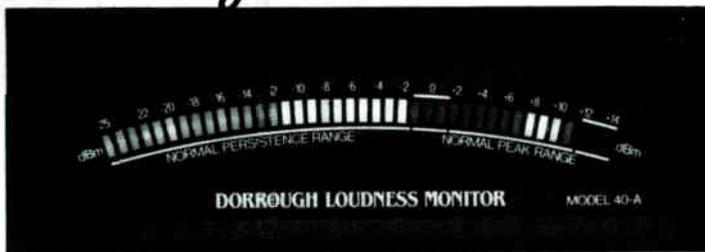
Product Description & Applications: 9600' versions (one hour) of product approved for use on DASH, DMS, and PD systems.

**UHER OF AMERICA**  
7067 Vineland Ave., North Hollywood, CA 91605  
(818) 764-1120

Product Name: Uher CR 160 AV  
Contact: John Belgiojoso, president  
Date Product Introduced: November 1985  
Product Description & Applications: Portable, self-contained cassette recorder with three built-in speakers (two with 3 watt output for high frequencies and one with 10 watts for low end mid-frequencies; Dolby B and C NR; twin-peak reading level meters for record and playback; front-loading; long life Sendust tape head; ALC with two time constants; modular power supply, 110-130/210-240 VAC, 40-80 Hz; "C" cells, Ni-cad, or 9-12 VDC supply; variable speed; all metal construction.

**Basic Specifications & Suggested List Price:** Track system: 2/4-track; tape speed: 4.76 cm/sec (1-7/8 ips); speed deviation: ±1.5% (max.); wow and flutter ±0.10% weighted NAB; frequency response: 30-16kHz (CR, FeCr, Fe); dimensions: 9.3x2.3x7.3-inches (WxHxD); weight: 2.7kg (w/o power supply). Suggested retail: \$899.

# The Dorrrough Loudness Monitor



Model 40-A  
Dimensions: 8¼" X 2⅞" X 6½"

## Simultaneous display of Peak and RMS on one simple-to-read scale.

Equal perceived loudness from program to program can now be achieved. Dual bridging inputs allow for monitoring L+R or L-R.

More and more broadcasters and production houses are discovering the accuracy of this visual display.

## DORROUGH ELECTRONICS

5221 Collier Place  
Woodland Hills, California 91364  
(818) 999-1132

Circle #117 on Reader Service Card



**VESTA FIRE U.S.A., INC.**  
MVR-8

**VESTA FIRE U.S.A., INC.**  
10 McLaren, Bldg. E, Irvine, CA 92718  
(714) 380-7314

Product Name: MVR-8  
Contact: Todd Richardson, president  
Date Product Introduced: May 1986  
Product Description & Applications: The MVR-8 is an 8-track multi-track recorder using standard Sony Beta format. It also uses SMPTE/MIDI sync, switchable dbx noise reduction, and auto locator. For additional operator convenience, the MVR-8 can be used with a Sony remote control and is rack mountable.  
**Basic Specifications & Suggested List Price:** Suggested pro-user net of under \$2,000.

# N

# EW PRODUCTS

## SIGNAL PROCESSING DEVICES

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**ADA SIGNAL PROCESSORS, INC.**  
7303 D Edgewater Dr., Oakland, CA 94621  
(415) 632-1323

**Product Name:** Digitizer 4

**Contact:** David Gonden, marketing rep.

**Date Product Introduced:** January '86

**Product Description & Applications:** The Digitizer 4 is a 16-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. In addition, ADA has loaded 16 "shadow" programs into constant memory which may be recalled at any time, or used right out of the box.

**Basic Specifications & Suggested List Price:** Other features include 16 kHz frequency response, 1024 milliseconds of delay, an LED readout displaying delay time or function, stereo outputs, and a self-diagnostic program which checks the unit during power up. The Digitizer 4 is covered by a 1 year parts and labor warranty.

**ADA SIGNAL PROCESSORS, INC.**  
7303 D Edgewater Dr., Oakland, CA 94621  
(415) 632-1323

**Product Name:** Pitchtraq

**Contact:** Lorry Marcus, nat'l sales mgr.

**Date Product Introduced:** January '86

**Product Description & Applications:** The Pitchtraq produces all harmonizing effects within a two octave range, including harmony lines, octave shifts, synthesized textures, de-tuned chorusing, and harmonic alteration. ADA's advanced PCM circuitry insures superb audio quality for instrument, sound reinforcement, and professional recording applications. An on-board computer allows full programming of all 16 effects, including sweeps, mix, regeneration, and pitch change.

**Basic Specifications & Suggested List Price:** Other features include 15 kHz frequency response, an LED readout which displays pitch change in cents, ratio, or standard musical interval, and a self-diagnostic program which checks the unit during power-up. The Pitchtraq is covered by a one year parts and labor warranty. Suggested list price is \$599.95.

**Product Description & Applications:** The AKG ADR 68K is a full featured, remote controlled digital signal processing computer. In its initial version, its software produces a professional digital reverb and a 16-bit digital sampler. Future software will add many special effects and additional reverb programs. The ADR has full MIDI implementation (dynamic parameter control will be added in the level 2 software), stereo splits, and eight seconds of sampling time at 15 kHz (32 seconds will be available in 1987) which can be broken up into four segments. Regular software upgrades will be available.

**Basic Specifications & Suggested List Price:** Two inputs, 4 outputs (XLR). Program-dependent bandwidth, switchable between 15 and 20k Hz, variable sampling rate between 32 and 48k Hz, 16-bit PCM conversion, 86+ dB dynamic range. 256K internal memory capacity. U.S. list: \$4,995.

**ANT TELECOMMUNICATIONS INC.**

211 Perry Parkway, Suite 4, Gaithersburg, MD 20877  
(301) 670-9777

**Product Name:** telcom c4S

**Contact:** Rick Mattei, sales mgr./commercial products

**Date Product Introduced:** June 25, 1986

**Product Description & Applications:** telcom c4 noise reduction is available for use with audio and video tape recorders, STLs, satellites, and line transmissions. The system greatly reduces tape distortion, echos, crosstalk, and modulation noise while expanding headroom and improving signal-to-noise ratios. The new c4s card will provide up to a 40 dB gain in dynamic range, giving analog tape machines performance equal to 18-bit digital.

**Basic Specifications & Suggested List Price:** Gain in dynamic range: approx. 40 dB; total harmonic distortion: less than or equal to 2%; frequency response: 20 Hz-25 kHz (-2 dB), four frequency bands; crossover frequencies 215 Hz, 1450 Hz, 4.8 kHz; center frequencies: 55 Hz, 550 Hz, 2.5 kHz, 15 kHz; attack times (30 dB level variation): 350, 53, 22, 8  $\mu$ s; release times: 2200, 320, 50, 16 ms; sloped, 1:1.5 dB linear, 1:1.7 dB linear.

**CIRCUIT RESEARCH LABS, INC. (CRL AUDIO)**

2522 W. Geneva Dr., Tempe, AZ 85282

(602) 438-0888/(800) 535-7648

**Product Name:** Dynalex DX-1 and DX-2

**Contact:** Ray Updike

**Date Product Introduced:** Re-introduced by CRL 1986

**Product Description & Applications:** The Dynalex is a single-ended noise reduction unit for both mono and stereo applications; provides up to 30 dB of noise reduction, with brilliance control for upper harmonic amplification and variable low pass sliding filter to greatly reduce the level of the noise that is aurally perceived.

**Basic Specifications & Suggested List Price:** Suggested list: DX-1, \$700; DX-2 \$800. Specifications: signal-to-noise: 90 dB; frequency response: 20-20 kHz  $\pm$  5 dB (ref. 400 Hz); brilliance control: adjustable up to 10 dB boost at 20 kHz; dynamic range: 110 dB; distortion: (20-20 kHz bandwidth) 0.1% THD typical.

**CLARITY**

Nelson Lane, Garrison, NY 10524

(914) 424-4071

**Product Name:** MIDI/XLV

**Contact:** Gregory Kramer, president

**Date Product Introduced:** September, 1986

**Product Description & Applications:** The Clarity MIDI/XLV uses MIDI control of Lexicon 224XL, 480L and all devices that receive a control voltage input (DDLs, compressors, etc.). Automation tool for the entire studio using MIDI to dynamically control all LARC parameters, change programs, and either preset or actively alter compression ratios, delay times, etc. Positive and negative scaling of input by percentage and special scaling factors for trigger output and logarithmic automation by VCAs. MIDI output derived from LARC faders for automation



**CLARITY  
MIDI/XLV**

from the LARC and use of LARC as MIDI remote.

**Basic Specifications & Suggested List Price:** Dimensions: 12" x 9" x 3". Plugs in between LARC and mainframe; no modifications necessary. MIDI input recognizes complete MIDI specification. MIDI output from LARC faders and system exclusive. Eight control voltage outputs, 0 to +10V. Any MIDI input can be scaled and sent to any or all LARC or analog destinations. 99 programs of 32 patches each, including 16 factory presets and 83 user programs. Price: \$1,295 (factory direct only). See us at both 1013.

**DALBEC AUDIOLAB**

Red Mill Road, Rensselaer, NY 12144

(518) 477-7873

**Product Name:** DBC Interface Series

**Contact:** John Wesson, project director

**Date Product Introduced:** June, 1986

**Product Description & Applications:** DBC releases versions of popular modular distribution amplifiers for specialty use. Compact disc player-to-line balanced and EIA tape record/play interface—as with DBC distribution amplifiers, the interface units are modular, easily serviced designs, meeting or exceeding digital requirements for noise and distortion. Extensive R.F. rejection design guarantees performance in even stubborn R.F. environments. Both the two-way tape interface and CD player interfaces are available in one-rack space or wall mount configurations with barrier strip or XLR balanced sections.

**Basic Specifications & Suggested List Price:** Typical specs: CD interface unit EIA-to-balanced line section, input impedance 25k ohms; output impedance 600 ohms; active balanced; input level -20 to +20 dBm; output level +24 dBm; hum and noise better than 80 dBm; distortion less than 0.005%. List prices: CD interface, \$189; 2X2 tape deck interface, \$229.

**DATACUBE INC.**

4 Dearborn Rd., Peabody, MA 01960

(617) 535-6644

**Product Name:** MaxVideo—Euclid DSP module

**Contact:** Susan Solomon, marketing manager

**Date Product Introduced:** June, 1986

**Product Description & Applications:** Euclid is a digital signal processor (DSP) module for the VMEbus and MAXbus. It may be used alone, or in conjunction with other MaxVideo modules from Datacube. Euclid is based on the ADSP-2100 DSP microprocessor from Analog Devices. As a single VMEbus DSP engine, Euclid is 10-100 times  
—LISTING CONTINUED ON NEXT PAGE



**AKG ACOUSTICS, INC.**  
ADR 68K digital reverb & effects

**AKG ACOUSTICS, INC.**

77 Selleck St., Stamford, CT 09602

(203) 348-2121

**Product Name:** ADR 68K digital reverb & effects

**Contact:** Dave Ogden, sales mgr., Digital Products

**Date Product Introduced:** September, 1986



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If ears could talk, they'd scream for SONEX.

The only patented acoustic foam with a specially sculptured anechoic design can replace traditional studio materials for a fraction of the cost. SONEX absorbs sound, controls reverb, eliminates stray reflections, and kills standing waves. What's left is true sound. Your ears know. Listen to them. Simple to apply and economical to buy, SONEX blends with almost any decor and looks clean, sharp, professional. Call or write us for all the facts and prices.

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 RECORDERS, INC.

4031 Guadalupe  
 Austin, TX. 78751

**512-454-8324**

Circle #119 on Reader Service Card

## NEW PRODUCTS

### SIGNAL PROCESSING DEVICES

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—LISTING CONTINUED FROM PAGE 169

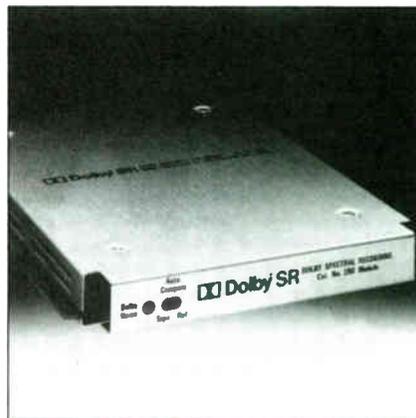
faster than a Motorola 68000 CPU.  
**Basic Specifications & Suggested List Price:** Euclid contains an eight MIPS ADSP-2100 CPU, 32k words data storage, 32k words program storage, MAXbus and VMEbus interfaces, all on a single dual-height VMEbus card. Single quantity price is \$5,000. A "C" compiler is available.

**DOD ELECTRONICS**  
 5639 South Riley Lane, Salt Lake City, UT 84107  
 (801) 268-8400

**Product Name:** Audio Logic SC 31 graphic equalizer  
**Contact:** Dean Stubbs, assistant marketing manager  
**Date Product Introduced:** September, 1986  
**Product Description & Applications:** The Audio Logic SC 31 is a single-channel graphic equalizer offering 31 bands of equalization. The equalizer offers 12 dB of boost and cut, or a 18 dB cut-only mode. The SC 31 features 31 one-third octave ISO frequency centers, variable frequency high pass and low pass filters, an input level control, and three different types of connections: Cannon XLR-type connectors, a barrier strip, and 1/4-inch tip-ring-sleeve phone jacks, for balanced or unbalanced audio systems.  
**Basic Specifications & Suggested List Price:** Frequency response: 20 Hz to 20k Hz, ±0.5 dB; harmonic distortion: 0.006% @ 1k Hz; S/N: greater than -90 dB; 3.5" h x 19" w x 6.75" d, 6 lbs. (2.7kg); optional security cover; suggested retail: \$499.95.

**DOD ELECTRONICS**  
 5639 South Riley Lane, Salt Lake City, UT 84107  
 (801) 268-8400

**Product Name:** Audio Logic SC 30 graphic equalizer  
**Contact:** Dean Stubbs, assistant marketing manager  
**Date Product Introduced:** September, 1986  
**Product Description & Applications:** The Audio Logic SC 30 dual-channel graphic equalizer offers two channels each with 15 bands of equalization of 12 dB boost and cut. The SC 30 offers 15 two-third octave ISO frequency centers per channel, variable frequency high pass and low pass filters, input level controls, and three different types of connections: Cannon XLR-type connectors, a barrier strip, and 1/4-inch tip-ring-sleeve phone jacks, for balanced or unbalanced audio systems.  
**Basic Specifications & Suggested List Price:** Frequency response: 20 Hz to 20k Hz, ±0.5 dB; harmonic distortion: .006% @ 1k Hz; S/N: greater than -90 dB; 3.5" x 19" w x 6.75" d; 6 lbs. (2.7kg); optional security cover; suggested retail: \$499.95.



**DOLBY LABORATORIES, INC.**  
*Dolby Spectral Recording (SR)*

**DOLBY LABORATORIES, INC.**  
 100 Potrero Ave., San Francisco, CA 94103  
 (415) 558-0200

**Product Name:** Dolby Spectral Recording (SR)  
**Contact:** Stacey Rehm, nat'l sales manager  
**Date Product Introduced:** March 4, 1986  
**Product Description & Applications:** Dolby Spectral Recording provides audible signal integrity and usable

dynamic range superior to any other recording method. The performance of Dolby SR with professional analog tape recorders stands up to extensive scrutiny; Dolby SR master recordings sound exactly like line-in. The Cat. No. 280 and Cat. No. 431 Dolby SR modules are designed for simple evaluation with operational use without major studio equipment changes or capital expenditures. The new Cat. 431 Dolby SR module fits Dolby SP and XP multi-channel frames.

**Basic Specifications & Suggested List Price:** Cat. No. 280 Dolby SR module: achievable dynamic range at 15 ips, 96 dB; fits Dolby Model 360, Model 361 and M-series frames; \$750 per module. Model 360-SR \$1,250; Model 361-SR \$1,500. Cat. No. 431 Dolby SR Module: achievable dynamic range at 15 ips, 96 dB; fits Dolby SP- and XP-series multi-channel frames; \$875 per module. XP24-SR \$19,960.

**DREW ENGINEERING CO.**  
35 Indiana St., Rochester, New York 14609  
(716) 544-3337, 288-6700

**Product Name:** XPS II

**Contact:** Joseph Barone, sales manager  
**Date Product Introduced:** October, 1986

**Product Description & Applications:** The XPS II digital processor provides special shaping functions and multi-purpose signal processing; stored sound shapes can be triggered from MIDI, audio, front panel or externally—a full selection of shapes are supplied and the user can create shapes and store them; real time shaping of one sound with another; multi-purpose digital signal processing that emulates limiters, etc. User can create special signal processing functions and store them.

**Basic Specifications & Suggested List Price:** 16-bit stereo digital signal processor. 50 kHz bandwidth. THD: 0.005%. S/N ratio: -98 dB. Slew rate: 9 volts/microsecond. Fully programmable. MIDI triggering of shapes and program control. Controls and indicators: keyboard (24 keys), backlit display, parameter control, five bargraph level & status meters.

**EVENTIDE, INC.**  
1 Alsan Way, Little Ferry, NJ 07643  
(201) 641-1200

**Product Name:** SP 2016—MIDI implementation

**Contact:** Gil Griffith, sales manager

**Date Product Introduced:** August, 1986

**Product Description & Applications:** MIDI implementa-

tion for the SP2016 is available with new units. Existing SP2016s can also be retrofitted with MIDI capability with the purchase of a PC-25 ROM expansion board and MIDI implementation package.

**Basic Specifications & Suggested List Price:** \$495—for MIDI option, \$495 for PC-25 upgrade—Both purchased together, \$949.

**EVENTIDE, INC.**  
1 Alsan Way, Little Ferry, NJ 07643  
(201) 641-1200

**Product Name:** BD 980

**Contact:** Gil Griffiths, sales manager

**Date Product Introduced:** August, 1986

**Product Description & Applications:** Timesqueeze® time compression capabilities up to 10 seconds. Stereo radio talk show delay with 10 seconds of stereo delay. Dramatically enhanced catch-up; "ramp-to-zero" mode lets you out of delay effortlessly, "wait and exit" feature plays out delay and dumps to real time, remote control, at-a-glance readable display.

**Basic Specifications & Suggested List Price:** Two channels; 20-20,000 Hz; 90 dB dynamic range; 16-bit PCM circuitry; 50 kHz sampling rate. List price: \$5,495.

**FIRST ORDER EFFECTS**  
206 West 106th St., Suite 27, New York, NY 10025  
(212) 864-5491

**Product Name:** Digital effects programs for the Eventide SP2016 signal processor.

**Contact:** Steve Hoge

**Date Product Introduced:** Spring 1986

**Product Description & Applications:** New effects programs in ROM for the SP2016 digital reverb/signal processor, including a variety of special-purpose reverbs, early-reflection and ambience programs, a tempo-tracking delay line, "sympathetic string" resonators, a psycho-acoustic exciter, envelope-controlled filtering and echo effects. Split programs can execute dual effects on a single SP2016. Custom programming available for special-purpose signal processing applications.

**Basic Specifications & Suggested List Price:** Requires Eventide SP2016 w/generation 2 software. MIDI-compatible with SP2016 MIDI interface. New effects ROMs are priced from \$75 to \$200.

**FM ACOUSTICS LTD.**  
Tiefenholstrasse 17, CH-8820 Wädenswil  
(01) 780 64'44

**Product Name:** FM 236/4 Linear-Phase Electronic Crossover

**Contact:** Manual Huber

**Date Product Introduced:** May, 1986

**Product Description & Applications:** Using FM Acoustics unique proprietary linear-phase filters. This new monophonic crossover has been designed for multi-way amplification of studio monitor systems as well as for all critical applications in professional sound reinforcement. Six independent modules for individual setting of low-pass and high-pass crossover points to the drivers optimal frequency ranges are located behind a protective cover plate. For each frequency band there are separate recessed level controls, a signal presence as well as a peak LED indicator, a limit on/off switch with the corresponding limit on LED indicator and a threshold control for retrofit at any time without special tools.

**Basic Specifications & Suggested List Price:** FM Acoustics' proprietary linear-phase filters achieve an attenuation of 36 dB/octave and smooth blending of drivers. Common mode rejection: minimum 75 dB; discrete pure class-A balanced output stage frequency (necessitating hand-selection of components to ±0.25% tolerance); rise time: 500 nano-seconds (0.5 μsec). Price: depending on version, \$2,998 and \$3,498.

## MEET THE MIX!

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**FOCUSRITE, LTD., U.S.A.**  
Focusrite—input signal amplifiers

**FOCUSRITE, LTD., U.S.A.**  
(West Coast Rep: Audio Intervisual Design)  
1100 Wheaton Oaks Ct., Wheaton, IL 60187  
(312) 653-1919  
Product Name: Focusrite—input signal amplifiers  
Contact: Dan Zimbelman  
Date Product Introduced: September, 1986  
Product Description & Applications: Introducing a new line of signal processing modules designed by Mr. Rupert Neve. Featured are input signal amplifiers ISA 85110 and ISA 85109, modules consisting of microphone preamp, line input, four and three band equalizers, and steep filters. Combining ultimate signal integrity with great design reliability, ISAs are supplied in outboard rack frames and are designed to fit ISEP frame systems used on certain Neve and other consoles.  
Basic Specifications & Suggested List Price: Bandwidth: tailored to -3 dB at 100 kHz; max output: +26 dBm; noise: input, 127 dBu; output, 93 dBu; distortion: input signal +10 dB - 0.02%. List prices: ISA 85110, \$2,500; ISA 85116, \$2,300; ISA 85109, \$1,750.

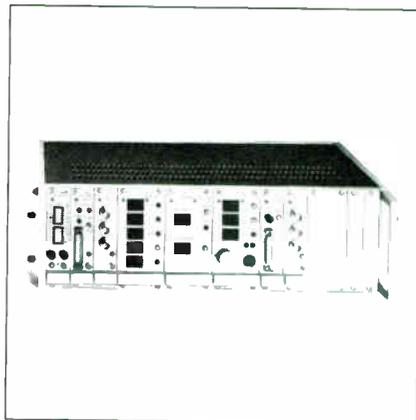
**FURMAN SOUND, INC.**  
30 Rich St., Greenbrae, CA 94904  
(415) 927-1225  
Product Name: RV-3 digital reverberation system

## NEW PRODUCTS

### SIGNAL PROCESSING DEVICES

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Contact: Diane Poole, director of marketing  
Date Product Introduced: September, 1986  
Product Description & Applications: Human-engineered digital reverb that uses rotary switches to give an easy visual indication of the program selected. Offers two plates, two rooms, two halls, and gated and reverse reverb effects, with four decay times for each. Includes pre-delay, position, and hi and lo rolloff modifiers. Has front panel mix controls and footswitch jack. Outputs are stereo, and there are bypass, in/out level, and ground lift switches; and a bar-graph level meter.  
Basic Specifications & Suggested List Price: 79 dB signal-to-noise ratio; 11 kHz bandwidth in reverb channel, 20 kHz direct; suggested list price: \$599.



**HARMONIA MUNDI ACUSTICA**  
BW 102/21 digital equalizer

**HARMONIA MUNDI ACUSTICA**  
c/o Gotham Audio Corporation  
1790 Broadway, New York, NY 10019-  
(212) 765-3410  
Product Name: BW 102/21 digital equalizer  
Contact: Russell O. Hamm, president  
Date Product Introduced: AES Convention, 11/86  
Product Description & Applications: The BW 102/21 modular equalizer is a new plug-in module for the Harmonia Mundi Acustica BW 102 digital interface mainframe. Together with existing modules for digital level control, filtering and sampling frequency conversions, the system allows transfers in the digital domain between all machine formats. The new module allows the recording engineer the opportunity to alter the sound through equalization changes while remaining in the digital domain. This eliminates the quality degrading effects of A to D and D to A conversion which are necessary with analog processing.  
Basic Specifications & Suggested List Price: Four tuneable frequency bands with 15 dB boost and cut, variable cue controls, high pass and low pass filters with adjustable roll-off. Two signal changes with independent controls for each channel. User memory for preset equalization changes during program.

**KORG U.S.A. INC.**  
89 Frost Street, Westbury, NY 11590  
(516) 333-9100  
Product Name: SDD3300 triple digital delay  
Contact: Mitch Colby, VP prod. development  
Date Product Introduced: 11/86  
Product Description & Applications: Three independent digital delays in double space rack mount package. Programmable with full MIDI implementation. Each delay features six channel input and output mixers as well as low cut filter, high cut filter, two LFOs and separate control of the phase relationship between delays and LFOs. Independent inputs and outputs and sampling function.  
Basic Specifications & Suggested List Price: Each delay features 0.5 to 512ms delay time; one full second in sampling mode; and 16 kHz frequency response. MIDI in, out, thru jacks. LCD display for program and parameter values. LED displays for inputs and programmable six channel input and output mixers. \$1,049.95.

**KORG U.S.A. INC.**  
89 Frost Street, Westbury, NY 11590  
(516) 333-9100

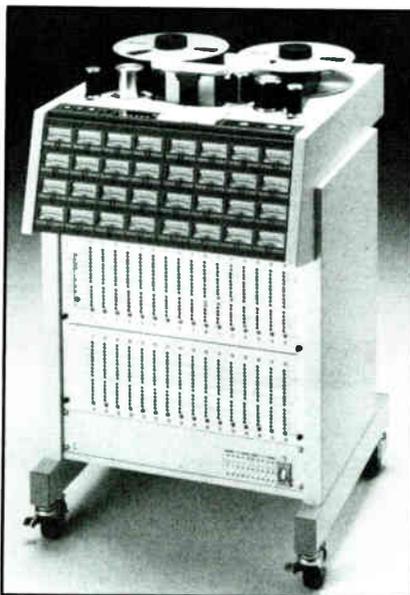
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THE MOST AFFORDABLE 2" MULTI-TRACK: 24 TRACKS \$24,950.00

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- Available also as 24 tr. pre-wired for 32 tr., or 32 tr.
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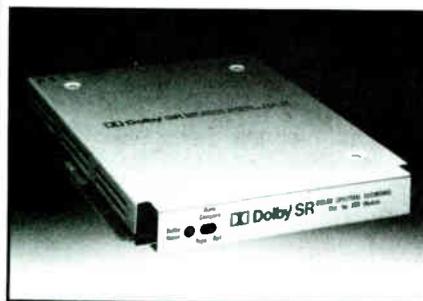
**1-800-323-0281**  
IN MINNESOTA CALL 612-729-8305



## DOLBY'S SPECTRAL RECORDING (SR) SYSTEM

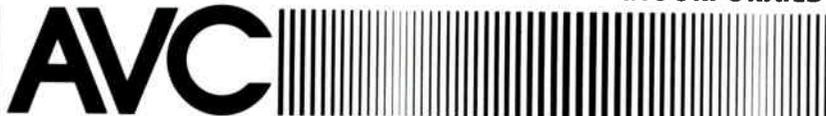
### A TOTALLY NEW RECORDING PROCESS:

- Largest usable dynamic range of any available method of recording
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- Can be used with any tape recording format
- Available as a retro-fit for Dolby A mainframes
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Circle #121 on Reader Service Card

**Product Name:** DRV1000 digital reverb  
**Contact:** Mitch Colby, VP prod. development  
**Date Product Introduced:** 11/86  
**Product Description & Applications:** Cost effective digital reverb with eight patterns including gate, reverse gate, two plates, two halls and eight decay times per pattern. Controls include input level with LED indication, mix, high frequency damping switch, bypass switch, pattern and time. Footswitch control of bypass and longest decay time. Single rack space.  
**Basic Specifications & Suggested List Price:** 16 bit A/D and D/A converters. 10 kHz frequency response. Gate time: 200-600ms. Reverb time: 0.7 sec to 10 sec. List price: \$449.95.

**LAKE PEOPLE, FRIED REIM**  
 Rosgartenstr. 13, 7750 Konstanz, West Germany  
 FRD 07531 24428

**Product Name:** Unigate V3  
**Contact:** Lake People, Fried Reim  
**Date Product Introduced:** August, 1986  
**Product Description & Applications:** The Unigate V3 is an expander/noise gate for use with PA and recording equipment. Modulation problems are avoided by wide ranges of attack and decay. A keying facility looks for external trigger sources. Signal processing is made by a high-quality VCA. Gain reduction up to 50 dB is shown on a ten segment LED display. The unit comes modular to fit in the 19-inch rack SR 9 with space for nine modules.  
**Basic Specifications & Suggested List Price:** Input, key level: electronic sym, max 20 dBm; output level: asym, max 20 dBm; frequency range: 10 Hz -50 kHz  $\pm 1$  dB; distortion: 1: 0.1%; dynamic: gt 100 dB; gain reduction: 0-80 dB; threshold: -40 to +20 dBm; ratio: 1:1.1 to 1:100; attack (20 dB increase): 0.02-20 msec; decay (-20 dB decrease): 0.04-10 sec; dimension: W40 x H129 x D190 mm; price: \$550.

**LAKE PEOPLE, FRIED REIM**  
 Rosgartenstr. 13, 7750 Konstanz, West Germany  
 FRD (07531) 24428

**Product Name:** Compressor/limiter V2  
**Contact:** Lake People, Fried Reim  
**Date Product Introduced:** April, 1986  
**Product Description & Applications:** The compressor/limiter V2 is a protective device to prevent following units from clipping or create special sound effects. The unit comes modular to fit in the SR 9 rack with space for nine modules. Two limiters can be linked to a stereo version with excellent tracking. All significant parameters as input, output, attack, decay and ratio are independently adjustable in wide ranges. The gain reduction (up to 20 dB) is shown on a 10 segment LED display.  
**Basic Specifications & Suggested List Price:** Input level: electronic sym, 20 dBm; output level: asym, 20 dBm; max gain: 40 dB; frequency range: 20 Hz-20 kHz  $\pm 1$  dB; distortion: 0.5%; S/N: gt 80 dB; attack: 20-800 micro sec; decay: 50-1000 milli sec; ratio: 1.4 to 1:20; dimensions: W40 x H129 x D 190 mm; price: \$450.

**LEXICON INC.**  
 60 Turner St., Waltham, MA 02154  
 (617) 891-6790

**Product Name:** Lexicon 480L digital effects system  
**Contact:** Virginia Cassle, marketing services  
**Date Product Introduced:** April, 1986  
**Product Description & Applications:** The Lexicon 480L digital effects system offers new possibilities in creative digital signal processing. Time-based effects, four-voice sampling, reverse sampling and reverb effects such as Varoom, Brick Wall and 10W-40 can be created. Stereo digital inputs/outputs and on-board digital mixing allows manipulation of digital audio without any analog interface. The 480L functions as two independent machines which can be configured in mono split, stereo split or stereo cascade. An NVM-Cart is used to store up to 50 user program set-ups for creating libraries of effects and reverbs. The system is fully automated through Dynamic MIDI™ for real time parameter and program changes. The Lexicon Alphanumeric Remote Console (LARC) is the control interface and is capable of simultaneously controlling the 480L and a 224XL reverb. Fully modular construction allows for hardware and software options.  
**Basic Specifications & Suggested List Price:** Audio inputs: 2; levels: +6 to +28 dBm, electronically balanced; impedance: 30 kilohms; audio outputs: 4; levels: +6 to +24 dBm, transformerless balanced (600 ohms); impedance: 33 ohms; frequency response: 20 Hz to 20 kHz, (+0.5 dB, -1 dB); dynamic range: 100 dB typical, 96 dB minimum, 22.4 kHz unweighted; sampling rate: 48.0 kHz/44.1 kHz, selectable. Prices: 480L mainframe, \$8,200; LARC remote control, \$1,500.

**MICROAUDIO**  
 4438 S.W. Hewett, Portland, OR 97221  
 (503) 292-8896

**Product Name:** Model 2800  
**Contact:** Gene Rimkeit, president  
**Date Product Introduced:** January, 1986  
**Product Description & Applications:** Computer controlled automatic equalization system. One third octave  
 —LISTING CONTINUED ON NEXT PAGE

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 30 Rich Street  
 Greenbrae, CA 94904  
 (415) 927-1225

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—LISTING CONTINUED FROM PAGE 173

equalizer. One-third octave real time analyzer. Instantaneously stores, recalls and averages EQ and RTA curves. Automatically equalizes to any pre-determined curve. Down-loads into EQ POD.

**Basic Specifications & Suggested List Price:** List price: \$2,499. Memories: 24, on board, non-volatile. Filters: 2nd order, combining on ISO centers. Boost-cut range:  $\pm 12$  dB, in 1 dB steps. S/N: 90 dB. THD: less than 0.01%, 20-20 kHz. IMD: less than 0.005%, 20-20 kHz. Frequency response: 20 Hz to 20 kHz, better than  $\pm 0.5$  dB.

**MICROAUDIO**

4438 S.W. Hewett, Portland, OR 97221  
(503) 292-8896

**Product Name:** EQ POD 1.0; EQ POD 1.1; EQ POD 1.2  
**Contact:** Gene Rimkeit, president  
**Date Product Introduced:** January, 1986  
**Product Description & Applications:** 1.0 POD is a tamper-proof, 1/3 octave equalizer, programmed by the model 2800. Stores one EQ curve. Battery back-up. 1.1 POD is a tamper-proof 1/3 octave equalizer, programmed by the model 2800. Stores 1 EQ curve. Non-volatile memory. 1.2 POD is a tamper-proof 1/3 octave EQ, programmed by Model 2800. Stores up to eight EQ curves in non-volatile memory. Recalls curves only with three digital access code. PODs are completely tamper-proof as they can be adjusted ONLY by the model 2800.

**Basic Specifications & Suggested List Price:** List prices: 1.0 POD—\$499; 1.1 POD—\$599; 1.2 POD—\$649. Filters: 2nd order, combining on ISO centers. Boost-cut range:  $\pm 12$  dB, in 1 dB steps. S/N: better than 90 dB. THD: less than 0.01% 20-20 kHz. IMD: less than 0.005%, 20-20 kHz. Frequency response: 20 Hz to 20 kHz better than  $\pm 0.5$  dB. All PODs are single rack space, 1/3 octave equalizers with terminal strip connections.

**ORBAN ASSOCIATES INC.**

645 Bryant St., San Francisco, CA 94107  
(415) 957-1067

**Product Name:** Programmable Mike Processor  
**Contact:** Sid Goldstein, marketing manager  
**Date Product Introduced:** November, 1986  
**Product Description & Applications:** The Programmable Mike Processor combines the features of a compressor/limiter, 3-band parametric equalizer, noise gate/compressor gate, and de-esser in a fully programmable rack mount unit, capable of storing up to 16 complete settings in memory. A built-in mic preamp allows easy direct interface to the unit. The primary application of the unit is to allow storage of complex processing functions on voice which can then be instantly recalled, such as in disc jockey rotations.

**ORBAN ASSOCIATES INC.**

645 Bryant St., San Francisco, CA 94107  
(415) 957-1067

**Product Name:** "The Co Operator"  
**Contact:** Sid Goldstein, marketing manager  
**Date Product Introduced:** November, 1986  
**Product Description & Applications:** The Co Operator combines a gated compressor/leveler and high frequency limiter in a user-friendly, single rack-mount package. The high frequency limiter is useful in cassette mastering while the defeatable clipper offers positive microwave STL protection in broadcast. This is an ideal package for non-technical operators in recording, video post-production, and broadcast.

**OWL AUDIO PRODUCTS, INC.**

P.O. Box 3122, Linden, NJ 07036  
(201) 925-0650

**Product Name:** Owl Multifilter  
**Contact:** Tom Owen  
**Date Product Introduced:** 1985  
**Product Description & Applications:** The Owl Multifilter is a system of active notch filters designed to aid in removing unwanted frequencies or noise from program material. Each notch filter can be precisely tuned to the frequency to be removed and selectively switched in or out. The high frequency cut filter is a very effective 18 dB/octave sloping filter. The Owl Multifilter is designed as a stand alone unit or (ideally) may be used in conjunction with the Owl 1 Restoration Module pre-amplifier.

**Basic Specifications & Suggested List Price:** Frequency response:  $\pm 1/4$  dB 20 Hz to 20 kHz; distortion: less than 0.1% THD; hum and noise: 85 dB below 10VU; input impedance: 10k (both inputs); output impedance: 1k (both outputs); low end cut: 20 Hz, 40 Hz, 70 Hz, 110 Hz—rumble filtering 14 dB per octave; mid filter notch: variable 200 Hz—10 kHz, 40 dB notch depth minimum; high filter notch: 7 kHz to 22 kHz, 40 dB notch depth minimum; high frequency cut: 4.5 kHz to 12 kHz 18 dB/octave slope; power requirements: 12 VAC to 70 MA (supplied); dimensions: 4"H, 11.5"W, 5"D; weight: approx. 4 lbs; connectors: RCA phono, 2 in/2 out; price: \$195 + \$5 shipping.

**PEAVEY ELECTRONICS CORPORATION**

P.O. Box 2898, Meridian, MS 39301  
(601) 483-5365

**NEW PRODUCTS**  
**SIGNAL PROCESSING DEVICES**  
**1 • 9 • 8 • 7**

**Product Name:** IDL-655

**Contact:** Ken Valentine, product manager  
**Date Product Introduced:** June, 1986  
**Product Description & Applications:** The IDL-655 single tap digital delay line is engineered primarily for permanent installations, in auditoriums and other applications requiring delayed secondary speakers. The single rack space package features 20 to 20k Hz response, with greater than 100 dB dynamic range, variable delay settings from 2.5 to 655 milliseconds, security cover and balanced XLR inputs and outputs. Suggested list price: \$299.50.

**PEAVEY ELECTRONICS CORPORATION**

P.O. Box 2898, Meridian, MS 39301  
(601) 483-5365

**Product Name:** PEP-4530  
**Contact:** Ken Valentine, product manager  
**Date Product Introduced:** June, 1986  
**Product Description & Applications:** The PEP-4530 provides continuously-variable delay time to 4095 milliseconds with computer-controlled frequency bandwidth to maximize audio performance. The PEP-4530 is supplied with 10 factory-input programs and allows capability for storage of 520 user-input programs. Unlike other competing units, the PEP-4530 memory circuit can store far more than delay settings; all operating parameters may be stored as part of any program. Complete MIDI time clock sync capability is provided and program recall can be accomplished by means of a standard MIDI interface.

**Basic Specifications & Suggested List Price:** Suggested list price: \$699.50.

**ROH division of ANCHOR AUDIO, INC.**

913 West 223rd. St., Torrance, CA 90502  
(213) 533-1498

**Product Name:** ROH DigiMax  
**Contact:** Dan Garrigan, sales manager  
**Date Product Introduced:** June, 1986  
**Product Description & Applications:** The DigiMax audio playback module is the newest addition to the ROH Series 200 family of general purpose and specialized audio modules. The DigiMax is capable of storing and reproducing audio using solid-state memory. There are no moving parts. Applications for the DigiMax include message or music reproduction, source identification and standardized audio tests utilizing our proprietary "Pink Tone." The DigiMax is compatible with all ROH mainframes and modules including Series 300 intercom systems.

**Basic Specifications & Suggested List Price:** The DigiMax features a maximum bandwidth to 16 kHz with 1% distortion, 90 dB dynamic range and 105 dB SNR. Unlimited playback time by adding optional memory expansion modules. A full complement of input/output control functions are standard. Multi-message and multi-channel outputs are available. Basic price is less than \$500.

**ROLAND CORP. U.S.**

7200 Dominion Circle, Los Angeles, CA 90040  
(213) 685-5141

**Product Name:** DEP-5 Digital Effects Processor  
**Contact:** Barbi Clark, communications  
**Date Product Introduced:** June, 1986  
**Product Description & Applications:** The Roland DEP-5 Digital Effects Processor is a new MIDI compatible multi-effects processor that features digital reverb, digital delay, digital chorus, and parametric equalization. Unlike other multi-effects processors, the DEP-5 allows the user access to the effects simultaneously. All the various effects are programmable and can be stored into one of the unit's 99 memory locations. These locations can be accessed via the front panel, footswitches, and/or MIDI patch change numbers.

**Basic Specifications & Suggested List Price:** The DEP-5 is a 16-bit linear device that features a frequency response of 30 Hz to 12 kHz, a dynamic range of 90 dB, and THD of 0.03%. The reverb mode offers 99 seconds of linear or non-linear reverberation time, a pre-delay of 0-500 milliseconds, and reverberation presets consisting of eight rooms, live halls, and two plates. The echo and early reflection modes utilize the pre-delay specifications. The equalization has shelving low and high and a shiftable mid with variable Q. Price: \$850.

**SCHOLZ RESEARCH & DEVELOPMENT**

1560 Trapelo Road, Waltham, MA 02154

(617) 890-5211

**Product Name:** Rockman Stereo Chorus/Delay  
**Contact:** Jane Braun  
**Date Product Introduced:** January 1986, NAMM show  
**Product Description & Applications:** The Rockman stereo chorus/delay creates the stereo chorus sound, a new "long chorus" effect, and delay effects adjustable from 20 to 200 milliseconds. The sweep speed control presets the pace and intensity of chorusing, while the feedback slider presets the number of echo repeats. No other processor offers footswitching stereo/mono mix controls. The adjustable drive level circuit maintains unity gain, matching the C/D to any signal source. 90 dB signal to noise ratio.  
**Basic Specifications & Suggested List Price:** Input impedance: over 2M ohms; stereo outputs: impedance 1k ohms; chorus frequency response: (+1, -3 dB) to 14 kHz; sweep speed range: 0.25 Hz to 1 Hz; effects loop; dimensions: 8 1/2"W, 5 1/2"D, 3/4"H (half-rack width); price: \$269.95.

**SCHOLZ RESEARCH & DEVELOPMENT, INC.**

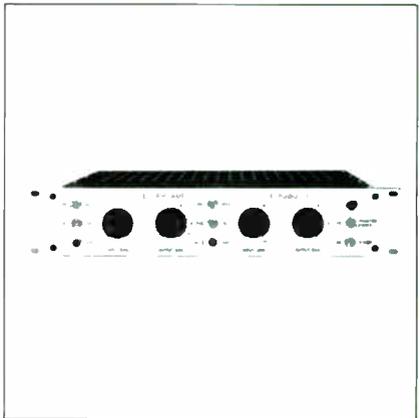
1560 Trapelo Rd., Waltham, MA 02154  
(617) 890-5211

**Product Name:** Rockman Sustainor  
**Contact:** Jane Braun  
**Date Product Introduced:** January 1986, NAMM show  
**Product Description & Applications:** The Rockman Sustainor combines a wide range of ultra-low noise clean and distortion sounds footswitchable through two independent channels. Auto clean lets you go from distortion to clean sound without losing output volume or treble as guitar volume is lowered. The smart gate automatically removes hi frequency noise with an adjustable cut-off time that never cuts off the end of notes. The output section features a master volume control for each channel.  
**Basic Specifications & Suggested List Price:** The Rockman Sustainor is custom made for stage/studio use. Dimensions: 8 1/2"W, 5 1/2"D, 13 3/4"H (half-rack width); input: impedance over 2M ohms; compressor: adjustment range 21 dB (0, 8, 15, 21); maximum level (input-output): 3.3 VRMS (+10 dBv); effects loop; price: \$349.95.

**SONY PROFESSIONAL AUDIO**

1600 Queen Anne Road, Teaneck, NJ 07666  
(201) 833-5200

**Product Name:** DFX-2400  
**Contact:** Gus Skinas, product manager  
**Date Product Introduced:** 1986 NAB  
**Product Description & Applications:** The Sony DFX-2400 is a sampling rate converter with a variable input ranging between 30 kHz and 50 kHz. Its output is fixed at the standard rates of 32 kHz, 44.056 kHz, 44.1 kHz and 48 kHz. The DFX-2400 also functions as a serial digital format converter, converting Sony format (1610/1630/3324) to AES/EBU and vice versa, using Sony's newly-developed ADSP (Advanced Digital Signal Processing) LSI, the DFX-2400 employs digital anti-aliasing filtering and has a conversion resolution of 16 bits.



**SUMMIT AUDIO INC.**  
Stereo tube preamp, model TPA2

**SUMMIT AUDIO INC.**

131 West Main St., Los Gatos, CA 95030  
(408) 395-2448

**Product Name:** Stereo tube preamp, model TPA2  
**Contact:** Mike Papp  
**Date Product Introduced:** October, 1986  
**Product Description & Applications:** The TPA2 is a stereo tube preamp with mic/line and Hi-Z inputs. The mic input has a switch selectable 48V phantom power supply. Each channel contains a 15 dB pad for use with both mic and line inputs. The Hi-Z input allows plugging a guitar or synthesizer into the front of the preamp. Each channel has an input and an output gain control to provide a convenient way to create tube-type overload distortion.  
**Basic Specifications & Suggested List Price:** Price to be announced.

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## NEW PRODUCTS SIGNAL PROCESSING DEVICES

1 • 9 • 8 • 7

### SYMETRIX

4211 24th Ave. West, Seattle, WA 98199  
(206) 282-2555

Product Name: 571 SPL computer

Contact: Dane Butcher, sales manager

Date Product Introduced: December, 1986

**Product Description & Applications:** The 571 is a microprocessor-driven automatic level controller for music and paging systems. Its on-board computer continually analyzes ambient noise conditions, then adjusts the system gain accordingly. And since the computer always knows what's being fed into the system, it always knows how much of the sound picked up by the sensing mics is actually ambient noise, and how much is from the system itself. As a result, the 571 does not suffer from the runaway feedback problems that have always plagued systems of this type.

**Basic Specifications & Suggested List Price:** Balanced inputs and outputs, user programmable minimum and maximum music volume, maximum page volume, and integration time (to set how quickly the system responds). How much change occurs at the output for a given change at the ambient sensing mic input is adjustable. A remote volume control is included for overall system adjustment.

### SYMETRIX

4211 24th Ave. West, Seattle, WA 98199  
(206) 282-2555

Product Name: 528 Voice Processor

Contact: Dane Butcher, sales manager

Date Product Introduced: October, 1986

**Product Description & Applications:** A complete voice processor in a single rack space package. The 528 includes five high-performance systems: mic preamp, compressor/limiter, downward expander, parametric equalizer/notch filter, and de-esser. Phantom powering is provided for condenser mics. The comp/limiter and downward expander comprise an interactive dynamics processor that always responds appropriately. Levels are kept in check by the program-controlled compressor/limiter, while the downward expander prevents pumping and breathing, and reduces noise.

**Basic Specifications & Suggested List Price:** Balanced transformerless, high dynamic range mic preamp, program-controlled selectable frequency de-esser with voice optimized variable-Q filter, phantom power, line input, interactive dynamics processor, parametric EQ/notch filter with 12 dB boost, 30 dB cut, 25 dB output gain. Metering is provided for output level, gain reduction, and de-esser activity. \$649 retail.



### TDM DESIGN

24CX-2 and 24CX-4 electronic crossovers

### TDM DESIGN

RT, 1 Box 573, Hillsboro, OR 97124  
(503) 647-5957

Product Name: 24CX-2 and 24CX-4 electronic crossovers

Contact: Tim Miller, owner

Date Product Introduced: January, 1986

**Product Description & Applications:** The 24CX-2 and 24CX-4 electronic crossovers from TDM Design are cost-effective crossovers which can be used in a wide variety of pro sound applications. The 24CX-2 can be used as a stereo 2-way or mono 3-way crossover. The 24CX-4 will function as a stereo 3-way, quad 2-way, or as a unit which includes subwoofer combinations. Both units feature external transformers for low-noise and hum-free operation. Optional internal transformers provide greater user versatility.

**Basic Specifications & Suggested List Price:** Fourth order Linkwitz-Riley filters are used, guaranteeing greater loudspeaker protection through the 24 dB per octave crossover slopes. The user is given the option of engaging the built-in constant-directivity horn equalization and selecting between balanced and unbalanced inputs and outputs. Priced ultra low at \$299.95 and \$399.95.

### TROISI DC

27 River St., Westford, MA 01886  
(617) 692-7768

Product Name: DQ-520 Dynamic Equalizer

Contact: Stewart Adam, sales/mktg. mgr.

Date Product Introduced: April 1986

**Product Description & Applications:** The DQ-520 modular dynamic EQ features two fully parametric equalizer bands with independent dynamic control circuits: each spectral band can be tuned to operate within a windowed frequency range. A few of the DQ-520's applications include vocal de-essing and de-popping, eliminating mic proximity effects, percussion accents without adding leakage, and many special effects and problem solving uses.

**Basic Specifications & Suggested List Price:** The 5 1/4-inch module fits dbx, API, and Troisi racks, and provides control of frequency, bandwidth, amplitude (range), threshold, and response time for each of two bands. The module is priced at \$450, and a two channel, 1.75-inch rack mount, expanded function unit is planned.

### VALLEY PEOPLE, INC.

P.O. Box 40306, 2817 Erica Place, Nashville, TN 37204  
(615) 383-4737

Product Name: Leveller

Contact: Tom Irby, vice president sales and marketing  
Contact: August 1, 1986

**Product Description & Applications:** The Leveller is a two-channel limiter employing Valley's proprietary Linear Integration Detection circuitry to insure that musical instruments, voice and mixed program material maintains sonically correct relationships when processed through the device. The operator merely has to decide which of the unit's two integration times is desired, set the threshold and determine the desired output gain, the Leveller's automatic circuitry does the rest. The unit's two channels may be used independently or "linked" for stereo operation. The Leveller may be used to protect against speaker damage or to prevent tape saturation.

**Basic Specifications & Suggested List Price:** Signal input impedance: 75 kohm, balanced or unbalanced; input gain range: +10 dB, 0 dB, -4 dB; output source impedance: 50 ohms, balanced or unbalanced; output noise and hum: -83 dB typical at unit gain, 20 Hz to 20 kHz; limiter ratio: 2:1 to 60:1, automatically variable; limiter attack time: approx. 1 ms in fast, approx. 10 ms in slow, program dependent; distortion: 1 kHz THD or SMPTE IMD: minus less than 0.04% from -20 dB to +20 dB; list price: \$620.

### VALLEY PEOPLE, INC.

P.O. Box 40306, 2817 Erica Place, Nashville, TN 37204  
(615) 383-4737

Product Name: Model 415 Dynamic Sibilance Processor  
Contact: Tom Irby, vice president sales and marketing

Date Product Introduced: May, 1986

**Product Description & Applications:** The Dynamic Sibilance Processor works quite different from a conventional de-esser. By constantly measuring the sonic energy present in the band of frequencies in which sibilance problems occur, and comparing that energy with the energy contained in the broadband signal, the DSP "looks for" sibilance. If a signal is present which might have sibilance, the DSP then analyzes it for complexity and inverts the tone, and sums it with the original signal, thus eliminating the sibilance. Since the DSP only removes the sibilant portion of the signal and leaves the upper-mid and high frequency portions of the program intact, it is ideal for both vocals and mixed program material.

**Basic Specifications & Suggested List Price:** Input impedance, balanced: 100 kohm; input impedance, unbalanced: 50 kohm; max. input level at 1 kHz: +24 dB; input CMRR at 50 Hz to 20 kHz: >60 dB; output source impedance: <40 ohm balanced, <20 ohm unbalanced; nominal output level: -10 dB to +8 dB; max. output level: +24 dBm (600 ohm) balanced, +18 dBm (600 ohm) unbalanced; static THD at 1 kHz, 0 dB in, unit gain: <0.01%; static IMD per SMPTE, 0 dB in, unit gain: <0.01% output noise and hum, 20 Hz to 20 kHz with 600 ohm source at unit gain: -90 dB. List price: \$749.

VESTA FIRE U.S.A., INC.  
10 McLaren, Bldg. E, Irvine, CA 92718  
(714) 380-7314

Product Name: SF-100 Space Commander

Contact: Todd Richardson, president

Date Product Introduced: May, 1986

**Product Description & Applications:** The Space Commander presents the delay time at five different levels to obtain the best possible chorus effect whatever the instrument used. In addition, digitalization enables you to obtain realistic chorus sounds, making the Space Commander versatile enough for uses ranging from pro MTRs to live performance vocals and guitars. Controlling time, phase and sound image, the Vesta Fire SF-100 gives you effects no other unit can produce. The Space Commander also includes five modes: 1) ambience/enhancer; 2) high chorus; 3) standard chorus; 4) bass chorus; 5) short delay/doubler.

**Basic Specifications & Suggested List Price:** Input level/impedance: -20 dB/500 kohms (unbalanced), +4 dB/33 kohms (balanced); maximum input level: -2 dB (unbalanced), +18 dB (balanced); output level/impedance: -20 dB/1 kohms (unbalanced), +4 dB/33 ohms (balanced); frequency response: 40 Hz-15 kHz (+0, -3 dB) delay, 10 Hz-30 kHz (+0, -3 dB) dry; S/N ratio: 85 dB (IHF-A, wtd) delay, 95 dB (IHF-A, wtd) dry; total harmonic distortion: 0.1% delay, 0.005% dry; LFO rate: 0.1 Hz-10 Hz; dimensions: 482W x 44H x 204D mm; weight: 4 kg. Pro/user net: \$799.50.

VESTA FIRE U.S.A., INC.  
10 McLaren, Bldg. E, Irvine, CA 92718  
(714) 380-7314

Product Name: DIG-412 Programmable Digital Delay

Contact: Todd Richardson, president

Date Product Introduced: January, 1986

**Product Description & Applications:** The DIG-412 is a programmable MIDI digital delay with 1,024 msec delay time. One-hundred-twenty-eight programs are available and all parameters such as delay time, feedback, rate, depth, phase, delay vol. and dry vol. are fully programmable. Programs can be changes via MIDI, front panel or optional FP-1 footswitch.

**Basic Specifications & Suggested List Price:** Input level/impedance: -20 dB/470 kohms; maximum input level: +21 dB; output level/impedance: -50 dB (direct), -10 dB (delay)/600 ohms; maximum output level: +4 dB; frequency response: 10 Hz-50 kHz +0, -3 dB (direct); 20 Hz-15 kHz +1, -3 dB (delay); dynamic range: 100 dB direct (IHF-A), 88 dB delay (IHF-A); modulation rate: 0.1-10 Hz; distortion: 0.005% typ. direct, 0.1% typ. delay; power: 12W; dimensions: 485W x 44H x 245D m/m; weight: 5 kg. Pro user net: \$659.50.

#### WJR DISTRIBUTORS

1379 Chattahoochee Ave. NW, Atlanta, GA 30318  
(404) 351-6008

Product Name: D&R Electronics Signal Processing

**Product Description & Applications:** The D&R line of outboard gear incorporate a full complement of control parameters never before featured on signal processing in this price range. The comp./limiter (for example) has adjustable threshold, attack time, release time, ratio, output level, and stereo coupling. The noise gate, parametric EQ, band-pass filter, RIAA preamp, phase meter, and telephone interface are equally well-endowed.

**Basic Specifications & Suggested List Price:** Each is 9.5-inches wide, so two can be mounted in a single rack space. All utilize premium components on computer grade PC boards. List is \$149.95 each.

YAMAHA INTERNATIONAL CORP.  
P.O. Box 6600, Buena Park, CA 90622  
(714) 522-9011

Product Name: SPX90 Digital Multi-Effect Processor

Contact: Professional Products Division

Date Product Introduced: January 1986

**Product Description & Applications:** The SPX90 Digital Multi-Effect Processor provides 30 preset effects—including delay, echo, modulation, gate, pitch, freeze, pan, vibrato, parametric EQ, and reverb—as well as 60 user-created effects stored in random access memory for instant recall. Each effect type has a selection of programmable parameters for custom tailoring sounds to specific user needs, and a front panel utility key accesses the unit's MIDI control functions.

**Basic Specifications & Suggested List Price:** Other features include: a high contrast LCD display of program name and parameter values, 1/4-inch mono input/stereo out jacks, MIDI in/MIDI thru terminals, bypass footswitch jack, and gate/freeze program footswitch control jack. Price: \$745.

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# N

# EW PRODUCTS

## SPEAKERS AND MONITOR SYSTEMS

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### ANCHOR AUDIO INC.

913 W. 223rd St., Torrance, CA 90502  
(213) 533-5984, 1-800-ANCHOR-1

Product Name: MB 3000

Contact: Jon Peirson

Date Product Introduced: August 1, 1986

Product Description & Applications: Battery powered, 50 watt self-powered 2-way music speaker. Two microphone and line level inputs, all mixable.

Basic Specifications & Suggested List Price: \$695.

### ANCHOR AUDIO INC.

913 W. 223rd St., Torrance, CA 90502  
(213) 533-5984, 1-800-ANCHOR-1

Product Name: MA 3000

Contact: Jon Peirson

Date Product Introduced: August 1, 1986

Product Description & Applications: 75 watt self-powered 2-way music speaker. Two microphone and line level inputs, all mixable.

Basic Specifications & Suggested List Price: \$595.

### AUDIO CENTRON

1400 Ferguson Ave., St. Louis, MO 63133  
(314) 727-4512

Product Name: ACS-1

Contact: Tony Moscal, training director

Date Product Introduced: October 1, 1985

Product Description & Applications: Three-way speaker enclosure. 15-inch DAS cone drivers in acoustic low pass filter/folded horn. 10-inch DAS cone driver with bullet phase plug and constant directivity horn. 1/2-inch DAS compression driver w/2-inch titanium diaphragm. Plywood construction, XLR and binding post inputs, flying hardware; Ozite covered.

Basic Specifications & Suggested List Price: Frequency response: 30-20kHz; sensitivity: 108dB (1W/1M); power handling: 580 watts RMS, 1160 program; dispersion: 90°x40°.

### AUDISAR

Box 1561, Bellevue, WA 98009  
(206) 454-2040

Product Name: Rack-Mount Monitor Loudspeaker

Contact: R. Munger

Product Description & Applications: Model 14K100, a 5 1/4-inch rack-mount monitor consisting of a 4-inch polypropylene woofer, smooth cone tweeter and second order cross-over network with built-in high-frequency protection against burn-out. Finish is light-texture black, with black grill.

Basic Specifications & Suggested List Price: Freq. resp.: 68Hz-12.5kHz ±3dB, power is rated at 30 watts cont. (15.5V RMS/8 ohms); sensitivity: 87dB 1W/1M; crossover frequency: 4.5kHz.

### BAG END/MODULAR SOUND SYSTEMS INC.

Box 488, Barrington, IL 60011  
(312) 382-4550

Product Name: TA-12 Jr.

Contact: Jim Wischmeyer, sales mgr.

Product Description & Applications: The TA 12 is a wide-band, time-aligned loudspeaker systems design for applications where a high output, high efficiency, high fidelity loudspeaker is required in a small space. Like our standard TA 12, the Jr. offers uniform controlled dispersion and a flat frequency response. Time-Aligned is a trade mark of E.M. Long Associates. The TA-12 Jr. comes in rugged black textured finish or a hand oiled walnut finish on Finland birch plywood.

Basic Specifications & Suggested List Price: System type: 2 way Time-Aligned; frequency response: 70Hz to 19kHz; power handling capacity: 300 watts continuous program; sensitivity: 101 dB 1W/1M; crossover frequency: 3.5kHz; dimensions: 14w x 23h x 12d; weight: 42 lbs.

### CALIBRATION STANDARD INSTRUMENTS

P.O. Box 2727, Oakland, CA 94602

(415) 531-8725

Product Name: BE-32 System 1

Contact: Debbie Long

Date Product Introduced: August 1986

Product Description & Applications: The BE-32 system 1 is a two channel bass extender with remote control. It consists of four 16 x 12 x 19-inch enclosures with a BD21/181 bass driver. Two of the enclosures contain ELF™ patented Extended Low Frequency electronics to produce the low frequency range without the need for the usual crossover with its attendant time delay. The BE-32 system 1 is designed for use with the MDM-4, MDM-TA2, and MDM-TA3 monitors but it can be used with other systems as well.

Basic Specifications & Suggested List Price: Frequency response: ±1 dB 32 to 70 Hz; time offset: +100 μsec 30 to 70 Hz; amplifier required: 200 watt/ch amp min; distortion: <3% THD or IM 32 to 70 Hz (94dB SPL 1 Meter); matched pair response: ±0.5 dB; sensitivity: adjustable; input: 10k line level and 8 ohms line; finish: black laminate.

### CETEC GAUSS

9130 Glen Oaks Blvd., Sun Valley, CA 91352

(213) 875-1900

Product Name: Model 3285 Coaxial Loudspeaker

Contact: Mort Fujii, president

Date Product Introduced: June 14, 1986

Product Description & Applications: Single point source loudspeaker ideal for PA applications, stage monitoring and sound reinforcement. Computer design places both drivers in the same acoustic plane, eliminating the need for costly time compensation networks. High frequency horn does not extend beyond the frame, allowing flush installation.

Basic Specifications & Suggested List Price: Power handling: 400 watts music power; frequency response: 70Hz-13.5kHz; sensitivity: 99dB, 1 watt/1 meter; 8 ohms.

### CETEC GAUSS

9130 Glen Oaks Blvd., Sun Valley, CA 91352

(213) 875-1900

Product Name: Model 7228 Coaxial Monitor

Contact: Mort Fujii, president

Date Product Introduced: New for AES

Product Description & Applications: Coaxial Monitor System utilizing computer designed 12-inch coaxial loudspeaker (Model 3288). Walnut cabinet is symmetrically ported for superior stereo imaging. Speaker design does not require time compensation, as both drivers are virtually in the same acoustic plane. Designed for smaller studios who want single point source.

Basic Specifications & Suggested List Price: Frequency response: 45Hz-18,000Hz; sensitivity: 94dB; 8 ohms; pattern: 40°H x 40°V; crossover frequency: 1200 Hz; roll off 2500 Hz.

### COMMUNITY LIGHT & SOUND, INC.

333 E. 5th St., Chester, PA 19013

(215) 876-3400

Product Name: SH2064/864 Horns

Contact: John Wiggins, exec. vice president

Date Product Introduced: 1986

Product Description & Applications: Community Light and Sound introduces a set of compact fiberglass horns to be used with: the M4 midrange compression driver and two, two-inch drivers, respectively, in four style array cabinets where sound output/cabinet volume is critical. Designed to provide high quality acoustical performance in clean, compact packages, the SH2064/864 puts high output in a package less than 22.5-inches deep. The SH2064 and SH864 are identical in depth to maintain equal path length.

Basic Specifications & Suggested List Price: Dimen-

sions: SH2064M, 23 1/2w x 20 1/4h x 2 1/2d (w/M4 driver); SH864, 23 1/2w x 8 3/4h x 1 1/2-inches (w/o driver). Prices: SH2064M horn, \$325; SH864-\$180.



COMMUNITY LIGHT & SOUND, INC.  
CS70

### COMMUNITY LIGHT & SOUND, INC.

333 E. 5th St., Chester, PA 19013

(215) 876-3400

Product Name: CS70

Contact: John Strand, national sales manager

Date Product Introduced: August 1986

Product Description & Applications: A high efficiency, 3-way loudspeaker system. 1500 watts program power capacity. Uses include high level playback systems in clubs, sound reinforcement systems from clubs to concerts. Features include internal crossover with mid-range boost switch, 105dB SPL sensitivity, internal speaker protection, output in excess of 140dB SPL. Steel bar handles.

Basic Specifications & Suggested List Price: Frequency response: 45-18kHz, power capacity: 600 watts; 1500 W program; sensitivity: 105dB SPL; max SPL: 132dB SPL; impedance: 4 ohms; dimensions: height 26 3/4 x width 33 1/2 x depth 18-inches; weight: 135 lbs. Suggested retail price: \$849.

### COMMUNITY LIGHT & SOUND, INC.

333 E. 5th St., Chester, PA 19013

(215) 876-3400

Product Name: CSV and LFR Systems

Contact: John Strand, national sales manager

Date Product Introduced: summer 1986

Product Description & Applications: Community Light and Sound introduces aesthetically pleasing contractor series. The CSV full range systems and LFR bass reflex systems designed to provide high quality acoustical performance in clean, compact packages. Primarily designed for permanent installation, the CSV/LFR systems enable quick, convenient mounting in a wide variety of situations. The exterior finish is light oak formica. T-nuts are factory installed on the top/bottom and either side to facilitate mounting with optional brackets.

Basic Specifications & Suggested List Price: Suggested retail: CSV 25 12-inch two-way, \$283; CSV35 15-inch two-way \$336, CSV45 double 12-inch two-way \$516; CSV38M 15-inch slant monitor \$369; CSV50B 18-inch sub-woofer \$579. The LFR bass reflex enclosures are equally attractively priced.

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### SPEAKERS AND MONITOR SYSTEMS

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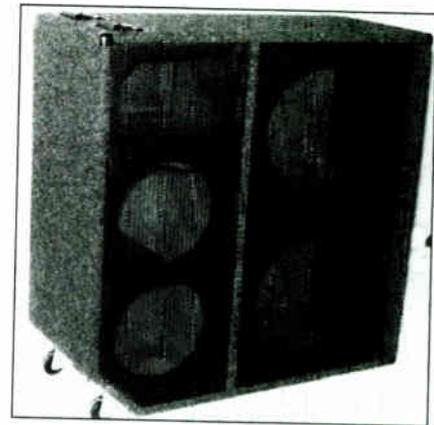
**DAHLQUIST INC.**

601 Old Willets Path, Hauppauge, NY 11788  
(516) 234-5757

**Product Name:** DQM-9, DQM-9Compact  
**Contact:** Paul Josefson, field support supervisor  
**Date Product Introduced:** 1985

**Product Description & Applications:** The DQM-9 and the DQM-9Compact are both three-way monitor speakers. The DQM-9 has an 11-inch woofer, whereas the DQM-9Compact has a 9-inch 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. Both models are available in genuine walnut or oak veneers, or suede-grey Nextel, for extra cabinet resonance damping.

**Basic Specifications & Suggested List Price:** DQM-9: frequency resp. 28-22k Hz; sensitivity: 95 dB; impedance: 8 ohm nom/6 ohm min; suggested listed: \$1200/pr.; DQM-9Compact: frequency resp. 35-22k Hz; sensitivity, 92 dB; impedance, 8 ohms nom/4 ohm min; price, \$980/pr.



DECUIR CORP.  
1512C



DECUIR CORP.  
4115THN

**DECUIR CORP.**

4012 So. Broadway Pl., Los Angeles, CA 90037  
(213) 233-4184

**Product Name:** 4115THN  
**Contact:** Frank M. DeCuir

**Date Product Introduced:** June 1986

**Product Description & Applications:** A 15-inch Thiele cabinet with an extended 5-inch top for a horn or tweeters. Constructed with 3/4-inch plywood covered with a durable carpet and fiberglass insulated, cabinet includes recessed handles, two 1/4-inch phone jacks and a grill with a durable commercial grade cloth cover. Unit has reinforced cleating for tighter sound and road durability. The ideal companion for portable keyboards or smaller club PAs.

**Basic Specifications & Suggested List Price:** \$158.

**DECUIR CORP.**

4012 So. Broadway Pl., Los Angeles, CA 90037  
(213) 233-4184

**Product Name:** 1512C  
**Contact:** Frank M. DeCuir

**Date Product Introduced:** June 1986

**Product Description & Applications:** A dual 15-inch Thiele cabinet with a dual 12-inch cut-out and an uncut (15 x 11) hornboard we will cut to your specifications at no additional cost. Constructed with 3/4-inch plywood covered with a durable carpet and fiberglass insulated, cabinet includes spring-loaded, rubber gripped handles, recessed corners, 1/4-inch phone jacks and casters. Designed as an "all-in-one," easier for the roadie: saves breakdown time and storage space.

**Basic Specifications & Suggested List Price:** \$400.



DESIGN DIRECT SOUND/WALKER  
CFD 1-51

**DESIGN DIRECT SOUND/WALKER**

6850-35th H.E. Ste. 1, Seattle, WA 98115  
(206) 527-4371

**Product Name:** CFD 1-51

**Contact:** Bob Fica, president

**Date Product Introduced:** November 1985

**Product Description & Applications:** The CFD 1-51 is a one-inch entry throat, consistent "Q" horn with a frequency range of 800Hz to 16kHz. It has particularly smooth frequency response across its 58 degree coverage pattern, which makes this horn an excellent choice for high quality reproduction in critical monitoring situations, or in high-level foreground or small to-medium club systems. All DDS professional line horns are constructed using biaxial stitched fiberglass cloth with end grain balsa wood lamination. Our exclusive biament winding technology achieves an unmatched level of strength.

**Basic Specifications & Suggested List Price:** Sensitivity: 108.2dB; frequency range: 800Hz-16kHz (+2dB -5dB); frequency response: 1kHz-14kHz (+1.5dB -2dB); mean dispersion: 58°H x 52°V; mean directivity: 7.9 (+5.3dB -3.2dB); dimensions: 8h x 8h x 5d; weight: 1.5 lbs.

**ELECTROMEDIA MARKETING**

24166 Haggerty, Farmington Hills, MI 48024  
(313) 471-4314

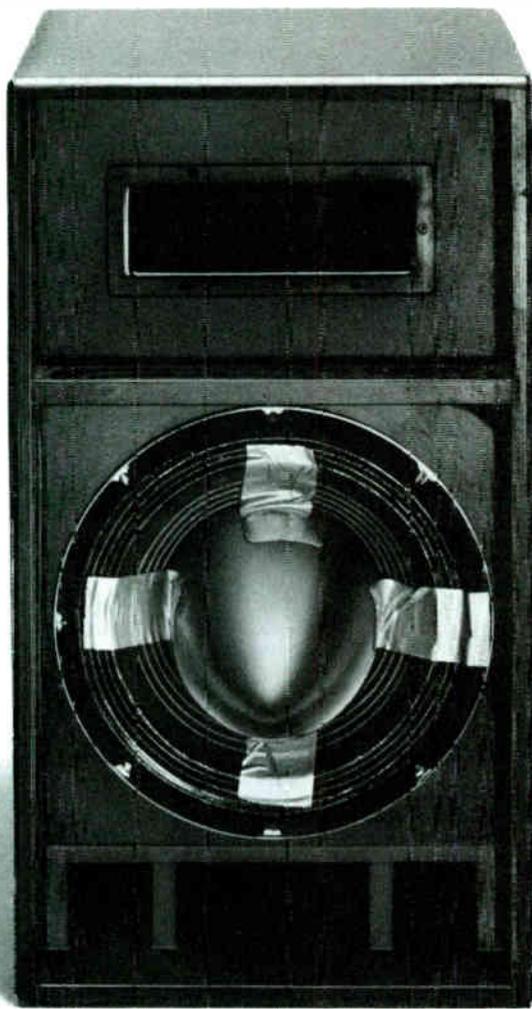
**Product Name:** Acoustech MTR 4.5

**Contact:** Henry J. Foot, president

**Date Product Introduced:** July 1986

**Product Description & Applications:** The MTR 4.5 is a powered monitor speaker designed to mount in a Tektronix rack assembly next to a waveform monitor. It has 2 switchable balanced inputs that loop thru. Frequency response is 45-16 kHz ±3 dB. The internally equalized 55 watt power amplifier will produce 102 dB SPL-C continuous at one meter. The vented, short transmission line enclosure houses a magnetically shielded 4.5-inch driver. The MTR 4.5 is designed for television and portable field production use.

**Basic Specifications & Suggested List Price:** Pro net price is \$495.



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**ELECTRO-VOICE, INC.**  
*MTL-4 Concert Sound Reinforcement System*

**ELECTRO-VOICE, INC.**  
600 Cecil St., Buchanan, MI 49107  
(616) 695-6831

**Product Name:** MTL-4 Concert Sound Reinforcement System

**Contact:** Alan Shirley, marketing services mgr.

**Date Product Introduced:** November 1986 (at AES)

**Product Description & Applications:** The M-4 four-way concert sound system is an active, two-box design which delivers distortion-free performance at high levels through the use of Manifold Technology. For each bandpass, the outputs of four transducers are combined through a manifold into a single-exit aperture to achieve total summation of acoustic power without phase cancellations up to 20,000 Hz. As a result, the MT-4 features smaller enclosures (36 x 36 x 30-inch hwd) with smaller frontal areas than those typically used in multiple loudspeaker arrangements. Destructive interference, a common problem with multiple sources, is also eliminated, so pattern control is maintained and efficiency increased.

**Basic Specifications & Suggested List Price:** Specifications for the MTL-4 low-frequency enclosure include a maximum continuous SPL output capability of 134 dB at a distance of one meter and a peak SPL of 140 dB. Distortion is rated at typically less than 3.0% above 40 Hz with a 1,600-watt input. Continuous SPL for the upper box, the MTH-4 is 137 dB at a distance of one meter. Recommended crossover frequencies for the MT-4 are 160 Hz, 1,600 Hz and 7,000 Hz. The MTL-4 retails for \$2825. Price information for the MTH-4 is not yet available.

**ELECTRO-VOICE, INC.**  
600 Cecil St., Buchanan, MI 49107  
(616) 695-6831

**Product Name:** SH-1810 3-way, horn-loaded speaker system

**Contact:** Alan Shirley, marketing services mgr.

**Date Product Introduced:** June 1986

**Product Description & Applications:** Designed primarily as a frontal system for professional music groups, the new SH-1810 incorporates state-of-the-art Manifold Technology to provide substantially more bass output and superior intelligibility as compared to competitive designs of roughly equivalent size. A unique box configuration combines the best performance of horn-loaded and vented-box designs for exceptional bass in a compact enclosure. The 1810's super smooth mid-range produces a vocal range that is essentially crossover free and phase coherent for very natural sound quality. And the high-frequency section's constant directivity horn and titanium-diaphragm driver combine to deliver smooth, extended response well beyond 20,000 Hz.

**Basic Specifications & Suggested List Price:** The SH-1810 has a usable frequency response of 35-23,000 Hz, a sensitivity of 105 dB 1 watt/1 meter and a peak output in excess of 135 dB SPL. The system can be operated in 3-way passive or biamp modes, with input power capacity of 300 and 700 watts respectively. By tilting the cabinet onto a set of rear wheels, one person can easily move the SH-1810 which measures 47.6 in x 24.8 in. x 24.0 in. (hwd) and weighs 153 pounds. The SH-1810 has a suggested list price of \$1974.

**ELECTRO-VOICE, INC.**  
600 Cecil St., Buchanan, MI 49107  
(616) 695-6831

**Product Name:** DH1A high-frequency compression driver

**Contact:** Alan Shirley, marketing services mgr.

**Date Product Introduced:** May 1986

**Product Description & Applications:** With 2 dB more output above 2,000 Hz than its predecessor the DH1, the new DH1A compression driver provides more high-

## NEW PRODUCTS

### SPEAKERS AND MONITOR SYSTEMS

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frequency output than any 500-Hz-crossover driver on the market. One reason for high-frequency efficiency is a larger magnet which provides the highest flux density—21 kilogauss—currently available in a compression driver. A pure titanium dome and suspension plus EV-exclusive Profel voice-coil protection also extend high power capacity. The end result of this advanced driver architecture is a sound quality that is subtly, yet dramatically improved for musical depth and transient clarity not usually associated with compression drivers.

**Basic Specifications & Suggested List Price:** A maximum-efficiency design (25% midband), the DH1A has a frequency response from 500 to 20,000 Hz and a 24-hour 500 to 20,000-Hz pink-noise power capacity of 200 watts. The DH1A is available at a pro user net price of \$360.

#### FRIED PRODUCTS

7616 City Line Ave., Philadelphia, PA 19151  
(215) 473-7474

**Product Name:** C/3-L Mini Monitor

**Contact:** Irving M. Fried, owner

**Date Product Introduced:** January 1986

**Product Description & Applications:** Mini monitor featuring free flow transmission line loading of bass-mid driver, for high accuracy, high-level digital or analog monitoring. Intermodulation and time smear component of the enclosure is thus eliminated, permitting proper reproduction of the program. Can be used alone, or in conjunction with Fried subwoofer systems, for accuracy of the highest order.

**Basic Specifications & Suggested List Price:** Frequency response (within 3dB): 55Hz-22kHz; sensitivity: 91dB; trapezoidal shape; suggested price: \$950/pair.

#### FRIED PRODUCTS

7616 City Line Ave., Philadelphia, PA 19151  
(215) 473-7474

**Product Name:** Model G/3 Monitoring Loudspeaker

**Contact:** Irving M. Fried, owner

**Date Product Introduced:** June 1986

**Product Description & Applications:** High accuracy studio monitor, featuring full free flow transmission line loading of midrange (99Hz to 2.7 kHz); low resistance bass loading; high energy dome; inward dispersion. Line loading produces greater speaker linearity and higher accuracy, for very highest quality monitoring applications. SPL levels can safely approach 120dB peaks, with unequalled individuation of orchestral and human voices because of greater accuracy to temporal cues.

**Basic Specifications & Suggested List Price:** Frequency response (3dB): 22Hz-22kHz; 92dB sensitivity; very flat impedance curve (true 8 ohms); size 44h x 16w x 18d; series quasi second-order networks for absolute homogeneity and power transfer; available in various finishes; suggested consumer price: \$2190 per pair.

#### GENELEC OY

Tehtaantie 17, SF-74100 Iisalmi, Finland  
(Int) + 358 77 13311

**Product Name:** Genelec Triamp 1022A

**Contact:** Lasse Huttunen, product manager

**Product Description & Applications:** Active monitoring speaker with three integral power amplifiers.

**Basic Specifications & Suggested List Price:** SPL: 108dB @ 1m; frequency response: 38 to 20k Hz, (±2dB); crossover frequencies: 380Hz, 3.5kHz; features: 3-way triamped system, 300mm LF driver, 80mm MF driver, 9x60mm ribbon driver; amplifiers: 150+100+100 watts; dimensions: 735x405x365mm; weight: 25 kg.

#### GENELEC OY

Tehtaantie 17, SF-74100 Iisalmi, Finland  
(Int) + 358 77 13311

**Product Name:** Genelec 1025A

**Contact:** Lasse Huttunen, product manager

**Date Product Introduced:** 1983

**Product Description & Applications:** Active control room monitor with four integral power amplifiers in a separate case.

**Basic Specifications & Suggested List Price:** SPL: 120 dB at 1m; frequency response: 28 Hz to 20 kHz ± 2dB; features: 4-way system, 2 x 385 mm LF drives, 80mm MF dome driver, 28 mm dome tweeter and 21 mm dome tweeter; amplifiers: 250 + 250 + 250 + 250 watts.

## SERVO DRIVE

**INTERSONICS, INC.**  
*SDL-5 Servo-Drive Subwoofer*

**INTERSONICS, INC.**  
3453 Commercial Ave., Northbrook, IL 60062  
(312) 272-1772

**Product Name:** SDL-5 Servo-Drive Subwoofer

**Contact:** Tom Melzer, sales manager

**Product Description & Applications:** Offering "the best in bass," the Servo-Drive Loudspeakers (SDL) have eliminated fragile voice coils which compromise low frequency response. The SDL mechanism is based on a special high-tech, low-inertia servo motor. The motor's rotary action is converted to linear motion by means of a driveshaft mechanism. The result is clean, powerful output from compact-sized cabinets. Ideal for sound system, club, theatre and special effects applications.

**Basic Specifications & Suggested List Price:** The new SDL-5 is the finest, most powerful unit yet developed. Boasting peaks of 140dB and high fidelity performance, it is compact in size: 22½w x 45h x 45d. Other units offer smaller size alternatives. Please check with manufacturer for prices, users list and specifications.



**JBL PROFESSIONAL**  
*Concert Series*

**JBL PROFESSIONAL**  
8500 Balboa Blvd., Northridge, CA 91329  
(818) 893-8411

**Product Name:** Concert Series

**Contact:** Mark Gander, vice president marketing

**Date Product Introduced:** January 1986

**Product Description & Applications:** JBL Concert Series systems are complete and ready to operate with the addition of source and mixing equipment. Each system includes loudspeaker systems, power amplifiers, electronic crossover/loudspeaker signal processing equipment, equipment racks and loudspeaker connecting cables. Each system is pre-wired, tested and ready for immediate use. Road cases and loudspeaker dollies are available for touring applications.

**JBL PROFESSIONAL**  
8500 Balboa Blvd., Northridge, CA 91329  
(818) 893-8411

**Product Name:** 4400-Series Studio Monitors

**Contact:** Mark Gander, vice president marketing

**Date Product Introduced:** January 1986

**Product Description & Applications:** With the 4400 Series, we are introducing a new standard in small systems. In addition to the traditional JBL attributes, these

new monitors have a high-frequency response that reduces phase shift through the critical 3,000 to 20,000 Hz range for more natural sound. This superlative response is due to JBL's unique titanium-diaphragm dome tweeter and patented diamond surround. The new 4400 Series dramatically reduces bass distortion through the use of JBL's exclusive Symmetrical Field Geometry magnetic structure. They are ideally suited for any type of recording, broadcasting or post-production application.

**Basic Specifications & Suggested List Price:** Model 4406, (2-way 6½-inch) 75 W max, 87 dB SPL sensitivity, \$180 retail. Model 4408, (2-way 8-inch) 100 W max, 89 dB SPL sensitivity, \$225. Model 4410, (3-way 10-inch) 125 W max, 91 dB SPL, \$357. Model 4412, (3-way 12-inch) 150 W max, 90 dB SPL sensitivity, \$549.

**JOE'S SOUND & SALAMI CO.**  
981 S. Broad St., Trenton, NJ 08611  
(609) 394-5637

**Product Name:** Joe's Speaker Cabinets

**Contact:** Corrinne S. Gately, marketing director

**Product Description & Applications:** Small compact unloaded speaker cabinets, lightweight (our 15 AA is only 55 lbs. shipping weight). Our cabinets save you money so you can buy more at your music store. UPS-able except double 15s and 18s. Cabs in single 10s to double 18s all with double connectors. Ask about our tech. sheet "True Facts and Information on Speaker Cabinets."

**Basic Specifications & Suggested List Price:** Single 10s start at \$125.83, CBB; and Pro material available at \$164.75, to single 18s and double 18s CBB and Pro. Slide-Align cabinets in 12-inch and 15-inch with horns and lens from \$320-350 S/A cabs are time aligned without electronics.

**KLARK-TEKNIK ELECTRONICS, INC.**  
30 B Banfi Plaza N., Farmingdale, NY 11735  
(516) 249-3660

**Product Name:** Jade-1

**Contact:** Jack Kelly, president

**Date Product Introduced:** September 1986

**Product Description & Applications:** Jade-1 is part of a joint development project between Klark-Teknik and Andy Munro Associates. The Jade-1 powered monitor is of 2-way bass reflex design incorporating not only the amplifiers (100W), but the electronic crossover and custom equalization as well. The input can be fed from any line level source and the output is 105dB SPL at 1 meter.

**Basic Specifications & Suggested List Price:** Freq. resp.: 55-17k Hz, ±3 dB; electronics: 100W RMS power amplifier, 24dB/octave crossover at 1.5kHz. Controls: HF ±3dB @ 10kHz; LF +0, -6dB @ 75Hz; level: infinity to +6dB. Features: thermal, DC offset and overload protections. Price: \$2700/peir.

**KLIPSCH AND ASSOCIATES, INC.**  
P.O. Box 688, Hope, AR 71801  
(501) 777-6751

**Product Name:** CP-1

**Contact:** P. Woody Jackson, national sales manager

**Date Product Introduced:** January 1986

**Product Description & Applications:** The Klipsch CP-1 has high output capability, low distortion, extended bandwidth, and exceptionally smooth frequency response making it an ideal system for use in permanent installation and touring applications for the performing arts. It is an excellent choice for the output requirements of medium-sized performing halls, nightclubs, and church sound reinforcement.

**Basic Specifications & Suggested List Price:** The CP-1 is horn-loaded in the midrange and tweeter sections—providing sparkling clarity and wide dynamic range. The woofer of the CP-1 is a 15-inch direct radiator for deep, powerful bass. The bass is further enhanced through the use of a dual port system. The CP-1 has a sensitivity rating of 100 dB/SPL one watt one meter and a maximum continuous output of 123 dB/SPL at 200 watts one meter. Price: \$719 each.

**KLIPSCH AND ASSOCIATES, INC.**  
P.O. Box 688, Hope, AR 71801  
(501) 777-6751

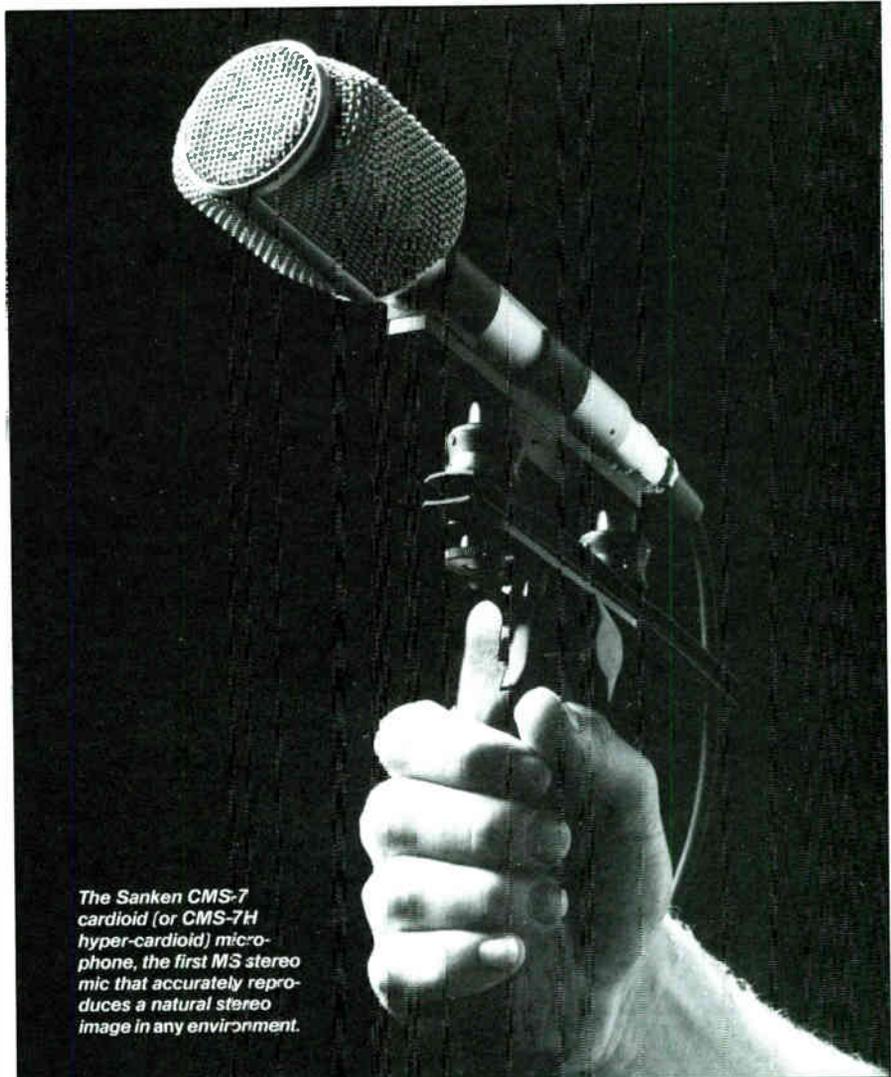
**Product Name:** HP-1

**Contact:** P. Woody Jackson, national sales manager

**Date Product Introduced:** January 1986

**Product Description & Applications:** The Klipsch HP-1 is a high output, low distortion system with a much "bigger" sound than its compact size would suggest. It is an excellent choice for use in a permanently installed commercial stereo system, sound reinforcement in small clubs and halls, and other applications of the performing and recording arts.

**Basic Specifications & Suggested List Price:** The HP-1 is horn-loaded in the midrange and tweeter sections. The woofer of the HP-1 is a 12-inch direct radiator in a sealed enclosure. The HP-1 has a sensitivity rating of 97 dB/SPL one watt/one meter and a maximum continuous output of 117 dB/SPL one meter at the maximum rated power level of 100 watts. Price: \$392 each.



*The Sanken CMS-7 cardioid (or CMS-7H hyper-cardioid) microphone, the first MS stereo mic that accurately reproduces a natural stereo image in any environment.*

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Sanken, maker of the world-acclaimed CU-41 CD-recording microphone, is pleased to announce the new CMS-7, the first portable MS stereo condenser mic that accurately captures a natural stereo perspective in any environment. Ideal for TV and radio broadcasting, motion picture making and studio recording. Its corrosion-free titanium diaphragm is immune to temperature and humidity changes, and performs superbly in adverse conditions. Battery power supply/switchable matrix box, which clips to your belt, carries an aperture control for focusing the stereo perspective. For more information, please contact:

<b>LOS ANGELES</b>	Audio Intervisual Design Tel (213) 463-4773	<b>NEW YORK</b>	Martin Audio Video Corp Tel (212) 541-5900
<b>NASHVILLE</b>	Studio Supply Co., Inc. Tel (615) 366-1890	<b>CANADA</b>	Gould Marketing, Inc. Tel (514) 342-4441



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5-72-6 Asakusa, Taito-ku, Tokyo 111, Japan  
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**ASC** ACOUSTIC SCIENCES CORPORATION  
P.O. BOX 11156 EUGENE, OREGON 97440

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**NEW PRODUCTS**

**SPEAKERS AND  
MONITOR SYSTEMS**

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**KLIPSCH AND ASSOCIATES, INC.**

P.O. Box 688, Hope, AR 71801  
(501) 777-6751

Product Name: HIP-2

Contact: P. Woody Jackson, national sales manager  
Date Product Introduced: January 1986

**Product Description & Applications:** The Klipsch HIP-2 is a high output, though compact, system that is an excellent choice for use as a front system by the performing musician in small-to-medium-sized clubs and halls. When larger front systems are required, the HIP-2 is an excellent choice for center fill. Its rugged drivers provide exceptionally wide dynamic range, low distortion, and high power handling capability. Its rugged cabinetry is built to withstand years of arduous touring.

**Basic Specifications & Suggested List Price:** The HIP-2 is horn-loaded in the midrange and tweeter sections for sparkling clarity. The woofer of the HIP-2 is a 12-inch direct radiator operating in a vented cabinet for tight, clean bass. The HIP-2 has a sensitivity rating of 100 dB/SPL one watt one meter and a maximum continuous output of 122 dB/SPL one meter at the maximum rated power level of 150 watts. Price: \$519 each.



**MANTA ELECTRONICS GROUP**  
MS2.10 Studio Monitor System

**MANTA ELECTRONICS GROUP**

204 King St. E., Toronto, ONT M5A 1J7  
(416) 868-0513

Product Name: MS2.10 Studio Monitor System

Contact: Jane Spencer, marketing manager  
Date Product Introduced: Late 1985

**Product Description & Applications:** MS2.10: high performance, tri-amped, 3-way monitor system designed for phase coherence throughout full frequency range. The dual 15-inch woofer based system is capable of high power in large studio applications. Unique cabinet for efficient space usage and minimum cabinet resonance. MX1.030: high quality stereo 3-way crossover.

**Basic Specifications & Suggested List Price:** Power handling: 300 W @ 35-800Hz, 100W @ 800-7k Hz, 50W @ 7k-16k Hz; frequency response: 35-16k Hz ( $\pm 3$ dB); recommended amplifier power: 300W; dimensions: 30x42x26-inches, 255 pounds. Price: MS2.10, \$6450/pair; MX1.03 crossover, \$850.

**MANTA ELECTRONICS GROUP**

204 King St. E., Toronto, ONT M5A 1J7  
(416) 868-0513

Product Name: MS1.10 Studio Monitor System

Contact: Jane Spencer, marketing manager  
Date Product Introduced: Late 1985

**Product Description & Applications:** MS1.10: high performance, bi-amped, 3-way monitor system designed for phase coherence throughout full frequency range. The single 15-inch woofer based system is capable of high power in medium size studio applications. Unique cabinet for efficient space usage and minimum cabinet resonance. MX1.020: high quality stereo 2-way crossover.

**Basic Specifications & Suggested List Price:** Power

handling: 150W @ 35-800 Hz, 50W @ 800Hz - 16kHz; frequency response: 35-16k Hz,  $\pm 3$ dB; recommended amplifier power: 150W; 12dB/octave @ 4kHz internal passive crossover; dimensions: 22x30x26-inches; weight: 152.5 pounds. Price: MS1.10, \$3250/pair; MX1.02 crossover, \$600.

**MARTIN AMERICA**

P.O. Box 5139, Chatsworth, CA 91313  
(818) 718-1031

Product Name: VRS-800 (brand: Martin Audio London)

Contact: Ted Telesky, president

Date Product Introduced: May 1986

**Product Description & Applications:** The VRS-800 is a full range, one-box system which incorporates the latest Martin technology. The wide frequency response, high efficiency, wide coverage and low distortion make the VRS-800 ideally suited for installations and touring sound applications. The VRS-800 is an all-horn loaded 3-way system using an 18-inch bass driver, a special Martin 12-inch mid-range and a titanium one-inch compression driver. The system comes complete with flying points.

**Basic Specifications & Suggested List Price:** 1000 watt power capacity; 8 ohm impedance; 75°x35° dispersion; 106dB 1w/1m sensitivity; 2 or 3 way switchable (bi or tri-amp); 22½x51x26 in dimensions; 229 pounds; steel mesh grille, fly points and wheels included. \$2695 list price.

**MEYER SOUND**

2832 San Pablo Ave., Berkeley, CA  
(415) 486-1166

Product Name: 500 Series Loudspeaker System

Contact: Pat Maloney

Date Product Introduced: March 1986

**Product Description & Applications:** The 500 Series Loudspeaker System consists of a matched pair of two-way full-frequency loudspeakers in combination with a 600 watt/channel stereo integrated amplifier which contains proprietary control electronics as well as loudspeaker and amplifier protection circuitry. The integrated amplifier can power four 500 Series loudspeakers or two loudspeakers and a complementary pair of optional 501 subwoofers. Applications include discos, cinemas, clubs, churches, control room playback, etc.

**Basic Specifications & Suggested List Price:** Frequency response: 30Hz to 16kHz (half space), 40Hz to 16kHz  $\pm 3$ dB (free field); sensitivity: 110dB SPL - 1v RMS, 0dBv gain, sine wave sweep; maximum SPL: 130dB SPL peak pressure (program, half space); high frequency coverage: 90 degrees horizontal, 40 degrees vertical; system noise: less than 30 dBA SPL; list price: \$4800, optional subwoofers: \$1900/pr.

**MTX LOUSPEAKERS**

One Mitek Plaza, Winslow, IL 61089  
(815) 367-3811

Product Name: PRO 115

Contact: Rob Landsberg, national sales manager

Date Product Introduced: June 1986

**Product Description & Applications:** PRO 115 is designed for mobile DJ and disco sound reinforcement applications. Exceptional high-end sizzle from MTX's newly developed bullet tweeter. Clean, smooth midrange from MTX's PL5, the die-cast midrange now being used in rock clubs across the country. Outstanding bass from 15-inch woofer specifically engineered to perform optimally within this Thiele/Small-aligned cabinet. Remarkable efficiency. Rugged, durable cabinet features protective steel grilles, cup handles, and a built-in tripod mounting cup.

**Basic Specifications & Suggested List Price:** PRO 115 has a frequency response from 60Hz-21kHz. Sensitivity: 96.6 dB at 1 watt/1 meter. Power handling: 5-200 watts RMS; 400 watts peak power. Nominal impedance: 4 ohms. Dimensions: 29½h x 21¼w x 16d. Shipping weight: 77 lbs. Suggested retail: \$449.95 each.

**MTX LOUSPEAKERS**

One Mitek Plaza, Winslow, IL 61089  
(815) 367-3811

Product Name: PRO 215

Contact: Rob Landsberg, national sales manager

Date Product Introduced: June 1986

**Product Description & Applications:** PRO 215 is a versatile multi-purpose professional system, the power house of MTX's professional speaker cabinet line. Extended power handling capability. Remarkable efficiency. PRO 215 features exceptional high-end sizzle; clean smooth midrange from MTX's PL5, the die-cast midrange being used now in rock clubs across the country; outstanding bass from two 15-inch woofers that have been specifically engineered to perform optimally within this Thiele/Small aligned cabinet. Rugged cabinet has steel grilles to protect woofers and midranges. Convenient cup handles make moving system easy.

**Basic Specifications & Suggested List Price:** PRO 215 has a frequency response from 50Hz-21kHz. Sensitivity: 99.2dB at 1 watt/1 meter. Power handling: 5-400 watts RMS; 800 watts peak power. Nominal impedance is 4 ohms. Dimensions: 46½h x 18½w x 16d. Shipping weight: 125 lbs. Suggested retail: \$599.95 each.



# OPRYLAND

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*Mark Johnson, Coordinator  
Opryland Talent Agency<sup>SM</sup>*

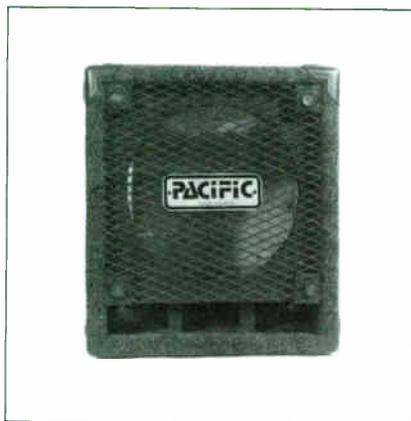


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Meyer Sound Laboratories, Inc.  
2832 San Pablo Avenue  
Berkeley, California  
94702



**PACIFIC WOOD WORKS**  
Pacific Wood Works Speaker Cabinets

**PACIFIC WOOD WORKS**  
P.O. Box 244 (6492 1st St.), Forestville, CA 95436  
(707) 887-1652

**Product Name:** Pacific Wood Works Speaker Cabinets  
**Contact:** Michael Kane, owner  
**Product Description & Applications:** The Pacific Wood Works line of Thiele-aligned modular speaker systems are designed for high power handling, efficiency, portability, and roadworthiness. All cabinet construction is 7-ply hard-wood plywood (birch) and is extensively braced to minimize cabinet resonance. They are finished with industrial grade carpeting, steel mesh speaker grills, stacking corners, fiberglass insulation, recessed panel jacks and bar handles. A complete line of instrument and sound reinforcement cabinets are available.  
**Basic Specifications & Suggested List Price:** PR-110: freq resp. 75-7,000Hz (\$150); PR112: freq resp. 60-1,600 Hz (\$165); PR115: freq resp 45-1,300 Hz (\$215); PR 118: freq resp 50-1,100 Hz (\$290); POB 212 (\$265); POB 412 (\$415); PS 412 (\$375); PR 412 (\$455). All cabinets should be loaded with Electro-Voice drivers.

**PEAVEY ELECTRONICS CORPORATION**  
P.O. Box 2898, Meridian, MS 39301  
(602) 483-5365  
**Product Name:** PCS/SP-4 Processor Controlled System  
**Contact:** Ken Valentine, product manager  
**Date Product Introduced:** June 1986  
**Product Description & Applications:** The PCS and the SP-4 are the components comprising the new "smart" speaker/processor system. The Processor Controlled System (PCS) is a dedicated rack-mount crossover/processor which is optimized for the new SP-4 speaker enclosures. The processor offers the versatility of a processed low frequency output for the addition of a subwoofer. The SP-4 features two 15-inch Black Widow speakers and a 90° x 45° horn mounted in a trapezoidal, carpet-covered enclosure.  
**Basic Specifications & Suggested List Price:** (PCS): \$399.50; (SP-4): \$649.50.

**PROFESSIONAL AUDIO SYSTEMS**  
1224 W. 252 St., Harbor City, CA 90710  
(213) 534-3570  
**Product Name:** TOC (Time Offset Correction) Series Loudspeakers  
**Contact:** Larry Doran, Roger DuNaier  
**Date Product Introduced:** August 1986  
**Product Description & Applications:** New improved version of the Time Offset Correction coaxial systems. Improvement has come from the development of a new Constant Coverage Horn. This new computer designed horn offers improved intelligibility, extended frequency response, and excellent pattern control above 10kHz. Construction is of high impact ABS and may be retrofit into any existing PAS coaxial 12-inch or 15-inch woofer. These systems are recommended wherever high-output, compact full-range systems are required.  
**Basic Specifications & Suggested List Price:** Specifications and prices vary with particular model. Please contact factory for more information.

**PROFESSIONAL AUDIO SYSTEMS**  
1224 W. 252 St., Harbor City, CA 90710  
(213) 534-3570  
**Product Name:** PI (Permanent Installation) Series  
**Contact:** Larry Doran, Roger DuNaier  
**Date Product Introduced:** August 1986  
**Product Description & Applications:** The PI Series offers very compact, high output coaxial systems with constant coverage horn technology and Time Offset Correction. These wedge-shaped PI systems may be clustered in the vertical or horizontal plane, up to 360 degrees, with available flying hardware. Available with

## NEW PRODUCTS

### SPEAKERS AND MONITOR SYSTEMS

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passive networks or active processor with on-off relay protection, subsonic and supersonic filters and amplifier output sensing protection. Rotation of coaxial speaker achieves vertical or horizontal dispersion of 30°x60° degree horn.

**Basic Specifications & Suggested List Price:** Frequency response: 50Hz to 18k Hz ±3dB; phase response: ±10 degrees, 100Hz to 10kHz; sensitivity: 102dB (1 meter/1 watt); power handling: 200 watts (into 8 ohms); suggested list price: \$800.

**STANTON MAGNETICS INC.**  
200 Terminal Dr., Plainview, NY 11803  
(718) 445-0063

**Product Name:** 30M/SR Disco Headphones  
**Contact:** Jean Kapen, mgr. advertising and promotion  
**Date Product Introduced:** June 1986  
**Product Description & Applications:** 30M/SR Disco Headphone. Unique product designed to satisfy the professional DJ's needs. It's a shoulder rest, single cup headphone that provides convenience, comfort and superb sound quality.  
**Basic Specifications & Suggested List Price:** Samarium cobalt magnet; frequency response of 20-22kHz; impedance of 100 ohms; max. input 0.25W; suggested list: \$49.95.

**STATE OF THE ART ELECTRONIK, INC.**  
43-1010 Polytek St., Ottawa, ONT K1J 8Z2  
(613) 744-1003  
**Product Name:** CF-1500B Acoustic Align Studio Reference Monitor  
**Contact:** Dr. Claude Fortier  
**Date Product Introduced:** July 1986

**Product Description & Applications:** The CF-1500B is a 4-way, acoustic align all-cone monitor system designed to deliver high SPL levels in control room applications formerly served only by systems employing horn-loaded drivers. The CF-1500B is a plug-in replacement for a UREI type 813, and is 4-way actively powered, employing the AAX-1 phase coherent electronic crossover. The system utilizes dual 15-inch woofers and its performance is unprecedented in terms of flatness of frequency response and clarity.  
**Basic Specifications & Suggested List Price:** Acoustic output: 119dB SPL continuous, 122 dB SPL program @ 1m; power handling: 600+200+100+56 watts (per frequency band); frequency response: 39Hz to 20kHz, ±1.5 dB on reference axis; acoustic listening window: ±30° horizontal, ±10° vertical; crossover: active, phase corrected AAX-1, fully modular unit. Dimensions: (WxHxD) 770x900x510mm (30¼x35½x20-inches). Price: \$2,750 each.

**STUDIO "7" RECORDING CO.**  
P.O. Box 57, Smith Station, Alabama 36877  
**Product Name:** Sico St. (Sound Trailer)  
**Contact:** Frank B. Gowan  
**Date Product Introduced:** April 1, 1986

**Product Description & Applications:** Strong, hard finish cabinets with full range speakers and amplifiers. (Customer specifications) for concert and large group productions. Can be purchased with matching travel trailer.  
**Basic Specifications & Suggested List Price:** Frequency response: 20-20k Hz; watts and SPL ratings vary according to specification. Cost per unit: \$750 and up.

**TANNOY NORTH AMERICA INC.**  
97 Victoria St. N., Kitchener, ONT N2H 5C1  
(519) 745-1158  
**Product Name:** L-300/Lion  
**Contact:** Bill Calma, market manager  
**Date Product Introduced:** June 1986

**Product Description & Applications:** The Lion is a new bass system designed to complement the Wildcat series. It is based on the latest dual chamber, reflex loaded acoustic bandpass design technology. It offers high sensitivity and accurate frequency response over a controlled bandwidth. It houses a unique passive X-over network which provides mid/high frequency take off points for single lead connections to other loudspeakers from the Wildcat Range. This enables the building of larger systems without the necessity for complicated external electronics.  
**Basic Specifications & Suggested List Price:** Sensitivity/freq. resp.: 43-85 Hz at 103 for 2.8V @ 1M; power

handling: 150W continuous; impedance: 5.5 ohms nominal; X-over frequency: 85Hz; dimensions h40½xw28x20-inches.

# TANNOY

The Name for Loudspeakers

**TANNOY NORTH AMERICA INC.**  
Super Gold Monitor Series (SGM)

**TANNOY NORTH AMERICA INC.**  
97 Victoria St. N., Kitchener, ONT N2H 5C1  
(519) 745-1158

**Product Name:** Super Gold Monitor Series (SGM)  
**Contact:** Bill Calma, market manager  
**Date Product Introduced:** November 1986  
**Product Description & Applications:** The new Super Gold Monitor series implements a form of crossover design which is unique in the distribution of high peak currents. Printed circuit boards and layouts have been discarded. Contacts between potentially dissimilar metals have been eliminated. The result is a range of loudspeakers which seem traditionally based, bear little external change from the existing series, use the same proven time alignment techniques and yet provide a major step forward in the quality of reproduced and recorded sound for monitoring in the pursuit of gainful profit (or sheer enjoyment).

**Basic Specifications & Suggested List Price:** Sensitivity: (2.83V @ 1M) 93-97dB; power handling continuous: 150-300W; dispersion: 90°-100°, conical @ 10kHz; phase response: better than ±20°-25° between 100Hz-10kHz; impedance: nominal 8 ohms, minimal 5.5 ohms.

**TOA ELECTRONICS**  
480 Carlton Ct., So. San Francisco, CA 94080  
(415) 588-2538  
**Product Name:** ME-AV Studio Recording Reference Monitors

**Date Product Introduced:** 1986  
**Product Description & Applications:** The ME-AV Studio Reference monitors are designed for high quality reference monitoring of audio source material in applications where video monitoring is necessary. Specially shielded magnet structures are used to eliminate video interference problems typically encountered when audio and video devices are in close physical proximity to each other.  
**Basic Specifications & Suggested List Price:** Models range from \$129 per pair to \$899 per pair (list price).

**TURBOSOUND INC.**  
611 Broadway, New York, NY 10012  
(212) 460-9940  
**Product Name:** TMW Series Floor Monitors  
**Contact:** Your local dealer

**Date Product Introduced:** February 1986  
**Product Description & Applications:** The TMW Series of low profile floor monitors consists, initially of two complementary units, the TMW-212 and TMW-215. Both are designed to provide high quality, powerful, compact on-stage sound for the live sound, television, theater, and audio-visual industries.  
**Basic Specifications & Suggested List Price:** TMW-212: 300 watts 4 ohms, optimized passive crossover network; 2 x 12-inch drivers and 1-inch compression driver loaded with custom triangular inert resin horn; frequency response, 110Hz-17kHz ±3dB; max SPL: 127 dB Peak. TMW-215: 450 watts; switchable active two-way/passive; 2 x 15-inch drivers, and 2-inch compression driver loaded with custom triangular inert resin horn; frequency response, 90Hz-17kHz ±3dB; max SPL 133dB peak.

**TURBOSOUND INC.**  
611 Broadway, New York, NY 10012  
(212) 460-9940  
**Product Name:** TSW-124 (revised)  
**Contact:** Your local dealer

**Date Product Introduced:** November 1986

**Product Description & Applications:** The TSW-124 now incorporates the LS-2403 loudspeaker. This radical speaker is a completely new design and eliminates the great majority of problems often associated with low and sub-bass loudspeakers. The recommended crossover point is 63Hz and the unit is useful to 15Hz.

**Basic Specifications & Suggested List Price:** Power handling: 600 watts RMS; frequency response, 15Hz-150Hz; full specifications T.B.A.

#### TURBOSOUND INC.

611 Broadway, New York, NY 10012  
(212) 460-9940

**Product Name:** TMS-3 (revised)

**Contact:** Your local dealer

**Date Product Introduced:** November 1986

**Product Description & Applications:** The basic format of the best selling TMS-3 remains unchanged but an important change has occurred with the high-frequency drive unit. Turbosound have developed the V-2 which incorporates two one-inch compression drivers loaded by a common horn and a new development of the Turbo loading technique. This new device is available as a retrofit for existing TMS-3 users. Full specifications T.B.A.

#### TURBOSOUND INC.

611 Broadway, New York, NY 10012  
(212) 460-9940

**Product Name:** TFM Floor Monitors

**Contact:** Your local dealer

**Date Product Introduced:** November 1986

**Product Description & Applications:** The TFM Series consists initially of the TFM-2. Turbosound considers this to be the first new approach to on-stage monitoring for years. The unit is incredibly compact and features a custom built co-axial 15-inch driver system coupled with a two-inch compression driver and Turbo loading devices, in a cabinet hardly larger than the speaker itself. Full specifications T.B.A.

**Product Name:** Sound Reinforcement Speakers

**Contact:** Jessie Whitby

**Date Product Introduced:** Fall 1986

**Product Description & Applications:** Put back the music energy where it belongs. Transients, harmonic strength, and the high energy mid-bass through mid range area are reproduced for the engineer to perceive the feeling of the highest energy area of music. All the energy—speakers designed to the structure of music, studio or concert—Whitby Sound.

#### YORKVILLE SOUND

56 Harvester Dr., Batavia, NY 14020  
(416) 751-8481

**Product Name:** Elite (Model) SW-1000

**Contact:** Mike Holman, communications mgr.

**Date Product Introduced:** June 1986

**Product Description & Applications:** A dual-18 subwoofer enclosure for concert applications. Features include XLR and 1/4-inch inputs, input protection circuitry for power overloads and distortion connected to a resettable breaker. Tilt-back wheels and handles are included. The dual-vented reflex enclosure is constructed of acoustically-braced 3/4-inch plywood covered in black Ozite carpeting and comes with a perforated metal grill.

**Basic Specifications & Suggested List Price:** Power capacity: 1000 watts PGM. Frequency response: 45 Hz to

600 Hz  $\pm 1.5$  dB. Sensitivity: 103 dB 1W/1M. Impedance: 4 ohms. Contents: 2 X RCF Model L18/851. Outside dimensions: 22x28x42 1/2-inches. Price: \$1,095 each.

#### YORKVILLE SOUND

56 Harvester Dr., Batavia, NY 14020  
(416) 751-8481

**Product Name:** Elite (Model) Maxim-1000

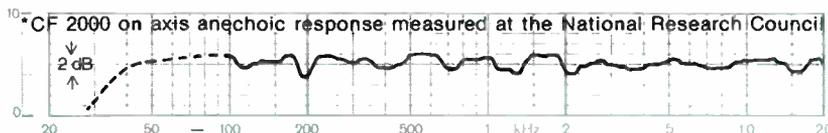
**Contact:** Mike Holman, communications mgr.

**Date Product Introduced:** November 1985

**Product Description & Applications:** A full-range, 2-way speaker system for concert sound applications. An electronic processor linearizes bass response  $\pm 3$  dB down to 55 Hz and may alternately be employed as a stereo crossover for bi-amping the optional SW-1000, dual-18 subwoofers. The onboard crossover contains protection circuitry for power and distortion. This is connected to a resettable breaker. XLR and 1/4-inch inputs, tilt-back wheels and handles are included.

**Basic Specifications & Suggested List Price:** PGM power capacity: 1000 watts. Sensitivity: 105 dB. Frequency response: 55 Hz to 19 kHz  $\pm 3$  dB. Contents: 2 x 15-inch custom-designed speakers @ 500 W, 8 ohms and RCF H3709/N-481 horn/driver. Crossover: 2.5 kHz @ 18dB/octave. Impedance: 4 ohms. Dimensions: 39x26 1/2 x 18-inches. Weight: 154 lbs. Price: \$2,095/pair w/ processor.

## STATE OF THE ART ELECTRONIK INC.



Ruler flat frequency response is the realization of an ideal for high definition monitoring in the digital age. The CF Series Acoustic Align Studio Reference Monitors have achieved this ideal through multi-way, active systems that are capable of sustained high power output in constant professional use. Imaginative design and exacting technology have resulted in these all cone systems, integrally designed with the phase corrected filters of the AAX 1 Active Crossover System. The CF Series Monitors provide your client with the analytical monitoring environment essential in today's market, and they are already in use in studios all over the world, from Hamburg to Los Angeles.

The CF 2000 (shown) and CF 1000 feature:

4 Way all cone active monitoring system with computer matched drivers

Ruler flat frequency response on reference axis with excellent off-axis performance

Wide dispersion with symmetrical polar pattern for a broad listening window

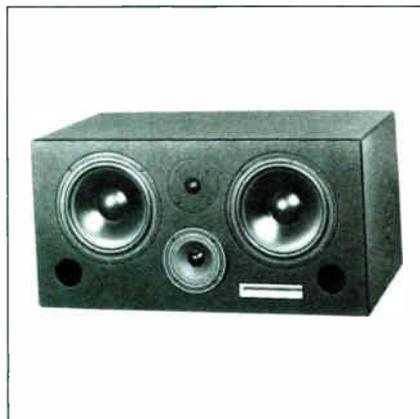
Continuous output of 122 db SPL in a typical control room with 130 db peaks



**STATE OF THE ART  
ELECTRONIK INC.**  
43-1010 Polytek St., Ottawa, Ont., Canada K1J 8Z2

Dealer inquiries invited

Circle #136 on Reader Service Card



**WESTLAKE AUDIO**  
BBSM-8 Reference Monitor

#### WESTLAKE AUDIO

2696 Lavery Court, Unit 18  
Newbury Park, CA 91320  
(805) 499-3686

**Product Name:** BBSM-8 Reference Monitor

**Date Product Introduced:** June 1986

**Product Description & Applications:** Designed as a high accuracy portable reference, the BBSM-8 features a unique combination of drivers, crossover, and mounting configuration which combined provide: wide bandwidth, low I.M. distortion, good power handling, pinpoint stereo imaging and a coherent wave front even as close as 18-inches. Applications for this monitor are: as an alternative reference to permanently installed studio monitors; monitors for small control rooms; mobile recording; broadcast on-air or production work; quality control stations; editing suites; producer or auditioning offices; and home reference for the professional user.

**Basic Specifications & Suggested List Price:** Type: 3-way, medium power, phase coherent monitor with two 8-inch ported woofers, 3.5-inch mid in sealed enclosure, one-inch dome tweeter, and internal crossover. Impedance: nominally 4 ohms. Frequency response: 65 to 18k Hz,  $\pm 3$  dB on axis, suspended. Cabinets: oiled walnut, brown grilles; black utility, no grilles. Weight: 68 pounds (30.8 kg). Dimensions: 13x26x16.5-inches (hwxwd). Price: (3 each) \$995.

#### WHITBY SOUND

8067 Center Parkway, Sacramento, CA 95823  
(916) 424-8881

# N

# EW PRODUCTS TEST AND MAINTENANCE GEAR

# 1 • 9 • 8 • 7

**APOGEE ELECTRONICS CORP.**  
1517 20th St., Santa Monica, CA 90404  
(213) 828-1930

**Product Name:** Audioscope 3113 1/3 octave real time analyzer

**Contact:** Betty Bennett, sales

**Date Product Introduced:** June 1986

**Product Description & Applications:** The Audioscope 3113 is a 1/3 octave real time analyzer utilizing a separate RGB color monitor to provide an accurate display of frequency levels with excellent resolution. Columns, graticule and secondary graticule colors may be programmed internally to suit individual requirements. Six pole filters ensure precise frequency measurement. Four memories are provided together with a peak hold facility and internal pink noise generator.

**Basic Specifications & Suggested List Price:** 1/3 octave bands: 30 with center frequencies from 25Hz to 20kHz. Filters: 30 six-pole switched capacitor Chebyshev, Pass band peak to valley ripple less than or equal to 0.6 dB. Switchable "A" weighting filter. Scale: Logarithmic, electronically generated. Amplitude display range 55dB. Accuracy: sine wave input at the filter center frequency and ambient temperature range +5 to +40 degrees C, 0.5dB +10 to -30dB. Pink noise generator resolution: 0.25 dB (one screen scan line). Price \$4,900.



**AUDIO CONTROL INDUSTRIAL**  
SA-3050 Spectrum Analyzer

**AUDIO CONTROL INDUSTRIAL**  
6520 212th St. SW, Lynnwood, WA 98036  
(206) 775-8461

**Product Name:** SA-3050 Spectrum Analyzer

**Contact:** Tom Walker, president

**Date Product Introduced:** August 1986

**Product Description & Applications:** Affordable, real time, third octave, microprocessor controlled, spectrum analyzer with six non-volatile memories, digital pink noise generator and multiple display options meeting ANSI Class II standards by utilizing fourth order double tuned filters. Balanced XLR input, balanced bridging 1/4-inch line input and BNC input. Calibrated microphone is phantom-powered, pressure gradient with internal pre-amp.

**Basic Specifications & Suggested List Price:** Suggested list \$850 including microphone, \$715 without mic. 30 bands, one-third octave ISO centers; 9x30 LED dot matrix display; range: 56dB to 136dB SPL, 0 dBu=100dB SPL; filters to ANSI S1.11-1971 Class II type E. Size 4.1x10x12.75-inches, weight 10 pounds.

**AUDIO PRECISION, INC.**  
P.O. Box 2209, Beaverton, OR 97075  
(503) 297-4837

**Product Name:** System One audio test system options

**Contact:** Bob Metzler, Adolfo Rodriguez

**Date Product Introduced:** March 1986

**Product Description & Applications:** New wow and flutter options, new intermodulation distortion option including TIM capability, new audio switchers for automated test of multi-track tape machines, mixing consoles. **Basic Specifications & Suggested List Price:** Wow and flutter option \$840, intermod. distortion option \$1200, switchers (per 2x12 unit) \$1000.

**B&K-PRECISION/DYNASCAN CORP.**

6460 W Cortland, Chicago, IL 60635

(312) 889-9087

**Product Name:** Digital Storage Oscilloscope Model 2520

**Contact:** Dennis Hoy, director of sales

**Date Product Introduced:** April 1986

**Product Description & Applications:** The B&K-Precision Model 2520 provides digital storage and analog oscilloscope operation in one instrument. The unit is used to capture and store one time events, and use them as a reference source or as a source of comparison with a "live" signal.

**Basic Specifications & Suggested List Price:** 2 mega-sample/second A/D converter, 20 MHz analog band width, 20 MHz storage bandwidth with a repetitive waveform, 1k per channel memory, analog output, equivalent time sampling, pre-trigger 25%, 75%, and 100%. Price: \$1895.

**DALBEC BROADCAST PRODUCTS**

Red Mill Rd., Rensselaer, NY 12144

(518) 477-7873

**Product Name:** DBC Techman—Beltpack Audio Multitester

**Contact:** John Wesson, proj. director

**Date Product Introduced:** July 1986

**Product Description & Applications:** DBC Techman is a beltpack audio signal test kit for critical testing and on line maintenance/evaluation of signal and data lines. Accurate tests of signal levels from -60dBV to +15dBV. Fully balanced and isolated design allows equipment test while in use, not affecting operation. Typical uses include: distortion tests, gain and phase testing, frequency response tests, noise testing and identification, multi-track tape deck alignments and quick fault analysis.

**Basic Specifications & Suggested List Price:** Range: better than 75dB (-60 to +20dBV); useable frequency response: 30-15kHz; input impedance 25k ohms; transformer balanced (isolated); load impedance 22 ohms; constructed of finest grade components in extruded aluminum belt clip pack with rugged polycarbonate graphics. Kit includes: Techman, foam lined instrument case, nicad cell, recharger, Oldaker test probe kit, instrumentation headphones, summing probe, and instruction guide. List price: \$239. Accessories: full patch box to allow quick connect to popular connector types; list: \$89.

**HEWLETT-PACKARD CO.**

1620 Signal Dr., TAF C-34, Spokane, WA 99220

(509) 922-4001

**Product Name:** HP 8903B Audio Analyzer

**Contact:** Ken Thompson, product marketing engineer

**Product Description & Applications:** The HP 8903B combines the functionality of a high-performance distortion analyzer, frequency counter, AC voltmeter, DC voltmeter, and SINAD meter into one compact package. The instruments cover the frequency range of 20 Hz to 100 kHz. In addition, the HP 8903B includes a low-distortion audio source which allows it to perform such tests as swept flatness, swept distortion, and signal-to-noise ratio, automatically with no additional equipment.

**Basic Specifications & Suggested List Price:** Source: frequency range, 20 Hz to 100 kHz; flatness, ±0.06 dB 20 Hz to 20 kHz. Analyzer: frequency measurement range, 20 Hz to 150 kHz; AC voltage accuracy, 2%, 20 Hz to 20

kHz; residual distortion, 0.003% typical from 20 Hz to 20 kHz. U.S. list price: \$5,800.

**JASONI ELECTRONICS**

2900 E. Charleston Blvd. Ste. 197

Las Vegas, NV 89104

(702) 384-0081

**Product Name:** TAS-1000 audio tape analyzer system

**Contact:** Dan G. Peluso, president

**Product Description & Applications:** The TAS-1000 audio analyzer will align, calibrate, and set up any audio tape gear, read noise down to -70dbm, with scope connections for signal analysis, and precise phase adjustment. Noise (pink) generator, and sine osc., variable selected frequencies/2 range, auto/manual sweep with adj. rate.

**Basic Specifications & Suggested List Price:** Balanced input and outputs, built-in monitor speaker. Will reference any input level between -10 and +4dbm. Price: \$680.

**MENLO SCIENTIFIC**

39 Menlo Pl., Berkeley, CA 94707

(415) 528-1277

**Product Name:** Sigma RS-4

**Contact:** Mike Klasco, president

**Date Product Introduced:** January 1986

**Product Description & Applications:** Portable audio/computer workstation. Applications include 1/3 octave real analyzer, RT 60 reverb measurements, 3-D spectral decay, transient response. RS-4 tests rooms, halls, (acoustics) and speaker, amplifiers, tape machines, etc. Runs Apple software, MIDI-interface, and works with printers and X/Y plotters.

**Basic Specifications & Suggested List Price:** 1/3 octave analyzer meets highest ANSI standards. Built-in disk drives, 9-inch monitor and printer interface. Optional FFT spectrum analyzer. Price of system is \$5000.

**RAPID SYSTEMS INC.**

755 N. Northlake Way, Seattle, WA 98103

(206) 547-8311

**Product Name:** PC based real time spectrum analyzer

**Contact:** Bo Ray, marketing

**Date Product Introduced:** September 1, 1986

**Product Description & Applications:** The R360 a fast totally turnkey spectrum analyzer peripheral for IBM PCs. Offers four channel, real time FFT analysis using the TI TMS 32010 IC. Features: 1024 pt FFT's in less than 60 msec, sample rates from: 1Hz to 500kHz, 4 channels with 4 A/Ds and 32k data buffers. Input signal ranges from 140mv p-p to 280 v p-p, bandwidth DC to 250kHz, analog/digital/external/internal triggering.

**Basic Specifications & Suggested List Price:** Price \$999 to \$2699, depending on configuration. Simple menu-driven operation, rectangular and hanning windows, log and linear scaling on both amplitude and frequency scales, amplitude and frequency cursor, time series data display, source code available.

**RECORDING STUDIO SERVICES**

P.O. Box 382M, Bay Shore, NY 11706

(516) 667-6737

**Product Name:** Peak Program Meter (PPM-100, PPM-200)

**Contact:** Jim Jordan

**Date Product Introduced:** April 1986

**Product Description & Applications:** Recording Studio Services Peak Program Meters are precision instruments designed to meet BS 4297:1968 and all proposed PPM standards. The primary advantage of the PPM over the VU meter is the faster response time (10 ms vs. 330 ms); this eliminates "second guessing" meter readings on percussive material. The ability of the PPM to accurately display peaks results in better knowledge of available headroom, which is critical in digital recording and transmission systems.

**Basic Specifications & Suggested List Price:** The PPM-

100 is intended for mounting into existing equipment. The PPM-200 mounts in our MMS cardframes. Power requirements:  $\pm 15$  VDC, 25 ma. Input: actively balanced, 50k ohm min. Usable range: 12 Hz-50kHz, "0" level ("8" on PPM scale) adjustable from -2 to +12 dBv. PPM-100 \$274, PPM-200 \$311.

#### RECORDING STUDIO SERVICES

P.O. Box 382M, Bay Shore, NY 11706  
(516) 667-6737

**Product Name:** Correlation/Phase Indicator (CPI-100, CPI-200)  
**Contact:** Jim Jordan

**Date Product Introduced:** April 1986

**Product Description & Applications:** The Correlation/Phase Indicator displays the correlation between left and right stereo audio signals on a color-coded 10 LED bar graph. The CPI is used to indicate the mono compatibility of a stereo signal, and an expanded mode permits accurate setting of tape head azimuth. The display provides positive indication of out-of-phase and loss of channel conditions, making the CPI an ideal replacement for X/Y oscilloscopes in many applications.

**Basic Specifications & Suggested List Price:** The CPI-100 circuit board is intended for mounting into existing equipment. The CPI-200 installs in our MMS (Modular Metering System) cardframes. Power requirements:  $\pm 15$ , 30 ma. Usable range: 50-30kHz, -20 to +28 dBv. CPI-100 \$195, CPI-200 \$225.

#### RESEARCH TECHNOLOGY INTERNATIONAL

4700 Chase Ave., Lincolnwood, IL 60646  
(312) 677-3000

**Product Name:** RTI DV-5 Dropout Analyzer/Time Code Generator

**Contact:** Tom Tisch, vice president sales

**Date Product Introduced:** 1986

**Product Description & Applications:** RTI's new DV-5 Dropout Analyzer/Time Code Generator combines two necessary functions for CD pre-mastering. It writes SMPTE 60 Hz non drop frame time code, synchronized to the NTSC video signal. Also, the DV-5 reports an accurate dropout count, providing quality control data of the tape's condition. The DV-5 is used in conjunction with any existing VTR. No special wiring or VTR modification is required.

**Basic Specifications & Suggested List Price:** Supplies precise video or RF dropout information. Generates crystal black (video) and either longitudinal or VITC time code. Can be rack or surfaced mounted. Requires no VTR modifications.

#### RE INSTRUMENTS CORPORATION

31029 Center Ridge Rd., Westlake, OH 44145  
(216) 871-7617

**Product Name:** RE540 BTSC TV Stereo Generator

**Contact:** Steve Watts, sales/applications engineer

**Date Product Introduced:** June 10, 1986

**Product Description & Applications:** The RE540 is a programmable TV stereo generator to be used in testing the audio circuits of stereo televisions, VCRs and set top decoders conforming to the BTSC Multichannel sound system.

**Basic Specifications & Suggested List Price:** Stereo separation: 60dB. Overall distortion: 0.03% (-70dB). Single frequency and multitone signals. Outputs: composite baseband BTSC signal, SAP channels with digital dbx encoding, baseband modulated on a 4.5 MHz IF carrier, baseband modulated on a 41.25 MHz IF carrier. Pilot phase locks to external line frequency. A 45.75 MHz signal is available for interfacing with an external frequency translator.

#### ROH DIV. OF ANCHOR AUDIO, INC.

913 W. 223rd St., Torrance, CA 90502  
(213) 533-1498

**Product Name:** ROH Series 1900 Extended Range Audio Line Monitors

**Contact:** Dan Garrigan, sales manager

**Date Product Introduced:** May 1986

**Product Description & Applications:** ROH's Series 1900 Line Monitors are general purpose instruments capable of performing a variety of broadcast audio measurements. Inputs, selected by front panel switches, are displayed on VU and/or PPM meters automatically referenced to +4, +8 or +30 dB calibration. A continuous action range control allows the unit to accommodate range sensitivity from -50dBm to +30dBm, in 2 dB steps, for a "zero" meter reading. Inputs may be 20k ohm bridging or 150/600 ohm terminating.

**Basic Specifications & Suggested List Price:** A built-in

line amplifier and 3-frequency test oscillator are normalized to front panel jacks, where they may be selected as inputs to the meters. The instruments are half-rack configured, ready to mount in existing video test equipment enclosures. Base price is \$1920 for mono and \$2460 for stereo.

#### SESCOM, INC.

2100 Ward Dr., Henderson, NV 89015  
(702) 565-3400

**Product Name:** AG-1

**Contact:** Franklin J. Miller, president

**Date Product Introduced:** October 25, 1986

**Product Description & Applications:** Rack-mounted low-distortion audio generator. Features push-button frequency selection and decade control. The range of selectable frequencies is from 100 Hz to 15kHz which is very useable in studio applications. The output level is also user-selectable via front panel push buttons.

**Basic Specifications & Suggested List Price:** The output levels are +20, +8, +4, 0 and -10 dBm transformer balanced. The unit has a VU meter which tracks the output level, is one rack unit high and is AC powered. Price is \$200.

#### SOUND TECHNOLOGY, INC.

1400 Dell Ave., Campbell, CA 95008  
(408) 378-6540

**Product Name:** ATS-Audio Test Software

**Contact:** Cindy Alderson, sales and marketing

**Date Product Introduced:** April 1986

**Product Description & Applications:** Three software modules available for automated testing using the Sound Technology 1500 Series test systems and an IBM or compatible computer. Main test module allows full front panel control through computer keyboard, default settings for test parameters, save test results to disk, print out or save to graph when used with compatible graphics module. Graphics module allows manipulation of test results to two or three dimensional graphs. Line, bar, pie, text, Gantt and flow charts. Change axis, scales, size, color, etc. Tape test module performs pass/fail test sequence.

**Basic Specifications & Suggested List Price:** Main module: \$295. Graphics modules: \$450. Tape test module: \$295.

#### SOUND TECHNOLOGY, INC.

1400 Dell Ave., Campbell, CA 95008  
(408) 378-6540

**Product Name:** MSAT-Audio Switching System

**Contact:** Cindy Alderson, sales and marketing

**Date Product Introduced:** April 1986

**Product Description & Applications:** Bus-controlled switching systems for automated multi-channel audio equipment testing. Minimum system contains one (1x8) switching card. Each card cage can contain as many as twelve (1x8) switching cards for a total of (1x96) capability per card cage (or you can divide the card cage in half and have (1x48) right channel and (1x48) left channel). The main controller rack can control up to sixteen fully loaded card cages, or a total of (1x1,536) or (768x768).

**Basic Specifications & Suggested List Price:** channel separation greater than 90 dB. Prices start at \$1,750.

#### STUDIO MASTER SYSTEMS

P.O. Drawer P, N. Miami Beach, FL 33160  
(305) 945-9774

**Product Name:** Studio Master Plus with CCL (Console Control Logging)

**Contact:** Seth Snyder

**Date Product Introduced:** Late 1985

**Product Description & Applications:** Studio Master Plus with CCL (Console Control Logging) is a software and hardware package for the Macintosh computer. With it, you can scan and log all knob and fader positions in each mixing console module. Studio Master includes a high speed, audio spectrum analyzer which can be used to aid maintenance personnel with the alignment of tape recorders and monitor loudspeaker systems or any other device where spectrum analysis could be useful.

**Basic Specifications & Suggested List Price:** Spectrum analyzer input channels: 16. Input impedance: 10k ohms balanced. Frequency range: 20 Hz to 20,000 Hz. Frequency resolution: Switchable 500, 250, 100, 50 frequency points. Level resolution: Switchable .10dB, .25dB, .10B per pixel. Includes: Studio Master Plus with CCL; Studio Master billing system; Track Master track sheets and tape labels; outboard master outboard gear charting systems. List price: \$12,500.

#### TEKTRONIX, INC.

P.O. Box 500, D/S 58-699, Beaverton, OR 97077  
(503) 627-1843

**Product Name:** 760 Stereo Audio Monitor



TEKTRONIX, INC.  
760 Stereo Audio Monitor

**Contact:** Jeanine Navara, marketing communications mgr.

**Date Product Introduced:** April 12, 1986

**Product Description & Applications:** Tektronix' new precise 760 stereo audio monitor takes the guesswork out of multi-channel audio mixing. It is ideal for any audio mixing, sweetening, and master control or transmission location where monitoring the stereo audio signal is a must. On the CRT and adjacent bar graph, you can observe amplitude information, stereo separation, and phase correlation between the left and right channels. Also of great importance, you can see monoaural levels created from the stereo channels.

**Basic Specifications & Suggested List Price:** Two calibrated bars are dedicated to the left and right channels. The input to a third bar is selectable from internally matrixed L + R or L - R, or an auxiliary input on the rear panel. These give you accurate level indicators featuring a three second "peak hold" segment to make level monitoring easier than ever. Compact and aggressively priced at \$1,685, the 760 stereo audio monitor is one of the best defenses against out-of-phase stereo sound.



#### REMOVES VOCALS FROM RECORDS!

Our VOCAL ELIMINATOR can remove most or virtually all of a lead vocal from a standard stereo record and leave most of the background untouched! Record with your voice or perform live with the backgrounds. Used in Professional Performance yet connects easily to a home component stereo system. Not an equalizer! We can prove it works over the phone. Write or call for a free brochure and demo record.



#### Before You Buy!

- Time Delay
- Reverberation
- Crossovers
- Noise Reduction
- Compressor/Limiters
- Expanders
- Spectrum Analyzers
- Parametric EQ

Don't have regrets about paying too much for a lesser product. In demos and comparisons, we'll show you why we're Better! Our Factory Direct sales allow us to produce a Superior product and offer it to you at a Lower price. Call or write for a free full length Demo Album and 24 page brochure. Write to: **LT Sound**, Dept. MX, P.O. Box 338, Stone Mountain, GA 30086. In Georgia Call (404) 493-1258. **TOLL FREE: 1-800-241-3005 - Ext. 8A**

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# EW PRODUCTS

# OTHER EQUIPMENT

# 1 • 9 • 8 • 7

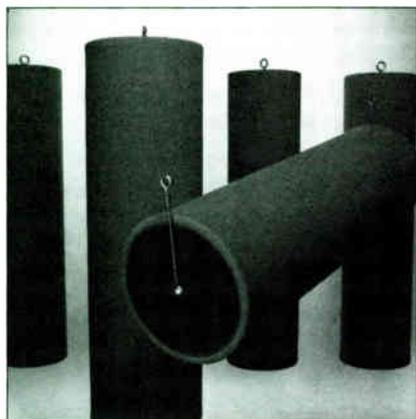
**AARMOR CASE CO.**  
420 N Dexter, Ionia, MI 48846  
(616) 527-2120

**Product Name:** Shipping cases, "Vara-Shock" electronics racks

**Contact:** David Hall, sales

**Date Product Introduced:** July 13, 1986

**Product Description & Applications:** Shipping containers for rack mounted electronic equipment. The shock and impact suppression system can be adjusted to equipment of various weights and centers of gravity.



**ACOUSTIC SCIENCES CORPORATION**  
Tube Traps

**ACOUSTIC SCIENCES CORPORATION**  
385 Lawrence, Eugene, OR 97401  
(503) 272-8823

**Product Name:** Tube Traps

**Contact:** Larry Ward

**Product Description & Applications:** A patented line of broadband sound absorbers. Provides significant amounts of low frequency absorption in a small light weight package. Used in recording studios, stage and commercial applications. Useful around musical instruments and for trick microphone techniques. Half round version offers cost effective treatment for schools, churches and assembly halls. Easy to spec. and easy to install. An alternative to traditional acoustic treatment while offering much more low frequency control. Custom units are available.

**Basic Specifications & Suggested List Price:** Stock tubes are 3-feet long, 9-inch diameter voice range traps provide up to nine Sabines absorption, 11-inch diameter instrument range traps to 16 Sabines and 16-inch diameter subwoofer range traps to 18 Sabines. They have 3 dB/octave roll off in low end and 400 Hz crossover panel for adjustable midrange diffusion.

**AD MUSIC CONCEPTS**  
309 19th Ave., Belmar, NJ 07719  
(201) 681-1455

**Product Name:** The Stocking Screen

**Contact:** Stacey Stempier, director of marketing

**Date Product Introduced:** June 1986

**Product Description & Applications:** The Stocking Screen is a highly effective breath pop filter employing twin membranes of a durable and acoustically transparent fabric, separated by a half-inch air space. This system provides excellent low frequency suppression (breath pop protection) and superior transparency throughout the vocal bandwidth. The Stocking Screen system outperforms the familiar coathanger and pantyhose setup, while avoiding those problems normally associated with

foam windscreens. Look for our full color photographic ad in this issue of *Mix*.

**Basic Specifications & Suggested List Price:** Standard 3/8-inch threaded mount. Colors in pink, aqua, and high tech black. Suggested pro net \$49.95.

**ALPHA AUDIO ACOUSTICS**

2049 W. Broad St., Richmond, VA 23220

(804) 358-3852

**Product Name:** Sonex 1

**Contact:** David S. Walker, director of marketing

**Date Product Introduced:** July 1, 1986

**Product Description & Applications:** Sonex 1 is a porous acoustic melamine material. Tests performed by the independent laboratory, Factory Mutual Research prove that uncoated Sonex 1 meets Class 1 requirements for both flame spread and smoke density. Yet Sonex 1 retains the famed Sonex anechoic wedge properties for noise reduction.

**Basic Specifications & Suggested List Price:** Sonex 1 will be sold in 2 feet by 4 feet panels with a depth of 2-inches. It will be packaged with four sheets in a box, and is available immediately in uncoated form, color white. Additional colors will be made available by the fall of 1986, as well as a washable Hypalon finish for greater product durability.

**APEX MACHINE COMPANY**

3000 N.E. 12th Terrace, Ft. Lauderdale, FL 33334

(305) 566-1572

**Product Name:** CA-80 Cassette Printer with U.V.

**Contact:** A.R. Coningsby III, sales executive

**Date Product Introduced:** November 1986

**Product Description & Applications:** Apex will be exhibiting for the first time ever their new high-speed fully automatic two-sided 3-color cassette printer complete with alcohol scrubber and ultraviolet drier. Their new low production single color hand operated cassette printer will also be exhibited for the first time.

**APEX MACHINE COMPANY**

3000 N.E. 12th Terrace, Ft. Lauderdale, FL 33334

(305) 566-1572

**Product Name:** T-8 Platemaker

**Contact:** A.R. Coningsby III

**Date Product Introduced:** January 1986

**Product Description & Applications:** Tapex Corporation a subsidiary of Apex Machine will be exhibiting with Apex their new T-8 Platemaking machine. This incredible unit is utilized to make the printing plates used on the Apex printers.

**Basic Specifications & Suggested List Price:** The T-8 Platemaker can make eight printing plates using only water in less than 10 minutes at a cost of less than \$1 each.

**APOGEE ELECTRONIC CORP.**

1517 20th St., Santa Monica, CA 90404

(213) 828-1930

**Product Name:** Audioscope Model 3211 Video Based metering system

**Contact:** Betty Bennett, sales

**Date Product Introduced:** June 1986

**Product Description & Applications:** The Audioscope model 3211 Multi-channel Audio Level Display provides accurate monitoring of up to 32 channels simultaneously on a separate RGB color monitor. Columns, gratitudes and secondary gratitudes colors may be programmed internally to suit individual requirements. A color square may be displayed at the top of each column to indicate the record mode of that channel when used with a multi-track tape machine and switching may be effected automatically. Meter characteristics are switchable VU or PPM.

**Basic Specifications & Suggested List Price:** Thirty-two electronically balanced inputs, 20k ohm impedance. Unbalanced sources may also be connected. Eight scales ranging from: -12 to +23dBV through -50 to +5. Frequency

response: (from +10 to -20dB): 10Hz to 20kHz±0.5dB. Tracking between channels better than 0.3dB. Outputs: video, 75 ohm, positive modulation, red, green, and blue all 1Vpp. Sync 4Vpp. variable. Price: \$2300.

**AUDICO, INC.**

219 Crossen Ave., Elk Grove, IL 60007

(312) 640-1030

**Product Name:** Model 609 Video Cassette Rewinder/Cycler/Counter—Umatic, VHS and Beta

**Contact:** Bill Hinkle

**Date Product Introduced:** April 1986

**Product Description & Applications:** Safely, accurately and rapidly rewinds, fast-forwards, cycles and counts and length of tape in video cassettes. Plug-in modules allow users to rapidly interchange between Umatic, VHS and Beta cassettes on the same unit. Cycler fast-forwards the tape to the tail leader, and then automatically rewinds it. This feature is useful to check for broken or damaged tape, to improve its appearance on the reel, and to cycle cassettes stored for a long period without use. Optional counter verifies length of tape in the cassette.

**Basic Specifications & Suggested List Price:** Model 609-R Video Cassette Rewinder/Cycler for Umatic, VHS or Beta is \$1,125. Additional plug-in modules for other formats are \$700 each. Model 609-RC Rewinder/Cycler/Counter is \$1,400 for first format and \$975 for each additional format. A heavy duty product with servo operated DC motors and rugged cast aluminum construction.

**AUDIO DESIGN CALREC, INC.**

P.O. Box 786, Bremerton, WA 98310

(206) 275-5009

**Product Name:** Admix

**Contact:** Kathleen Mallory, sales manager

**Date Product Introduced:** June 1986

**Product Description & Applications:** Using the "hidden" facilities of a Sony PCM 701 coupled with an Admix, it is possible to replay a digital recording and add a further digitized signal; to record the composite signal on a second recorder while monitoring the new balance through the 701 D/A converter. Other Admix features include: ± 12dB level change, channel balance, phase reverse, redithering (to reduce 1610 quantizing noise); DC offset trim—all in the digital domain.

**Basic Specifications & Suggested List Price:** Dynamic range: greater than 92 dB (16 bit); freq. response: 10-20k Hz ± 0.5 dB; harmonic distortion: less than 0.005%. Suggested price: \$2495.

**AUDIOLAB ELECTRONICS, INC.**

3725 Esperanza Dr., Sacramento, CA 95864

(916) 485-0500

**Product Name:** Audiolab Tape Degaussers

**Contact:** Ron Stefan

**Date Product Introduced:** Updated 1986

**Product Description & Applications:** The new TD-1B, TD-4A, and TD-5 tape degaussers from Audiolab Electronics, Inc. are bulk erasers for use with any kind of magnetic media including audio, video, computer diskettes, data tapes, magnetic films, cartridges, and cassettes. The TD-1B is designed for home and business use and has a widely focused magnetic field to assure complete erasure. The TD-4A and TD-5 are designed for heavy duty business and computer use and will erase any type of magnetic media up to 14 inches in diameter and 1-inch or 2-inches wide, respectively.

**Basic Specifications & Suggested List Price:** All models are available in 115 and 230 volt versions. The TD-1B retails for \$119, the TD-4A \$850, and the TD-5 \$950.

**AUDIOLAB ELECTRONICS, INC.**

3725 Esperanza Dr., Sacramento, CA 95864

(916) 485-0500

**Product Name:** Audiolab Event Timer  
**Contact:** Ron Slofan

**Product Description & Applications:** Event timer provides automatic 3-way operation timing starts and stops from any audio source—panel pushbuttons—remote contacts or pulse. Interfaces with any audio source from -20 dBm. Input is balanced bridging 12k ohms. Normal minutes/seconds mode displays up to 10 minutes, pushing hours/minutes shows elapsed time up to 24 hours.

**Basic Specifications & Suggested List Price:** Display—four LED 7-inch digits; resolution/accuracy—1/2 second, .001% typical, audio input -20dBm minimum balanced bridging; external connections -14 pin molex; options 001: 120 VAC, 50Hz; 002: 230 VAC, 60 Hz; 003: 230 VAC, 50Hz; matching clock—DC—DC—1400 Prices: AT-1200 \$162, DC-1400, \$145.

**AUDRA INTERNATIONAL**  
PO Box 38, Silverado, CA 92676  
(714) 649-2207

**Product Name:** Alphon Mic Transformers and Splitters  
**Contact:** Algis Renkus

**Date Product Introduced:** 1986

**Product Description & Applications:** Audio transformers: highest quality available anywhere. Audio distribution systems: low insertion loss, very flat frequency response, nominal level up to +6 dBm All Alphon products meet the German and other European broadcast standards.

**BRETFORD MANUFACTURING INC.**  
9715 Soreng Ave., Schiller Park, IL 60176  
(312) 678-2545

**Product Name:** Bretford BB54 Equipment Table

**Contact:** Bob Garro, adv. mgr.

**Date Product Introduced:** November 1985

**Product Description & Applications:** The BB54 wide-body TV/VTR stand is designed especially for transporting and viewing TV systems in schools and other institutions, with an oversized base shelf for extra stability during transport

**Basic Specifications & Suggested List Price:** Constructed of solid steel, the unit has die-pressed shelves and a midnite gray baked enamel finish. The 32w x 54h x 27d table comes with 4-inch casters (two with locking brakes) and a glare-free top shelf, when used with the optional BBS slant bar. The BB54 is available with electrical assembly with two grounded outlets, a 20-foot, 3-wire extension cord with grounded plug, and a built-in cord winder. List price: \$166.

**BRETFORD MANUFACTURING INC.**  
9715 Soreng Ave., Schiller Park, IL 60176  
(312) 678-2545

**Product Name:** Bretford MP54DX Equipment Table

**Contact:** Bob Garro, adv mgr.

**Date Product Introduced:** July 1986

**Product Description & Applications:** The MP54DX, with its five shelves, can accommodate everything from multiple slide projectors to a television monitor and up to four VCRs.

**Basic Specifications & Suggested List Price:** The table's functional design features steel construction, smooth, rounded edges, die pressed shelves and "quiet-glide" casters. The rugged, (30w x 54h x 20d) MP54DX is finished in midnite gray and is available with electrical assembly. Suggested list price: \$338.50.

(619) 743-7143

**Product Name:** Cramolin Contact and Connector Preservatives

**Contact:** Mark Lohkemper

**Date Product Introduced:** January 1986

**Product Description & Applications:** Cramolin products are fast acting anti-oxidizing solutions that clean, preserve and lubricate all metal surfaces, including gold. When Cramolin is applied to metal contacts and connectors it removes resistive oxides and also forms a protective molecular layer that adheres to the metal surfaces maintaining maximum electrical conductivity. Applications: switches, microphone connectors, snake cables, battery contacts, all plugs and jacks, patchbays, faders, pots, terminal strips, speaker terminals and mixing consoles.

**Basic Specifications & Suggested List Price:** Cramolin products available in liquid, paste and aerosol containers depending on application and specifications required.

**CALZONE CASE COMPANY**  
225 Black Rock Ave., Bridgeport, CT 06605  
(203) 367-5766

**Product Name:** Escort, Proline, Convoy, Ultima Series  
**Contact:** Barbara J. Honeycomb, sales and marketing administrator

**Product Description & Applications:** We are a manufac-

turer of transport cases and our product lines include: Escort—ATA styled, 1/4-inch plywood, heavy duty construction; Proline—medium duty case constructed of 1/4-inch plywood designed for local travel; Convoy—lightweight, inexpensive, yet protective, constructed of ABS plastic; Ultima Series—extremely lightweight case providing maximum protection for keyboards, mixers, recorders, and drum machines during local transport. Ultima is priced at nearly half the cost of related ATA type cases.

**Basic Specifications & Suggested List Price:** The price of the case depends on the type of equipment the case is to protect. This is why all orders are custom made.

**CST SALES**

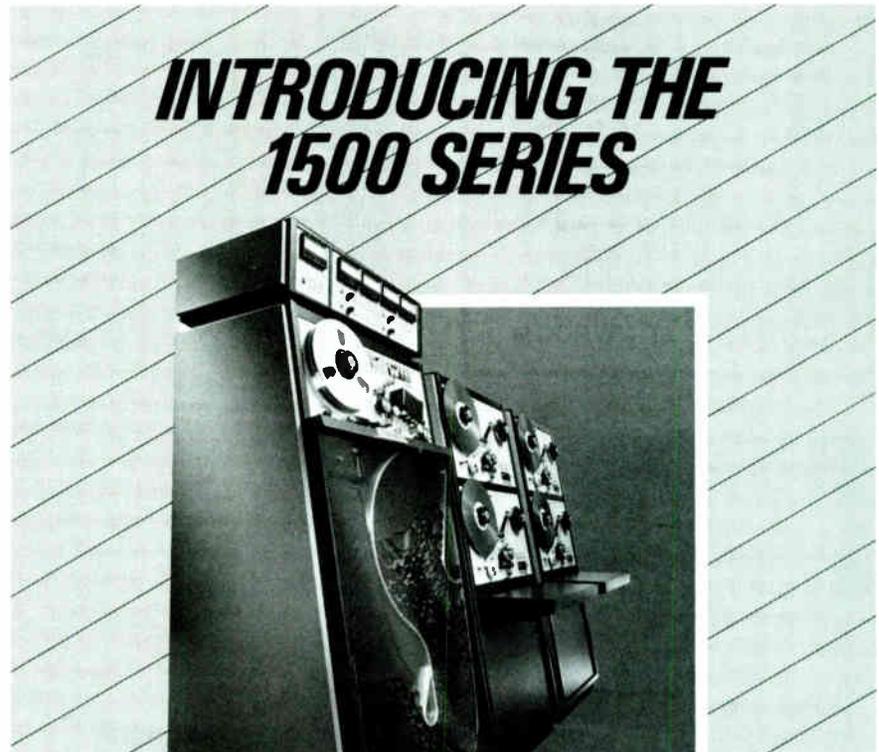
5891 New Peachtree Rd. Ste. 122, Atlanta, GA 30340  
(404) 452-8803

**Product Name:** Sitruc Model 2100 Cassette Labeller  
**Contact:** Curtis Treadway, president

**Date Product Introduced:** January 15, 1986

**Product Description & Applications:** Automatic high speed cassette labeller, 2100 to 2400 per hour using plain paper, no pressure sensitive paper required. Operates on air logic (60 lbs.) weight approx 65 lbs.

**Basic Specifications & Suggested List Price:** Uses solvent applicator to affix labels. Price \$7,500 (demonstration videocassette available, state VHS or Beta).



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Cramolin Contact and Connector Preservatives

CAIG LABORATORIES, INC.  
(P.O. Box J) 1175-O Industrial Ave.  
Escondido, CA 92025

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## NEW PRODUCTS

### OTHER EQUIPMENT

1 • 9 • 8 • 7

#### DAGO CASES

6945 Indiana Ct. #600, Golden, CO 80403  
(303) 421-7912

Product Name: La Strada, La Strada Flite  
Contact: Tom Clagett

**Product Description & Applications:** High quality, custom-made shipping and carrying cases for electronic equipment. Both the La Strada and La Strada Flite are made of 3/8-inch high grade plywood, interlocking channeled aluminum extrusions, and a Ozite fourth dimension covering. However, the La Strada Flite has recessed hardware rather than exterior mounted as on the La Strada.

#### DCS AUDIO

335 E. 21st St. Ste. 2D, New York, NY 10010  
(212) 982-3654

Product Name: DAP-1 Digital Effects Processor  
Contact: Paul Michelman, vice president

Date Product Introduced: 1986 (shipping in November)

**Product Description & Applications:** The DAP-1 multi-channel, digital effects processor is designed to allow user-programmed effects to be run on up to four independent input and output channels. The unit's basic effects include a variety of reverbs, loop editing, simple and complex delays and other programs. These effects can be concatenated to perform several effects in series on each channel. In addition, the DAP-1 allows for software updates of its effects. Other features include a multi-line graphics display to aid in modifying preset effects, a nonvolatile memory to store the modified effects, a variety of input and output formats (including the proposed AES digital audio interface standard), and studio automation system interfaces.

**Basic Specifications & Suggested List Price:** Frequency response is 20 Hz to 20 kHz  $\pm$  1dB, 16-bit linear PCM data encoding and expandable to 4 Mbytes of main memory (40 seconds of delay at full bandwidth). Also shown will be Effects Development System software to allow the user to design his own effects and download them to the DAP-1 over an RS-232 interface. See us at booth 602.



**DECUIR CORP.**  
Turntable Combo

#### DECUIR CORP.

4012 S. Broadway Pl., Los Angeles, CA 90037  
(213) 233-4184

Product Name: Turntable Combo

Contact: Frank M. DeCuir

Date Product Introduced: June 1986

**Product Description & Applications:** A DJ. console with a three space rack channels up front for rack mount amplifiers, effects units or graphic equalizer. An all solid core plywood construction with a durable carpet covering, the unit features recessed handles and twist locks.

**Basic Specifications & Suggested List Price:** Suggested retail: \$360.

#### DECUIR CORP.

4012 S. Broadway Pl., Los Angeles, CA 90037  
(213) 233-4184

Product Name: Single 1200 Turntable Case

Contact: Frank M. DeCuir

Date Product Introduced: June 1986

**Product Description & Applications:** A single turntable case to use as a backup unit or as a modular set-up with our rack-combo series. A solid core plywood constructed, frame covered with a durable carpet, unit features 3/4-inch foam lining, strap handle and drawbolt latches. Price: \$100.

#### DUAL

122 Dupont St., Plainview, NY 11803  
(516) 349-9180

Product Name: Dual CS 5000

Contact: Michele Rizzo, promotion manager

Date Product Introduced: June 1986

**Product Description & Applications:** The Dual CS 5000 turntable has many features designed to obtain the maximum performance from analog records. Dual's Optimum Pivot system puts the tonearm pivot point on the same plane as the stylus tip. The CS 5000 also has 33/45/78 speeds; a floating chassis with adjustable four-point suspension; adjustable vertical tracking angle (VTA); quartz controlled flat-rotor motor; manual cueing with automatic lift-up at the end of a record.

**Basic Specifications & Suggested List Price:** Wow and flutter:  $\pm$ 0.025% DIN and  $\pm$ 0.015% WRMS; rumble: -56 dB DIN unweighted; price: \$400.

#### DWIGHT CAVENDISH COMPANY

2117 Chestnut Ave., Wilmette, IL 60091  
(312) 256-0937

Product Name: Video Cassette Duplicator

Contact: Marshall A. Ruehrdanz

Date Product Introduced: June 1, 1986

**Product Description & Applications:** The new model Copymaster 250 video cassette duplicator is a totally modular system allowing the user to start small and add duplicator slaves as needed. The unit is complete with routing switching, remote VCR control with status monitoring, test equipment and switching and a built-in QC system. Unit comes with all racking, AC power distribution and all cables. Prices start at about \$13,000.

#### EDUCATIONAL ELECTRONICS CORP./SONY A/V

213 N. Cedar Ave., Inglewood, CA 90301  
(213) 677-8167

Product Name: AA-30

Contact: Bernard Keach, Sr., president

Date Product Introduced: October 1986

**Product Description & Applications:** Interface device for use with Sony's new high speed in-cassette duplicating equipment. Allows current users of older models ORM-10, CCP-13, CCP-13A and CCP-13B to interface with new product line, CCP-300, CCP-304, CCP-200 and CCP-202.

**Basic Specifications & Suggested List Price:** Comes complete, retail: \$530.

#### EDUCATIONAL ELECTRONICS CORP./SONY A/V

213 N. Cedar Ave., Inglewood, CA 90301  
(213) 677-8167

Product Name: IA-112

Contact: Bernard Keach, Sr., president

Date Product Introduced: June 1986

**Product Description & Applications:** Interface adapter for use with Sony's CCP-110 high speed duplicator. Permits one CCP-110 to drive up to five CCP-112s (two position slave units). Upgrades 1-master/3-slave system to a maximum of 1-master/11-slave system. Used with Sony high speed in-cassette duplicators.

**Basic Specifications & Suggested List Price:** Comes complete with required system and audio cables retail \$225.

#### FURMAN SOUND, INC.

30 Rich St., Greenbrae, CA 94904  
(415) 927-1225

Product Name: PL-Plus Enhanced Power Conditioner and Light Module

Contact: Diane Poole, director of marketing

Date Product Introduced: April 1986

**Product Description & Applications:** New version of the popular model PL-8. It is a rack-mount accessory that provides two pull-out, aimable lights for rack illumination. The rear panel has eight switched accessory AC outlets. PL-Plus offers surge suppression, multi-stage LC filtering for RF interference, and a bar-graph line voltage meter calibrated in two volt increments. Also has rugged 8-foot AC cord and resettable circuit breaker.

**Basic Specifications & Suggested List Price:** Rated 15 amps. Uses easily-obtainable four or seven watt night-light bulbs. Suggested list price \$219.

#### GAINES AUDIO

P.O. Box 17888, Rochester, 14617  
(716) 266-0780

Product Name: Model BN-16 Patchbay  
Contact: Jon Gaines

Date Product Introduced: February 1986

Product Description & Applications: Thirty-two position, ¼-inch TRS balanced patchbay designed for smaller recording studios and musicians' racks. Rear panel printed circuit board facilitates cable connections. Metal bushing phone jacks for long life and high reliability.

Basic Specifications & Suggested List Price: Thirty-two ¼-inch TRS (Tip-Ring-Sleeve) Switchcraft phone jacks (2 rows of 16 each) in a single rack space panel. Top row jacks are normalised to bottom row jacks. \$75 plus \$2.50 shipping, direct from Gaines Audio.

#### INOVONICS, INC.

1305 Fair Ave., Santa Cruz, CA 95060  
(408) 458-0552

Product Name: Model 315/925 Audio Tape Duplicator Electronics

Contact: Jim Wood, president

Date Product Introduced: November 1986

Product Description & Applications: Inovonics 315/920 comprise a complete audio tape duplicating electronics system for high speed duplication of cassette and open-reel audio material. The electronics systems has application in retrofit of existing duplicators, or in OEM applications.

Basic Specifications & Suggested List Price: High-level, bus-type master reproduce and slave record electronics for duplication ratios of 64:1 or less. Features include headroom reserve and EQ versatility for all tape oxides, and "HFE" signal-controlled bias. 50-watt bias supply and electronics power supply: \$1005. Signal electronics (per channel): \$710.

#### INOVONICS, INC.

1305 Fair Ave., Santa Cruz, CA 95060  
(408) 458-0552

Product Name: Model 390: Insert Mag-Film Electronics

Contact: Jim Wood, president

Date Product Introduced: November 1986

Product Description & Applications: Inovonics 390 is a multi-track, erase/record/replay electronics package for 16 and 35mm magnetic film recorders. It features multi-point EQ, 16/35 dual-format operation and "HFE" signal-controlled bias. For retrofit service in existing recorders, or for OEM applications.

Basic Specifications & Suggested List Price: 5¼-inch rack-mount (3U) chassis accommodates from one to four channels of plug-in amplifiers. Chassis with power supply: \$625. Each amplifier channel: \$825.

#### INSTANT REPLAY

2951 S. Bayshore Dr., Miami, FL 33133  
(305) 448-7088

Product Name: Image Translator World Traveler VCR

Contact: Chuck Azar

Date Product Introduced: June 1986

Product Description & Applications: A VHS VCR that will record all the standards worldwide and operate on all power voltages and will play PAL-SECAM tapes on NTSC TVs and will play NTSC tapes on PAL TVs or both on RGB monitors in a 9½ kilo pkg. that fits in overhead airline compartment.

Basic Specifications & Suggested List Price: VHS VCR with NTSC, PAL, SECAM record and playback; 3 speeds; 4 heads; 3 tuners; 9½ kilos weight; 100 to 280 V, 50-60 cycle operation; wireless remote control; 4 event programmer. Plays back all standards on a NTSC TV, PAL TV, or RGB monitor.

#### INTERFACE TECHNOLOGIES INC.

120 W. 88th St., New York, NY 10024  
(212) 787-4242

Product Name: Stable Cables

Contact: Jas. Stephen, president

Date Product Introduced: March 1986

Product Description & Applications: Stable Cables, a broad-based product line of audio/video/MIDI and multi-cables, utilizes premium materials and construction, and features top quality Bantam All-Pro adapter cables;



INTERFACE TECHNOLOGIES INC.  
Stable Cables

color-coded, multi-channel "MOD Cleanup Cables;" a wide variety of machine-to-console interfaces, and all standard cable configurations.

Basic Specifications & Suggested List Price: Stable Cables are custom-built, yet competitively priced, and sold exclusively in New York by Martin Audio Video Corp. (212) 541-5900.

#### KABLE KING

P.O. Box 2646, Savannah, GA 31402  
(800) 554-1154, (912) 233-8959

Product Name: King's Kable

Contact: Jerry Portman, president

Date Product Introduced: July 1, 1986

Product Description & Applications: High-tech instrument cables featuring oxygen-free copper, foam dielectric insulator, 22 gauge center conductor and trained shield. Cables are ultra-cost effective and have a five-year warranty.



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**LA RUE PROFESSIONAL SYSTEMS**  
La Rue Model EC-1000

**LA RUE PROFESSIONAL SYSTEMS**  
683 Mountview Pl., Newmarket, ONT L3Y 3P8  
(416) 895-3191  
Product Name: La Rue Model EC-1000 SMPTE Time Code Event Controller  
Contact: Michael La Rue  
Date Product Introduced: August 1, 1986  
Product Description & Applications: The EC-1000 reads and decodes any of the four standard time codes and allows the user to control virtually any piece of studio equipment based on the time code. This unit provides eight SPDT contact closures, which can be programmed to operate according to the incoming time code. Any sequence of on/off times can be stored, to a maximum of 256 Event Times. The EC-1000 can be used in a wide variety of control applications such as frame accurate punch ins/out, auto starts and stops, etc.  
Basic Specifications & Suggested List Price: Time code input is from -30 to +10 dBm, 24fps, 25fps, 30fps or drop frame. Contact closures are 1 amp 120 VAC max. The EC-1000 is priced at \$2000 U.S. and can be interfaced to the remote control provisions on virtually any piece of studio equipment, with respect to the manufacturer's specifications.

## NEW PRODUCTS

### OTHER EQUIPMENT

1 • 9 • 8 • 7



**LENCO, INC.**  
600 Series Distribution Amplifiers

**LENCO, INC.**  
300 N. Maryland, Jackson, MO 63755  
(314) 243-3147  
Product Name: 600 Series Distribution Amplifiers  
Contact: Jim K. Rhodes, product mgr.  
Date Product Introduced: 1985  
Product Description & Applications: Lenco's 600 Series design concept centers around versatility, employing audio and video distribution and synchronization components within a single rack-mountable frame system. Lenco's 300 series video components to make this system

a good choice where both video and audio signals are being used simultaneously.

**Basic Specifications & Suggested List Price:** Specifications and features vary with the selection of components to be used in the mainframe. Contact Lenco or a Lenco dealer for information.

**LITTLITE/CAE, INC.**  
10087 Industrial Dr., Hamburg, MI 48139  
(313) 231-9373

Product Name: Littlite gooseneck lamps and accessories  
Contact: Fred Mikeska  
Date Product Introduced: November 13, 1986 AES  
Product Description & Applications: Engineered for audio applications providing an unobtrusive yet concentrated light source for mixing boards, multi-tracks, synthesizers and drum machines.  
Basic Specifications & Suggested List Price: Littlite X Series: right angle mount; list: \$38.40; 3 pin or 4 pin right angle XLR connector; isolated lamp circuit; 6-, 12-, or 18-inch length available.

**L.M. ENGINEERING**  
660 W. Evergreen Ave., Youngstown, OH 44511  
(216) 788-7373

Product Name: XL Series Cases  
Contact: Chuck Thompson, sales mgr.  
Date Product Introduced: February 5, 1986  
Product Description & Applications: The XL Series Case is bred from one of the most dependable, long lasting, ATA case lines in the industry today. The XL Series incorporates a user friendly, sensible design, unparalleled in durability and lightweight performance. Our exclusive aluminum extrusions are available in a variety of heights to precisely accommodate product specification. Call for specific product information and pricing.  
Basic Specifications & Suggested List Price: Constructed of top-grade, solid core plywood, laminated with puncture resistant ABS plastic, with continuous aluminum extrusion fitted around plywood mainframes. Full length piano hinge joins the lid to the body and insures tight lid alignment. Tough epoxy coated steel corners and latches provide distinctive appearance.

**MARKETING INSIGHTS**  
1445 Sunset Ridge Rd., Glenview, IL 60025  
(312) 729-2047

Product Name: Tough Tech Speaker Suspender System  
Contact: Frank Luppino Jr.  
Date Product Introduced: July 1986  
Product Description & Applications: Using the axiom "simplicity is the essence of good design," this system was created to offer you a method of loudspeaker suspension that is functional, attractive and safe. No damage to the finish or structural integrity of the cabinet. Ultimate in mechanical decoupling, isolating the loudspeaker completely, freeing it from unwanted resonance. Single-point ceiling suspension using a unique Velcro fastening system. Will support a 125 lb. loudspeaker or TV monitor with ease. Saves space in recording studios. Suspends speakers horizontally or vertically.  
Basic Specifications & Suggested List Price: Attractively boxed pair lists \$59.95. Available in three sizes to accommodate most loudspeakers. Ceiling mounting plates, two-inch-wide nylon webbing lined with Velcro mate with Velcro fastener pads that attach to wide variety of speaker cabinet, all hardware supplied with instruction booklet. Technical comparison literature available.

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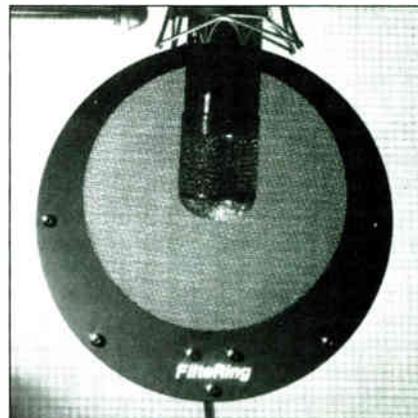
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Rochester, Michigan 48063  
(313) 853-3055



**MILLER AUDIO SERVICES/ACCESSORIES (MASA)**  
Filte Ring

**MILLER AUDIO SERVICES/ACCESSORIES (MASA)**  
4928 Maytime Lane, Culver City, CA 90230

(213) 836-4524

Product Name: FileRing

Contact: Lee Miller

Date Product Introduced: August 1, 1986

**Product Description & Applications:** The FileRing is a steel framed pop filtering system designed to replace the infamous "stocking on a coat hanger" jury-rig pop screen. It uses a standard microphone stand mount and has a steel frame that securely holds user replaceable nylon filters. The nylon filters are made from the same material used in nylon stockings. FileRing also accepts custom filters made by anyone who wishes to use new or time-tested materials. By merely cutting a simple pattern, many materials can easily adapt to FileRing's frame. Filters can be replaced in less than two minutes.

**Basic Specifications & Suggested List Price:** The FileRing has a six-month warranty, is priced at \$39.95, and comes with two nylon filters. Extra filters are \$3.95 ea.

Product Name: NS-TENUator

Contact: Lee Miller

Date Product Introduced: August 1, 1986

**Product Description & Applications:** The Yamaha NS-10M small monitor is one of the most widely used reference speakers. Many engineers cover the tweeters with tissue or a variety of materials in order to attenuate the high end. Usually using white masking tape, this set up looks jury rigged in otherwise well designed control rooms. The NS-TENUator neatly holds tissue or any other filtering material against the tweeters of the Yamaha NS-10M.

**Basic Specifications & Suggested List Price:** Using Yamaha's existing mounting holes, the NS-TENUator can be installed or removed in five minutes, requiring only a screwdriver. It is made from steel, finished in jet black to match the Yamaha cabinet, and has a six-month warranty. The price is \$15/pair.

OLD DOMINION BROADCAST ENG.

1101 Front St., Richmond, VA 23229

(804) 321-4506

Product Name: Tel Talk

Contact: Sam Straus

Date Product Introduced: 1985 (end)

**Product Description & Applications:** Telephone 2-way coupler, no mix minus bus needed, several models for 1A2 key as well as single line sets.

**Basic Specifications & Suggested List Price:** Input: 10 k bridge line level. Output: adjustable, 600 ohms, + 21 max. Priced from \$450.

OMNIMOUNT SYSTEMS

10850 Vanowen St., No. Hollywood, CA 91605

(818) 766-3700

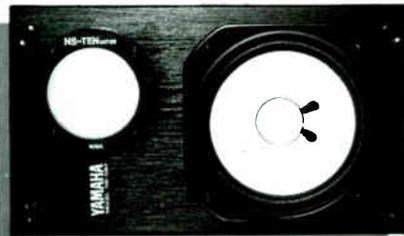
Product Name: Omnimount 75 Series

Contact: Jim Schaller

Date Product Introduced: 1986

**Product Description & Applications:** Omnimount Systems now has the perfect, industrial quality mounting assembly for every mounting need: from ounces to hundreds of pounds—for speakers and loudspeaker horn arrays, for televisions, security equipment, and much more. The new 75 Series, hot off the press, is suitable for weight loads 20-40 lbs. And new lower prices coming this fall on many Omnimount assemblies make them even more cost effective to use. Call for details.

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NS-TENUator

MILLER AUDIO SERVICES/ACCESSORIES (MASA)  
4928 Maytime Lane, Culver City, CA 90230  
(213) 836-4524

MONSTER CABLE PRODUCTS, INC.

101 Townsend St., San Francisco, CA 94107

(415) 777-1355

Product Name: Prolink Series One Tube Mic Cable

Contact: Paul Stubblebine, sales manager

Date Product Introduced: October 1, 1986

**Product Description & Applications:** High performance audio cable specifically designed for tube microphones, connecting the mic to the power supply. Uses Prolink Series One audio conductors.

**Basic Specifications & Suggested List Price:** List price: \$8.75/ft.

MONSTER CABLE PRODUCTS, INC.

101 Townsend St., San Francisco, CA 94107

(415) 777-1355

Product Name: Prolink Series Three 8-channel snake

Contact: Paul Stubblebine, sales manager

Date Product Introduced: October 1, 1986

**Product Description & Applications:** An 8-pair version of Prolink Series Three microphone cable now incorporating new "micro-fiber" dielectric for improved performance.

**Basic Specifications & Suggested List Price:** Eight pairs individually foil shielded within one jacket. List \$5/ft.

## GET INTO THE MIX!

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Circle #142 on Reader Service Card

## The Stewart Electronics ADB-4

Four Channel Active Direct Box  
Four transparent, reliable direct boxes in one chassis.



List Price \$349.00

### Each Channel Features:

Hi Z inputs on front and rear of chassis • Ground lift switch • Instrument/line/speaker level input selector • Lo Z balanced output with XLR connector • Mic/line Lo Z output level selector • Operates on Phantom Power or auxiliary power supply • Optional rack kits allow rack mounting of up to 8 channels in a single rack space • May be mounted forward or reverse—allowing terminations to be made on front or rear of rack.

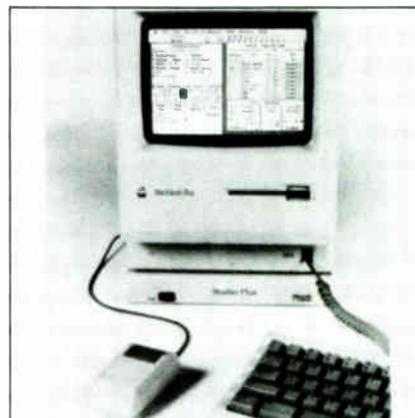
Dealers Inquiries Welcome  
**Stewart Electronics**  
P.O. Box 60317, Sacramento, CA 95860  
(916) 635-3011

Circle #143 on Reader Service Card

## NEW PRODUCTS

### OTHER EQUIPMENT

1 • 9 • 8 • 7



**OPCODE SYSTEMS**  
*Studio Plus*

**OPCODE SYSTEMS**  
707 Urban Lane, Palo Alto, CA 94301  
(415) 321-8977

Product Name: Studio Plus  
Contact: Gary Briber, mkt. mgr.  
Date Product Introduced: August 1986

**Product Description & Applications:** The Studio Plus features two opto-isolated and fully independent MIDI ins. Optoisolation eliminates ground loops, hum and whine, and ensures that it conforms completely to the MIDI specification. MIDI inputs can be assigned to either modem or printer ports. The use of two independent MIDI inputs allows the Macintosh to sync to an external clock on one port while still being able to record from a keyboard attached to the other port. Another use of the second MIDI in is to record from two MIDI keyboards at once, truly a "studio" feature.

**Basic Specifications & Suggested List Price:** 1 MHz clock rate, 2 MIDI ins and 6 MIDI outs, AC power adapter and "Custom Plus cables" included, uses both the modem and printer ports, works with the majority of MIDI software. Dimensions: 9.5 x 9.5 x 1.5-inches. Opcode Systems introduced the first professional full-spec MIDI interface for the Macintosh, and is the standard of the industry recommended by Mark of the Unicorn, Digidesign, Electronic Arts, Byte and others. Now, the Studio Plus offers the same standard of quality for the Macintosh Plus. Price: \$225.

**OPCODE SYSTEMS**  
707 Urban Lane, Palo Alto, CA 94301  
(415) 321-8977

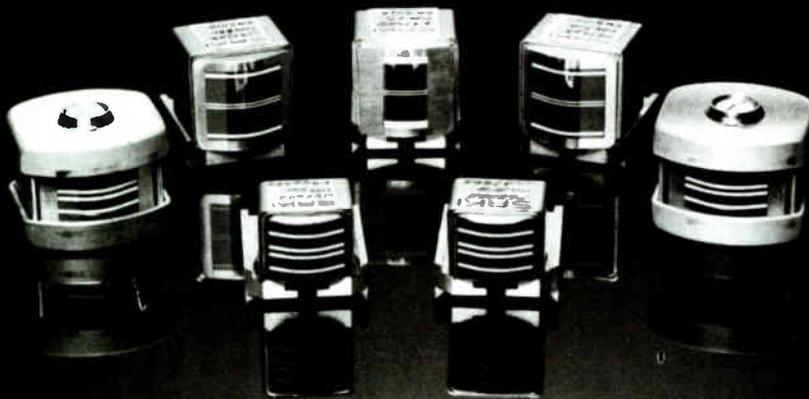
Product Name: Opcode Sequencer 2.5  
Contact: Gary Briber, mkt. mgr.  
Date Product Introduced: August 1986

**Product Description & Applications:** Sequencer is a real time musical performance and composition for Apple's 512k Macintosh. Records up to 132,000 MIDI events (66,000 notes) on a Macintosh Plus; up to 26 instantly playable sequences of 16-tracks each; independent loop for each track, multi-note keyboard transpose and trigger, keyboard split, random-generated sequences; record multiple channels at once (from two keyboards or another sequencer). Song Pointer allows synchronization with SMPTE-MIDI interfaces. Precise edit locating: record over, delete, or filter MIDI events from any part of a track. Step entry allows you to record notes or chords one at a time at any speed.

**Basic Specifications & Suggested List Price:** Sequencer 2.5 allows files created on Sequencer to be transcribed using Deluxe Music Construction Set (from Electronic Arts) or Professional Composer (from Mark of the Unicorn), in addition to all the features of 2.0. Includes free membership on PAN, the Performing Artists' Network, a bulletin board service for professional musicians. Price: \$250.

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\*40,000 MILES PER HEAD of tape travel — routine performance for Saki premium quality audio heads. We are the world's leading manufacturer of professional long-life audio and instrumentation heads. **Ask about our 2-track, 1/2 inch format.**



**SAKI MAGNETICS, INC.**

A CALIFORNIA CORPORATION

8650 HAYDEN PLACE, CULVER CITY, CALIFORNIA 90230 • TEL: (213) 551-8704 • (TWX-910-328-8100)

Circle #144 on Reader Service Card

#### ORION RESEARCH

1315 Main #230, Durango, CO 81301  
(303) 247-8855

**Product Name:** 1987 Professional Sound Blue Book

**Contact:** Roger Rohrs, publisher

**Date Product Introduced:** December 1986

**Product Description & Applications:** The 1987 Professional Sound Blue Book gives list and used selling prices, high and low buying prices. Orion publishes five blue books: Pro, Audio, Video, Camera and Computer.

**Basic Specifications & Suggested List Price:** Pro Blue Book: over 500 pages, hardbound with over 30,000 products including: guitars, monitors, mixers, mics and studio equipment.

#### ORTOFON

122 Dupont St., Plainview, NY 11803  
(516) 349-9180

**Product Name:** OM-Pro Kit

**Contact:** Michele Rizzo, promotion manager

**Product Description & Applications:** A phono cartridge engineered to withstand tough use in discos and radio stations, while producing the unrivaled sound quality Ortofon is so famous for. It meets the IBA requirements for radio station use. For easy cueing, the cartridge tip has been cut away so the user can see the exact location of the stylus. The tip is also luminous for easy viewing under poor lighting conditions. The cartridge is available with standard mounting or with the Concorde integrated headshell.

**Basic Specifications & Suggested List Price:** Frequency response: 20 to 18,000 Hz; 5mV output @ 1 kHz, 5 cm/sec; 20 dB separation; weight, 2.5 grams (16 grams with Concorde mounting); has user replaceable conical stylus. Price: \$95 (includes extra stylus).

#### PARASOUND PRODUCTS

945 Front St., San Francisco, CA  
(415) 397-7100

**Product Name:** PVA-1

**Contact:** Janice Mancuso, Trade Secrets (415) 759-6220  
**Date Product Introduced:** January 9, 1986

**Product Description & Applications:** Video/audio processor w/9 function wireless remote, built-in Dolby surround sound amplifier, 4 video source inputs (2 on front panel for easy access), simulates stereo from mono sources, video dubbing, record EQ function, antenna selector, speaker and line outputs for surround, VHF and video line connections, extra audio line input, audio spectrum display and illuminated switches to sum audio and video systems into one controllable system.

**Basic Specifications & Suggested List Price:** EQ controls: 10 band,  $\pm 12$  dB;  $<0.01\%$  THD; frequency response: 10Hz-100kHz  $\pm 0.1$  dB; 25w RMS amplifier; surround EQ 3 band; delay adjust 5-30msec. 5MHz video bandwidth, chroma level, color balance, sharpness and luminance control. Bypass for video controls. Retail: \$599.95.

#### PENNY & GILES

2716 Ocean Park Blvd., Santa Monica, CA 90405  
(213) 393-0014

**Product Name:** T-Bar Controllers

**Contact:** Gaynor Moses, manager

**Date Product Introduced:** 1985/86

**Product Description & Applications:** The Penny & Giles T-Bar controller provides a smooth accurate control of signals in vision mixing systems and video generators.

**Basic Specifications & Suggested List Price:** Compact, ready-to-fit unit. Under panel or side mounting. Ultra low hop-on, hop-off end voltages. Customized operating handles. Conductive plastics potentiometer. Standard resistance: 2k5 ohms.

#### PRO CO SOUND INC.

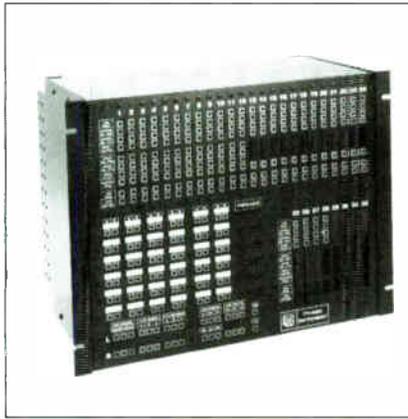
135 E. Kalamazoo Ave., Kalamazoo, MI 49007  
(616) 388-9675

**Product Name:** TT-448 Patchbay System

**Contact:** Jerry Smelker, national sales manager

**Date Product Introduced:** September 15, 1986

**Product Description & Applications:** Rack-mounting TT (Bantam) patchbay system with full patching facilities for up to 32 inputs/groups/tape tracks, left/right stereo masters, up to three stereo tape machines, auxiliary sends/returns, 36 effects units, etc. Ideal for mid-priced multi-track consoles that do not include integral patchbays (TAC Scorpion, Soundcraft 500/600 and others



**PRO CO SOUND INC.**  
TT-448 Patchbay System

similarly priced and configured). All cabling for console, recorders, and external gear is included, providing a complete, pre-tested package that is simple and quick to install.

#### RENKUS-HEINZ, INC.

17191 Armstrong Ave., Irvine, CA 92714  
(714) 250-0166

**Product Name:** RH-2 Dynagard Processor

**Contact:** Greg McLagan, national sales manager

**Date Product Introduced:** November 1986

**Product Description & Applications:** Signal processor—2-channel, with high and low frequency box EQ automatic loudness compensation also driver protection circuitry; low freq. thermal and excursion protection; high frequency thermal protection. For use with passive speaker systems will increase output, efficiency and provide driver protection.

**Basic Specifications & Suggested List Price:** Single rack space; programmable for driver size and power rating, 1/4-inch connectors. Sugg. list: \$749.



**RPG DIFFUSOR SYSTEMS, INC.**  
RPG Abffusor

#### RPG DIFFUSOR SYSTEMS, INC.

12003 Wimpleton St., Largo, MD 20772  
(301) 249-5647

**Product Name:** RPG Abffusor

**Contact:** Dr. Peter D'Antonio, president

**Date Product Introduced:** April 1986

**Product Description & Applications:** RPG Diffusor Systems has developed a unique broad-bandwidth sound absorber to complement its line of sound diffusing reflection phase grating surfaces. This new absorber, called an Abffusor, combines the properties of porous absorption and diffusion for the high and mid-frequencies and panel resonance for the low frequencies. The Abffusor is completely Class A fire-code safe and can be obtained in any of the Guilford Panel fabrics to complement any decor.

**Basic Specifications & Suggested List Price:** 2 x 2 and 2 x 4-foot panels are available, with an average thickness of 2-inches, for mounting on a wall or in a standard suspended ceiling grid. The absorption coefficients measured in a certified NVLAP laboratory for an E mounting are 1.04, 1.05, 1.04, 1.07, 0.90 and 0.82 at octave centers from 4000-125 Hz, respectively. NRC=1.0.

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**THE SOLID GOLD SOUND**  
PMD 430 PORTABLE CASSETTE DECK

Professional quality stereo recording and playback, three head mechanism, Double Dolby® System and dbx™ noise reduction are some of the features that make this sturdy Marantz portable a truly professional recorder.

Other features include pitch control  $\pm 6\%$ , 3-position tape selector, limiter, 4-way power supply and built-in speaker. And, all Marantz audio equipment is backed by the Marantz Solid Gold Warranty.

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**(818) 985-1792**

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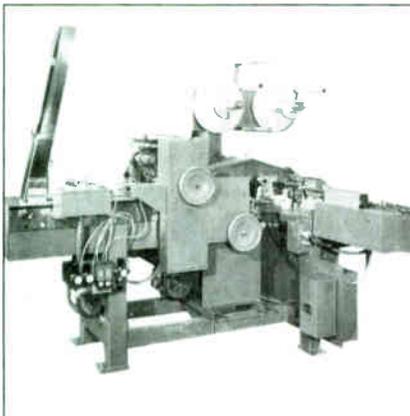


RPG DIFFUSOR SYSTEMS, INC.  
RPG LFD

RPG DIFFUSOR SYSTEMS, INC.  
12003 Wimpleton St., Largo, MD 20772  
(301) 249-5647

**Product Name:** RPG LFD  
**Contact:** Dr. Peter D'Antonio, president  
**Date Product Introduced:** April 1986  
**Product Description & Applications:** RPG Diffusor Systems has developed LFD,™ a new low frequency diffusor system. The LFD provides modal modification and uniform sound decay over the important frequency range below 300 Hz. The LFD also decreases the frequency coloration arising from the interference between direct and reflected low frequency energy. The LFD can be used in conjunction with the standard RPG and is effective in control rooms, studios, rehearsal spaces, worship spaces, and performing arts venues.

**Basic Specifications & Suggested List Price:** The LFD is necessarily massive to diffuse low frequency energy and requires a maximum depth in feet of approx.  $240/I_0$ , where  $I_0$  is the minimum frequency. At present, RPG is licensing the use of the LFD to qualified acoustical consultants and providing custom design plans for on-site fabrication.



SCANDIA PACKAGING MACHINERY COMPANY  
Packaging Machinery

SCANDIA PACKAGING MACHINERY COMPANY  
180 Brighton Rd., P.O. Box 575  
Clifton, NJ 07012  
(201) 473-6100

**Product Name:** Packaging Machinery  
**Contact:** W.B. Bronander, III, national sales manager  
**Product Description & Applications:** Audio cassettes automatic packaging equipment for Norelco box loading and wrapping in film. Video cassettes (VHS, Beta, 8mm). automatic packaging equipment for cartoning and wrapping in film. Compact disc: automatic packaging for jewel case wrapping in film.

SIDEREAL AKUSTIC AUDIO SYSTEMS INC.  
1969 Outrigger Way, Oceanside, CA 92054  
(619) 722-7707

**Product Name:** Sidereal Kaps  
**Contact:** Richard A. Smith, president  
**Date Product Introduced:** January 1, 1986  
**Product Description & Applications:** Designed by Sidereal Akustic specifically for high-quality audio circuitry. exceptional intertransient silence; DC operation.

## NEW PRODUCTS

### OTHER EQUIPMENT

1 • 9 • 8 • 7



SIDEREAL AKUSTIC AUDIO SYSTEMS INC.  
Sidereal Kaps

blocking, coupling, bypass, R.F. circuitry, R.C. circuits, computers and high sensitivity instrumentation, AC operation; power factoring, line filtering, high level audio (loudspeaker filter networks).

**Basic Specifications & Suggested List Price:** Metalized polypropylene; extremely low DA, DF and ESR; multi-gauge stranded, oxygen-free high-purity copper leads; special oxidation inhibiting Teflon lead insulation; hand-soldered lead termination; 100% quality testing; call or write for price/information.

SILVER-EAGLE DESIGNS, INC.  
6747 Valjean Ave., Van Nuys, CA 91406  
(818) 786-8696

**Product Name:** Good Foundations Stands  
**Contact:** Lawrence Weisberg, president  
**Date Product Introduced:** August 1, 1986  
**Product Description & Applications:** Silver-Eagle introduces a new line—Good Foundations Stands—for keyboards, guitars and combo amps. Keyboard and guitar stands are available in aluminum, 1, 2, or 3 tier modular style components in anodized black or silver colors. Features memory locking device for each tier and convenient set-up/tear-down features. Combo amp stands are of sturdy steel construction available in black only. Guitar stands accommodate all electric and acoustic guitar styles.

**Basic Specifications & Suggested List Price:** Suggested retail for 3 tier keyboard stand is \$237.50/ea. For anodized silver or black colors: \$212.50/ea. Suggested retail for guitar stand is \$24.95/ea. For anodized black color and anodized silver color, \$21.95/ea. Combo amp stands are available in steel, black color only; retail at \$159.95.

SILVER-EAGLE DESIGNS, INC.  
6747 Valjean Ave., Van Nuys, CA 91406  
(818) 786-8696

**Product Name:** Deluxe Saxophone Strap w/Sheep  
**Contact:** Lawrence Weisberg, president  
**Date Product Introduced:** Chicago 1986 N.A.M.M., Chicago  
**Product Description & Applications:** One-inch width, comfortable 100% cotton web tenor/alto or baritone sax strap with special "snap on" swivel hook attachment feature with deluxe sheep pad for the maximum of comfort and support in the neck and shoulder area. Available in black and white, plus exciting new colors: red, blue, yellow, tan, dark brown. Also available without sheep pad.

**Basic Specifications & Suggested List Price:** #SE-SAT regular strap for alto/tenor sax retails @ \$5.95; #SE-SAT/D deluxe strap w/sheep for alto/tenor sax retails @ \$9; #SE-SB regular strap for baritone sax retails @ \$6.50; #SE-SB/D deluxe strap for baritone sax w/sheep retails @ \$10.

SKYLINE, INC.  
6309 Eleanor Ave., Hollywood, CA 90038  
(213) 856-0033

**Product Name:** Skyline 48 Volt battery supply  
**Product Name:** Fred Ginsburg, mktg. director  
**Date Product Introduced:** July 1986  
**Product Description & Applications:** A compact battery operated 48 volt phantom power supply for condenser microphones, such as the Sennheiser MKH-40-P. Takes five 9-volt batteries.  
**Basic Specifications & Suggested List Price:** 48 Volt phantom power supply with XLR input/output connectors (Neutrik Gold). Price: \$135.

SKYLINE, INC.  
6309 Eleanor Ave., Hollywood, CA 90038  
(213) 856-0033

**Product Name:** Skyline Location Sound Cart  
**Product Name:** Fred Ginsburg, mktg. director  
**Date Product Introduced:** May 1986  
**Product Description & Applications:** Lightweight, portable, folding sound cart designed for production sound recording in motion picture and video applications. Accepts rack-mount equipment; off-set top shelf holds Nagra recorder or video monitor. Currently in use on *Miami Vice*, *St. Elsewhere* and other major productions.  
**Basic Specifications & Suggested List Price:** Aluminum alloy construction; 39-inches high; 24-inch wheel base; weight 28 lbs.; two 16-inch spoked rim tires—instantly removable. Four shelves—17.5 across x 14d. Price: \$535.

SONY BROADCAST PRODUCTS CO.  
1600 Queen Anne Rd., Teaneck, NJ 07666  
(201) 833-5200

**Product Name:** BVH-2800  
**Contact:** Steven P. Sarafian, product manager  
**Date Product Introduced:** April 1986  
**Product Description & Applications:** One-inch VTR with 2 channels of digital audio when used with optional PCM processor (BKH-2801). Two hour record/playback with BVH-2800 and three hour record/playback with BVH-2830. In addition to digital audio channels, the BVH-2800/2830 has the standard configuration of two longitudinal audio channels and one time code channel. Analog and digital audio channels are editable in any combination. Standard configuration: analog audio in/out. Optional direct digital in/out to AES/EBU standard.  
**Basic Specifications & Suggested List Price:** Digital audio channels 1,2—frequency response: 20Hz to 20kHz, +0.5/-1.0dB; dynamic range: more than 90 dB (1kHz, emphasis on); distortion: less than 0.05%; crosstalk: less than -85 dB; sampling rate: 44.056 kHz/44.1 kHz/48 kHz.

SONY BROADCAST PRODUCTS CO.  
1600 Queen Anne Rd., Teaneck, NJ 07666  
(201) 833-5200

**Product Name:** CDK-006  
**Contact:** Ryuchi Katsumi, product manager  
**Date Product Introduced:** 1986 NAB  
**Product Description & Applications:** The CDK-006 Auto Disc Loader which can house up to 60 CDs is suitable for various applications such as: automated music on-air system for radio broadcasting; sound effect library system; background music playback system; jukebox and other coin-operated music entertainment systems.  
**Basic Specifications & Suggested List Price:** Disc access time: approximately 16 seconds; frequency response: 20 ±20,000 Hz ±1.5dB; audio output: 2 phono jacks (max 2 VRMS ±3dB at more than 10k ohm load); suggested list price: \$3,500.

SOTA INDUSTRIES  
P.O. Box 7075, Berkeley, CA 94707  
(415) 527-1649

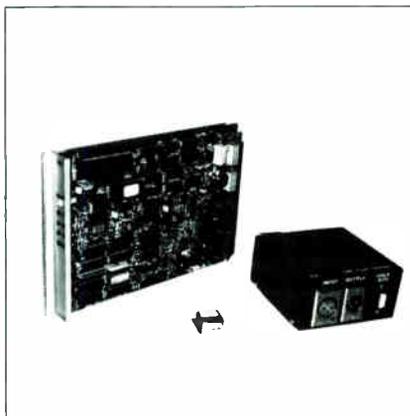
**Product Name:** SOTA Star Sapphire Turntable  
**Contact:** Robert Becker, exec. director  
**Date Product Introduced:** Upgraded 1986  
**Product Description & Applications:** Fully-isolated, belt-drive ultimate performance turntable deck, with easy-to-use vacuum clamping system to secure record, neutralize warps and vinyl resonances. Features acrylic record mat integrated with vacuum clamping to transmit energy from stylus vibrations in vinyl to a material with similar mechanical impedance (acrylic). Optional power line conditioner for pure DC to drive motor (\$300). Applications: for the highest studio resolution LP mastering/copying/transmission.

**Basic Specifications & Suggested List Price:** 12 pound platter, damped with lead and compound; 22 pound sub-assembly, damped. Rumble (DIN B) wtd: -88.2 dB; wow and flutter, DIN wtd: 0.05%; long term drift: 0.10%; suspension frequency 2.7 Hz; price: \$1600 (without tone arm or cartridge).

SOTA INDUSTRIES  
P.O. Box 7075, Berkeley, CA 94707  
(415) 527-1649  
**Product Name:** SOTA Star Sapphire Turntable

Contact: Robert Becker, exec. director  
 Date Product Introduced: 1985/86 (improved versions)  
**Product Description & Applications:** Fully-isolated, belt-drive high performance turntable deck. Easy-to-use, easy to set-up, easy-to-check set-up. Able to withstand maximum mechanical feedback situations (up to 40 dB better than the competition, per independent testing). Applications: high quality LP transmission, mastering, taping. Optional acrylic platter mat and deluxe reflex clamp to flatten record.

**Basic Specifications & Suggested List Price:** 12 pound platter, fully damped; 22 pound subassembly, fully damped. Rumble (DIN B), wtd: -88.2 dB; wow and flutter, wtd: 0.05%; suspension frequency: 2.7 Hz; price: \$895 (with acrylic Supermat \$995). Reflex clamp: \$95; vacuum option: \$600; AC line conditioner option: \$300.



**STRATEGIC SOUND INC.**  
*SMPTe Center Track Time Code System*

**STRATEGIC SOUND INC.**  
 908 Marilyn Dr., Campbell, CA 95008  
 (408) 866-0648

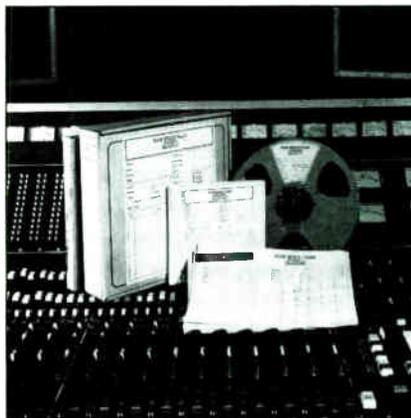
**Product Name:** SMPTe Center Track Time Code System

**Date Product Introduced:** Dallas NAB April 15, 1986

**Product Description & Applications:** A retro-fit plug-in package that incorporates SMPTe/EBU Time Code capabilities into the Ampex ATR 102 and 104 mastering recorders. The system provides full time code record, reproduce and sync capabilities, and consists of an intelligent microprocessor-based time code logic controller, a proprietary center track head and a time code I/O interface.

**Basic Specifications & Suggested List Price:** Automatic time shift of time code to simulate matched position with audio head in record, playback and sync modes. Time code channel controlled the same as if it were an audio channel. Easy on-site installation. Price: \$2695.

**STUDIOFORMS, CO.**  
 186 Glen Cove Ave. Ste. 201, Glen Cove, NY 11542



**STUDIOFORMS, CO.**  
*StudioForms*

(516) 671-1047

**Product Name:** StudioForms

Contact: John Bontempi, marketing director

**Date Product Introduced:** March 1985

**Product Description & Applications:** A complete line of industry standard forms, labels, and products specifically designed for the recording industries. These products help organize and standardize studio information while promoting the studio's image. Studio forms can 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:** 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 \$25.50; 24-hour scheduling book; sequencer, MIDI and drum machine charts; recorder alignment plaques; invoices, etc. Call or write for free catalog.

**SOUNDFOLD INC.**  
 3794 Wilmington Pk., Kettering, OH  
 (513) 293-0540

**Product Name:** Soundfold II Wall Panels

Contact: Tony Sickels, vice president

**Date Product Introduced:** January 1986

**Product Description & Applications:** Multi-directional sound absorber with two density molded fiberglass substrate covered with Guilford cloth. Additional one-inch fiberglass 3 lb. density, available for extra backing for NRC 1.0. Cloth covered aluminum mounting channel. 3-dimensional face with vertical ribs. Patent pending.

**Basic Specifications & Suggested List Price:** Standard panel size: 39 x 72-inches high; connector track for height connection; noise reduction coefficient: .80 or 1.0 with one-inch opt. backing panel; weight: 46 lb. per square foot; class A fire rated; aluminum track with end caps in 45° or 90° for track.

**STAR CASE**  
 648 Superior, Munster, IN 46321  
 (219) 922-4440

**Product Name:** Star Case

Contact: Bernie Fryman

**Date Product Introduced:** June 15, 1986

**Product Description & Applications:** New Miami pink and Miami aqua flight cases. Protective flight cases need not be drab! Available in Carry Star, ATA Star, Super Star, and Ultra Star series cases.

# dbx PERFORMER SERIES

... Great Sound Made Easy

**\$149** each  
 Suggested retail price



Model 163X Compressor/Limiter/Preamp  
 Smooth-sounding OverEasy® compression

Model 263X De-Esser  
 Eliminates excessive sibilance

Model 463X Noise Gate Expander  
 Gets rid of noise between notes

- DBX STUDIO QUALITY
- DBX TECHNOLOGY
- SIMPLE TO USE — SINGLE-SLIDER ACTION
- FRONT PANEL PLUG-IN
- RUGGED CONSTRUCTION

**dbx**

Professional Products Division  
 71 Chapel Street  
 Newton, Mass. 02195 USA  
 617-964-3210



**SUMIKO, INC.**  
 P.O. Box 5046, Berkeley, CA 94705  
 (415) 843-4500  
**Product Name:** Tweek—contact enhancer  
**Contact:** Joe Abrams, director of sales  
**Date Product Introduced:** New formulation January 1986  
**Product Description & Applications:** Tweek improves the quality as well as the reliability of signal-level electrical contacts. The new formulation and brush-on applicator bottle allows easy application of just the right amount of Tweek.  
**Basic Specifications & Suggested List Price:** Volume: 7cc total; 0.75cc Tweek diluted in 6.25cc pure isopropyl alcohol: \$15. Also available in larger sizes for industrial, OEM or service shop use.

**TABER MFG. & ENG. CO.**  
 1880 Embarcadero Rd., Palo Alto, CA 94303  
 (415) 493-3811  
**Product Name:** Taberaser 1500H  
**Contact:** Veldon Levench  
**Date Product Introduced:** NAB, April 1986  
**Product Description & Applications:** Automatically erases all tapes by moving tape through a strong field, while electronically diminishing the field over a precisely-controlled gradual decay of the erase field. Erases tape with coercivity from 150-1500 Oersteds down 84-92dB as measured from a reference control tape. Any size audio or video tapes erased. Erase time: 20-30 seconds.  
**Basic Specifications & Suggested List Price:** Requires 30-amp circuit wiring, AC voltage 115VAC in either 60 or 50Hz versions. Weight approximately 350 pounds. List price: \$5995.

**TELDEC/NEUMANN**  
 c/o Gotham Audio Corporation  
 1790 Broadway, New York, NY 10019  
 (212) 765-3410  
**Product Name:** DMM CD Mastering System  
**Contact:** Russell O. Hamm, president  
**Date Product Introduced:** AES Convention November 1986  
**Product Description & Applications:** Teldec and Neumann will introduce a compact disc mastering system based on the principles of the DMM process. It consists of a Neumann lathe, cutterhead, amplifier rack and digital coding electronics. The system can be operated by a disk mastering engineer in a normal cutting studio and requires no clean room. The CD glass master has a copper surface which is not destroyed in the subsequent plating

process also developed by Teldec. The master can generate multiple mothers and stampers for CD molding. The DMM CD system allows producers the same artistic control of the mastering process as they have with analog disk mastering. At the same time, DMM CD significantly lowers mastering costs in comparison to clean room based methods.  
**Basic Specifications & Suggested List Price:** Technical paper to be presented at AES with pertinent system specifications.

**3M COMPANY, MAGNETIC MEDIA DIVISION**  
 Bldg. 223-5N-01, 3M Center  
 St. Paul, MN 55144  
 (612) 736-5209  
**Product Name:** Fire Retardant Audio Shipper  
**Contact:** Rich Collins, audio/magnetic film product manager  
**Product Description & Applications:** 250 2-inch and 275 one-inch are now available in fire retardant shipper for added protection for recording audio masters.

**3M COMPANY, MAGNETIC MEDIA DIVISION**  
 Bldg. 223-5N-01, 3M Center  
 St. Paul, MN 55144  
 (612) 736-5209  
**Product Name:** 309 Magnetic Film Splicing Tape  
**Contact:** Rich Collins, audio/magnetic film product manager  
**Product Description & Applications:** More durable, stiffer and peelable splicing tape with new state-of-the-art adhesive.

**TOLEETO PRODUCTS, INC.**  
 P.O. Box 4272, Chula Vista, CA 92011  
 (619) 281-3584  
**Product Name:** Cord Lox  
**Contact:** Tom Van Oss, sales manager  
**Date Product Introduced:** Chicago NAMM 1986  
**Product Description & Applications:** Cord-Lox is a new accessory product for guitarist, keyboardists, vocalists, sound engineers, lighting technicians, home recording enthusiasts, even drummers with electronic sets. Cord-Lox is a cord tie that stays on your cord, prolongs cord life, and organizes your tangled cords. Cord-Lox can also be used on keyboard stands, mic stands, and speaker stands. Cord-Lox is made of ultra-strong hook and loop material (i.e. Velcro) and will outlast the cord itself.  
**Basic Specifications & Suggested List Price:** Cord-Lox comes in a variety of sizes that can be used on cords ranging from 5 to 100-feet in length. Prices start at 99¢.



**TOLEETO PRODUCTS, INC.**  
 Cord Lox

**TOUCH TECHNOLOGIES INC.**  
 363 Adelaide St. E., Toronto, ONT M5A 1N3  
 (416) 865-1877  
**Product Name:** SPT-6 Microphone Splitter System  
**Contact:** Alan Hardiman, director marketing communications  
**Date Product Introduced:** November 1985  
**Product Description & Applications:** The SPT-6 provides up to six transformer-isolated microphone level outputs from one microphone source, and comes in standard formats of 10, 20, 30, and 40 inputs. Each I/O module features front-panel switchable +48V phantom power and 20dB PAD. Both with LED indicators. Applications include the parallel distribution of original microphone levels to various consoles, including on-stage monitor, sound reinforcement, effects, broadcast, recording, and an archival or media feed.  
**Basic Specifications & Suggested List Price:** Input Z: 1350 ohms; designed to bridge source Z 50-150 ohms; max input: +4 dBV; output Z: 150 ohms; max output level: +14dBV; EIN: -128 dBV; noise figure: 2.8; power bandwidth: 0dBV output/20Hz-70kHz, 10dBV output/30Hz-70kHz; freq. response: 20Hz-20kHz ±.5dB; max. dynamic range: 132.8 dB; common mode rejection: 85dB minimum at 1kHz.

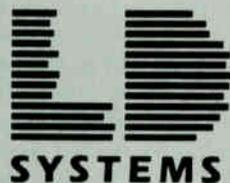
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Biamp	Otari
Brooks	Proco
B&K	QSC
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JBL	Wireworks

#### TRF PRODUCTION MUSIC LIBRARIES

40 E. 49th St., New York, NY 10017  
(212) 753-3234

**Product Name:** Tele Music Production Music Library (new releases)

**Contact:** Michael Nurko

**Date Product Introduced:** December 1986

**Product Description & Applications:** New production music in several categories including AV industrial, dramatic, sports, jingles, with excellent contemporary electronic and orchestral opening and closing themes. All new Tele Music releases are being recorded, mixed and mastered digitally and will be available on both high quality stereo records and first-generation digitally mastered tapes.

**Basic Specifications & Suggested List Price:** Record albums available at \$9 per album and can be received "on approval." Special annual blanket licenses at very economical rates are available. Rate sheet with specific licensing rates and the new Tele Music catalog available on request.

#### ULTIMATE SUPPORT SYSTEMS

P.O. Box 470, Ft. Collins, CO 80522  
(303) 493-4488

**Product Name:** Ultimate Rack Mount Stands

**Contact:** Phil Glasier, mktg. asst.

**Date Product Introduced:** 1986

**Product Description & Applications:** Until now there has not been an attractive, convenient method to display MIDI equipment. So, Ultimate Support Systems proudly introduces Rack Stands. USS A-Frame configurations offer independent support for extensive rack mount needs. The T-Leg systems provide a practical method for the cast-conscious musician. And Rack Extensions enable performers to integrate keyboards and rack equipment.

**Basic Specifications & Suggested List Price:** Like all USS products, the Rack Mount Stands are constructed of black or silver aluminum alloy tubing and rails, with glass-reinforced polycarbonate fittings for the maximum assurance of long lasting stability.

#### UNIVERSAL LOGIC RESEARCH

70 Labrie, L-D-R, Laval, QUE H7N 3E8  
(514) 687-7424

**Product Name:** Lucksound

**Contact:** Sylvain Provost

**Date Product Introduced:** April 1986

**Product Description & Applications:** Universal Logic Research release, after a long period of research, a complete line of acoustical foam, to help you to treat your acoustics. Lucksound is available in panels or tiles. They are made to solve problems of: reverberation, absorption, deflection and diffraction in the overall spectrum frequencies. Applications include: recording studios, radio/TV production, disk mastering, auditoria, churches, cinema, anechoic chamber. We will help you to figure your needs, free of charge. Call us.

**Basic Specifications & Suggested List Price:** We offer three different kinds of panels: Standard Anechoic Lucksound panel 1½ to 4-inch: \$15 to \$44/ea.; Super Anechoic Lucksound panel 8-inch: \$124 to \$153/ea. Master Anechoic Lucksound panel with splitting sound wedges 16-inch: \$208 to \$230/ea. Tiles 12 x 12 x 3-inch: \$90/24; tiles 12 x 12 x 4 = \$120/24. Prices in U.S. funds. Available in: yellow, white, pink, orange, green, grey, blue.

#### VELODYNE ACOUSTICS, INC.

2565 Scott Blvd., Santa Clara, CA 95050  
(408) 748-1077

**Product Name:** Velopro 18

**Contact:** Bruce Hall, vice president sales

**Date Product Introduced:** September 1, 1986

**Product Description & Applications:** 18-inch servo-controlled sound reinforcement subwoofer system including a 500 watt built-in mated switching amp with adjustable high and low pass passive crossover. Velodyne's patented High Gain Servo (HGS) technology provides for the cleanest, most accurate bass reproduction available with less than 1% THD throughout its frequency range and power handling capabilities. Particularly suited to acoustic bass and studio applications.

**Basic Specifications & Suggested List Price:** Dimensions: 22 x 22 x 22 LWH. Reinforced corners and metal grille. Speaker type: 18-inch driver, 3-inch voice coil, ¾-inch linear travel. Frequency response: 15Hz to crossover point, ±3dB. Crossover: 12dB/octave slopes, 85 Hz crossover point (factory adjustable). Max output: 120 dB @ 50 Hz. Input sensitivity: 300mV for max. output. Distortion: 0.1% @ 50 Hz (1W/1M), 1% 50Hz (25W/1M). List price: \$1395, complete.

#### WIND RIVER GROUP

909 Elm St., Denver, CO 80220  
(303) 388-6121

**Product Name:** The Broadcaster's Dictionary

**Contact:** James McDonald, president

**Date Product Introduced:** April 12, 1986 at NAB, Dallas  
**Product Description & Applications:** *The Broadcaster's Dictionary* is an 8½ x 11-inch 198-page dictionary of broadcast terminology which includes technology, production and FCC rules. It also includes appendices which contain a variety of technical articles on such subjects as maintenance, digital audio, safety, RF radiation, attenuators and filters, and a variety of other topics.

**Basic Specifications & Suggested List Price:** Size: 198 pages, 8½ x 11-inch. Bibliography. LC# TK 6544.M37 1986 621.3841 [03 '21 86.9215. ISBN: 0-938023-00-4. Price: \$24.95, paper/lab, illustrated. Author: James R. McDonald and contributors.

#### WIREWOKS CORPORATION

380 Hillside Ave., Hillside, NJ 07050  
(201) 686-7400

**Product Name:** CR1808 Cable Reel

**Contact:** Angela DiCicco, cust. service mgr.

**Date Product Introduced:** May 1986

**Product Description & Applications:** CR1808 (large cable reel) reel holds over 1,000 feet of mic cable (smaller CR1207 holds approximately 500 feet.) Special construction guarantees cable protection at all times in all positions and allows easy access of up to 20 feet of inside end of cable for immediate use—without completely unreeling

cable. CR1808's were used to reel Wireworks audio/video cable assemblies on NBC's Today Show broadcast from the USS Norway in May 1986.

**Basic Specifications & Suggested List Price:** Reels are made of tubular carbon steel and are completely stackable. Reels also feature three cable spooling positions: Free, Brake, and Lock. List price: \$326; smaller model (CR1207) lists at \$226.

#### WOODHAVEN PRODUCTS CO.

430 W. Browning Rd. #18, Bellmawr, NJ 08031  
(609) 933-3018

**Product Name:** Rackspace

**Contact:** Adam Kessler, president

**Date Product Introduced:** June 28, 1986

**Product Description & Applications:** Four models of pre-fabricated equipment racks for the professional and home recording studio environments. Model 1 double width slant face; model 2 single width slant face; model 3 double width vertical face; model 4 single width vertical face. All models delivered ready to assemble and finish requiring common household tools. Racks are stackable and are available with rack rails or mounting blocks.

**Basic Specifications & Suggested List Price:** 29-inch high (desktop) racks pre-fabricated from ¾-inch, finish side, 7-ply, cabinet-grade birch plywood. Prices on request.

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**1** The MC 740 Studio Condenser is ideal for critical analog and digital recording situations because it is virtually inaudible — no self-noise, coloration or sonic footprint of any kind.

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**6** Typifying Beyer's world-renowned accuracy, the MC 740 reveals the subtle differences between instruments and ambient environments.

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Hicksville, NY 11801

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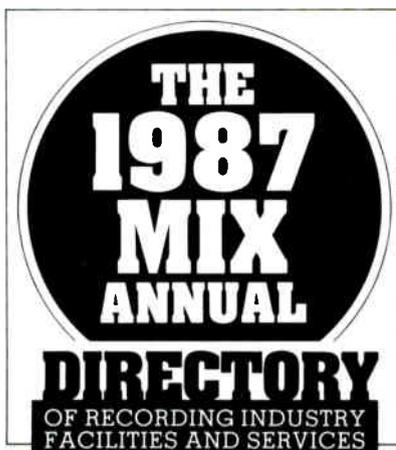
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Over 2,000 studio listings, broken down by geographical region, including equipment, size of studios and control rooms, personnel, areas of specialization, rates and other useful information.



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Gladwyne, PA

•••• **KAJEM STUDIOS LTD. USA**  
1400 Millcreek Rd., Gladwyne, PA 19035  
(215) 649-3277  
Owner: Joe Alexander, Sam Moses, Kurt Shore, Moishe Goldfarb  
Engineers: Mitch Goldfarb, Joe Alexander, Terry Hoffman, Jim Campbell, Brian Dorn, Joe Hauserman.  
**Dimensions of Studios:** Hexagonal 35 x 30, plus an adjacent 2,000 sq. ft. ambient w/25-foot ceilings.  
**Dimensions of Control Rooms:** 22 x 20.  
**Tape Recorders:** Studer A-80, 24-track; Otari MTR-90, 24-track; Studer A-80 1/2-inch, 2-track; Studer B-67 1/4-inch, 2-track.  
**Mixing Consoles:** Solid State Logic w/primary and Total Recall computers 4000 E 48 x 32.  
**Monitor Amplifiers:** Crown, Hafler.  
**Monitor Speakers:** UREI, Yamaha, Auratone.

**Echo, Reverb & Delay Systems:** EMT, AMS, Sony, Lexicon, Yamaha, URS, Major.  
**Other Outboard Equipment:** AMS Eventide, Lexicon, UREI, Teletronix, Valley People, Audio Design & Research, Scamp, API, BBE, MXR, dbx, EXR, DeltaLab, Acoustilog, Pultec, OmniCraft, Hush II.  
**Microphones:** Neumann, AKG, Sony, RCA, Electro-Voice, Crown, Countryman, Sennheiser.  
**Instruments Available:** Emulator I w/Total Music, Macintosh software, Mirage, Yamaha DX7, Juno 106.  
**Rates:** Call for info, block booking and package rates available. Also, housing can be provided.

## Mastering, Pressing, Duplication Facilities

Over 450 listings of mastering houses, pressing plants, and tape duplicators. Includes rates, production capacity, equipment used.



**MASTERFONICS INC.**  
Nashville, TN

**MASTERFONICS INC.**  
**Mastering, Tape Duplication, CD Services**  
28 Music Square East, Nashville, TN 37203  
(615) 327-4533  
Contact: Margaret Meadows, office mgr.  
**MASTERING**  
Cutting Lathes: Neumann VMS70 (3), Zuma equipped.  
Console: Neumann (2).  
**Tape Machines:** JVC digital, Sony 1610, Sony PCM-F1.  
**Monitor Speakers:** Hidley/Kinoshita Model 3 vertical, Yamaha NS-10, etc.  
**Signal Processing:** JVC digital disc mastering console, Sontec and usual goodies.  
**Engineers:** Glenn Meadows, Benny Quinn, Milan Bogdan, Butch Carr, Lois Walker.  
**Rates:** Available upon request.  
**Credits:** Available upon request.

**Other Services:** CD preparation, full pre-mastering services, analog to digital transfers, full Tom Hidley 20 Hz monitor SSL/Otari DTR-900 equipped remix room available.  
**TAPE DUPLICATION**  
**Method of Duplication:** In cassette.  
**Tape Used:** TDK SA-X, HXS.  
**Duplicating Speed:** Real time.  
**Rates:** Varies with quantity.  
**COMPACT DISC**  
**Preparation/Manufacturing:** Full CD pre-mastering services available with JVC DM-900 digital disc mastering console. Full D to D format conversion from Sony 1610, Mitsubishi X-80, EIAJ to JVC and back.

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SD, AC  
3364 Clandara, Las Vegas, NV 89121  
(702) 731-1917

Contact: Chips Davis  
2169 Francisco Blvd. J-1, San Rafael,  
CA 94901  
(415) 459-2888

Contact: Jerry Jacob  
**Services offered, credits, specialization:** Chips Davis designed and built the first LEDE control room in 1978 in Las Vegas, NV. Since then, Davis has defined and set the standards for LEDE and LEDE-type monitoring environments. Davis' research and continued commitment to the scientific principles involved have made him the acknowledged expert in the field. Among Chips Davis-designed facilities you might wish to visit are: Tarpan Studio, San Rafael, CA; Crescendo Audio Productions, San Juan, PR; Radio-TV Caracas, Caracas, Venezuela; Audio Archives, Syracuse University, Syracuse, NY; NBC Training Center, NY; ABC, NY; Sounds Inter-

change, Toronto, Ont., Canada; MBC Center, Winnipeg, Manitoba, Canada; NBC PPS 1, CRs 2 and 4 Burbank, Brooklyn 2, Brooklyn, NY (Bill Cosby Show); National Public Radio, Washington, DC; JBL, Columbia Academy, Vancouver, BC, Canada; Granny's House, Reno, NV; Starstudio, Hamburg, W Germany. **Services offered:** design, consultation, seminars and training, TDS™ measurements, electronic and product design consultation, marketing and management services as well as on-site supervision and turnkey services.

## Video Production and Post-production Facilities

Nearly 1,000 video production companies, including post-production/editing, on-location production, and audio post-production for video. Listings give personnel, rates, and equipment.



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Southfield MI

PRODUCERS COLOR SERVICE, INC.  
VIDEO COMMUNICATIONS  
DIVISION

VFF, OLVP, VPP/E, APPV  
24242 Northwestern Hwy., Southfield, MI 48075  
(313) 352-5353

Manager: Bruce Calmer  
**EQUIPMENT**  
Synchronizer: EECO, Time-Lynx.  
Switchers/editors: (4) CDL 480; GVG 300/3.

Cameras: (2) Sony BVP-3; Ikegami EC35, ITC 730; Bosch FDL60 telecine.  
**Audio recorders:** Ampex MM-1200, ATR-100; MCI 110B; Otari MTR-90 II, MTR-20, MTR-12; Dolby and dbx noise reduction.

**Audio mixers:** Solid State Logic SL-4000B, 24-channels and SL-6000E, 32-channels (computer assisted consoles).  
**Other major equipment:** (5) on-line edit salons (CMX 3400/3400 A-M\*); (3) ADOs; 2-channel Vidifont V; Quantel Paint Box; Ultimatte; (2) audio post suites with SSL consoles; 1-inch VTR mix-to-

pix; full complement of EFX; (3) stages, 150 x 100, 50 x 60, 40 x 40.

**Rates:** On request.  
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Contact: P. Woody Jackson, Nat'l Sales Manager  
Products manufactured: Audio

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Important note: At the request of listees, some entries in the Directory include only company name, address, phone and person to contact. However, the majority of facilities include detailed information as shown.

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# CURING THE STADIUM SOUND BLUES

## DYLAN, PETTY & THE DEAD

AT RFK STADIUM, WASHINGTON, D.C.

---



PHOTO: RON DELANY

by Larry Oppenheimer

The sun beat down mercilessly, pushing the mercury over the 100 degree mark inside the stadium. Mounted police cruised the perimeter of the grounds, enforcing the "No Cans, No Glass, No Coolers" provision, as thousands of scantily- but brightly-clad fans milled about consuming a host of liquids and intoxicants of all types. Slowly, the crowd worked its way inside to fill the cavernous area of RFK Memorial Stadium and spend a long, steamy, Washington, D.C. afternoon continuing the activities begun outside (leading hundreds of the more intoxicated and/or less prudent to collapse from heat prostration), roasting its collective flesh to a fiery lobster red, and,

of course, dancing to the sounds of the two supergroups that drew the people out of their air-conditioned comfort in the first place.

The scene described actually took place 13 years ago, when the Allman Brothers Band and the Grateful Dead warmed up for the massive event at Watkins Glen, New York which they staged (along with The Band) later that same summer. (That event drew 600,000, still a record.) However, the description also fits the two shows staged here this past July by Cellar Door Productions which featured Bob Dylan, Tom Petty & the Heartbreakers, and the Grateful Dead. Despite these similarities, things were not really the same as they were when I so gleefully fried my teenage brain and body all those years ago; and the difference

*Overview of RFK from the top deck during Dylan's performance.*

was more than the wear and tear that showed on the now middle-aged rock-and-rollers onstage. In the intervening time, the art and science of concert production has advanced by quantum leaps.

### Background

Robert F. Kennedy Memorial Stadium was opened in 1961 as D.C. Stadium, and renamed in 1969, a year after Kennedy's assassination. It serves as the home for the Washington Redskins football team, and was used by the Washington Senators baseball franchise until it moved to Texas in 1971. The stadium seats

65,000 for Redskins games, but these concerts drew crowds of 67,000, which included "festival" seating on the playing field. Many music concerts have been held there over the years, including The Beatles, the Rolling Stones' July 4th concert on their 1972 tour, the aforementioned Grateful Dead/Allman Brothers concerts, Michael Jackson, and Bruce Springsteen. Weather has always been a significant consideration for events at the stadium. You see, when the city of Washington, D.C. was no more than a glorious plan on paper, the only land contribution the then-small Federal government was able to wrangle for the construction of a capital came from Maryland, which proudly and patriotically offered a large parcel of stinking swampland on the banks of the muddy Potomac River. Consequently, summertime in D.C. tends to be blazingly hot and maddeningly humid and sticky, with mosquitoes the size of toy poodles thrown in for general annoyance. Although this extracted its toll from all involved at these concerts, the crews still had fewer complaints than about the immediately preceding dates in Buffalo, where severe rainstorms complicated both the load-in and load-out (although it did not rain during the performances).

The concerts at RFK July 6 and 7 were the last of five that the Dead played with the Dylan/Petty alliance; the others were in Akron, Minneapolis (Dylan's hometown), and Buffalo. Looking at the three artists, it is obvious that Petty, a product of the late '70s, has been around and touring for considerably less time than the headliners. The Grateful Dead, of course, have toured incessantly for the last 20 years, while Dylan's appearances have in that same time been far fewer and much further between. Petty and the Heartbreakers' role as Dylan's backup group began when they appeared together at the now-legendary Farm Aid concert, but was also facilitated by other factors, such as their shared management, Elliot Roberts' Lookout Management. A tour of Australia, New Zealand, and Japan solidified the symbiosis. The RFK concerts came in the middle of an extensive (40 to 45 dates) U.S. Dylan/Petty tour, and held added significance for the Dead because of Dylan's long-time influence on them (and, in retrospect, because they turned out to be the Dead's last performances before the tragic collapse of guitarist Jerry Garcia's health less than a week later).

Unlike Dylan or Petty, live performances and touring have been the Dead's *raison d'être* all along. Years of

experience and many thousands of dollars have been poured by the band into their sound and lighting systems, never sparing expense in the continual effort to improve their technical production in the service of bigger and better fun. Consequently, it was decided that the main house sound system would be supplied by Ultra Sound, the San Rafael, California company which has serviced the Dead since the early '80s. Delay towers were supplied to Grateful Dead sound engineer Dan Healy's specifications by Electrotec (Canoga Park, California), which provided the sound system for the entire Dylan/Petty tour.

Concerts of this size and stature present tremendous logistical problems, perhaps the most significant being the coordination of two separate and quite different touring productions. Nowhere was this more evident than in the technical aspects, particularly sound, where the stage and mixing needs of these large concert acts must be met in a smooth and predictable fashion. Rearranging and repatching stage equipment between bands was an unthinkably dangerous proposition: what if something was mispatched and Dylan's microphone didn't work when he stepped up to sing? Furthermore, after working with

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World Radio History

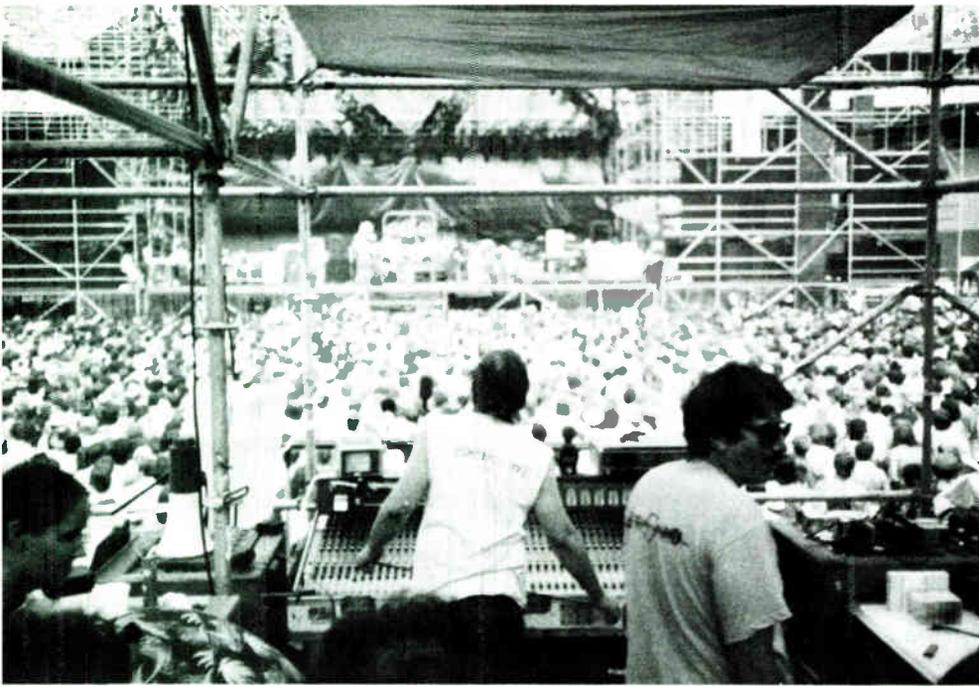


PHOTO: LARRY OPPENHEIMER

*Dan Healy (at the console) mixing position during the Dead's set. At right is Ultra Sound's Don Pearson.*

a particular console and set of outboard equipment for some period of time, it is untenable to consider switching everything around on the spot. Some of the possible problems can be easily seen with a quick look at Fig. 1, which shows the mixing console layout for each act. Note that Dylan engineer Gennaro Rippo set up his console (from lowest channel to highest) with drums first, then instruments, then vocals down by the masters; while Healy had the opposite order for the Dead: vocals, instruments, drums. No matter how such a conflict was resolved, significant amounts of repatching would have to be involved.

The solution was the most straightforward idea conceivable: if sharing was impossible, then simply use two completely separate setups. And so they did—after Dylan's and Petty's set, the stage was completely struck by their crew and reset for the Dead by the Dead's crew. Each group used its own microphones, cables, stands, and so on. Similarly, the large mixing station held both Ultra Sound's and Electrotec's house consoles and outboard racks. Separate monitor systems and consoles were used, even separate snakes were run. Although this redundancy may seem wasteful, it turned out to be the most efficient system, as it minimized the amount and complexity of coordination and/or compromise between the two sound companies, and required the least deviation from their respective familiar and road-tested procedures.

### Main Sound System

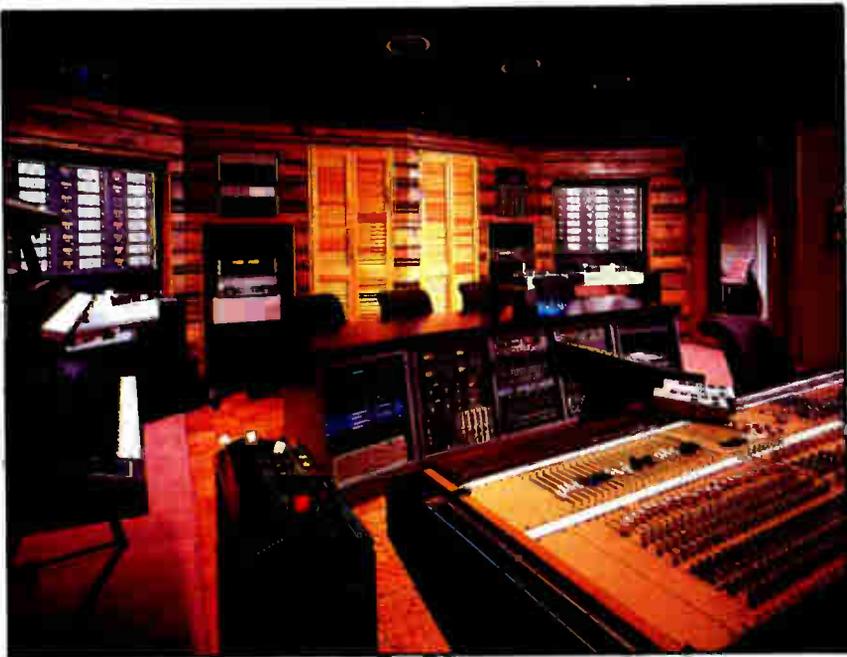
Ultra Sound bases its main system around Crest amplifiers and Meyer Sound speakers, and is perhaps the only large-scale sound reinforcement company that consistently runs its systems in stereo. For the large venues used for the Dylan/Dead concerts, Ultra put up everything they had. This amounted to over 50 Meyer Sound MSL-3 full range systems and 16 Meyer 650-R2 subwoofer systems (two 18-inch drivers per system) on each side of the stage. The two 12-inch drivers in each MSL-3 were powered by one side of a Crest 3500 amplifier (430 W/ch/4 ohms), the MSL-3 horns (one per cabinet) by Crest 4000s (800 W/ch/2 ohms, 4 horns per channel), and the subwoofers with a Crest 5000 (900 W/ch/2 ohms, two cabinets per channel). (These are FTC power ratings, and stated loads are those actually seen by the amplifiers in this system.) The crossovers are contained in the Meyer Sound processor electronics that accompany each system. Meyer Sound speakers are designed to be stacked in arrays, which result in excellent acoustic coupling and coherence. An accompanying photo shows how the speakers were stacked at RFK. Note the vertical arraying of the subwoofers, designed to provide maximum coupling. The low frequency performance of this system is particularly astonishing, with the ability to develop more SPL than this writer has ever heard from any other sound system. Ultra Sound also has a carefully designed AC distribution system,

which scrupulously balanced the load on the legs of the three-phase house AC drop. This results in more efficient performance, especially from the power amplifiers, and avoids a lot of interference and voltage variation problems.

### Delay Stacks

Watkins Glen, which followed the Dead's 1973 RFK Stadium shows by only a few months, was perhaps the first large-scale application of delay stacks. This technique employs speaker systems located on remote towers in the audience area to supplement the main stage system, with digital delays on the remote speaker feeds to match the acoustic propagation delay on the main speakers, thus making the sound from the two sources coincident. This technique is now standard for large concerts. The use of delay towers at RFK served several purposes: it assured beyond a doubt adequate coverage and SPL for the distant upper bleachers, effectively increased the ratio of direct to reverberant sound (thus helping to ameliorate the intelligibility problems that typically plague large venues designed more for sporting events than music), and allowed both sound companies to participate fully, avoiding any potential confrontation that could have resulted from the use of one company to the exclusion of the other.

For the RFK concerts, four delay stacks were used. On each stack were two levels of nine Electrotec speaker systems each, a total of 18 per tower and 72 in all. The Electrotec speaker system, known as the "Lab-Q" system, is a two-box design using JBL drivers, with the low end provided by a single 2240-G (18-inch) speaker in one cabinet, and the mid and high frequencies coming from two E120 (12-inch) speakers, one custom bi-radial-type horn (designed by Electrotec engineer Mick Whelan) with a 2445 driver, and two 2402 "bullet" tweeters (located in front of the E120s) in the other cabinet. Each low frequency cabinet was powered by one channel of an Electrotec Lab-Q amplifier, which is a customized JBL 6233 (300W/ch/8 ohms). The other channel powered the E120s in one mid/high cabinet. The horn and tweeters in each mid/high cabinet were powered by one channel of a UREI 6400 (four channels at 100 W/ch/8 ohms). Each amplifier rack contained four Lab-Q amplifiers and one UREI, enabling it to power four complete Lab-Q systems. A Brooke-Siren modular crossover with MCS 203a, 204, 205, and 208 modules completes the setup.



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## Bob Dylan/Tom Petty and the Heartbreakers Console Layout

CHANNEL	INPUT	SOURCE
1	Kick	AKG D12E
2	Snare (top)	Shure SM57
3	Snare (bottom)	Shure SM57
4	Hi-hat	Beyer 201
5	Rack toms	Sennheiser 421
6	Floor tom	Sennheiser 421
7	Conga	Sennheiser 421
8	Overhead (stage right)	AKG 460/CK8
9	Overhead (stage left)	AKG 460/CK8
10	Bass	Countryman DI
11	Mandolin	Countryman DI
12	Dobro	Countryman DI
13	Electric guitar, Campbell	Shure SM57
14	Acoustic guitar, Campbell	Countryman DI
15	Electric guitar, Petty	Shure SM57
16	Acoustic guitar, Petty	Countryman DI
17	Electric guitar, Dylan	Shure SM57
18	Acoustic guitar, Dylan	Countryman DI
19	Keyboards (Dylan, not used)	
20	Electric grand piano	Kbd sub mixer
21	Organ Leslie (low)	AKG D12E
22	Organ Leslie (high)	Sennheiser 421
23	Roland SDE3000	Direct
24	DX7 synthesizer	Kbd sub mixer
	Queen Esther Marrow and the Queens of Rhythm:	Beyer M88
25	Backing vocal 1	Beyer M88
26	Backing vocal 2	Beyer M88
27	Backing vocal 3	Beyer M88
28	Backing vocal 4	Beyer M88
29	Piano vocal	Beyer M88
30	Organ vocal	Beyer M88
31	Drum vocal	Beyer M88
32	Dylan/Petty vocal	Helpinstill pickup
33	Piano bass	Helpinstill pickup
34	Piano mid	Helpinstill pickup
35	Piano high	Direct
36	224X dig reverb left	Direct
37	224X dig reverb right	Direct
38	REV7 dig reverb left	Direct
39	REV7 dig reverb right	Direct
Stereo submasters		
1	Drums	
2	Backing vocals (Queens of Rhythm)	
3	Backing vocals (TP and the Heartbreakers)	
4	Bob Dylan	

## Grateful Dead Console Layout

CHANNEL	INPUT	SOURCE
1	Bass vocal	Neumann KM84E
2	Rhythm guitar vocal	Neumann KM84E
3	Lead guitar vocal	Neumann KM84E
4	Keyboard vocal	Neumann KM84E
5	Bass	Custom DI
6	Rhythm guitar	Sennheiser 421 / custom coil mic
7	Lead guitar	Sennheiser 421
8	Keyboards 1	Countryman DI
9	Keyboards 2	Countryman DI
10	Organ Leslie (high)	Shure SM57
11	Organ Leslie (low)	Shure SM57
	Drums: Billy Kreutzmann	
12	Kick	<i>Assorted:</i>
13	Snare (top)	AKG 451s,
14	Snare (bottom)	AKG 460s,
15	Hi-hat	AKG 414s,
16	Rack tom 1	Sennheiser 421s,
17	Rack tom 2	Sennheiser 421s, used on drums.
18	Floor tom	
19	Overhead	
20	Overhead	
	Drums: Mickey Hart	
21	Kick	
22	Snare (top)	
23	Snare (bottom)	
24	Hi-hat	
25	Rack tom 1	
26	Rack tom 2	
27	Floor tom	
28	Percussion O.H./SP2016 left	
29	Tar/SP2016 right	
30	Son of Beast 1	
31	Son of Beast 2	
32	Beast left/Dylan vocal	
33	Beast right/Dylan guitar	
34	Lexicon 200 left	Direct
35	Lexicon 200 right	Direct
36	Super Prime Time	Direct
37	Roland SDE3000	Direct
38	Echotron	Direct
39	Multi-effects	Direct
40	PCM42	Direct
Effects returns		
1	Timbale (top)	
2	Timbale (bottom)	
3	Rototoms	
4	Octobans	
5	Other percussion	
6	dbx 500 boom	
7	Walk-in music left	
8	Walk-in music right	
Stereo submasters		
1	Vocals	
2	Bass	
3	Keys and guitars	
4	Drums - Billy Kreutzmann	
5	Drums - Mickey Hart	
6	Rhythm Devils/Electrotec console feed	
7	Autopanners	
8	Effects return	

The stacks were located in a gentle arc such that they were equidistant from the center of the stage, meaning that one delay time could be used for all the stacks. The stacks were run in mono, and the delay was provided by an Ampex ADD-1 Mastering digital delay from the GD. The only difficulty encountered with the stacks came when the sound companies, after completing load-out in Buffalo at 3:30 a.m. and driving straight through to D.C., arrived about noon on July 5 to discover that the scaffolding for the towers had only been set up to accommodate one level of speakers. The RFK house crew was quickly set to work constructing platforms for the second level of speakers, which were

in place and fully operational by about 6 p.m.

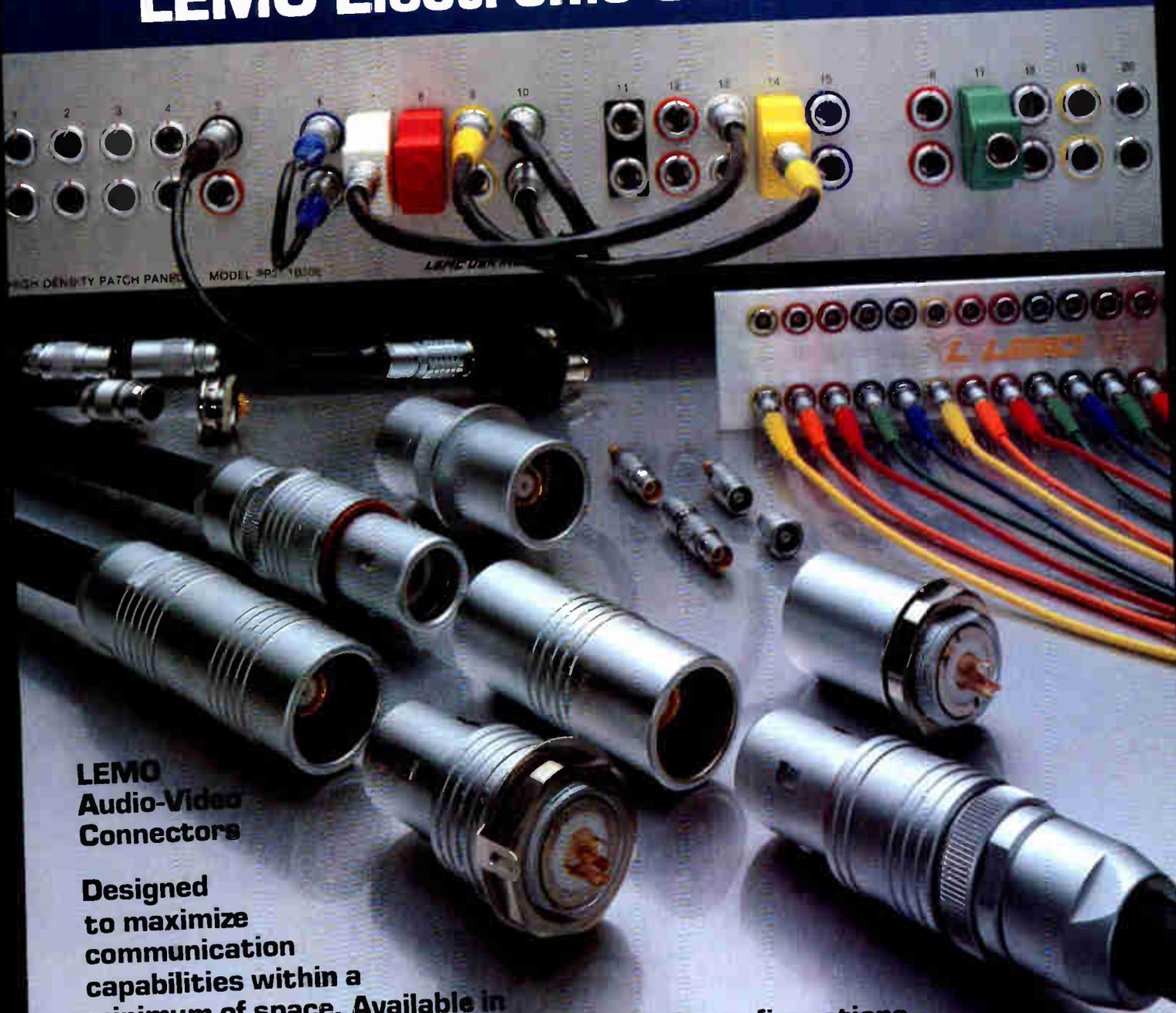
### Bob Dylan/Tom Petty and the Heartbreakers

The Dylan/Petty portion of the concert featured a set that alternated between several different configurations: Dylan with Petty, Petty without Dylan, Dylan without Petty, more Dylan with Petty, more Petty without Dylan, and more Dylan with Petty to close. From a production standpoint, however, it was a relatively straightforward rock and roll setup. Dylan sang and played electric guitar with Petty, and acoustic guitar and harmonica in his solo spot. Petty's group featured Petty on vocals and rhythm guitar, plus the

Heartbreakers: lead guitar, keyboards, bass, drums, and backup vocals. Backup vocals for Dylan were also performed by Queen Esther Marrow and the Queens of Rhythm. Petty and Heartbreaker Mike Campbell also played acoustic guitars in spots, and, on one song, Campbell played dobro and mandolin. In all, there were five snakes, each with 32 lines, coming from the stage. These were passively split in a stage box contained in the monitor console and then fed to the house snakes.

Out at the mixing station, these inputs were fed into a Soundcraft Series 4 console which was constructed by Soundcraft to Electrotec's specifications. (The monitor console was also a

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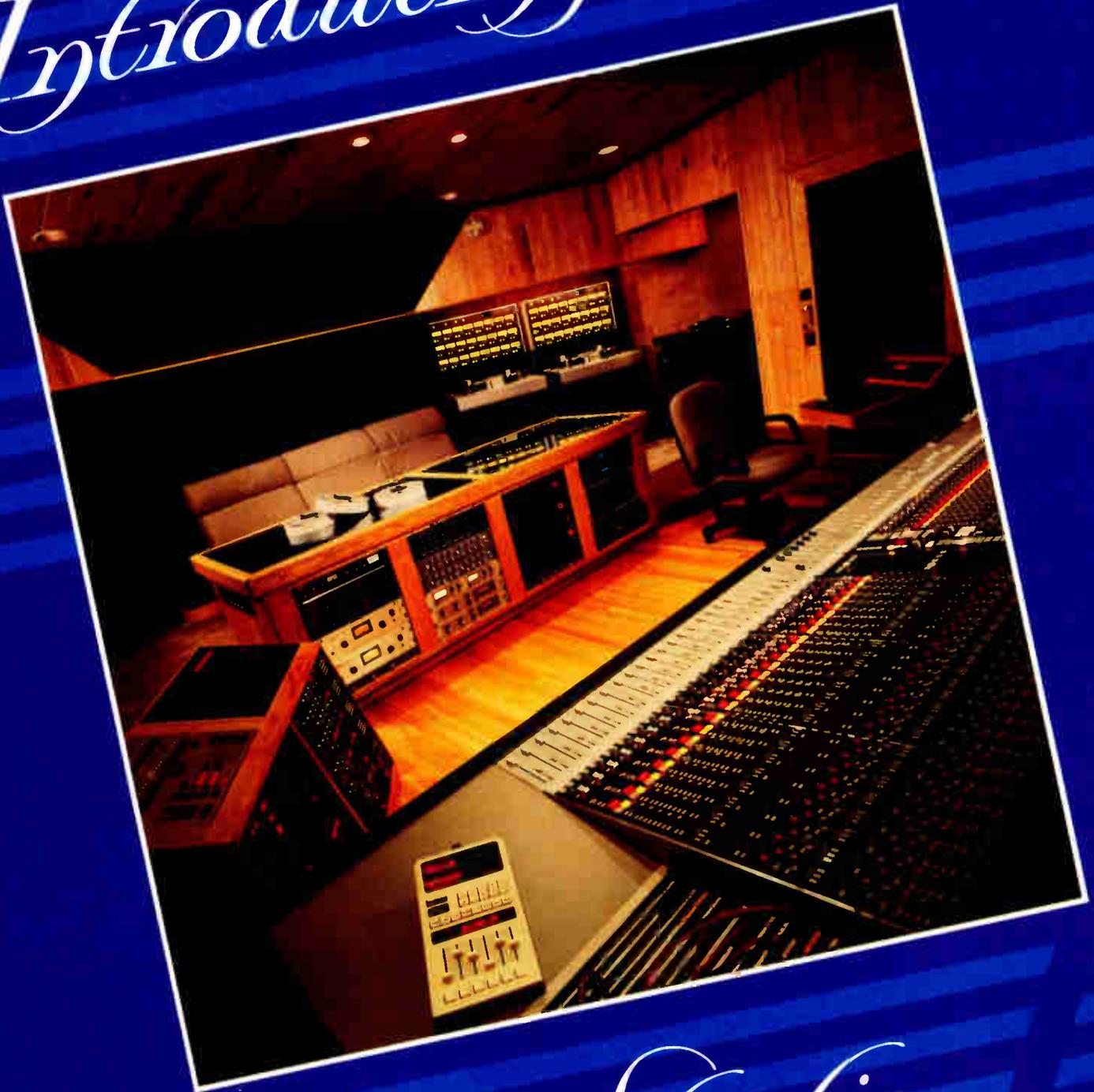
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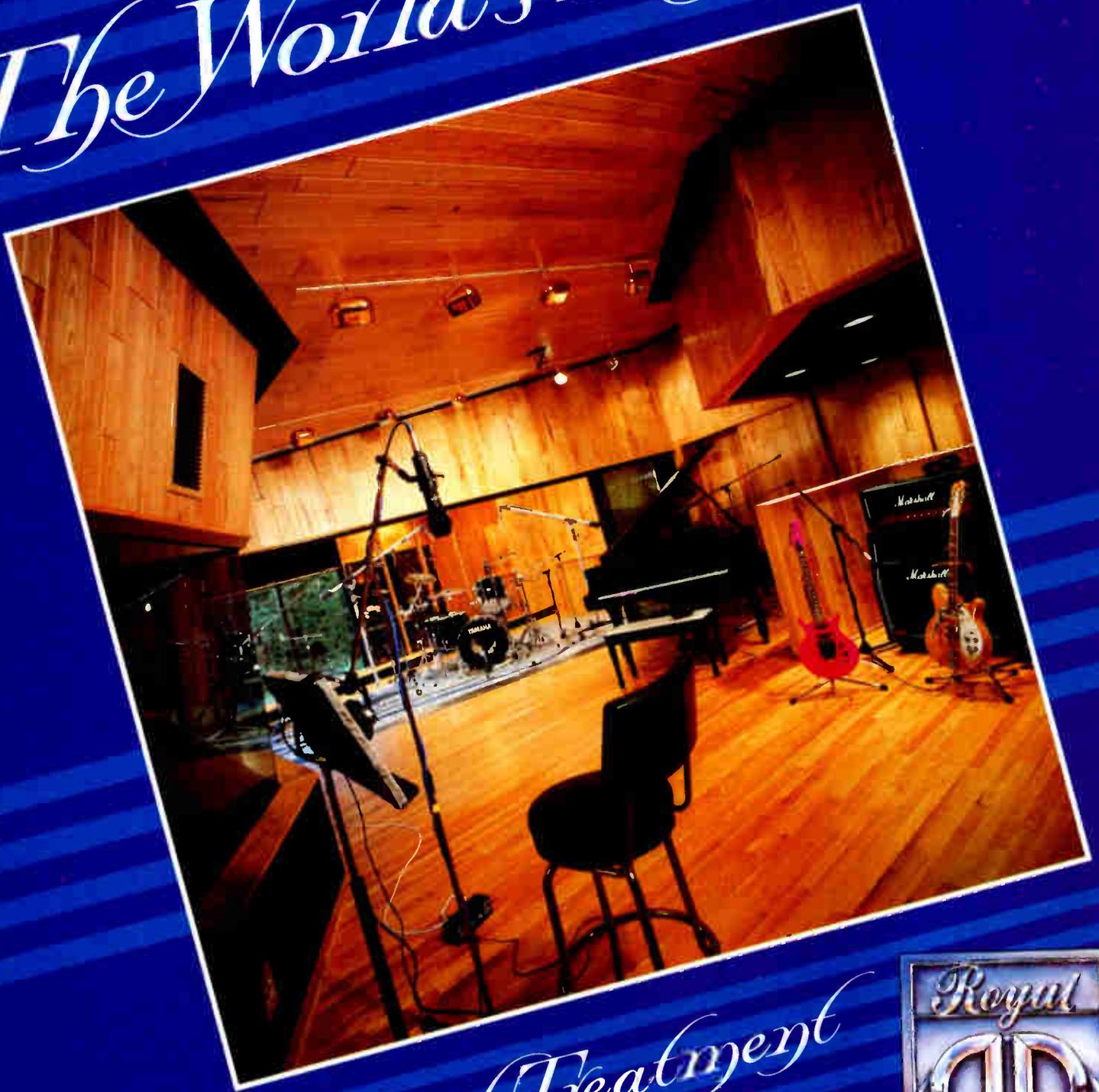
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custom Series 4, with the splitters and 16 monitor mix buses.) Among the features of note on this console are the four-band parametric EQ on each channel, and the programmable mute feature. This last allows any number of inputs to be arbitrarily grouped under the control of a single mute switch. There are eight such mutes on the Electrotec console. The stereo master outputs of the console were patched into a stereo submaster insert point of Ultra Sound's console. In the signal processing racks were

dbx 903 compressor/limiters for the drums and Dylan's vocal, White 4000 1/3 octave equalizers for left and right house mixes and Dylan's vocal, a Lexicon 224XL for Dylan's vocal, a Yamaha REV7 for the snare drum, and a Roland SDE3000 delay for Campbell's guitar. The White equalizers on the house mixes enabled Dylan's set to be EQ'ed without altering any of Ultra Sound's equipment. The monitors were Electrotec cabinets with a JBL E130 or E140 (15-inch) speaker, and a JBL 2390 horn/lens

assembly with a JBL 2441 driver. Two Lab-Q systems were used on each side of the stage for side fill. Engineer Gennaro Rippono declared that he did "nothing special" in mixing Dylan and Petty, mixing them simply as "a guitar band."

### The Grateful Dead

In contrast to Dylan, the Dead's production is extremely sophisticated, although the instrumentation is almost identical. Each musician has a complex setup involving an exten-

## Recording at RFK: Ultra Sound's M-S System

The Grateful Dead have not recorded an album of studio material since 1980's *Go To Heaven*, yet they are probably the most recorded band ever. This is largely due to the sect of their legions of fans known as "the tapers." These fans have come to realize the significance of live recording to a band that does not do well in the studio, and have acquired increasingly sophisticated techniques and equipment for this task, especially since the band began to officially condone such recording with a reserved "tapers' section" at concerts. As one might guess, this lesson is far from lost on the band themselves. In fact, their last two albums, both recorded live, were recorded using techniques developed by Healy as a result of his contact with tapers' recordings. The Dead record every concert, with both digital and analog 2-track recording systems. This has precipitated the need for equipment which allows this recording to be done with maximum flexibility and uncompromised quality. To answer this need, Ultra Sound has again risen to the occasion with a new "black box" for the Dead, designed by Healy, Geoff Peters and Don Pearson, which at this time is simply referred to as "the M-S box."

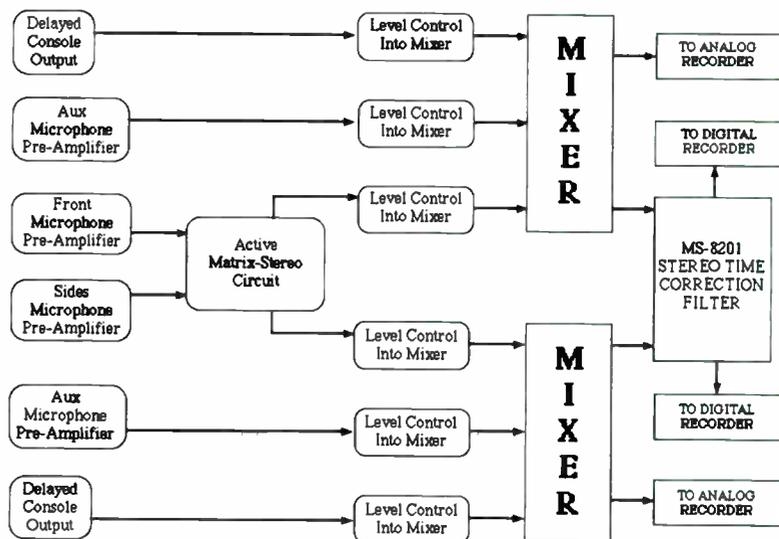
The M-S box does not in and of itself perform any amazing new function, but it collects a number of needed features in a coordinated system housed in a 3u rack space package. The basic goal is to allow the combination of a signal from a microphone, the direct signal from the console, and, if needed, voice-over microphone signals, with numerous ancillary functions. A block diagram of the M-S box is shown here.

The Dead use an AKG C34 microphone in an M-S (Mid Side or Matrix Stereo) configuration, mounted in front of the console. The C34 contains four of the AKG 414-type gold foil capsules in one housing. This is powered by a phantom power supply, with true active  $\pm 48V$  circuits. A low-noise microphone preamplifier for each section of the mic follows, and the outputs are fed into an M-S matrixing circuit. Note that there are level controls, mutes and cue bus monitoring placed in strategic points before and after circuits.

The mixing console signal is also fed to the M-S box, but in order for it to be coincident in time with the mic signal, it must be delayed equivalently to the propagation delay on the mic signal. At this time, this is achieved with an insert loop which sends the console signal out to an Ampex ADD-1 Mastering Digital Delay. After returning from the delay, the console signal is

mixed with the mic signal in the desired proportions. Also at this stage are two more microphone inputs which can be used for cueing or voice-overs during live broadcasts. Following this, the mixed stereo signal is sent into a Meyer Sound MS-8201 Stereo Time Correction filter, which compensates for the objectionable phase shift (particularly at high frequencies) which often occurs in anti-aliasing filters in digital recording equipment. In this case, the signal is fed from the M-S box into a Sony PCM701 or 501 and a battery of analog cassette recorders (which derives its feed from before the MS8201 module). Finally, a five watt headphone amplifier is included onboard to allow the monitoring bus to be heard above the sound reinforcement system when monitoring. The unit is constructed in a "roadworthy" fashion to provide reliable service on the Dead's journeys. —L.O.

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sive inventory of electronics and/or multiple instruments. As a result, the 42-pair house snake is completely filled up. Technical needs in the Dead's set-up are often met with custom electronics, usually designed by John Cutler, Dan Healy and/or Don Pearson, and built by Ultra Sound. The style of music purveyed by the Dead often features extended instrumental passages. To avoid the problems caused by open vocal microphones, Healy has devised a system wherein each vocalist (excepting keyboardist Brent Mydland, who plays seated) has a small pad placed in front of his mic stand. When he steps up to sing, a pressure switch in the pad is activated, sending a DC voltage which then opens a dbx 904 noise gate at the mixing station. To facilitate this application, the noise gates have been modified to DC couple the keying input. When the vocalist finishes singing, he steps back to play and the gate closes. This system works quite well to a point: it is often the case that the vocalist (particularly Jerry Garcia) will wish to stand on or near the pad when he is not singing, perhaps to hear the monitors or to be able to resume singing easily after a short solo. Worse still, Garcia likes to rock back and forth on his heels when he plays, which can cause the gate to flop open and closed. Healy deals with this with an override footswitch placed just beneath the mixing console, which keeps the gate pulled low. Mydland's gate is also dealt with by a footswitch operated by Healy, who, amazingly, never seems to miss any of Mydland's vocals. A similar gating scheme is used on Mydland's organ Leslie mics: the voltage output of the Hammond organ is transformer split, with one feed going to the Leslies, and the other being sent to a custom box at the mixing station, containing gates and threshold comparators. The microphone signals go into the gates while the Hammond feed goes to the threshold comparator which keys the gates. Thus, the Leslie mics are only open when the organ is actually being played.

All stage inputs feed directly into the monitor console onstage where they are passively split and then sent out the house snake. The house console is a 48-input Gamble console which includes a number of the same deluxe features found on the Electrotec console: four-band parametric EQ on each channel, programmable mutes, and eight effects sends (configured as four dual concentric pots). Those sends get used, too; Healy's goodies racks contain: a Lexicon PCM42, Super Prime Time, and Model 200, ADA Digital Multi-effects,

Roland SDE3000, DeltaLab Echotron ADM4096, Eventide SP2016, two custom autopanners, and a dbx 500 subharmonic synthesizer. These get used to create a variety of subtle or bizarre effects, depending on Healy's mood of the evening. In addition to the gate control footpedals already mentioned, Healy also has footpedal control of delay time and the repeat/hold function on the Echotron, and the speed of the autopanners. To keep all the effects sends straight, strips of colored tape corresponding to the color coding of the effects send pots are placed beneath the faders of the appropriate effects return channels and marked "upper" or "lower" to indicate which part of the concentric pot is the send to that effect. The subharmonic synthesizer sees consistent use on the large drum assembly played primarily by Mickey Hart and known as "The Beast." This is where the large numbers of Meyer subwoofers really get their workout, as the dbx unit allows reproduction of low frequencies from the drums in a way that no microphone could do, in fact, it most likely creates more low frequencies than the drums actually have! The section of the show which features The Beast — an exotic percussion duet between Hart and Kreutzmann, calling themselves the "Rhythm Devils" — delivers sufficient low frequencies at its climax to literally vibrate your pants against your leg. Mind you, these are just the toys.

In the way of more utilitarian processing there are two dbx 900 racks, containing a total of 12,903 compressor/limiters and four 904 noise gates (used for the vocals as described above). The 903s are used for vocals and instruments, including Son of Beast, the melange of electronic percussion and processing which is Mickey Hart's latest addition to the Rhythm Devils. Equalization is performed with five Meyer Sound CP10 Complementary Phase parametrics. The CP10s have been altered to allow several sections to be cascaded in series, thus achieving deep notching while retaining very narrow bandwidth. Other racks at Healy's station contain test and recording gear and assorted ancillary devices. All snake and rack connections are terminated with AMP Quick-Latch multi-pin connectors, which mate to a panel wired to a large patch bay on the back of one of the racks. Thus, just as in a recording studio, any desired configuration can be patched quickly without running any additional cables.

At the second show, Dylan came out during the Dead's set and performed two of his songs with them. To accommodate this situation, Dylan's

guitar and vocal inputs were patched when he came onstage into two channels which would not be in use simultaneously with his appearance: those used for the Beast. Each musician monitored through a Meyer UM1 speaker system, fed from the 40 x 16 Gamble monitor console.

### System Setup and Test

With this great mess of speakers and electronics, it would seem likely that a sophisticated system of aligning and equalization would be used, and this is indeed the case. The Grateful Dead and Ultra Sound have worked very closely with Meyer Sound in the development of many of their products, and have also been instrumental in helping Meyer devise his Source Independent Measurement test procedure. The system currently used by Healy and Ultra Sound differs somewhat from that used by Meyer, but is basically the same. In essence, the technique works like this: first, a sound system is constructed with a consistent (from cabinet to cabinet) and flat frequency and phase response, thus eliminating the speakers as variables in the equalization problem. Next, a reference point in the signal chain, typically the console output, is chosen and fed into the reference input of a dual-input FFT analyzer. A calibrated test microphone is set up in front of the mixing station and its output fed into the analysis input of the analyzer. To match the propagation delay between the speakers and the microphone, a delay is inserted in series with the reference. The two analyzer inputs are then compared, and the CP10 equalizers used to flatten the response. The great advantage of this system is that any signal, even music, may be used as a test source, as the technique depends only on a before-and-after comparison. The classic sound reinforcement problem of drastic changes in acoustics between a full and empty hall is eliminated.

In the case of the Grateful Dead and Ultra Sound, the Meyer speakers are the flat system, having matched processor electronics to compensate for any anomalies. The analyzer is a Bruel and Kjaer 2032, which contains an onboard trigger delay for making the reference signal coincident in place of the digital audio delay. The microphone is also Bruel and Kjaer, consisting of a preamp and 4133 capsules. It is mounted on a rail and motorized to allow it to be moved laterally at a calibrated rate over an eight-foot range in front of the console, with the resultant signal being averaged, thus eliminating from the

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# SOUND AS SCENERY IN LILY TOMLIN'S "INTELLIGENT LIFE"

by Brooke Sheffield Comer

Lily Tomlin's *Search for Signs of Intelligent Life in the Universe* (which won Tomlin a 1986 Tony Award for Best Actress in a Play) isn't even a musical, yet the Broadway show penned by Jane Wagner utilizes as much sound equipment as its next door neighbor, the aptly named *Song and Dance*. Because *Intelligent Life* replaces props and scenery with appropriate noises, soundman Bruce Cameron must create a complete sound environment.

Cameron's dependence on split-second timing gave him nightmares his first four nights on the job. "I'd wake up in a cold sweat," he says, "thinking I was a 1940s radio man with sleighbells and coconut shells, reading from a script and putting in the right effects. But I'd always be one sound behind." Though the dreams subsided, "that's actually what this job entails: being an old time soundman who does all his own effects, crunching the cornstarch box while the man walks over the snow, in real time. The only difference is, I work with tape."

Initially, his work at New York's renowned sound effects house, Masque Sound (also a recording studio and rental house), brought Cameron to the attention of Tomlin's sound designer Otts Munderloh. "Otts was hired as a solution to a show that was only working 75 percent of the time," he explains, "and he brought me in to help." Though Cameron worked in theater sound for years prior to his gig with *Intelligent Life*, "this is a new experience for me," he says. "I don't know of any show quite like this one."

"I'd been a stereo nut for years," Cameron says referring to a youth of taking systems apart and putting them together, hopefully for the better. But despite his enthusiasm for electronics, he wavered between theater arts and computer engineering in college. "I finally combined the best of both when I went on tour as a sound engineer for



Soundman Bruce Cameron backstage with Lily.

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*Cameron at his mixing position.*

dance companies, including Alvin Ailey and the Joffrey Ballet," he explains. "Sound for dance isn't very exotic—it's mostly tape playback—but touring gave me some valuable feedback that I've been able to apply to this show. I learned how to adapt to different sound environments. I can walk into a theater, size it up, and figure out how to get the job done in the shortest amount of time with the equipment available. Often it's a real crash and burn situation. You may not have the time or budget to get new equipment, so you use house gear plus whatever you're carrying."

Touring also instilled in Cameron the art of commanding a crew. "You have to motivate people in a hurry, and often you're dealing with very different kinds of people," he says. "Say you're in a small town and all the stage hands are retired firemen and insurance brokers. You have to inspire them to get the system up and working in the shortest amount of time. In a big city, it's exactly the opposite. The crew could be completely professional

or lackadaisical. So in that respect, touring was a crash course in human nature for me, a lesson in priorities, pressure and stress. As a result, I'm a lot more businesslike and less forgiving. If I see something I like, I go for it, bypassing a lot of protocol. Sometimes that's the only way to get things done."

Separate sets of speakers in the house help Cameron send effects throughout the house. "We're working with a couple of distinct systems," Cameron explains. "A system on stage reproduces all the effects cues with six separate sets of speakers. [Four Galaxy Hot Spots are mounted in the stage, two Meyer Sound UPA-1s off stage left and right, and two in the wings, and a set of subwoofers. The major portion of the system is made up of John Meyer components.] I can select any one or a combination from the console, and send effects out, depending on where we want the sound to appear to come from. I can also follow Lily around the stage as far as those six speakers will allow me to."

The console routing system works

so that Cameron can also send tape effects into the house, though this only happens occasionally. "I'll have music start up in a specific speaker to represent Lily turning on a jukebox, for instance. As the music builds, it goes out into the house, then back into the speaker again. Though for the most part, effects happen on stage where Lily mimes."

Despite the importance of sound on stage, Tomlin does not use vocal monitors. "I can't think of another performer who does an act similar to hers that depends so much on how her voice sounds, and doesn't use any kind of monitoring," Cameron says. "But she's worked without any monitors for 20 years, and she's not about to start now. Her voice is amplified over four or five different systems in the house, so essentially everything she hears is filtering back from the house. Fortunately the house cluster, made up of six John Meyer UPA-1s, is designed for high pressure rock and roll, so the sound has a very even, controlled pattern. It's the idea speaker to use in a cluster because it can focus the sound exactly where you want it to go."

The rest of the Plymouth Theater's house system is composed of a number of Bose 101s, small speakers originally marketed in Europe, then in the U.S. as "The Roommate," and intended to be plugged into a Walkman and played in a dorm room or car. "We used 12 Bose 101s in the main floor and 12 in the balcony," Cameron says, "and four in the overhang area, all set up so they're appropriately delayed. That way, you tend to focus on Lily as a performer rather than as a source of sound, which is actually coming from the speakers above or quite near you. Because of the delay, created by the proximity of so many little sources, I could keep the overall level down instead of having to push an enormous amount out of the cluster and pull back a little and distribute it all over the auditorium with the delay system."

Cameron calls his Yamaha PM 2000 console "bare bones basic, keeping with the design philosophy of the show. It's old technology, but this works to the console's advantage," he explains. "It's cost-effective and you can send it out on the road and it lasts forever. It's really straightforward, with no automation. I just put the cart in the deck, and select the speakers, dial an EQ and a pan in, and set a level. For each cue, I have to go over that sequence of actions, though at some point in the future I hope to get some kind of automation that will allow us to do routing electronically. It would be nice if we could do some of the cues from disk rather than tape."



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Despite the console's age, Cameron feels that its reliability is a big plus. "When we got involved, Otts told me that the show had to be 100 percent accurate. At the time we went in, they couldn't get the cues right. Otts and I set up a system where we'd load up a set of carts all at once, preset the number of cues for that segment of the show and route the console to select which combination of speakers each one would go toward. My eight cart decks are actually stereo cart decks, but single channel, so I have 16 separate sound sources actually available. The music can be stereo, but since very little sound in the show is on the same cart, the channels aren't usually related. I have 16 different sources which re-route to various combinations of effects speakers to produce all the effects."

It's been suggested that technology could make him obsolete, but he rebuffs the notion with appropriate nonchalance. "People think the show runs to track but because of the way Lily interacts with her audience, if they laughed a second longer one night, the track would be off. It's the same with the light board. People say it must be automated, instead of a whole sequence of five or six things happening to get one cue going. In the future,

*"This show sets new precedents. I don't know of anyone who's built an act around miming action onstage while a soundman follows them."*

I may be able to press one button and instead of getting one cue from tape, I'd get one cue from a sampling machine like a Synclavier, with automated routing features. I could press a button, it would select the right channel, and I could send out the channel and level. The information would be stored in the computer memory instead of my having to do it manually. But until then, when Lily reaches for

the next cue, she has to have someone there to give it to her."

Since traditional theater sound involves noises that reinforce, rather than create a scene, Cameron's job on *Intelligent Life* is more complex than usual. "Ninety-five percent of theater sound is background," he notes. "When it's evening, the lighting designer has moonlight streaming out the window, and you hear crickets. But this show sets new precedents. I don't know of anyone who's built an act around miming action onstage while a soundman follows them. I think of myself as an accompanist too."

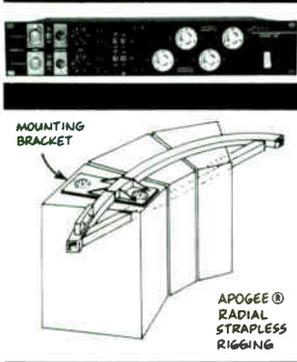
In his search for appropriate sounds, Cameron didn't always look for the obvious. "Often there are better ways," he explains. "There's a waterbed in the second act, but we couldn't get the right sound from a real waterbed. We found a water bottle that made a better sounding noise, so we used that. And when Lily is portraying Trudy, the bag lady, she walks across stage with her cart and you're supposed to hear her tennis shoes squish-squishing in the rain. Originally, they went into a studio and taped someone walking around in a pan of water, but that didn't work at all. I went to the dime store and got a half dozen sponges in different sizes, and squeezed them till I got the effect of walking around in a puddle.

"Debbie Van Pouche, the former soundwoman, was responsible for a lot of the sounds, plus Lily has her own sound library," he notes. "To get the shopping cart sound, an upside down tricycle was taped. We took that original cue and spent a lot of time cutting it into a loop, so I could push a button and get cart whenever I wanted and not have to worry about starting and stopping. We worked with that tricycle sound for a long time, doubling it and tripling it, stretching into various manipulations. We don't have to do much to doctor and add sounds because they're so basic. When Lily pulls kleenex out of a box, we taped just that, but it took a lot of time to get the balance just right."

Both Tomlin and writer Jane Wagner, Cameron reveals, are avid listeners. "They both spend a lot of time in the theater listening and listening to make sure that the editing and EQing are just right. I have tremendous respect for both of them. Lily is technically oriented, but only to an extent. She wants to know how the process works. She goes through a range of 14 voices, so we communicate each night. She has a lot of key words that I've learned to translate. Just working with Lily has been the most exciting part of my job."

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# DARYL HALL

## STANDING SOLO

by Bruce C. Pilato

After 15 years on the national music scene and selling nearly 40 million records with his partner John Oates, Daryl Hall found himself late in 1985 back on the same stage where he started.

Nineteen eighty-five was a monumental year for Hall. He and Oates had big success with *Big Bam Boom* and its tour. Then there were the performances at Farm Aid and Live Aid (where in addition to headlining, Hall backed up Mick Jagger and Tina Turner in one of the show's most incendiary performances). But the event that changed Daryl Hall's life in 1985 was the night Hall & Oates sang at the legendary Apollo Theatre with former Temptations vocalists David Ruffin and Eddie Kendricks.

In October of that year, he began work on the album that would become *Three Hearts in the Happy Ending Machine*. This is not his first solo album. Hall recorded an avant-garde pop album, *Sacred Songs*, in 1978, with Robert Fripp producing, but RCA considered it so off-the-wall that they refused to release it for fear it would hurt H&O's sales. Hall and Fripp, determined to get the album out, launched a press campaign asking fans to write

(L to R) Co-producer Dave Stewart of Eurythmics, and Daryl Hall.



to RCA and demand the record. The label relented in 1980, but *Sacred Songs* was not a commercial success. But the album does mark the beginning of Hall's solo career.

Whereas Hall & Oates have relied on spectacular studio production to drive their musical point home since 1980's hugely successful *Voices*, *Three*

*Hearts* places a stronger focus on the songs themselves. Although Hall has written most of H&O's hits on the piano, the songs on this record were written for the most part on guitar, giving the album a more straight ahead feel. The production (by Hall, bassist Tom "T-Bone" Wolk, and Dave Stewart of Eurythmics) is strong but not overbear-



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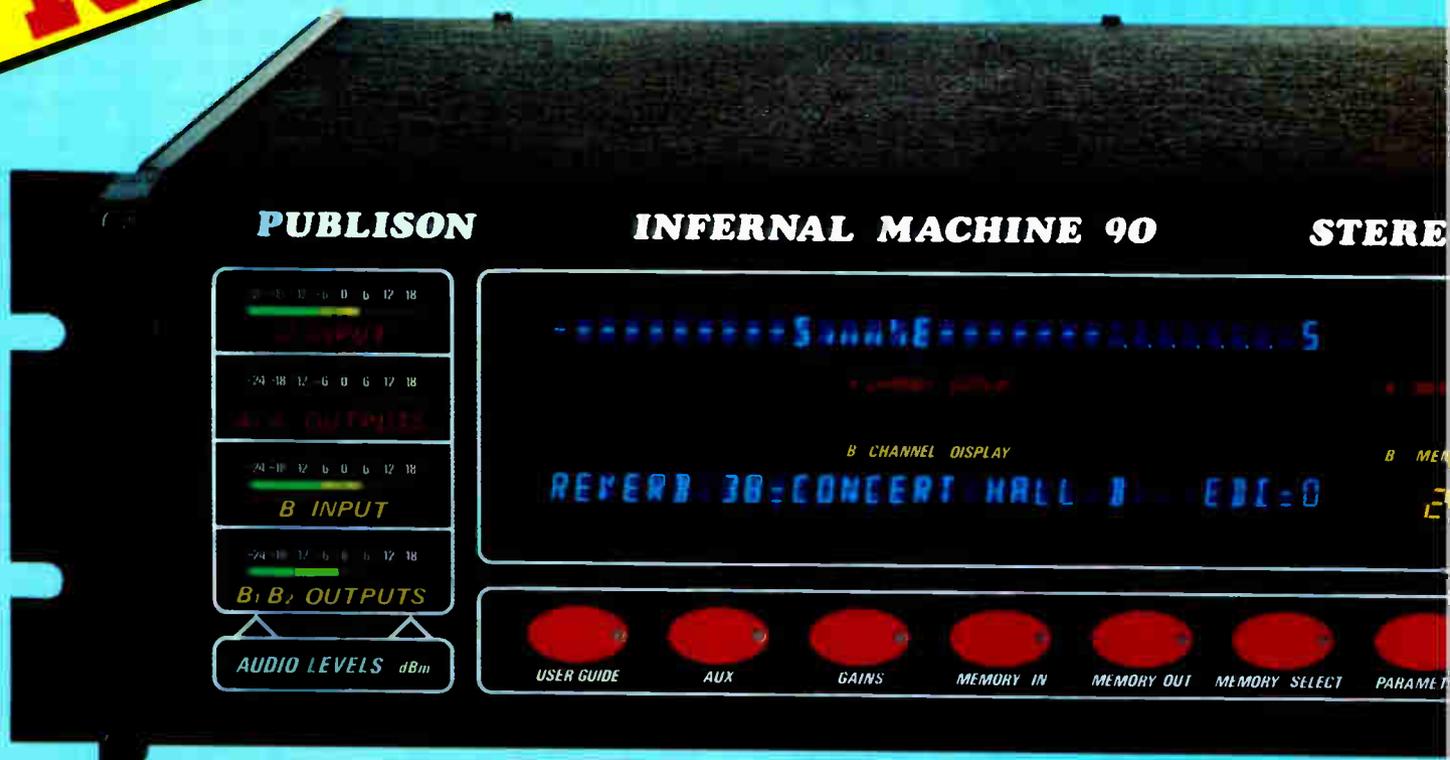
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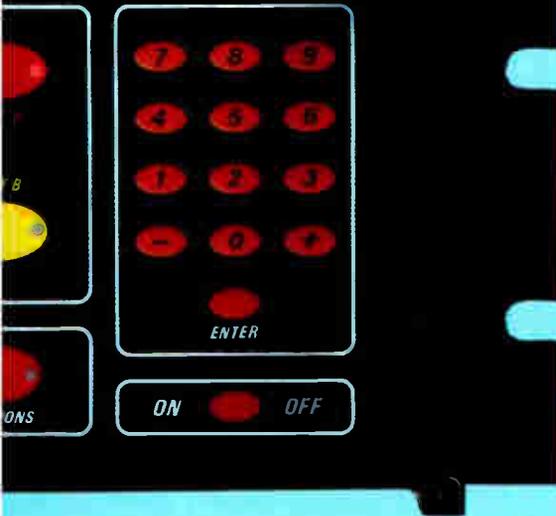
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that. A lot of things happened all at once. I felt like I stopped one era and started another one. It was time for me to make a solo statement.

One obvious musical thing that happened was the *Apollo Theatre* album. It was a very intense experience for both me and John. It was a full circle for me; when I stood on that stage—the same stage that I had started on—it was one of those moments in time that made me re-evaluate my life and my musical career, because all that stuff is so intertwined anyway. After that, I had a completely different way of looking at my past. History is one thing that John and I had in common and that kept us together, and when that history was finally summed up in one fell swoop, I said, “Well, it’s time to move to another place.” So there was a bit of death and renewal right there. There were other things, emotionally, and also my observations of the world.

I think the lyrics have a lot to do with breaking down my own personal walls—trying to reach out and embrace larger things, and get out of myself a bit. I think a lot of that has to do with 1985 and the interplay I had with all these other musicians for all these different causes that I was involved in. That certainly had a positive effect on me. All these things combined caused me to look at the world in a different way, and I think that’s what the lyrics are about.

**Mix:** Did you write the lyrics after recording the tracks?

**Hall:** Oh yeah, but I always do that. I didn’t really have the songs written when I started. We kind of wrote them in the studio. I had phrases and that, but that was it.

**Mix:** Aren’t the vocal phrasings necessary in order to lay down tight music beds?

**Hall:** What I do from the very beginning, usually, is lay down an instrumental track of some sort. Then I do vowel sounds or gibberish around it; I constantly update that as the process goes along. So I do have rudimentary melodies and rhythmic phrasings and things that I eventually try to adapt into the actual lyrics.

**Mix:** What happens when you’ve already laid down all the music and then you realize that a song has to change musically in order to fit a very important lyric?

**Hall:** I just figure out a different way to say whatever I want to say. I adapt the tone of my lyrics to the mood of my music. That’s one craft that I’ve built over the years. Different moods

ing. Gone are H&O’s trademark bombastic drum machines and multiple synthesizers; Hall has opted instead for acoustic strings and percussion.

These elements, subtle as they are, take *Three Hearts in the Happy Ending Machine* away from the Hall & Oates sound, although comparisons to the duo are inevitable. Like it or not, the voice and songwriting of Daryl Hall have become synonymous with the hit records of Hall & Oates; with the same brand of catchy melodies and his pop sensibility, Hall’s album will not make it easy for many H&O fans to see the difference.

**Mix:** Musically, *Three Hearts in the Happy Ending Machine* is a nice compromise between an intelligent artistic statement and an accessible pop album for the masses.

**Hall:** I feel pretty much the same way. I didn’t go into it with any real ideas in mind. I knew what I *didn’t* want to do: I didn’t want to work in New York, because I’ve been so involved in New York music for so many years and for me, that was locked in with Hall & Oates. I knew that if I got out of the immediate environment, at least, I would look at things differently.

Using different personnel was also a big deal. I always want to stretch things, but I figured I could do that without trying to be obviously stretchy.

I don’t need to do that at this point in my life. I got myself off creatively, that’s for sure, and I still feel that people can understand what I’m trying to do.

**Mix:** Your voice and your songs have made up the bulk of Hall & Oates’ hits. Do you think the average listener can view this as something different than your work with Hall & Oates, and did you worry about this when you were making it?

**Hall:** Nah. I didn’t worry about it at all. I was so much less formed in my direction and my musical abilities when I made the first album in 1978. I didn’t even know what Hall & Oates’ sound was back then. I’m proud of everything I did with Hall & Oates, and that’s part of what my music is; strong melodies and pop songs. That’s what I am.

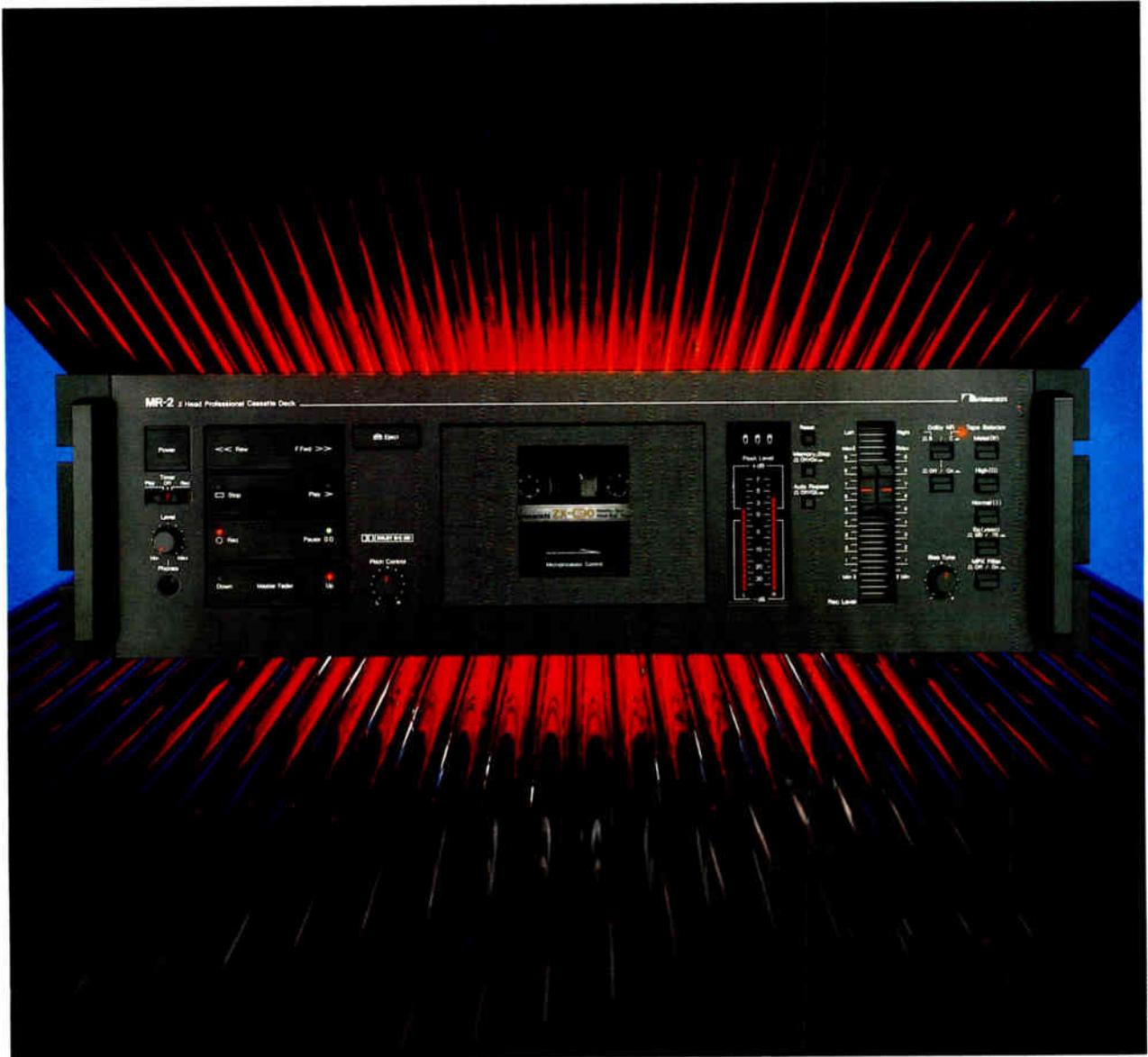
The difference between Hall & Oates and this is basically a more pure point of view. Hall & Oates is very much a duo, or even more, point of view. Creative decisions from the very beginning to the very end are made by more than one person. For instance, John would come to me with a chorus like “Here she comes, she’s a man-eater,” and my task was to write a verse with that thought in mind. That is not necessarily a thought I would have come up with on my own.

All these thoughts here [on *Three Hearts*] are my own. It’s a very pure sense of my own vision. It may be a subtle difference, but it’s a difference nonetheless.

**Mix:** What motivated this album lyrically?

**Hall:** I did go through some emotional situations, but I have to downplay

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require different kind of word patterns.

**Mix:** What does the title *Three Hearts in the Happy Ending Machine* mean?

**Hall:** Well, I can tell you the process of it and then I'll tell you kind of what it means. I was taking Polaroid snapshots near a house I have in the country. I wanted the mood to have a sort of distorted nature, which is what I had in mind for the cover. I was taking snapshots and I stuck them in my journal. One photo became a prototype of what the cover is. I opened up the book one day, and above that photo I had written the phrase "Three Hearts in the Happy Ending Machine." I thought, this all fits together somehow. It's typical of a lot of the happy accidents that happened while making the album.

**Mix:** I thought perhaps it meant you had been caught between two lovers and were somehow able to fit them into one happy relationship...

**Hall:** Well, that would be nice, wouldn't it? (laughs). I'll tell you what it really means. The Happy Ending Machine is a metaphor for life, and for the creative personality. I feel that's sometimes what I am. All these different things are stuck into my brain, and somehow there is a synthesizing process—in some unknown way, it comes out

being whatever it is. Sometimes it's happy and sometimes it isn't, so there's a bit of irony involved in that.

The "Three Hearts" represents an emotional or romantic imbalance of some sort. With threeness, there's something that needs to be resolved: it's not safe and it's not calm. There's turbulence involved.

**Mix:** How did you get together with Dave Stewart?

**Hall:** A lot of people were telling me I had to meet Dave Stewart because we'd really get along great. Jimmy Iovine was working with Dave, so he was our direct contact. But he wasn't the only person to suggest I work with Dave.

They were right! We got along amazingly well, both as people and creatively. In fact, the first day we met we ended up writing "For You," the first song on side two. That was an auspicious way of getting together and it just went on from there.

**Mix:** What did Dave bring to the album that might not have otherwise been there?

**Hall:** I was looking for someone who could take me out of myself, out of my normal pattern, and he was really good at that. He's like me in the sense that he works spontaneously and he has an ability to see something the

way it is immediately. He really got things started. His role was really that of a catalyst.

After the first few weeks of the album, he left and I continued on with T-Bone. So he was not part of the whole process, but he was in on the most important part—the very beginning—when it was molded and shaped.

**Mix:** Was there any reason why you used six different studios in three countries?

**Hall:** It just happened that way. For example, the Paris thing happened because just after Dave and I met, he was scheduled to go to Paris. So we both went. We found a great studio, so we used it.

**Mix:** How did you enjoy recording at Studio de la Grande Armee, and in France itself?

**Hall:** It influenced the sound of the music. I wanted to use real percussion on this album. I was trying to get away from all the synthesizers and all the electronic drum machines and everything that I'd been using for a while, so my first thing was to try and find a really good percussionist. In France, there's a different kind of African connection—a North African dimension. I found a guy who was not a black African, but a white, middle-

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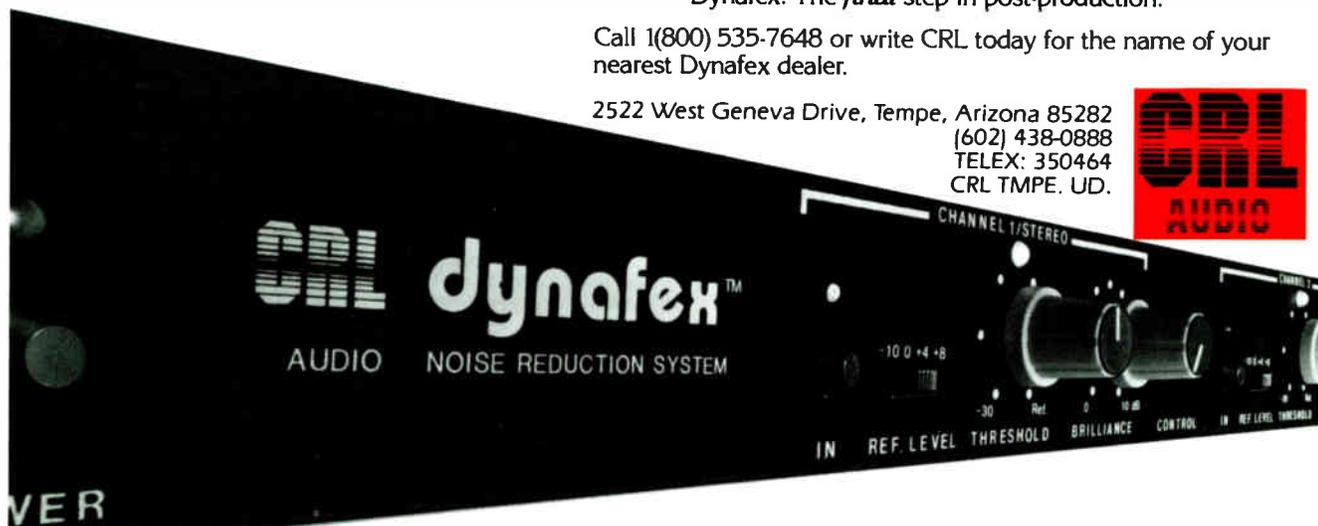
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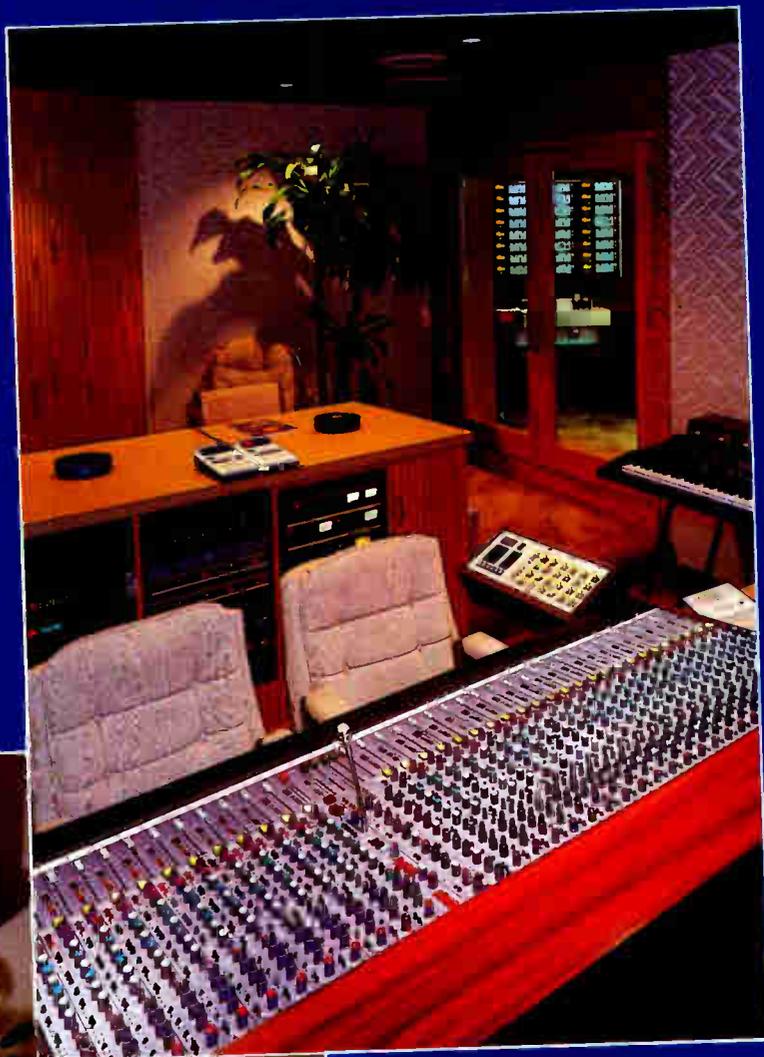


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aged ex-Foreign Legion soldier. He had been stationed in North Africa and India and studied with all these percussion masters. He made his own drums, including a lot of water drums. I don't know if you noticed it from listening, but the rhythms on this album are very different from what I normally use. They're very liquid. And they really did influence the tracks. One of the first thing I did was put percussion on. I built the tracks from the percussion, so he had a lot to do with the shaping of the album.

**Mix:** I know that Hall & Oates just signed a worldwide deal with Arista Records, but do they still exist?

**Hall:** To tell you the truth, I'm not really sure. When I first started this album, I figured I was going to do an album and see what happened. As I started thinking about it, I started realizing what it was and what it meant to me. The way it looks right now, I'm going on the road with this and I have no immediate plans of getting back together with John. John and I are still friends and everything that we are, but we don't have any immediate plans of reforming Hall & Oates after this album. I'm leaving it open. I'm sure that John and I will make music again at some point, but it might be two years, three years, five years, ten

years. It depends on when we want to get back together, really.

**Mix:** Do you think John is looking at this arrangement the same way? Is it something that you've discussed?

**Hall:** We haven't really talked specifically about it. I know he is in the process of trying to find his own path. He's been producing some people and he did a song for a movie score. I think eventually he'll get into some solo work himself. I think he also realizes that this is the time to do that, though. He's a little more methodical and specific than I am, so since we haven't talked about this yet, at some point we're going to have to say "What does this mean?" and then we'll sit and talk about it. I can tell you what it means: it means we don't know when we're gonna do it again.

**Mix:** But you don't intend on breaking up.

**Hall:** Oh, no. I don't consider that we have.

**Mix:** What are your tour plans as a solo act?

**Hall:** I'm going to let the record circulate around a little for a while and let people get familiar with it. I want people to get familiar with it, because I don't have any past music to draw on

for a live show. I'm a new act, basically. I want people to know the whole album. February sounds right to me.

**Mix:** Can we expect to hear the Hall & Oates hits, as well?

**Hall:** Hmmm. I don't know. Yeah, maybe. I'll consider anything at this point. I haven't really thought about the set.

**Mix:** Who's going to be in the band?

**Hall:** Well, T-Bone, the bass player, will obviously stay because he was a big part of this record. And I am going to keep G.E. Smith because I love his guitar playing and I think he's flexible enough to go into any direction I want to go in. The rest of the Hall & Oates band, I think, will be on hold.

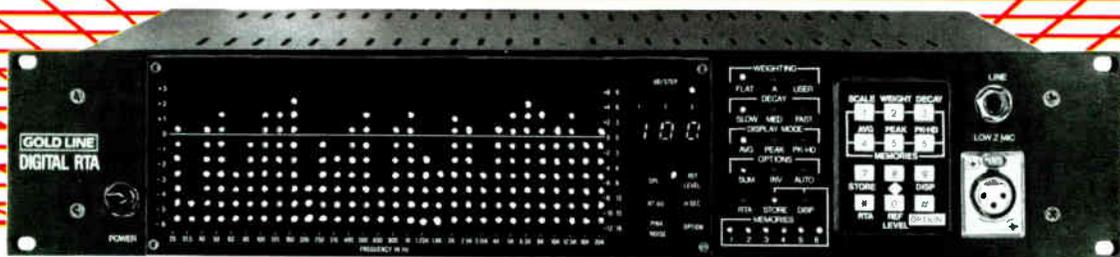
**Mix:** Because Phil Collins and Genesis both use the same musicians on the road and in the studio, it's become nearly impossible to find a distinction between the two acts. Do you feel using members of the Hall & Oates band and playing some of the hits you had with John will cause you to have the same problem? Do you worry that people will just see this as Hall & Oates without John Oates?

**Hall:** I thought a lot about that. I was very wary about even using G.E. be-

—CONTINUED ON PAGE 283

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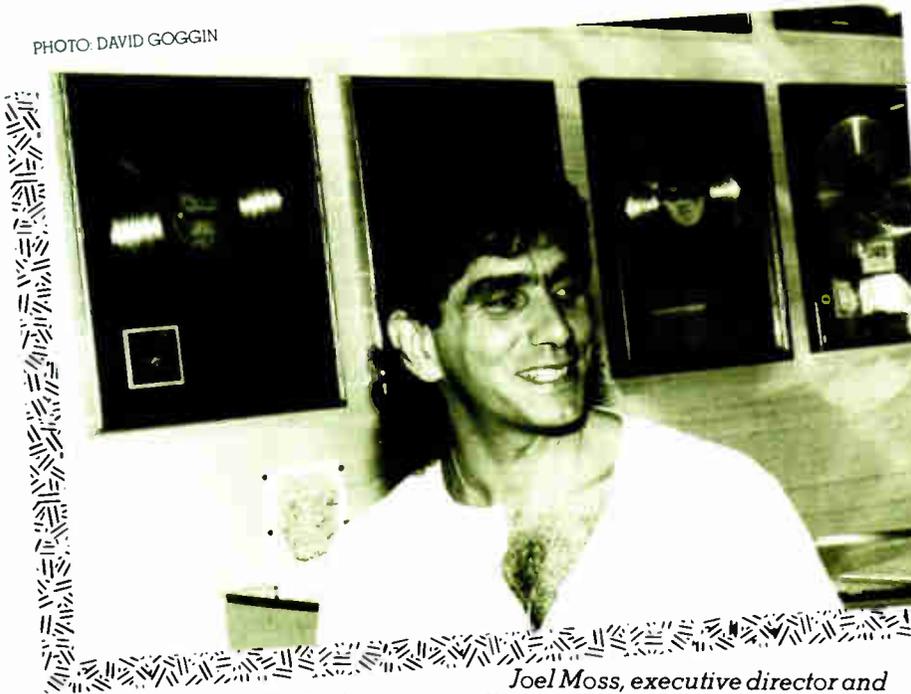
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PHOTO: DAVID GOGGIN



Joel Moss, executive director and chief operating officer of Record Plant Scoring, Inc.

# SOFTWARE in the Studio

by Tony Thomas

**The studio has become the natural habitat of the silicon chip.**

If you don't think that computers have made a tremendous impact on the recording studio, take a look around you. From microprocessor-controlled tape transports and computer-based console automation systems to digital reverb units that are nothing more than specialized computers, it is quite clear that the studio has become the natural habitat of the silicon chip.

The increasing use of MIDI synthesizers and sequencers and SMPTE time code has made the computerization of most studios inevitable. And as more studio owners have begun to watch the bottom line, computers are being used with greater frequency for such tasks as accounting, word processing, booking, forecasting, data base management and telecommunications. As a result, a number of companies have begun releasing software packages positioned to meet the needs of the average recording studio. Such

## THE RECORD PLANT

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Of all of the well-connected Hollywood recording studios, the Record Plant may be the best connected of all—at least computer-wise. With Macs to the max, the prestigious studio's new Sycamore facility is not only wired for sound, but for data too. According to Joel Moss, the new executive director and chief operating officer of Record Plant Scoring, Inc., the studio's long-standing commitment to digital has also extended to the computer realm. Moss, a veteran mixing engineer, has worked on numerous film, television and record projects, including the scores for *White Nights*, *Pretty in Pink*, *About Last Night*, *Knots Landing*, *St. Elsewhere*, plus records for Patti Labelle, Michael McDonald, Kenny Loggins and Neil Diamond.

Each studio at the new facility is being equipped with an Apple Macintosh computer which will run Mark of the Unicorn Performer software and will be tied into the synthesizer room which houses virtually every popular machine on the market. The user-friendly mouse-driven Mac system adds a degree of "high touch" to the brute force high-tech that is an inavoidable part of the recording process. The result is bytes without the bite of intimidation that usually accompanies getting used to working with computers.

"After trying several types of MIDI software, we decided on the Performer package which is slowly becoming the standard," Moss explains. The use of Macintosh computers and Mark of the Unicorn software ties perfectly into the Record Plant's present objective of providing its clientele with a full-service scoring facility. As Moss elaborates: "What happened over the past couple of years in television particularly with the advent of *Miami Vice* is that television producers are realizing that they can capture a much more modern sound with synthesizers than they can with a small orchestra, especially with the budgetary constraints they are faced with. As a result, the producers are going after guys who can put together that kind of stuff in

—CONTINUED ON PAGE 240

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—FROM PAGE 232, SOFTWARE

packages can be broken down into two basic categories: those that deal with studio business operations and those that can be used in studio for music composition, synthesizer and sampler sound programming and storage, and automation of studio processes. Let's take a brief look at some popular programs...

### Studio Management

Pristine Systems, Inc. of Hollywood have introduced what they call their "Recording Studio Management System"—six different software modules which include: Bookings and Work Orders, Accounts Receivable

**As more studios have begun to watch the bottom line, computers are being used with greater frequency for tasks such as accounting, word processing, booking and telecommunications.**

and Payable, General Ledger, Tape Library and Sound Effects Management. Pristine's package, which retails for \$2495 per single user (non hard-disk) system and runs on IBM-PC compatible (MS-DOS) computers with at least 256K of RAM, reportedly allows the automation of all fiscal functions from the work order to financial statements.

This package also provides detailed data on studio and customer usage, maintenance, inventory with re-order points and accurate records for tax purposes. It is currently in use by several major studios including Group IV Recording, Fred Jones Recording

—CONTINUED ON PAGE 237

## THE SOUND MASTER EDITING SYSTEM

One of the things that computers can do very well is keep track of time. And timekeeping has become a very important task around the recording studio these days, especially since the use of multiple audio and video tape transports locked-up together via SMPTE time code is commonplace. Sound Workshop's Sound Master Integrated Editing System allows an IBM PC or compatible computer with 256K of memory to be used as a master SMPTE control system with advanced EDL (edit decision list) capabilities that are quite similar to those found on video editing systems. The system incorporates a proprietary SMPTE synchronizer, dubbed Syncro™, which allows the system to operate as a self-contained unit that does not have to be continually updated to accommodate changes in synchronizer operation.

According to Bob Predovich, Sound Master's president: "We have tried to make this system so easy to use that a film person can learn to operate it in about two hours. We have made the system as uncomputerish as possible so that, even though it uses an ASCII keyboard and a PC, it has functions like play, record and rewind which are easier to learn than control and alternate codes. It is so simple to use, that it doesn't even look like a computer-based system."

Even so, the Sound Master system employs considerable computing power to get the job done. The Syncro™ synchronizer has its own 8088 microprocessor, 8087 math co-processor and 8K of RAM storage which makes it a computer in its own right, which when used with

the IBM-PC, is capable of true multi-tasking. The system also runs very fast, since the synchronizer is connected directly to the data bus and communicates with the host computer at about 5 MHz. Another unique feature of Syncro™ is that it utilizes identical cables for each transport, with a small paperback book-sized interface providing the right type signal required by that transport.

The system was originally designed for use by Master's Workshop, the sister-company to Sound

Master for use at its own state-of-the-art audio post-production facility in Toronto. It was not, therefore, designed on a workbench in some obscure laboratory, but in a real-world studio environment. Predovich is thus committed to making sure that input from the real-world continues to shape Sound Master's development: "We want to have a unique manufacturer/end-user relationship. I want to have a network of Sound Master users all contributing to the development of the system as time goes on. And from what I've seen in the last few months, we're going to do it."

—Tony Thomas

*Soundmaster's "Set-Up" screen provides visual confirmation of pre-set transport parameters, such as ramp time and machine damping. Other screens include an edit decision list and real time transport monitoring.*

SET UP		DISK STORE ?		ST-A
MACHINE	TYPE	REC_I	ADS_I	
MASTER	BUL800	00	OFF	
SLAVE 1	JH24	02	OFF	
SLAVE 2	MTR90	04	015	
SLAVE 3	3324	03	100	
PRE-ROLL	07 SECS	REACTION	04	
FRAMES	30	DF	25	24

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# A PRIMER ON GROUNDING

by Greg Hanks

After alluding to the discussion of grounding in my last two *Mix* articles on studio installation (Aug., Sept.), it's finally time to give the straight poop about getting rid of the pops, buzzes and other grounding gremlins that recording studios are famous for. The first of the problems that we must face when discussing "grounding" is the relative flippancy with which we bandy terms about. Let me use the following example:

"It is never a good practice to ground any wire at more than one point. We should earth our common and shield lines at the point that is closest to zero potential."

The preceding sentence may or may not be true, depending on the definitions applied to the four terms that are generally used interchangeably to describe the same item. Therefore it is imperative that we start this dissertation with a few definitions. While it may appear that we are saying the same thing in four different ways, we are not. And this illustrates one of the difficulties in dealing with this topic.

## Ground

Ground is the material composing that big ball of dirt on which we live. It is also the connection that the power company makes to the neutral line of the incoming AC service. This is a little confusing in that the NEC (National Electrical Code) only talks about "ground." Ground in the NEC handbook refers to: A) The earth; B) The electrode that is planted in "A"; C) The circuit that is formed by a connection to the electrode in "B".

What this means in a practical sense is that they are talking about the connection that is tied to all conduit and other electrical service metal enclosures. Conceptually, this is done to ensure that the maximum voltage that can exist at the electrical service is the voltage between any two conduc-

tors. We can live with that in this instance. Aw, what the heck, let's use this definition from this point forward to refer to the signal connection of the power company conduit, or safety bonding. This is the point that is most often available at the third pin of your standard receptacle.

## Earth

Earth, when used in this text, will not refer to the circuit point described above, but to the "screening" or enclosure connection on the audio equipment that we are interconnecting. We will also use this term as "the earthing wire" to refer to the conductor used to bring the enclosure of a piece of equipment to the studio "zero reference," or "technical ground." Most consoles made have the chassis and the audio common brought together at one point. Earth is a good term for the circuit that is "other" than the audio common. This seems a little foolish, but please bear with me.

## Shield

Shield is the term that describes the wire(s) that is tied to earth. The shield, in this writing, will refer to the wire enclosure, or the "drain." When we are referring to wiring, the shield is the conductive braid or foil that surrounds the signal conductors. When we are referring to theory, the shield is the electro-static barrier that is composed of the enclosure of the given piece of equipment, coupled with the screening provided by the conductive sheath of the cable.

## Common

Common, or most often referred to as "the audio common" is the circuit point that is shared by both the input and the output of a circuit. This point is somewhat vague when dealing with the inside of an op-amp, because the op-amp inputs and output only share the power supply rails. But in application, it becomes very clear. In order to use this device, the positive input

must refer to the point that is midway between the V+ and the V- connections. It is this point that establishes the quiescent output voltage. And the output must reference to this mid-point (or one of the rails). We do not often see circuitry wherein the output common connection is one of the rails, but even then, that common becomes the system common. When hooking up the power supplies, there are most often three wires, +, -, and 0 volts. Common refers to this 0 volt point. If good circuit layout and design are examined in depth, it is easy to show the direct correlation between system grounding method and good circuit board layout procedure. It is important to note that common and earth are not necessarily at the same potential. "Common" refers to the signal 0 volt connection.

## Neutral

The neutral is the wire feeding your electrical outlets that is most commonly taken to "ground" at the electrical service entrance. Make no mistake about confusing this with "ground"! One of them is used to provide a return path for the AC power, and the other is used to provide for safety. The term "neutral" is used almost exclusively by the electrical trade, but is included here for completeness. It is also necessary to understand that because the neutral is almost always taken to the same point as the ground, that all of the current that is used in any system is flowing through the neutral, thus imposing a mighty charge on the ground system unless it, in fact, is at the earth's "0" volt potential. (By the way, this is a near impossibility.)

## Technical Ground

With any large recording system, there is one point chosen that will be the reference for all of the system earth references, and this point is the technical ground. I believe in single point ground systems, and the single point that we will be discussing throughout this article is the "technical ground."

## Basic Theory

Now that we have defined the terms that we are going to be using throughout, we can move on to the other main area of confusion that exists when discussing "grounding." This is the difficulty that exists in drawing the equivalent circuit of a grounding system, with all of the operating parameters. The most often used representation of signal common is  $\downarrow$ . The most often used representation of an earth, or chassis connection is  $\sim$ . All too often the chassis connection (earth),

and the signal common are both referred to with the "ϕ" symbol, and where they are tied is almost never indicated. Well, what the hell, you say! A wire is a wire, is it not? Since they are tied together, you don't have to indicate how many times or where, do you? Well, that is why I am writing this. This type of misconception has brought many to tying down shields at both ends, not using ground lifts, and adding alligator clips between pieces of gear to eliminate problems. Life can be much simpler if some of the basics of grounding and shielding techniques are understood and carefully applied.

### Charge

The first bit of physics that applies to this study is the understanding of the static charge (unit of charge = Q). (If any readers have a mathematical bent, the applicable formulae will appear in parenthesis.) Whenever an excess of electrons ( $6.28 \times 10^{18}$  is equal to 1 Coulomb) exist on a body, that body is said to be negatively charged. If there is a lack of electrons, that body is said to be positively charged. Oppositely charged bodies attract each other, and equally charged bodies repel. When we have two oppositely charged bodies near one another, a force exists (force =  $(Q1 \times Q2) / \text{distance}^2$ ). With one charged body, a force in fact exists, when the earth is taken into account. This force exists because the earth, for practical matters is considered an infinite source of charge, because it is at zero potential. The mathematical term is  $-Q$ . Because the earth is at zero potential, any charged body has a field that possesses force. This is an electric field. The field that radiates from a charged body produces electrostatic force. ( $E = (Q / (\text{dielectric constant, "k"} \times \text{distance}^2))$ ). This force radiates from a charged body, and either terminates at infinity, or another charge. A conductor that has a charge on it, when surrounded by another conductor, radiates a field that terminates at the surrounding conductor. Any fields outside of this surrounding (shield) conductor also terminate at this conductor. The conductor(s) that is surrounded (the signal carrying conductor(s)) will not be affected by any charges outside of the shield conductor. Since the earth is at a zero potential, then a conduction path to the earth will bring the shield to zero potential. It should be understood that grounding the shielding conductor is not necessary for the shield to function. The potential that exists between two shielded conductors will remain unaffected by any fields outside of the shield, and the fields outside of the shield will not be modified by the

potential(s) within it. The purpose of taking the shield to ground is to make the mutual capacitance of the conductors to the conductors outside of the shield zero, or so the classic theories state. What occurs in real world situations involves many conductors within shielding enclosures whose mutual capacitance is not zero. The mutual capacitance terms are defined by the geometry of the conductors and the shielding system itself.

### Capacitance

Capacitance, in this discussion, is multi-influential. It is the self and mutual capacitance of shielding and shielded conductors that make electrostatic shielding work. When a potential is impressed upon a single insulated conductor, and that potential is varied, the charges that exist between that conductor and surrounding conductors varies. When a charge varies, current flows. This seems to defy the law that a circuit must be closed for current to flow. The capacitance that couples these systems provides the path for current flow. One of the sources of hum in our audio signal is the capacitive coupling of the power mains to our audio commons through the primary windings of the power transformers in the system.

### Room Pickup

An electrostatic field at power frequencies exists in almost all inhabited areas. The sources of this field include lighting, power distribution, zip cords and other things that use electrical power, and are unshielded. The field originates on unshielded wiring and terminates on the various lower potential conductors. According to Morrison, (1) the room may be thought of as a large capacitor, with the signal carrying conductors as one plate, and the lowest potential conductors (earth, or ground), as the other. Therefore, a person standing in a room is standing in the middle of a big capacitor. Everything in a room will modify the coupling of the fields that exist, and this makes it almost impossible to map the field strength with any real accuracy. The induced reactive current flow of a typical room is about 100na per square foot at 60 Hz. This is the source of the buzz that occurs when you touch an amplifier input.

### Ohm's Law

Everybody is familiar with the classic formulae,  $E=IR$  and  $P=IE$ . Ohm's law is one of the fundamental concepts on which our understanding of electronics and its properties are based. Application to grounding theory and application is most profound when

considering the voltage drop(s) that occurs over the finite resistance of our earthing conductors. If these wires did not possess a finite resistance, then all earthing connections could be made at any point, and there would be no problem. However, it doesn't work this way, and these finite resistances create small voltage drops that together create hum, buzz and noise. The above mentioned capacitive effects also reduce to resistance terms with the also classic formula of  $Xc$  (or 'R' for Ohm's law) =  $1 / (2 \times \pi \times F \times C)$ . Oh Lord, there I go again, rambling on without addressing the issue! OK, we'll try a little more direct approach—

### Purpose

The reason that we are concerned with grounding in the first place is to eliminate unwanted signals from our system. This is accomplished through electrostatic shielding. The individual components accomplish this with the enclosure (hopefully!). As we interconnect the individual components of the system, we must bring all of the enclosures to the same potential. Minimizing current flow within this interconnection is the desired result, and making the audio signal see this shield charge as being the lowest potential is the way that this is accomplished. With almost any recording studio environment, the most desirable point to consider as the technical ground (the point of lowest potential) is the electrical point in the console that takes audio common to the console chassis. The reason that this point is most desirable is easily understood when you consider where most of the gain of the system is: the console. Summing buses, microphone pre-amplifiers and the like, as well as the location of the interconnection scheme of the patch bay make this the considered location of technical ground. When the system is thusly interconnected, chassis to chassis that is, the circuitry that is contained within the shielded enclosure(s) and the shielded wire that ties this stuff together are both "impervious to external fields." This is true for electrostatic effect. It is not so with magnetic fields, and this is cause for design concern (see previous article on control room installation design). The sources of interference that are most commonly encountered with studio installations have not to do with electrostatic coupling from external fields to the audio wiring, but coupling from the currents flowing within the shield(s) itself to the shielded conductors. Current flowing through the shield structure will not necessarily only be at AC power frequencies, but has a broad power spectrum response, and the system noise as a rule will suffer from

current flowing in the shield(s). We will attempt in the following pages to show how to eliminate these currents and illustrate a time proven methodology for dealing with the hook-up vagaries that conspire to ruin our work.

Rather than end the article with a list of exceptions to the rules that we espouse, we will introduce some now. We just said that the point of choice for technical ground is physically located at the console. Not necessarily so, because it is possible to achieve other very good technical ground points. One of these involves the using of "hospital grounding method." This will be discussed in detail a little later. I think that this is a good time to discuss the "How To's" of system shielding, with a little of the theory that goes with it!

**Rules**

1) In order for a shielding system to work most effectively, the "system" audio common and the shielding sys-

tem must be tied together at some point. The mutual capacitance of an unterminated shield leads to capacitive coupling of any interference fields that cut the shield into the signal conductors themselves.

2) For minimum hum, connect to technical ground at one point only.

The easiest way to think about shielding procedure is to consider it verboten to connect the chassis of a piece of equipment to technical ground with more than one path. Remember when we spoke of the rule that says that no current flows without a complete circuit? With multiple paths, the voltage drops that appear because of the leakage current(s) returning to their source create voltages that are amplified by any part of the system that reference to the path that the currents are flowing in.

3) Every signal line should have its own shield.

If signal lines appear within a common shield, then they will capacitively

couple to each other. This leads to excessive cross-talk within the system. This effect is most noticeable at high frequencies, where the ratio of the Xc to the line impedance can become significant.

4) The shield wire should not be shorted to other shield wires at any point other than the signal source reference.

If shields are shorted together at some point other than that point described above, then they will share coupled signal currents through capacitive coupling, and this will cause a voltage drop in the shield through the finite resistance of the shield thus raising the shield potential above the signal reference zero point. This leads to high frequency cross-talk.

5) Never use a piece of equipment that does not provide true power transformer isolation from the chassis. An example of this type of equipment would be a television set, where the AC line goes to the signal common.

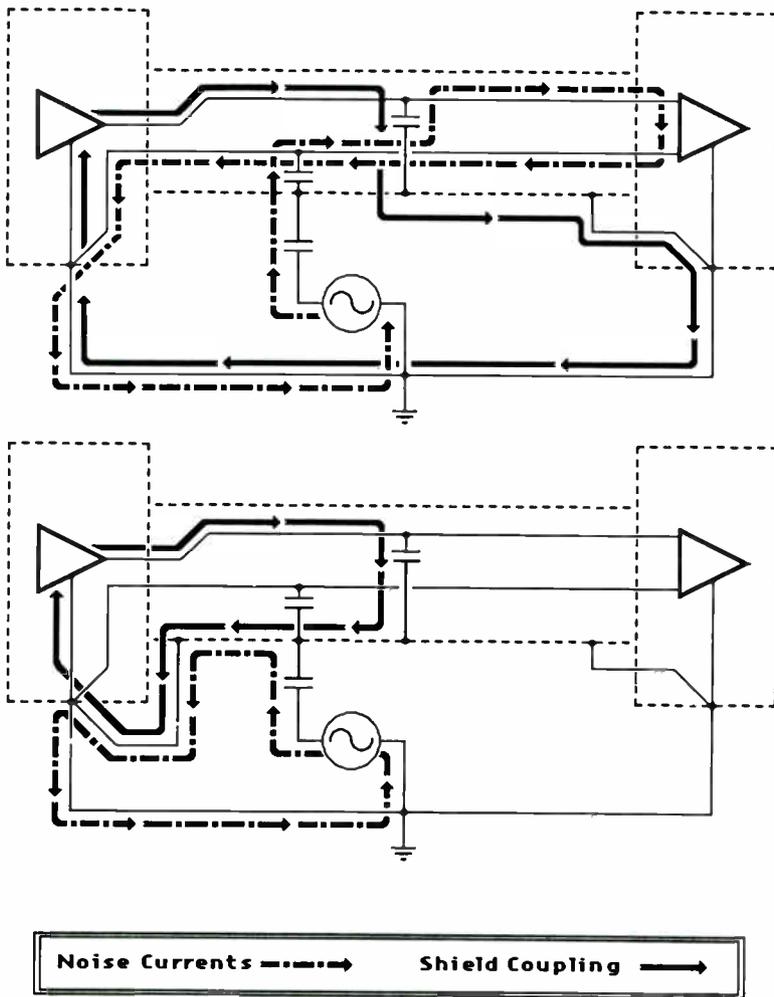
The reasons for this should be obvious, since the power mains would then be coupled into both the system technical ground, and therefore through the signal zero reference. There are leakage currents from all power transformers, and these will couple to the mains as a return path, therefore modulating the whole reference system at 50/60 Hz. Should it be necessary to use a piece of equipment of this type, then an isolation transformer must be used on the AC input. It would also be wise to transformer isolate the signal inputs and outputs to minimize the corruption of the technical ground.

6) Shields should connect at one end only, and the connection point should be at the signal source.

The shield wire is not sufficient in most instances as the method of returning the earth connection of a piece of equipment to technical ground. It is not fortuitous for most installations to even consider such an action, in that the wiring termination point never goes through the physical area of the technical ground. Therefore the most expeditious practice is the utilization of an earthing wire that is either the third pin of the AC plug in a "hospital ground method" installation, or conversely a separate conductor that terminates at one end at the piece of equipment, and the other end at the technical ground.

Termination of the shield wire at the signal source end is desirable because any noise signals that are impressed upon the shield will capacitively couple to the signal that is also capacitively coupled to the shield. These currents must return to the signal source. If the shield were termi-

**FIGURE ONE**  
Additional noise contribution created by coupling the shield to the input of the driven device



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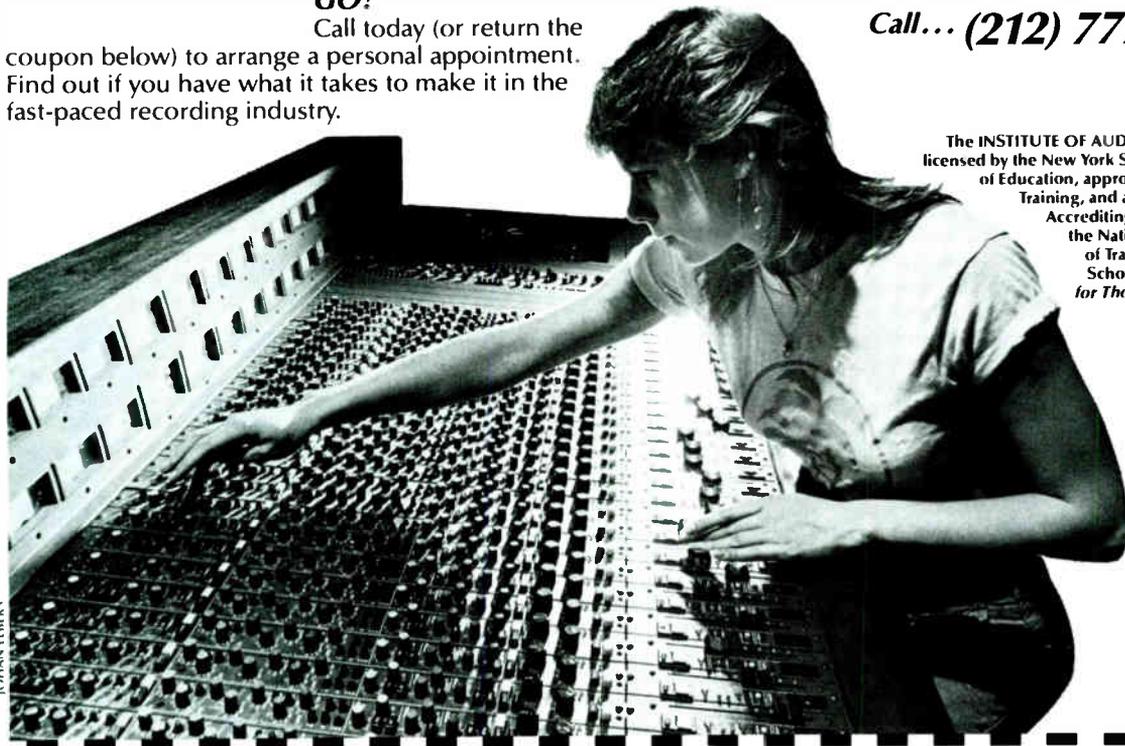
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nated at the input of a driven device, then the noise signal would be amplified because the capacitive coupling of the signal to the shield would have to return to the source through the reference point of the driven device. The voltage drop that will occur because of the finite resistance of the earthing wire will cause currents to flow in the reference. These currents will be impressed upon the input stage of the driven device. See Figure 1 for an illustration of this phenomenon.

7) Never use the electrical conduit for technical ground.

The concept of a single point star ground is violated at the first contact with the conduit of the electrical system. Electricians allow the conduit to contact metal, other conduit, machinery, the building reinforcement beams or just about any damn thing that is convenient. Ground loops—where the earthing wire has more than one path to technical earth—are guaranteed if you allow this dastardly condition to occur.

I have stated that the single point star ground system is necessary. It is the only type of system that I have used that consistently works in audio applications. If you are wiring a video system, you don't care about 60, 120 and 180 Hz 40 dB below the signal. But in audio, with a dynamic range of 100 dB plus, it becomes a critical problem. A single point star system is one where the technical ground is the only point where all of the equipment comes together. There are basically two ways of going about implementing a star system. The first is that of using the "hospital ground method" that I mentioned earlier. The other is a separate earthing wire that is independently brought to technical ground.

## REAL WORLD THEORY

### AC System

The power system is the culprit. All we have to do to eliminate buzz and hum is turn everything off. Seriously folks, the power line is where most of our problems start. In an ideal world, the power coming in will provide a constant voltage, infinite current, have no noise on it and the neutral currents will always be zero. So much for the ideal world. Instead we face voltage fluctuations from 90 to 130 volts, Noise spikes that can exceed 1000 volts and lines that really sag when you want a hundred amps in a hurry. Neutral currents are often measured in the 10s of amps and this is our first concern.

Equipment manufacturers are in a bit of a bind when it comes to informing the buying public about how to correctly install their equipment. The

reasons for this are legion. If, as a manufacturer, you recommend a particular course of action, especially in print, you assume liability for the execution of that action. This means that if someone mistakenly hooks up, say, a tape recorder, uses a ground lift (at your recommendation) and ties the chassis to 110VAC, then grabs both the tape recorder and a cold water pipe, you can be sued for any pain and suffering that results. Therefore all manufacturer statements will reflect the wisdom of covering thy behind, and will not necessarily reflect what is going to be the best action to take.

### Building Codes

It's a funny thing, the National Electric Code (or NEC for short), tells us

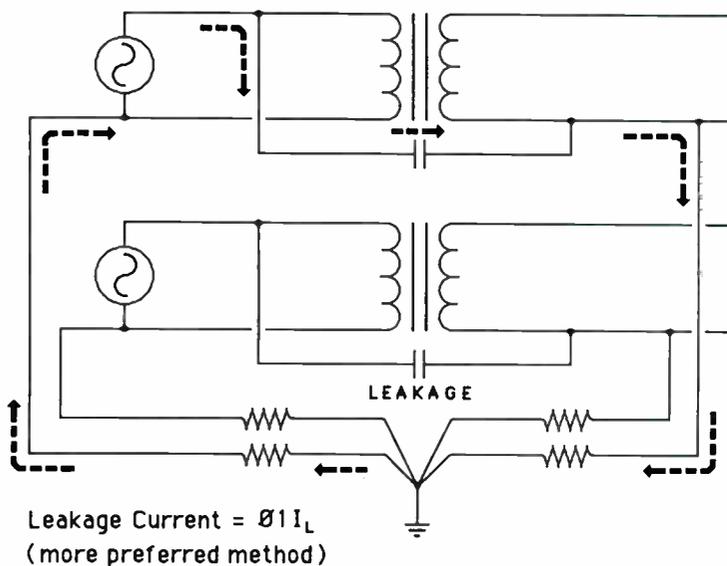
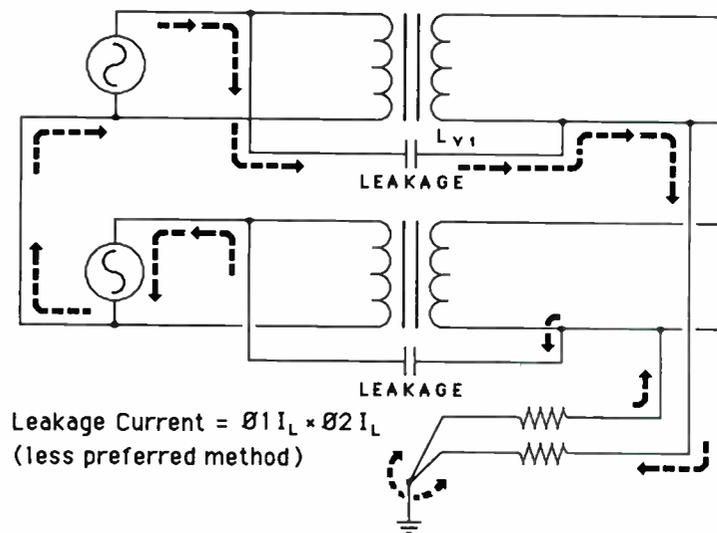
that all electrical service will have the neutral brought to earth either through a grounding rod, or a cold water pipe. All "ground" wires will also be bonded to the electrical conduit at the same physical point that the neutral is brought to ground. What's funny about this is that most municipal building codes require that there be no electrical connection between the water supply and the building. This brings to rise an interconnection system that kind-of gets to ground. There are ways around this of course, and these we will address.

### Hospital Ground Method

The way this system works is through the use of the third pin on the electrical power cord. The outlets that are

**FIGURE TWO**

Two-phase wiring vs. single-phase wiring—how leakage current doubles when running on two separate phases



employed in the installation must have a separate earthing wire brought back to the technical ground. This technical ground is usually a large copper or brass bar located at the power distribution panel. The technical ground is kept isolated from the box and is brought to ground (power company ground!) at one point only, and this is accomplished through the use of a very heavy conductor. This methodology has the benefit of manufacturer approval, electrical building inspector approval, and overall safety improvement. The drawbacks come in the form of extreme expense, considerable difficulty in implementation and a lot of hassle with the electric company.

When implementing this type of system there are a number of rules that should be abided by. Most of these procedures are good practice, and you would be wise to follow them with whatever type of ground system that you employ.

1) The control room, and all equipment that is used therein should be kept on the same phase of the AC line.

When all of the equipment is on the same phase, the leakage currents due to capacitive coupling of the power transformer to the chassis are all in phase, and are not additive through the technical ground. (See Figure 2.)

2) Isolate the electrical feed from everything else. Keep the audio power separate from copiers, fluorescent lights, refrigerators and the like.

The simplest way of accomplishing the isolation required is to request a separate power transformer feed from the power company. This is not really practical in most urban areas, but it is worth a try anyway. Lacking this, an isolation transformer should be used. When implementing power isolation, power conditioning is desirable, thus cleaning up the noise, line drops and other forms of garbage that get into the power feed. An acceptable power conditioner will provide a Faraday shield that is connected to the secondary side of the transformer system ground. When considering isolation and power conditioning systems, look at the secondary impedance at RF frequencies. It must be low enough to act as a shunt impedance to radiated fields. Ideally, the transformer will provide for two or three phase input and single phase output. This output will then be taken as technical power. Keep it clean.

3) Shield all AC power lines.

As mentioned previously, unshielded power lines radiate a field that will terminate on your audio lines. It is ideal to use steel conduit because it provides not only electrostatic shield-

ing but magnetic shielding as well. It should be noted here that steel conduit is desirable for the audio runs as well. The power and audio lines must never be run in the same conduit. Both magnetic and electrostatic coupling will occur.

4) Bring the third pin of each outlet back to technical ground separately.

For a single point star ground to work, there must not be any serial ground connections. The leakage currents will add up and hum on the "downstream" equipment will result. The conductor should be at least the same size as the power carrying conductors and preferably larger. This means that only isolated ground receptacles may be used. These are identified by their distinctive orange color. This is an area of difficulty due to the large number of conductors that will be running back to technical ground. Conduit must be sized accordingly, and provision must be made at the power distribution panel for these wires to get to the technical ground, which is usually on one side of the panel. Multiple outlet distribution strips can only be used if the third pin connections are independent of their enclosure.

5) Never allow the third pin to contact the conduit.

The conduit, as mentioned earlier,

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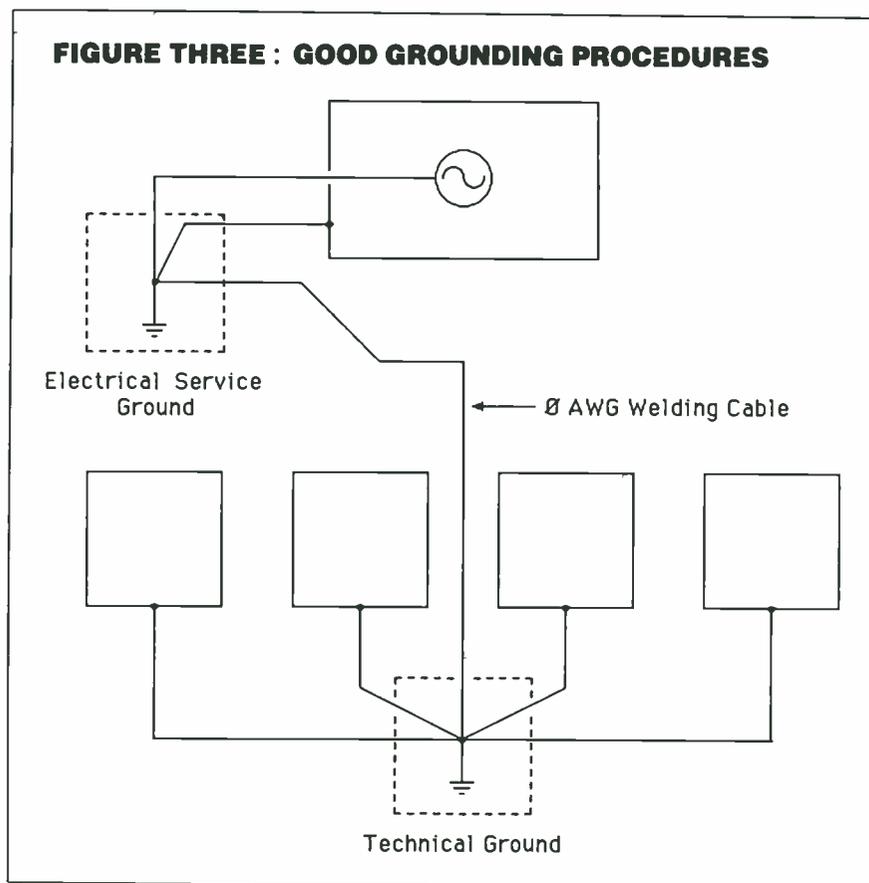
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**FIGURE THREE : GOOD GROUNDING PROCEDURES**



will always introduce loops. The technical ground will contact the conduit at one point only, and that will be where the conduit is bonded to the earth. And the earth will be the only common connection point.

6) Take technical ground to the earth with only one very large conductor.

This connection is the one in which you take the system shield potential to  $-Q$ , or infinite negative charge. The size of the conductor is important because all voltage drops from leakage currents of different phases will return through this path. It is important that this connection be made at the point that the power company takes the neutral to earth. This is to ensure that the return path(s) of all leakage currents have minimal voltage drop. The importance of taking the system to "real" earth is illustrated in Figure 3. Examine this topology and trace the various leakage paths. It becomes obvious that the leakage is minimized by going back to earth at the same point that the power does. The previous statement is very difficult to achieve.

7) When utilizing relay racks for equipment, isolate the chassis of each piece that is not sharing an outlet with another rack-mounted chassis.

This is also a very difficult rule to implement. The chassis of each piece of equipment in the rack is in electri-

cal contact with the third pin of its respective power cord. There are usually many more power cords than there are receptacles for power. When this occurs, the most expeditious means of installation that will meet acceptable criteria is to use a multiple outlet distribution strip that carries each third pin in a strip out to the master third pin. The chassis of the outlet strip must be isolated from the rack, but this is not difficult. The strip is then plugged into the wall outlet. If more than one strip is required, both strips are to be plugged into the same duplex receptacle. The equipment that plugs into each strip should be isolated from the equipment employing the other strip. This can be accomplished by having a break in the rack rails themselves—a real pain in the ass.

### Separate Earthing Wire Method

The above described system topology is both difficult and expensive to employ. The less expensive alternative is to use a separate earthing wire attached to each piece of equipment that returns to the technical ground. In order for this method to properly function, it is imperative that the third pin connection of the AC cord is lifted. The technical ground is returned to earth with a very large conductor at one point only. The location of the technical ground in this type of sys-

tem is much simpler to position and access. The technical ground should still be a large copper or brass bar. I prefer to tie this point down at the point on the console that is either the point that audio common and the enclosure make electrical contact, or a location near the cabling entrance to the console. When locating the technical ground bar in this manner, it becomes imperative that the bar is electrically isolated from everything, and is taken to the console commoning point with one large cable. We have often fastened the technical ground bar to the console leg by drilling and tapping the leg, and bolting it in place, running a braid to the console ground point. Theoretically this is not so good, but it has worked very well in most instances. I wish that all other console manufacturers would look at SSL's ground bar connection at the DL panel. It is the way to do it!

### Implementations

One of the big advantages of using the separate wire method is the availability of using a larger conductor than is available at the power cord. With the 24-track, it is desirable to use a #8 or larger earthing wire. The power cord earthing wire is a #12 or smaller. Anyway, this is the implementation, so we won't futz around—

### The General Idea

Using the separate earthing wire technique is much the same as the hospital method in that you:

1) Connect the shield of the interconnecting cables at one end only (preferably the source, or output)

2) Connect one earthing wire to the chassis of each piece of equipment interconnected, and the other end of each earthing wire to terminate at the technical ground bus.

3) Earthing wires all terminate at the technical ground bus and do not "daisy-chain" in a serial manner, to get to technical ground.

4) The technical ground should be located at either the power distribution panel or at the terminus of the audio cabling (99 percent of the time this will be at the console termination area).

5) The technical ground bus shall not touch any building conduit, except at the point that technical ground is taken to ground.

6) The third pin of each electrical power cord is to be lifted.

7) Shield wires are not to be shorted together at any point other than the chassis connection of the interconnected piece.

8) Keep all power distribution on the same phase.

9) Keep all audio power circuits

free and clear of office equipment, refrigerators, lighting and the like.

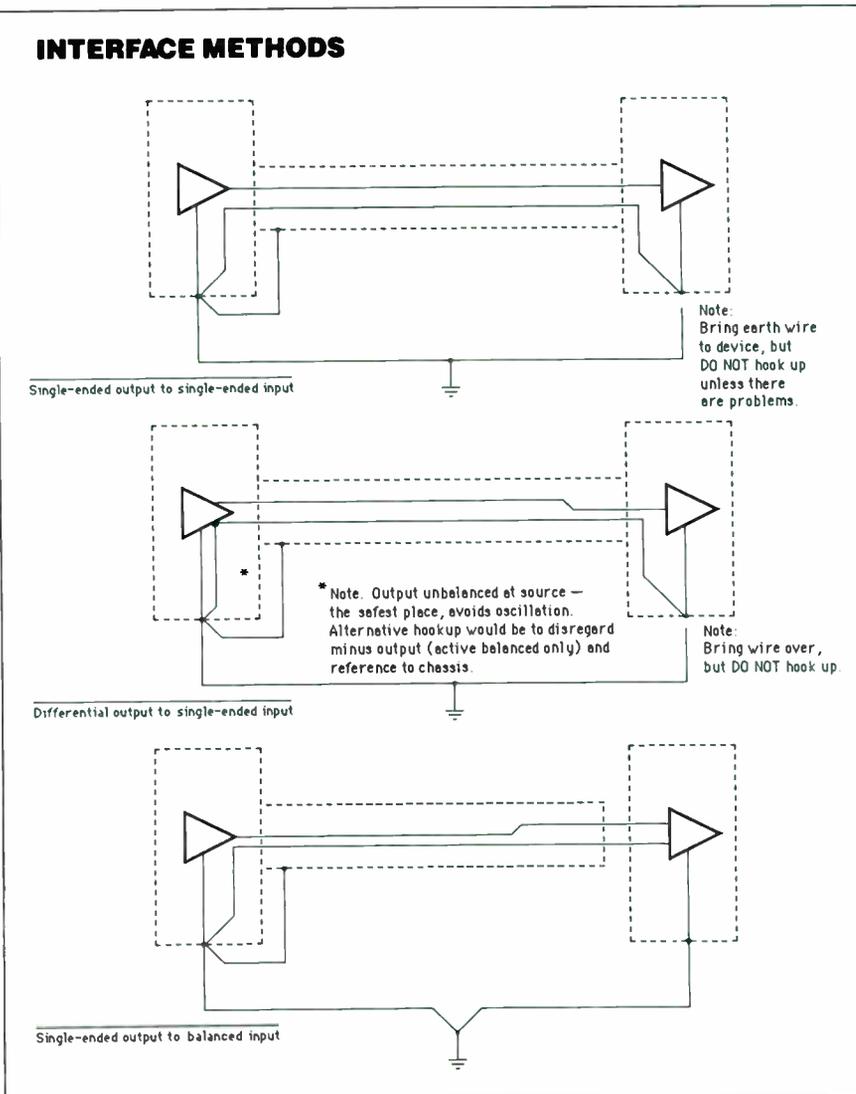
10) If the technical ground is to be taken to ground, then make sure that the ground, neutral to ground, conduit bond to ground, and technical ground to ground connections are all clean and tight.

### Racks

Rather than having 20 to 30 earthing wires trailing out of a rack assembly, it makes a lot more sense to follow the *spirit* of the above rules rather than the strict letter. Attach a grounding bus in each rack, and treat it as a single piece of equipment. Bring each of the individual chassis to the grounding bus with an individual earthing wire, and then take the grounding bus to technical ground with a single, large conductor. We are treating each rack full of equipment in this manner as a single large piece of equipment. When the shield is properly terminated, this works very well in almost all instances. The time that you will find trouble is when equipment that has single ended inputs and outputs is mixed in the same rack as balanced equipment. When the console outputs, and/or driving source is single ended and it terminates in a single ended input, then there is a ground loop if the minus is tied to signal common, and an earthing wire is attached to it. The act of rack mounting such equipment with other earthed gear produces the aforementioned loop condition. Complete rack isolation is the only answer in this situation. The earthing wire attachment is not to be used here, rather the signal minus connection will bring the equipment shield to system technical ground potential. Power amplifiers in power supply racks are a common offender, and it is recommended that the inputs be converted to balanced, either via transformer or active balancing.

### Microphone Panels and Boxes

Using the greatest care in establishing a proper earthing system, you get it all done and find that you have a multitude of points that get to power company ground unintentionally! Usually this is caused by the way that the microphone and cue boxes are installed. When running the mic wiring, use steel conduit. This provides both magnetic and electrostatic shielding for the cables. More often than not, the construction personnel are not as careful as you would like in maintaining the electrical and physical isolation from the metal of the building. Not a big deal you say. But what happens when you plug in your recently purchased, rented or borrowed microphone cable, and the system hums?



Well, most microphone cables out there in audio land have the connector body wired to pin 1 of the XLR. The shield is connected to the chassis of the console. The panel that the XLR connector is mounted on is almost always connected to building steel, usually through the conduit that ties to the box that the panel is mounted on. Because of the connection between the shell of the connector on the microphone cable, the power company ground, through the conduit connection, and the audio technical ground, through the shield of the microphone wiring to the console, are now tied together.

The shells of all of the mic level XLRs should at some point be referenced to technical ground. This is necessary for RF shielding. What must occur is that all of the microphone cables must have the pin 1 to shell connection made at the female end, and disconnected at the male end. Because of the previously mentioned rule that shields must not be shorted together at any point other than the chassis connection point at the wire

termination, it is imperative that the panel mounted females connectors do not have the pin 1 to shell connection made. The best way to provide this shielding is to electrically isolate the box from the conduit that feeds it and from the building metal. Then take an earthing wire from technical ground to the box. This provides for shielding of the box, and because of the mechanical connection of the connector(s) to the panel and the panel to the box, the entire connection is shielded.

### Multi-Track Dolby

Another source of consternation is the single-ended input of an M series Dolby frame. When driven with a single-ended console output, it is necessary to float the chassis and take the chassis connection back to the system technical ground. The console output(s) and the Dolby inputs will provide correct wiring if they are wired as balanced.

### 2-Track Single-Ended Machines

When interfacing cassette systems, 1/4-track 1/4-inch machines on the two

mix bus with regular balanced +4 type machines, it is a good idea to isolate the unbalanced inputs with one of the commercially available interface boxes specifically designed for this purpose. What is necessary is to establish that the input of the adapter device is in fact balanced, and that the port on the console that the adaptor is driving is balanced, otherwise it will be necessary to again forego the advantage of a separate earthing wire and rely upon the signal minus to derive the shield connection.

### The Final Steps

OK, you've followed all of the above

advice and everything is wired neatly in place. It's getting to that time when you have to fire the system up and see if it all works! Whenever we construct a room, we don't terminate everything for the "fire up," but defer this to a more systematic approach.

It is necessary to isolate the various component parts of the control room so as to determine what is properly functioning and what isn't. This holds true for the earthing connections as well. With all of the earthing wires not terminated at the technical ground, there should be no ohmic connection between any two pieces of equipment (with the exception of single-ended

equipment, and this should be disconnected for this test). Once it has been established that there are no loops present in the earthing system, terminate each piece and ensure that the earthing wire is the only path that takes the chassis to technical earth. Perform the above steps for each and every unit installed. It is now time to disconnect all of the signal wiring and check the console out. This is where the multi pin connector approach to console fabrication is an essential aid to the installer. The first thing that is hooked up is the console power supply system. It is best to ascertain at this time that the console itself is functioning properly. This is the time for basic testing, such as checking the power supply voltages, determining that signal gets to the two mix bus, and the like. Once it is established that the console basically works, terminate the monitor rack and hook up a set of control room monitors. The ears are great pieces of test equipment. With nothing other than the monitor system hooked up, listen for hum and buzz. If it is found, chances are that the monitor rack contains some single-ended inputs being driven by single-ended outputs. Also take care that the chassis connection isn't taken from, say, the power transformer core—lots of capacitive coupling to the technical ground will result. It may be necessary to experiment to determine the best place to terminate the earthing wire. Another little trap to avoid, if you are returning the cue system to the console, is to make sure that the audio '—' is isolated from the console chassis, otherwise some nasty things can happen. You should be able to turn the two mix master of the console all the way up, monitor this and turn up the control room monitor, and hear only hiss. Hum in the signal indicates a problem.

The next step is to terminate the signal wiring and earthing wires of the mix-down machines. This would include any noise reduction systems employed. Again, monitor the two mix, and the 2-track returns. Hiss is allowed, hum is not.

Following the two mix is the multi-track (again including noise reduction) and the above rules apply. Continue in this manner until everything is hooked up, tested, and correctly functioning. As you encounter problems in the just-mentioned procedure, remember the basic theories outlined here, and try to apply some of the physics principles learned to your mental models of what is really happening in your system. With a little thought, conscientious testing and application of wiring rigor, a quiet installation will result. ■

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# VOCAL PRODUCTION - TIPS FOR ENGINEERS AND PRODUCERS

*Thomas Appell and Randy Crenshaw, session singer and music director/vocalist for the a cappella jazz vocal group Terra Nova, during pre-production work for a soulful rendition of "You Are So Beautiful," at Vocal Dynamic's Santa Ana studio.*



by Thomas Appell

Most recording engineers and producers have had the pleasure of working with a truly great vocalist—the kind of singer who comes into the studio on time, completely prepared, warmed up and knocks out a first take so good that it sends chills up your spine. The session goes smoothly because the vocalist knows what sounds good and has the vocal chops to pull it off. But vocal production is much more difficult when you're dealing with a singer whose studio experience, stylistic sense, and vocal technique are lacking.

In this article, we'll look at how good vocal production skills are used to help vocalists at all levels of expertise execute their best performance on tape. We'll start by presenting the elements and parameters of control most important to a good vocal line, and conclude with a concise outline of the vocal production system I've developed for producing masterful vocal tracks.

The first thing to check when moni-

toring a freshly laid track is the intonation. Listen to each line carefully, even if you think the singer was on a roll and pulled off the first half of the song in one take. Ask the vocalist to help you search for flat or sharp notes as you both listen to the recorded tracks on the monitor system. Don't let anything slide by. A poorly intonated vocal track that sounds "close" after you've listened to it once can leave you cringing after you've heard it 20 times.

There are certain styles of singing that can allow for inaccuracy in the pitch but still sound OK. Robert Plant and Bono from U2 are good examples of this. The trick to producing artists of this type is to make sure that the places where your ears tend to look for a perfectly intonated note are on target.

If it sounds on tape like the singer is "trying" to find the pitch, and doesn't, you'd better do it over. But if the part is real loose with a lot of emotion, a little inaccuracy can sometimes help to make the finished product sound convincing.

A general guideline to follow would be to require perfect pitch in proportion to the length and looseness of a given note. Longer notes with a straight feel should be perfectly intonated. Short scats with lots of soulfulness can take some liberty.

Producing a vocalist with pitch problems requires a lot of patience. You will probably end up recording the songs one line at a time, punching in wherever possible. The session will be lengthy, but can be shortened by providing the artist with an instrumental accompaniment, preferably a keyboard, playing their lead vocal line note for note on an adjacent track. This will generally provide the needed reference.

Singing with good intonation is a must, but realize that there's a lot more to a well-produced vocal line than perfect pitch. Whenever the recording budget and time permit, vocal producers should direct thorough pre-production sessions designed to check for the artist's effective use of ornamentation.

Nearly every vocal line that has ever made it to *Billboard's* top ten is full of ornamentation—additions or changes to the initial version of the song which create a unique style of vocal interpretation. An ornament is said to be "structural" when it is an integral part of that which it adorns, and "applied" when it is executed on the surface of something structurally complete without it.

Examples of structural ornamentation are major changes in the melody line or timing, as when a song is transformed from one style to another. Applied ornamentation is more subtle, like the addition of vibrato to a note or an interesting way of pronouncing a common word. Assuming that you have a good song to start with, selection of the right ornamentation will largely determine whether or not people will enjoy listening to the finished product.

For this reason, when producing a vocal line, it's a good idea to thoroughly check the ornamentation. Pre-production work should focus on four areas—phonetics, grace notes, vibrato, and tonality.

A phonetic analysis is simply a detailed check of the artist's pronunciation. Poor pronunciation sticks out like a sore thumb when you know what to look for, and it's the producer's job to spot the areas that need improvement and fix them.

The easiest way to trouble-shoot for pronunciation problems is to write out the song phonetically using the International Phonetic Alphabet. You can spell out the lyrics using a series of symbols representing specific sounds in speech. Words can be written on

paper *exactly* as they will be pronounced, with all of the subtle shades of pronunciation necessary to create a particular vocal style.

Although the I.P.A. can be used to produce "straight" styles of singing, it's the looser interpretations that really show off its creative power as a production tool. An excellent guide to learning how to use the I.P.A. is contained in the book *A Pronouncing Dictionary of American English* published by Merriam-Webster Inc.

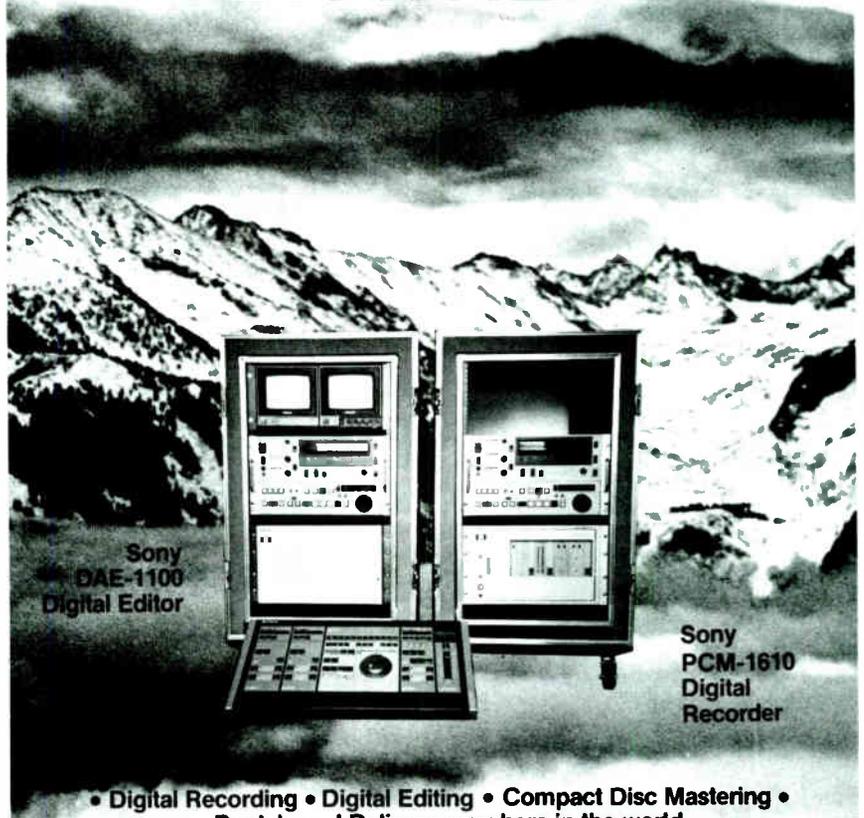
Most pronunciation improvements can be achieved by changing the position of the tongue (arched, flat, etc.), the position of the jaw (up or down), or the shape of the lips. Subtle changes can make a big difference, so it's im-

portant to know what changes produce which effects. *The Science Of Vocal Pedagogy*, published by Indiana University Press, has a fairly comprehensive section dealing with this subject, complete with pictures that show the tongue, lip, and jaw positions for most commonly produced sounds. It's heavy reading, but the information is practical when understood and applied in working situations.

Assuming you've got the pronunciation problems figured out in your song, the next step is to check for the artists' use of grace notes.

While classical singers spend much of their time and energy trying to sing their songs exactly as penned by the original composer, contemporary sing-

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- 1985 March, Southeast Studios. Loudspeaker Technology. Martin Rushent. Cotton Club Sound. John Fogerty.
- 1985 April, Video Production Supplement with Facilities Listings. Compact Power Amps. Radio Recorders' Harry Bryant. Eurythmics.
- 1985 May, Northeast Studios. Digital Reverb. Flo & Eddie. Holophonics. Emmylou Harris. Humberto Gatica.
- 1985 June, Sound Reinforcement & Remote Recording Listings. Location Recording Tutorial. Grateful Dead Sound. Weird Al Yankovic. Synthesizer Oriented Studios. David Sanborn.
- 1985 July, Recording School Listings and Southwest Studios. Mixing Consoles. Dr. Demento. Kashif's Studio. Roger Nichols and John Denver.
- 1985 August, Studio Design Issue: Listings of Designers & Suppliers. Control Room Acoustics. Thomas Dolby. Orchestral Recording. On the Road with Prince. Neil Young.
- 1985 September, Southern California Studios. Film & TV Sound. Frank Zappa. Digital '86 Supplement. *Mishima* Sound. David Foster.
- 1985 October, New Products for AES. Maintenance & Testing. Abbey Road Studios. Ambisonics. Ben Burt on Imax. Nile Rogers.
- 1985 November, North Central & Canadian Studios. George Massenburg. Video Supplement. Alligator Records. Women in Media Production.
- 1985 December, Tape-to-Disk Listings. Mastering, Pressing & Duplication. TEC Award Winners. Sound for the *Twilight Zone*. Tom Waits.
- 1986 January, Northwest Studios. Equipping Home Studios. Paul Winter. SMPTE-MIDI Connection. Yoko Ono.
- 1986 February, Independent Engineers & Producers. Microphone Special Report. Laurie Spiegel. Budgeting for Sessions. Joni Mitchell.
- 1986 March — SOLD OUT
- 1986 April, Video Production & Post Production Facilities. Video Supplement. Al Kooper. Wireless Mics. Alan Parsons.
- 1986 May, Northeast Studios. Digital Supplement. Sampling Primer. CD Facilities. Future of Console Design. Steve Lillywhite.
- 1986 June, Remote Recording & Sound Reinforcement Listings. Roadability. Russ Titleman. CD-ROM & CD-I. Ry Cooder.
- 1986 July, Recording School Directory and Southwest Studios. CD Pre-mastering. Britain's Live Aid. Producer Rick Rubin. Christian Rock. Stevie Wonder.
- 1986 August, Directory of Studio Designers and Suppliers. ~~1986 May, Dooney's Magic Keyboard Sound. Jean-Michel Jarre. Laurie Anderson.~~
- 1986 September, Southern California Studios. Film Sound. Telecommunications. Production Music Libraries. David Byrne's *True Stories*.
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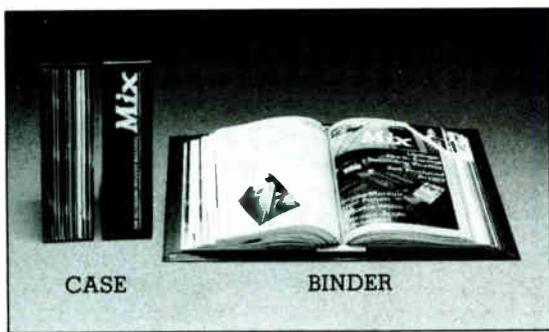
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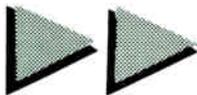
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Just thinking about how to customize each note, phrase, and verse will really start to spark your creativity. The result is a greatly improved vocal line.

By this time, your song should be starting to sound like it's been produced, but there is still more work to be done. Once the grace notes are in place, it's time to plan the artist's placement, timing, and quality of vibrato.

Vibrato is one of the most valuable tools available for improving the style and interpretation of a song. Regardless of the recording budget, there should be no excuse for sloppy vibrato. In order to recognize good vibrato, you need to know how to create it, because most of your clients won't. You'll have to show them what you want and how to get it.

There are two primary ingredients to good vibrato, pitch variation and pulse. Pitch variation is executed by causing the pitch of the note to go down and up at a constant volume. Pulsing is created by causing the volume to go down and up at a constant pitch. The quality of the vibrato is the proportion of these two elements. Pitch variation used sparingly can lend a smooth and flowing quality to the vibrato while pulsing tends to make it more distinct.

It's as important to plan where you want vibrato to occur as where you *don't* want it to occur. Vibrato on *everything* sounds very "operatic" which is fine if you're producing an opera star, but for most of us a tasteful balance is necessary to capture the feel of modern music. One technique that is helpful in maintaining this balance is to use vibrato fade-ins. Longer notes can be held out straight for a pre-determined length of time, after which the vibrato begins fading in a little at a time becoming fully developed towards the end of the note.

Vibrato timing should be fairly planned. For example, if you're doing a song with a beat at a metronome setting of 104, shoot for three vibes per beat. Four would sound like a flutter and two would sound lethargic. Acceptable vibrato rates are generally between 80 and 132 for a rate of three vibes per beat. If the beat is at 76 you would use four vibes per beat as your target. If you're at 160 you would use two vibes per beat and so on.

Vibrato can be uneven in several different ways. Obviously if the timing is haphazard you should consider doing a retake. But it's not uncommon to find an artist with a good sense of timing that has trouble keeping uniform pitch variation and pulse in their vibrato. Listen carefully when checking for these split-second irregularities, evaluating the quality of each vibe separately. Keep in mind that vibrato

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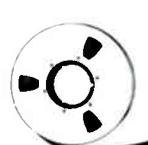
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usually sounds best when it is fairly uniform in all respects. If the degree of pitch variation or pulse does change, it should change smoothly enough to not appear like a mistake.

It's helpful when directing vocalists with vibrato problems to think in terms of the number of vibes that will suit a particular word. Instead of saying, "Put vibrato on that word..." you might say, "Try putting four vibes on that word..." Have them write 3V, 4V, 5V, etc. above the corresponding words on their lead sheet as a reminder. You will be utterly amazed at how quickly an artist will pick up on this simple system.

Now that the phonetics are under control, the grace notes are in place, and the vibrato tastefully planned, it's time to put the icing on the cake by checking the artist's execution of all of the above while looking for just the right tonal qualities.

The two most important variables to consider when designing the tonal qualities for a phrase are the degree of focus and the equalization.

A focused tone, created by a tight pull on the vocal cords, would be akin to the clear, bright sound produced by a trumpet. The exact opposite, an airy tone, is created when the cords are at a looser tension, and would be like the breathy sound of a flute.

I use a vocal tension scale from one to ten when producing to indicate what I want for a given word in terms of focus. Tensions 1 through 4 represent varying degrees of airy, falsetto-ish tones. Tension 5 is borderline focused, and tensions 6 through 10 are varying degrees of focus.

Be on the lookout for places in a song where the singer unintentionally relaxes the vocal tension. The resulting reinforced falsetto can produce what I call a "hooty" head voice and is one of the more common causes for vocal retakes on high notes with fatigued vocalists.

Vocal EQ is adjusted by positioning an organ in the throat called the larynx. A high larynx position produces a thinner, brighter tone. A low larynx position produces a deeper, rich tone (yawning occurs with the larynx lowered). Larynx position is easily noted by corresponding vertical movement of the "Adams apple."

When directing a session, use suggestions like "try lowering your larynx to fatten up that tone..." in lieu of "fatten up that tone..." The artist should respond a little better to the most detailed direction.

As your vocal production skills improve, you should start to hear more of the elements that contribute to a good vocal line, and with so many variables to account for, it's helpful to

write down the things that count ahead of time.

I've developed a vocal production system that I use when producing a vocal line that helps to pinpoint those things discovered during pre-production that you just wouldn't want to forget on the recording date. There are four simple steps to follow:

- 1) Write out the songs phonetically using the I.P.A. Use the artist's demo as a starting point and customize the pronunciations as necessary.
- 2) Decide the best places for grace notes and other ornaments and note them on the phonetic analysis.
- 3) Determine the tempo and placement of vibrato, and write tension

numbers below key words to indicate the desired focus. Note all of this on the phonetic analysis.

4) Review the polished song with the artist and adjust as necessary.

When in session, make sure that both you and the artist have matching copies of the completed phonetic analysis. Use it as a guide, but leave plenty of room for the spontaneity that sometimes comes out only when the tape is rolling. ■

**Thomas Appell is a vocal instructor and producer. He is also director of the Vocal Dynamics voice studios located in Santa Ana and Covina, California.**

U2—"Under A Blood Red Sky, Live" □ Big Country—Live □ Hank Williams Jr.—Live □ Elvis Costello—Live □ Bryan Adams—Live □ John Anderson—Live □ The Fixx—Live □ Mick Fleetwood—"The Visitor" □ REM—Live □ Chris De Burgh—Live □ Robert Palmer—Live □ Todd Rundgren—Live □ America—Live □ Billy Idol—Live □ WLIR □ Waylon Jennings—Live □ NBC Radio □ Marshall Crenshaw—Live □ Broadway Video—Franken and Davis' HBO Special □ Kenny Loggins—Live □ Scandal—Live □ WBCN □ Jerry Jeff Walker—Live □ Jon Anderson—Live □ The Pat Metheny Group—"Travels" □ Men At Work—Live □ The Cult—Live □ BBC—Andrew Lloyd Webber "Requiem" □ The Roches—Live □ EG Records □ James Brown—Live □ Bon Jovi—Live □ MTV "Rock Influences" □ Gary Morris—Live □ The Hooters—Live □ ABC—Live □ The Bongos—Live □ Stevie Ray Vaughn—Live □ Stray Cats—Live □ Joan Baez—Live □ X—Live □ Divinyls—Live □ The Wrestling Album □ Nitty Gritty Dirt Band—Live □ The King Biscuit Flower Hour □ George Thorogood and The Destroyers—"Maverick" □ WMMR □ Oingo Boingo—Live □ Monarch Entertainment □ WNEW □ The Replacements—Live □ Betty Buckley—Live □ Paul Winter Consort—"Earth Mass" □ Emo Phillips—"E=MO<sup>2</sup>" and Showtime Special □ John Paar—Live □ 'til Tuesday—Live □ Concord Jazz Records □ John Waite—Live □ Twisted Sister—Live □ The Alarm—Live □ Southern Pacific—Live □ George Strait—Live □ The Thompson Twins—Live □ Simon And Garfunkel—"Live In Tel-Aviv" □ Fine Young Cannibals—Live □ Ruben Blades—Live □ MTV—"Live From The Ritz" □ Roxy Music—Live □ Robert Fripp □ U2—"The Unforgettable Fire" (Dublin, Ireland) □ Bryan Ferry—"Boys and Girls"



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—FROM PAGE 214, RFK STADIUM

measured data any acoustical artifacts that may be present only at a single spot. The analyzer shows two traces: the room response, determined by deconvoluting the reference signal with the mic signal, on top; and the correlation between the two signals, which gives an ongoing indicator of the validity of the test date, on the bottom. The equalizers are set manually to make the top trace maximally flat or to the desired curve. The initial setup was done using pink noise, but final adjustments were made using taped music after the audience had entered, but before the show. Minor tweaks were also done during the performance, especially

in the first few songs.

The analyzer was also used (before equalizing the system) to determine the proper delay time for the delayed stacks. The line output of a General Radio 1565B SPL meter was fed to the line input of an HME wireless PAL (Precision Audio Link), and the two were placed in the bleachers beyond the stacks. With the delay stacks shut off, pink noise was played through the main house speakers. The meter signal was received at the mixing station, fed into the analyzer (which was in impulse response mode), and stored, thus capturing the acoustic delay, displayed as the arrival time of the test signal wavefront. Then the house speakers were shut off and the

stacks turned on. Using the B&K's cursor alignment function, the other trace of the analyzer now showed the delay from the stacks to the microphone. Finding the correct value for delaying the stacks was now simply a matter of subtracting the latter from the former. As the delay was actually set up, the results could be viewed on the analyzer and fine-tuned until the two wavefronts appeared to be vertically (in time) coincident. The only difficulty experienced with this procedure was in elevating the meter enough to avoid the effects of primary reflections off the seats.

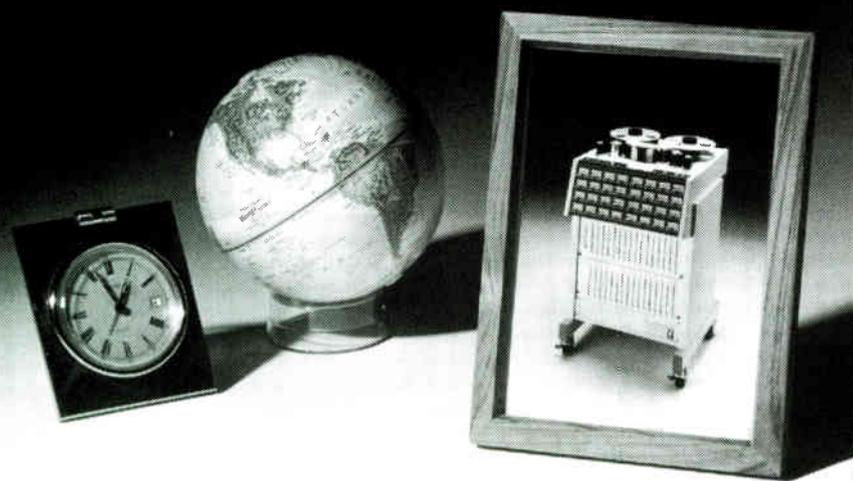
A standard Altec/Hewlett-Packard 8050A third-octave real time spectrum analyzer sat on top of the console on the right side, and a small video monitor with the B&K's display on the left side to allow Healy a quick monitoring capability that didn't require turning around. The Gamble console also includes an onboard spectrum analyzer, but this was not needed under the circumstances.

### System Performance

RFK Stadium has no one's idea of desirable acoustics. The last concert I heard there before these was the Dead/Allman Brothers in 1973, which had used the Dead's "Wall of Sound," a very good, if impractical, sound system. Without doubt, the Ultra Sound/Electrotec system compared favorably with that system. Although there were some difficulties with Dylan/Petty's sound the first day, the Dead, who were, of course, used to the system, sounded full and clear, filling the cavernous stadium with ample amounts of music. The normal stadium slap echo was still there, but the dull roar of undesirable low frequency reverberation was noticeably absent, which reduced the annoyance of the slap. This was most likely due to the tuning of the system, and resulted in much greater intelligibility than would usually be experienced in such a venue. The smooth interaction and level of coordination between the two sound companies and touring organizations was quite in evidence and certainly contributed heavily to the success of the shows. The audience, quite obviously being more of a Deadhead crowd than anything else, was generally thrilled with the proceedings... with the exception of the blazing weather. ■

Special thanks to Dennis McNally, Dan Healy, and Robbie Taylor of Grateful Dead Productions, Don Pearson of Ultra Sound, Ted Leamy and Patrick McDonald of Electrotec, and Al Santos for their cooperation and tolerance.

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—FROM PAGE 82, INTERACTIVITY

**Pre-mastering**—The stage in the production of a video disc when the master tape is the coding, editing, assembly, evaluation, revision, checking and preparation of intermediate materials for transfer onto the master disc from which all subsequent discs will be pressed.

**Pre-production**—That part of the production schedule leading up to the actual shooting of material on video or film, including script writing, storyboarding, flowcharting, software design, prior to media production.

**Production**—In video terms, that stage in the job when video or film footage is actually shot. Compare **Pre-production** and **Post-production**.

**Reflective optical video disc**—The format that uses lasers to write (record) and read (play back) a video disc. A writing laser turns video, audio and control signals recorded on videotape into a pattern of shallow pits along a spiral track on a glass master disc. Copies are pressed in plastic, covered with reflective aluminum film and sandwiched between layers of translucent plastic. In play, the disc spins at 1500 (PAL) or 1800 (NTSC) rpm. Light from the reading laser bounces off the reflective surface through a photosensitive diode that converts variations in reflected light into electrical signals from which video and audio signals derive. Optical disc technology, of which video discs are a part, describes the whole field of (computer) information storage on disc. Optical discs can store a variety of information including computer-generated data and digitally-encoded video and audio signals.

**RAM**—random access memory—That part of a computer's memory that can both read (use and display) and write (load) information, and that can be updated or amended by the programmer or user.

**The Red Book**—The Philips/Sony book of standards for CD-audio technology.

**RGB**—Red-green-blue: a high quality screen used with many computers, and increasingly with video systems as well.

**ROM**—Read-only memory, the smaller part of a computer's memory, in which essential operating

information is recorded in a form that can be recalled and used (read) but not amended or erased (written). (Compare **RAM**.)

**Search**—The facility in interactive video systems to request a specific frame, identified by its unique sequential reference number, and then to instruct the player to move directly to that frame, forwards or backwards, from any other point on the same side of the disc or tape.

**Step frame**—The facility to move through a video sequence frame by frame, forward or backward, either automatically or using a remote control device. This can be used to examine a sequence of moving footage in close detail, or to employ a set of stills that have been recorded as single, static frames.

**Still frame**—A graphic of any kind that is presented as a single, static image rather than as moving footage. The economical storage of still frames is one of the strengths of the video disc.

**Transmissive disc**—A designation of the means by which the laser beam reads data encoded on an optical video disc. In the case of the transmissive disc, the laser beam passes through the transparent surface of the disc.

**Vertical blanking interval (VBI)**—Twenty-one blanked lines during field one and 21 blanked lines during field two, wherein frame numbers, picture stops, chapter stops, white flags, closed captions, etc. are encoded.

**Vertical interval time code (VITC)**—A derivative of the Society of Motion Picture and Television Engineers (SMPTE) time code that is stored in the vertical blanking interval.

**Video disc**—A generic term describing a medium of video information storage that uses thin circular plates, usually primarily composed of translucent plastic, on which video, audio and various control signals are encoded, usually along a spiral track. Optical disc systems use a laser beam to read the surface of the disc; they are far divided between reflective and transmissive systems.

**The Yellow Book**—The Philips/Sony book of standards for CD-ROM technology. ■

—Lou CasaBianca

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*Neve DSP, BBC outside broadcast vehicle*

### **BBC Outside Broadcast Van**

The BBC installation required the provision of a complex digital console which would fit and operate within the confines of the vehicle. Extra facilities developed were a comprehensive telephone system including outside sources, interfacing to NICAM PCM transmissions, and a central facilities unit, all provided by the Neve console system.

All processing racks and analog I/O boxes are placed in an air conditioned section at the rear of the van. The I/O boxes may be removed for remote operation. A central section provides the studio environment, including the console control surface, monitoring, and graphics display. A further section within the van contains the tape machine, Mitsubishi X-80s for digital recording and the patch bays and ancillary equipment

to be found in any OB van.

The system has 48 microphone or line analog inputs, with a further 15 on the Central Facilities Unit and 26 digital inputs. There are 30 analog outputs with 16 more in the Central Facilities Unit and 30 digital outputs. Provision is also made for the main outputs to be fed back into the system for monitoring by another two analog inputs incorporated within an output box.

An important aspect of this installation is the ability to drive a NICAM link from the console, allowing direct digital transmission to Broadcasting House and or transmitter via ground PCM or microwave links. This direct connection from microphone to transmitter has now been achieved totally in the digital domain. More than 40 outside broadcast events have been covered all over the UK, many of them live. ■

## **A Brief Look at Two Digital Studio Installations**

### **CTS STUDIOS, London**

Although the studio was already using digital tape machines for recording, the impact of the proposed compact disc led them to think about providing a digital studio for customers. They were also keen to obtain the benefits of digital control for better studio utilization and ease of operation, particularly on large film scores.

The Neve console has 48 main analog inputs which are at microphone or line level, plus a further 32 line inputs and 12 insertion returns with 32 digital inputs. There are 32 digital outputs. Analog outputs are used for insertion sends, auxiliary sends, studio and control room speakers and, of course, main stereo outputs. The console layout includes a comprehensive monitor section with separate monitor and channel faders. Floppy disk storage of control settings is provided with a corresponding increase in studio efficiency.

Mated with the console is a Sony PCM-3324 24-track digital tape machine which is connected to the Neve console digital I/O via a Sony/AES format convertor box. A Studer SFC16 stereo unit converts the sample rate from 48 kHz to 44.1 kHz for operation with a Sony PCM-1610 and associated recorder.

This commercial operation has been running for more than a year now and the compact discs which have been mastered digitally are reaching the consumer. ■

### **—FROM PAGE 36, TRENDS**

not, I believe, replace the present multi-track until optical storage provides read/write facilities at many hundreds of Gbits of storage.

The control and, of course, signal processing design of a console will evolve as advances are made in display and integrated circuit technology, allowing an improved user interface and higher audio performance respectively.

A control surface may evolve using graphically generated symbols, and a mouse to provide the operator with

a small interactive system, and this approach is certainly feasible. As has already been stated, however, the user requirements and not technology must drive product evolution. Any menu driven system for real time operation will meet with operational resistance, where accessibility to controls is a prime consideration. Off-line post-production may be better suited to this approach, as adopted by the Droid manufactured by Lucasfilm.

Advances in integrated circuit performance will invite several approaches to improvement:

- reduced cost
- reduced size
- reduced power consumption
- increased processing capability
- increased performance
- adoption of new console architectures.

There are trade-offs between these marketing and engineering decisions but the trend toward greater integration and the use of CMOS will help reduce size, power consumption and manufacturing costs. Improvements in processing capability and performance can only occur if new devices have suit-

able architecture for digital audio requirements, which are essentially high processing speeds and large data word widths. Adoption of different architectures for console design depends either on the use of the processing pool which assigns processing to any path as required, or on using dedicated processing devices in much the same way as analog operational amplifiers are used. The former approach is complex but results in a more flexible system whereas the latter provides restricted flexibility but with the possible cost advantage of using large numbers of a single part particularly for small to medium-sized systems.

Improvements in audio quality will occur with the introduction of higher resolution converters or converters with higher dynamic range. Floating point converters may be developed to provide 16-bit resolution but with dynamic range equivalent to 20 bits or higher, or a new development of oversampling to provide higher resolution for A/D and D/A converters (18). Greater dynamic range and resolution will become available, thus posing a problem for other equipment such as tape machines which are at present designed to store 16-bit audio.

The future of the digital studio must be viewed from a systems angle, and one important aspect is equipment reliability and down time. As equipment becomes more complex and costly, steps must be taken at the design stage to ensure diagnostic capability down to board level for fast repair. The Neve console has considerable diagnostic capability so the system bypasses faulty boards automatically and transparently to the user. Techniques like these should evolve further to ensure user confidence.

The concept of shared processing, while initially attractive commercially, opposes the increased reliability of the product due to shared resources, which could be achieved by careful design. There is a parallel in the computer industry where technology-limited large multi-user systems prevailed, but as soon as technology developed further and costs reduced, the workstation began to replace many multi-user installations, thereby providing single-user stand alone systems. If digital audio evolves towards shared systems, new techniques may render this approach obsolescent.

A further aspect of the all-digital studio is the ability to perform interfacing to a studio's commercial operation incorporating direct-cost booking and documentation of studio utilization, maintenance and other such day-to-day parameters. ■

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—FROM PAGE 75, CORNYN

made. You can sit around and think of all the good things that could accompany the CD-I system. Some people might want to put a piano keyboard with it. Some people might want a mixer console so you can change audio qualities. Or modems so you could download data and superimpose it on the data base you have on your CD-I. Here's a picture of the sofas you can buy, and here are the latest prices you get over the phone line. All those things will be considered as adjuncts to the system, but sometime someone has to define what the basic one is, because if you keep adding to this thing, you're going to end up with a

\$5,000 player, which nobody thinks is a very practical way to start.

**Mix:** Can you describe the levels of interactivity that will be possible with CD-I?  
**Cornyn:** One thing the CD-I can do is *not interact*. You can put music on and it plays. You can put pictures up there and just watch, and that requires very little reaction other than emotional, if that. Beyond that, yes, you can start interacting with it. You can start looking for things. The simple thing would be to look up the word "oasis." OK, that's interaction. It's not much more than you would do looking through the pages in a book, but it is interaction. And you can take it to

levels above that to the point where the interaction really becomes real time—meaning that as you lean right, something leans left on the screen, simultaneously with you. That's in a sense what video games are. There's a huge number of definitions of interaction, many of which can be accomplished by CD-I, but that's really the trick of the program makers—to figure out what CD-I can do and to do it. And I hope that those programs are different enough and appealing enough so that people will say, "I would like that."

**Mix:** Can we hash over again some of those software projects in the works right now?

**Cornyn:** We have a couple of things in the music area. We're doing a classical music encyclopedia, but we hate the word "encyclopedia," so I withdraw it immediately upon having uttered it.

**Mix:** What do you call it?

**Cornyn:** Don't know yet. We want to avoid the response to "encyclopedia" where you go to it, look something up, then put it back on the shelf. We want this to go with you as part of an on-going experience, not look up the word "oboe" and then listen to it and put it back. We think it *is* kind of neat to be able to look up "oboe" and then hear it, see it, but we're looking beyond that to have it as part of a whole experience.

In rock, we're doing one, which is called *Rock Family Trees*, and we're doing that with a British fellow named Pete Frame, who knows all the relatives of any given thing in rock. Mick Jagger to the Penguins. The Penguins to the Byrds, since they're both winged animals.

Again that's an in-house production. Almost everything we do is kind of a commissioned work where we find an outside expert and have them aligned with us.

I think I've already talked *ad nauseum* about the tour of London. (*London Anywhere You Turn*) and the maps program where you pick a year and find the map of the world for that time (*Time Machine*). And we're doing about ten programs in all.

**Mix:** Can you talk about the CD-I project with Firesign Theater *Danger in Dreamland*?

**Cornyn:** Surely. *Danger in Dreamland* is based on a famous Firesign Theater character named Nick Danger from their comedy albums. We've put them together with one of our important producers, Marc Blank, who was one of the founders of a company called Info-Com, and wrote programs like *Zork*, and other famous computer adventure

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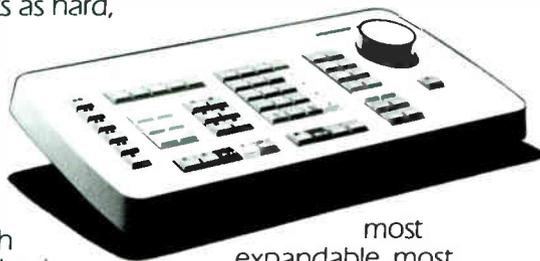
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programs. The combination of their two talents is coming up with a new game that will take computer adventure games where they've never been before. They've been a text thing where you read about where you are and you're in this room and there's this staircase to your right, etc., etc. . . . and you communicate with this thing by typing in instructions and something would happen. These things are fairly popular with computer people. But we've added real pictures, real dialog, comedy, and a sense of participating with this program in real time. It's like going to a movie with a steering wheel. That's going into audio recording right now.

**Mix:** This is kind of a long-term question: is your company thinking at all about eventually combining CD-I with the LaserDisc format?

**Cornyn:** Sure. It's almost inescapable. The fact the CD-I does not accomplish motion video well is one of the very few limiting things. The other being, perhaps, the non-recording ability. I would hope that there will be an eventual combination of the capabilities that the CD-I has, which are world-wide standard, long-playing capabilities and one operating system, and so on. Those can merge with LaserVision, which has a 12-inch diameter and full motion video, and the two can be mixed up very nicely in a new form. But there are a lot of things that LaserVision is limited for right now. It lacks a world standard, it plays only 30 minutes on a side interactively. So it still has a ways to go. I think the two will get married some day, and you'll have a very good system. Maybe my grandchildren will know optical disc as a recordable medium that is priced right. It exists as a recordable medium now but as an industrial thing beyond the reach of people.

You've got to start somewhere, and we started with the success of compact disc. That's what you build on. Something that's going already.

*At the Video Software Dealers Association meeting in Las Vegas on August 25, Stan Cornyn gave an address in which he estimated November of '87 as being a reasonable time to expect to see software for CD-I ready to hit the stores. Cornyn stresses, however, that since there are so many variables in launching a new entity such as CD-I, we should anticipate that plans may change as the format takes on a life of its own. If you want the latest word on CD-I software, look for Cornyn's keynote address at the Audio Engineering Society conference in Los Angeles.*



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## SEQUENCERS: NEW TOOLS DEMAND NEW TECHNIQUES

by Craig Anderton

Every now and then, this column examines the implications of equipment rather than the equipment itself. This month, we'll look at sequencers.

By now, sequencers are accepted as an important adjunct to modern music-making. Used in conjunction with a personal computer, a sequencer can offer "micro-surgery" editing that puts razor blades and splicing tape to shame. When synchronized to a tape recorder, a sequencer can drive MIDI instruments in sync with existing tape tracks, thus giving first generation "virtual tracks" that can expand an existing multi-track set-up simply, economically, and—perhaps most important—noiselessly. (Those who would like more information on virtual tracks are urged to check out Bruce Nazarian's excellent columns on "mega-tracking" in the July and August issues of *Mix* magazine.)

It seems that for every computer, there's at least one sequencer available. Mac enthusiasts can choose from programs like Total Music, Mark of the Unicorn's Professional Composer/Performer combo, and OpCode's MIDIMac line; IBM PC fans have Roger Powell's Texture, Personal Composer (which even lets you create your own notational symbols), and Sequencer Plus; Dr. T's Keyboard Controlled Sequencer is already available for the Atari ST, Hybrid Arts' MIDI Track ST should soon be out soon, and after a long wait for Amiga software, Soundscape (from Mimetics) fulfills the prom-

ise of a "music operating system" that manages sequences, samples, and synchronization. Even lower-cost computers are well represented—for the Apple II, Roland's Muse, Syntech's Studio II, and Passport's Master Tracks are popular, and for the Commodore 64/128, Sonus, Dr. T, Passport, and several other companies offer sequencer products whose sophistication goes far beyond what anyone has a right to expect when you're dealing with a \$100 computer. Even the Radio Shack Color Computer is MIDIified. This list is by no means comprehensive, but should give you an idea of how much is out there.

What intrigues me the most about sequencers is that they allow for entirely new techniques in recording. We're all creatures of habit to some extent, and when the first sequencers appeared, the tendency was to approach them as one would approach tape—simply a medium for storing data, albeit in digital MIDI form instead of analog audio form. Sure, it was clear that editing was a whole new ball game, but sequencers mean more than that... much more.

### The Separation of Performance and Sound

One important concept is that the *performance is now separate from the sound*. If you recorded a track on tape, you recorded the sound as well as the performance. Once committed to that sound, the only changes you could make involved such minor alterations as equalization, degree of reverbera-

tion (or other special effects), or stereo placement.

A sequencer, however, lets you concentrate on the *part* and leave the sonic decisions until later. Consider the "MIDI room" being added to many major studios. Sequences can be worked out in pre-production in a low-cost studio or at home, using inexpensive gear. If needed, these sequences can then be dumped into the MIDI studio's more sophisticated sequencers that offer better editing, SMPTE synchronization, and so forth, and played through the studio's arsenal of big bucks MIDI keyboards. In many ways, this is the equivalent of someone working out parts at home on a 4-or 8-track, then bouncing these up to a 24-track at a commercial studio. The big difference is that you're bouncing data, not audio—which prevents any kind of signal degradation during the transfer process. Also, unlike tape, you don't have to bounce that badly recorded piano and try to fix it in the mix—use the MIDI sequence data to drive something like an Emulator, Kurzweil, or Roland MKS-20 electronic piano.

A recent album project (titled *Eden*) really brought this concept home to me. The album features the compositions of Spencer Brewer, a very fine piano player, and uses mostly electronic instrumentation. Each tune begins by Spencer playing his compositions into the Emulator II's on-board sequencer. We don't have to worry about setting levels, mics, or any of that stuff; we just boot up a piano disk and he plays. Fortunately, he can lay down his right and left hand parts independently, which gives two working tracks of data. Then my part of the collaboration begins. Sometimes I work with the Emulator sequencer only, but usually I'll "bounce" the E-II tracks to a computer-based sequencer with more sophisticated editing. Then it's time to arrange. I'll make plenty of copies of his original tracks, and edit each track to suit. For example, I took a left hand bass line and copied it over to three tracks. Each track was then edited to cover a specific part of the tune. For the intro, one track drove an acoustic bass sound on the Emulator, then during choruses—when the sound became thicker—the first track would cut out, and the second track would kick in and trigger an OB-8 set for a full, deep sound. The third track

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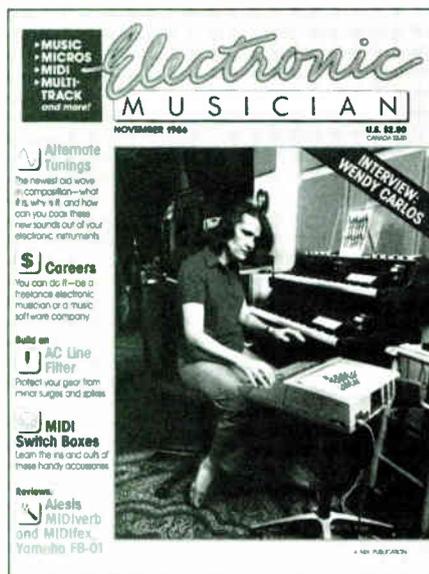
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was edited to cover only an instrumental break, and drove an Oberheim Xpander. Upon playback, these three parts were sent to one channel of a tape recorder (yes, I still use tape!). Because I could run the sequenced tracks over and over again, it was easy to set levels and equalization to create a seamless transition between the three tracks. The right hand parts were similarly worked over, and what started off as a simple solo piano piece ended up triggering multiple tracks on multiple instruments.

Best of all, decisions can be postponed. If Spencer listens to my handiwork and wants to make some changes, no problem. This has also encouraged a more collaborative attitude with his record company (Narada/MCA). Rough mixes can be sent off, and comments noted. If they have suggestions, it's a simple enough matter to edit a track, or sometimes, simply change a sound or two.

### Sequencers & Composition

Sequencers have also affected the way I write my own songs. It used to be that when I got good "hook" ideas, I would record them on tape (which meant I could usually never find those 20 seconds out of all the tapes sitting around), or try to score them out on paper (another hassle). Now, I just keep a sequencer disk of ideas. Often, I'll loop those sections to play over and over again, and listen until I get an idea of what should come next. With this "modular" approach to music-making, the many little hooks that used to get lost in the shuffle are now safely tucked away on disk and often get used at some point. Also, the songs have more time to "mature"; I'll often make a reference tape of pieces of a tune, and listen to that for a couple of weeks—or months—until I get inspired and come up with the rest of the song.

### Mixing Techniques

Even mixing has changed. I used to record tape tracks pretty much flat because I knew that if I did anything drastic while recording, I might regret it on mixdown. Nowadays, when transferring a sequenced part to tape, I actually try to mix the part *as I want it to be in the final mix*—EQ, level changes, reverb, and all that. If my projection of what it should sound like doesn't work a few weeks down the line in the final mix, I don't have to re-record the track—just re-start the sequencer and transfer the track again with the corrected mix moves.

The more I work with sequencers, the more I realize one must "unlearn" old habits to get the most out of these new devices. After all, new tools demand new techniques. ■

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Bruce Cockburn

## Bruce Cockburn's World of Wonders

by Phil Catalfo

Liberation theology on the pop charts? Searing images of Guatemalan refugees on MTV?

In an era when popular music seems dictated more by hairstyle than by substance, it's heartening to encounter an artist who takes his role in the world—and his voice and his vision—seriously, who dares to imagine that art can matter in the unglamorous world of everyday survival, and that the everyday world bears artistic expression.

For more than 15 years, Bruce Cockburn (pronounced "Coburn") has crafted his songs of love, wonder, suffering and hope with a power and eloquence matched by few of his contemporaries. He can comment on the spiritual search or political injustice with equal clarity and insight, always grounded in compassion for the human condition. At his best, like any valued poet, Cockburn reflects back to us our own struggle to transcend our narrowest sense of what is humanly possible, and to envision the world as it could be. At the core of his work is a profound reverence for life

and the gift of this world—or, as the title of his most recent album describes it, this *World of Wonders*.

A stirring vocalist, topnotch songwriter, and virtuoso guitarist, Cockburn and his 16 albums to date have garnered much acclaim in his native Canada, where he has won ten Juno awards (the "Canadian Grammy"). But he only began to attract mass attention in this country with "Wondering Where the Lions Are," an achingly lovely expression of helpless joy in the face of cosmic paradox, from his 1979 LP *Dancing in the Dragon's Jaws*. The song marked a new level of airplay for Cockburn, both in Canada and the U.S., and earned him a spot on "Saturday Night Live."

Still, it wasn't until the release in 1983 of *Stealing Fire*, a potent collage of existential courage, love songs and political fury, that Cockburn began to make his presence felt in earnest among American audiences. That album enjoyed a 30-week stay on the American charts, peaking in the low 60s, and selling some 200,000 copies in the U.S. alone, driven by the backbeat of "Lovers in a Dangerous Time" and ignited by the searing "If I Had a Rocket Launcher."

Those two songs nicely illuminate the range of Cockburn's talents. In "Lovers," we find lyrics that are evo-

cative and finely-wrought to a degree rare among pop singles:

*These fragile bodies of touch  
and taste  
This vibrant skin, this hair  
like lace  
Spirits open to the thrust of grace  
Never a breath you can afford  
to waste  
When you're lovers in a  
dangerous time . . . \**

At the other end of Cockburn's tightrope-walker's pole, "Rocket Launcher" conveys only too well the desperate rage the singer himself felt during a visit to the Guatemalan refugee camps inside Mexico, when Guatemalan army helicopters periodically strafed the camps. The song inspired a video that, amazingly enough, aired on MTV; no less striking, and indicative of Cockburn's appeal, was the song's climb to number 80 on the Billboard charts.

I've been following Cockburn's work for a decade, intrigued by this mystic-seer and his nimble fingers, eloquent pen and moving voice. I first contacted his Toronto management in 1981, seeking an interview with Cockburn for "New Dimensions," the national radio series I co-produce. It took five years and three American tours, but finally the interview materialized. In the course of a couple of hours with him, Cockburn proved every bit as articulate in conversation as he is in song.

As we left his hotel near Union Square and headed for the studio to tape the interview, Cockburn gave off an aura quite different from the shaggy folkie, or leatherjacket, or

### THE FAR SIDE

By GARY LARSON



countless others he's adopted during his long career. As we walked, he looked to me not unlike a bookish Left Bank bohemian (an image never too *passee* in San Francisco); yet he moved along in long strides, with a bouncy, Canadian-hiker gait.

Cockburn's oeuvre frequently presents the juxtaposition, rare in popular music, of a profound sense of wonder, even rapture, on the one hand, and a penetrating look at worldly suffering on the other. "A lot of people see one of the functions of popular music as being to avoid that sort of thing," he said, chuckling. "People, and not unreasonably, I suppose, want to escape, and music is certainly one of the more wholesome ways of doing that."

Conventional wisdom has it that one looks at the world as either a fundamentally happy place or a fundamentally grim place, but not both. "That especially happens in North American culture. People don't have such a hard time with that duality in Latin America or Europe, where the realm of the political is seen as a part of life. We're cushioned from a lot of the things that keep other people's lives pinned down to the ground, and enable them to see things in an ongoing, realistic way. In so much of Latin American literature, for instance, you

get that mix of the fantastic and the real, the amazing flights of beauty and crawling horror at the same time; I think that's because people there live with that kind of stuff day by day."

Cockburn has made two trips to Central America (in 1983 and 1986), where he observed "the ongoing problem of people having inherited a feudal history that they haven't really escaped from yet." His 1983 sojourn inspired the suite of songs that make up side two of *Stealing Fire*, including "Nicaragua," a strident paean to the Nicaraguan people ("In the flash of this moment/You're the best of what we are"), and "Rocket Launcher."

The latter is "a strange song for me to sing over and over again, because it states a point of view that I don't share, even though I wrote the song and it was real at the time. We're familiar with the type of refugee camps run by the U.N.; they're fairly well-organized, and even though the conditions are difficult, there's a kind of order to it. Basic support systems are in place. In the two camps (Cockburn visited) there was none of that.

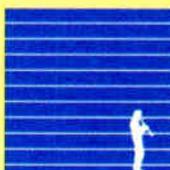
"And in the background of all of this, as a kind of soundtrack to it, were the engines of the helicopters of the Guatemalan military, patrolling the border—which in the case of one of the camps was only a few hundred

meters away. Those helicopters could be heard periodically throughout the day, and you never knew when one of them might swing north and start shooting, because the Guatemalan army had established the precedent of raiding the refugee camps even though they were in another country. These people were in such precarious circumstances already that the possibility of these military raids was the last straw—for me.

"At that point, I felt like I could easily, had I had the means, try to shoot down those helicopters. And it seemed that the people in them were not a consideration, because they had somehow sacrificed their own humanity by doing the things they were doing." Returning to the town from which he made the trek to the camps, Cockburn found himself in tears, writing "Rocket Launcher," with its climactic refrain, "If I had a rocket launcher/Some son of a bitch would die."

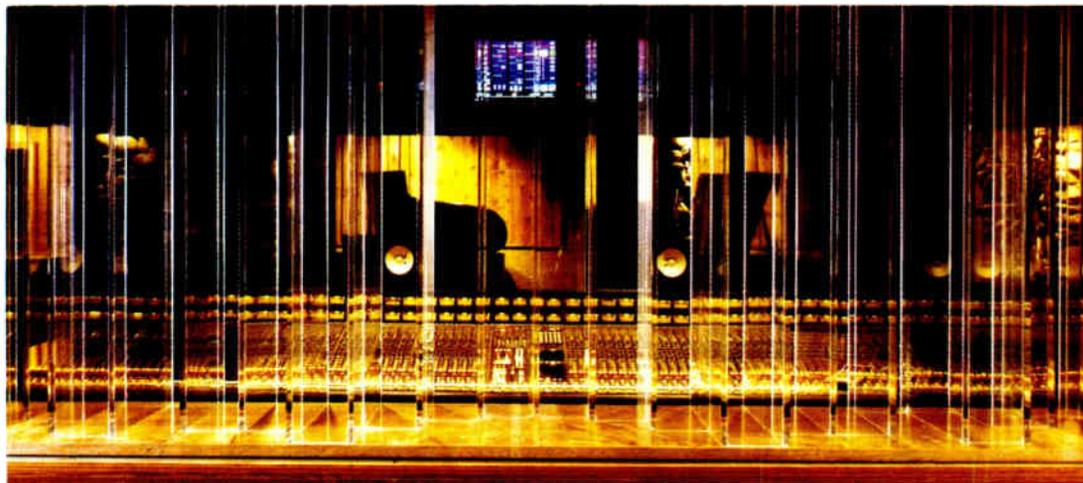
Cockburn is quick to add that he had serious misgivings about recording the song. "I didn't want people taking it as a fist-shaking rallying cry—'Let's go down and kill Guatemalan soldiers.'" In fact, the song's true power may lie in its demonstrating the chilling appeal of, as Cockburn put it, "the kind of war mentality where the enemy is fit for killing

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because they're sub-human." For, potentially, *each* of us is the guy looking for the "rocket launcher." The rub, of course, is that each of us would prefer to believe it's the *other* guy who has the launcher, who heads the "evil empire"; few among us are willing to own up to those darker impulses.

Cockburn derives his times-of-trouble strength from his religious faith. He became a committed Christian in 1974, after extensive forays into various other religious philosophies. But don't count him among your card-carrying born-again pop stars, for the Christianity he embraces is less the hit-you-over-the-head-with-The-Book kind than the do-unto-the-least-of-mine kind. In fact, Cockburn fits not so much in the pantheon of religious rockers as in the "liberation theology" cadre of Christian activists in the pre- and post-revolutionary Third World. (Among the highlights of his visits to Nicaragua was meeting with Ernesto Cardenal, the priest-poet who serves as Minister of Culture in the Sandinista government.)

Perhaps the most remarkable facet of Bruce Cockburn's body of work is the steadfast *hope* it offers—despite its painful recitation of refugee camps, American operatives hovering over the indigenous struggles of suffering peoples ("They watch from planes/

Eavesdrop from ships/Voyeurs licking moistened lips"), short-fuse terrorists (who'd "blow away Karl Marx/if he had the nerve to come around") and "men in gas masks dancing/while the shells burst." It's a hope he draws from his personal faith and from the "recognition that there is a lot that's good in humanity, even though it doesn't triumph enough of the time." This hopefulness pervades *World of Wonders*, even though the album's opening number, "Call It Democracy," blasts Western nations for their insatiable appetite for human and material resources, and "Berlin Tonight" sees the Wall as a symbol of the unworkability of modern politics. The album also contains the wistful love song, "Lily of the Midnight Sky," and the we'll-do-OK-in-spite-of-it-all "Down Here Tonight." Finally, the album's center of gravity rests squarely on the title tune, in which the singer apprehends "darkness alive with possibility" (a line that, by itself, fairly well encapsulates the attitude of many Cockburn songs) and, before long, exclaims, "I stand here dazzled with my heart in flames/at this world of wonders..."

Cockburn is wholly engaged in making music that matters. Immersed as he is in the ongoing, human process of sorting out for himself the

paradoxical ways of this tortuous, wondrous world, he blurs the distinction we tend to make between "artist" and "person." In the last analysis, Bruce Cockburn embodies what the Buddhists may have had in mind in coining the aphorism, "cold eye, warm heart." And if his fans are moved, then, to see things as they are and act compassionately, well, that in itself would be a wonder, in a world full of them.

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## MCA Joins Audiophile Derby

by Dan Daley

The distinction between the mainstream record companies and the "audiophile" and custom labels has been blurring of late, as digital technology



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makes ultra-high-grade sound available to virtually all comers. For a long time, the audiophile market has been the stomping ground of classical and jazz listeners and those crazed hardware freaks who, if they admitted to it themselves, are often more concerned with specs than with the music itself.

With the success of Windham Hill Records—now distributed by A&M—all the bigs are jumping on the highest bandwagon. And when the latest of these, MCA's Master Series, opens up in *Nashville*, you gotta wonder.

"A lot of people don't realize we're based in Nashville," says label chief Tony Brown, "and I don't really care to advertise the fact 'cause there's a bias against Nashville with country music and all." But Brown, whose native drawl and downhome locutions belie a canny knowledge of the business, saw a chance to realize a dream when he moved over from RCA Records three years ago. He relishes the opportunity "to show that there's more down here than country," as he twangs it.

As an A&R vice president (the same title he holds at MCA), Brown failed to interest RCA in the audiophile idea. But he found a sympathetic ear in Jimmy Bowen, president of MCA Records Nashville. "Bowen's idea was to start a music center [in Nashville] that would encompass all kinds of music,"



PHOTO: JIM MCGUIRE

**MCA Master's Series artist John Jarvis. He's the one playing piano.**

says Brown.

Brown's concept called for modest recording budgets, uniform but not low-rent graphics, and some home-grown talent in addition to big names from out of town. The first seven MCA Master LPs, issued early last summer, included Grammy-winning guitar king Larry Carlton's *Alone/But Never Alone*, which occupied the number one slot on Billboard's Jazz Album chart for several weeks. "We were lucky to get Larry in our first group of releases," says Brown. "Having him on the label gave us credibility.

"I want to capture session players who could be artists...I essentially created some solo artists," laughs Brown. One of these is John Jarvis, a sought-after Nashville pianist who's played with the diverse likes of Ringo Starr, John Mellencamp, Rod Stewart and Delbert McClinton. "I knew this other side of John," says Brown, "a real melodic aspect. I asked him if he'd ever considered a solo album, and he said he hadn't." Jarvis's plaintive piano evokes a tranquil antebellum South.

Chicken-picker extraordinaire Albert Lee's Master Series release, *Speechless*, shows off the tasteful velocity the Englishman has demonstrated as part of Emmylou Harris's Hot Band and on records by Rosanne Cash, Juice Newton, Eric Clapton and a host of others.

Bassist Edgar Meyer adds an element of eclecticism that helps the MCA Master Series avoid provincial connotations. Meyer "is well-known in classical circles," says Brown. "I heard some demo tapes of his 'Dawg' music—the kind of bluegrass/jazz stuff David Grisman plays—and it blew me away."

The novelty of basing in Nashville was only a gambit, according to Brown. "That angle has its limitations; now we're going to go past that." Recent



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signings include the utterly one-of-a-kind multi-stringsman David Lindley, and the British group Acoustic Alchemy.

The rather regimented look of the first series of LP covers is going to change, too. "I wanted a look to start with," Brown explains, "to let the marketplace know there's a new label." Asked whether this uniformity doesn't somehow contradict the label's stated intention to let artists be unique, Brown is pragmatic. "I've heard pros and cons on that. . . All I know is that we accomplished what we wanted to accomplish." Future releases will have different cover art, but Brown says some factors will remain consistent.

Where it *really* matters—in the music itself—Brown maintains a hands-off policy. "It's sort of a verbal agreement between the acts and me," he notes. "The neat thing is that I don't want any control over what they do. I say, 'Here's a budget; cut me a record.'"

"What this is is documentation of people's [artistic] statements," Brown continues. Looking over an artist's shoulder "would defeat the whole idea of this label. I don't go checking up on nobody—I don't even ask them for roughs. I just have them bring me the masters when they're done." The autonomy Brown gives his artists mirrors the latitude he's given by Jimmy Bow-

en. MCA, laughs Brown, "gave me a gold chain to hang myself with."

Compact disc is the flagship format for the Master Series. "For our next series of releases, I'm asking everyone to cut 55 minutes of music for CDs; instead of trying to stretch an album to CD length, we'll edit down from there for vinyl," says Brown. "CD is where it's at for this kind of music."

However, Brown doesn't want the quality of the label's vinyl discs to lag. Even though MCA operates its own pressing plants, Master discs are pressed on virgin vinyl by KM. "The only other time they've done that it was for Steely Dan," says Brown. "For me to go outside was a pretty big deal for them, but if we're going to compete with Windham Hill, ECM, GRP and the others, we have to do it right. Once the standard is set, you've got to stick with it." ■

## Utley & Greenidge: Mad Music for Discerning Ears

by Hillel Resner

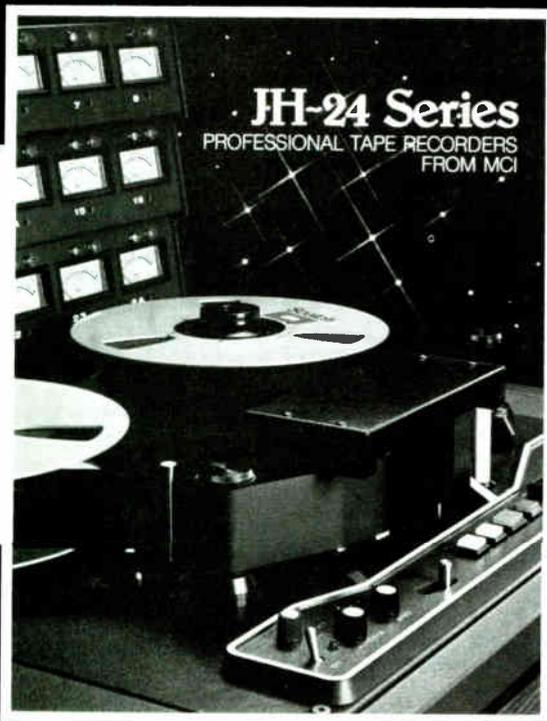
It's nighttime at Mountain View, California's Shoreline Amphitheatre as

Jimmy Buffett's Coral Reefer Band takes the stage, minus Buffett. It's more than a little cool, but the band launches into an opening instrumental that evokes lush tropical isles and steamy Caribbean nights. Is it rock, pop, fusion—or is it Caribbean soul? Whatever you call it, it's the bouncy and infectious creation of long-time Buffett keyboardist/arranger Michael Utley and steel drummer Robert Greenidge. The song is "Coco Loco," one of eight tunes on the duo's MCA Master Series LP, *Mad Music*.

With the Master Series, says Utley, MCA is "really going for the CD market—for the type of people who want really fine-sounding recordings. The next album Tony [Brown, label chief] wants to do is 60 minutes of music that will be cut down for a record."

And compact disc is the right medium for this music. Utley plays a variety of synthesizers (primarily a Yamaha DX7), and the drum parts were played on a Yamaha RX11, but the predominant sound of *Mad Music* is the steel drum, that remarkable post-World War II Trinidadian invention of discarded oil drums. Robert Greenidge, a Trinidad native who came to the U.S. in 1965, is a master of the instrument. In 1983 he brought his unique sound to Buffett's Coral Reefer Band, where Utley has been a mainstay for 13 years.

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Mike Utley (L) and Robert Greenidge

Steel drums have since become a trademark of the Coral Reefer sound, and arranger Utley knows just how to use Greenidge's pans to maximum musical effect.

"The first thing I noticed about Robert, besides his virtuosity, was the tuning of the drums. I'd always thought steel drums—y'know, they weren't *tuned*. That was part of the sound—it was sort of a funky type of sound, especially when they played in sections. But Robert's pan was right in pitch." The sound of Greenidge's steel drums is the fruit of much work by various drummers during the '70s. He gives special credit to the late Rudolph Charles, a Trinidadian bandleader who tuned Greenidge's drums for the *Mad Music* sessions.

Another factor is his approach to handling the mallets. "The average person who plays steel drums plays from the elbows," says Greenidge. "That's okay, but you get tired too quickly and you don't have as good a feel for the note. So I use wristwork to get a good strike on the note—a balanced tone, better control, and more speed and flexibility."

Whatever the technique, the overwhelming effect is one of *musicality* in the purest, most pleasing sense. Greenidge's notes never sound discordant or squashed (the "hurdy gurdy" effect sometimes produced by more traditional steel drumming). Rather, they float in rippling, bouncing and arching lines over the solid bottom created by Utley with the RX11 drum machine and the melodic bass

lines played on the DX7 and MIDI'd to a Roland JX3P synthesizer. Meanwhile, Utley's and Greenidge's unison lines, counter-riffs and fills create complex harmonies and a magical marriage of the old and new, ethnic and electric.

All the songs on *Mad Music* (recorded at L.A.'s Village Recorder by engineer Cliff Jones) were written either by Greenidge or by Utley, with the exception of Buffett's "African Friend." While several of the tunes have a definite "Caribbean" flavor, there is also some classical-rock ("Pan Classique in B minor"), a soul groove ("Funk on Steel"), and the latin-inflected "Shango."

Greenidge's tunes were written a year or more before the project began, but Utley had to scramble to come up with his contributions to the album. "I never thought anybody would ever ask me to do an instrumental record in the first place," says the keyboardist. "So I had nothing ready at all. We were on the road last summer when Tony Brown came to us and said, 'We're going to start this label. Can you have a record ready in August?' So we started writing." Greenidge and Utley somehow managed to write and rehearse the album in between concerts with the Coral Reefers, and they hit the studio when the band took a mid-tour break.

*Mad Music* was recorded analog, on a Studer A800, mixed to a Mitsubishi digital 2-track, and then transferred to the JVC VP900 for digital mastering at Nashville's Masterfonics on the JVC Digital Audio System. The care taken in both recording and mastering is evi-

dent from a first listen to the *Mad Music* compact disc, and the happy marriage of acoustic and electronic on the Utley/Greenidge collaboration promises not only a bright future for these Coral Reefers, but pleasant commercial prospects for MCA's foray into instrumental for discerning ears. ■

## Robert Quine's 4-Track Rebellion

by Bill Milkowski

Records are stacked to the ceiling. Ritchie Valens, James Burton, Chuck Berry, Mickey Baker, Jimmy Reed, Bo Diddley—just a few of Robert Quine's heroes. On one shelf, every Miles Davis album ever released. Ample supplies of Charlie Parker and Lester Young. The guy's got eclectic tastes.

A few albums and tapes are scattered about the cramped studio apartment in Manhattan's East Village. Many of these are by pals of his—John Cale, Fred Frith, Brian Eno. One tape, an outtake from Eno's ambient *On Land*, is a rare item indeed. The room is full of such rarities and oddities. Records everywhere. Guitar cases propped up against one wall. A multi-

tude of effects boxes, opened and unopened; practice amps, back issues of guitar magazines, bound copies of *Weird Science*...there's barely any room to sit, let alone live. Let alone record. And yet Robert Quine wouldn't have it any other way.

This Skinner Box is precisely where Quine recorded his last two albums. On 4-track, no less! In these days of digital 48-track, Quine is clearly a throwback, or a rebel. Fact is, he could be recording in some studio somewhere in Manhattan—after all, being the guitarist with Lou Reed for four years does carry some weight.

And, of course, there's his involvement with the landmark punk album, *Blank Generation*, with Richard Hell & the Voidoids back in 1977. Check out the primal scream guitar on the anthemic title cut. And who can forget the classic "The Kid with the Replaceable Head"? Yeah, that's Quine playing the sick guitar solos on that one.

That album alone was probably enough to gain Quine a lifetime cult following, but his work with Reed years later on *Legendary Hearts*, *The Blue Mask* and *Live in Italy* (not to mention the excellent concert video, *Live at the Bottom Line*) brought Quine's guitar prowess to the attention of Lou fans the world over.

Sure, the guy's made a name for

himself. His record company, Editions EG, would probably be willing to pop for studio time. But Quine insists on making his albums his way—at home in his cramped apartment, with a TEAC Portastudio. And he's got his reasons.

"To me, nothing today sounds as good as the rock and roll records made in the late '50s," he asserts. "And some of those records were made under the most atrocious conditions. 'You're So Fine' by The Falcons was recorded under grotesque conditions. So was 'Quarter To Three' by Gary U.S. Bonds. But both are magnificent recordings, in my opinion. There's something there that was caught, an energy, a feeling. You could never duplicate it.

"See, I believe the cliché: The music is the most important thing. Absolutely. My favorite Charlie Parker record is *Bird On 52nd Street*, which is the worst recorded record I've ever heard. It was done on a wire recorder in 1948, strictly his solos, everybody else spliced out. It's got a wall of white noise over it. But I think it's his most inventive playing ever. It was just one of those magic nights and somebody happened to be there with a tape recorder. It happens to be one of the greatest jazz albums ever, and it also happens to be badly recorded. But that's irrelevant. I mean, I can listen to that or I can go out and buy a five-

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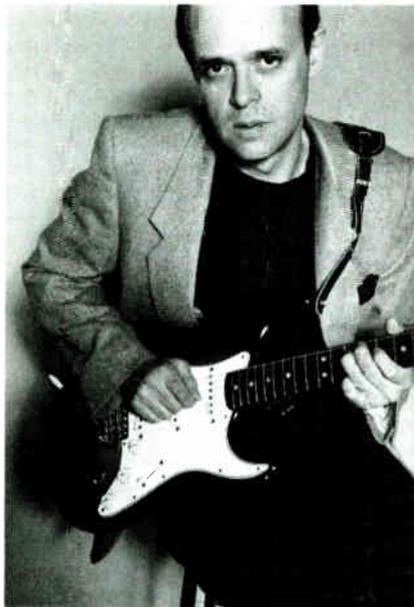
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**Robert Quine**

volume Keith Jarrett, digitally recorded on one of his eight billion dollar pianos. And I personally would rather hear the Bird record. It's the music that counts. The music's going to be good or bad depending on the artist on the particular day in that particular performance. If it's caught in any way, whether it's a mono cassette recorder or 48-track digital... fine. Whatever. The technology is irrelevant."

Quine's first record, *Escape* (Infidelity Records) was recorded in his studio apartment with guitarist Jody Harris (Raybeats, Golden Palominos) in 1979. Total cost: about \$12.

"When I got my advance for *Blank Generation* in 1977, I immediately went out and spent \$350 on a Dokorder 4-track reel-to-reel, and I also got a really decent TEAC mixer. But I left that Dokorder in the box for two and a half years. When I saw the end coming with the Richard Hell thing, around October of 1979, I decided it was finally time to do my own record... in my apartment. I had produced a couple of singles for Lydia Lunch and the group DNA for the Lust/Unlust label. And the guy who ran that company, Charles Ball, approached me about doing an album. So with that to go on, I did it."

It took a few months to complete, since by this time Jody was busy with The Raybeats. But the record eventually came out in early 1981 to critical acclaim. Quine himself describes the album as "Iggy & The Stooges meet Miles Davis out-of-control."

He hooked up with Lou Reed in 1981, and also appeared on the Voidoids reunion album, *Destiny Street*, that year. Four years later, after touring the world and recording three ai-

bums with Reed, Quine was ready for another homemade LP. This time, he chose the versatile Fred Maher as his partner. A drummer with the Voidoids and other New York groups like Mas-sacre (with Fred Frith and Bill Laswell), Maher also played some decent guitar and bass. And being a drummer, he was especially adept at programming the Oberheim DX drum machine used on *Basic*.

"I have no problems with drum machines," says Quine. "First of all, it's completely impractical to have somebody playing drums in somebody's studio apartment without being evicted. And if you get somebody like Fred, who can program some soul into the machine, you've got it taken care of."

One big change from *Escape* to *Basic* was the new recording machine. Instead of the old Dokorder reel-to-reel, Quine brought in a TEAC Portastudio, model 244. "It's an amazing machine," he says. "It has dbx instead of Dolby B, which meant there was no tape hiss and no high-end loss. In fact, when we mixed to a 2-track we didn't even bother with noise reduction on the other end. It wasn't necessary. There's no tape hiss at all on that record. And with a parametric EQ, you really have a lot of control."

The 4-track cassettes for *Basic* were mixed at Sorcerer Sound and mastered at Sterling. "The expense of the album was about \$12 worth of cassettes and \$500 to have it mixed. And I paid about \$1,500 for the album cover out of our advance, so the cost of the cover art was actually more than the album itself."

And why? Because Quine wasn't paying \$150 an hour for studio time or engineer's fees or producer's fees. It was truly a self-contained, self-made project. "We spent a lot of time on the record," he recalls. "There were a couple days when we would spend 12 hours at a time, trying to come up with things, and the day would be a total loss. Then again, it didn't cost us anything to try. There was never any pressure to produce. If things didn't work out that day, Fred just went home. No big deal. We'd try again some other day."

There was no real method to his madness on *Basic*. Unlike the cost-efficient producer who goes into the studio with a hard and fast plan and then sticks to his guns in order to get through it and bring the project in under budget, Quine just went with the flow from day to day.

"We would just sit around and jam and hopefully come up with a good riff. And when that riff happened, then we'd start worrying about 'Is this a good guitar sound? Is this a good bass sound? How's the echo on this drum machine?'

PHOTO: MARCIA RESNICK

That's why I really love that record; because it was just as much a surprise to me as it was to anyone else. There is some thematic unity to the record, somehow. But nothing was as premeditated as records usually are."

Quine got excellent reviews for *Basic*, thought some writers seemed to be confused as to just how this music was created. "Some reviewers knew that I made the record for something like \$500, and they used that as a jumping-off point... 'Despite the primitive technology going on here...' That sort of thing. And I can show you other reviews that begin... 'Despite the advanced technology at their disposal, they created a soulful record.' The whole spectrum is covered. I don't understand it.

"I'm making no secret of the technology being used on these albums of mine," Quine adds. "People can be impressed, they can laugh at it. I didn't advertise it on the back of the cover: 'This album was recorded on a Portastudio for \$500.' Like how all these albums come out now bearing that sticker 'Digitally Recorded.' Who cares? Maybe it's suicidal to admit that I'm doing things on such a primitive level. But in fact, *Basic* looks like a professional record and sounds like one. It came out exactly like I wanted it to, although I didn't know what I

wanted when I started out."

So what's next for this home recording artist? Plenty. First of all, he's recently acquired a TEAC 388 8-track recorder, though he still hasn't taken it out of the box. He plans to record another album in his apartment on this unit, featuring Fred Maher, Jody Harris and kindred guitar spirit Bill Frisell.

"Frankly, I have no idea what I'm going to do. I don't know if it's going to be commercial. Probably not. The commercial potential for what I'm doing is probably nil. But working with three different people instead of just one will make it more flexible. This way I won't have to wait for somebody to squeeze me into his schedule... 'cause Fred is very busy these days with Scritti Politti and Jody is out with the Golden Palominos and Bill is touring around Europe with a lot of different ECM artists. There's no telling what their availability will be like. So this time I'm going to structure it around these three people and when one of them happens to be around, we'll just see what happens."

Quine has also added some new rack-mounted gear to his collection of effects devices. His latest pet sound is an eerie effect achieved by playing through an Ibanez HD-1500 harmonics delay hooked up to a Korg SDD-

1000 digital delay with a high-cut filter and a Roland SRV-2000 digital reverb. "The sound is pretty amazing. Any wobbling of the harmonizer is completely smoothed out. I've been experimenting a lot with that sound, which was inspired by the Jon Hassell record he made with Eno, *Possible Musics, Vol. 2* (Editions EG). That record was a very big influence on me. And in fact, I've been setting it to the same interval that he consistently uses. I'm much happier with this set-up than with the guitar synthesizer I had and recently dumped. I mean, if a \$3,000 instrument can't track as well as my cheapo electric guitar, I'm not interested." ■

## Rodney Crowell: A Rocker At Last

by Holly Gleason

Rodney Crowell is no stranger to country fans. Following his stint in Emmylou Harris' Hot Band, he produced wife Rosanne Cash's first three albums and released three country-rock records of his own. He

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has also written a slew of hits for others: "Ain't Livin' Long Like This," "Leavin' Louisiana in the Broad Daylight," "Shame on the Moon," "Voila, an American Dream," "Til I Can Gain Control Again," and "Even Cowgirls Get the Blues."

So it's surprising to hear the normally soft-spoken Crowell vehemently proclaim that he thinks country music is "wimpy."

"I'm not looking to change anybody. I'm not that presumptuous. If some people hear this and say, 'Hey, this has got some guts to it,' then I'd be proud..."

Crowell is referring to *Street Language*, his first album for Columbia and his first in five years. It is without a doubt a rock and roll record.

Not that there wasn't a rock undercurrent to Crowell's three Warner Bros. LPs. But here you can pick up the influences of Chuck Berry, Everly Brothers and Roy Orbison (who co-wrote "When the Blue Hour Comes" without straining. Crowell refers to the "Let Freedom Ring" (the first single) as "Chuck Berry's 115th Dream."

His parents were country people. "I grew up with Hank Williams; his music was always around the house." His first taste of rock and roll came when he was around five, riding in a car with his grandfather: "Maybelline" came on the radio, and I thought it was the coolest thing I'd ever heard.

"The same thing happened when I heard Bob Dylan's 'Subterranean Homesick Blues.' It's really percussive, the way the words just keep bouncing off the beat."

Crowell pauses for a moment and flashes a grin. "The uptempo stuff (on *Street Language*) is really a rehashing of Chuck Berry and Bob Dylan," he admits. "The ballads may be more uniquely my own. They tend to be a bit more reflective."

Crowell's journey to *Street Language*—and the musical redirection the album represents—took some time and required some career decisions. "I made a conscious decision to stop producing in favor of writing and performing, because I was spending all my time in the studio with other people. I had to make a decision: was I going to be a record producer, or was I going to devote my talents to writing and performing? The second was what I really wanted to do."

He had planned to spend three years immersing himself in the recording studio. It turned into five years, but Crowell considers the time well spent. "Now I'm being satisfied mentally. I was telling Rosanne, 'This is the first time I've ever felt really satisfied with a day's work in the



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studio—satisfied enough to go in there and give it my best, then go home and leave it. I used to go home and worry about what I was doing, because I was making it the end of my life. It's *not* the end of my life—it's a day's work.

"I was 27 when I made *Ain't Livin' Long Like This* (his first album), and I had a real lackadaisical attitude. I really wasn't very organized. I didn't think those songs out very well."

Crowell recorded a fourth album for Warner Bros., but the label was uncomfortable with his rock leanings and refused to release it. "When I got around to making this record, I actually put some time into planning it and making sure I was covering the whole spectrum of things I was writing about," he notes. "I learned a lot about selecting the right key for a song. I learned about vocal performance. And I'd say I wrote a little more...intelligently."

"It's a giant leap for me personally, because the person I was five years ago and the person I am now are a lot different. I'm having a lot more fun now, and I think that should reflect in the music I'm making." ■

## Uptown Horns: No Longer a Section of the Grapefruit League

by Dan Daley

"If you really want to know the essence of the Uptown Horns, you have to come to one of our parties," says Arno Hecht, tenor saxist and one-fourth of the increasingly successful anachronism that is the Uptown Horns.

And you don't need an engraved invitation. On a muggy afternoon in their publicist's office near Central Park, a visitor is greeted with cake, champagne and noisemakers. The occasions are alto player Crispin Cioe's birthday, trombonist Bob Funk's week-old marriage, and Hecht's week-old daughter. The fact that trumpeter "Hollywood" Paul Litteral didn't have a specific occasion to fete didn't stop him from sampling the bubbly.

The foursome are very close-knit. "We've all had affairs with each other's wives," quips Hecht, whose personality answers the question that has plagued science for decades: what if Shemp Howard could play tenor sax? But they have no reason to be contemplating a vaudeville act; the Uptown Horns have had a very busy schedule over the last couple of years,

playing on records with artists as diverse as Pat Benatar, Tom Waits, Joe Piscopo, Grandmaster Flash, the Four Tops, the Stray Cats, Dan Hartman, Power Station and Joan Jett. Not content with vinyl, they've also gone out on the road with Robert Plant & the Honeydrippers and the J. Geils Band in addition to playing on their albums. And they're currently nursing along their own release.

They met like most musicians do, at gigs and on sessions. Hecht, the only native New Yorker, was playing with Brenda & the Realtones in 1978 when he met Kentucky-born Paul Litteral, who he "recognized as a maniac of kindred spirit," on a demo date. In the meantime, Detroit-bred Crispin Cioe was playing with local heroine Carolyn Mas. When her brief tour ended, Hecht and Cioe met and took refuge with the *outré* gigs staged at various New York venues by the bizarre and talented Jack Sonni (who is currently lending his eccentricities to Dire Straits as second guitarist). "We hit it off real well," recalls Hecht, whose conviviality is a counterpoint to Cioe's intensity. Their affinity became clear when they discovered that they both knew the lyrics to the Coasters' "Shopping For Clothes." Cioe joined Hecht backing Brenda and Litteral met tonsured Coloradan Bob Funk, who was running a rehearsal band in Manhattan.

"Around 1979 we found ourselves involved together on more and more things," says Cioe. "We had all been solo horn players for a while and we realized that we all wanted to be in a horn section. We all had it in us to try, and we also realized we all had it in us to be friends."

The Uptown Horns were officially born in 1981 during a weekly showcase they ran at Manhattan's Tramps nightclub. "The Tramps thing pulled us together," declares Cioe. "It gave us the commitment to have to play together every week. And it wasn't run like any other jam. Anyone who was going to play that night came down during the afternoon and we worked up arrangements."

That extra effort was soon noticed by a range of performers who came to sit in, including Iggy Pop, Joe Jackson and David Johansen, whose alter ego, Buster Poindexter, was shaped during that period, influenced to a degree by the Horns. "We encouraged him to come in and try out his act in a really loose atmosphere," says Cioe.

"Also," points out Litteral, "the Tramps gig threw us into the beginnings of what we came to be very good at, which is quick head arrangements." That capacity made them especially appealing to cost-conscious produc-

ers; record dates began coming, traditional R&B sessions and some adventurous rock dates. "We've worked out a million ways to voice that we can go to really fast," notes Cioe. "If the artist wants to give us a chart, that's fine, but usually it's us bouncing ideas off each other."

The four made a commitment to working as a section. Each accepted individual dates, but only in New York; any extended work was to be done as a unit or not at all. "That was the only way it would work," says Cioe.

One hurdle that had to be dealt with was what they perceived as a prejudice against horns in pop music at that time. "There was a time that [radio programmer] Lee Abrams' or-

ganization I think had a memo out that said don't play stuff with horns," Hecht recalls.

"A lot of people told us we were chumps to try it," adds Cioe, "but music always changes. We felt strongly that dance music was going to merge more and more with rock and roll." Cioe cites Bruce Springsteen's latest singles as examples.

"We always saw the potential for the use of horns where they were never used," adds Litteral.

One of those places was on Bronski Beat's synth-laden *Age of Consent* LP, in which producer Mike Thorne combined the sounds of digital and analog synthesizers with the Uptown

—CONTINUED ON PAGE 301

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—FROM PAGE 230, HALL

cause he is such an identifiable part of Hall & Oates. But, I think I'm keeping the two people who are most able to move beyond it. It will definitely sound different.

**Mix:** How did T-Bone come to be so involved in the album, and in your career in general?

**Hall:** We became really good friends, and I came to recognize his superior musical ability. T-Bone is not just a bass player; he's a great arranger. He obviously plays bass, but also great keyboards. He's a good person to have along because he knows me and he can translate what I want to other people in certain situations.

**Mix:** Did you, however, always call the shots?

**Hall:** Oh yeah, definitely.

**Mix:** Even in the case of Dave Stewart, if you two didn't agree on something did you do it your way?

**Hall:** There was never a basis for a disagreement. They were always my ideas. Dave's not like that. We just weren't in that kind of situation at all.

**Mix:** In the studio, how conscious were you of technology? Was this done in the same layering pattern that most Hall & Oates albums have been cut, or was it more of a live recording situation?

**Hall:** There was a lot of layering; it wasn't live work. Yet I really stayed away from using that wall of MIDI'd synthesizers and all that stuff. An E-mu was really the only keyboard we used other than "real" keyboards—harpsicord and pianos. Some of it's not even noticeable, but I used a lot of stringed instruments. On a few songs I used mandolins. I've been playing a lot more six-string guitar.

**Mix:** These songs sound much more guitar-oriented than those with Hall & Oates.

**Hall:** They are, because I wrote most of the songs on the guitar. That's a switch right there: I was the piano player and John was the guitar player. I've been moving more towards guitar. I always felt that somehow my parents gave me the wrong instrument when I was a kid. Although I'm happy I learned keyboards, I always wanted to be a guitar player. I've been working real hard and practicing for quite a few years, and finally I'm getting to the point where I feel confident and I can play it in front of people.

**Mix:** When you take your own band on the road, will you come out as a guitarist?

**Hall:** Yeah, I'll be playing a lot of guitar.

**Mix:** Do you plan to cover these songs with 12-inch dance mixes in the same way you've done with the last few Hall & Oates albums?

**Hall:** I thought I'd move away from dance music a bit. There are a couple cuts that could be remixed. I'm going to remix "Next Step." But I don't think I'll spend a lot of time doing that. Part of moving away from the New York mood on this album is also moving away from that.

**Mix:** How did you happen to get Joni Mitchell on this record?

**Hall:** I've always been a big fan of hers, and I've known Joni about ten years. I happened to see her on a plane to England. She had some free time, so I asked her to come down to the studio. It was right in the beginning of the project and I didn't even really know what I wanted her to do. But I had the song "Right as Rain," which I thought would be good for her. We just had her sing a bunch of things and then I wound up sampling them and replaying them. We sang some harmonies together and it was lots of fun, really.

**Mix:** And you also used Robbie McIntosh from The Pretenders. . .

**Hall:** He's a guy I've been following since he joined that band. I think he's a great guitarist. If I could get him to tour with me, I'd take him in a second. He's an excellent guitar player and he's got so much soul. He's really flexible, and he's got a great personality as well.

**Mix:** Another English musician you used was Jamie West-Orr from The Fixx.

**Hall:** I've always listened to The Fixx for the guitar playing. I had never met him, but he happened to be in London when I was there, so I just called him up and asked him to come down to the studio. He ended up doing a lot on the record.

I enjoyed working with everyone on the record. The people I worked with I ended up choosing for some similarity that most people probably wouldn't see. But, I was right on every count.

**Mix:** What about your career as a producer?

**Hall:** I'm not really that interested in outside production. The last thing I did was "Ruthless People" with Mick Jagger and Dave Stewart. I'd like to produce people the way Dave did me. I'd like to go in and throw some ideas out, get things started and then split. I

don't have the patience or the meticulous attitude that a really successful producer would have. I hate mixing and all those things. I'm really not a technocrat at all. I'm really a composer and a singer. That's really what I do the best and what I like to do.

**Mix:** You weren't involved in the mixing of your new album?

**Hall:** Not really. I let Bob Clearmountain mix it. I stopped in and gave him

---

"I've been moving more towards guitar. I've always felt that somehow my parents gave me the wrong instrument when I was a kid."

---

a lot of direction, and T-Bone was there, so it wasn't like I wasn't represented. Believe it or not, Bob Clearmountain is one person—and I know this because I've worked with him quite a bit—that you can give something to and let him fly blind with it, and he'll come out with the right thing. He's supernatural when it comes to that. He's the only person I know who can do that, and I guess that's why I use him all the time. He's so much better than any mixer I've ever worked with that it's really astonishing.

**Mix:** How far in advance have you planned your solo career?

**Hall:** With Hall & Oates, things had to get really planned out because we were so much in the midst of things that we had to do it that way or we got swamped. So we got really preoccupied with planning things out. And that's a John Oates thing, too. John likes to plan things out. I don't like to plan things out. I think an album and a tour is as far as I can see. And as far as the tour goes, that depends on how well the album does and how much I want to tour behind it. I'm leaving it really open-ended. ■

# SOUND ON STAGE



PHOTO: RANDY BACHMAN

## A BEHIND-THE-SCENES LOOK AT KENNY LOGGINS' STAGE SHOW

### A-1 AUDIO AND THE 1986 SUMMER TOUR

by Mike Stande and John Locke III

Before a major tour can begin for any artist, several months of preparation and negotiations must first be completed. It is this preparation and forethought (or lack of it) that most directly influences the ultimate success of the show, from the perspective of both audiences and critics. These are often the very people who do not realize that what they are seeing in concert is the final result of the time and effort of

many different people; literally, the hour or two on stage each night is the culmination of many months work.

Veteran songwriter, recording artist and live performer Kenny Loggins has long been known in the entertainment industry for his strict standards regarding concert sound. For his summer 1986 tour, Loggins elected to use Los Angeles-based A-1 Audio. "Forethought is what makes a tour run smoothly," advises A-1 Audio owner Al Siniscal. "With the proper prepara-

tion and the right equipment, a show can be set up in just a few hours, night after night, in many different cities. Getting involved with a tour's planning from the beginning, instead of just throwing a bunch of gear out on the road, is one thing we like to feel sets us apart from the rest."

#### Tour Preparation

Before a tour can begin correctly, every detail concerning the sound system must be laid out and analyzed.

*Terry Nelson's subwoofer effects are brought in and out of the mix with a volume pedal located at the house position. Consoles are Harrison "Alive" 24 and 32 input models.*

Detail work and finishing touches to a road system are much more easily done in the shop than on the road. For this reason, A-1 Audio maintains a full production rehearsal stage at the firm's main offices in Hollywood. Full 24-hour access to the 20,000 sq. ft. facility simplifies easing rehearsal time into artists' schedules. "Music rehearsals are usually held elsewhere," notes Siniscal. "What we have here is a place to do the final production rehearsal, to catch and solve problems before the tour goes out on the road. These rehearsals usually run from three to five days. Things go particularly well when they are held at night, so we can do all of the custom modifications and repairs during the day when we have full use of the technical and fabrication shops."

A-1's rehearsal facility makes use of risers and portable stage flooring to simulate the concert stages each show will be seeing. A unique power supply system has also been added to the facility to simulate arena AC power conditions and accessibility. The mod-



PHOTO: JOHN LOCKE III

ern hookup offers up to 600 amps per leg of current available in any combination of voltage/phase taps. Such a setup allows production rehearsals to be complete with main and monitor systems, and full lighting systems can be supported. The facility also houses a storage area and a 2000-lb. scale

for weighing road cases. Finally, after several days of complete setups and teardowns, the sound and staging systems are ready to tour.

#### On the Road

Advance preparation makes the tour itself flow more smoothly. Several

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days and nights each week of Kenny Loggins' summer tour were devoted to travel time for both the crew and the musicians. Major cities such as Los Angeles, San Diego, Minneapolis, Washington, D.C. and Cincinnati were visited. "We're hitting everything from 3000 seat outdoor civic venues to 20,000 seat indoor sports arenas," states Loggins' monitor mixer Alan Richardson. "We are doing a wide variety of different types of shows, but mostly outdoors."

### The Setup

Once the sound crew arrives at its destination each day, different individuals begin work on one of the season's most technologically advanced productions. The stage setup itself, with its digital sampling keyboards and complex input patching, was seemingly right out of the future... yet, standard rock instruments such as guitars, drums and keyboards preserve a warm feeling of familiarity. While it may have looked like a standard rock concert stage, Kenny's guitars and other instruments on stage were actually being used to trigger sounds taken directly from the album masters. What follows is a description of how Loggins' live sound crew made it all work.

### Studio Technology on the Road

Aside from the actual sound reinforcement gear, Loggins' stage set utilized many instruments and different technologies often common only to the multi-track recording studio. The standard complement of microphones was present, along with three Cetec-Vega wireless systems. As for instruments, several wireless guitars were used



PHOTO: RANDY BACHMAN

along with keyboard synthesizers and both electronic and acoustic drums. Perhaps the important thing to note here is not the type, but the manner in which these instruments were used.

Digital sampling is common to today's music recording studios, yet any sampling other than for synthesizers

*Checking final details at the 4,377-seat Open Air Theater at San Diego State University, one of the first tour stops.*

is seldom seen with touring shows. Such was not the case for the Kenny Loggins tour. In order to reproduce a sound identical to that of the album, samples were made of the original master tracks and implemented back into the stage instruments. On stage was a full array of MIDI-controlled digital sampling devices, including two Emulator IIs and an Emulator SP-12 drum machine.

In the studio, a particular sound was developed for each instrument, with particular attention paid to keyboard parts and drum sounds. By sampling the original master tape of each song, these sounds could be recreated instantly, without several hours of reprogramming or tuning of each instrument. Consequently, the SP-12 was loaded with the sounds of 14 different drum sets, each corresponding to the song on which it was originally used.

Internal microphones inside the snare drum and a Roland Octa-Pad served as triggering devices for the SP-12 drum sounds and effects (such as explosions for the song "Danger Zone"). The synth voices were loaded into the memory banks of the Emu II and recalled accordingly. "We try to get a studio sound when we are on the road. That's what people want to hear, the songs exactly as they are on the album," explains house mixer Terry Nelson.

### People Behind the Scenes

Terry Nelson has a unique position in his work with Kenny Loggins. Not only is he Loggins' studio engineer, but he also controls the house mix when the show goes on the road. He has previously toured with such artists



PHOTO: JOHN LOCKE III



PHOTO: JOHN LOCKE III

*Internally miked snare and Roland electronic pads triggered 14 drum kits (stored in the E-mu SP-12) corresponding to drum sounds used on the original versions of each song. Samples were taken from 24-track master tapes.*

as the Beach Boys, Captain & Tennille, and Joe Walsh. "My turning point came with Walsh," recalls Nelson. "I wanted to help the bands I was working with in the studio get that same sound out on the road, so I started engineering both. Kenny and I have been together now for two years, both on the road and in the studio. When I agreed to come out on the road again this time,

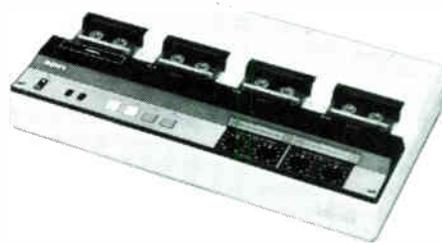
he told me not to worry . . . all I want you to do is mix, he said. I'm respected by the band for what I do and consequently travel with them as a sort of 'fifth Beatle.' I believe that an engineer should tour with and be treated as a band member. I put together what is on stage, and consequently I need to be at my best when the show goes on. Not having to worry about the actual

setup and teardown of the equipment, I can concentrate on the show and try out new things. Afterwards, I have time to discuss the show with Kenny and the band and to go over the show tapes critically. I'm very particular about how a show is run, and a lot depends on the crew and my confidence in them."

While creative responsibility falls to Terry Nelson, the technical responsibility of each concert rests with A-1 Audio's crew chief and assistant technicians. The mandate: produce a technically flawless show each night, regardless of environment.

A-1 supplied two technicians for the Kenny Loggins tour to manage and assist with the equipment setup and operation. A-1's Jim Stark works with monitor mixer Alan Richardson before, during and after the show. "This monitor system is really a two-man operation," explains Stark, "especially when we have to worry about cue-

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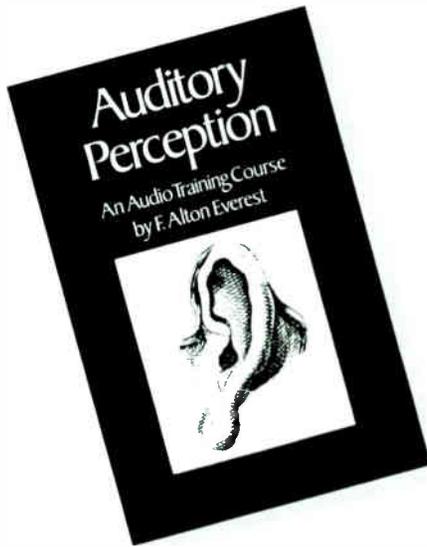


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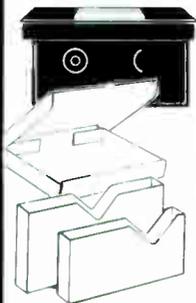
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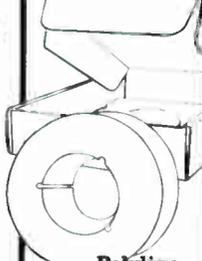
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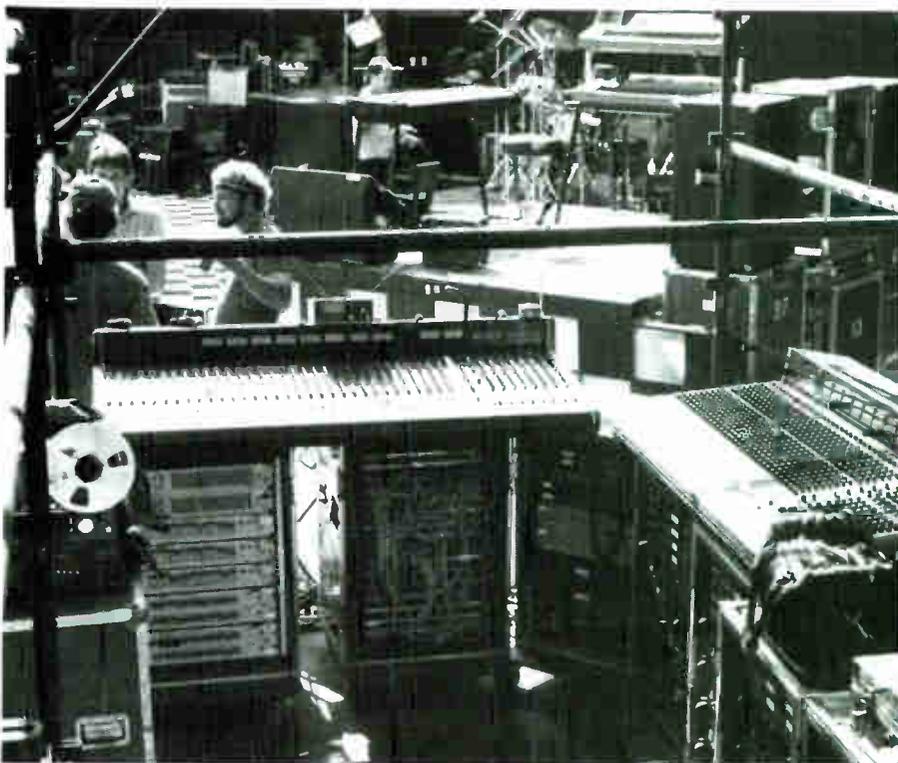


PHOTO: JOHN LOCKE III

*Monitor mix position: two Soundcraft 800B consoles (modified by A-1 Audio) supply 12 onstage mixes.*

ing up tape machines. There's a lot going on at this stage mix position."

"Jim is a big help to me during the show, since things can get pretty hectic," according to Alan Richardson. "We work together as a team." Richardson, a graduate of Sound Master technical school, has previously toured with Frank Sinatra, Paul Anka and Tony Orlando, among others.

*Two Fostex B-16 recorders (one is backup) supplied click track cues to the stage musicians.*



PHOTO: JOHN LOCKE III

In the house, A-1's Keith Hubbell is responsible for the entire setup of all house systems and onboard gear. House soundmixer Nelson puts a lot of trust in Hubbell. "A good assistant sets things up the same way every night; that way I can give him a chance to work with me during the show as well, and not have to worry about how the system was put together," states Nelson.

#### House System

Nelson mixes Kenny Loggins' show on a pair of Harrison "Alive" consoles provided by A-1 Audio. Modified for A-1 by John Windt, the consoles are patched together with custom multi-pair patchbays, and a total of 56 inputs are in use. All auxiliary effects

devices are connected with two 38-pair snakes. The six effects racks serve as a solid foundation for the console, and are filled with a variety of processing gear.

"I love effects!" enthused Nelson. "Every time I go on the road, I add more." Outboard equipment used included two Roland SDE-3000 digital delays, AMS RMX-16 reverb, two Yamaha SPX90s, Yamaha REV7, Lexicon Prime Time II digital delay, and several racks of dbx Series 900 limiters, noise gates and de-essers.

The house speaker system supplied to Loggins is A-1 Audio's VIP setup, a proprietary three-way, two-box rig. Horn-loaded bass cabinets house a pair of Gauss 4583 15-inch woofers for low end. A second cabinet contains two JBL 2350 radial horns loaded with JBL 2482 and TAD 4001 2-inch compression drivers and a curved array of eight JBL 2402 super-high frequency tweeters supplying the top end of the tri-amped system.

Incorporated in each loudspeaker cabinet is a BGW 750 power amplifier, thus reducing the amount of cable used between amps and speakers, more efficiently transmitting the system drive power.

Specially-implemented with this touring system for Kenny Loggins is a set of Meyer Sound Laboratories 2- x 18-inch subwoofers. The main mix signal is taken from the Yamaha F1030 crossover and fed through an auxiliary send to a foot-controlled volume pedal. From there, the signal is sent to a dbx 500 Sub-Harmonic Synthesizer unit, and on to the subwoofers. The dbx unit takes the signal and lowers it an extra octave, while the foot pedal controls the level of the subwoofer send. "Any low-frequency cabinet can be made to sound good in these situations," states house mixer Terry Nelson, "but I like to use the subs as an added effect, to enhance the music and drive home a particular point."

### Stage Monitor System

For Kenny Loggins, a pair of Soundcraft 800B consoles with custom flip-up rear patchbays are slaved together for a combined total of 64 inputs and 12 outputs. One central patchbay simplifies setup and teardown with the use of multi-pin patch facilities. All electronics racks, stage snakes and house snakes are comparably equipped.

"I like this setup a lot," notes monitor mixer Alan Richardson. "It goes together really fast. We usually get on stage and are all set up within two hours." All stage line patching is done at the one location, including outputs to the monitor amp racks. "We only

—CONTINUED ON PAGE 308

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## RON DANTE

### PERSEVERANCE PAYS OFF

by Brooke Sheffield Comer

Once a \$50-a-week songwriter for Don Kirschner, Ron Dante survived to become a first-call session singer, lead vocalist for The Archies and eventually a top producer, in demand by the likes of Barry Manilow, Cher, Pat Benatar, and Dionne Warwick. In short, his is a classic success story. Not only do his efforts provide a lesson in perseverance, but his prowess in the art of production, gleaned from studio experimentation in the '60s, offer unique insights into two decades of change in the recording industry.

Admittedly, competition in the early '60s music business was not as intense as it is today. A more solidified structure, strengthened by publishing houses who hired stables of staff singers and writers, gave young opportunists a more concrete starting point. But even then, the teenaged Dante had to fight to get a foot in the door. "I used to cut classes in high school, come in from Staten Island, and spend all day

at the Brill Building (then the music publishing center of New York)," he recalls. "I'd take my guitar, start at the top floor, and audition my way down. Most of the time, people threw me out, but nothing could stop me. I figured, 'tomorrow I'll be better,' and I waited for a break."

Dante got his chance when Charlie Coppleman introduced him to Don Kirschner. "I'd become friendly with a secretary in Don's office," he explains, "and she brought me to Charlie, who at the time was a staff writer and singer there. We got along, and he arranged for my subsequent audition for Don. I was a nervous wreck, because all the writers and singers were standing around, but they liked some of my songs, and I was signed on for \$50 a week."

From the start, Dante recognized the value of paying close attention to his colleagues at work. "I'd go into the studio, put down my lead vocal track, but instead of leaving afterwards, I'd stick around," he says. "I found that everybody had their own technique.

No one's idea of a drum sound was the same. I even found drastic differences in the way people socialized. A lot of maniacal songwriters were making demos in those days. I saw some of them break the glass between the studio and the control room because they didn't like a take."

Dante, whose producer-potential was just developing, found the diversity in techniques educational. And when his own vocals began to suffer at the hands of producers bent on trying recording techniques they hadn't mastered, Dante took it upon himself to learn studio craft. "Experimentation in the studio created some terrible recordings," Dante recalls. "My own vocals were done so badly sometimes that I learned to record myself out of necessity. That's why my greatest attribute as a producer today is getting a good vocal sound, be it lead or background."

Session dates fortified Dante's future as a producer, but his goal in the mid-'60s was still a solo career. As lead singer for Don Kirschner's creation,

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The Archies, Dante earned his first hit single, but because it was a buy-out deal, even when "Sugar, Sugar" hit 12 million sales, Dante wasn't set for life. "But it was a great experience," he recalls. "Working with The Archies put me in touch with session greats like David Spinoza and Hugh McCracken, who are still writing and arranging today." "Sugar, Sugar" broke not only sales records, but also Dante's career. "I stayed in town after The Archies' sessions because you can't take a cartoon on the road," he explains. "During that time, I did four or five commercials a day for five straight years, working with every jingle house in the city, with other session singers who wanted to break into solo careers. I remember one date with Barry Manilow, Melissa Manchester, and Ashford and Simpson. We were all trying to get our feet wet."

Dante developed his own criterion for good production standards from the "never ending line of people who produced me. Every time the record would come out, I'd sound too low in the mix, or too high. Out of necessity, I had to find a better mix for my voice. That's why I work so well with singers now. I learned how to put a voice up front. I'd have preferred to work on guitar-oriented records, but I was successful with vocals, and I couldn't walk

away from a great project."

Barry Manilow's "Mandy" was one of Dante's first successful production projects, as well as one of the first MOR ballads to break nationally in an era of hard rock. "At first, 'Mandy' was an uptempo song," he remembers "but Barry and I saw that we could slow it down and make it into a ballad. When it hit number one, no one had heard a ballad projected in such a way; it was like a breath of fresh air."

On the other hand, Dante knew when *not* to push a ballad, too. "When Pat Benatar's manager called me to see her showcase, Pat was singing ballads," he says. "I saw her as the black-haired Blondie. It was her 'love me or I'll kick your teeth in' attitude that I wanted to promote, so we did 'Heartbreaker' and 'You Better Run, and it worked. The ballads she was originally singing weren't as effective in promoting a marketable image." Dante believes there was a special quality surrounding the music of the late '60s and early '70s, but that part of that quality is irretrievable, since the techno-explosion of the early '80s put more electronic equipment and more tracks in virtually every studio in America. "In the '60s, tape had a bigger sound," Dante explains. "There was the same 2-inch tape we use today, but with fewer tracks, you got more

sound out of it. That sound was fatter, with more punch, and the drums, bass and vocals sounded richer. To put more tracks on the tape, each track lost a little quality. Digital sound may capture more range, but there's a natural space that created a bigger sound, and that's missing now. You can hear it in hard rock records by Grand Funk Railroad and early Ted Nugent—that full, pounding rhythm.

"That was one of the advantages of the old days—there was less leaning on technique and more on what could be done naturally, which stimulated creativity tremendously. It made people work harder, and it made music less predictable. In the late '60s, you never knew what the next sound on the radio would be. 'Sugar, Sugar,' 'Aquarius,' by the 5th Dimension, and 'Honky Tonk Woman' by the Stones were the number one, two and three records of the year, which is quite a diversity.

"Nobody said, back in 1968, 'you can't make that sound, it hasn't sampled yet,'" Dante continues. "So we would try anything. I've used fire extinguishers on my records. I had people slamming their feet into boards, and shaking packs of sugar into the mic. Once someone dropped a guitar in a session, and the producer came out and said, 'Can you drop that on

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four of each bar?' Today they'd just sample it."

Not only production techniques, but engineering has changed the sound of records today, according to Dante. "In the '70s, engineers watched the artist, and they watched their dials. Now they watch the computer to show them the noise ratio scope on the screen. The voice can be barreling over the track because the singer is singing louder, but the scope won't register that. But I have tremendous respect for engineers today, and all that they've had to learn in terms of feeding information into the computer. Studios today are capable of taking technique far."

Dante has watched recording technology make giant strides. "Studios today have become like *2001*," he notes. "Everybody has harmonizers, digital delays, synths and outboard gear that isn't built into a computerized console. Even small studios have incredible equipment. They have to, to compete. Just in the recent years, there's been a tremendous flux in the studio industry. Some of the best studios five years ago have gone under, and I think the studio of the future will have a modular design. You'll walk in with your Mirage sampler and plug it into the board, which will be compatible with all formats."

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"I stayed in town after The Archies sessions because you can't take a cartoon on the road. During that time I did four or five commercials a day for five straight years."

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Because Dante travels back and forth between his homes in Manhattan and Los Angeles, he's got extensive studio experience in studios on both coasts. His preferences in the

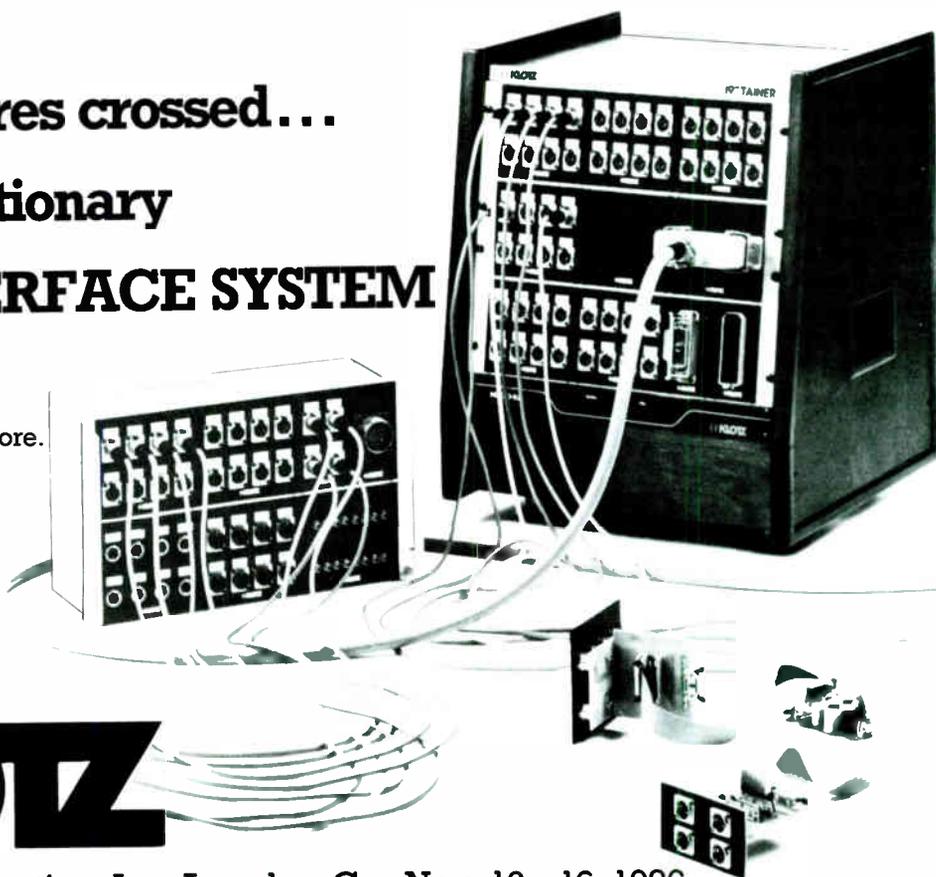
east run toward Power Station and Media Sound, the former because "Tony Bongiovi opened the room with an engineer's eye. He built the best sounding room for singers, with a dome ceiling." Bongiovi's standards were no doubt affected by his previous work at Media Sound, "the best singing room in New York, bar none," Dante says. "Tony took the same great acoustics that singers love to work in and built it into a new studio."

"The sound that you hear in New York studios is true, too. When I work in L.A., I take tapes home and find a different mix than I heard before. In New York, I can take the tape anywhere, listen to it, and I don't want to slit my throat."

Los Angeles studio sound notwithstanding, Dante is currently working with West Coast-based artist Roo Morgan, whose debut LP is titled *At The Beach*. Though Dante admits that his background has linked him to "sweet sounding voices," Dante says his dream is to produce a hard rock act, "maybe Journey, or the Stones." And well he may. "The music industry is a fresh business," he notes. "Top producers are relatively young. It's a business of longevity, and people in the production end last. If you hang in long enough, you get what you want." ■

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## THE Laser Turntable

### RAY OF HOPE FOR THE LP?

by Philip De Lancia

The laser is certainly among the most powerful and versatile technological tools to emerge this century. In the prerecorded music industry, lasers have made possible the success of digital audio at the consumer level in the form of the compact disc. Through their use in thermal magnetic duplication (see last month's AfterMix), lasers may also soon be playing an important role in software production for rotary head digital audio tape (R-DAT). And in the realm of analog audio, a small firm in Sunnyvale, California has been working on applying laser technology to a prerecorded music format that has achieved software distribution perhaps 1,000 times greater to date than that of the CD. The firm is Finial

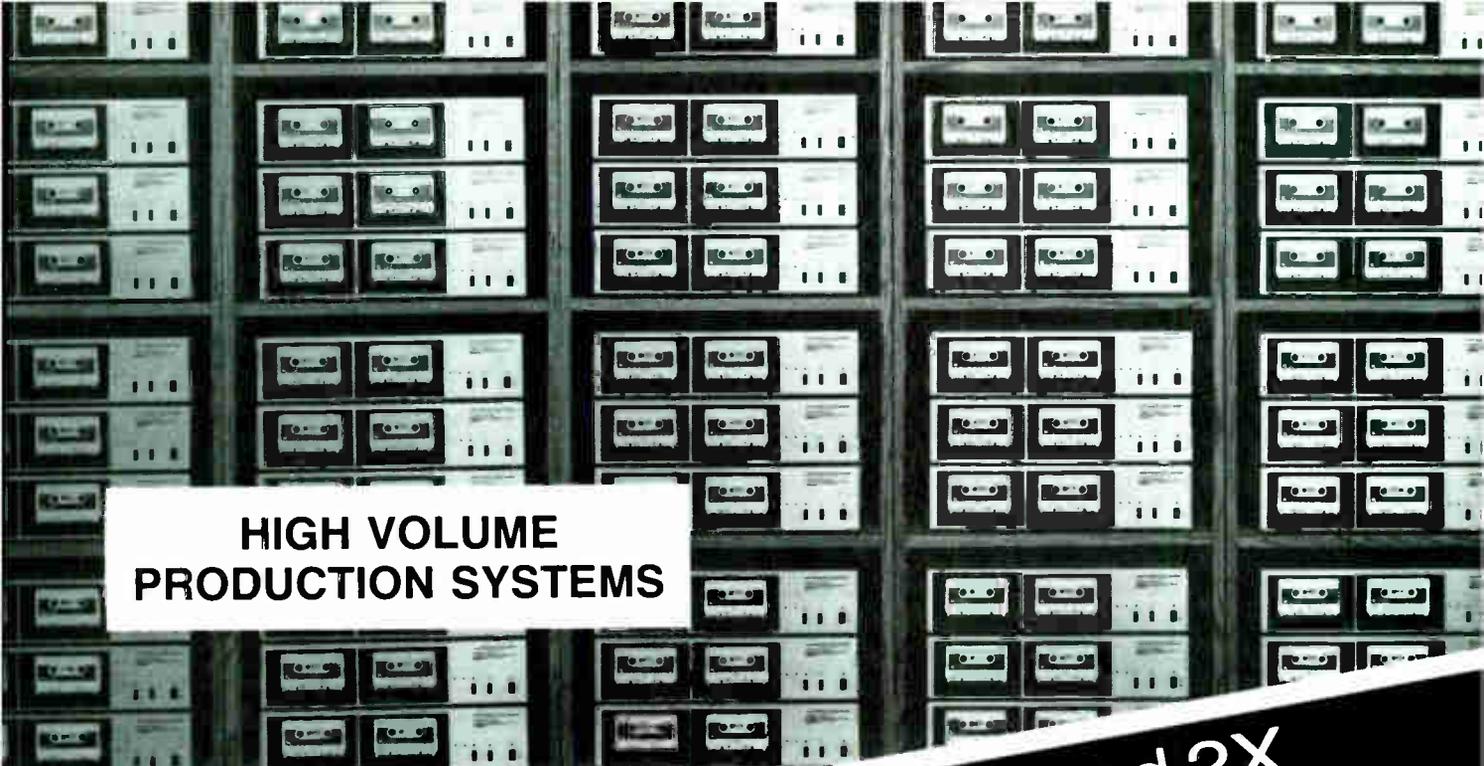
Technology, the format is the vinyl LP and the product is the Laser Turntable.

As the name implies, the Laser Turntable is a record player in which optics replace mechanics as a means of extracting information from the groove. Gone are the stylus, cartridge and tone arm of conventional turntable designs. In their place (according to Finial's literature) are solid state laser diodes guided by "a combination of closed loop servo-tracking and micro-positioning systems." The location of the groove is optically sensed by a "high speed digital micro controller chip," which regulates the movement of the light beams. Beams are reflected from the groove, read and converted into program signal. The player's platter is belt driven by a computer disk drive microstepping motor, which is said to enable extremely precise con-

trol of positioning and velocity.

Finial Technology claims many important advantages for their system over standard turntables. The elimination of physical contact between player and disc is obviously a big plus in terms of record longevity. Worn records reputedly sound better because the beams are able to pick up program from the least worn areas of the groove wall. The system is also claimed to be less susceptible to ticking and popping, immune to skipping and able to leap tall warps in a single bound (thanks to its height servo system). Records in perfect condition are supposed to sound better as well, with improved frequency response and reduced distortion. The player also offers such convenience features as full programmability and front loading.

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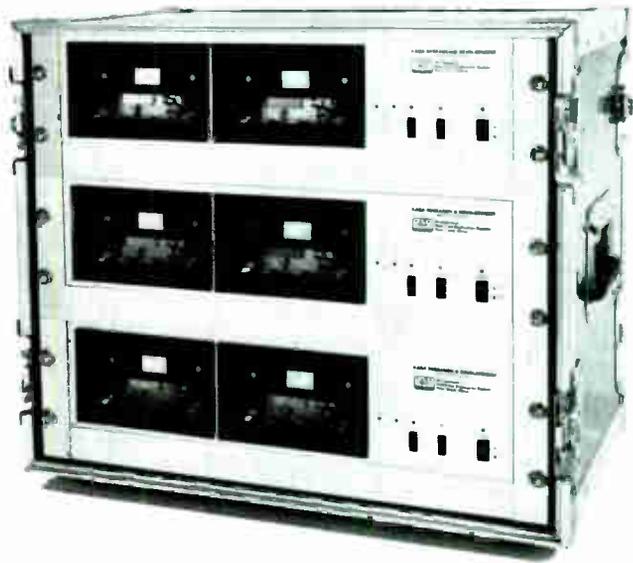
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one obvious flaw (the suggested list price of \$2,500), the Laser Turntable looks intriguing on paper. To get beyond the general description found in Finial's press packet, I contacted the company and spoke with Michael May, marketing manager. Unfortunately, much of the technology developed by Finial for the player is "patent pending," meaning that the company is very reluctant to reveal much in the way of details on how their system actually functions. After attempting to clarify a few technical points within

groove of interest and staying at the proper distance. The height servo system is just keeping that distance very accurate between the groove and the sensor. So the systems are tied together, but it's a subsystem, a different servo, which is actually doing the height servoing, moving the laser up and down.

**Mix:** Is the information upon which the adjustments in height are based coming from the same two beams which read program?

**May:** Yes. Of course, there are limits. We're not really addressing ourselves to things which are completely out of the norm. We're looking at everyday playing: improving things at the inner diameters, tracking more accurately. Those are the areas where we really will shine. The response to transients is phenomenal because you don't have the inertia of the tone arm. You still have servos that have to start and stop, but those are much faster.

**Mix:** Do you foresee any professional applications, aside from radio stations and dance clubs, for the new system?

**May:** Yes. Getting smart about how records are cut and made was a key part of understanding what we needed to do. So, from very early on we tapped various industry professionals, including Fred Catero [recording engineer; owner of Catero Records]. And one day Fred said, "It really would be wonderful if I didn't have to send my lacquer masters off to get test pressings just to find out if they are all right. It would save me time and money if I had a player that I could use to play the lacquers." It would have to be able to take a 14-inch disc, but there is really no reason we couldn't do that. It's a small market, and we would have to assess whether it makes sense from a business perspective, but technically, we've developed the technology and we can make variations on it.

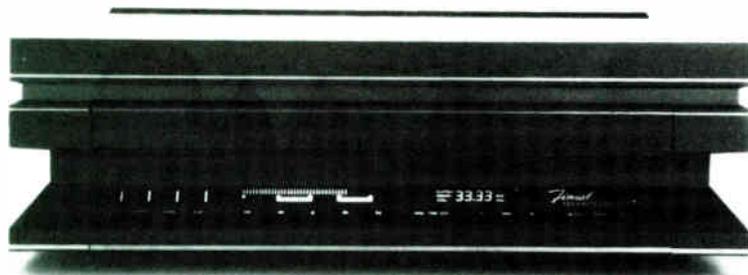
**Mix:** Assuming that the Laser Turntable has superior tracking ability, some of the tracking problems for conventional players that you would be listening for might not show up when listening to the lacquer by laser.

**May:** That is something we would have to consider. Maybe you wouldn't get a useful representation, assuming that everybody is still using conventional turntables.

**Mix:** Is it likely that these units could ever be manufactured in models that could sell at a price, say under \$400, that would allow everybody to have a laser turntable?

**May:** It's really a matter of economies of scale, volume and time. The beauty of the system is that it isn't so complicated that it's always going to cost \$2,500. It's similar in complexity to a video laser disc player. It's the same kind of thing: a sort of disc drive tracking system and laser reading systems. You have the same kind of stresses and the same kind of parts and development that goes into that. So Pioneer or somebody like that could take this thing with their existing factory and, with the right kind of development, get the price down there. I think you will see that happen. There are no

*Finial Technology Laser Turntable front view*



this restriction, May and I moved on to discuss Finial's plans for the product, as well as the effect, if any, of the industry's current format trends on his company's goals.

**Mix:** Explain as much as you are able to about how the beams work to pick up program from the groove.

**May:** The system has two beams, one for each channel. Those are the only beams used, both for extracting the music and for tracking. These come from basically the same laser diodes that CDs are using. Of course, it's a different optics head or optics package than the CD because we're talking analog.

The light reflects back from the groove to the sensors which convert the signal into music. [Changes in the reflection are converted into changes in voltage.] The actual characteristics of the reflections is where our formula is. We tried 13 or 14 different techniques before we hit the one that worked well, although there were others that worked moderately well. There are a lot of different ways to approach it in terms of how you aim the lasers, what kind of characteristics you use, what you look for and what you look at.

**Mix:** What is the relationship between the height servo system [which allows playing warped records, within limits] and the extraction and tracking systems?

**May:** The systems are all tied together because it's all part of staying over the

**May:** Yes. There is no feeler. All you have is those reflections, which are the player's interface with the record.

**Mix:** How does the system distinguish between height variations that are part of the program (groove depth changes) and those that result from warping?

**May:** I would have to tell you how we read the groove in order to explain that. You have to be careful about making assumptions about how the groove is read. There is no problem as far as getting confused between music content and height.

**Mix:** Explain the claim that this player gives better frequency response than conventional turntables.

**May:** There are none of the mechanical resonances that you have to deal with in a stylus. Any time you have a mechanical element, it's going to resonate. Better styli resonate less than others, but they are still mechanical. They have the contact against the record, dragging along at high pressure. When you pull that out of the equation, and you have no resonances, then you can have a truly flat frequency response. You can choose the shape and size of the laser footprint you use so that you have flat frequency response out to 20kHz.

**Mix:** Has the player demonstrated the ability to track passages, especially at inner diameters, which are difficult for conventional turntables to track without edginess and distortion?

inherent technological obstacles to having a model for the mainstream consumer.

**Mix:** What would be your guess as to how soon we might be seeing something like that?

**May:** It depends on many different things. It's technically feasible at any time. But it's a function of who gets involved, how many are sold, whether people are licensing the technology and what the reaction is to the product. You're probably not going to see one that cheap for at least two years, and it could be longer than that. The typical evolution of that process is probably represented by CD players and VCRs—five or six years.

**Mix:** Your immediate plans call for manufacturing in your own facility here in the U.S. Is that just an initial phase to prove the feasibility of the system, after which you may license the technology to some manufacturer or group of manufacturers for mass production?

**May:** Our strength is innovation. I think that will continue to be our strength. We are certainly set up and capable here for manufacturing in low or moderate volume. Over time, we could grow and become a higher volume manufacturer, but realistically our position is that we're good in innovation and in the high end, and we want to maintain that. There are a number of companies, Japanese and others, that have expressed interest in either licensing or joint partner relationships. There are certainly a lot of different routes that we can go as far as the laser turntable becoming more of a high volume, mass market product. As far as exactly what strategy, which company and how soon, that's all still dynamic.

**Mix:** Regarding the models to be manufactured by Finial itself, who do you see as the market for a turntable that costs \$2,500?

**May:** Different people have their various vices. There are a fairly sizeable number of audiophiles that currently buy \$2,500 turntables. Those are our initial customers. I think there are also a fair number of people who typically have not perceived a difference between a \$400 and a \$2,400 turntable. But, what our \$2,500 turntable offers them that they don't get from another, besides superb sound, is that it doesn't wear out their precious record collection. So our market will be audiophiles, music lovers and record collectors.

**Mix:** When will your first production models be available in stores?

**May:** We're looking at slowly rolling

things out towards the end of the year. We've shown prototypes, but there are certain aspects of software and front panel controls that have to be completed before we're ready. We'll start production when we finish up some of those final developments. We won't release the product until it's right.

**Mix:** What are your thoughts on how the player fits into the overall context of the current struggles in the music industry between competing product distribution formats, such as cassettes, LPs and CDs?

**May:** The important factor for us is that there are billions of records out there already in people's collections, and they are still buying around 200 million yearly. Maybe that goes down some, but there is still a need for a no contact system of playing those records. It's both for the records people are still buying and the ones they have had around and consider part of their history from the '60s and '70s. That's important. There really does seem to be a need that we can fill with this product. It's not just a super technology that's past it's time.

#### Notes

The Dub Centre, Inc. of Owings Mills, Maryland has expanded its video and audio duplication facility. Vid-

eo decks now on-line at the plant include four one-inch (Ampex and Sony), nine 2-inch Quad (RCA), 70 3/4-inch (Sony) and 260 half-inch (200 Panasonic VHS; 60 Beta). An audio expansion is in process as well, which will allow the company to offer both high volume cassette and reel-to-reel high speed duplication. The Dub Centre also plans to include free pickup of masters from anywhere in the country and 24 to 48 hour turnaround in its client services.

\* \* \*

Larry Rallo, audio/video marketing manager for BASF Corporation Information Systems has announced the introduction of BASF 8mm video cassettes in 30, 60, 90 and 120 minute lengths. "While we don't see this developing as a major market," Rallo said, "we will continue to offer our retailers a complete range of choices of video and audio cassettes."

\* \* \*

Ampex Magnetic Tape Division has prepared a brief news release designed to aid duplicators in selecting appropriate tape stocks for their audio duplication projects. Information is available through Bob Griffin at (212) 255-8491, or from Jerry Campbell, audio product manager, at (415) 367-3888. ■

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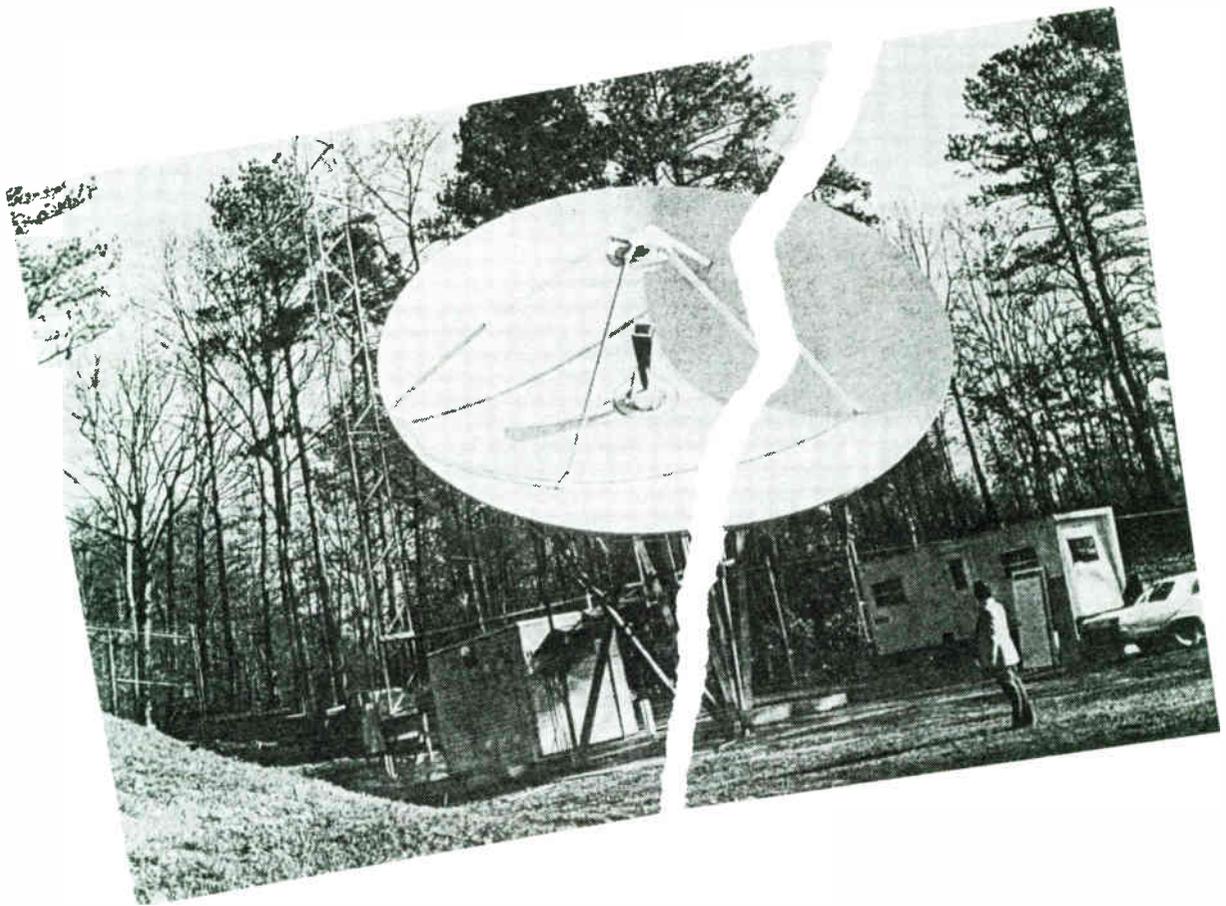
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# PIRACY!

## A FICTION

by Neal Weinstock

Deep in the Central American rain forest, atop what may well be an overgrown pyramid, stands an earth station with a 22-foot dish. Just below is a tin-roofed duplication studio furnished with several compact disc players, audio and videocassette recorders, and thousands of tapes. Next door is a printing and packaging plant. All is guarded by an army of former Nicaraguans, with capital investment by the U.S. government. It is one of many such record and tape piracy operations in the hemisphere. This is its story.

Somewhere between Mexico City and Managua. Bright sunshine and shady goings on, like Raymond Chandler's L.A. except more Spanish spoken and less blacktop. The rain forest: seemingly limitless living and dying, instantaneously easy to get lost in, to die in, be reborn in. It is where gringos go to loose their way.

Your eyewitness happened to be there accompanying a lovely archae-

ologist on vacation, having emerged from the jungles of antiquity to take a bath in town. The town, like its people, is dirty, small, poor, and though perhaps young, totters in advanced decrepitude. The people are used to existing as a painted backdrop to history.

El Paradiso, the capital of a similarly named province, is the painted backdrop to this gringo story. Because our gringo jeep was slightly vandalized, we were in the National Guard station one night, filling out forms. Routine. The night duty cop was helpful, efficient and kind.

"What does this have to do with the record industry?" asked a woman in a white fur jacket (it gets cold in the evening in the mountains), in an indeterminately middle European voice as she emerged from a back room and put her arm around the cop.

She had not long ago been very attractive, had the exaggerated presence of a Gabor sister, and very nervous eyes. "You are American? Oh," a nibble on the cop's ear, "you are

North American," she corrected. "They like to call Americans 'North Americans' around here. You are North Americans? Hello. Welcome to paradise. I am not American, North American or South American. I am three countries: Hungary, Germany, Austria. Three passports. I speak 12 languages. How many languages you speak? I speak Spanish, English, German, Russian, French, Italian. . . I forget the others. Hungarian, of course. What is your business? You have to put it on the form here."

"I write about the record business," I said. "Why did you mention it?"

"Journalist? You are journalist? Welcome to my story. I am the much successful journalist in Europe."

The opportunity for parallelism couldn't be passed up so I called myself the much successful journalist in America. Success may be measured in so many ways.

"Yes?" she said. "I have two million marks in the year. One million dollars. How much you?" Well, she had me

beat there. "You have one jeep? Also I have one jeep, and these two Porsche, different numbers. They are all red. What color is your jeep?"

Red, of course.

"Ach, we are very same. I work for..." She named a large German tabloid chain. I told her the name of the lurid rag I write for in New York. As long as her English was so lousy, I switched into German that was no better, which allowed her to grow more confidential. No one else would understand now, and she was all too eager to tell an outrageous tale of corruption, spying, smuggling, and record piracy. Why tell me?

I kept wondering, as I more than half decided she was merely crazy. She said the only safe place for her in El Paradiso was this army station, which stayed open all night; in a hotel she was afraid she would not live through the night. From the duty cop's attitude toward her while she confided in a gringo in a language he didn't understand, I wondered if she'd traded sex for the night, then decided she was smart enough to have promised it later. He watched her with an anxious hunter's glance, not anything satisfied and proprietary.

Her daughter might be dead, she sobbed. For days threats had been mailed to the daughter in Stuttgart, then they'd come by telephone, then in person. Because her mother had film, and conversations on tape. The million dollar most successful journalist bit, explained: that was what she would sell her story for. Well, the publisher had once been very nice to her, given her the two Porsches, promoted her from secretary to correspondent. Of course, there were things a woman had to do for such promotions. Anyway, now she had the greatest story of the year. She only hoped her daughter was alive. She wept on my shoulder.

The lovely archaeologist understood something of what was going on, though she does not understand German. She dutifully engaged the cop in conversation and took care of our accident report.

Europe's most successful journalist had started on the trail in a Hamburg nightclub. She'd just broken up with her friend the publisher, and was going home with the nightclub owner. He had to make a stop, at his record distributing business on the way—it was 7 a.m. While waiting for him at her car, parked inside his warehouse, she watched the unloading of a shipment of album cassettes, hashish and cocaine, all off the same truck. It all came through Lisbon from Brazil, her friend told her. Now, drugs were something she would never investigate—believed they should be as available

as tobacco and alcohol—but the records were something else. They were packaged as well as any legal recordings she'd ever seen, and there were thousands of them. Later that morning, the nightclub owner was casually caused to drop the information that he mixed in about 40 percent bootlegs among the records he distributed. And his is one of the largest record distribution companies in northern Germany.

She followed the trail to Lisbon, generally known as one of the world's current smuggling capitals (recently eclipsing even such an active competitor as Hamburg). She had little difficulty digging up data.

—FROM PAGE 281, HORNS

Horns. Thorne "felt strongly that our sound would be a nice contrast and would mix in well with the synth sounds," says Cioe, adding that the producer decided where the horns would go and let the foursome come up with the parts. Hecht adds that on some records the Uptown Horns are the only acoustic instruments other than vocals; their value is increased as they add a "human touch" to the sound.

When pressed to characterize the section's sound, Cioe says it's a combination of the flat-out drive of rock and roll and the more sophisticated syncopations of classic R&B. James Brown's *Living in America* is a good illustration of their approach and sound, he says. "We did those arrangements," says the man who claims to own every James Brown record ever made. "Our color is very beefy; that's the rock side. But because it was James Brown, we had to come up with syncopated parts, too."

"We've played together for a long time, like a rhythm section," Hecht explains. "We try to keep things fresh so people don't say, 'Oh, there's an Uptown Horns lick.'"

Bob Funk: "The physics, the actual harmonics and the tone structure of our sound are unique."

Paul Litteral: "We never sat down and decided we were going to sound a certain way. We played a lot of different kinds of music and let our sound evolve."

The unit hasn't been totally dependent on other artists' material; they've all been composing since they assembled seven years ago, intending to make their own records. Although it was tough to sell record companies on a band fronted by four horn players, EMI/U.K. took a shot. They recorded an album in England from which a single, "Sex With My Ex (Sent Me to the Chiropractor)," was released

The club owner was misinformed: his hashish came from Morocco. His records and cocaine did come from the wide-open port of Belem. But this Belem was at the mouth of the Amazon, not the Belem that is a suburb of Lisbon and has a big holy shrine. There had been some confusion. She had hunted around for a contact in a monastery, but soon found herself, she said, stowed away in a rust-bucket boat to Brazil.

There she schmoozed around the river barges and shanties in which business and pleasure mingle, and discovered that the airport was largely occupied with unloading electronics



*The Uptown Horns (L-R) Arno Hecht, Crispin Cioe, Bob Funk (rear) and Paul Litteral.*

in 1984, but a corporate shakeup left the album to gather dust on the "unreleased" shelf. The band acquired the rights to those tracks and released them in May on their own independent label, Roadside Records.

They're contemplating some gigs on the East Coast with a revised version of their own band this summer, but those dates will have to be squeezed between the slew of sessions the Horns are booked for, including Billy Idol, Debbie Harry, Dan Hartman and pugilist/rapper Hector "Macho" Camacho. They enjoy being in demand; they like the personal involvement with artists it brings. And as Paul Litteral says, "We want to stretch that involvement further—like use their cars, houses."

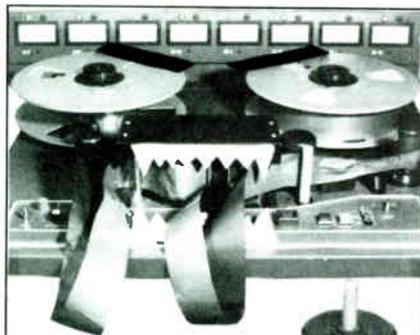
"We want to move *in* with people," Cioe chimes in. "It's never been done by a horn section before." ■



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from Miami (VCRs, hi-fi's, TVs and computers) and transferring cocaine barged from upriver to those C-130s and DC-3s for the trip back to Florida. By sea went coffee, minerals, and more cocaine, to Lisbon as well as to Florida, Texas, and New York. Where were the records? This was a bigger secret than the drug traffic, until she actually went to the airport and, through her camera's 1000 mm lens from beyond a barbed-wire fence, noticed all the blank video and audio cassettes being unloaded. There were far many more boxes of cassettes than of equipment. These were trucked along with the electronics to a warehouse on a floating dock (everything is on or near the river in Belem.)

In public records she found who owned the warehouse: a corporation mostly owned by a bank. It is not hard for a European with money to gain introduction to a bank chairman, the upper class of Belem being so small, and soon she was dancing with him at a disco he part owned. Not long after he told her about his recording studio. It was near the warehouse; they visited it. Original samba records were recorded there, however and a lot more American hits were duplicated. A printing plant for labels was nearby, too. When she asked him about piracy, she was surprised by the answer.

He was very concerned about bootlegging; it was a big problem, he admitted. His company was a legitimate distributor for several record labels in the north of Brazil, but now many pirated tapes were coming into the country from Central America. Things were getting set up there on a big scale, with a lot of Yankee money. It was just like the way the cocaine businesses were set up in Bolivia and Colombia, he said: private armies were created with capital from World Bank loans, U.S. and European aid and the CIA, then kept in power and expanded by running contraband. In the Andes, the natural contraband was cocaine; in Central America now audio and video software was a natural resource. With an earth station there—but not in Brazil, he complained, it was too far away—you could pick up the American television and radio signals, and get a much better duplicate than can be had from most records and tapes. And they had a big organization of Contras now in Honduras, Guatemala, Salvador, even Costa Rica and Panama, to push the product back to North America and into South America, too. "Contra" doesn't mean they are against Nicaragua, he told her, it is short for "contrabando."

"It's not just that their copies are better," he told her. With a compact disc master, they can make very good boot-

leg albums in Brazil, too—though there is no way to compete in video quality. "It is also that with their big organizations we cannot stop them from competing with us, and it means less profit." Before the competition, distributors in Brazil were content to sell bootleg copies of about half of their sales of any hit, and to sell the rest completely legitimately. This would preserve their relationships with the record labels who licensed the product, yet allow them to sell a product at a competitive price. Now they had to sell over 90 percent bootlegs, and it took a lot of money in payoffs to the representatives of the American labels in Rio and Sao Paulo to keep things quiet. The banker was thinking about getting out of the video business entirely, like he'd got out of the cocaine business a few years ago. "There are too many gangsters to compete with," he said. But he'd keep distributing records for a while, because of the convenience of the compact disc.

She trusted me with this information partly because I knew something about it already, having done a couple of stories about electronics smuggling in and out of the U.S., and about worldwide piracy. Indeed, we knew a few of the same people. Because of the coincidence of running into a journalist who had done similar research, there in the rain forest, she trusted me even more.

Her puffy, jumpy eyes and facial muscles were a result of not having slept for days. Two weeks before, she had landed in "Tegoose," as American soldiers and CIA operatives call the capital of Honduras, and from all the crew-cut Americans on the streets, she said she would have thought she was in New Orleans. She would not tell me just how she had gotten from Honduras to here, since this was the meat of her million dollar story. Trust between journalists has its limits. However, she did allow me to guess that her undeveloped film bore images of well-known Contras, well-known North Americans, earth stations, duplicating facilities, and many, many guns and cassettes.

A phone rang. The wild, hunted look came over her. "Let's go dancing, yes?" she said as soon as the cop turned to answer the ring. She locked her arms in mine and the archaeologist's and pulled us toward the door.

But there was a guard in front of the door, young, short and holding a rifle. Before, we had spoken our gringo languages so as not to be understood; now that we needed understanding he understood his duty all too well. The phone was ringing. Eventually the duty cop picked it up, said yes a few times, then hung up and said to us that he was sorry, we were not allowed

to leave. Routinely, as always happens at about this time of night at this time of year in the province of Paradiso, it suddenly began to rain very hard.

I demanded to be told why we were being detained, though I did not expect to be told. I was wrong. The polite answer was, "Soon there will be a telephone call for you." He only had eyes for her, but was so genuinely sorry that he could hardly bear to look at the angry, frightened face of Europe's most successful journalist. He said, "You watch some television, eh?" He flipped on a color Sony set, flipped past a couple of recent movies to MTV. "Our friends have the big dish not far away," he said proudly. "You see, nothing scrambled. You like porno? We have porno. Our friends, they have a big operation. Everybody knows about it here, but nobody else needs to know. You tell the lady. I am afraid she will say something to make them take away my MTV."

You know how when it's been very humid for a long time, and you are tightly squeezed with other humid people, say, sitting on a hard bench for several of the wee hours while forced heavy metal in a tropical police station, gradually your olfactory sense becomes very sharp? You know how usually you forget this is the case, and how between happenings like this you think it melodramatic to speak of "smelling fear"?

Finally the phone rang again. After saying yes a few times, the duty cop came toward us and said to her, "It is for you."

The conversation was in German. She tried to argue her publisher into letting her stay on the story, without success. "Oh, and I see that you're one of these crooks, and you not only put me out to pasture for younger women, you don't care if I get murdered here!" Finally, shouting, crying, vibrating, she slammed the phone down. There was silence all around but for her sobbing.

There was nothing for me to do but to ask the duty cop, "May we leave now?" He was about to answer affirmatively when she pulled a gun out of her purse, trained it on him, and told him not to move. Before he could say or do anything, one of the guards at the door unloaded his rifle into her.

Noises outside: people sloshing toward the guard station's gate. It was a group of politicians, conservative ministers and reporters, caught in the rain while on a public relations tour of the Contra camps. They asked that the television's channel be changed. The blood on the floor was in an inconspicuous spot. In a little while, we left with them for the comfort of our gringo hotel. ■

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by Elizabeth Rollins

**Next month AFI Sponsors Sixth Annual National Video Festival:** December 4 through 7 at the American Film Institute in Los Angeles, award-winning video from 18 countries and 25 broadcasting systems will be featured. (In '87, the show goes on the road to Washington, D.C., New York, Chicago, Boston, San Francisco, Paris and Turin.)

The technological evolution of television audio will be one the festival's central themes this year. Special seminars include "the Aesthetics of Television Sound," "The History of Rock Video" (a six-hour documentary by the BBC which features interviews with the likes of David Byrne and David Bowie), and "Before Music Videos: Soundies, Snaders and Scopitones," (which includes film juke box material from the '40s and '50s and '60s. Plus, more than 40 hours of rock, rhythm & blues and big band performances will be available on request through interactive video installations).

If you're interested in high definition television, don't miss the session that assembles practically everything that's been done to date in the new format, including programming from the U.S., Italy, France, Canada and Japan. Discussions with program creators will follow.

This festival gives Americans a unique opportunity to see our own television history from an international perspective, plus premiere and classic material from diverse cultures. Last year the fee for four days was \$75, but this year it may be a bit higher. Day passes can be purchased as well. For more information call the festival's director, Steven Ricci, at (213) 856-7787.

**Hardware Update: Sony D-1 Digital VTR; New Generation of EditDroid Interfaces to Tape; Spectra Image Edit System Gaining Strength in Hollywood TV:**

At the SMPTE convention in New York, Sony demonstrated for the second time their new D-1 digital audio and video tape recorder, which is scheduled to ship more than 50 units next March, according to Sony product manager Curtis Chan. The DVR-1000 tape transport and DVPC-1000 signal processor combine to form the

first system to embody the guidelines for component digital video that have been under discussion since 1980, when CCIR drafted Recommendation 601 in an effort to agree upon a worldwide standard for digital recording.

Recently the Society's Working Group on Digital Television Recording, the Video Recording and Reproduction Technology Committee and the Standards Committee all approved fundamental parameters of the D-1 component format. The main attractions to most producers who will be using the new Sony system are the fact that there are no significant signal degradation for up to 20 generations, plus maximum picture manipulation capability for executing and compositing special effects. Four channels of digital audio will certainly come in handy in the age of broadcast stereo and hi-fi home entertainment, as well.

The component standard itself is referred to as the 4:2:2, which divides

the sampling frequencies into Y(13.5 MHz); R-Y(6.75 MHz); B-Y(6.75 MHz).

Lucasfilm company The Droidworks is issuing this month a new version of their electronic editing system the EditDroid. The Mark II will not only interface to optical video disc as its playback medium, but also to the Sony GCS-50 Super Hi-Fi Beta deck, and the JVC BR-8600U VHS deck. According to Droidworks product manager Ken Yas, Mark II, "will have a faster computer and a slightly different touchpad. It'll be more modular."

As for the 12 EditDroids out there in the field, Yas says owners can buy a serial-to-parallel box if they want to retrofit their optical disc-based systems to tape. Yas says he's demonstrating the "tapeDroid" at the company's North Hollywood office.

While EditDroid is trying to adapt to the realities of Hollywood television production, another electronic editing system that uses LaserDisc, has been

## MTV AWARDS SHOW

by Dan Daley

Last September, the growing sophistication of music video technology was prominently displayed on MTV's third annual Music Video Awards program, broadcast live from both coasts. But no matter how spectacular the video world becomes, the awards show also pointed up how critical some older-fashioned audio expertise can be.

Located between New York City's splendiferous Palladium and a satellite hovering in a geosynchronous orbit 22,600 miles above, bearded and bespectacled David Hewitt sits at the veteran API console in his Remote Recording Services truck, a sleek black semi connected by so many electronic intravenous tubes to the equally veteran music hall-turned-disco.

Hewitt's remote truck, based out of his home in Monsey in Westchester County, New York, blends a cross of high-tech and homey comfort. Above the large 1/4-inch patch bay, three rubber alligators stand (lie?) sentinel. "Our mascots," chuckles the avuncular Hewitt as he holds them up for display.

During the rehearsal/soundcheck, technical assistant Fritz Lang sits across from Hewitt, holding his finger over the "play" button on the cued-up Otari 2-track deck, where the backing tracks—known as music-minus tracks—are ready to go. Up on one of the living room-style color monitors, Tina Turner checks her stage directions with the disembodied voice of the director. "Let's go, Tina," says the voice, a hint of edgy weariness audible through the custom Westlake speakers on either side of the screen. Lang's finger comes down and Turner launches into "Typical Male," and even the jaded stage crews visible in the long shots are mesmerized by what a little discipline can do for a 47-year-young body.

While a fan of live music, Lang's a pragmatist. "In the long run, it winds up being easier and smarter to use pre-recorded backing tracks," he says. "In TV, you can't afford the chance of feedback, especially with a gigantic PA in a small house like this."

Tina Turner is asked to do it one more time, and Lang points out some of the outboard equipment picked up for this gig. "There are two AMS reverbs, one set for digital delay, chorus-ing and doubling and another on a plate setting. We added a Neve com-

—CONTINUED ON PAGE 306

steadily making its mark at LaserEdit in Burbank for the past two years. The Beta test site facility offers 14 off-line bays equipped with Spectra Image editing systems, plus three Optical Disc Corporation 12-inch LaserDisc recording machines.

Spectra Edit VP of manufacturing, Michael Sayovitz, says testing at an active facility in the thick of the commercial television production community has been an efficient way to iron out the kinks that are inevitable with any new technology. "We've used this time to develop a philosophy of editing," says Sayovitz, "a long-term life for the system with expandability to fill any need that may come along with changes in ways of doing production." Sayovitz projects that his company will soon begin leasing systems around Burbank-Hollywood, but that full-scale manufacturing for sale is still a bit unrealistic.

At press time, LaserEdit was offlining ten episodic television series on Spectra Edit systems. The edit console uses a dedicated keyboard, and though the computer is off the shelf, the custom software has undergone a series of fine-tuning upgrades. The playback system uses a dual laser head, which enables A/B roll effects such as dissolves, off of one DRAW (direct read after write) disc. Access time to any

address on a 30-minute disc is two-thirds of a second. The resultant edit decision list then goes to on-line, where, for complex special effects, up to 16 one-inch type C machines can roll in simultaneously, with two CMX 300 and one 100 downstream switcher bundled. ADO and DVE are there too, though they're not used that frequently in straight episodic television.

LaserEdit offers time on their three Optical Disc Corp. machines, too. The price for one disc is \$300.

Compusonics Corporation (which has formally completed its move from Denver to Palo Alto, California) has made a foray into optical media, as well. Their DSP-1000 audio record/playback system, which ships into McIntosh Labs audio retailers this month, actually records up to two hours of digital material onto a specially formatted two-sided optical disc. You can also interface the DSP-1000 with an IBM or Macintosh computer for editing capability. The system retails for \$6,995 with double-sided discs at \$175 and singles for \$99.

**New Software For DVE:** At SMPTE in New York, NEC introduced a new software package for its DVE System 10 (Digital Video Effects) that offers pre-programmed special effects. The soft function buttons on the DVE 10 can automatically punch up transi-



*The CompuSonic DSP-1000 consumer digital disk recording/playback system stores up to one hour of stereo material on a floppy disk.*

tions such as Curl (which looks like the corner of a picture is being pulled across to the opposite page), Roll (looks like the image is being rolled under like a rug), and Fold or Peel (like pulling a piece of tape off a glass window). The package begins shipping this month.

**New Full Blown Computer Graphics/Animation System for Well Under \$200,000:** Last August in Dallas at SIGGRAPH, Vancouver-based Vertigo Systems International introduced its V-2000 Computer Animation System, which offers the following features: 2-D graphics capability, power extrusion of objects, object editing (includes a library of forms), scene choreography, high-speed rendering and

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compositing. The hardware is based on the Sun Microsystems 3/160S-4, and features up to six render accelerator boards, a frame buffer board to support video input/output and a video coder/decoder. The workstation consists of a vector display device, ASCII terminal, digitizing tablet, and mass storage devices. The base price of \$119,700 includes all software for modeling, animation and rendering; full blown with five more render accelerator cards the price runs up to \$176,200. Vertigo marketing director Doug Harrison says candidly that the V-2000 is meant to compete head to head with the Alias and Wavefront systems.

**Software Hardsell—Home Video Playing with the Big Boys:** The Video Software Dealer's Association started its annual meet five years ago largely on the strength of the kind of software that sold consistently at the dawn of VCR mania—X-rated films. In the last couple of years, these veteran vendors have been cordoned off the main VSDA exhibition floor—quarantined behind porn partitions—as mainstream and non-adult specialty product have flooded the marketplace.

At the 1986 VSDA at the Las Vegas Convention Center in August, (which pulled in about 9,900 people during four days) the beginnings of other significant shifts became evident. Home

—FROM PAGE 304, MTV

processor set on an easy 2:1 compression ratio to catch the peaks," he says. "And of course, it gets squashed again going to the satellite."

The send from Remote Recording's truck is fed to the video trucks parked behind it, after which it's sent out via 15K telephone lines through an uplink to the satellite.

"The great thing about the truck," says Lang, "is the way it's set up for doing television and radio broadcasts in addition to live recording or parking at someone's house and doing an album." Hewitt reaches over during a momentary break and pets one of the alligators. Lang smiles and says, "The thing that makes the truck unique is the console and the crew."

Hewitt looks over the eight-year-old API board. "It's a 44 by 44 with 96 mic lines running in, all patchable," he says. Custom designed by Hewitt and the Record Plant maintenance staff, "it's similar to the line of consoles they've put out over the years," says Hewitt. "The difference is the gain structure really. It's simply got a lot of headroom and a lot of beef. It's got fully redundant power supplies with automatic switchovers." He says the older technology of the board holds up in the applications he uses it for. "It's bulletproof," he laughs. "On a remote, you're only interested in what sounds good, and this is still one of the best sounding consoles out there."

"We have a Sony PCM701 which is modified to lock to video. It's a digital audio processor that stores information on digital Beta Hi-Fi and we use that for our log tapes. It's also handy for film and video dates because we can put the SMPTE code on the analog audio tracks and digital lock to video. It gives us a very clean safety. We did a shoot recently where they locked two of the 24-track tapes and all they had to use was our safety."

Hewitt viewed the MTV shoot as routine, finding fewer problems with esoteric satellite feeds than with routine RF annoyances in the intercom system. "We have maybe 150 people working on the show and keeping in touch is the hard part," he says. "You've got a big house with a lot of steel in there and we had to try a lot of systems before we found one that worked." He adds that using high-band Sennheisers alleviated a lot of the trouble.

The Remote Recording Services truck is rounded out with Bryston amps, Yamaha NS-10s, a full selection of mics, Lexicon PCM60, video interface patch bays, time code readers and distribution system and two color monitors.

And three rubber alligators. ■

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Circle #213 on Reader Service Card

video sales and rental is becoming increasingly attractive to the mass-merchandise, not just the Mom and Pop specialty store owner. Commtron video division VP Vern Fross was quoted on the front page of VSDA Show Daily as saying, "It's clear that the mass merchants of all types are well past the test marketing stage, and are now committing to video software in a big way, and though grocery store representatives aren't here at the show in any great numbers, I'd say that those outlets—as well as convenience stores—are going to make up the next big wave at retail." (Commtron Corporation of Des Moines, Iowa sells video software titles to wholesalers.)

**First Run Home Vid:** Karl-Lorimar, the company that brought you the Jane Fonda series, is experimenting with the direct-to-home-vid route. Instead of theatrically releasing a low-budget slasher feature that is estimated to return a marginal profit, the company has decided to place quarter-page ads in the Sunday movie section of large metropolitan area newspapers that announce the premiere of the movie *in your local video store*. Lorimar's new campaign stresses the VCR-owner-as-programmer of his own private TV station. In fact, the new logo is KLV-TV (Karl-Lorimar Video Television).

Vestron announced at VSDA '86 that this month they will be releasing the much publicized underwater footage of the Titanic taken last spring as part of their National Geographic tape series *before* the material airs on WTBS in February. This should be a boost to the ten-tape series priced at \$29.95, which one Vestron marketing person reports had started with slow sales, but is gradually building to be a constant catalog seller.

If more and more programming is released directly to the video store, marketing techniques are in for an overhaul; it's not just *TV Guide* anymore. With that in mind, Michael Nesmith's Pacific Arts Video is launching in January *Overview*, the first electronic monthly magazine for home entertainment. Unlike the smattering of consumer video review mags on the stands, *Overview* will be released on VHS tape and will supply two hours of reviews, clips and news stories about the latest titles at the unbelievable competitive price of \$3.95.

Obviously most people won't wade through two hours of linear programming in an in-store environment, but a new point-of-purchase interactive video kiosk will start appearing soon. The Videoviewer 5000 will let customers get a look at up to 100 30-second previews of titles, and about 5,000 still frames. The system costs \$7,900 which includes a new disc

every month for a year.

**Facility Notes:** In its 20th year of operation, Windsor Total Video of New York City has made some substantial upgrades: the Abekas A62 Digital Recorder has been interfaced with the graphic department's ADO, Paint Box and Mirage systems. A third CMX editing suite has been added recently, as well. Windsor has purchased the new Sony D-1 format digital video tape recorder, and expects to take delivery this spring. These hardware acquisitions are pushing the facility out of their current office space in mid-town Manhattan, and founders Bert Goodman and Bob Henderson are looking for a larger space for '87...

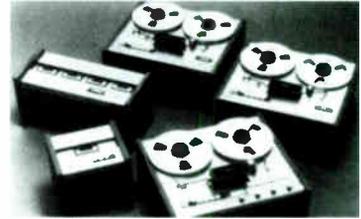
Video Tape Associates of Atlanta is busy outfitting its new building with a proprietary high-speed edit controller, manufactured by its subsidiary, VTA Technologies of Hollywood, Florida (who also brought you the Da Vinci Color Correction System early this year). Chief engineer John Conrad chose top of the line Ampex VPR-3s coupled with the Zeus signal processor because, "Our system requires VTRs that can meet or exceed its speed," according to Conrad. "The VPR-3's fast shuttle and recue times were major reasons for selecting them." VCA-Atlanta also bought three ADOs with a concentrator...

Hollywood has yet another new special effects and computer graphics/animation facility. Computer graphic artists Clayton Whitney and Scott Bergman have launched Mix Eflex with a Bosch FGS-4000 computer graphics animation system as the main attraction. The company is housed in one of Hollywood's most active production facilities, Pacific Video...

Positive Video, east of San Francisco in Orinda, CA scored a great job recently... Editor Glenn Schockley and designer George Murphy got to work with David Byrne on his new film *True Stories*. The team experimented with the Mirage system's floating viewpoint to matt live action video over background scenes that were shot on film. According to Byrne, who supervised the effects, "We made an attempt at this effect with an ADO in Los Angeles but it didn't look right because the ADO could not match the perspective and focal length of the background scene." Schockley used the fish eye shape within the Mirage to recreate effects for several camera angles in less time than was spent on the earlier attempt in L.A. The resulting video effects were later transferred to film and recomposited optically.

McHale Video Services of Honolulu, Hawaii has a new address: 1116 Auahi Street, Honolulu, Hawaii 96814. ■

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—FROM PAGE 291, LOGGINS

have to patch multipins; it takes hardly ten minutes and the whole system is together," Richardson adds.

Sixty lines of stage snake and 70 lines to the house mix position are patched here. Since all patches are done in one central location, they can be left intact between shows, thus simplifying the daily setup. A-1 owner Al Siniscal believes that the advantages of a central patchbay are numerous. "Using major interconnects and fewer XLR jumpers facilitates a faster setup, so load-in and load-out labor costs are reduced. By continually duplicating the same setup daily, patching errors are dramatically reduced. Finally, it improves the entire stage system cosmet-

ically, leaving very few bare wires visible. This all allows the engineer to concentrate on the quality of the sound, rather than constantly being in a mad dash to hook things up right. Hopefully, it allows more time to be creative and do a good show."

The monitor system also features four drawer-mounted Klark-Teknik graphic equalizers and four Orban 622-B parametric equalizers in a road case with extender patch cables. "This feature allows me to take the EQ units

*Patchbay located at the monitor mix position allows instant access to all stage input lines, house snake feed, and monitor amp rack patching.*

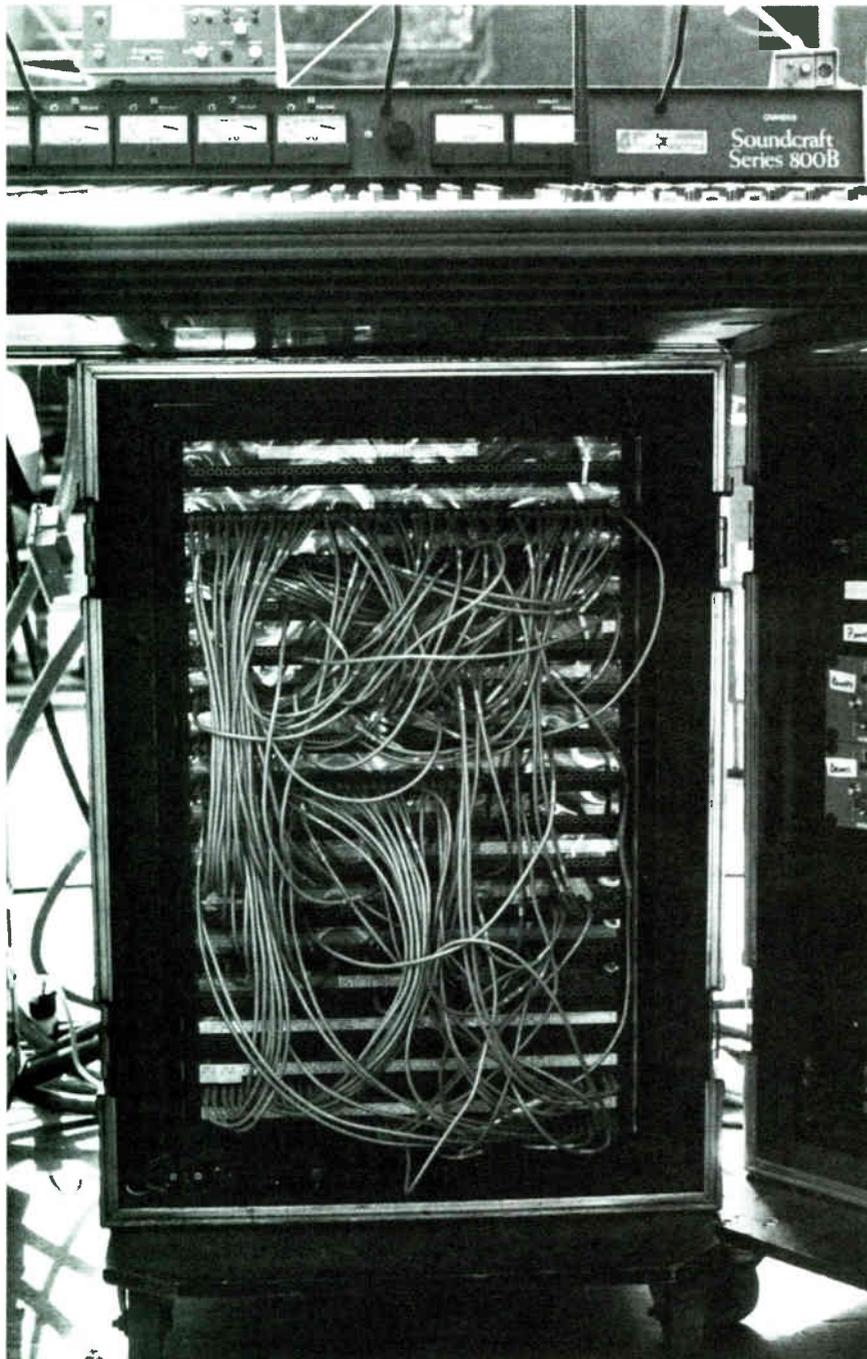


PHOTO JOHN LOCKE III

out on stage with me when I'm ringing out the system for feedback," explains Richardson. "This way, I don't have to keep running back and forth between the stage monitors and the mix position in order to make corrections; I can do them onstage while I'm listening."

The stage monitor system is powered with Crest 4001 amplifiers, along with two BGW 750Bs and two BGW 150Bs. Monitor cabinets used onstage include A-1 Audio bi-amplified slants, rear-loaded horn sidefill cabinets, and Meyer Sound Laboratories' UM-1 'Ultra-monitors.'

Also supplied to the show are a pair of Fostex 16-track tape machines. Dubbed "Hal-1" and "Hal-2" by the sound crew, these two units are patched through the central patchbay and on to a control unit located on the keyboardist's stage platform. Steve Woods, musical director for Loggins, uses the Fostex machines to assure consistency of tempo for the band, as the machines are fed throughout the stage monitor system. The musicians are not only playing with other musicians, but with click-track cues. At the beginning of the tour, the 16-track was also used to cover bass lines onstage, since the band did not yet have a bassist traveling on tour.

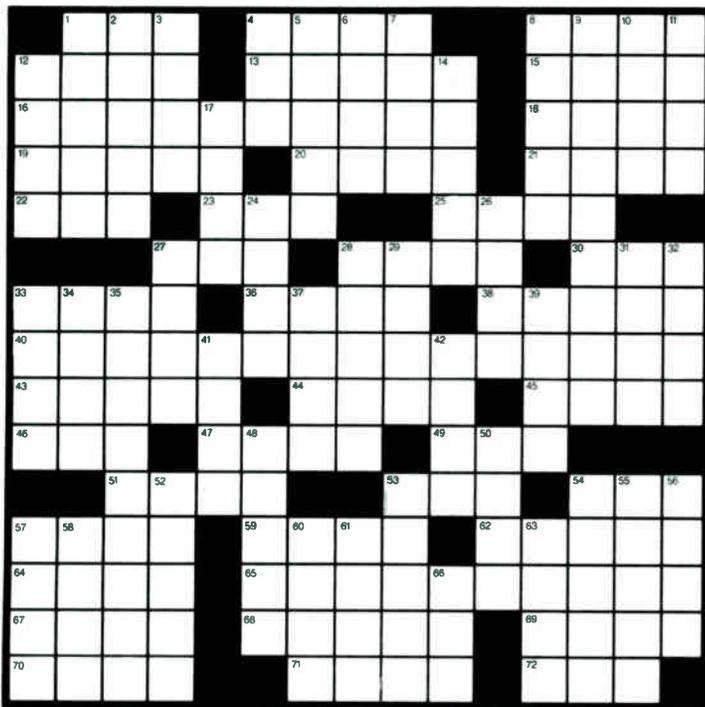
## The Show

Kenny Loggins' 1986 summer tour began in early August in Southern California. The A-1 Audio system was observed in action on one of the first dates, a nearly sold-out outdoor amphitheater show at San Diego State University. This performance saw the use of four VIP stacks and two Meyer subwoofers per side to effectively fill the 4,377-seat Open Air Theatre with quality sound.

Loggins put on his infectuously enthusiastic show. The overall sound and use of special effects, combined with an occasional boost from the subwoofer pedal provoked the collegiate audience into a screaming frenzy with such tunes as "Footloose" and the show's closing song, "Forever." After two hours of music, two encores and three deafening ovations, the show was over. Sound gear was hastily packed up for overnight transport to the tour's next stop.

"It really only takes us 25 minutes to set up the house system," beams A-1 technician Keith Hubbell. "Tearing it down is a snap!" While a sound crew is never exactly "footloose" until the last piece of gear is loaded on the equipment truck, the combination of a well-planned stage setup, liberal use of multi-pair interconnects and a road-worthy main speaker system make this tour go more smoothly than many on the road today. ■

# MIX WORDS



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## "LOST IN A THIMBLE"

### ACROSS

1. What you do with a shell
4. Upsets
8. Latin lover's word
12. Arty locale
13. Meted out "Bicycles"
15. S.A. capital
16. The essence of 65A
18. Bakery person
19. A command in France
20. This, in 15A
21. Leaves the path
22. Deli item
23. Rep.
25. Canal, in Panama
27. Change a color
28. See
30. \_\_\_\_\_Magnon
33. Body (Gr.)

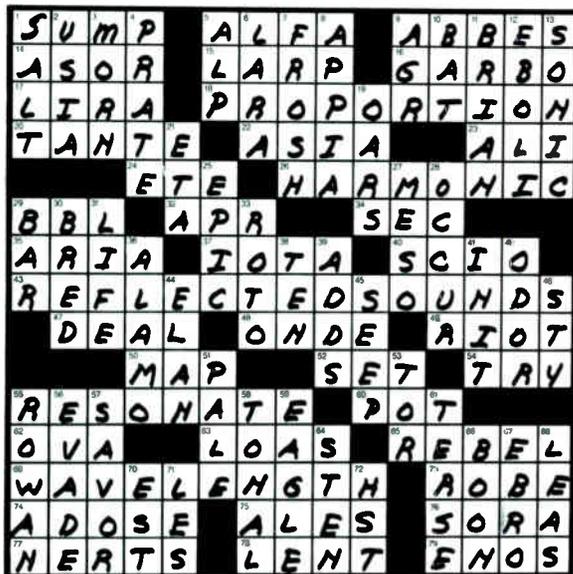
36. Draw back
38. Hurting one
40. Wiring eliminators
43. Lighten
44. Belonging to Mr. Adderley
45. Graf \_\_\_\_\_
46. Mr. Shannon
47. Reflective part of an LEDE control room
49. Celebrity
51. Roman road
53. G.I. address
54. Health place
57. Wings
59. Algerian port
62. Known
64. Eternal city
65. Important electronic advance

67. Reposes
68. NEOTEK console
69. Flower
70. Being
71. Thin
72. Word with head or up

### DOWN

1. British vehicle
2. Chi-town terminal
3. Carving material
4. Amin
5. Circuit-breaker word
6. Roadside attraction
7. "Rock the coin right into the \_\_\_\_\_"
8. Foreign
9. Further advance from 40A
10. U.S., for short
11. Sailors
12. Rock \_\_\_\_\_
14. Circuit board pathway
17. Maurice William's hit
24. Actor Richard
26. Electronics plane
27. \_\_\_\_\_ Andrews
28. Minister
29. Towel letter (Abbr.)
31. Network
32. Cockney's arab?
33. WWI plane
34. Fillet
35. Power for 9D
37. Ms. Millay
39. Horn of a crescent
41. Mideast seaport
42. Invitation request
48. Jagged
50. Charged radicals
52. Card wool
53. O'Day
54. Gape
55. Small, to Jacques
56. King Sunny's namesakes
57. British composer
58. Haitian spirits
60. "\_\_\_\_\_tape!"
61. Cannot tell \_\_\_\_\_
63. \_\_\_\_\_ Redding
66. Rumpus room

## Solution to October Mix Words



# MIX 1987 EDITORIAL SCHEDULE

**January**  
Northwest Studios  
NAMM Show Edition

**February**  
Ind. Engineers/Producers  
International Recording/  
European AES

**March**  
Southeast Studios  
\*Digital Recording Supplement

**April**  
Audio-for-Video Issue  
NAB Show Edition

**May**  
Northeast Studios  
Computers in the Studio

**June**  
Remote Recording/  
Concert Sound  
NAMM Show Edition

**July**  
Southwest Studios  
Audio Education/Recording  
Techniques

**August**  
Tenth Anniversary Issue  
\*Acoustics, Design & Installation

**September**  
Southern California Studios  
Radio Production Technology

**October**  
New Products for 1988  
AES Show Special Issue

**November**  
North Central & Canadian Studios  
\*Film Sound & Scoring/  
SMPTE Show Edition

**December**  
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Mastering, Pressing & Duplication  
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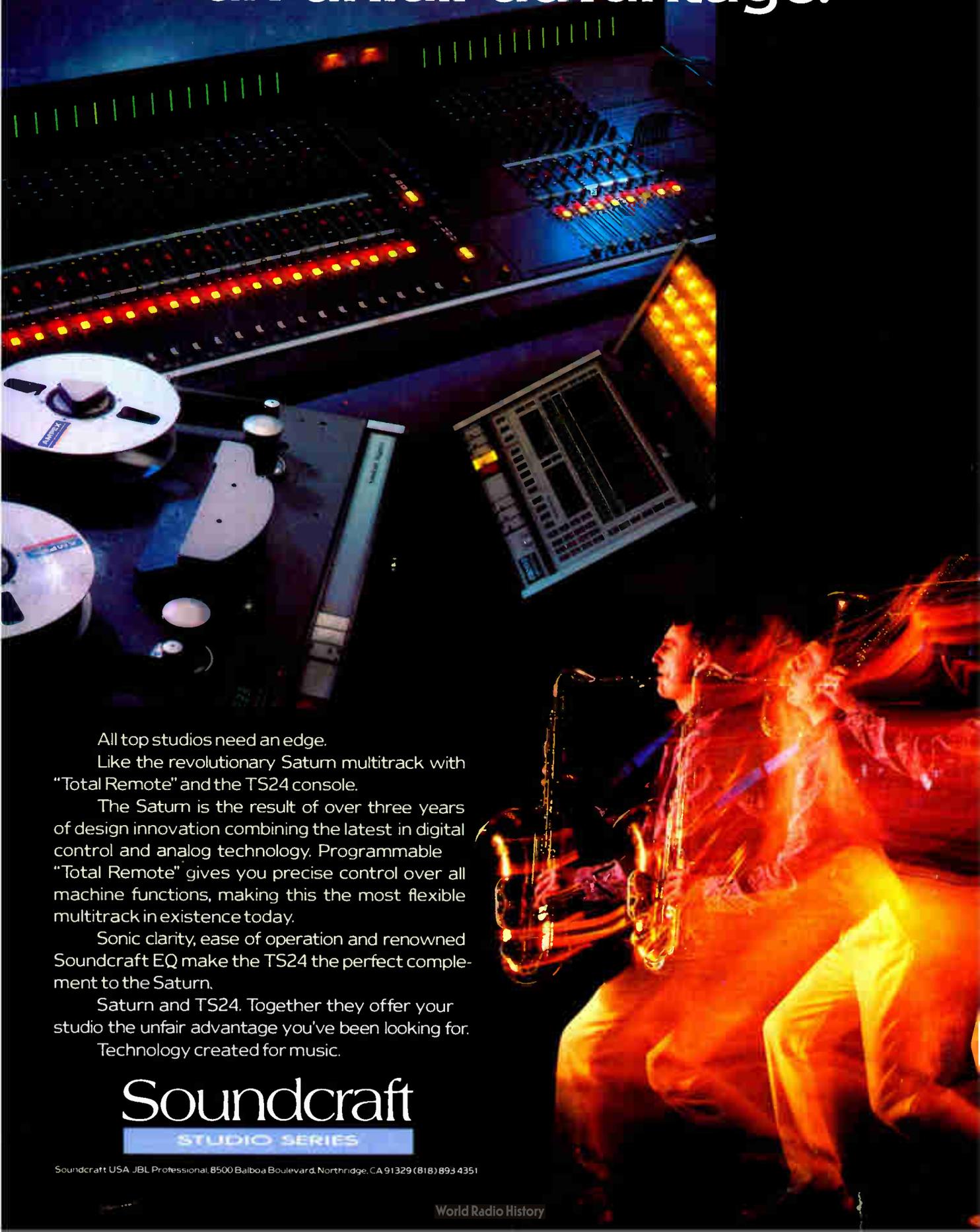
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