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THE RECORDING INDUSTRY MAGAZINE

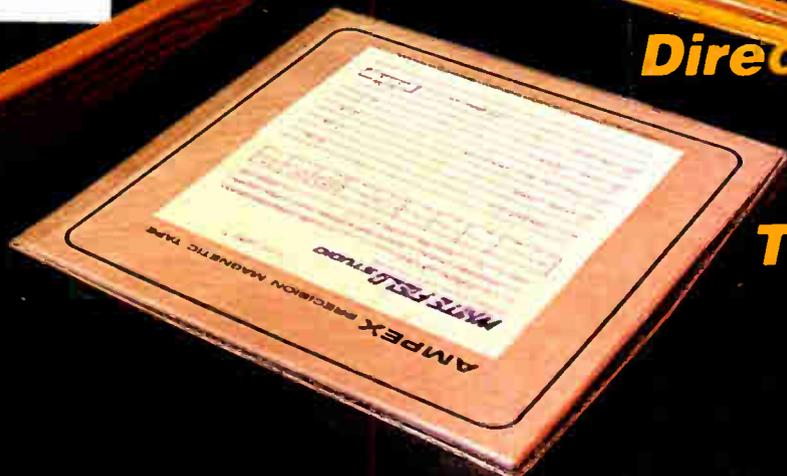
Mix

Interview: Tom Waits

Tape-to-Disk Issue
Mastering, Pressing & Duplication

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The transport mechanics in our new A820 Analog Master Recorder are solid, stable, and precision-crafted in the Swiss tradition. That's all typically Studer. What's new is an ingenious network of software-controlled operating systems.

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STUDER REVOX



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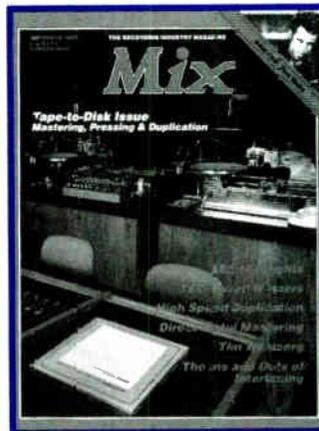
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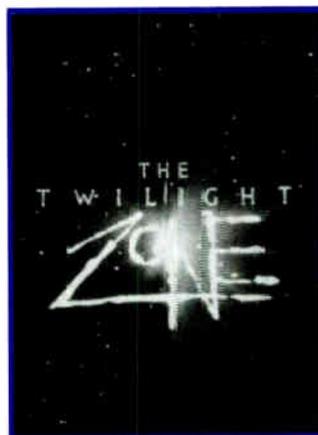
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Cover: Disk cutting room at Bernie Grundman Mastering in Hollywood, California. Both the studio and owner/engineer Grundman were honored with two TEC Awards in the categories of "Mastering Engineer" and "Mastering Facility" of the year, as voted by *Mix* readers. Photo by: Lou Costy
Corner photo of Tom Waits: Anton Corbijn

In this issue we offer the most extensive listings of U.S. and foreign mastering, pressing and tape duplication facilities *Mix* has ever assembled. (Index on page 165.) In some related features, Dennis Drake talks about mastering for CDs (page 24); writer Brooke Comer looks at Direct Metal Mastering (page 46); Mike Jones examines a new approach to bin-loop transport (page 54); and Bryan Lanser and William Johnston check out the latest information on high speed cassette duplication (page 51).



One of the most interesting new television series of the fall season is CBS' new version of *The Twilight Zone*. And two of the most fascinating elements of the new *Zone* are the music and sound effects, which are light-years more sophisticated than anything heard on the original series. *Mix* writer Elizabeth Rollins gives us an in-depth picture of the Grateful Dead's bizarre scoring of the show, as well as some of the exciting new technology the show utilizes that seems like something out of...well...*The Twilight Zone*. (Page 32.)

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Otari's new EC-101 synchronizer module, when combined with the MTR-90 audio machine, creates an entirely new audio post-production system that uses a time-code-only link, via mic cable, with the master. This unique "pre-engineered" combination offers performance well beyond that of any other audio tape recorder.



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OTARI

CURRENT

Lexicon Shows Digital Recording System

Lexicon Inc., the world's first digital audio manufacturer and long a leader in digital signal processing, has unveiled an ambitious new project, currently referred to as RD-1, which represents a significant new direction for the company. Stressing that the unit being shown during the New York AES Convention was not a product but a technology, Lexicon representatives demonstrated hard disk-based digital recording, playback, mixing and random access editing capabilities on the machine, which consisted of a mixing console/CRT display unit connected to a single rack containing the electronics and disk drive. The configuration could record up to 120 minutes of mono sound on a disk, or proportionally smaller amounts of multi-track information. The system will accommodate any number of disk drives for greater recording time.

The console had six channels and fixed function controls, although the system can treat it as virtual (software-defined controls.) Level, muting and panning were all implemented, as was a "scrub wheel," similar to that found on existing electronic editing systems. Scrubbing was done at full-bandwidth, however, unlike present systems, and appeared to sound glitch-free. Level manipulations also produced no artifacts. A menu-driven software package, in conjunction with a group of softkeys was also used to interact with the system.

Product development manager Rod Revelok said, at the closed door demonstration held at New York's Martin Audio, that RD-1 was a large project which extended beyond what was being shown and that it was still under development, pending further research and user feedback. He stated that the system would accommodate "all the standard interfaces and sampling rates" and implied that other functions might include extensive signal processing (obviously starting with reverberation) and sample rate conversion. Revelok estimated the system being shown might cost in the \$70 to \$100,000 range.

Industry Unit Shipments Down

Total industry unit shipments of recordings declined 4.3 percent in the

first six months of 1985, according to figures released by the Recording Industry Association of America (RIAA). The dollar volume of U.S. manufacturer net shipments of pre-recorded records and tapes rose slightly by .1 percent for the first six months of 1985, over a comparable period last year, calculated at suggested retail list price. Unit shipments of Compact Discs rose dramatically by 391 percent, while the dollar volume of the newest configuration went up by 314 percent. LPs, EPs, single records, and 8-tracks declined.

There were 299.2 million total units shipped from January through June, 1985, compared to 312.5 million units through the first half of 1984, a decrease of 4.3 percent. Calculated at suggested retail list price, six-month 1985 shipments were valued at \$1.931 billion, compared to \$1.929 billion for the comparable period last year, representing virtually no change.

SPARS Elects New Board

The new Board of Directors for the Society of Professional Audio Recording Studios was elected by acclamation October 13, 1985, at a general membership meeting held at New York's Studio Instrument Rentals during the Audio Engineering Society Convention.

The new slate consists of President, Len Pearlman, Editel/Chicago; First Vice President, Nick Colleran, Alpha Audio/Richmond, VA; Regional VP/Treasurer, Shirley Kaye, Coconuts Recording/Miami; Regional VP/Secretary, Richard Trump, Triad/Des Moines; and Regional VPs John Rosen, Fanta/Nashville; Charles Benanty, Soundworks/New York; Guy Costa, Motown/Los Angeles; Bruce Botnick, Digital Magnetics/Los Angeles; Russell Whitaker, Dallas Sound Labs/Dallas; Paul Sloman, Atlantic/New York; and Tom Kobayashi, Glenn Sound/Los Angeles.

Chicago Music Expo Attracts 2000

About 2000 Midwest musicians, producers, recording studio personnel and record label execs attended the Chicago Music Expo, held September 20 through 22 at Chicago's Hotel Continental. A broad array of industry seminars drew from nearly 100 professionals who focussed attention on indepen-

dent label strategy and career options for those entering the business. Co-sponsor Flanners Pro Audio contributed to an extensive exhibit arena that included representation from recording studios, record labels, music publishers, booking agencies and manufacturers of professional audio and video manufacturers. Executive Producer Paul Kelly, of KBA Enterprises, has indicated that next year's Expo will have an expanded exhibit floor, more emphasis on A&R panels, and will probably be held in August.

Ampex Owners in Merger

The Signal Companies, which recently purchased the ownership of the Ampex Corporation, has agreed to merge with Allied Corporation and form a new public company to be called Allied-Signal Inc. The resulting company will control assets of about \$13 billion, with a combined research, development and engineering budget of more than \$1 billion per year, and a scientific staff of 19,000. Allied and Signal last year received a total of 599 U.S. Patents, behind only General Electric and IBM among U.S. industrial corporations.

Media Association Form Coalition

ICIA, the International Communications Industries Association, and IMPA, the Independent Media Producers Association, have recently announced an alliance of the two organizations. ICIA, based in Fairfax, VA, has represented manufacturers and dealers of audio, audiovisual, video, photographic and micro-computer equipment, and producers of educational materials and computer software, while IMPA, based in Washington, DC has represented businesses that produce motion pictures, audio and video productions, and slide presentations under contract. The address of the new expanded ICIA will continue to be 3150 Spring St., Fairfax, VA 22031, with Harry McGee serving as Chief Executive Officer.

Sound Contractors Expo

The National Sound and Communications Association's annual Contractors Expo will be held April 29 through May 1, 1986 in Las Vegas. One hundred fifty-two suppliers of equipment for elec-

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INDUSTRY NOTES

INDUSTRY NOTES

Compusonics Corporation and **AT&T** have announced a one-year agreement to promote jointly Compusonics' patented tele-recording equipment and AT&T's ACCUNET Switched 56 Service, for use together in sending high quality digital audio signals over long distances...**Solid State Logic** has announced the appointment of **Audio Intervisual Design** of Los Angeles as its Special Consultant for large-scale systems applications...**Production Innovations '86**, a hands-on equipment exhibit devoted to the user of professional film and video equipment, will be held at **New York University** in the Film School soundstage in New York City, December 3 through 5. Contact Rita Miller at 212/586-8782 or Loet Farkas at 212/691-4720 for details...**Rupert Neve** has announced the appointment of **Tom Semmes**, of Nashville, TN, as southeastern sales manager...**John Woram** has announced the formation of **Rockville Press, Inc.** to offer a wide range of publishing services to the audio and computer industries. For more info, call 516/764-8900...**Symetrix** have completed their move into a larger research/administrative/production facility, located at 4211 24th Avenue West, Seattle, WA, 98199, phone 206/282-2555...**AEG Corporation** (previously known as AEG-Telefunken) has announced the appointment of **Larry Lamoray** as sales manager-audio systems...At **Linn Electronics, Inc.**, **Steve Alcorn** has assumed the position of chief operating officer and **Bob Connelly** has become the new director of sales...New factory representatives for the **Valley People, Inc.** product line consist of **Darmstedter Associates, Electro-Acoustic Marketing, Wilson Audio Sales, Bencsik Associated, Dobbs Stanford Corporation, YoreCo, RM Associates**, and **Radon and Associates**...**Triad Marketing Associates** has been appointed

as the New York metro area representative for the professional line of **Audio Technica** products...**Joan V. Silver** has been promoted to president of **Reeves A/V Systems, Inc.**, the Manhattan-based broadcast and industrial video equipment sales and service dealership...**Christopher Louis Emery** has been appointed technical service representative for video products for the magnetic tape division of **Agfa-Gevaert, Inc.**...**Lexicon, Inc.** has presented **Professional Audio Associates, Inc.** of Burlington, MA, with the company's "Sales Rep of the Year Award" for 1984-85...**Straight Wire Audio, Inc.**, of Arlington, VA, has announced the appointment of **Saul A. Walker** as vice president for product development and marketing...The **National Association of Jazz Educators** will hold their annual convention at the Anaheim, CA, Marriott Hotel January 9 through 12 featuring "Women in Jazz." Write to Bill McFarlin, Box 724, Manhattan, KS, 66502 for details...**Jack S. James** has been appointed southeast regional manager of **Ampex Corporation's** magnetic tape division...**Mel Foster Technical Sales** of Edina, MN, have been appointed sales representatives for **Community Light and Sound** in the North Central region...**The California Professional Music Business Academy**, in Sunnyvale, has awarded its Outstanding Management Scholarship to **Colleen Armstrong** for her involvement in community and music business activities...**Karen A. O'Brien** has been appointed marketing manager for **Monster Cable**...**Charles Rue Woods** has joined the audio and video publishing division of **Simon and Shuster** as executive editor...**Gordon T. Ray** has been appointed senior vice president, technology, for **NEC America, Inc.**...**Kinsley D. Jones** has joined **Fidelipac Corporation** of Moorestown, New Jersey as marketing director and **Scott A. Martin** has been added as sales director...**Bob Presuhn** has joined **Computer Video Pro-**

ductions, Inc., of Minneapolis, MN, as account executive...**Sally Altman** has been named marketing/advertising director for the jointly-owned Tulsa-based firms **Challenger Productions, Inc.** and **Advantage Sports**...**Audio Systems, Inc.** has been appointed dealer for the Central Region by the magnetic tape division of **Agfa-Gevaert, Inc.**...the pro video service division of **JVC Service and Engineering** has appointed **James Wood, Jr.** to head the unit, according to division manager **Dan Roberts**...**Robert Perry** has accepted the position of vice president at **Schulman Video Center** in Hollywood...**John Carroll** has joined the editing staff of the Hollywood division of **Unitel Video**...**Howard T. La Zare** has been advanced to senior vice president, engineering, **Deluxe Laboratories**...**Audio Kinetics** has announced the addition of **Iain Roche** as area sales manager and **Chris Braclik** as product manager—VAPP Systems...**Crawford Post Production**, in Atlanta, has appointed **Marcos Obadia**, ABC technical supervisor for the "Live Aid" concert, as chief engineer...**Stan Peters** has joined **dbx** as vice president of worldwide marketing and sales for all divisions of the company...the **Mitsubishi Pro Audio Group** has brought in **David Masnica** to serve as regional sales manager for the west coast region, responsible for all field sales activities with the film and broadcast industries...**Rusty Jones** has been appointed vice president and general manager of **John Crowe Productions**...The **Temple University College of Music** has changed its name to the **Esther Boyer College of Music** in appreciation for receiving an endowment valued between four and five million dollars which will be used exclusively for music scholarships. Write to W. Weidenbacher, Esther Boyer College of Music, Temple University, Philadelphia, PA 19122, for information...

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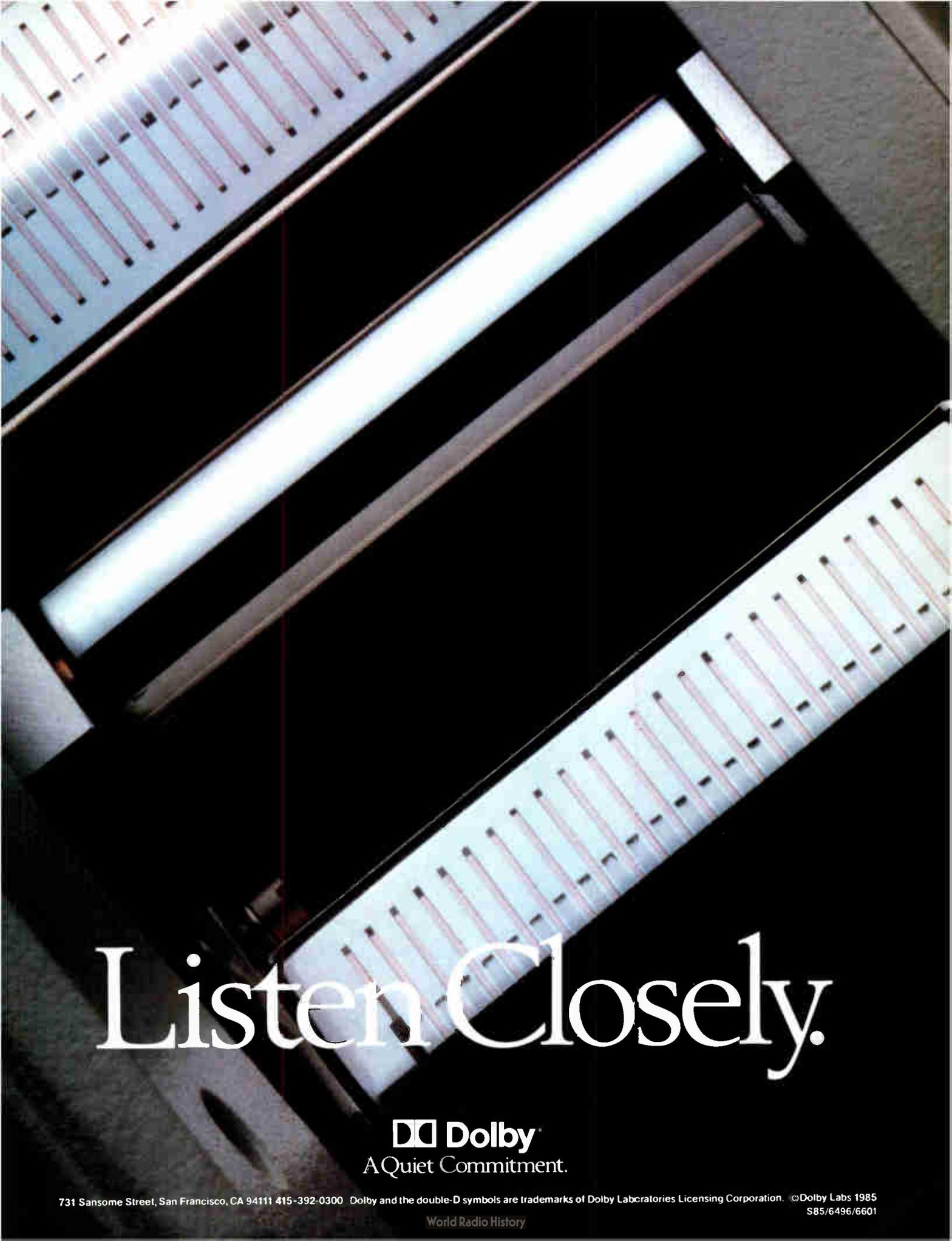
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S85/6496/6601

World Radio History

SESSIONS

NORTHWEST

Tracks were recorded at *Live Oak Studio* in Berkeley for *Rosie Gaines* and her producer/manager *Don Cornelius* of *Soul Train* fame, for her new album. Engineering was by *Robin Yeager* and *Dale Everingham*. . . The *Steve Miller Band* was in recording at Seattle's *Steve Lawson Productions* to lay basic tracks for an upcoming album. Miller is producer of the album and *Rick Fisher* is engineering with assistance from *Terry Date* and *Vince Werner*. . . At *Dave Wellhausen Studios* in San Francisco, *Mary Ellen* and *Roy Soblosky* worked on an EP project, *New Harbinger* worked on a demo, and *Tony Pasciucco* mixed an EP project. . . Ex-Romeo Void singer *Debora Iyall* has been in at *Starlight Studio* in Richmond, CA. The album was produced by *Pat Irwin* and engineered by *Bill Thompson*. And ex-Sons of Champlin guitarist *Terry Haggerty's* album project at Starlight heated up with recent overdubs by the great sax man *Ernie Watts* and the *Freaky Executives'* horn section. Producer *Norman Kerner* hopes for a late fall release on this one as well. . . *80:88*, a Northern California synth pop band, recorded an EP at *Studio 8* in Alameda. It was produced by bassist *Victor Owens*. . . *Lee Greenwood* finished vocals for a Coors jingle at *Axe-Trax Studio* in Reno, NV. . . At *Montage Recording Studio*, Newark, CA, producer *Elliot Mazer* (Neil Young) was in doing pedal steel guitar overdubs with Sneaky Pete Klienow for *Billy I. Walsh's* new LP due to be released after the first of the year. . . *Eric Tingstad* completed a song for a Portland Radio Station *KINK* LP benefiting the Portland Food Bank; and pianist *Kaeren Fouts* completed her fourth cassette album project. . . *Jeff Fogerty* was in *Prairie Sun Recording* in Cotati, CA, working on his debut EP, *New Orleans Lady* on TJ Records. The record features Jeff, who co-produced this effort with *Tom Fogerty* (Creedence Clearwater Revival) on all instruments and vocals. *Matt Wallace* engineered the sessions with *Randy Vance* assisting. . .

SOUTHERN CAL

At *Crystal Studios* in Hollywood was *Jon Anderson* of the group Yes, recording a solo album for Elektra Records with *Roy Thomas Baker* producing, *George Tutco* engineering, and *Jim McMahon* and *Bry Willis* assisting. . . The *Truck Mobile Recording Facility* of Glendale, CA, has completed its expansion to 24-track capability. The Truck also can now handle up to 48 mike inputs and 80 remix

inputs. . . *Jose Feliciano*, on the eve of an Australia-New Zealand tour, recorded both Spanish and English versions of new Budweiser commercials at *Advanced Media Systems* in Orange, CA. *Steve Anderson* and *Michael Hutchinson* shared engineering duties. . . At *Group IV Recording* in Hollywood, engineer *Dennis Sands*, assisted by *Andy D'Addario*, were behind the board for composer Jack Nitzsche and orchestrator Michael Hoenig scoring *9½ Weeks* for PSO Films, Inc. . . *Bob Seger* was in Capitol Recording Studios in Hollywood working on mixes for his new album, with co-producer *Punch Andrews*, engineer *David Cole* and assistant *Steve Himelfarb*. . . At *Cherokee Recording Studio*, headbangers *Krokus* were in Studio One cutting tracks for their new Arista album. *Duane Baron* engineered with *David Eaton* assisting. In Studio Two, *Device*, songstress Holly Knight's band, was in doing their debut album for Chrysalis. *Mike Chapman* produced and engineered with assistant *Brian Scheuble* at the board. . . *Mike Davis* was in *Artisan Studios* with the rock band *Lion*. *Duane Baron* produced. . . *Sound Image Studio*, North Hollywood, had producer *John D'Andrea* in with artist *Rick Mathews* for Gramma Baby Music, with *Carmen Rubino* engineering and *Mike Ellison* assisting. . . *Jackson Browne* has been cutting tracks at *Sunset Sound* for his upcoming self-produced album, with *James Geddes* engineering. Also in Sunset was *Elvis Costello* doing overdubs with *T-Bone Burnett* producing, *Larry Hirsch* engineering, and *Bill Jackson* assisting. . . *George Martin* was in producing *Kenny Rogers* for RCA, with *Jon Kelly* engineering and *Bino Espinoza* assisting. Also, *Jermaine Jackson* was in mixing with *Steve Hodge* engineering and *Liz Cluse* assisting. . . Producer *Jeff Weber* was recently at *Poema Studios*, in Camarillo, CA, mixing down a live recording of the Queen Mary Jazz Festival to digital 2-track and half-inch 4-track with time code for an upcoming video release. At the console engineering was *Bill Cobb*. The Festival included such artists as Bob James, Stanley Clark, Chick Corea, and many others. . . At *Preferred Sound* in Woodland Hills, *REO Speedwagon* sequenced and edited their *Greatest Hits* album with engineers *Dave Devone* and *Matty Spindel*. . . Arista Records artist *Dionne Warwick* was in Hollywood's *Conway Recording* doing her new project and video. She had some help from her friends Elton John, Gladys Knight, and Stevie Wonder. *Burt Bacharach* and *Carol Bayer Sager* produced. *Mick Guzauski* engineered with assistance from *Daren Klein* and *Richard McKernan*. . . At *Sound Solution* in Santa Monica, *Tierra* recorded their song "Body Heat" for an aerobic video with *Rudy Salas* producing, and *Keith Wechsler* engineering. Also, Samuel

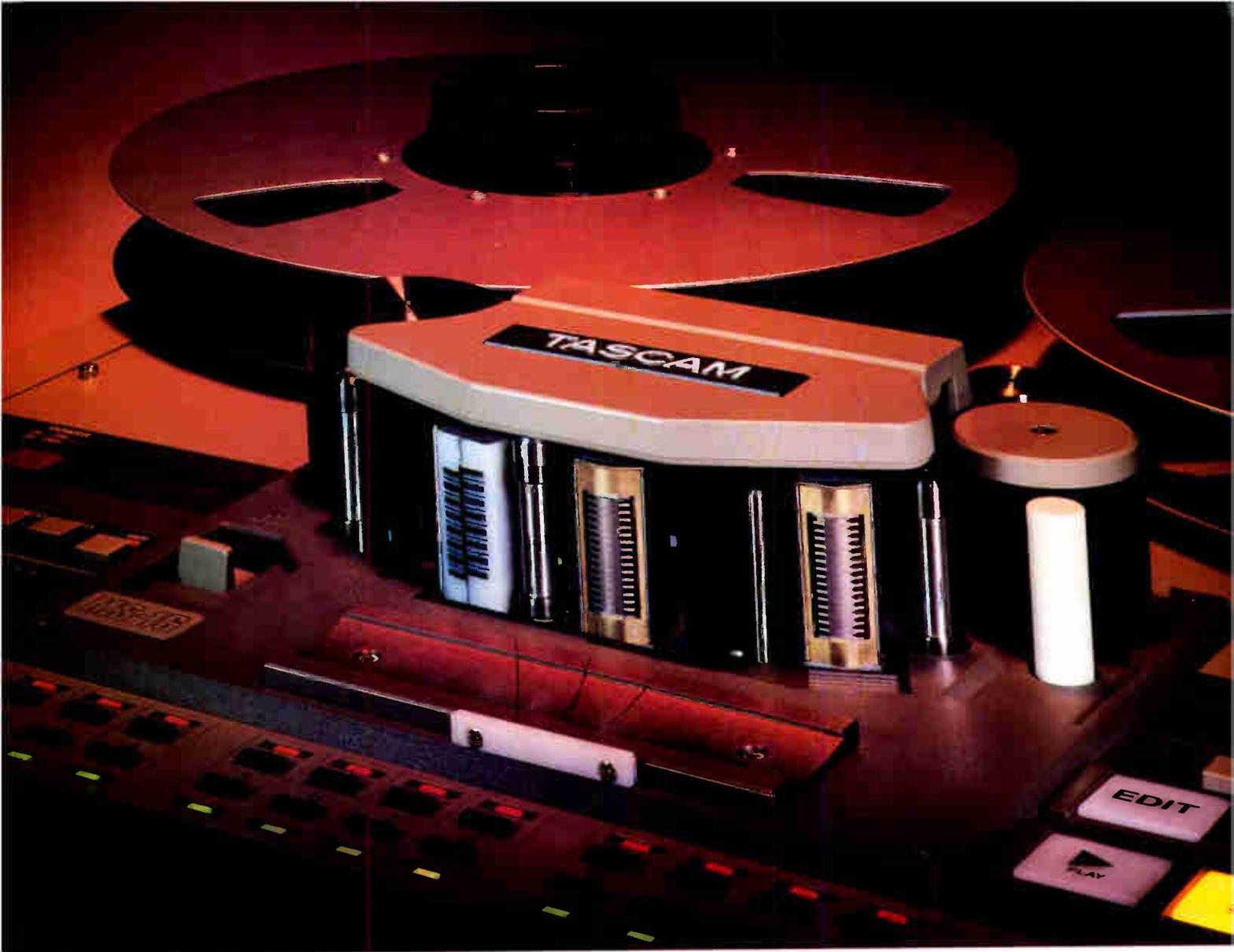
Goldwyn Co. recorded the soundtrack for the movie *Once Bitten*. *Joe Regis*, the film's music supervisor, worked with engineers *Richard Jallis* and *Keith Wechsler*. . . At *Maui Records* in Hawaii, Ghosts' guitarist/vocalist *Middlejohn* worked on an album project, *Bad Day for the Outlaw*. Rhythm tracks were recorded digitally with overdubs at *The Winery*. Mixing was done at George Benson's *Lahaina Sound*; *Tom Milner* handled the engineering, with *John Neff* producing. . .

SOUTHWEST

The award winning leader of Talking Heads, *David Byrne*, cut tracks for his new motion picture, *True Stories*, at *Omega Audio's* 24/48 track recording facility in Dallas. . . *Reel-sound's* 46-track remote unit completed dates with *Tears for Fears* in Austin and Dallas and back to Austin to record *Eddie Rabbitt* and *Silvia* in concert for Westwood One. *Richard Kimbal* and *Barry Freeman* produced with *Malcolm Harper*, *Mason Harlow*, *Gordon Garrison* and *Brent Campbell* engineering. . . The Los Angeles-based *Choice Channel* contracted Dallas' *Omega Audio* and their 46-track mobile recording unit to originate the audio programming for a recent live pay-for-view television special beamed direct to cable via satellite. The show, titled *Fabian's Good Time Rock and Roll*, originated from a specially constructed stage in downtown Baton Rouge, Louisiana, overlooking the Mississippi River, and featured 11 rock acts from the '50s and '60s. . . Sax player *Cliff Sarde* completed recording and mixing his second self-produced album for MCA/Curb Records at *Larrabee Sound* in Los Angeles. *Steve Escallier* was at the board, with *Sabrina Buchanek* and *Fred Howard* assisting. . .

NORTH CENTRAL

Beachwood Studios, near Cleveland, had *Dale Peters* completing a single for *Samson & Delilah* (Saturn Records) with producer *Greg Williams*. Peters also engineered albums for the *B.E. Taylor Group* (Epic) and *Donnie Iris & The Cruisers*. . . Producer/songwriter *Al Babb* completed production of "Halley's Rock," a new song dealing with the coming of Halley's Comet, at *Evergreen Recording Studios* in Pittsburgh. The song was mastered in New York at *Masterdisk*. . . Dance music master *Jamie Princeple* returned to *Solo Sound Studio* to record a tune called "Never Again." *Jerry Soto* engineered. . . At *Sunset Recording* in LaGrange, IL, *Knightklub* re-



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

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

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

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

Take a closer look at the MS-16. See your TASCAM dealer for a demo, or write us for more information at 7733 Telegraph Road, Montebello, CA 90640.

THE TASCAM MS-16 SIXTEEN TRACK



TASCAM THE SCIENCE OF BRINGING ART TO LIFE.

mixed a 12-inch single from their album, *Mixed Emotions*. . . Polygram Records artist *Bon Jovi* spent time at *Sound Summit*, Lake Geneva, WI, recording a new single. *Phil Bonanno* and *Barry Mraz* engineered with Mraz producing. . . At *The Recording Workshop*, Chillicothe, OH, engineer *Dave Egan*, assisted by *Tom Johnson* and *Jeff Redeker*, just finished an album project with the *Pleasant Mountain Boys*, produced by *Joe Waters*. Egan also just finished an album with *Southbound* (Warner Bros.) produced by Joe Waters. . . At *Gnome Sound* in Royal Oak, MI, Atlantic Records recording artist *Bobby Barth* has been working on his new solo LP with *Bruce Nazarian* producing. Barth is the former lead vocalist and guitarist of another Atlantic group, *Axe*. Also, vocalist *Kathy Kosins*, known for her work with Was (Not Was), has been cutting her first solo album, produced by Nazarian for Gnome Productions. . .

SOUTHEAST

At *Castle Recording Studio*, Franklin, TN, producers *Jimmy Bowen* and *Tony Brown* completed mixing for *Steve Wariner's* new MCA release with engineer *Steve Tillisch*. Also, *Paul Lawrence Jones* was in to cut and mix tracks for his debut solo release on Capitol. . . *Crystal Gayle* was in *OmniSound* in Nashville with producer *Jim Ed Norman* to do vocal overdubs for TV tracks. *Scott Hendricks* and *Chris Hammond* engineered. Also, *Shelly West* did tracks, overdubs and mix at *Omni-Sound* for an upcoming television special. *Bill Whittington* engineered. . . *Candi Staton* recorded her new release on Beracah Records at *Crescendo Recorders* in Atlanta; it was produced by *John M. Sussewell* and engineered by *Gary Ham*. . . Producer *Harold Shedd* finished up mixing on *Glen Campbell's* upcoming album with *Jim Cotton* and *Joe Scaife* engineering at the Music Mill in Nashville. . . Recent activity at *Cheshire Sound Studios* in Atlanta included *Tony Iommi* of Black Sabbath recording a solo project with *Glenn Hughes*, (Trapeze, Deep Purple), doing vocals. *Jeff Glixman* produced and engineered. . . At *Cotton Row Recording* (Memphis, TN), Canadian artist *Jim Corcoran* recorded and mixed eight sides for the EMI-owned Pathe' label in France. It was produced by *Carl Marsh*, engineered by *Niko Lyras* and *Danny Jones*. . .

NORTHEAST

Andy Paley and *Rob Dimit* produced mixes for *Jonathan Richman & the Modern Lovers* for Twintone Records in the States and for Rough Trade Records in England, with Dimit at the board and *Tim Purvis* and *Mike Theodore* assisting. . . At *Big Apple Studios* in New York City, producers *Dave Wolff*, *Joel Dorn* and *Rick Derringer* produced a World Wrestling Federation video and audio LP entitled *The Wrestling Album*. Cyndi Lauper's engineer

Tom Edmonds was at the board for *Hulk Hogan* and other WWF superstars. . . Producer *Joe Ferry* and partner *Dave Weckl* (drummer with Chick Corea, among others) finished recording on *Tony Michaels's* single on SOS Records, at *Title Productions*, Bronx, NY. *Tom Lana* engineered. . . At *Digital By Dickinson* in Bloomfield, NJ, Capitol Records' producer/artist *Paul Laurence* finished his debut album, *Haven't You Heard*, and produced new artist *Melissa Morgan*; *Steve Goldman* engineered all projects with *Joe Marno* assisting. . . *Eastern Standard Productions* real time cassette duplication facility recently completed production for Blue Wave Records of the album by *The Doyle/Whiting Band*, *Good Rockin' Tonight*. The project was digitally mastered onto chrome tape, and was engineered by *Bill Scranton*, produced by *Mark Doyle*. . . *Aaron Hurwitz* and *Marie Spinosa* worked on a single for W.A.R.C. (Westchester Association for Retarded Citizens) at the *Workshoppe Recording Studios* in Douglaston, NY. Hurwitz and *Kevin Kelly* engineered. . . Culture Club's *Boy George* and Fairlight-whiz *Michael Rudetsky* recently produced tracks at *Michael Levine's Studio* in Manhattan for British pop singer *Marilyn*. Levine engineered and played both violin and keyboards. . . At *Celestial Sounds*, New York City, *Allen George* and *Fred McFarlane* produced the English group *The Bellestars's* upcoming album on Stiff/EMI for Terrible Two Productions. *Hugo Dwyer* engineered with *Larry DeCarmine* and *Kurt Upper* assisting. . . *Kimbotto*, the popular New York-based band, put the finishing touches on their new EP at *Broccoli Rabe Studios* in Fairfield, NJ. . . Guitarist Fredrix "Dreddie" Clark was in *Tommy Boy Studios* in New York City laying down some ferocious lead and rhythm guitar tracks for Tommy Boy Records recording artists *Stetsasonic's*, a six-piece rap group. . . Activity at New York City's *Unique Recording* included *Motley Crue* working on their single, "Home Sweet Home," from their platinum *Theatre of Pain* LP for Elektra/Asylum. *Dwaine Baron* engineered. And *Stewart Copeland* finished the soundtrack to the TV series *Equalizer* for Universal. . . Artist *Jerry Harrison* finished overdubs on his current single, an independent project written and produced by *Tony Prendatt*, at *Sound Heights* in Brooklyn. *Vince Traina* engineered and co-produced, with *Shaun James* assisting. . . At *Sigma Sound*, *Evelyn "Champagne" King* made her return to Philadelphia for sessions for her new RCA album. The producer was *T. Life*, and the engineering was by *Gene Leone*, with assistance from *Scott MacMinn*. Also, *Nick Martinelli* produced *Stephanie Mills* for MCA Records. The engineer was *Mike Tarsia*, assisted by *Randy Abrams*. . . *Rohit International* is in recording, mixing and preparing masters for *Carnival* release to the West Indies market; singer/songwriter *Nicole Kelly* was in at Queens, New York's *Inner Ear Recording* cutting two new tunes, "Hateweek" and "Free-Spirit" with keyboardist *Danny Gibbons*. They were engineered by *Steve Vavagiakis*. . . The *Tommy Keene Group* spent a week at *Track Recorders* in Silver Spring, MD,

in pre-production sessions for their first album on Geffen Records, with producer *Geoff Emerick*. . . At *Widener University* in Chester, PA, *Mark Oppenlander & His One Alternative* finished their first album with *Acoustical Concepts* producing and *Terry Hoffman* engineering. . . *Gary Katz* was in at *Sound Ideas* in New York City producing vocalist *Rose Vella* for A&M Records with *Daniel Laseruz* engineering and *Mike Cosmai* and *Mario Rodriguez* assisting. Also, *Evelyn King* completed work on her latest album for RCA Records with producer *Alan George*, engineer *Hugo Dwyer*, and assistant engineer *Yoram Vazam*. . . Recording at *Pyramid Sound Studios* in Ithaca, NY, were *Attila*, with *Carl Canedy* producing with *Alex Perialas* engineering. . . At *Reel Platinum Studios* in Lodi, NJ, producer *Roger Monaco* cut tracks with *Cathy Derico*, and *Dan Jenks* produced the band *Abstract Parking*. . . CBS recording artist *Mission* cut their first album at *Studio 4* in Philadelphia with *Roy Carter* producing and *Phil Nicolo* engineering. . . At *D&D Recording*, producer *Richard Gotterher* (Go-Go's, Blondie) was in working on a two-song demo for a band called *Girl Talk* for Geffen Records. *Gary Rottger* co-produced and played all the instruments. *Douglas Grama* engineered. . . Activities at *Rawlston Recording Studio* in Brooklyn included rap artist *Dr. Jeckyll & Mr. Hyde* completing mixing on their self-produced album for Profile Records. *Akili Walker* engineered with *Tony Smalios*. . . *Brian Setzer* has been working a lot at Glen Cove, NY's *Tiki Studios*, where he's been in a lock-out working on his new solo LP for EMI/Capitol. *Don Gehman*, who produced the past three John Cougar Mellancamp albums, is producing Setzer. . . *Big Apple Studios* in New York City did audio and video for *Gil Scott Heron's* Carnegie Hall performance for the Richie Havens Benefit. Also, *Stephan Galfas* engineered and produced *Crossfire Choir* for Geffen Records. . .

STUDIO NEWS

Acoustic Spaces Corp. has made Woodstock, New York its east coast base. Offices have been established in the recently completed *Dreamland Recording Studios* which was designed and constructed by Acoustic Spaces and KDP Engineering. . . After eight months of construction, Chicago's *Seagrape Recording Studios* is now on-line. Seagrape is the only local facility to feature fully floated walls and floors. Included in the 3,500 sq. ft. studio are 15 ft. ceilings; variable acoustic elements; a NEO-TEK 50x24 console; a large complement of outboard gear; and recorders by MCI, Sony, Otari and 3M. . . On September 18, 1985, *Calvary Chapel* of Costa Mesa acquired Roshire Studio in Anaheim, CA. Business began October 1st. The name of the studio will be *Maranatha Studio*, and its clientele will be primarily Christian artists. For more information, you can contact the manager of the studio, Gordon Driver, at (714) 630-3412. . . *Aura*

—PAGE 114

THE MIXING LINK



Space-age technology has joined the musician on stage and the producer in the studio... everything from digital reverbs to 16-bit sampling. But until now, there's been no easy way to put it all together.

Enter TDA's D-4... the first electronic music mixer.

The D-4 is a 4-input stereo rack system... expandable to 16-in, designed to handle the varying voltages and complex timbres produced by state-of-the-art gear.

For live performance... the D-4 delivers balanced XLR mic inputs, stereo and mono mixing, and ground lifting.

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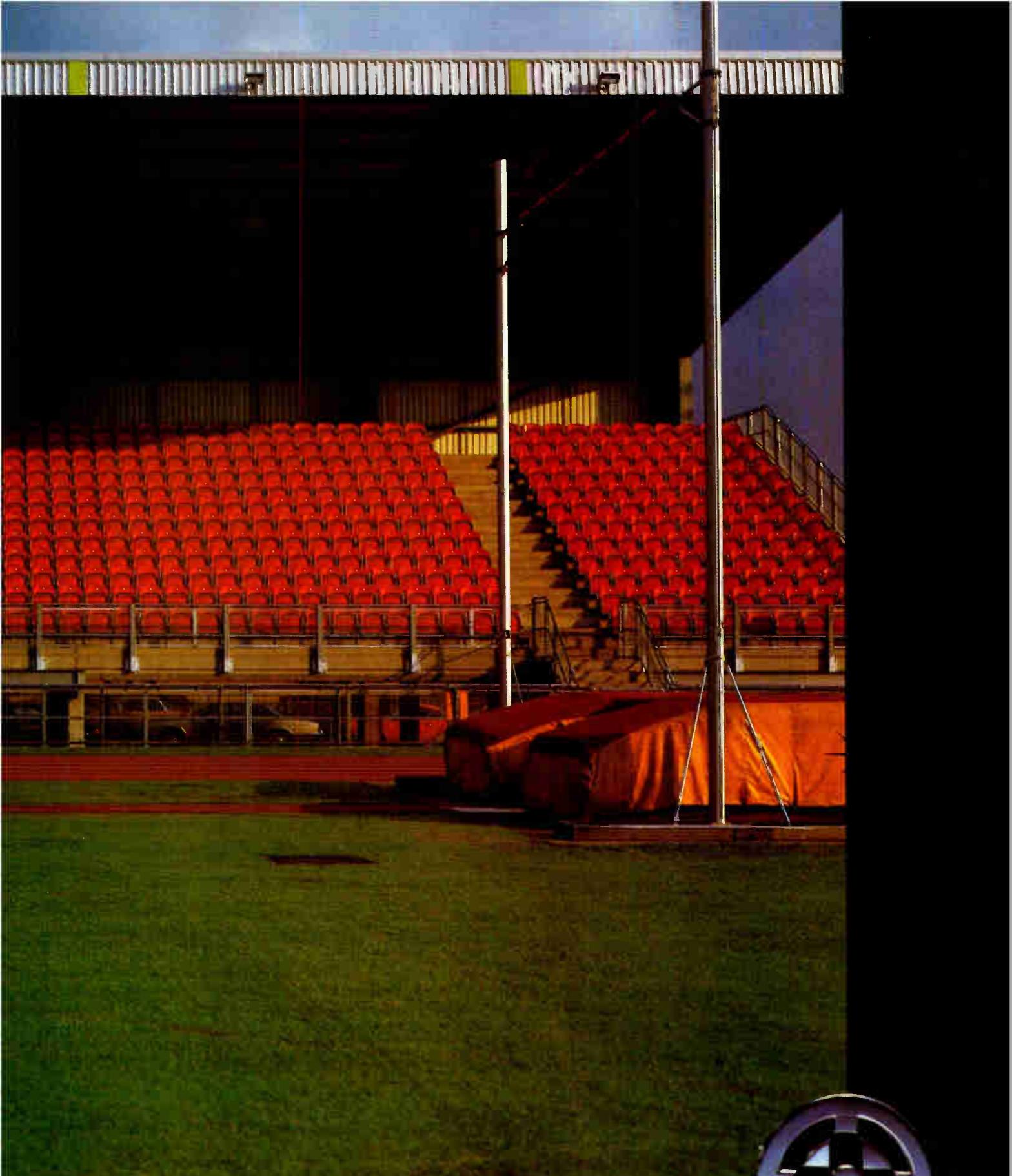
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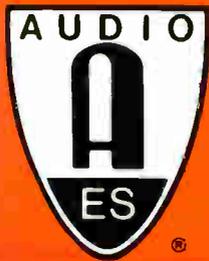
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without a Klark Teknik Reverb.**

To discover the heights you can reach with a DN780 Digital Reverberator/Processor contact your local dealer or Keith Worsley at Klark Teknik Electronics Inc., 262a Eastern Parkway, Farmingdale, N.Y. 11735, USA. Telephone East Coast (516) 249 3660. West Coast (415) 482 1800. Omnimedia Corporation Ltd., 9653 Côte de Liesse/Dorval, Québec H9P 1A3. Canada. Telephone (514) 636 9971.



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KLARK TEKNIK



A BRIDGE TO TOMORROW'S AUDIO TECHNOLOGY

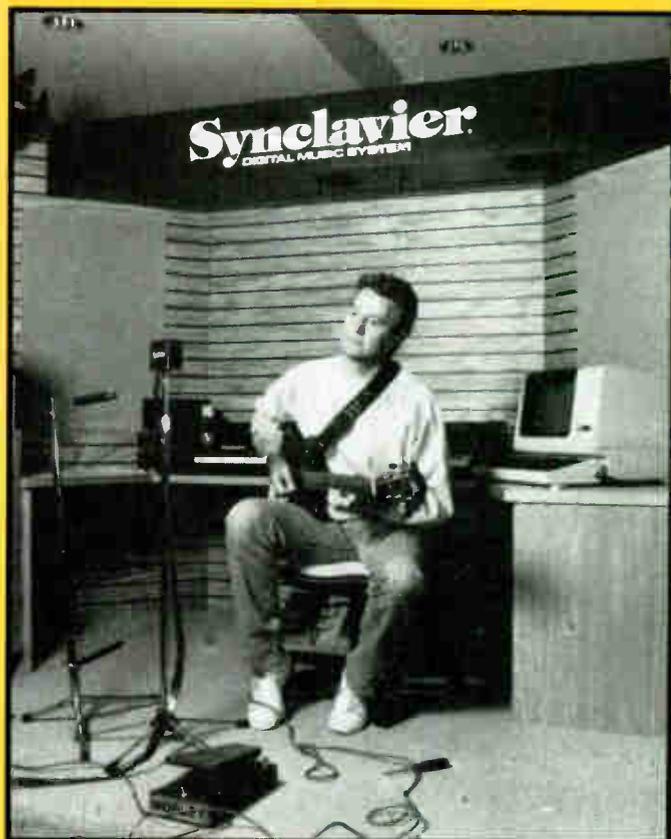
Photo highlights of the 79th Convention of the Audio Engineering Society, New York Hilton, October 12-16, 1985.

PHOTOS AND TEXT BY GEORGE PETERSEN



(Left) With convention attendance hovering around the 10,000 mark, the registration desks were crowded, as were the exhibits, papers and seminar rooms.

(Below) Senior design engineer John Lumsden with the MXP-2000, Sony's first broadcast console. The board's features include an assignable, four channel dynamics processor; fader start, which can start an ATR when a fader is raised; and an upcoming video editor interface.



(Above) John McLaughlin provided an enlightening demonstration of the compositional capabilities of New England Digital's Synclavier system.



(Above) Tore Nordahl, of Mitsubishi Pro Audio Group, shown here flanked by representatives of AEG and Otari, announced the agreement among the three manufacturers on the new PD (Prodigy) digital standard. Otari stated they would unveil their first digital machine at the 80th AES Convention, at Montreaux, Switzerland, next year.



(Above) The VCA grouping capabilities of Yamaha's PM-3000 console is explained by Gary Davis, who wrote the board's operational manual.

(Below) Alex Vangellow of Northern Music (Potsdam, NY) shows off the extensive MIDI control capacity of Lexicon's PCM70 digital effects processor.

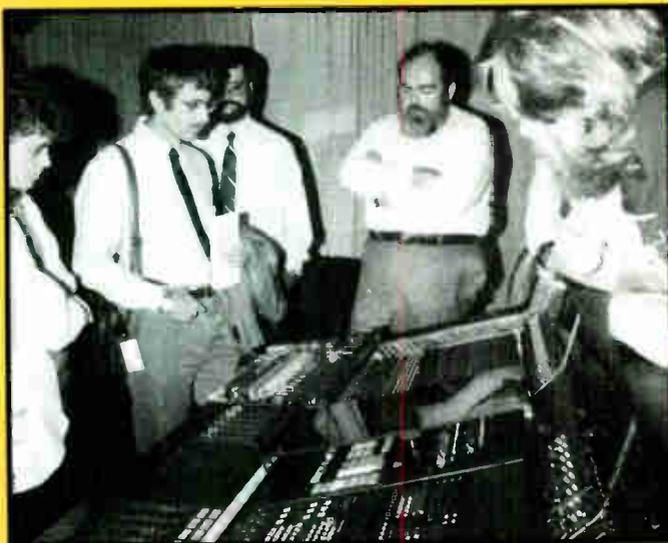


(Below) Dave Harrison points out some of the features (subframe accurate automation of levels, pans, EQ, dynamics and signal routing) of the Harrison Series 10 console.



(Above) John Eargle and Lou Dorren introduced the Colossus™ (shown here in a hand-wired prototype version), their low-cost 4/8/12 channel, 16-bit video-based PCM digital system. The pair are now seeking licensing and development agreements with interested parties.

(Below) In the Sony digital suite, Curtis Chan demonstrates CD mastering/prep using the new PCM-1630 processors, DAE-1100 editor and K-1105 digital mixer.





THE EVOLUTION OF SUCCESS

To stay number one, you've got to make the best even better. Which is why for ten years Ampex has continued advancing the performance of mastering tape. Through a decade of increased performance and reliability, Grand Master 456 remains the tape behind the sound of success. Which is why more top albums are recorded on Ampex tape than any other tape in the world. For Grand Master 456, the beat goes on.

AMPEX

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AND THE BEAT GOES ON

World Radio History

THE 1985 Technical Excellence & Creativity Awards

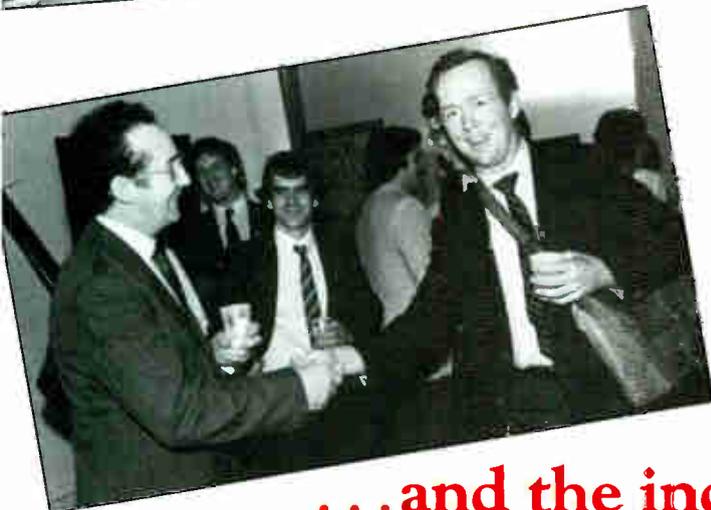
All photos
by Faye Ellman



▶ Howard Hesseman, alias D.J. Dr. Johnny Fever, presides over the first TEC Awards ceremony.



(Left) Herbie Hancock and the Rockit Band provide some high-tech musical fun after the awards presentation. (Above) The three-camera live video reinforcement for the event required a 12-man crew; shown here are the four technicians at the backstage master control.



...and the industry comes to celebrate.

The cameras point backstage and into the studios and design labs,



◀ (Left) Power Station co-owner Bob Walters accepts the TEC Award for Recording Studio of the Year.



▶ (Right) Bob Clearmountain accepts his trophy for Recording Engineer of the Year.

Bernie Grundman ▶ accepts two TEC Awards for Mastering Engineer and Mastering Facility of the Year.



Cece Hernandez of Mix presents TEC Outstanding Technical Achievement Awards to Lexicon's Ron Noonan (bottom left), in the Recording Technology category; and to Lucasfilm's Andy Moorner (below), who accepted the award in the Film & Broadcast Sound Technology category.



...and the spotlight shines on those who create the support structure for the entertainment industry.



Legendary session drummer Hal Blaine (far left) and Otari marketing manager John Carey present the TECs for Recording Session Musician, Record Company and Recording School/Program.



Author, raconteur and Zen nudist Mr. Bonzai and producer/synthesist Suzanne Ciani present TEC Awards for Recording Producer, Recording Engineer, Mastering Engineer, Film and Broadcast Sound Engineer and Sound Reinforcement Engineer.



The prolific Ken Pohlmann (left) and the erudite Richard Elen (center) present TEC Award in Acoustic Technology to Crown International's Charles Gushwa.

—CONTINUED ON PAGE 22

Los Angeles Record Plant president Chris Stone receives Remote Recording Facility TEC Award from Cece Hernandez as presenters Betty Bennett, Soundcraft U.S. president, and Gary Helmers, SPARS executive director look on.





How does a 24-channel Yamaha

You heard right. A 24-channel mixing console with Yamaha quality, flexibility and reliability. For only \$3,795.*

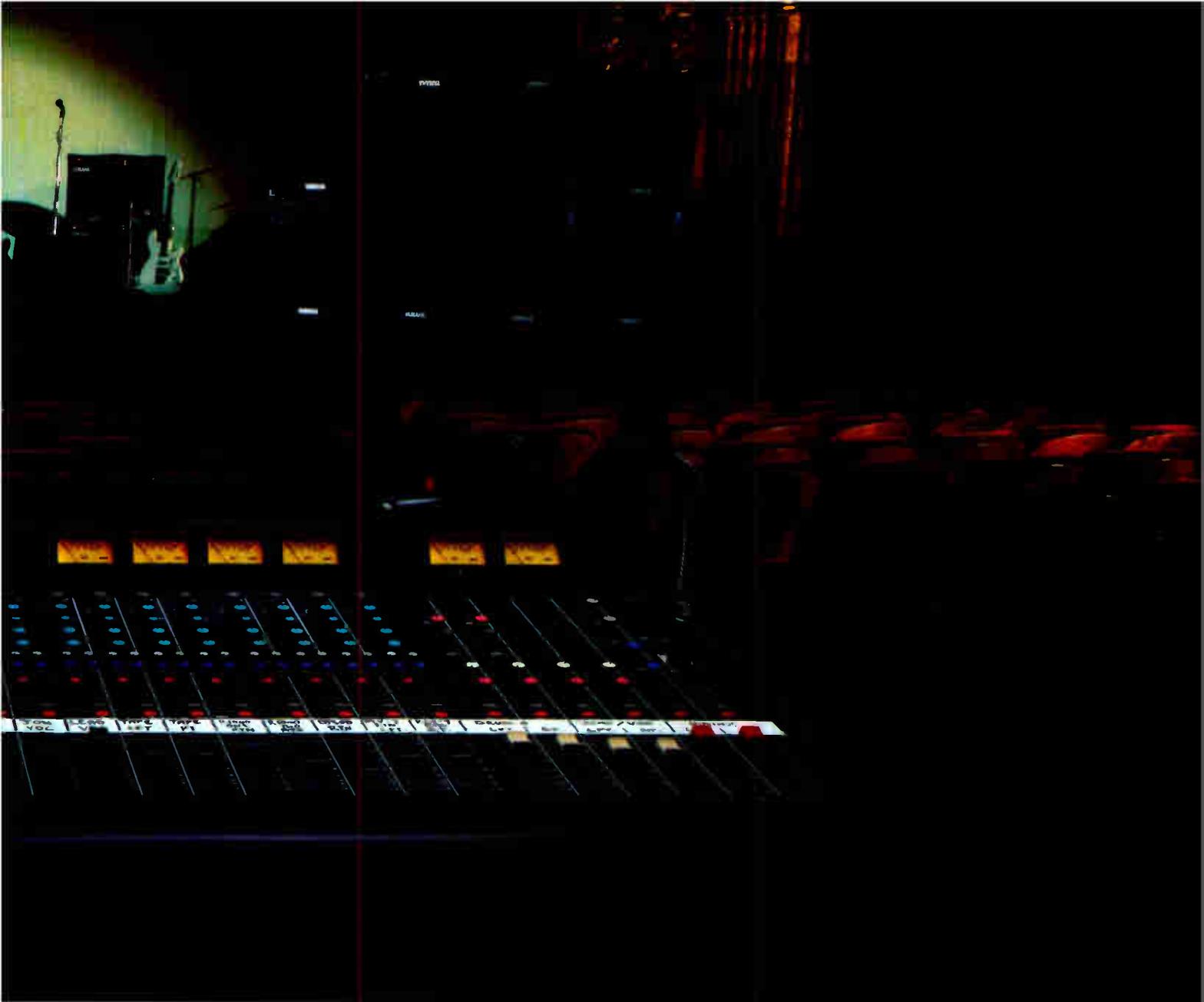
It's the MC2404 mixing console. Just one in a line of MC consoles that includes the 16-channel MC1604 at \$2,695.* And the 12-channel MC1204 at \$2,095.*

Each MC input channel has a 20 dB pad and gain control with peak LED, three-band EQ with sweepable mid-range, two pre-EQ and pre-fader fold-back sends, two post-EQ and post-fader echo sends, pan control, group 1-4

assignment switches, cue and channel on/off switches, and a 100-millimeter fader. All color-coded and logically grouped for easy operation.

The four group outputs are assigned to the master stereo outputs via pan controls. In addition, they have individual rotary controls to adjust the level to the four group XLR connectors on the back panel. So, for instance, different output levels can be set up for the house mix and a multitrack recorder.

Primary inputs and outputs are elec-



mixing console for \$3,795 sound?

tronically balanced with XLR-type connectors. And there are insert patch points on all input channels as well as on the groups.

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Yet with all these features and flexibility, the MC Series mixing consoles are compact and lightweight. As well as affordable.

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*U.S.A. suggested retail price. Canadian suggested retail prices are \$4,995 CDM for the MC2404, \$3,695 CDM for the MC1504, and \$2,995 CDM for the MC1204.

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PROFESSIONAL AUDIO SYSTEMS

The ticket proceeds are presented to the three worthy causes for which the TEC Awards were established.



Mix editor/publisher David Schwartz presents Audio Engineering Society president Albert Grundy \$5,250 to the AES Educational Foundation.



Berklee College of Music's Wayne Wadhams receives \$5,250 from Mix publisher/general manager Penny Riker Jacob as winner of Recording School of the Year.



Arnold Levine, executive director of the Deafness Research Foundation, is given a check for \$10,500 to benefit hearing research from Mix associate publisher Hillel Resner.

...and the winners:

OUTSTANDING TECHNICAL ACHIEVEMENT

Recording Technology
LEXICON
PCM60 REVERBERATION UNIT

Acoustic Technology
CROWN INTERNATIONAL
TECRON 10 TEF ANALYZER

Sound Reinforcement Technology
CARVER CORP.
POWER AMPLIFICATION

Film and Broadcast Sound Technology
LUCASFILM
TECHNICAL INNOVATIONS

Musical Instrument Technology
YAMAHA INTERNATIONAL
DX SYNTHESIZERS

OUTSTANDING CREATIVE ACHIEVEMENT

Recording Engineer
BOB CLEARMOUNTAIN

Recording Producer
QUINCY JONES

Mastering Engineer
BERNIE GRUNDMAN

Film and Broadcast Sound Engineer
BEN BURTT

Sound Reinforcement Engineer
GENE CLAIR

Recording Session Musician
STEVE GADD

OUTSTANDING INSTITUTIONAL AWARDS

Recording Studio
POWER STATION
NEW YORK CITY

Mastering Facility
BERNIE GRUNDMAN
LOS ANGELES

Sound Reinforcement Company
CLAIR BROTHERS
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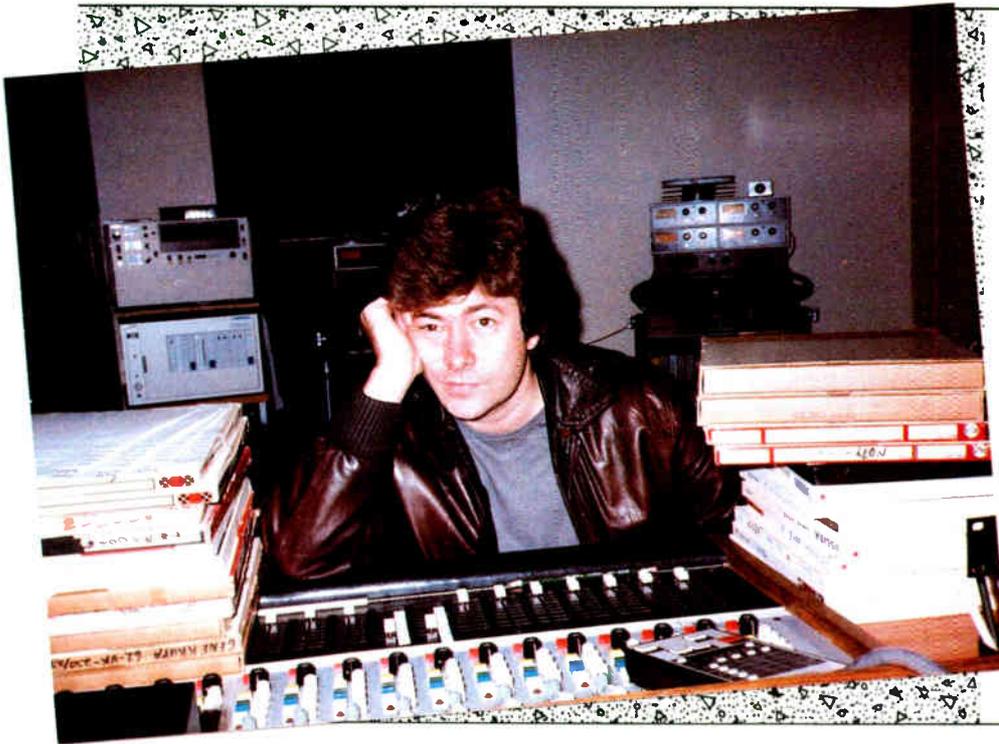


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AUDIO-APPLICATIONS



"We feel we want to cover all the product bases on CD. It is, after all, the next major music carrier. You have to consider that a lot of younger buyers will never buy an analog turntable."

An Interview with Dennis Drake

by Ken C. Pohlmann

Now that the Compact Disc has left the research laboratory, been invited into the homes of the well-heeled trend-setters, been embraced by the audiophile, survived the Yuppies, and finally been passed down to the only real music market, the KWC (Kids With Cash) market, I figured it was time to speak with someone at the nucleus of the explosion to find out exactly what was happening, and more importantly, how recording engineers could cash in. Dennis Drake was the ideal source; as chief engineer and studio manager for Polygram Records' Edison, N.J. tape facility, he has probably remastered more tapes for CD than anyone, and knows exactly what sounds good on CD, and what doesn't.

Mix: Could you tell us a little about your background?

Dennis Drake: I'm primarily a recording engineer. I started in the early '70s doing PA on the road, as chief engineer for a sound company in New Jersey. We were lucky enough to hook up with the Beach Boys, traveling with them on the 1971 tour, and with 32 shows in Europe. But after working with those and other artists, I got a little tired of the road, and left for A&R Recording, where I seconded for Phil Ramone on some of the early Paul Simon albums. After about three years there, I left for the West Coast and staff work at United Western Studios, including a lot of television and movie jobs. In general, I had the opportunity to develop my critical listening from a production engineering situation.

Mix: When did you join forces with Polygram?

Drake: I signed on in 1982, when the tape facility was moved from White Plains (NY) to Edison (NJ). Today we have about

80,000 archive master tapes, and two sound rooms, and are building a third, where we do all the in-house transfers, greatest hits compilations, new albums, editing, promotional work, copies for music videos, and so on.

Mix: When did digital audio change your life?

Drake: In late 1982, early '83, I recommended to the company that we purchase a Sony 1610 mastering system. I didn't see much sense in sending master tapes to Polygram in Germany, for transfer to digital, especially after the first shipment was gone over six months. Anyway, the management approved and we took delivery.

Mix: That's when you got down to some serious transferring.

Drake: That's right. We immediately started digging through the back catalog, especially the jazz catalog, and the pop catalog more recently.

Mix: What labels are involved here?

Drake: Mainly the Verve label for the jazz, as well as EmArcy, Limelight, Philips, Daybreak, and others. We're trying to pick the top artists for transfer to CD. Of course, the condition of the master tapes is important.

Mix: Speaking of which, how are the tapes stored?

Drake: Stability is very important for

Every console maker in the world is trying to build a better system than this:



Including Solid State Logic. And we know, better than anyone else, just how hard that is to do. Because the SL 4000 E Series is much more than just a mixing console. It is a comprehensive Master Studio System which gives the engineer command over the entire complement of control room equipment. It captures each artist's unique sound exactly, and allows the producer to perfectly shape that sound with efficiency, accuracy and the quiet confidence that only comes from working with the very best.

From the start, SSL understood that studios must adapt to a constant stream of new ideas. So we created an on-going development programme to keep our clients at the leading edge. To date, this programme has produced a solid history of software updates and hardware innovations such as Total Recall™, the SSL Integral Synchroniser, dynamically automated parametric equalisation, SSL Events Control, and the industry's most complete stereo module. All of these are field proven, retrofittable, and available today.

Solid State Logic

"I feel good once I have a classic master on CD. It's a piece of encoded plastic that's going to hang around forever if it's taken care of. It's even better than the digital tape itself."

long-term storage. We have a climate-controlled situation here, maintaining temperature and humidity within our specified tolerance of about 70 degrees and 60 percent humidity. Due to the large number of tapes, we are also moving toward cataloging on the New York office mainframe.

Mix: Here's a question I've always wanted to ask—do you play through the tapes periodically to help prevent print-through problems?

Drake: Well, that's something we would like to do, but because of the size of the archive, and the daily flow of tapes through the facility, that's impossible. Instead, as the tapes are pulled, either for remastering or a new order, we do a quality inspection of the tape at that time, with re-leading, resplicing, new reel, new box, or whatever is needed. In that way, the hot sellers, which have always been in demand, have been continually upgraded and restored. However there is a larger problem. Many of the tapes are Scotch 201, which unfortunately hasn't held up to the ravages of time. The oxide flakes off; sometimes during rewinding it sounds like a roll of cellophane tape being pulled from its reel—it's terrible. One of the reasons for the new sound room is for a complete evaluation of the Scotch 201, and restoration and transfer to digital, as needed. The computer system will also help us keep track of back-up copies; we try to keep a copy of every primary album at another location. The goal is a 100 percent back-up.

Mix: To what extent can you perform resuscitation for a tape that's in particularly bad shape?

Drake: The main job involves replace-

ment of dried-out splices, and paper leader. Paper leader is the worst! It dries out and distorts the adjacent layers; we rip it out wherever we find it. The ideal thing is perfectly clear plastic leader; it won't even leave paint residue like timing leader. The other problem, as with 201, is slowly disappearing oxide; that results in a rise in the noise floor. Munchy-crunchy sounds, gurgles, and things like that also appear from missing or misplaced oxide. When it becomes severe, the tape might be okay for black vinyl, but is no longer useable for CD. We will go to our back-up, which is a generation down, or to a foreign affiliate that might have a transfer from the time of the original release, on a different tape stock which has held up better.

Mix: Do you use a single-ended filter?

Drake: We put the tapes through the Burwen DNF 1000, their first discrete design, with variable high and low pass dynamic filter action depending on the frequencies present in the signal. Thus with filtering, in conjunction with the masking effect, it does a good job at removing tape hiss. With a slight shelving equalization, you can achieve a 3 or 4 dB decrease in the noise level, which is substantial for most tapes. On a really noisy tape, you have to use the Burwen too aggressively, and it becomes audible. Certain tapes can be saved, but not all tapes.

Mix: Where do you draw the fine line?

Drake: It's tough. On some of the tapes with bad noise levels, we are waiting for more heavy duty equipment; audio computers, for example, will process the sound in the digital domain; the SoundDroid has the DroidClean pro-

gram, in which you input about a 35 millisecond sample of tape hiss, and it creates an algorithm for the hiss and digitally removes it from the tape. Noise is certainly a problem; the CD acts like a mirror, and faithfully reproduces all the noise you start with.

Mix: Would something like a Quantec be considered sacrilege?

Drake: Well, some people may say it is, but I've used a Quantec on some of the older Billie Holiday mono recordings, which have a very dull and dry sound. Since it helps to feel a little bit of room ambience, I've taken the liberty of selectively using a Quantec on some of the songs to give them what I consider to be a normal room ambience. You dial in a small club sound, add a little EQ, and go with it. A Lexicon PCM 60 might help too. I really don't like to brag about the fact that I've taken such liberties, but if as an engineer you can say to yourself that you can make it better without anyone knowing, and if the producer would like it better, then you go ahead and do it. On occasion we try to get producer approval, but on the older stuff the people have either moved away or passed away.

Mix: No flanging?

Drake: No flanging.

Mix: Here's the big question: People are going to wonder why you are putting noisy, shedding archive programs on their pure and perfect digital medium.

Drake: We feel that we want to cover all the product bases on CD. It is, after all, the next major music carrier. People will want the older material on that medium; you have to consider that a lot of younger buyers will never buy an analog turntable.

Mix: You don't think this will have negative impact on the medium's image of a high fidelity medium?

Drake: We don't think an educated listener will have any problems. There's nothing wrong with a good analog recording, but if we feel that the product going to CD has sonic faults, we will put a disclaimer on the CD which precisely describes the situation.

Mix: Can you tell us specifically about the Silver Collection?

Drake: We have over 2,000 Verve and MGM jazz masters; from this collection we are re-releasing over 200 titles on CD. We recently had a meeting and approved about 25 more titles, which I am starting work on now. The fine line comes into play again. If it sounds really good, but isn't that popular, we'll go ahead and release. If it's popular, but sounds too funky, we'll wait. We really don't want to denigrate the medium with

and this:



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a bunch of garbage.

I should also give credit to some of the early engineers. With really good minimalist microphone placement, and working with the room acoustics, the quality is often excellent. In addition, the tube equipment is a kind of an asset; the stuff in the '40s and '50s was all tube recording, and the Telefunken and Neumann tube microphones, and tube consoles, gave a certain warmth to the sound with their harmonic overload capability. It turns out to be a very good mating with the digital medium.

Mix: As an archivist, you could probably speak highly of the Compact Disc...

Drake: I feel good once I have a classic master on CD. It's a piece of encoded plastic that's going to hang around forever if it's taken care of. It's better than the digital tape itself. And it's come along at a good time because magnetic recording has only been with us as a production tool since the late '40s, and now a lot of those tapes are getting toward the end of their lifetime. And now we have digital forcing us to evaluate our catalog of masters. It's perfect time for a review.

Mix: Let's talk technical. More than anybody else, you know what a CD factory wants in terms of a delivered tape.

Drake: Our plant in Hanover will accept about any system: the JVC 900, Mitsubishi, or F1, and they have the Studer sampling rate converter so all digital transfer can be made. Of course, we've standardized on the Sony 1610. Even with a DASH format, the video-based format will be with us for quite some time, especially since we're building up libraries in that format.

Mix: What should we know about a 1610 tape?

Drake: First I'd recommend starting with a high quality blank tape. It's not worth trying to save a few bucks using anything else, and having to re-do a transfer because of drop-outs. Next, exercise the tape; put it in the machine and run it forward to the end, and back. This removes any kinks. Then I pre-stripe the tape with time code, on audio track two, from the beginning of the tape, all the way to the end. It also helps to avoid any major zero crossings, like 59 minutes because this might confuse the editor. For an over-length CD we usually supply it on two different cassettes, and let Hanover do the final editing. They use an extra length 3M cassette and very carefully do the final editing to that cassette. The other trick is to begin the program two minutes into the tape; this gives them time to add the subcode information to the beginning of the tape, and you also stay away from the drop-out prone portion of the tape.

"CDs have come along at a good time because magnetic recording has only been with us as a production tool since the late '40s, and now a lot of those tapes are getting toward the end of their lifetime."

Mix: What's the deal on "CD offset"?

Drake: CD offset concerns the cue points for the home CD player; when the PQ subcode is programmed with the editor, a small offset of five or so frames must be built in so that when the subcode tells the home player to mute or unmute, you are not working so close to the music that you end up chopping off the beginning or end of a musical selection.

Mix: Unfortunately, Sony and Philips have different ideas about the number of frames...

Drake: The important thing is that when you are sending a tape to factory, you have to let them know if you are including the offset figure in the time code numbers. In other words, do the time code numbers for start and stop include offset, or must that be compensated for? We certainly don't want to chop off even ambient information, and it gets very tricky when songs are crossfaded. Where do you tell the player to cue?

Mix: What kinds of paper documentation should accompany a master tape to the factory?

Drake: We have a standard Polygram mastering order that must be included with any CD tape submission. It contains background information about the album, a bar code number is given for the CD, it includes the SPARS digital code, includes song titles, and time code numbers of stop and start times. In a compilation, I usually include the original source's album number, and tape box number so in the event of a problem, I can go back to the source. This paper follows the tape throughout the manufacturing process.

Mix: Any thoughts on pre-emphasis?

Drake: We don't recommend using any pre-emphasis. We have usually found that tapes with pre-emphasis have a lower level than linearly equalized tapes. More important is to fully utilize the headroom of the system, to +18 or +20 dB on the 1610. We also recommend a complete auditioning of any transfer; if you play it back from head to tail you can catch any drop-outs, and re-record that section. Once a tape goes to the factory, you can accrue tremendous production delays if they discover a drop-out. We also like to watch the error correction lights on the 1610 to see how hard the error correction is working; if you have ten or 15 error corrections a minute then you've probably got tape problems. Even if there are no audible drop-outs, on another day on another deck they might appear. The four error correction LEDs should really be brought out to the front panel.

Mix: What about analog errors themselves?

Drake: With the new digital editors, you can successfully remove many clicks and pops. We never wanted to take a razor blade to analog masters; now we transfer to digital, then use the digital editor. Any fault on the analog master that cannot be removed should be annotated on the mastering sheet; that way the plant will know that you are aware of the problem, and you are accepting it, and they won't hold up production because of it. The type of fault and time code location should be documented.

Mix: How about the analog playback machine?

Drake: That's very important. The machine has to be optimized for the tape you're playing back; is the azimuth fully tuned, do you have the right head stack, is it European or U.S. format, do you have the original playback curve, and so on.

Mix: Maybe you can answer a long-standing question: exactly which tones

and this.



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Dameon Higgins founded Delta Sounds and Video in 1976 after 10 years in broadcasting. This radio experience and his uncompromising audio standards quickly established Delta as a very successful recording studio and entertainment sound service in the Orange County/LA area. Although the company specialized in supplying complete custom sound programs and systems for school dance DJs and Discos, it wasn't long before Dameon found himself turning down a lot of *tape duplicating* requests. The high quantities were not practical for "real time" duplicating, and the jobs that he "farmed out" to high speed duplicating companies often came back to hurt his image.

Eventually, because of missed profit opportunities and a frustrating lack of control over

quality, Dameon decided to install his own high speed duplicating equipment. He looked carefully at every product on the market and finally selected the Telex 6120, seven slave, 1/2 track cassette-to-cassette model. He knows that he can add on to his system as his business grows, but for now his 6120 can copy up to 280 C-30s in one hour, and is easily operated by one *non-technical* employee because of its compact size, single button operation, jammed or short tape warning lights and automatic master rewind. Dameon hasn't regretted his decision for one moment because he now has a thriving additional business of duplicating voice and DJ audition tapes, seminars and syndicated radio programs. Now he reports a zero reject rate and his quality image is under *his* control where it belongs.

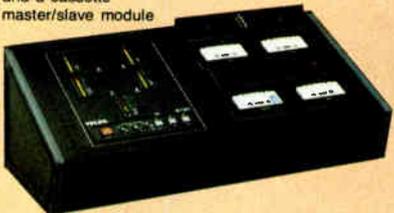
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are necessary on a tape, and which aren't?

Drake: We like 20 or 30 seconds of one kHz reference tone, 10 kHz for EQ reference, then 15 kHz for azimuth reference, and then 50 and 100 Hz to optimize the low frequency playback. If they are at the head, make sure that there is a generous pack of tape between the tones and the beginning of the analog program, to prevent print-through.

Mix: On the other hand, the 1610 tape really doesn't need tones.

Drake: Not really. It will play back, or not at all. If you want, you can put on a one kHz tone, particularly for intercompany production so interchannel balance can be set, but for CD production, you don't need it.

Mix: Should engineers prepare two submasters, for LP and CD?

Drake: Ideally, that is the best way to go. The mastering engineer should work out his musical or creative EQ, that will optimize the songs as a whole, then create his lacquer copies for the LP which incorporate diameter EQ, bass combining and so on. Then the CD should get a separate master excluding all of that. In addition, increasingly, cassette masters are being taken from the 1610 tape, thus saving an analog generation.

Mix: Do you think engineers are learning to un-learn some of their analog habits?

Drake: We certainly hope so. Most of the studios we work with, the top New York studios, have embraced the digital medium in their own right. They realize that the LP is a doomed format, and have their own 1610s or digital editing systems where they can do transfers, and learn and listen. I think they've adapted very well. On the other hand, we've had some dangerous situations from some less experienced studios.

Mix: Is there anything else you'd like to get off your chest?

Drake: In general, I feel that the CD is really a fantastic thing for the consumer; they are literally receiving studio-quality sound in the home, if their system is up to the digital challenge. And the real beauty is near-perfect reproduction time after time. Some people will say that the digital medium will sound harsh or overly bright, and it will — if that's the way you are feeding the signal in. In that respect it's an unforgiving medium. Every sonic fault stands out. I think a lot of engineers are learning to be a little more cautious in their microphone and equalization techniques; you don't have to pump in an extra 3 or 4 dB at 10 or 15 kHz since you're not going to lose it down the line. Digital remembers. ■

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just be your
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tricks on you

by Elizabeth Rollins

On September 27, the CBS network premiered a new version of Rod Serling's literary, psycho-thriller program, *The Twilight Zone*, whose first-run incarnation spanned 1959 through 1964 on the same network. Reruns have continued ever since.

Back then, Hollywood was producing prime-time series such as *Perry Mason*, *Ed Sullivan*, *77 Sunset Strip*, Ed Murrow's *Small World*, and about a dozen westerns. Serling came on Fridays at 10 p.m. with one of the most difficult dramatic forms: the short story. But even more difficult was the show's commitment to curling your toes and teasing your psyche every week. (Serling was not the only one, of course. Alfred Hitchcock's original anthology show dates back to the early '60s, also.)

A contributing writer to the original *Twilight Zone*, George Clayton Johnson, once described the feeling among those involved with producing the series: "On *The Twilight Zone*, there was an attempt to keep it literary, to keep it bright, to keep it good. No one in the show ever suggested at any time that something

would be good enough—although that's commonplace today in commercial television, just to do it good enough, what the hell. Quality doesn't count now, but quality counted in *The Twilight Zone*."

Philip DeGuere, executive producer of the new series, has inherited a momentous, karma-laden legacy. Good thing he came up with some ideas of his own...

He hired renowned science fiction writer Harlan Ellison as creative consultant, plus a stable of purebred successes such as Ray Bradbury, Robert Heinlein, Stephen King and Arthur C. Clarke. But some of his ideas were sort of... out there. What do you do if you want to disturb the mechanical rhythm of the network production line? You take the entire title sequence, the score, and the sound design out of the company town and up the coast to San Francisco. Furthermore, you hire the Grateful Dead to do the score and sound design, and expect them to hit weekly deadlines. Then you really flip out by hiring a psychoacoustician and experimenting with not only improved broadcast stereo sound, but with another dimension in audio—"spacial reverberation"—a dig-

(From left to right) Samuel Lehmer, Mickey Hart, Jim Loveless (at Emulator) and Bob Bralove at work on sound design for CBS' *Twilight Zone* at Russian Hill Recording in San Francisco.



nified attempt at localized, "3-D" sound effects for the masses.

"There is no such thing as conventional when it comes to doing a show which is, by definition, unconventional," says DeGuere, in a radio-voice that resonates with confidence. Like Serling, DeGuere established his reputation in the television industry as a writer before he went on to produce. Recent production credits include *Simon and Simon* and *Whiz Kids*.

Contrary to what some may assume, DeGuere does not drive around with one of those round, red, white and blue Grateful Dead insignia on his Porsche 928. "I am not a Dead Head. I hate the term. I'm not even on the Grateful Dead mailing list. I just asked to be put on the list to see what they're all about," he insists, though he is hardly ignorant of the band's long, strange trip. "I worked on a movie of theirs in 1972—*Sunshine Daydream*," says DeGuere, who had recently graduated Stanford Film School when the Bay Area spawned the Summer of Love in 1967.

"The Grateful Dead has been responsible for my auditory awakening ever since the first time I heard them," DeGuere confesses. "They are the state-

of-the-art when it comes to the amplification of music. Nobody's in the same league with them... The reason why getting them involved in this show has ended up in the kind of excitement that's being generated by knowledgeable people about the sound, is because that is precisely what the Grateful Dead has always been about—the sound. How to create it, maintain it, and propagate it to the largest number of people with the least amount of distortion, and the least amount of damage to the ears."

Actually, it was The Dead who sought work on the show by way of Merl Saunders, currently music director and supervisor. Saunders, who has scored several films including *Black Girl* and *Fritz the Cat*, is a member of the self-described

"Grateful Dead family" of contributing musical influences. In early 1984 while he was portraying the role of a father to two teenage boys on CBS' *Whiz Kids* comedy series, Saunders stepped quite unexpectedly into... The *Twilight Zone*.

Max Gail, executive producer of Full Circle Productions in Malibu, introduced Saunders to the project. "I said, 'This would be ideal for my friends The Grateful Dead to be involved in,'" he explains enthusiastically. "So I contacted Mickey [Hart] and Jerry [Garcia] and they couldn't believe it. So we just kept it cool for awhile, about a year-and-a-

—PAGE 38

Miniature interior with wall "paintings" by matte artist, Jena Holman.

Colossal Opening for a Classic Show

Since 1959, how many young people have huddled in front of the TV reciting Rod Serling's intro, his trademark grimace contorting their faces with the burden of otherworldly knowledge... Zone Heads.

There was no question about it, says executive producer Philip DeGuere—no one could replace Serling on-camera in the new CBS *Twilight Zone* series. So that left Gary Gutierrez of Colossal Pictures, San Francisco, who designed the title sequence, with a big challenge: to update a classic television show opening without a powerful persona such as Serling.

"Actually, Phil told me he wanted a breath of Serling in there someplace—a tip of the hat to him, and so I came up with the idea of rear-



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The Mitsubishi X-850 is the only PD format multi-track currently being manufactured, but Otari and AEG expect to be debuting their PD entries next year.

—FROM PAGE 5, CURRENT

tronic systems contractors will be exhibiting, and seminars will feature topics such as "How to Deal with a New Generation of Buyers," "How to Expand the Market for What You Sell," and "Fibre Optics and Other New Technologies Affecting Our Business." For more information, contact NSCA at 501 W. Algonquin Rd., Arlington Heights, IL 60005-4411, ph. 312/593-8360.

PD Digital Format Unveiled

AEG Aktiengesellschaft (formerly AEG Telefunken), Mitsubishi Electric Corporation and Otari Electric Co. Ltd., manufacturers of professional audio tape recorders, have announced the PD (Professional Digital) format for recording digital audio on fixed head magnetic tape recorders. The new format, jointly developed by AEG, Mitsubishi, and Otari, claims advantages in sonic performance, reliability and flexibility over previous format attempts by other companies.

PD compatible tape machines will include 32 channels on 1-inch tape, 16 channels on 1/2-inch tape, and two channels on 1/4-inch tape, with both razor blade and electronic editing available. The format agreement includes full tape, machine control as well as digital port compatibility between the different brands. This format standardization agreement is the result of years of discussion and cooperation between AEG, Mitsubishi, and Otari.

Specifications for the 32-channel standard include: 45 total tracks (32 digital, 8 parity, 2 auxiliary analog for cueing, one time code and 2 auxiliary digital tracks); a single tape speed of 30 ips; RSC error correction; 16-bit linear quantization; and 48/44.1 kHz sampling frequency. The 2-channel standard offers 12 total tracks (8 digital, 2 analog cue, one time code, and one auxiliary digital track); 7.5 or 15 ips speeds; RSC-IV code error correction; 48/44.1 kHz sampling frequency, and 16-bit linear quantization.

Canadian MIDI Users Group Forms

An independent group of musicians promoting the exchange of ideas and soundpatches within the realm of the Musical Instrument Digital Interface standard have formed the Canadian MIDI Users Group. Their monthly newsletter provides information on new products, programming hints, interfacing, software, and computer tips. For more information, contact the Canadian MIDI Users Group, P.O. Box 1043, Belleville, Ontario, K8N 5B6. ■



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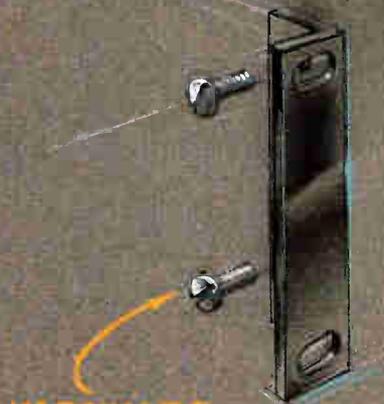
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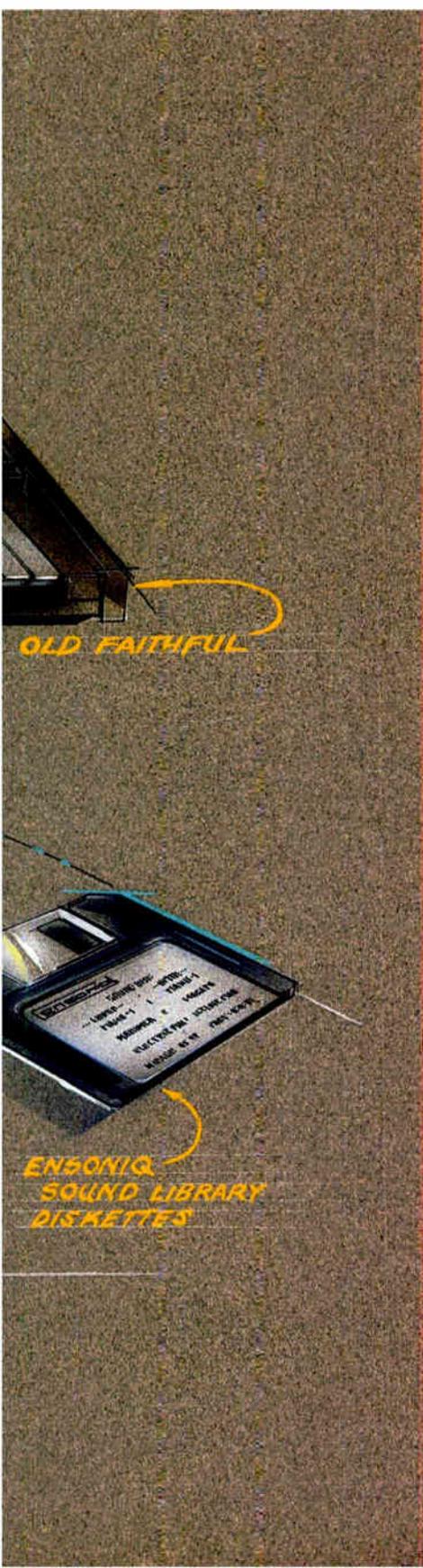
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World Radio History

half, until I finally got the whole thing together." Hart became the sound designer for the series.

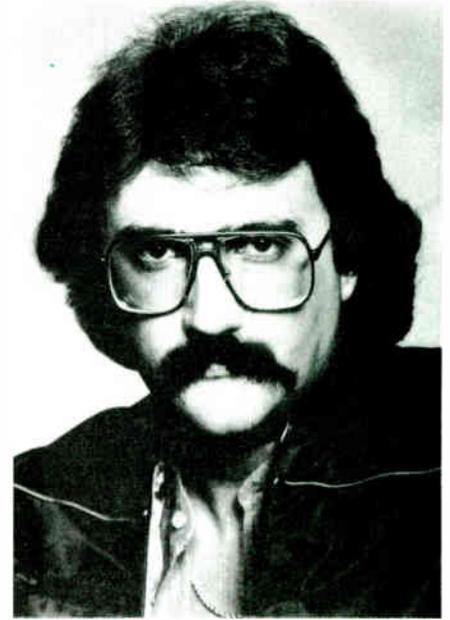
What was the executive producer's reaction to this? "I said, 'Well, that's one of the weirdest ideas I've ever heard in my life.' How could I pass that one up?" DeGuere says, laughing.

So Saunders set about scoring the theme and the music cues for each episode with the help of members of the band, and synthesists Brent Mydland and Bob Bralove (who works with Stevie Wonder. See *Mix*, December, 1984). Long-time Dead audio magician John Cutler has been behind the board with Jeffrey Norman assisting. Some of the tracks were recorded at San Francisco's Russian Hill Recording, at Fantasy Studios in Berkeley, and at the Grateful Dead's own ramshackle warehouse studio in San Rafael, California.

"We kind of freaked them out," says Saunders about the general reaction at CBS. "Is it gonna sound like the Grateful Dead, or what's happening?" he laughs. "So when they heard the theme, they knew we were capable of doing it because the theme came out so elegant." (Yes, that's Jerry Garcia picking the prickly eight-note *Twilight Zone* theme written by Marios Constant.)

In keeping with what DeGuere says about the band, the preoccupation is

Producer Philip DeGuere: "There is no such thing as conventional when it comes to doing a show which is, by definition, unconventional."



not with high-tech methodology, but simply with "the sound."

"We're doing some things that are just old fashioned—you know, putting up a nuke and going for it," Saunders summarizes. He's also using a mix of synthesizers: the DX7, a Quark with MIDI,

the Emulator and the LinnDrum 9000 sequencer, "which Bob Bralove introduced to us," says Saunders.

Mickey Hart interjects a mad note of eclecticism. "We're using anything that fits. The sound of rain, light bulbs breaking backwards at half speed, branches, car crashes, wood breaking. It's kind of a 21st Century orchestra." As sound designer, Hart supplies musical special effects, as distinct from Foley effects, which are being done in Hollywood by Sam Horta and company. Jim Lovelace is assisting him, and Don Goldstein is engineering.

Psychoacoustician Betsy Cohen, a professor at Stanford University's CCRMA (Center for Computer Music and Acoustics) was hired to oversee the entire audio production chain. She describes Hart's job in this way: "The original intent was that wherever there were magic moments, Mickey and sound design would come in and highlight that magic with a sound effect or music."

He is producing musical effects to inspire emotions appropriate to the creepiness of *The Twilight Zone*. "I'm unique because I'm a musician, so I'm composing it, generating it, mixing it, and processing it all. I have total control and I know exactly what I want," says Hart resolutely, standing in the middle of the Dead's studio in his grey and red pajamas. Hart underwent surgery of the spinal chord the previous week, so he was taking an ambulance to work, and spending short, horizontal breaks on a small couch in front of his instruments.

"I don't know what a sound designer really does," says Hart. "I'm not in the straight mold of a sound designer—I just know what I do, and I know what

—FROM PAGE 33, COLOSSAL

projecting some film of one of his intros into liquid nitrogen," Gutierrez explains. The effect is startling—the ghost of Serling hovers in a gaseous cloud.

When he was brainstorming for ideas, Gutierrez says he never even looked at the old opening. "I didn't think it should have anything to do with it except as sort of a fermented memory, I suppose."

He explains the thematic progression of the sequence: "We're in a twilight landscape and we move backwards through a window which is sort of symbolic of a transition to another place. And the window slams shut, locking us into a kind of forgotten-looking room with several patterns on the wall, which ultimately take over, and the room dissolves away, becoming just these images of floating asteroids and clouds and stars. And the window is replaced by a crystal ball. Then the succession of imagery that appears in that ball was something that we put together in collaboration with Phil DeGuere—partly as brainstorming ideas, and also Phil had a book—a dictionary of signs and symbols. It allows you to look up almost any item you can think of and find its

mythological, cultural associations."

Some of those images are of a tarantula, a tribal mask, and an embryo. (At the end of the sequence, under the embryo image, the heartbeat you hear is actually that of Mickey Hart's son, recorded while he was still in the womb. "It's great," says Mickey. "The kid gets publishing royalties from it, along with his mom.")

So how did the people at Colossal get a tarantula to dance around inside a crystal ball? "The ball itself was shot on an animation stand using a 35mm motion picture camera. The stand was a black velvet board that had a hole cut in it that was just a fraction of an inch smaller than the 5-inch crystal ball—so that when we laid the crystal ball in that little hole, it wouldn't fall through. So, the camera's looking at this ball with black velvet around it, which in effect, doesn't expose film. Now the ball becomes this refracting lens, and any footage that we rear-project below the ball out of sight of the camera, becomes distorted through the crystal ball," Gutierrez explains.

All compositing was done as an optical process, and video editing was done at Complete Post, Los Angeles. ■

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Tim Boxell (animation designer) and Tyrone McClosky (animator), test the logo transformation on a video animation stand.

DeGuere asked me to do. He gave me I guess you could call it a mandate, to just sound like me... he really didn't give me many restrictions."

DeGuere is trying to do something subtle with Hart's work. He's experimenting with the primal. "The sound design is subliminal," says DeGuere. "The way I came on that one was, I put on earphones and listened to my Dolby stereo cassette of *Apocalypse Now*—turned it up real loud, and listened to what Mickey did. [Hart created sound effects for the movie]. I said, 'Wait a minute... I never heard *that* before.' Then Mickey and I began to talk about how it works on a subconscious level."

Hart is more than happy to wallow

awhile in the primal. He has the look of a wild-eyed, flannel-clad anthropologist for a moment. "The Emulator can hold my whole percussion collection. I have hundreds and hundreds of instruments. One of the most unusual instruments I've used lately is a skull drum from Tibet. It's made of two human skulls joined at the cranium. It's called a *dam-aru*." (Hart is also collaborating with Betsy Cohen on an encyclopedic work documenting percussion instruments around the world. He's spent much of his career rubbing, beating and studying exotic instruments.)

Hart and Cohen have also been active in another even more esoteric—but decidedly non-primitive—aspect of

the show's audio production: spacial reverberation. This new computer-processed treatment of sound has never been used on television (in fact, it's only been used once before—on a demo reel for a computer graphics house in Columbus, Ohio called Cranston-Csuri). It's a new attempt by Gary Kendall and William Martens of Northwestern University's Computer Studio to create the coveted 3-D sound effect. The process attempts to give listeners localization of sound cues with both stereo, and to some degree, mono delivery systems.

Cohen is responsible for organizing who will be creating each effect that has been selected to be processed (for example, a buzz saw up in a tree to the left, or a water fountain dripping as a character walks past it) and making sure it is recorded correctly. "These have to be processed to certain specifications. They have to be done dry. When you're processing the sounds, you can't have reverberation and intensity. Those cues are provided by the computer itself. So Mickey has to be careful recording these selected sounds," Cohen explains. There is typically a total of 40 or 50 seconds worth of sound processed with spacial reverberation per show, although most of the theme was processed.

How did CBS get tangled up in an interesting experiment such as this? DeGuere says he'd been looking for an innovative audio recording technique that would subliminally draw the viewer deeper into the story. CBS investigated Holophonics™ technology and rejected it as wanting, according to DeGuere. But he, Hart, and Cohen kept experimenting under the aegis of Joe Flaherty, head of engineering at CBS. At one point, DeGuere bought a Sony binaural Walkman recorder, stuck it on his 15-year-old daughter's head, and paid her good money, "for the excruciating

Mickey Hart: "We're using anything that fits: the sound of rain, light bulbs breaking backwards at half-speed... It's kind of a 21st Century Orchestra."

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experience of standing on stage behind Mickey while the Grateful Dead played a couple of shows at Berkeley," he recounts. The trial produced some interesting tapes. "But when we found Northwestern, we knew we were on to something," DeGuere reports.

After the first broadcast of the show on September 27th, Cohen wrote DeGuere a memo about the variable sound quality experienced around the coun-

try with individual affiliate stations. He is candid about these problems, and says he'll encourage station engineers to leave the show's audio signal as transparent as possible. "The only thing we have no ability to control is what happens at local stations," he says. "If you hear something you don't like on *Twilight Zone*, you should call or write your local station manager, which is the way to affect the network."

When asked if he actually hears localization of the sound of a buzz saw above his head over mono speakers, he says flatly, "I haven't heard it [the elevation localization effect] yet, myself." He also says that if *The Twilight Zone* manages to stay on the air, this unusual crew will continue to experiment and fine tune until they get it right. "All I want to say is, *The Twilight Zone* is back... and turn up the volume." ■

Spacial Reverberation

Gary Kendall and William Martens, who are computer musicians and professors at Northwestern University's School of Music, have created a processing technique to create 3-D sound. "We use the term 'spacial reverberation' for this synthesis of directional cues and simulated reflected sound. It is our hope that techniques like ours will stimulate composers to produce a kind of music that not only takes place in space, but is spacially conceived," wrote the two researchers in a paper entitled "Simulating the Cues of Spacial Hearing in Natural Environments." The effect is best achieved with a stereophonic delivery system, although some cues such as distance and elevation can be experienced with a monophonic system, according to Kendall.

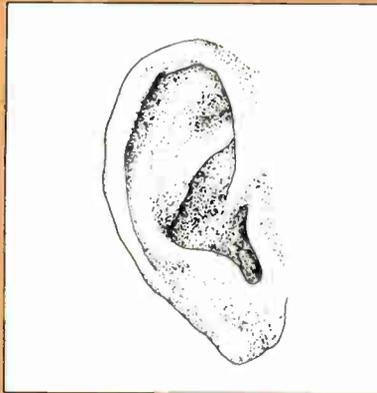
Their conclusions are based on psychoacoustic research involving how humans hear sound as interpreted by the outer ear (or the pinna), and also on spacial and temporal functions of a model environment.

Here are some additional excerpts from the Kendall and Martens paper which explain some essential findings:

"Psychoacoustic research has concentrated on three categories of cues for directional hearing: interaural intensity differences, interaural time differences, and spectral cues introduced by the pinna, head, and torso. Research into the first two types of cues had produced most of its major findings by the 1960s, while research into spectral cues is today still quite an active area. All of this research has treated these topics as separate issues and assumed that the auditory system's mechanisms could be studied in isolation. This assumption is valid insofar as one intends to study 'separate mechanisms' but it is clear that in natural listening situations all mechanisms work together in

the formation of spacial images...

"Since our goal is to provide composers with a comprehensive control of auditory space percepts in music, we must approach the problem of simulating spacial cues as a whole. Our effort in this regard has



had two primary components. The first is the formulation of idealized spectral cues for use in directionalizing sound. We know, for example, that spectral cues induce spacial percepts even when other types of cues are absent. The second is the simulation of environmental reverberation that retains the spaciality of reflected sound. By combining spectral cues for directional hearing with such reverberation, we are attempting to recreate the experience of listening in natural environments entirely from computer simulation."

On the subject of the pinnae, Kendall and Martens write: "In the last 15 years, we have come to recognize that an additional cue for directional hearing is provided by the reflection of sound off the convolutions of the pinna (outer ear), shoulders and upper torso... Because the pinnae have a very asymmetric arrangement of ridges, the composite sound reflections create a unique spectral profile for every sound direction."

Kendall and Martens analyzed widely varying pinnae measurements from lots of ears. They came up with a synthesis of these measurements—a combination of the

best and most regular features from a broad selection—to produce what they hope to be good ears. These data support the basis for the filtering program that provides directionalization in the process.

The second part of their unique program attempts to overcome the limitations of hostile listening environments by processing the signal to produce reverberent compensation. "We have concluded that in order to simulate the spacial cues of real environments, one must capture the total spacio-temporal pattern of reflected sound. For this reason we have sought a reverberator design that models an actual room and which accurately replicates the spacial and temporal distribution of reflected sound. The design must differentiate between large and small rooms, and allow us to place the reverberated sound source anywhere in the three-dimensional space, not just at the speaker positions.

"Our spacial reverberator was initially designed to accept control parameters that specify the physical attributes of a room—such as the room's dimensions, the absorption coefficient of the walls, the physical positions of the listener and sound source, etc. But composers or others who wish to use the reverberator probably will want to specify control parameters that have more psychologically relevant meaning... We view a large part of the task of perfecting our spacial reverberator as learning how to create a user interface with intelligence about the relationship of these psychological dimensions to a room's physical attributes."

Of course, these are only excerpts from Kendall's and Martens' writings. We hope they have supplied some basic information about their approach to the very complicated task of generating life-like 3-D sound. For more information, contact Gary Kendall at The Computer Music Studio, Northwestern University, Evanston, IL 60201. ■

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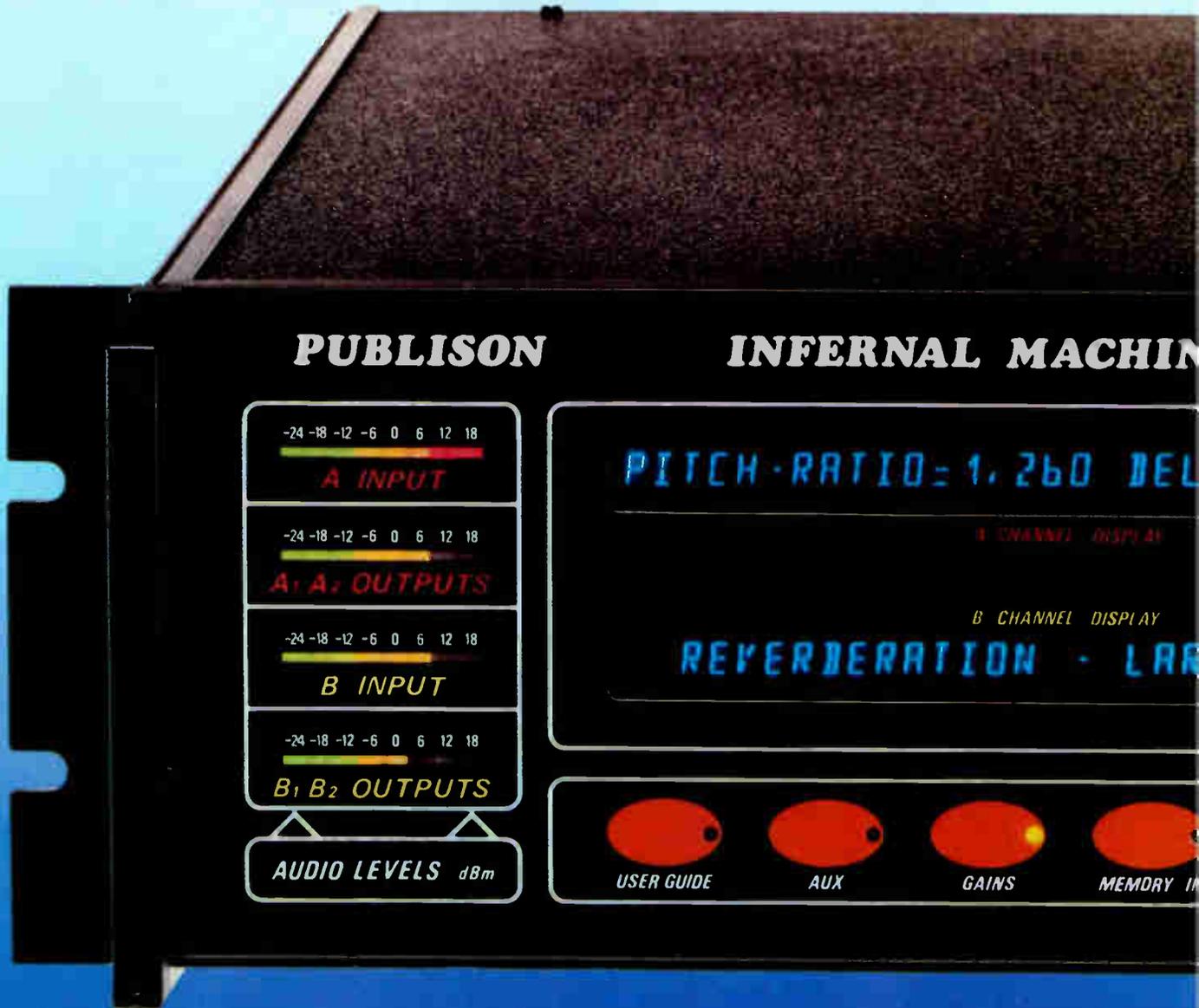
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DIRECT METAL

M · A · S · T · E · R · I · N · G

by Brooke Comer

Direct Metal Mastering (DMM), a technology for cutting record masters in copper metal instead of the traditional lacquer, was developed by West Germany's Teldec Schallplatten. In Europe, more than 40 million LPs have now been made using

Teldec's process, and high-quality LP imports sporting the DMM trademark are beginning to appear in U.S. outlets. Now DMM has crossed the Atlantic in the form of New York's Europadisk, Ltd. licensing of the DMM technology. Europadisk now offers complete DMM facilities on

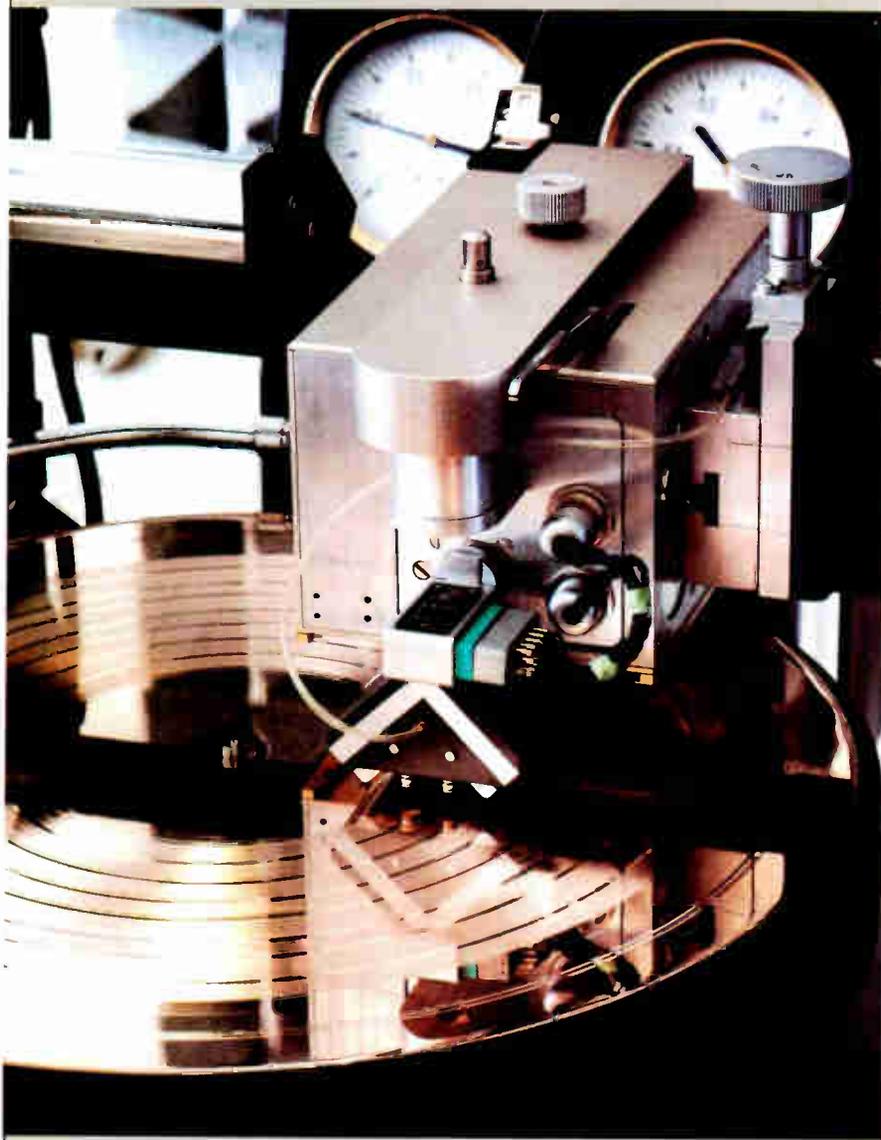
a custom basis including DMM Disk Mastering and DMM LP pressings meeting Teldec's strict quality standards and identified with the DMM trademark. Europadisk can also supply parts from its DMM masters to any other pressing plant, worldwide.

Europadisk's president, Jim Shelton, explains, "DMM has its primary advantage in higher quality—specifically, better high-frequency and transient response and lower noise. There are also potential cost advantages. Lacquer masters are cut in a soft, nitro-cellulose-based, plastic material which generates several typical problems—pre/post echo, tickiness, swishes and formation of rough 'horns' at the land/groove will junction. These horns produce a myriad of subtle and not-so-subtle problems in plating and pressing, resulting in noise on the finished LP. DMM masters are cut in a metallic copper material which has been electroformed with great purity on a stainless steel substrate, thus eliminating lacquer problems. Also, cutting in the relatively hard, stable copper metal greatly enhances transient response which the soft lacquers tend to mute."

While the mechanics of cutting copper and lacquer are very similar, processing for lacquer cuts involves three separate steps, beginning with metalizing and plating of the delicate lacquer master itself. This produces a metal negative which is in turn plated to produce a mother or metal positive from which the final stampers are produced. DMM Mastering eliminates these steps since the copper master is itself a mother from which stampers can be directly produced with no intervening plating steps. This considerably shortens the time from mastering to pressing, and saves the cost and problems associated with complex lacquer processing.

"Being first in the U.S. with DMM is quite a coup for us," says Shelton. "Although several European record companies have licensed DMM

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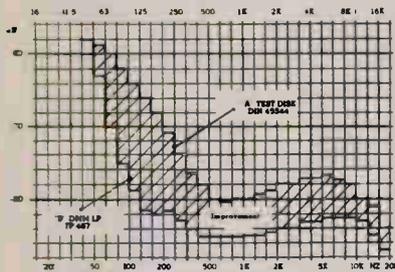
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World Radio History

(EMI has worldwide DMM licensing), major U.S. companies have been too timid to get involved in this new technology. Because of our established reputation for quality, Teldec was pleased to have us introduce DMM to the U.S. market."

Perhaps the most important difference between lacquer and



Background noise—comparison between DMM cut and lacquer cut.

DMM cutting is in the geometry of the cutting stylus. Lacquer styli have so-called burnishing facets necessary to smooth and quiet the groove walls as they are cut. However, at high frequencies this pro-

duces a self-erasure effect which grows more noticeable towards inner diameters of a record. By contrast, DMM styli are feather-edged with no burnishing facets so there are no high-frequency losses. It is also claimed that, because of the sophisticated lathe control developed for DMM mastering, up to 15 percent more playing time is available for DMM cuts as compared to lacquer cuts.

Shelton states, "The thing most people notice first with a DMM cut is the greatly improved transient response and extended high end—it's much cleaner and there is no inner diameter distortion and high-end loss as with lacquers. While the DMM quality advantages are a boon for difficult classical program especially as it relates to noise, we feel that rock and other popular program will benefit even more. That's because popular program usually has heavily loaded high-frequency content, and cutting levels are also high. This is exactly the area where DMM is superior to lacquer cuts."

Apparently one reason U.S. rec-

ord companies have shied away from DMM has been the licensing requirements. By working through the Europadisk connection, American producers can have access to DMM technology without making any licensing or royalty commitments. Records from DMM masters can be made by any pressers, but the DMM trademark is protected and can be used only by licensees such as Europadisk. Also, records bearing the DMM trademark must meet Teldec's published specifications for quality. "DMM masters we cut can be pressed anywhere," Shelton points out. "These records will have all the advantages inherent in DMM mastering with the exception of noise characteristics, which will depend on each plant's in-house standards." Typical costs for lacquer masters, including three-step plating, is \$266 per side. Europadisk's DMM masters are \$297 including plating, which makes the copper cuts only about \$30 more per side than lacquer costs. Says Shelton, "The additional cost for DMM masters is easily justified considering the high quality. Also, for record projects where masters for several different press plants are required, DMM offers large cost savings. Instead of sending lacquer masters to each plant at \$180 per set, metal mothers electroformed from the copper masters can be sent for \$80 per set."

In addition to its DMM operations, Europadisk offers three grades of record pressings, all made from imported Teldec vinyl. "For programs with limited dynamic range," says Shelton, "our least expensive Europa-Classical grade of pressing is excellent. For records to be identified with the fancy DMM logo sticker, we recommend our Audiophile or Ultimate-Audiophile product. By offering these different grades of pressing, we have tried to tailor product to the differing needs of our clients." Prices for Europa's press product range from 55 cents to \$1.21, depending on the grade and quantity.

"My partner and I originally started Europadisk in 1978 to fill a need in the U.S. for high-quality plating," explains Shelton. "This led us into audiophile pressing, and the progression into Direct Metal Mastering was natural. We feel that DMM puts the black disk in a good position to compete against CD and cassette as the medium of best value—that is, the best quality for the least cost." ■

PRINCIPLES OF DIGITAL AUDIO

by Ken Pohlmann

Hot off the presses! This clear and concise overview starts with the fundamentals of digital audio and comprehensively covers recording, reproduction, media, error protection, the Compact Disc, and more. Whether you're a skilled audio engineer or a novice, this book delivers and even manages to entertain while it informs.

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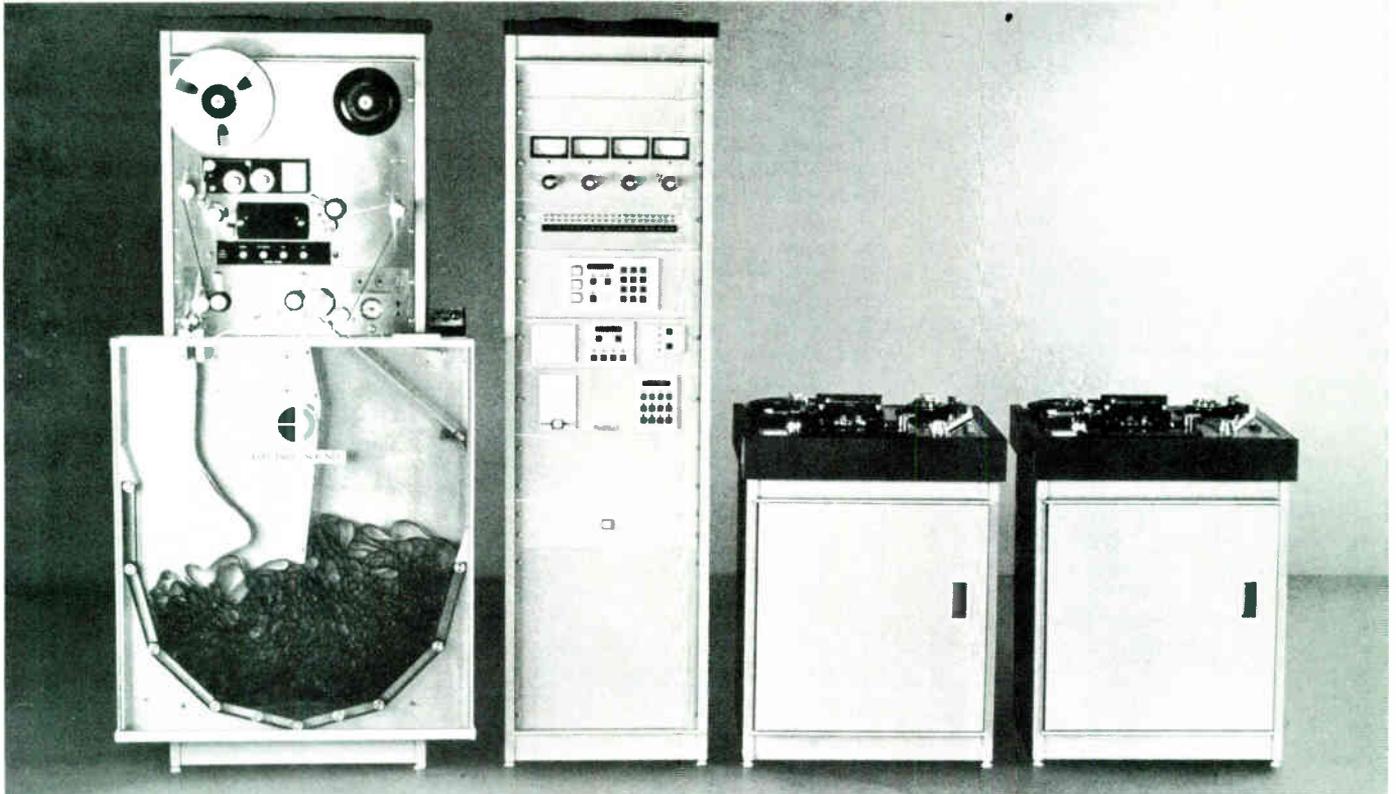
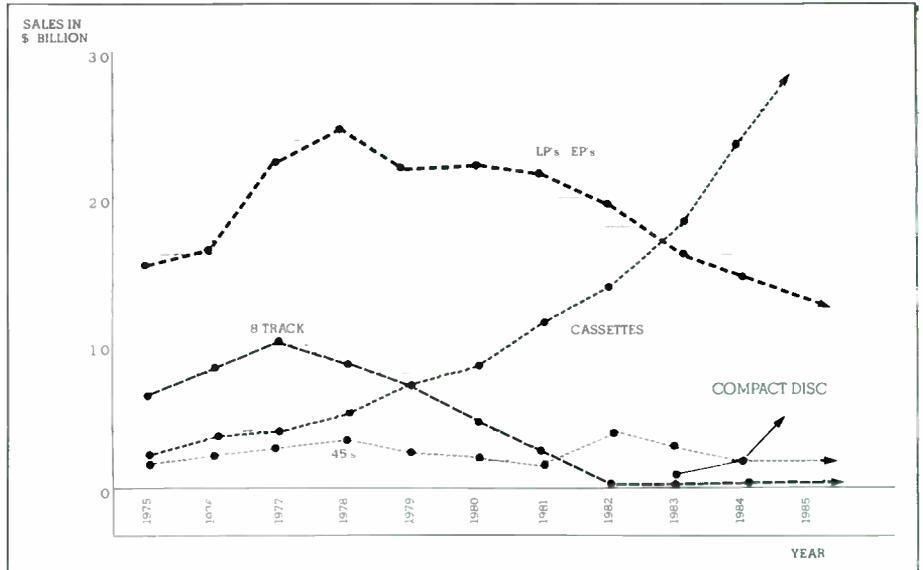
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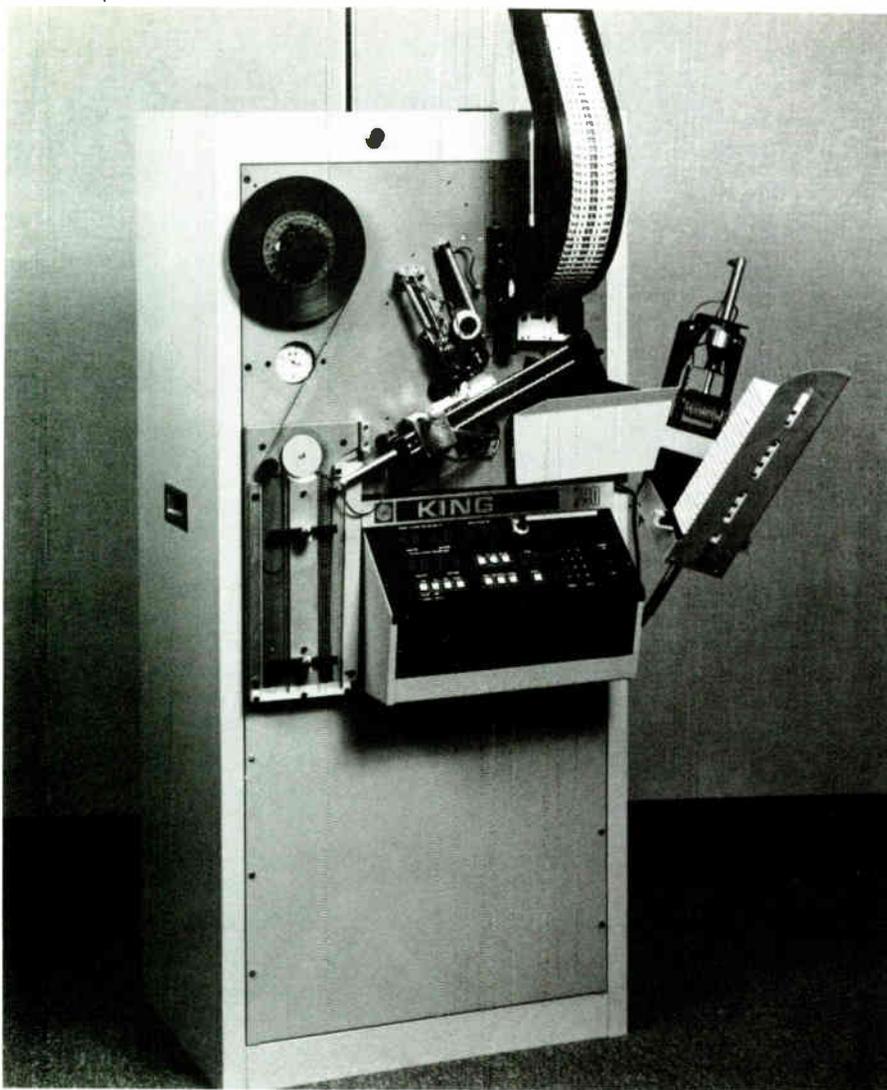
D PLICATION

by Bryan Lanser and
William Johnston

The cassette. Who would have guessed 15 years ago that in 1983 the cassette would become the dominant music distribution medium? In 1966 when Philips introduced "compact cassette" recorders, the medium was thought ideal for taking dictation and recording meetings. . . real high-tech stuff. Historically, the cassette has been viewed as a second-rate format appreciated more for its convenience than audio quality.

At right: Consumer buying trends in pre-recorded product, 1975-1985. Below: Electro-Sound's ES8000 64:1 duplication system.





Production capacity of the King Model 790 loader is 2,500 C-60 cassettes per eight hour shift.

proach when considering cassette manufacturing. Each step, the high speed duplication process interacts with the other, requiring constant monitoring of quality at each phase. Unfortunately, this is no easy chore. As in any manufacturing environment, decisions have to be made regarding the balance between cost and quality. A low grade tape in a die cast shell is still a cheap tape. Thus, a full understanding of the entire system is necessary to maintain the overall quality of the product.

The Basic Chain

The duplication process begins by transferring the client's master to a 4-track master, two tracks in each direction. This enables the duplication system to record all four tracks (A and B sides) of the cassette in one pass. This transfer is extremely critical and will be discussed in more detail later.

This newly created "bin loop" master is loaded into the high speed bin loop reproducer. After the tape has been loaded into the bin, the two ends of the program are spliced together, creating a continuous loop system. The bin loop master is played back at high speed and recorded (all four tracks) on slave recorders loaded with cassette tape pancakes. These pancakes are just a continuous length of 1/8-inch wide cassette tape from 8,500 to 14,000 feet long. As the bin loop master makes one full revolution (one program), a low frequency cue tone is recorded on the tape, marking the start of the next program. Thus, many programs are recorded on one pancake at a ratio of either 64:1 or 32:1 compared to real time.

From here, the cassette tape is loaded into shells that contain only leader. This is done with an automated loading machine. The loader takes the prerecorded tape and splices the program to the severed leader, winds the program into the shell at high speed, and then splices the other end of the leader to the program after it detects the cue tone.

—PAGE 56

Yet, two years ago the cassette eclipsed the LP in sales with continued dominance foreseen into the near future. It is no wonder that the cassette has recently garnered a great deal of attention from major labels and their manufacturing divisions, fostering an evaluation of present duplication procedures and standards.

The cassette is clearly superior to other music in at least two distinct areas—the medium's versatility and its inherent ability to record. The cassette has become the ultimate "portable" source of music for our highly mobile society. The rise in popularity of blasters, car stereos incorporating cassette transports and "personal" or Walkman-type players has certainly aided the dramatic rise in cassette sales over the last few years.

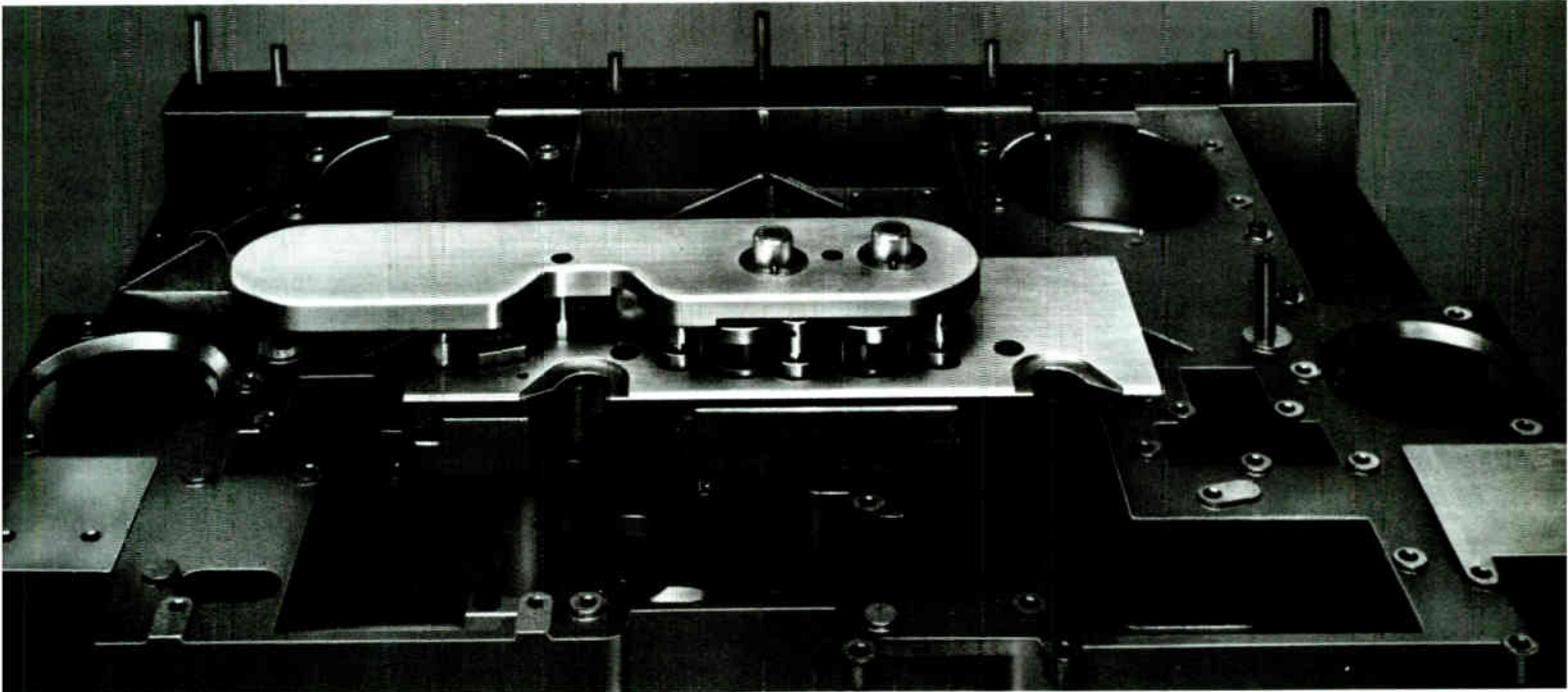
Still, for a number of people, cassettes are used to record other people's records. Better known as copyright infringement, this practice has caused a great deal of concern among the major labels. Current thought is that the best way to combat the rise of illegal home taping is to manufacture a better cassette than the consumer can record at home.

Unfortunately, there is an opposing point of view: If the cassette is going to be played back on two 5-inch speakers placed six inches apart with the volume set at 11, why should we concern ourselves with noise floor modulation and azimuth error? Clearly this attitude must be avoided as the high standards demanded by the digital revolution have created a more sophisticated public. The decisions being made today in the quality control departments of the nation's cassette duplicators will have substantial impact on the viability of the cassette in the future.

It is important to take a systems ap-

If the cassette is going to be played back on two 5-inch speakers placed six inches apart with the volume set at 11, why should we concern ourselves with noise floor modulation and azimuth error?

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STUDER REVOX



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A New Approach To Bin Loop Transport

ferred consumer format over the past couple of years, advancements in high-speed duplication systems have been coming fast and furious. One such development was recently unveiled by Concept Design, a subsidiary of American Multimedia (Burlington, NC), who have designed two new 480 ips loop bins (for half-inch and one-inch tape) which use a unique method of tape control in order to improve high-frequency amplitude and phase stability for improved stereo imaging.

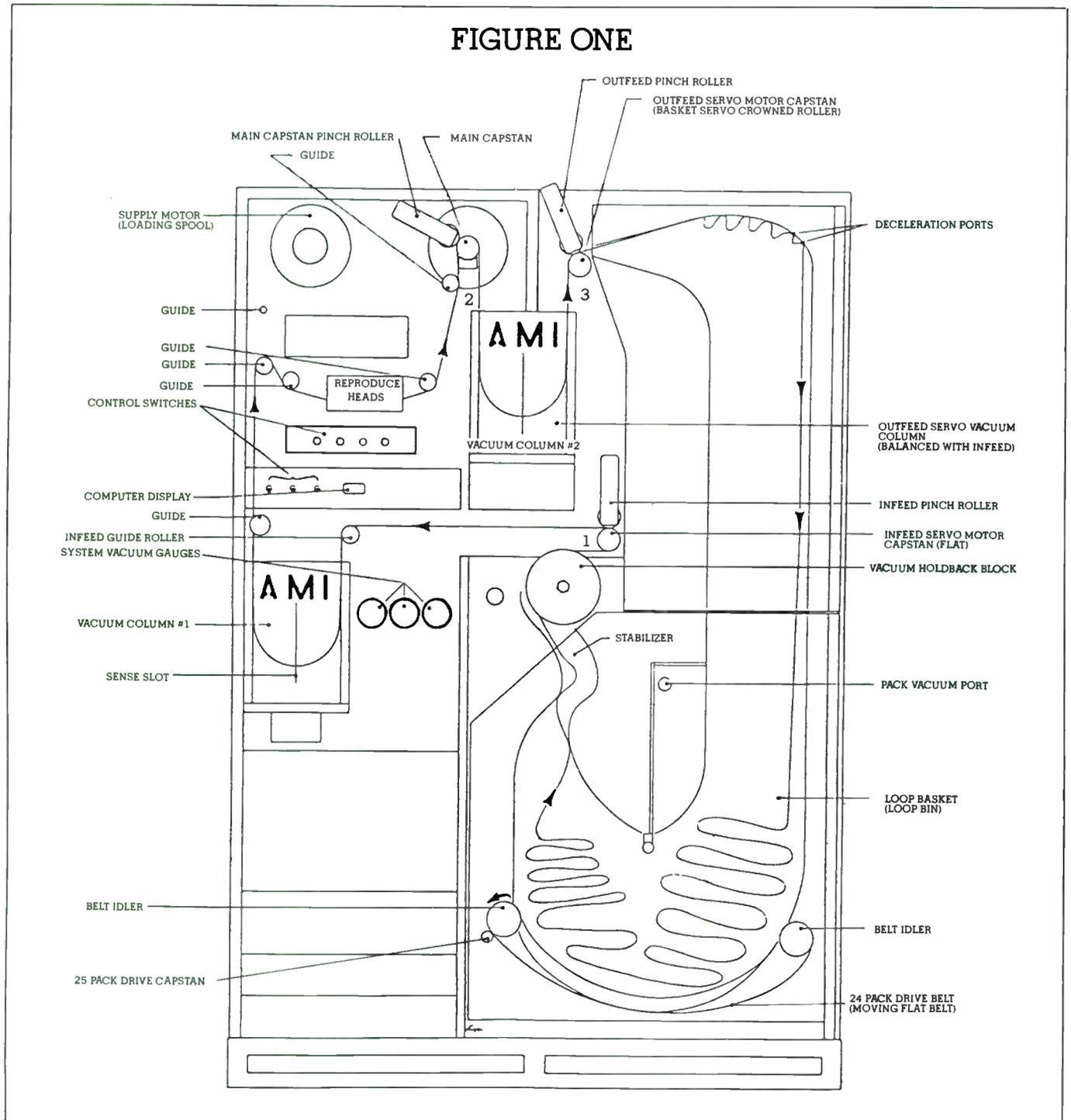
—PAGE 158

By Mike Jones

Ever since the introduction of the cassette medium in the mid-'60s, quality

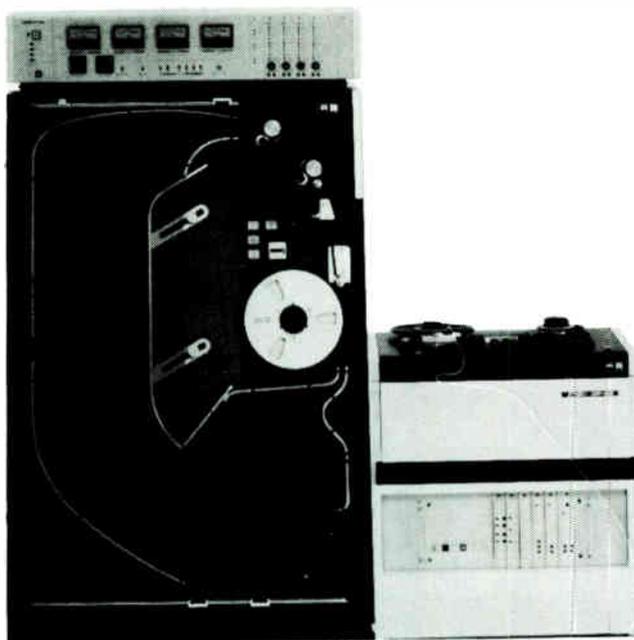
improvements have followed a steady path of evolution. However, with the cassette's rise to the top as the pre-

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—FROM PAGE 52

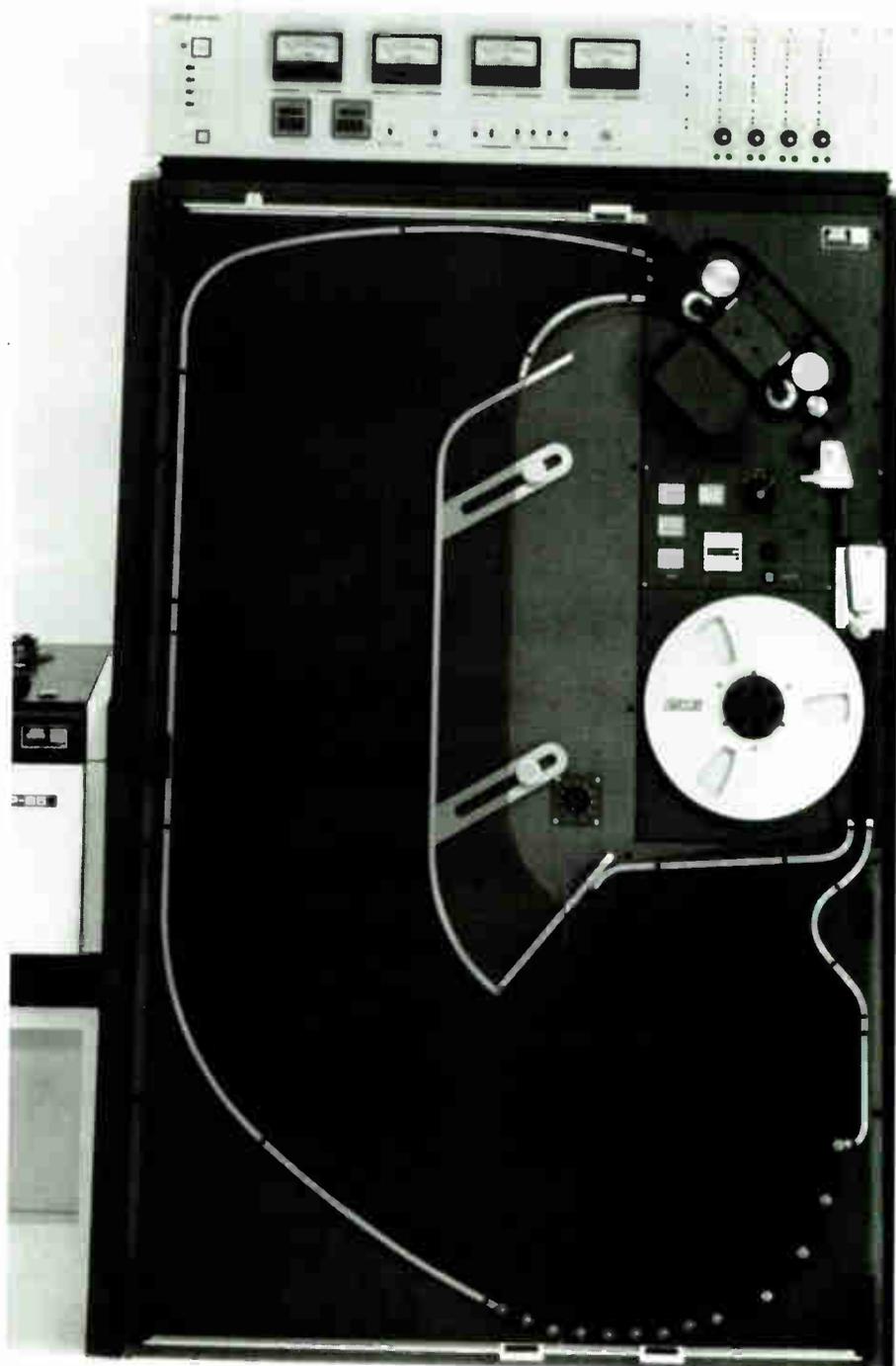
This can occur in as short a time as seven seconds for a C-60 program. The cassette is now ready for labeling and packaging. Although these are not critical to the audio quality, they can be just as important in the marketplace. The following is a closer look at each step of the manufacturing process, the prevailing attitudes, and the problems encountered in each phase.

Mastering

This step in the cassette duplication process is perhaps the most critical. Most industry labels currently employ bin loop systems, that operate at 240



*Above: Apex On-Cassette Printer.
Below: Otari DP-80 480 ips bin loop
duplication system.*



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ips and utilize a master tape of 3.75 ips. There is currently a lot of controversy as to whether this format is a limiting element in the quality of the cassette.

7.5 ips vs. 3.75 ips

American Multi Media Inc.—the largest independent cassette duplicator in the United States—has conducted a considerable amount of research into master tape quality and its dependence on speed. The results of AMI's research has concluded that 7.5 ips mastering must become the industry standard if the cassette is to hold off the digital threat. Implementation of this standard would require one of two things: either reducing the duplication rate from 64:1 to 32:1, or increasing the bin speed from 240 ips to 480 ips. Reducing the duplication rate sacrifices productivity, therefore it is obvious the bin loop speed must increase to 480 ips.

This presents two technological challenges which must be met. The first is the elimination of the phenomenon called air film—a condition where the tape actually begins to float over the head on a pocket of air as a result of the increased bin speed. The other is the minimization of the forces that are exerted on the tape at 480 ips. The constant acceleration and deceleration that occurs as a result of tape handling at these high speeds can cause premature mastering wear and breakage. Yet, at the recent Electro Sound seminar on cassette duplication, the general consensus was that conversion over to the 480 ips bin system is inevitable after the manufacturers of duplication equipment can prove the format reliable. Currently the only company manufacturing 480 ips systems is Otari Electric Company. Their DP-80 system offers both 240 ips and 480 ips operation, and has been shipping for well over a year with several systems on line in the U.S.

Even more critical to the quality of the bin loop master is the quality of the master tape from which it is derived. The theory "garbage in means garbage out" could not be more true than in the cassette production process. If the client's master sounds bad—be it drop-outs, elevated noise floor or distortion of any type—then the quality of the cassette will be compromised. Unfortunately, duplicators who are perfectly capable of producing a quality cassette are often sent safety copies or EQ'd copies created during the disk mastering session. Using these tapes which are often two or three generations down from the original obviously degrades the signal to noise ratio of the cassette. No wonder consumers complain about the level of tape hiss on commercially produced cassettes! Cassette mastering needs to be taken with the same seriousness as disk mastering. A good quality original master is an essential element of pro-

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Back in 1979, Jeff Hollender found-

ed a continuing education program called Network for Learning. Located in New York City, the Network offered a series of lecture classes that were so popular, book publishers grabbed the Network catalog and began mass-marketing Hollender's ideas. One lecturer, Mitchell Deutsch (then advertising director for Sony audio products in New York), was asked to write a book based on his talk about marketing the Walkman. But Deutsch possessed marketing savvy—he joined forces with Hollender, they ceased the lectures, and together began marketing their concepts: not on paper, but on audio tape, the Walkman's *raison d'être*.

—PAGE 58

ducing a good quality cassette.

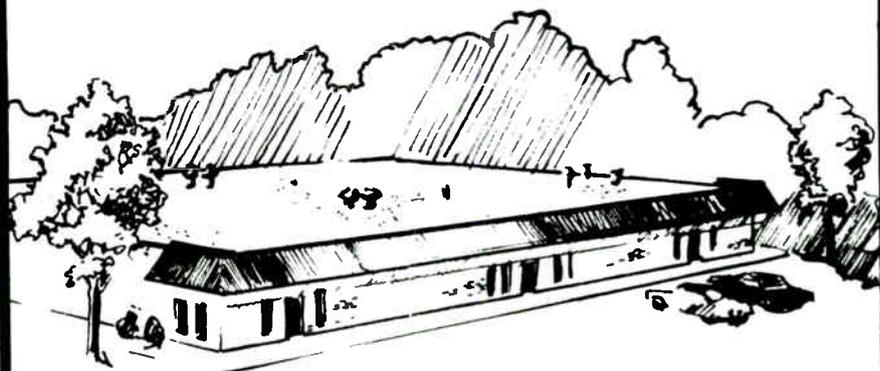
The signal processing that occurs during the mastering process can be as simple as encoding with Dolby-B noise reduction, or as esoteric as the addition of artificial reverberation and aural enhancement. Most masters receive little more than level adjustment and noise reduction encoding. Special processing must be considered an artistic decision which should not be performed without consent of the tape's producer. As

in the disk mastering process, the presence of the producer should be encouraged during the bin loop mastering process, whenever possible.

Since no bin loop master lasts forever, a digital backup copy of the master is run during the initial mastering session and is encoded with the level corrections, noise reduction encoding, and signal processing so other bin loop masters can be generated without hav-

—PAGE 154

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Warner Audio Publishing

Soon, the Network's titles were selling more than 50,000 copies just through the Waldenbooks chain; obviously, a national distributor was needed. The only one that didn't want total control was Warner Communications. Warner offered Hollender and Deutsch a five-year contract, minority interest in the company, and substantial operating autonomy. Last January they sold their company to Warner Communications, who renamed it "Warner Audio Publishing." Deutsch is president of the company (which now has a staff of 20) and Hollender is its publisher.

Warner Audio produces "non-music audio programming—from self-help to science fiction." They sell inspiration (e.g. "The True Joy of Positive Living" by Norman Vincent Peale) and humor ("Truly Tasteless Jokes"). Since Warner's acquisition, Hollender and Deutsch have been rapidly expanding their library, moving into high finance and literature.

Warner Audio's Director of Audio Production, Jane Schonberger, explains, "We have an editorial group that meets weekly to review upcoming titles from all the book publishing houses. After we choose a title, we acquire audio rights, and then go into production." Warner Audio pays author's royalties on the wholesale price (not retail, as most book publishers do), and they allow retailers to exchange only 20 percent

of the cassettes they order (unlike book publishers, who allow stores to return all unsold items).

But Warner Audio items seem to get sold. Indeed, their market could be bottomless. The tapes are geared to cassette deck owners between the ages of 18 and 54, and it's estimated that 300 million cassette players are in American homes and cars. No major record publisher produces as many non-music audio cassettes as Warner Audio—15 to 20 new titles every month. And whereas most major labels want \$8.98 for a 45-minute cassette retail, Warner Audio's 60-minute cassette goes for \$7.95.

To develop awareness of their many programs, Warner Audio merchandises their wares through a "modular cassette center (highly visible, free-standing, point-of-purchase displays) and snappy packaging (big, bold, and colorful).

Another merchandising method involves expanding Warner Audio's distribution channels to include record stores and mass merchants. Although most record companies sell to distributors, who sell to stores, Jane Schonberger explains, "We work a bit differently. WEA (Warner/Elektra/Atlantic) distributes to airports, newsstands, department stores like Caldor's and K-Mart, anywhere magazines are sold. Then we, Warner Audio, distribute directly to all the book stores, on a nationwide level."

Warner Audio has categorized their programs, enabling easy consumer identification and quick appeal. These categories, among others, include exercise and fitness, foreign language and travel, and self-hypnosis/subliminal persuasion. Their "personal and professional development series," featuring titles such as "The Heart and Soul of Excellence," is geared to "the growing market of go-getters who demand a no-nonsense approach to success."

Another clever marketing move is Warner Audio's engagement of top theatrical talent to read best-selling novels and classic fiction, transformed into richly produced, two-hour audio dramatizations, complete with music and sound effects. These are packaged in single- and double-cassette form, in cases that look like the original book cover, with titles printed on the "spines."

From Mickey Spillane to Isaac Asimov, Dostoyevsky to D.H. Law-

rence—Warner Audio produces something for everyone. Such celebrities as Eli Wallach, Michael York, Frank Langella, and Jane Alexander each portray all the lead characters in a program.

Jane Schonberger oversees all production. "I work mostly with freelance audio engineers and producers; we use a lot of National Public Radio producers.

"If we're doing a non-fiction program, we base the cassette on a best-selling book. We meet the author, decide what material to highlight, then go into the studio and interview the author, recording all original material. The sessions usually run three or four hours, which we edit down to an hour. Then we write announcer copy, and mix in some music. This generally involves little production. In the case of a fiction program, we use an adaptation of a best-seller or a classic. Our in-house writers work with the authors, if possible, to cut down the book. After the adaptation is complete, we cast the reader. We rehearse, and then go into the studio for about eight hours. Each program is generally a single voice, but this type of production is much more complicated since it involves a lot of sound effects and music—mostly stock, though occasionally we commission a musician to write something."

Warner Audio's recording is accomplished at three 24-track studios in New York City: Greene Street Recording, Media Sound, and Sorcerer Sound. Says Schonberger "We do a lot of post-production here in our 2-track mixing studio, if it's simple mixing and dubbing. For complicated multi-track programs, such as the fiction series, where we use music and sound effects, we go outside."

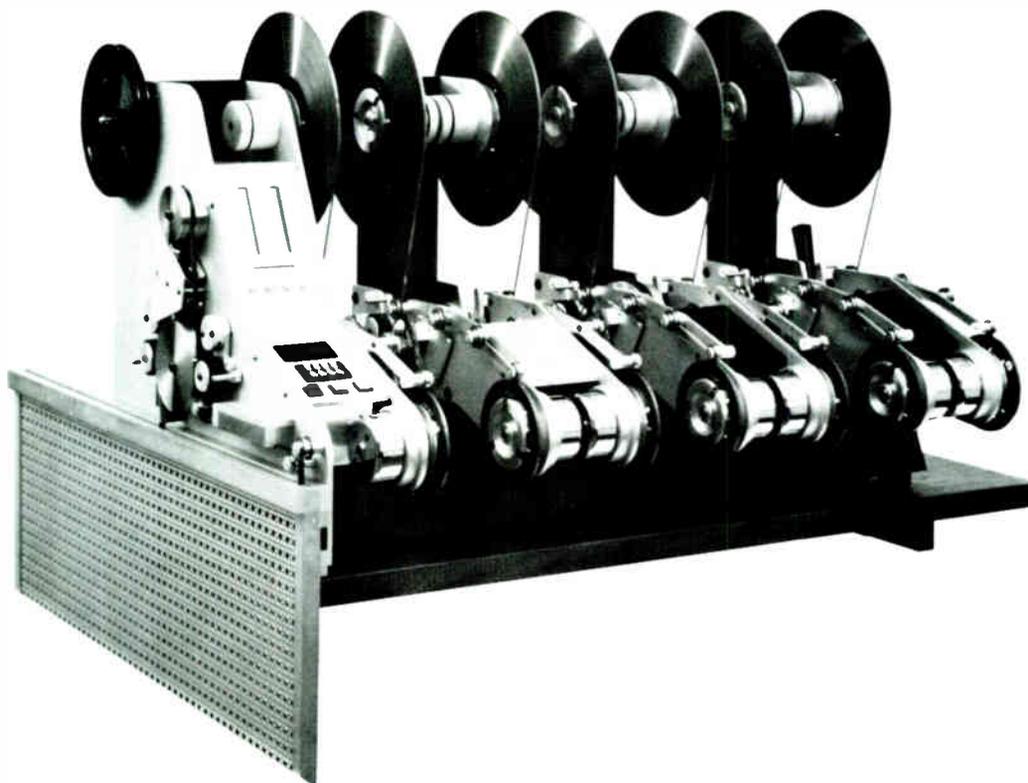
Since Warner Audio makes as many as 50,000 copies of a cassette title at one shot, they need a high-speed duplicator. For this purpose they work with HTM on New York's Long Island (Hauppauge Tape Manufacturing, Ltd.), who utilize two Electrosound high-speed master and slave machines, running at a 64:1 ratio. Theirs is a bin loop system, using Agfa 619 cassette tape and, for noise reduction, Dolby "B" technology (the recording process incorporates Dolby "A"). High quality production, attractive packaging and pricing, and strong material are a winning combination.

—Linda Jacobson

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World Radio History

all about INTERFACING

by Larry Oppenheimer

Isn't this a wonderful business we're in? Everything is so simple, the people are all friendly and honest, and you really don't need to know very much at all to do the job. Oh well, enough day-dreaming for one day, now it's back to the cold, hard realities. In actuality, you need to know about a lot of things to work in today's audio/musical (a/m) world, and each subject is a complete study in itself. Even the things that seem the simplest turn out to be quite complicated once you begin to delve into them. Take the example of hooking two pieces of equipment together. It seems like all that would need to be done is find the right cable, plug it in, and go. Sometimes it even works out that way, but the ongoing proliferation of a/m gadgets, especially those confounded contraptions called computers, is more often turning the whole affair into something between a nasty joke and a nervous breakdown. Perhaps a little more information on what needs to be thought about when trying to connect equipment together would influence more people towards the latter, hence creating more job openings.

General

Machines are interfaced to get information from one to another. There are only two kinds of information that you will ever need to transmit, audio and control, and only two possible forms that it can be in, analog and digital. When interfacing machines, there are only three links in the signal chain: the source, the destination, and the connection between them. Furthermore, there are only three kinds of considerations to think about: physical, electrical, and electronic. Pretty simple so far, eh? Just you wait.

Cables

I'll go easy on you and start with the last link that we mentioned: the connection between two devices. At this point in time, separate devices are usually connected with cables. Currently, wire-

"The availability of a particular patchcord is inversely proportional to its need"—corollary to Murphy's Law.

less connections such as RF and infrared are still considered relatively exotic and are not prevalent except for increasing use in microphones, so we will ignore them here altogether (whew!). Anyway, cables consist of wire of some sort terminated with connectors at either end. The things to think about here are physical and electrical characteristics.

Let's look first at the wire. Different applications will call for different numbers of conductors. For a complete electrical circuit, at least one conductor and a ground return are required, and a simple coaxial cable (e.g. for a hi-fi or standard musical instrument connection) or speaker cable would use this number, but computer interfaces and snakes can call for many more (the Belden catalog lists a cable with over 200 conductors!). The conductors can be of a single strand, or, more commonly, of a number of strands. The number and gauge of the individual strands can be quite important, as can the way in which they are assembled (twisted or not). For many applications, wire with a large number of small gauge strands is desirable, as it can be less affected by a strand breaking, but this arrangement may not stand up to abuse as well as wire with larger strands. Is this cable going to be permanently installed or will it be taken on tour and tortured nightly? Twisting strands helps

avoid problems like skin effect, twisting pairs of conductors can aid in the elimination of electromagnetic interference (EMI). Of course the gauge of the wire itself is crucial: small gauge wire has a limited current carrying ability, but large gauge wire is heavier and larger. In a multiconductor cable, large gauge conductors will quickly make the cable quite unwieldy, but in a high-level sound reinforcement speaker system, this is an unavoidable consequence of needing the current capability. Obviously, the quality of the conductors is important too: impurities and irregularities can cause audible degradation in the miles of wire used in a studio or concert sound system.

Okay, you know what you need in the way of conductors, but they aren't going to go out naked. Other than in high-level uses like speaker cables, you will usually need to have some sort of shielding for the conductors. There are a number of different kinds, ranging from foil to braided. There are tradeoffs here between how complete the shielding is, the kind of protection that is provided, durability, cost, and ease of manipulation when making cables. Although a nice foil shield provides great protection against RFI, it does not protect against EMI as well as a copper braid, and is much less sturdy. This can be fine in a controlled situation like a studio, but do you really want to use wire with a foil shield on tour with a heavy metal band? Some multiconductor cable applications will only require one overall shield, but others may need a shield around each twisted pair of conductors.

How about some insulation for the conductors and a jacket for the wire? Again, there are numerous choices that offer tradeoffs in protection against the elements, flexibility, cost, ease of stripping, etc. The same material (frequently polyvinyl chloride, or PVC) is sometimes used for both insulation and jacketing, but not always. If you are going to have a number of cables to deal with, or a

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number of conductors (or pairs) in a cable, you may wish to simplify your life with some color coding in the insulation or jacket. Color coding in multi-conductor cables is standard, but color-coded jackets are not quite as common. You may want to number all your cables so that you can trace connections without having to follow wire, or have a fixed setup routine in a touring concert situation.

In theory, wire is a perfect conductor which has no resistance. Don't you believe it. In the real world, wire has electrical characteristics of its own and you better be aware of what they are or else you'll wonder where your signal went. Larger gauge wire has less resistance than small gauge, but over a very long run, significant loss in level can still occur if the signal traveling over it is not strong enough. And that's not the worst of it. If you think of a shielded conductor in a cable as being two conductive surfaces (the conductor and the shield) separated by a dielectric (the insulation), you've got . . . a capacitor! If you're not careful about the capacitance of your cable, your high-end and transient response will go down the drain. Don't forget that the dielectric properties of the insulation vary with the material, too.

Impedance consists of two parts: resistance and reactance. The difference between those two is that reactance is resistance that varies with frequency. In broad terms that variance can be disregarded, but don't forget that it's there.

Let's assume that you've got the wire together. Now let's think about what you're going to stick on either end of it. There are hundreds, probably thousands, well let's just say a *whole lot* of different kinds of connectors, and you're going to have to know which one(s) you need. As it happens, there is a reasonable amount of consistency in the use of specific connectors for particular applications, which helps matters some. For example, most audio connections will use RCA-type (pin jack) phono connectors, 1/4-inch phono connectors, or 3-pin XLR-type connectors. Most. Some synthesizers use 1/8-inch mini-phono, and BNC ("banana") connectors turn up on speaker outputs, in addition to a few other places like test equipment and occasionally even synthesizers.

But even that's not as easy as it sounds, because 1/4-inch phono connectors can have either two or three conductors, and you can't tell looking at a jack from the outside which it is. Three conductor jacks are common on mixing consoles that want to save panel space while providing channel insert loops. I hate to break this to you, but you'll even find three conductor 1/8-inch mini-phones on products like the Sony Walkman, and not just the headphone jack but



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the microphone jack, too. Try wiring a couple of those up in a hurry. Just to make sure that you get the idea, don't forget about those "TT" connectors commonly used in patchbays on mixing consoles. They look a lot like 1/4-inch phones, but they're not. Oh yeah, almost forgot to tell you that there can also be enough variation in the way that some manufacturers make the same connectors (notably 1/4-inch phone) to make one company's plug not fit into another's jack. And keep in mind that some 1/4-inch jacks short the tip when nothing is plugged into it and some don't.

Of course, these connectors all have their own electrical properties, too, such as contact resistance and current capability. XLR-type connectors were not originally designed to carry the current load of a speaker cable, but they found such widespread use in that application that connector manufacturers were forced to develop versions that were.

So much for the easy part. Now, how about computer connectors? You are probably finding that you're seeing more and more of these as personal computers make the scene with MIDI software and the like. There are, of course, lots of varieties. To start simply, how about MIDI cables? Although they use 5-pin DIN connectors, the MIDI specification defines certain attributes, including a pin assignment, that do not match a common DIN-to-DIN cable. Watch out for this one; there is a legitimate reason that some instrument manufacturers are selling MIDI cables for more than the corner Radio Shack's DIN-to-DINs. More common on personal computers is the D-type connector. This little goodie can come in several different pin configurations, the 25-pin version being used for the popular RS-232 interface. The problem is that many computer interfacing standards, including RS-232, specify a particular wiring scheme that does not consist of directly wiring each pin to the corresponding numbered pin on the other end. Add to that the fact that it is quite difficult to neatly attach one of these multipin connectors to all those little conductors in a computer cable, compounded with the incredibly weird things that can happen in a computer from one sloppy connection on a cable, and you quickly realize that you don't want to be making your own computer cables. Of course, buying high quality cables can be expensive, in the area of \$30 to \$50 for one short cable. Nonetheless, it is worth it. Actually, there are many good reasons, mostly related to reliability, to buy a good cable of any sort rather than to make it yourself. Besides, you don't have the time to make cables because you have to figure out all the other things we haven't even

gotten to yet.

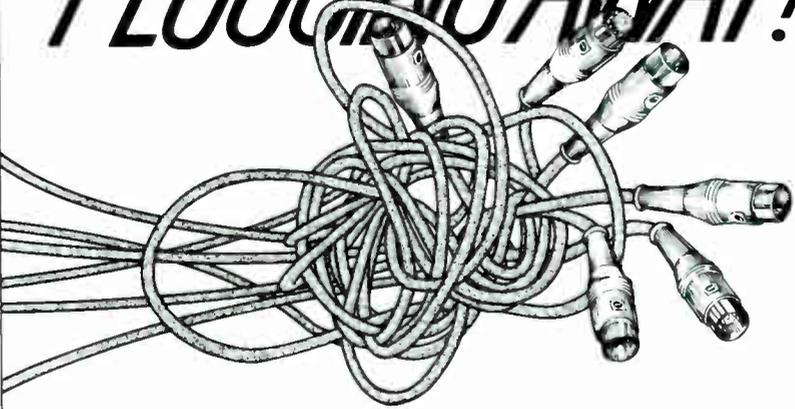
The last thing we're going to say about connectors is that it is quite common to find out that you need to hook together two things that have different connectors on them. Oh boy, does this ever get to be fun. One approach is to have lots of cables that go from male 1/4-inch phone to female XLR, or female phono to male 1/8-inch mini, or whatever. The problem with that is stated just below this writer's name at the top of the article. A better solution is accumulate a large (and it can never be too large) collection of adapters going from anything you can think of to anything else you can think of. Where this approach can fall down is if you need to plug several adapters together to make

the needed connection. This can become both mechanically and electrically questionable. Ya pays your money and ya takes your choice.

Electrical considerations

Moving right along, let's pretend that the cable thing is completely together (you clever person). Now you have to make sure that the machine receiving information can deal with the way that the source is sending it, or vice versa. Inputs and outputs that are not compatible are trouble. Let's talk about audio connections. The most common audio interfacing problem concerns connecting a piece of "pro" audio and a piece of "semi-pro" (or "creative audio," whatever that means) gear, or an electronic

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In theory, wire is the perfect conductor which has no resistance. Don't you believe it. In the real world, wire has electrical characteristics of its own and you better be aware of what they are or else you'll wonder where your signal went.

musical instrument, or maybe even a hi-fi piece that got in there somehow. There are several things that need to be dealt with here; it's not always as easy as simply having the right connectors. Musical instrument, semi-pro, and hi-fi equipment all usually employ high-level, high impedance, unbalanced lines, while pro gear tends towards low-level, low impedance, balanced lines. Before talking about any of this mumbo-jumbo, it is absolutely vital to understand that level, impedance, and balancing *are all completely independent properties*. Although you will find them grouped as stated above in most cases, it does not have to be that way. A high impedance line is not unbalanced by definition, and vice versa. Even more important, although a cable does actually have some resistance, it is generally negligible in terms of impedance matching between two devices. *There is no such thing as a "high impedance cable" or a "low impedance cable."* Okay, that said, let's go over this stuff briefly.

The signal level coming out of a piece of equipment must be enough to get through the cable (only a problem with long cable runs) and drive the input of

the following device, but not so much that the input it feeds overloads and goes into distortion. Signal level is usually described either as an amount of power into a specified load or as a voltage. In either case, when you are discussing connecting two things together, you can't really talk about level without considering impedance, which we'll get to in a moment. Most pro equipment references line level to \circ VU on a mixing console, which (for reasons beyond the scope of this article) is traditionally +4dBm (that's a power ratio, folks, not an absolute level) in recording studios and +8dBm in broadcast facilities. Semi-pro gear typically defines line level as \circ VU at -10dB. Well, -10dB says nothing without stating what it is referred to, so why did I use it? Because some semi-pro uses -10dBm (a power ratio into a specified load), some -10dBu (a voltage ratio referenced to .775V), and some to -10dBV (a voltage ratio referenced to 1V). That's why. Hi-fi is generally referenced to -10dBm, and I'm not sure it's safe to state that musical instruments are referenced to anything at all (although I'm not sure it's safe to state that they aren't). The point of this

whole morass is that without correcting for these level differences, the output from a piece of pro gear could cream the input of a piece of hi-fi or semi-pro, while semi-pro might barely drive an input on a piece of pro gear, and a musical instrument might do either, depending on the instrument and what you're doing with it. You get the idea. This is just talking about line inputs; if you feed anything with more level than an electric guitar into a microphone input (which is designed to accept levels as low as -50dBm), you're risking some nasty clipping.

What about impedance? Well, it's just as messy. The term "impedance" refers to a measure of how much something impedes the flow of current. Impedance consists of two parts: resistance and reactance. The difference between those two is that reactance is resistance that varies with frequency. In the broad terms in which we are speaking, the variance with frequency can be disregarded, but don't forget that it's there. The definitions of "high" and "low" impedance are somewhat arbitrary, but the dividing point is sometimes stated as being 1 kilohm.

It is more important, however, to understand the implications of the concept. You may have heard the analogy of electricity as water flowing through a pipe; it's a pretty good one that holds up fairly well. Consider that you have a large pipe and a small one, and you wish to flow water from one to the other with the important consideration being to maintain the water pressure. In most cases (speaker connections excepted), you are trying to transfer voltage (electrical pressure) as opposed to current (the amount of flow) or power (the product of voltage and current). It can be quickly seen that flowing the water from the small pipe (a high impedance source) into the large pipe (a low impedance load) is going to lose the pressure, while going the other way around or matching the sizes exactly will maintain the pressure. In fact, going from the large pipe into the small, it isn't even important exactly how much smaller the small one is. Of course, the greater the difference between the two the more pressure is transferred. Ideally, the small pipe would look like a wall to the water.

In fact, most inputs on current pro-, semi-pro, and even hi-fi gear are feeding op amps which have a very high impedance, so they can generally accept a wide range of source impedance. Some still have transformer-coupled inputs, though, so don't make assumptions. When trying to feed a genuinely low impedance input from a high impedance source, you will need to transform the impedance or else you will lose a lot of level. Also, high impedance lines

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can pick up noise and interference quite easily, so long cable runs should always be low impedance.

One other problem with impedance crops up when you need to feed several pieces of equipment from the same source. Several impedances in parallel (which they are in this situation) combine to present a composite impedance to the source which is lower than any of the individual impedances, and the more loads in parallel, the greater the drop in overall impedance. The result is that the source gets loaded down, causing a loss in level and possibly distortion. The solution here is to use a device which is designed to accept one source and drive a number

of loads. This is the function of bridging amplifiers. There is a similar but not quite identical problem that makes it impossible to "Y" a MIDI output to more than one input, which is why MIDI "Thru" boxes are being made.

This brings us to the subject of balanced and unbalanced lines. The difference here is that an unbalanced line has one conductor and a ground return, while a balanced line has two conductors which carry the same information but out of phase with each other, and a ground return. The advantage of a balanced line is that it can be fed into an input which subtracts the signal on one conductor from the other, thus doubling the signal level (subtracting an out-of-

phase signal has the same result as adding an in-phase signal) but eliminating any noise, hum, or other garbage picked up equally by both of them along the way. Furthermore, the ground return no longer has to carry current as in the unbalanced line, which helps to avoid ground loops. Note that I said, "helps." Ground loops are a nightmare that occur when there is more than one path that a signal can take to get to ground. If two pieces of equipment are plugged in, each is grounded, and all of the shields (ground returns) on all of the cables are connected, the signal can go to ground through either piece of equipment. Bad, very bad. There are a couple of approaches that people take to grounding systems. One is to only have the shield connected on one end of each cable, usually at the source. Another is to lift the ground on all pieces of equipment except one, usually the mixer or sometimes the amplifier for the system. This means that each piece of equipment is grounded through the cable shield, so if the shield should break . . . Anyway, this is a gross simplification of grounding, a subject which can often be fraught with problems that have no apparent rhyme or reason.

Another cause of premature baldness in the industry is that of polarity in balanced inputs and outputs. Most (but not all) pro equipment has balanced inputs and outputs. Under those circumstances, it doesn't matter which pin on the connector is considered "hot" and which "cold" (both are just arbitrary designations, "hot" indicating which pin a positive voltage will appear on if a positive voltage is introduced into the circuit). The problem comes when you try to interface a piece of semi-pro gear or a musical instrument, both of which typically have unbalanced inputs and outputs, with a piece of equipment that has balanced inputs and outputs. This forces the balanced line to become unbalanced; there is no longer "hot," "cold" and ground, just "hot" and ground. If phase is scrupulously kept consistent everywhere, you can get away with it, but if you flip it just once in the wrong place, your signal can seem to disappear (it's going to ground) until you can find where you flipped the phase and correct it.

Well, have you given up and gone back to your oboe yet? I hope so, because we haven't even touched on the most fun part of all: the electronic considerations. Yummm, tasty stuff like MIDI compatibility, sync clocks, data formats, baud rates. All kinds of headaches. We'll just have to save that stuff for another rainy day. Until then, have fun and remember those immortal words on the cover of the *Hitchhiker's Guide to the Galaxy*—"Don't Panic!" ■

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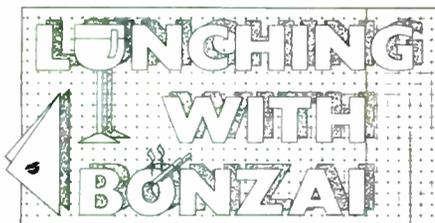
TIM WEISBERG

TAKES OFF



PHOTO MR BONZAI

Mrs. Bonzai offers Tim Weisberg the first of many lunching surprises.



by Mr. Bonzai

Tim Weisberg was brimming with enthusiasm when we discussed his new album on the phone. Having never met in person, we decided to dine as strangers for a late lunch at Chez Bonzai, high in the Hollywood Hills. Just to help break the iceberg of new friendship, my partner, Keiko, whipped up a Japanese smorgasbord of foreign intrigue. I uncorked the traditional beaujolais (Jadot, '83—\$5.94 at the Beachwood Market) and as we awaited his arrival, we listened to Tim's new album, *High Risk*.

His big hurricane of fame blew through town in '78—*Twin Sons of Different Mothers* with Dan Fogelberg. (Tim's pure-voiced flute has been blowing through towns since he played in "Around the World in 80 Days" at Webster Junior High School, 1957.) The new album, *High Risk*, takes off in many new directions, and the cover appropri-

ately pictures him climbing into a Navy jet fighter.

As we floated away in some lush Weisberg landscapes, offroading it down some hard rhythmic byways, a knock at the door brought us back home—time to get friendly in a hurry and get to work. Our guest arrived breathless from a swimming meet and jogged into the living room looking just as athletic as he does in his photos. Tim eyed the gooey bonito, parchment seaweed, and baby radishes with relish. He deftly fingered his chopsticks as Keiko offered him the puzzling first course. He correctly identified the squid, but failed to recognize the cheese it was stuffed with. We were on our way to a culinary and conversational adventure. New tastes and new friends go together like stuffed squid—ooishi!

Bonzai: Do you see yourself as a wanderer?

Weisberg: Definitely. I'll probably be a wanderer for my whole life. I really like to tour. Most musicians tour to support their albums so they don't have to tour anymore, but I've been making albums and touring for 15 years, and when I go onstage I am still excited to see an audience. It was a thrill when I played for 50 people in the dormitory when I was going to Cal State Northridge, and today it's still exciting to roll into Cedar Rapids or Madison, or wherever.

Bonzai: You're inspired by the enthusiasm of the audience?

Weisberg: Totally—completely. It sounds corny, but I owe my success to my audiences. When I got my first record contract in 1971, the industry said, "You play flute? You don't sing and you play for a sort of pop audience, not a real jazz audience, but not really rock and roll?" They were ready to bundle me up and send me off to a mental institution. The only way that I could continually prove to the industry—whoever that is—the record company, the radio station, the promoters, was to go out and play in front of people and show them the truth. If the industry was right and people started throwing tomatoes at me then I would have agreed that I was crazy. I just went out on the road and when I came back, I said, "See—I know you don't understand what I'm doing, Mr. Business Guys, but the people out there like it."

Bonzai: The industry looks at numbers—and that's abstract. It has to come down to people, and then it has to get down to one person listening. It's only the accumulation of individuals that has meaning. There are popular artists who have the numbers now, but it's the artists who really reach individuals that will survive.

Weisberg: The industry has short sight and expects most artists' careers to have a short duration. I guess they figure you're going to have a year or two of incandescence.

Bonzai: Sounds like sports...

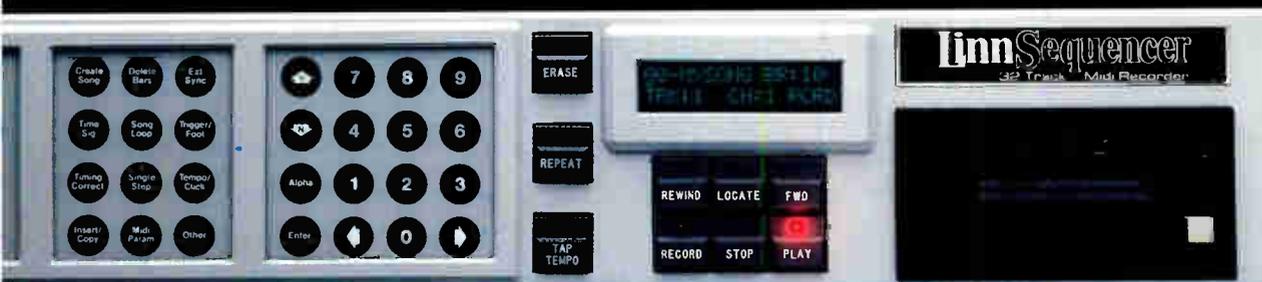
Weisberg: I think so. And then they throw you on the scrap heap. I don't think record companies can depreciate their artists the way athletic teams operate—that's interesting. Maybe I shouldn't give them any ideas.

Bonzai: I guess the average life span in the record charts is pretty short...

Weisberg: In the pop world you quite rapidly become obsolete and useless. That's always bothered me, but in the classical and jazz world there is longevity, and people think in terms of longer careers.

Bonzai: At any rate, the pop industry is one reality, and it operates according to some laws of nature. To survive, you have to interpret it correctly, and you seem to be one of the survivors in this business. What recent changes have you made in your way of thinking?

Weisberg: Well, I had done 14 albums by 1981 and I was not pleased with the last product from the manufacturing quality standpoint—it was the straw that broke the camel's back. I have always been quality conscious and I was very fortunate to start off with a very good company—A&M. They weren't quite sure what to do with me but they let me

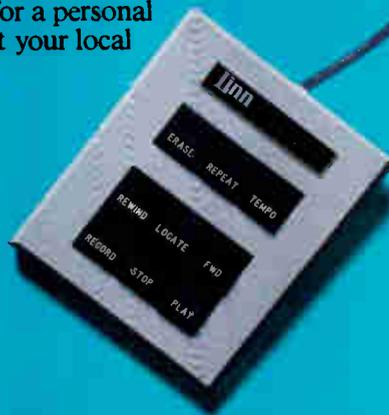


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make an album. It was Chuck Kaye who gave me the go-ahead, and they still have one of the best men in quality control—Marv Bornstein. I got a good education making six albums with A&M and with my newest album I was able to make informed decisions about where to have it pressed, where to have cassettes made, etc. I've always felt that I owed it to the people who buy my music to make sure they get quality for their money. I'm a consumer myself and I resent it when I buy something with poor quality when the product could have been improved with no extra cost—just a little care.

I've always requested test pressings—it's an integral part of being an artist or a producer. Some record companies have an adversarial relationship with their artists when it comes to quality control—they don't want you to have test pressings because you might cause trouble. I've always felt that I was in partnership with the record company, and if I could discover something wrong in the manufacturing, we should work together to make a better product—and I realize there is a limit to what you can do before it becomes cost prohibitive, but usually it only takes caring to correct the deficiencies.

Anyway, on that previous album for a company that I will leave unnamed, they went behind my back, did not send

test pressings, avoided my requests, and shipped the DJ copies out to the radio stations without my approval. I discovered this and demanded the copies from the pressing plants. The quality was so bad and there was so much noise in between cuts that you couldn't distinguish when the music started. Even the distribution guy, who was strictly a businessman, decided to call back the records and even wrote letters of apology to the radio stations and dealers. That experience soured me on recording and I just toured for the past two years.

Then in '84, I had the desire to go back into the studio—it was time to do another album and I was excited about seeing the reels of tape spin. I investigated major record companies, but there was another possibility that didn't really exist back in '81—the emergence of companies like Windham Hill and GRP that offer a viable alternative. They are small, and some are handled by independent distributors, kind of the way the record business used to be 15 to 18 years ago. When I thought about the kind of music I wanted to do and the musical direction of the alternative companies, I decided to do the record myself and form my own company. I wanted something more energetic than I had done in the past. I wanted to use drum machines, and I started immersing

myself in synthesizers.

Bonzai: You're the vice-president, right?

Weisberg: Yes, I didn't want to be the president. I'm not an executive. I want to be out doing what I've been doing for 15 years—touring and making more albums.

Bonzai: In this album, you've ventured into the computer landscape—how has this affected your style?

Weisberg: Well, I think this album is a fairly radical change for me. I wanted people who enjoyed me in the past to listen and say, "Is it Tim?" But not so far that they would say, "I like the old Tim better." It's a delicate balance. In trying to achieve it, I may have overcompensated, but one of the decisions I made was not to be a part of the composition in the beginning. I discussed what kind of tunes I wanted and looked for them but I was afraid that if I was in on the ground floor that I would exert too strong of an influence from my past and therefore not get the desired result—I wanted a departure. For this project I worked with a number of people and my approach was to say, "I like that melody, or I like those chord changes" or I would move parts around—maybe even take the bridge from one tune and put it in another. I wanted to be involved one step after the tune was composed. I

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don't know if that's crazy or not, but I love the result.

Bonzai: You used the Fairlight Voice-Tracker on this album—what does it do?

Weisberg: I used a prototype, and I'll try to explain. It takes the output of a voice, the output of any wind instrument and converts it to MIDI information. That allows you to hook up to any keyboard synthesizers and have them track along with whatever the input is—voice, or in my case, my flute. I had some very good programmers involved, and we were able to do things that made me feel as if I were still playing my instrument. I love the feel of the flute, and any interface still has to feel comfortable. In the past, I had an affinity for the Echoplex. The first time I ever heard amplified flute with Echoplex was when Paul Horn played. I was totally enthralled and I remember him telling me that you've still got to be making music and feeling—otherwise you can get lost. You can start plugging in and the technology becomes your major pursuit, not the music. It was a warning that I've always kept in mind. Technological tools can let you expand and go further. Playing amplified flute was natural for me—I've always plugged into anything that a guitar player would plug into, but I keep the music foremost.

Bonzai: Would you care for some ooba leaves?—they have a slightly minty flavor. Now, let's go back a ways—what is your first memory of music?

Weisberg: I remember listening to mysteries on the radio—we were the last ones on the block to get a television. And I remember a song, "Mr. Sandman," and Bill Haley & the Comets. And I remember classical music—going to Saturday symphonies with my fifth and sixth grade classes and being totally blown away.

Bonzai: What was your first instrument?
Weisberg: The accordion.

Bonzai: Ah, Weird Tim.

Weisberg: That's right—the only guy on the block to join the swim team instead of little league, and I also decided to play the accordion. But I have an excuse—someone came around door-to-door from an accordion school and three of my neighbors signed up. It was like, "Yeah, we'll all go do it." I took lessons for six months and definitely lost interest. My parents pushed me hard enough to see whether I liked it or not, but not so much that it was horrible.

Bonzai: Speaking of your parents, what of your father's identity is part of you?

Weisberg: The swimmer, the cyclist—the athlete in me.

Bonzai: How about your mom?

Weisberg: Mom sang in church and

loves classical music—that had a big effect.

Bonzai: Interesting combination—the flute takes great breath capacity and control, so you had the physical stamina and the music appreciation. Why did you pick the flute?

Weisberg: Well, in the seventh grade we could take elective courses at Webster Junior High in L.A. I was becoming aware of rock and roll and expressed an interest in drums. Drums were taught in the beginning winds class, so I signed up. The band director, Bob Armer, could teach all of the instruments but the flute was his first love—he is still a great player. Anyway, by alphabetical order we were given a choice of instruments and by the time they got to Weisberg it was bassoon or flute. Being 12 years old and

looking at this gigantic wooden bassoon—I chose flute. And everybody laughed, of course; for a 12-year-old boy it's as bad as playing the violin.

Bonzai: Not the adolescent macho image...

Weisberg: Definitely—but I was lucky. I started taking private lessons and I was hypnotized. When I heard my teacher play solo, I was mesmerized—like he was a snake charmer. I can still remember the room I was in. And the school was very good—young faculty, highly motivated. In junior high, we did *The King and I*, and *Around the World in 80 Days*, and we did *My Fair Lady*. I continued to study, but it wasn't until college that I decided to make it my vocation.

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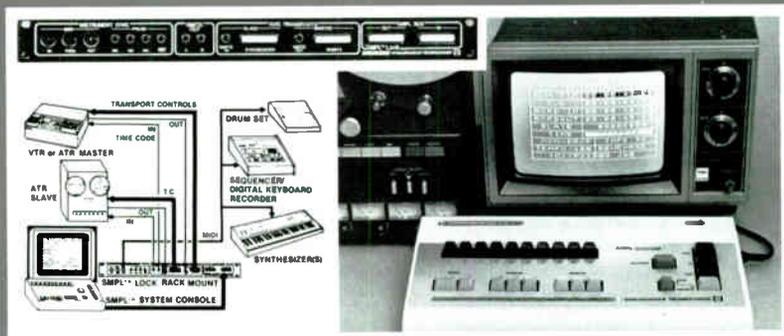
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Bonzai: Let's talk about art. Who is the Picasso of music, someone who absorbs so many sources and created new compositions?

Weisberg: It would have to be a group: The Beatles.

Bonzai: For contrast, who is the Norman Rockwell of music—we're talking pop consciousness, pop corn?

Weisberg: Weird Al.

Bonzai: And who is the Chuck Yeager of music—someone who has broken some sound barriers?

Weisberg: Well, I just had a flash on someone—one of my favorite musicians—Stevie Wonder. I smile every time I think of him.

Bonzai: Good choice—I think he flies alone. Let's see, if you were a musician in the past, where would you have played?

Weisberg: Camelot.

Bonzai: A strolling troubadour... nice image.

Weisberg: Maybe that's why I like to spend so much time on the road.

Bonzai: I imagine people in those days listening to music, and having no radios, no records. It was a special occasion when a player came to town, and maybe some of the local guys got together for a jam session.

Weisberg: For the performers it must have been very intense, and fun—no media competition.

Bonzai: Can you imagine playing in the future?

Weisberg: Yes, on the space shuttle—maybe on the moon for a colony up there. I think that would be great. I played once in a 747 and the crew came out to listen—it was like a little recital. But at high altitudes you have much less ambience—it's one of the reasons Dan Fogelberg and I didn't do our *Twin Sons* album in Colorado at Caribou Ranch up in the Rockies. Everything sounds different because of the lower air density—although it could be good or it could be bad. It's all subjective.

Bonzai: I understand that you had a tremendous fear of flying and always stayed on the ground while touring, but now you're flying jets.

Weisberg: Yes, after being in the equipment truck for so many years, I decided to take a radical approach and took flying lessons. The thing I didn't count on was falling in love with flying. I'm not a daredevil—six months ago I refused to go on the Space Mountain ride at Disneyland and left my date at the

gate. But I do have my private pilot's license, a multi-engine and instrument rating.

Bonzai: Who do you consider the greatest flutist?

Weisberg: That's a difficult question—maybe Galloway. I'm glad I'm alive to

“On this album (*High Risk*) we also used a prototype of Fairlight VoiceTracker, and when I first hooked it up, I actually got chills . . . it almost answers—so ethereal and mystical.”

hear him play the flute. He's brilliant and he plays with a lot of passion.

Bonzai: Has your classical training enhanced or affected your work with synthesizers?

Weisberg: I think so. Classical music has a lot to do with textures and tonal color—exciting things that you can do with synthesizers. It's one of the wonderful strengths of synthesizers.

Bonzai: On your new album, some of the tunes are playful, some make me think of Arnold Schwarzenegger as *The Terminator*. The flute can be so emotional, so sad or so energizing—what dream landscapes come to mind when you play?

Weisberg: Sometimes I think of clouds, mountain ranges, pine trees, fishing streams.

Bonzai: How about when you are playing gritty and punchy?

Weisberg: I think of The Four Tops and I think of dancers.

Bonzai: Scott Emmerman plays some guitar on this album—what is he like to work with?

Weisberg: Well, he's a friend, a very good guitar player, and he works for Roland Synthesizers. He's hooked into the new technology and he helped me to understand drum machines and

showed me the musical things you can do with them. He has a human touch and made me a believer.

Bonzai: What about Jeff Silverman?

Weisberg: He also plays guitar on the album and did some great solos. He does a lot of things and did a great job of engineering the album. He plays a lot of those solos with a guitar synth. He is one of the few musicians I know that is performance-oriented but can turn around and put on the technical hat. I listened to some of his demos and his whole sonic concept was exactly what I was thinking about. He helped make it an effortless album—we did it all in six weeks.

Bonzai: Can you remember some difficult times in the studio?

Weisberg: Yes, once we were using a drum machine and it dropped all of its memory. We were the first to have this model with touch sensitivity and there were some bugs in the software. It was the Linn 9000 and I have tremendous respect for the company. It was demonstrated for Stevie Wonder and me at the same time and I was impressed with the fact that the player, Kevin Kent, was actually playing it—he wasn't just pushing buttons. It was very musical and I realized that I was getting bored with pop music because there were so many sequenced keyboards and drums with no dynamics. This was a drum machine with subtleties and nuances. Stevie was very excited—he made up two tunes while we were playing with the 9000.

That device put some music back into the technology. On this album we also used a prototype of the Fairlight VoiceTracker, and when I first hooked it up I actually got chills. We used it on “Heart Child” with small envelopes and it almost answers—so ethereal and mystical. Dan DeSouca from Fairlight came to the sessions and showed us how to twist the knobs and make it a very musical instrument.

Bonzai: Nice to have some technical pals these days...

Weisberg: I had a lot of pals on this album...

And I imagine Tim has quite a few pals out there in listening land. The new album splashes with bright colors—it has the familiar Weisberg signature, solarized with synthesizer highlight. He has carefully chosen some guest vocalists, and woven his flute through impeccable musical tapestries. At times the music has a happy, primitive quality, simply stated, yet with intriguing and sophisticated technology embellishing his ideas. *High Risk* has moods of firelight, moonlight and sunlight. ■

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by David Huber

In its day, Capitol Recording Studios represented some of the most advanced concepts in studio design and function. Built from the ground up with optimum electrical, mechanical and acoustical characteristics for the production of recordings, these studios rested at the forefront of the technology of the time. Looking back, with the anticipation of multi-channel recording, Capitol Studios has had a strong impact on the progressive development of modern recording studio design and philosophy.

In February of 1956, Capitol Records had finally realized a long planned goal when its west coast operators were consolidated into a newly constructed office building and recording complex located in Hollywood. The building was, and still is, unique in a number of ways. At the time of its completion, it had already become a Hollywood landmark in that it was the first office building to be constructed in the form of a round tower.

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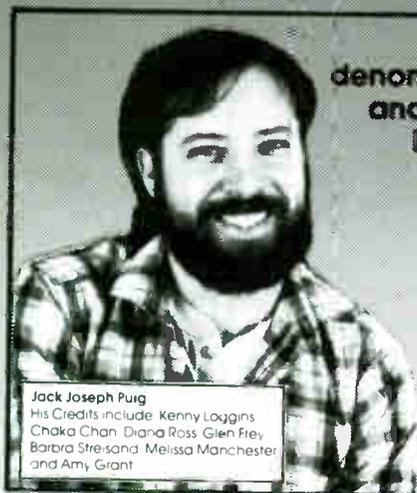
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One of the control rooms at Capitol Records around 1951, with three Ampex 300s.

PHOTO: COURTESY AMPLEX MUSEUM OF MAGNETIC RECORDING

maximum building height permitted in Los Angeles at the time.

The decor was designed in keeping with the outward appearance of the building. The ground floor, the only rectangular part of the building, is actually a separate structure which surrounds the tower and was joined to it after its completion. The ground floor originally housed the recording department offices, disk cutting facilities, and the three recording studios which were designed to be as modern and striking as the building itself.

In retrospect, what has given these studios historical significance is the great amount of planning and forethought that went into its design and construction. In preparation for the design of this complex, a comprehensive analysis of popular and classical recordings of the day was undertaken. The planning staff began the task of evaluating recording trends and characteristics which were to be considered in the design of an ideal recording facility, and even Les Paul, longtime friend of then Vice-President Jim Conklin, was asked to look over the plans and offer his suggestions. Ultimately, it was decided that the design would have to utilize new principles in order to achieve a degree of versatility and control previously unavailable. As a result of these studies, Capitol Studios built what is probably the first major recording complex, actually anticipating the production of multi-channel and stereophonic recording. This was accomplished through the equal integration of physical, electronic and acoustical components into the design considerations of the studio.

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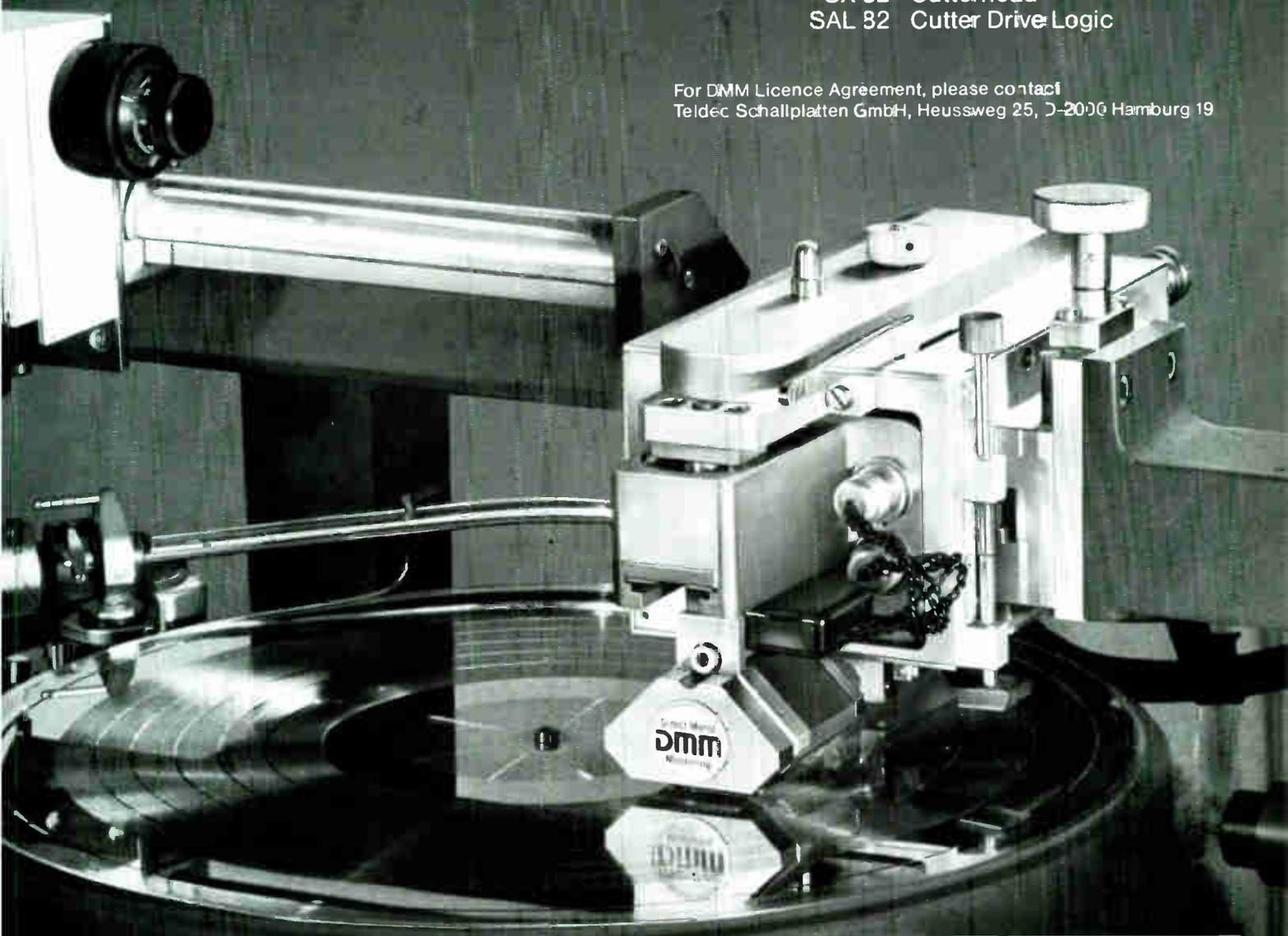
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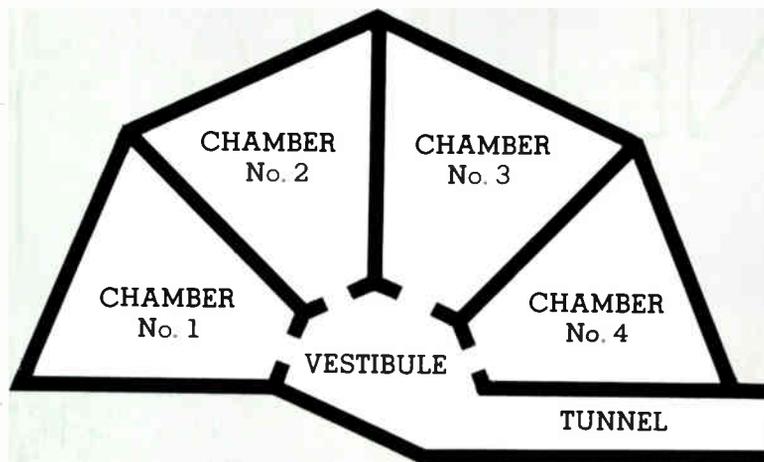


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Plan of Capitol's reverberation chambers.

STUDIO CONSTRUCTION

The basic physical plant consisted of three studios, two large (A & B) and one small (C), whose dimensions are listed in table I. The original control "booths" were situated in the corner of each studio, allowing for maximum visibility and to minimize the amount of required floor area. Wood paneling, a material not often in use at the time, was extensively employed because of its visual appeal, as well as for its lack of pronounced resonant frequencies. Fluorescent lighting in flush-mounted fixtures were in use throughout for bright, uniform lighting. Ballast hum, a poten-

tial noise problem often associated with such lighting, was solved by mounting the ballasts remotely in an area outside the studios.

The original floors of the studio were marked off into sections 13 x 13 tiles square. The center of each square was numbered, and at every recording session the position of each musician, microphone and divider wall was marked out on a scale drawing of the studio, containing a numbered grid which corresponded to the markings on the floor. Any set-up could then be quickly duplicated by referring to the chart on the original session.

The studio's location at the busy (and famous) Hollywood and Vine intersection required extensive measures to isolate the studios from environmental noises. To achieve this necessary isolation, the outer studio walls were constructed of concrete ten inches thick. Within this shell, another isolated room (one of the earliest floating designs), with a one-inch air gap separating the outer and inner studio walls was built. Using this floating technique, acoustical components were fastened to, but decoupled from the outer steel studs by specially designed clips. The inner walls then rested on a floor which floated on a rubber tiled 3-inch concrete slab. This upper slab floated upon a layer of cork which rested upon a final concrete foundation slab six inches thick.

Movable wall splays were mounted on the walls throughout the three studios. These splays, along with the ceiling splays, were angled out 15° from the walls to eliminate large parallel surfaces and to create a more diffuse, uniform sound. Each wall splay consisted

of two 10' x 3½' birch, veneered plywood panels 2½-inches thick. These splays were adjustable and could be made acoustically "hard" or "soft," the soft side being covered with an acoustic tile. The total reverberation time of each studio could then be controlled by the positioning of these splays. The resultant concept was that controlled variable acoustics, while keeping reverberation times down to between one and one-half second, would permit the recording of a wide variety of music. This allowed control over the room sound, while maintaining low levels of microphone leakage, a concept central to the multi-track studio design of today.

THE REVERBERATION CHAMBERS

The Capitol Tower Studios represented a milestone in the transition from the monophonic to the multi-track studio era in the United States, and today, it still serves as a world-class recording facility. One of its most prominent existing features are surely the original "acoustic" echo chambers.

Built under the existing parking lot surface, these chambers (among the first to be built) were constructed into four identical, trapezoid enclosures, each with a sloped ceiling, assuring that no parallel surfaces would exist. They were constructed of reinforced concrete and employed sound-proofing techniques similar to those used in the studios themselves. The inner walls of the echo chambers were surfaced with two layers of metal lathe and plaster, each ¾-inch thick, giving them a strong, reflective surface.

Late in 1959, Studio A was modified for the production of stereophonic recording. The mixing console accommodated up to 14 microphone inputs and allowed the simultaneous recording onto mono, stereo and 3-track formats. In the transition to stereo production, the reverb chambers cited above were subsequently converted to produce stereophonic reverberation. This was accomplished by installing a dividing wall inside each chamber. These dividers allowed the two-channel material to be fed to loudspeakers located on each side, with the reverberation being picked up by a pair of microphones (originally RCA 77s). The best results were obtained with an almost complete division between each chamber, with a gap of a little over a foot left from the ceiling, allowing for a natural leakage to travel between the left and right sides.

Today, these chambers are still considered to be some of the finest natural chambers ever built, and are not only in demand by Capitol Studios, but are rented out to other studios in the Los Angeles area through the use of equalized telephone lines. ■

The Capitol tower under construction in 1955.





Mark Freedman's BATTERY SOUND

by Brooke Comer

Mark Freedman's home studio, Battery Sound, reflects two main objectives: his desire to compose in a studio of his own, and his interest in the possibilities of futuristic technology that will enhance his composition technique. Located in a high rise building in downtown Manhattan, a block south of the World Trade Center, Battery Sound services Freedman's needs, as well as those of his clients.

"I hated to rent it out at first," he says, "but the exposure I get from clients is definitely beneficial. I've been turned on to some great musicians and learned new engineering techniques." (Freedman engineers his own projects while Erik Liljestrand mans the board for clients.) "I built the studio because if you want to be a composer today, you have to be involved in technology. If you want to compete, you must have the equipment. This isn't the early '70s,

when you could pick up a guitar and walk into a record company and walk out with a contract."

A pianist since childhood, Freedman's keyboard proficiency made him a synthesizer enthusiast in the early '70s, long before the electronic music era hit full force. "When I was at City College in '75, you had to go to Queens if you wanted to take computer music. You'd work with Charles Dodge on the mainframe computers and it took two or three days to hear back what you'd punched in." The studio of the future, Freedman predicts, will be composed of a keyboard, a TV screen, and a small mixing board. "That's where we're going," he says. "Six years ago I envisioned this kind of room, and that's what I've been gearing up for ever since."

Freedman began aiming for a computerized studio when most of his colleagues were still popping strings and getting a snare sound with a drumstick.

"I heard electronic music for the first time in a church in England," he recalls. "It was one of those little English synths with pins that are still around. I thought it was perfect. When I got back to New York, I took a course at the New School in synthesizers and fell in love. When I finally got one of my own, I spent virtually a year in my room. I also ran the electronic music lab at City College, and it dawned on me then that I might be a great songwriter but I might never make any money doing it. However, I could *build* a studio and earn an income running it. I already had a 4-rack studio in my bedroom, and that was the beginning of Battery Sound."

When Freedman found the site for Battery Sound, it was literally raw space. "I had to take a dull bibliography course for my Masters in composition at City College and used it to my advantage, by selecting texts on the subject of building a recording studio," he says. "I spent

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The new audio control room at Tele-Image

PHOTO: CHAS McGRATH

MULTI-TRACKING IN THE EDIT SUITE

DALLAS' TELE-IMAGE

PREPARES

FOR

STEREO TV

by Russell E. Berger II and
Charles Chiles

Impressive growth in the Dallas area media market is no surprise considering the healthy economic environment. By investing \$6.3 million in a new 32,500 square foot Dallas Communication Complex facility, the Tele-Image video facilities company has made a big bet on future market growth.

Traditionally, the careful mixing of synchronous audio to the edit master's two audio tracks is a vital and necessary part of the edit process. Quality productions often require time consuming attention to the details of audio during editing. When the finished product was to be monophonic and of modest fidelity,

this was reasonable. With the anticipated demand for high fidelity stereophonic or SAP (second audio program) production, the appropriate quality and efficiency can only be found with the use of synchronous multi-track recording. Four-track recording is sometimes adequate in monophonic work. But in stereo production we can easily visualize two channels of music, a channel of SFX, a channel of dialog, one channel of voice-over, and a channel of code. That's six channels and we haven't gotten fancy. Eight or more tracks seems an obvious requirement.

With the introduction of the multi-track recorder into the edit suite, a simplified transfer process from the video tape original sources can be accomplished without impeding the visual editing process. The 8-track tape then bridges the gap between edit suite and the power of the audio suite. From the client's point of view, this has a number of advantages:

(1) Cost savings can result. Critical audio decisions can be postponed until later, thus speeding up the editing process. This saves the client expensive video edit room time. And since an audio suite can cost as much as 40 to 60 percent less than the edit suite time, this is significant. This dramatic shift in costs implies that in many instances even modest amounts of audio decision-making in the edit suite is unwise.

(2) Quality is increased by avoiding use of videotape audio tracks when they are required as an interim medium. And the costs of transfers of interim mixes to a multi-track are eliminated.

(3) Eliminating unreviewable pre-mixing during the edit session increases quality and creative control.

(4) Specialized audio processing and computer mixing bring greater cost efficiencies and larger creative potentials.

(5) A scientifically engineered acoustic environment for accurate sound perception will increase their product's quality and consistency.

(6) Synchronization of additional sweetening tracks (say 24 tracks) is easily facilitated.

Acoustics and Construction

Beyond the extensive array of powerful audio and video production equipment, which we will not concentrate on in this article, there are several features in the design and construction of the Tele-Image control room that characterize this room as a unique advancement in applied acoustic technology. Many of the requirements set forth in the initial performance criteria presented difficult obstacles for the design and execution of the construction. Here are some of the major criteria used in planning the facility. Following each is a brief discussion of its associated problems, selected solutions, and results of application.

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1. *Accurate, deep bass response to support synthesized bass.*

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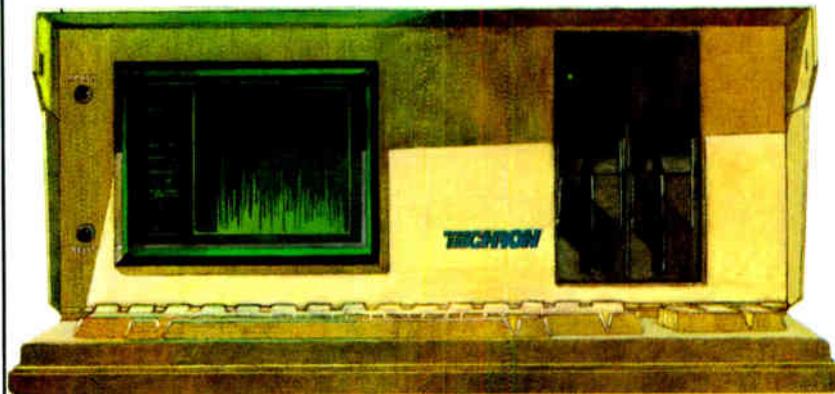
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Tele-Image's Edit A.

PHOTO: CHAS McGRATH

cal Tele-Image walls are comprised of grout-and-sand-filled concrete block. This type of construction offers excellent, predictable results at low frequencies. With masonry construction, however, extra care and thought are required to assure a good airtight seal, especially when employed in a geometry as complex as that of a control room.

Deep bass is as much a function of volume as of anything else. The Tele-Image control room commands a foot print of some 25 feet by 28 feet with a ceiling height that averages 13 feet providing an effective volume of some 9,100 cubic feet.

Another important aspect is to assure that the monitor speakers are decoupled mechanically from the building structure. This insures that vibration from the cabinet will not excite the structure so as to radiate sound into the listening position and will help reduce the transmission of sound through or around partitions into sound critical areas. To accomplish this, a 2,000 pound inertia base was constructed out of steel and concrete and mounted on 3-inch deflection, open, stable, steel springs. The isolation system is designed to perform with changes in mass loading of some 175 pounds, allowing Tele-Image to change monitors as the technology progresses or their clientele dictates.

2. *An increasing amount of the music performance work is done in the control room; therefore, a large area must be assigned for keyboards and the comfort of the client.*

Several aspects of the room must be addressed because of this one requirement. The keyboard and client areas want to be in an area of good listening; the machines and effects should be readily accessible, but not in the way; the monitors must be able to perform into this large space at the levels re-

quired by even the most demanding engineers. Video monitors for console information and production program, along with large screen projection, have to be provided while still allowing a view into the studio.

A special geometry was employed to maintain a large mix area, keyboard position, and client location that is free from early reflections that would combine with the direct energy from the monitors. It has been demonstrated on numerous occasions that when the direct sound source is combined with short delayed reflections, the amplitude response is convoluted. A combination of this geometry along with appropriate absorptive materials effectively eliminate these effects, providing more natural reproduction of both speech and music. Another benefit of this combination is an increase in the size of the normal "mix position" of a few feet square to a "mix area" some six feet wide by eight feet deep.

Absorptive materials are distributed throughout the room to control any late specular reflections from entering the mix position. The considerable late energy that does arrive throughout the listening area is highly diffuse, spread evenly over time, and is some 15 dB lower in energy than the direct sound. Multiple density glass fiber board was used to achieve a high change in impedance for sound striking the absorptive surfaces at a high angle of incidence (grazing incidence). As evidenced from the picture of the control room, the diffusing elements selected for Tele-Image are reflection phase grating diffusers in a quadratic residue depth series made by RPG Diffusers, Inc. A smooth transition from soft to hard is observed; diffusive areas allow a gradual change in acoustical impedance from the monitor area into the listening areas. The result

is more natural-sounding program material throughout the room.

At the November '85 Acoustical Society of America meeting, Jack Wrightson presented a paper concerning the effects of reflected energy on imaging in control rooms. The idea was to improve stereo imaging, front-to-back depth relationships and localization, not "increase" them. A proper balance of direct and reflected sound will allow more accurate judgments of the quantity, character and quality of ambience on prerecorded material, sounds from the studio, or by electronic means.

3. *The room must be capable of extreme dynamic range—from low-level background sounds to loud transient material.*

A target noise criteria was NC-20 for the control room. The culprits which want to deny you your quiet room are many: cooling fans in rack equipment; vibration from mechanical systems; structure-born sounds; plumbing noise; HVAC supply grill noise; damper noise for regulating the air flow; low frequency rumble from fan blades and motors through the air returns; and loud adjacent functions which leak around and through doors, walls, ceilings and floor structure. As you can see, the list is formidable and we are just scratching the surface.

However, the completed room tested at an extremely quiet NC-15, right at the threshold of sensitivity of many of the best pieces of test equipment. This level is achieved with all the recording equipment running. It should be noted that the tape machines are housed in alcoves that serve to reduce their noise as well as to act as a HVAC air return plenum. The heat from these machines is extracted before it can affect the ambient temperature of the room. On those occasions when the machines are needed in close proximity to the console, they can be tethered from the alcoves to virtually anywhere out in the room.

Tele-Image has implemented some of the finest in up-to-date speaker technology: monitors using all cone and dome drivers. Their selection is based on preference of the monitor's natural openness and smooth top-end. Specifically, the tweeter and midrange have power-handling capability of 800 and 1000 watts RMS respectively. The system is a four-way, quad-amped system, powered by more than 3500 watts per side. The monitors reproduced levels at the mix position of 132 dB with broadband pink noise as a source (measured, I might add, with hearing protectors securely in place!). This should satisfy the most demanding starship captain!

So, with the combination of the extremely low noise threshold and the incredible output capabilities of the monitors, the room has an effective acoustic and electroacoustic dynamic range eas-



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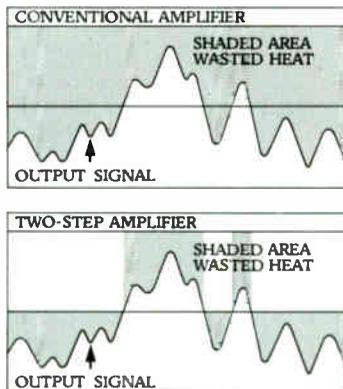
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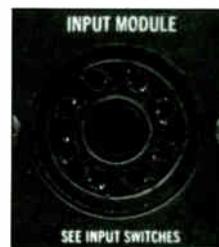
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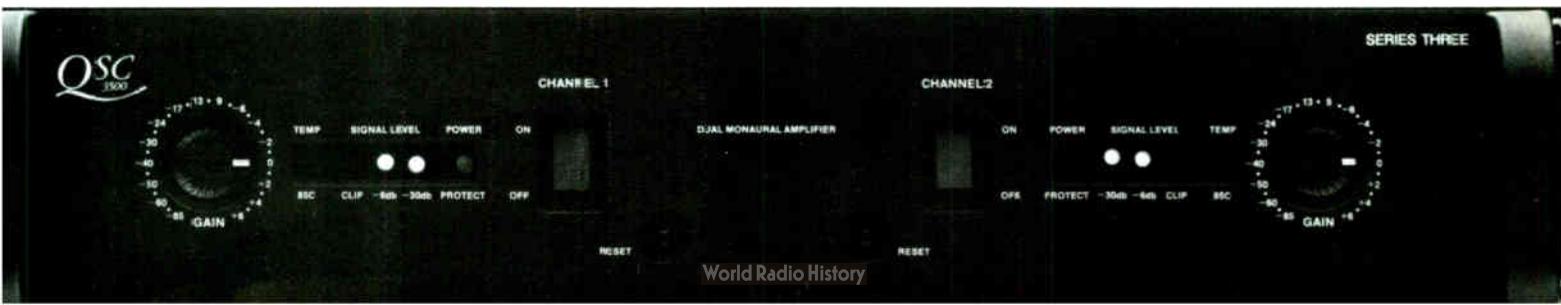


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4. Maximum flexibility and quality in the equipment interface.

Although the console Tele-Image selected is possibly more than they need, SSL is one of the most flexible, popular, well-engineered, and prestigious consoles available. This console will be called upon to interface with four video-editing suites, and handle its own audio production work as well; therefore, the interconnect is critical.

A video facility is never finished in terms of wiring and interconnect—it is in a continual state of modification. Because of this, a special wire-labeling system was developed for marking each end of every wire in the entire facility. These labels describe 1) the type of signal in the cable; 2) where each end terminates; 3) refers to the tech computer data-base which holds information regarding how many cables are in the bundle; 4) how long the cable is and; 5) the paths through which the cable is routed—a seemingly endless maze of wire ways.

Gepco cable was spec'ed throughout the facility for all low and intermediate audio wiring because of its excellent performance. For those who are unfamiliar with Gepco cable, it is a multi-core construction, with two conductors and a foil-wrap shield configuration. The two conductors and drain wire are the same gauge for easy punch-blocking. The insulator is a high-temperature PVC, avoiding the problem of having the insulator "skin back" during soldering. Each of these two conductor/shield pairs is covered in a pure PVC jacket that is pre-numbered and bundled into a group. This entire group of cables is then wrapped in foil with a 14-gauge drain wire and covered in another jacket of pure PVC. One of the many benefits this low-capacitance cabling offers is physical and electrical isolation from its neighbors. Another is that it allows easy implementation of a Faraday shield since each cable grouping is encased in a 100 percent shield which is covered with a non-conductive jacket. Gepco cable also lays well.

Our tests, both in listening and by instrument, show that we met the goals set forth in the criteria. The Tele-Image staff and, more importantly, their clients indicate the rooms fulfill a much more important criteria: They like the sound. ■

* * *

Russell Berger is an acoustical designer with the Joiner-Rose Group, Inc., in Dallas, and Charles Chiles is audio consultant at Tele-Image.

PHOTO: CHAS McGRATH



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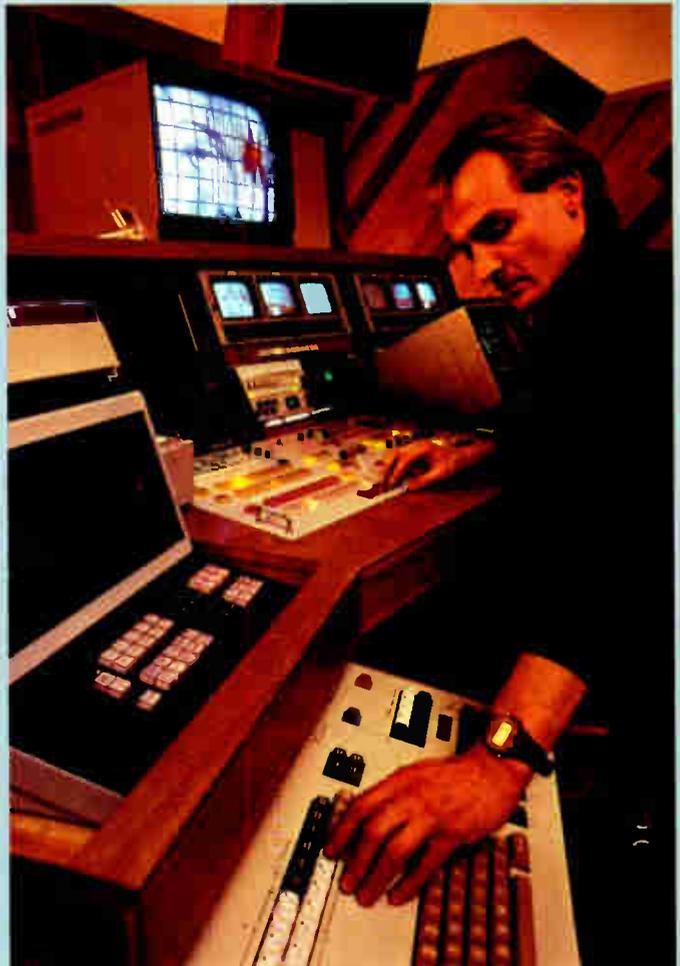


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PHOTO: ROBERT SPECTER

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INTERNATIONAL UPDATE:

SSL Confirms Digital Research

Colin Sanders, founder and managing director of Solid State Logic, has announced plans for a major expansion of the company's international headquarters at Oxford, England, and confirmed rumors that SSL is engaged in an intensive digital research and development program. SSL will move its administrative, research and training center from Stonesfield, where the company has been based for the last 15 years, to a new site in the nearby town of Woodstock. "Early next year, we will break ground there for our new production and test facilities, for additional classrooms and control rooms, for our new computer center, and for additional research and listening rooms," Sanders said.

Turning to the future, Sanders confirmed that SSL has been quietly engaged in digital research for the last several years at Stonesfield, and the program will accelerate as the company moves to its new site. "The goal of this research is an entirely digital SSL Studio System," Sanders explained. "I hasten to add that this is *not* a product announcement. We are not yet taking orders for the system, nor can I confirm exactly when it will be available or what it will cost." However, Sanders did reveal that the SSL Digital Studio System will be based on a proprietary 24-bit digital audio processor, incorporating integral audio storage and editing capabilities.

Palast der Republik Goes Meyer

Autograph Sales Ltd., exclusive European Distributor of Meyer Sound Inc. speaker systems, announces a contract to supply the single largest Meyer Sound system in the world to the Palast der Republik in East Berlin, supplied through Autograph's West German dealer, Jurgen Dudda. The Palast der Republik is a major center for multi-cultural events such as festivals and concerts, and is regularly used for radio and television broadcasting. The main hall has a maximum capacity of 5,000 people, but can be configured with telescoping and moving walls for a variety of applications.

The Meyer Sound system is being installed as part of an upgrade of the Delta Stereophony system first installed in the large hall in 1976. This system, detailed in an AES paper presented at the 65th convention in London, provides true direction and distance perception in large halls through the use of sophisticated signal processing and multi-

speaker positions.

The new speaker system incorporates up to 70 UPA-1A reinforcement loudspeakers with M-1 controllers. Also supplied are 18 USW-1 subwoofers, 8 UM-1A stage monitors, and 8 UPM-1 delay loudspeakers, all with their associated control electronics. The racking system incorporates standard Autograph racks and Daub 500C power amplifiers, supplied by Jurgen Dudda.

Munro and MBI Join Forces

MBI Broadcast Systems and Munro Associates have joined forces to offer a uniquely comprehensive service to studio operators. Andy Munro, formerly with Turnkey Two and now managing director of Munro Associates, specializes in the acoustic design and measurement of studios utilizing a TEF 10 computer based analyzer. Munro Associates also provide architectural services carried out under standard RIBA terms of engagement.

Both MBI and Munro Associates have a healthy track record of successful proj-

ects, and the two companies enjoy good reputations in their respective fields. They still remain separate, but by coming together, the companies offer a combined service ranging from the architectural and acoustic design of the studios to the technical commissioning of the equipment.

New Trident Plant Opens

Due to increased production requirements, Trident Audio Developments Ltd., the mixing console manufacturers, have moved to new and larger premises still based at Shepperton, Middlesex. The new address is: Trident House, Rodd Industrial Estate, Govett Avenue, Shepperton, Middx, TW17 8AQ. Telephone: Walton-on-Thames 224665, or Telex 881392 TRIMIX G.

Commenting on the move, managing director Malcolm Toft said, "With the launch of our Series 65 and Series 75 consoles coupled with the restructuring of our American office, sales have increased to the point where we could

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With the opening of the new Studio 4, CTS Studios in Wembley, England, is now offering a dedicated electronic music recording, mixing and overdubbing facility. This synthesizer suite, designed by Eastlake Audio, is made up of an isolation room and a large control room area housing an extensive range of permanently installed synthesizers. Fairlight CMI with MIDI/SMPTE, Linn 9000, Prophet-T8, Wave 2.3, Oberheim Matrix-12, Yamaha DX7 and TX816 are included in the new line-up.

PARKFIELD: SCORING IN THE COMPUTER AGE



Alan Oldfield and John Parker

by Jane Greenstein

Veteran musicians and composers John Parker and Alan Oldfield have created Parkfield, a soundtrack composing and scoring company based in Studio City, California. While soundtrack companies seem to be springing up overnight, with brash young musicians attempting to cash in on soundtrack fever, Oldfield, 49, and Parker, 58, have years of experience behind them. Now they are carefully delving into their partnership, using the new Synclavier II, the highly advanced digital synthesizer which acts as a 32-track recording studio.

Oldfield, a keyboardist who has had the distinction of performing and arranging for a number of Motown artists as well as having his own compositions

played by the Royal Philharmonic of London, holds a PhD in music theory. Parker, a jazz trumpeter who currently writes the music for the TV show *Trapper John*, has a long history of composing film and TV soundtracks, but no academic training.

Parker believes that he and Oldfield complement each other with their different backgrounds, balancing one's weakness with the other's strength. Neither had worked with a partner previous to this collaboration.

"I realized at the time I met Alan how limited my knowledge of synthesizers and electronic music was, and I really needed a crash course," says Parker. "I got that from Alan. In the process, I learned to write more stuff for what he could do and began emphasizing synthesizer music as time went on. At one

point we began to see we had a lot in common, and the combination of us made a plus and minus. I could do the stuff he couldn't do and he could do the stuff I couldn't do. We just kind of fit together.

"His knowledge of electronic music and the structure of music is staggering," continues Parker. "The things that I do instinctively he does from a base of preparation and study. He's got a lot of left brain stuff going, and I've got a lot of right brain stuff going and his brain and my brain form a formidable force."

Parker, tall with gray hair and a mustache, and Oldfield, short with white hair, beard, and a mustache, make a curious pair. Oldfield, though far from stuffy, is quite the scholar of the duo, answering questions as if he's prepared a lecture prior to the interview. Parker approaches matters with spontaneity, and speaks of the pair's approach to music in psychoanalytic terms.

"Half of the process is technical and half of it is creative," says Parker. "We are guided by our knowledge of what is appropriate. So the conduit of what's appropriate leads us to the technical aspect as well as the creative aspect. In other words, we draw on that part of ourselves over here on the left side of the brain, and that taps into the creative flow. It is our creative, spiritual feeling of what would be terrific coming from our talents and our technical ability of knowing how to produce that, and possibly third, the knowledge of what's appropriate dramatically through our experience in film."

Parker, a native of St. Paul, Minnesota served as musical director for the *Arthur Godfrey Show* in the early '60s and went on to score two Robert Youngson films, *Laurel and Hardy's Laughing Twenties* and *The Further Perils of Laurel & Hardy*. As a freelance arranger, he has worked with Sammy Davis Jr., Connie Francis, and Ray Charles. The bulk of his work has been in television. He has composed soundtracks for a host of TV dramas, including *Gunsmoke*, *Medical Center*, *Police Woman*,

Hawaii Five-O, and *Dallas*.

Oldfield, a Nebraska native, began playing piano at age 5. He later attended San Diego State University, UCLA and North Texas State University, where he received his PhD. He also studied in Paris with Aaron Copeland's teacher, Nadia Boulanger. Oldfield helped create one of the first electronic music labs at North Texas State University 15 years ago, working with early Moog equipment. He taught composition, jazz, and music theory at Southern Illinois University, where he continued his experimentation with electronic music. Additionally, Oldfield has scored a number of documentaries. He has performed on recordings by such artists as Barry Manilow, Rick James, and Thelma Houston and has arranged and conducted music for Helen Reddy, Thelma Houston, and the Fifth Dimension.

Parker and Oldfield met last year at a restaurant in Santa Ana, California where the two were playing. They formed Parkfield in September, 1984, and currently collaborate at Oldfield's converted garage in Studio City, where a horde of electronic keyboards, including Roland, Yamaha DX7, Oberheim, Moog and the Synclavier II are kept.

Parker and Oldfield praise the Synclavier II, manufactured by New England Digital, as the piece of equipment that has revolutionized modern composing. Capable of sampling sounds and reproducing them electronically, the unit consists of a synthesizer and a computer terminal with a keyboard attached. A printer prints out the score, which is stored on floppy disks. Among other nifty functions, the Synclavier II enables a composer to perform on the synthesizer keyboard, transfer the tune to the terminal in a readable format and edit it note by note.

"You can do composition on the keyboard to instruct the instrument to do different things," Oldfield says. "I don't have to play it, I can just tell the computer to make a change. Another spectacular option this particular instrument has over a lot of them is you can sit at the typewriter and create sounds and combinations that would maybe not be impossible, but so close to impossible to play, that you may as well forget about it in a normal type of scoring session when you go in and have three or four hours to record so much music.

"There's nothing out at this point that can do all those things with the ease of the Synclavier II. If we wanted to compose a piece where we wanted to use an orchestra as well as these instruments, we could put all the information on a floppy disk and haul the computer to a studio where the orchestra is, put the floppy disk in and away it will go, right in sync with the orchestra. You

"You listen to a lot of the music in TV or films and you hear a lot of the kinds of music that has to do with regular, fast pulsations. One of the reasons that's happening is synthesizers."

can put most of a 40- or 50-minute film score on three or four floppy disks."

"It is capable of running and operating other instruments," Parker adds. "All these instruments become its slave. It directs its own orchestra, literally and figuratively."

Parker and Oldfield have witnessed the burgeoning computer age, and find themselves constantly adding on to their instrument collection, which includes almost a dozen keyboards. Oldfield takes a philosophical approach to the industry, perceiving the growth in electronic music as part of the "baby boom" in advanced technology.

"One reason that technology is changing is the change that's going on in society," says Parker. "We're into, as Naisbitt said in *Megatrends*, an 'information age.' We're sort of dealing with the information in a way, and the society has changed music into a high-tech kind of thing.

"You listen to a lot of the music in TV or films and you hear a lot of the kinds of music that has to do with regular, fast pulsations, a lot of regularity. One of the reasons that's happening is synthesizers. They are able to do things with such precision and regularity that you can't create that any other way. What is

occurring more and more in the changing technology is that it is possible to interconnect instruments. It is very easy to send the information from, say, the DX7 to any other instrument that reads and understands computer numbers. It's becoming easier to go to a recording session, and a composer is now able to write a series of sounds for someone to play that four or five years ago would have taken three, maybe four, players to create.

"This technology is moving at such an incredibly high speed," Parker says. "I took a course in electronic music ten years ago, and it was like the Stone Age compared to now. Year by year, month by month there are things coming out. The equipment gets better and the prices go down. I paid \$4,000 for a Prophet 5 synthesizer five years ago. That synthesizer today is worth about \$1,800."

Although Parker and Oldfield have spent most of recent years scoring TV shows and documentaries (Oldfield did the soundtrack for the documentary *No Guts, No Glory* aired this past summer), their plans include television, films, records and, if possible, live performances with their entourage of synthetic sidemen.

"Financially, working in television is better because of the royalties," says Parker. "You're able to write more in TV because there are more opportunities than you have with films. TV involves more speed. It reaches a wide audience and therefore tends to be run-of-the-mill and doesn't give a composer a lot of room for experimentation. The way we work is ideal for TV because it's not tremendously time consuming. By the same token, we aspire to do feature films. Films are more varied and challenging."

"In one respect, it's more enjoyable to do work on feature films because generally there's more music," adds Oldfield. "The music has more of a chance to develop, and in films, if it's a good film, there's more of a chance for a subject to develop."

And, of course, Parker points out that there's always the possibility that a soundtrack can become a hit record.

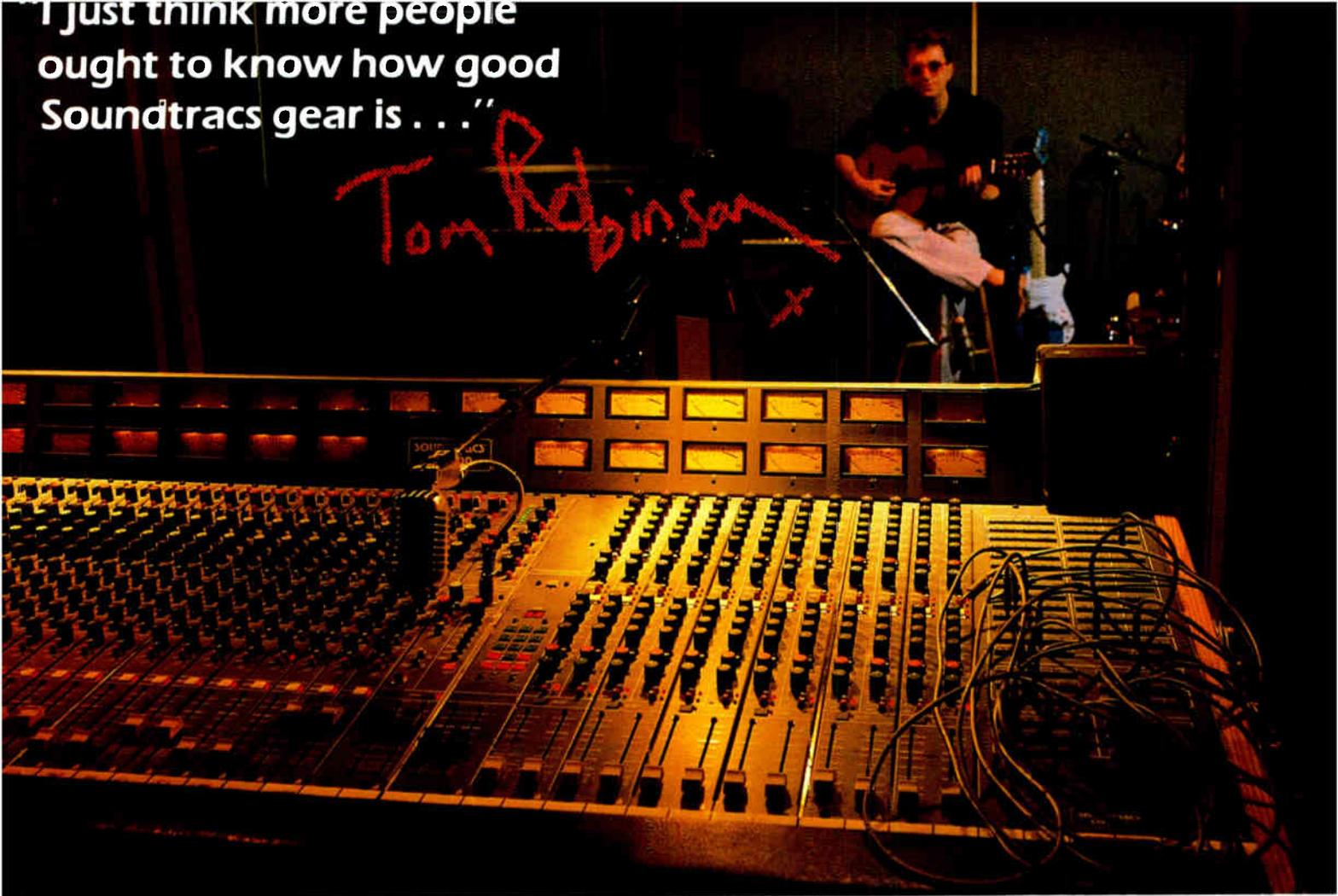
Parker and Oldfield are currently creating and recording an album of synthesizer, jazz and contemporary music. They hope to use the album to solicit soundtrack work. "Our goal is to score shows right here in this studio," says Parker.

Parker and Oldfield also have become investment partners. They're not sure what they want to invest in, but Parker's sure it will be something with a high risk.

"We're going to be a menace," Parker says with a smile. ■

I just think more people
ought to know how good
Soundtracs gear is . . ."

Tom Robinson



"I did a lot of research before buying a mixing console for Turbot studios. Ideally I'd have liked an SSL or a Harrison I suppose, but frankly, they were out of my price range.

Among the producers & engineers I asked, however, the general opinion was that — if it lived up to its claims — one of the new Soundtracs desks would be excellent value for the money I had.

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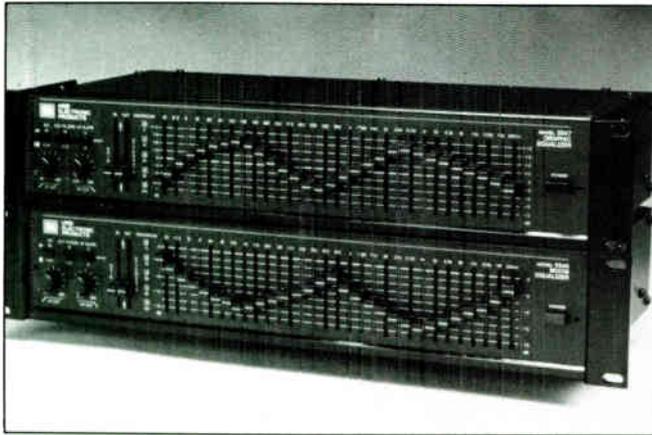


Dealer list and brochure from: Soundtracs Inc. 745 One Hundred and Ninth Street, Arlington, Texas, 76011. Tel: (817) 460 5519
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World Radio History

P R E V I E W



JBL 5547/5549 Equalizers

Providing improved headroom and lower noise than conventional integrated-circuit gyrator designs, the new JBL 5547 graphic and 5549 room equalizers use a new solid-state hybrid to synthesize the inductor in the LC circuit. Both units provide minimum phase shift consistent with amplitude response, and smooth minimum-ripple combining action over the entire control range.

The 5547 has 30 third-octave bands centered between 25 and 20k Hz, with 12 dB boost or cut available. The 5549 provides corrective room equalization and a 0-15dB cut-only range. Both models incorporate high- and low-frequency end-cut filters. Additional features include 45mm throw slide controls, with center detent on the 5547; an EQ bypass switch that facilitates before-and-after comparisons; a hardwire bypass with power-off; and a delayed turn-on that precludes power-on-thump. Ground loop isolation is provided by means of a chassis-ground to audio-ground barrier strip jumper.

Circle #137 on Reader Service Card



Turbosound Phase Checker

Turbosound Inc., of New York City, have introduced the TPC-1151 phase checker, a two-piece, pocket size unit designed to facilitate the proper connection of multiple cabinet speaker arrays. The set consists of a full-range pulse generator and a separate pulse detector which has a

female XLR jack and a built-in microphone. Green and red LEDs indicate in-phase or out-of-phase (negative polarity) conditions. According to the manufacturer, the TPC-1151's proprietary circuit design allows a far more accurate and consistent reading of acoustic phase and polarity with its built-in microphone than previously available devices of this type.

Circle #138 on Reader Service Card



Dcode™ TC-1 Time Code Reader

The Dcode TC-1 from Denecke, Inc. (North Hollywood, CA) is a low-cost time code reader for general film and video applications. In motion picture applications, using time coded film dailies, editors can use the TC-1 to assist in syncing dailies, making high-speed searches, logging, and keeping accurate time-date records of the actual production.

The TC-1 reads SMPTE or EBU time code from 1/10th to 15 times speed in both forward and reverse from VTRs, VCRs, film editing machines and film synchronizers. When transferring 1/4-inch tape to mag film, the unit reshapes code, and simultaneously displays code and generates 60Hz sync pulse at 24 and 30 fps. The unit is compact (1.6 x 6 x 5 inches, 1.5 lbs), and parallel port for a computer interface is optional.

Circle #139 on Reader Service Card



Audio-Technica ATM33R

Exhibited at the October AES Show in New York City, and now available, the ATM33R from Audio-Technica is a low impedance, phantom-powered unidirectional condenser microphone designed for recording, broadcast and sound reinforcement applications. According to the manufac-

turer, the microphone's response, which covers a frequency range of 30 to 20,000 Hz, is described as smooth overall, with a moderately rising high end. The body is seven inches long and weighs 4.75 ounces.

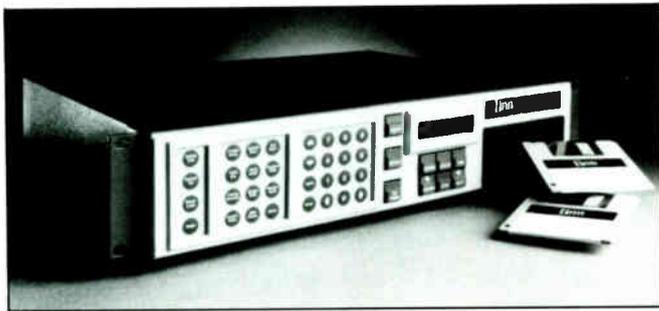
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Crown Battery Phantom Supply

The Crown PH-1 is a single-channel, transformer-isolated, phantom power supply operating on two 9V batteries. It supplies simplex phantom powering for the Crown PZM® or PCC® series microphones. The PH-1 also will power other condenser microphones that operate on 18 volts or less, simple powering. Supply voltage is +18VDC on pins 2 and 3 with respect to pin 1 of the input connector.

Since the PH-1 includes a high-quality 1:1 isolation transformer, the output of the PH-1 can be unbalanced without ill effects. The rugged steel-and-aluminum chassis and XLR-type connectors help the PH-1 withstand the rigors of daily professional use. Suggested list price is \$49.95.

Circle #141 on Reader Service Card



LinnSequencer

Linn Electronics of Tarzana, California, have introduced the LinnSequencer, a 32-track MIDI keyboard recorder capable of storing up to 100 sequences in non-volatile random access memory. Each sequencer track can be assigned to any of 16 MIDI channels, allowing the user to play up to 32 musical parts on 16 different synthesizers simultaneously. The unit can also be used as a centerpiece to control a number of instruments from a single keyboard, and one or all tracks can be transposed at the touch of a key. Other features include a real-time erase function for fast editing, timing correction, a 32 character LCD display with "help" mode, optional 3.5-inch disk drive with over 100,000 note capacity, standard data cassette interface, and tempo entry in: beats per minute, frames per beat (at 24, 25, 30 fps or drop frame), or by tapping quarter notes on the "tap tempo" button.

With an operating system comparable to the Linn 9000's, the LinnSequencer can be connected to a wide variety of MIDI-compatible gear and is priced at \$1,995 with disk drive and \$1,295 without. A remote control unit is optional, as is SMPTE time code synchronization capability.

Circle #142 on Reader Service Card

Sony PCM-1630

The Sony PCM-1630 digital audio processor is an updated version of their industry standard PCM-1610 unit. According to the manufacturer, the 1630 uses newly developed analog and digital filtering techniques, resulting in a significant improvement in audio quality. Fully compatible with the PCM-1610 format, the 1630 offers the same 16-bit linear quantization and switchable sampling rate (44.1 or 44.056 kHz), dynamic range of over 90 dB, harmonic distortion

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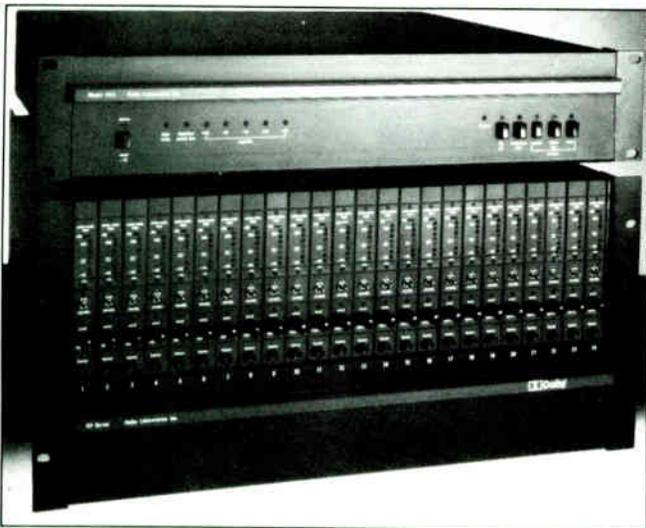
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under .05 percent and unmeasurable wow and flutter.

Among the new features of the PCM-1630 are peak level meters with peak hold mode, and an optional RAR (read after read) board for improved error correction on playback. Another option, a digital I/O board, makes the unit compatible with AES/EBU standards. The PCM-1630 weighs 57.5 pounds—about 25 less than its predecessor—and is base priced at \$19,000.

Circle #143 on Reader Service Card



Dolby XP Series

The XP Series, a new multi-track noise reduction package from Dolby Laboratories, contains up to 24 channels of Dolby A-type noise reduction. The XP is identical in performance to the SP Series noise reduction introduced by Dolby in 1981, while improvements in engineering and manufacturing permit the 24-track XP Series to be offered at \$14,950.

Among the XP's cost effective engineering changes are a new power supply and dedicated noise reduction circuit design, rather than carrier card/plug-in assemblies. The unit also features detented calibration trim controls, discrete FET noise reduction control switching, and individual channel hard-wire bypass, all in 12¼-inches of rack space. Dolby Laboratories will continue to produce limited quantities of SP units at a price of \$22,500 for 24 channels.

Circle #144 on Reader Service Card

Recortec High Speed ACD System

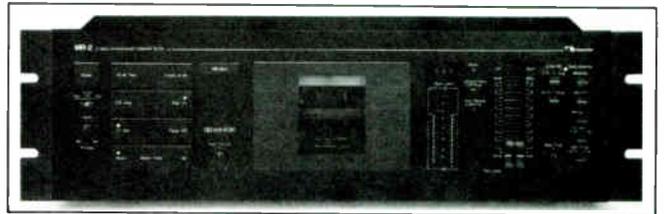
Recortec, of Sunnyvale, CA, has unveiled the Asynchronous Cassette Duplicator (ACD) system, which operates at 64:1 using a 7.5 ips master and is comprised of a bi-directional master transport and up to 12 cassette slave/loaders. A single operator, using the ACD and three slave/loaders



can produce 2,000 C-60 cassettes per eight hour shift. The slave/loaders duplicate the signal onto a feed pancake and simultaneously load the tape into the shell.

The master transport (available in either ¼-inch or ½-inch tape widths) utilizes reel-to-reel tape handling rather than a bin loop, and electrical switching between 4-track or 2-track, stereo or mono formats is standard. Vacuum column technology is employed in both master and slave transports for constant tension, a tight pack, and long master life. A basic system (one master, one slave/loader) is priced at \$39,000; additional slave/loaders are \$19,500 each.

Circle #145 on Reader Service Card



Nakamichi MR-2 Cassette Deck

Priced at \$499, and offering excellent audio performance combined with features tailored to the semi-pro user and the real time duplication industry, the Nakamichi MR-2 was first introduced at the New York AES Convention. This 19-inch rack mount deck operates in an unbalanced configuration, and both ¼-inch and RCA-type jacks are provided for inputs and outputs. Nominal input levels are -10dBV, while outputs are continuously variable from -10dBV (.316V) to +4dBm (1.228V) via a rear panel control, so the deck can be utilized in a high level environment without a step-up device. Real time duplicators will appreciate the MR-2's remote control connectors (permitting multiple units to be operated from a single remote control), and the left/right "copy out" jacks.

Other features include selectable Dolby B and C noise reduction, peak level LED metering, memory zero stop, an "auto-repeat" mode, ±6 percent playback pitch control, dual speed master audio fader, and headphone output with level control.

Circle #146 on Reader Service Card

Editron 500A

After three years of manufacturing audio post and video editing systems in Australia, Editron has introduced its line of synchronizing and editing systems to the U.S. market by exhibiting at both the AES and SMPTE Conventions, as well as opening a branch office in West Los Angeles (located at The Village Recorder Complex). The Editron 500A is a computer-based system that can control up to 15 audio, film, or video transports simultaneously (via one central host unit and a separate interface for each machine).

System features include: the designation of any machine as master; automatic multi-machine offset calculation; multiple standard operation—time code, pilot, tacho or quad, from any machine; event list storage of 999 events; a large

—PAGE 94

CLARIFIED SOUND

THE SPII PROJECTOR FROM DOD



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The technical term for the DOD SPII projector is synchronous hi audio processor. Yet, the SPII is a very sophisticated piece of electronic hardware. It is not a limiter, equalizer or compressor. The SPII's unique clarity is designed to clarify sound specifically for the human ear without distortion, without creating silence... without noise.

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DOD

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Circle #046 World Radio History Card

—FROM PAGE 92

video display of operating parameters; a rotary jogger to position images and scroll through screen information; and an internal time code generator/reader. The 500A host computer with keyboard and 12-inch monitor screen is priced at approximately \$10,000; the intelligent machine interfaces are approximately \$3,600 each.

Circle #147 on Reader Service Card



Ampex 672 Music Grade Cassettes

The first in a series of advanced music grade audio cassettes for institutional, educational and government users, Ampex 672 combines high quality tape and shell with efficient packaging. The cassette is designed to provide an affordably-priced tape that can stand up to tough operating conditions, such as spoken word applications.

Ampex 672 features a high performance gamma ferric oxide and binder system, and is housed in a new three-piece cassette shell to insure proper alignment for consistent high frequency performance. The cassettes are also available in 25 tape bulk trays for high volume handling efficiency. As a further convenience, Ampex has eliminated the use of individual hub clips, instead utilizing a single retaining rod to secure the hubs during shipment and handling.

Circle #148 on Reader Service Card



Sony CCP-200/202 Duplicator

Educational Electronics Corporation (Inglewood, CA), the exclusive U.S. distributor for Sony high-speed duplication products, has announced the availability of the CCP-200/202 stereo cassette duplication system. The unit provides a frequency response of 30 to 12.5k Hz, with a better than 45 dB signal-to-noise ratio. Features include: automatic record-

ing level, short tape detect, soft-touch interlocked controls, channel selection (A+B or A), auto copy modes, and automatic rewind of master and slave. The add-on CCP-202 two cassette slave unit allows for future system expansion. Both the CCP-200 master and the CCP-202 slave carry the Sony two year guarantee against head wear.

Circle #149 on Reader Service Card



AEG M-20/M-21 Two-Tracks

Shown at the AES Convention and now available, the M-20 and M-21 Series of professional mastering recorders from AEG Corporation of Somerville, New Jersey utilize a unique amorphous metal head design which, according to the manufacturer, will last as long as the machine itself. The M-20 line comes in either standard 2-track or center time code versions, and features include microprocessor control of all functions; a six-position locator; programmable and stored level, equalization and bias alignments for four tape speeds, with optimization for three tapes at each speed; and external synchronization.

The M-21 Series recorders have been developed for less sophisticated applications requiring only two speed operation, manual audio alignment, and no synchronization capability. Both the M-20 and M-21 lines are available in a variety of options and mounting configurations.

Circle #150 on Reader Service Card

Magnetic Storage Indicator

Concept Design, the engineering division of American Multimedia (Burlington, North Carolina), have introduced a Magnetic Storage Indicator that is designed to simplify the side "A" determination of magnetic recording tape. Any tape formulation recorded from one to over 200 ips can be tested in less than a second, with simple "go"/"no-go" indicators informing the user which is side "A". The MSI is a compact, cigarette pack-sized unit—small enough to be fitted on loaders and slitters for quick operator quality checks. The unit is currently available in the .150-inch cassette format, and other formats can be ordered.

Circle #151 on Reader Service Card

DARTS: PCM for the IBM-PC

Vois Inc. of Endicott, NY, have introduced their Disk Access for Real Time Systems (DARTS) software package for the IBM-PC which, when teamed with Micro Technology Unlimited's Digisound-16 A/D/A conversion system and a Priam hard disk drive, performs high-quality two-channel digital recording along with some editing capabilities. The recording time of the system is limited by disk space only, not the amount of memory in the computer. Priam's largest

disk, the Datatower, will hold about 20 minutes of two-channel, 50kHz sound. The sound files are stored as straight 16-bit linear samples with no data compression or other coding scheme, making it easy for these files to be accessed and processed by existing software (such as analysis programs) or programs which may be written to take advantage of this system.

Digisound-16 is the brainchild of author/computer musician Hal Chamberlin (*Musical Applications of Microprocessors*) and features selectable data formats (linear 16-bit, companded 12- or 8-bit), sampling rates (up to 50kHz stereo plus the ability to accept an external sample clock), and a 32k word sample buffer to simplify interfacing to a computer. Modular input and output filters are used to accommodate the different sampling rates. The DARTS systems sells for \$5,995, which includes the Digisound-16 but not the computer or disk.

—Larry Oppenheimer

Circle #152 on Reader Service Card



Carrolltronics Multi-Amp 12

The Multi-Amp 12 from Carrolltronics of Berkeley, CA, is a multi-channel line amplifier in a one-rack space enclosure requiring only five inches of depth. The unit can be configured as 12 independent gain stages or as a distribution amplifier with any combination of outputs driven from common inputs, by selecting internal links. Applications include amplifying the outputs of cassette machines, syn-

thesizers, and other semi-pro equipment to studio level; video facilities can benefit by leveling all VCR outputs before switching. Each channel is provided with unbalanced 1/4-inch phone and RCA input jacks, in parallel on the front panel, screwdriver-adjust gain control, and active transformerless balanced XLR outputs on the rear panel. Gain is adjustable to a maximum of 20 dB. A 12-channel version is priced at \$775, and other configurations are available.

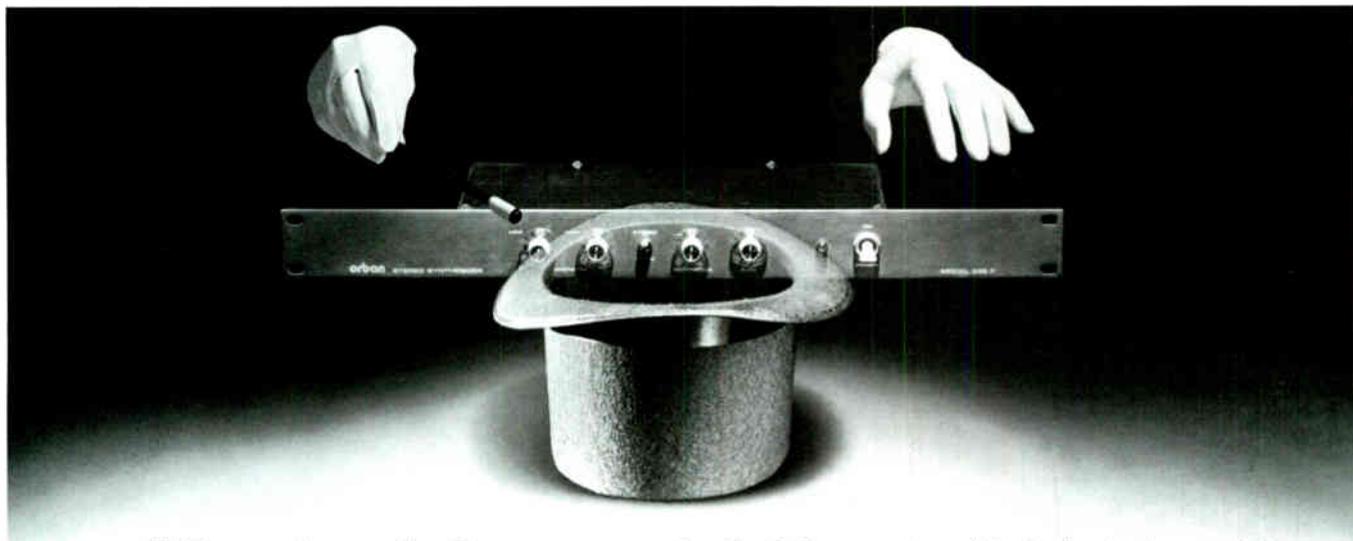
Circle #153 on Reader Service Card



Mirage Multi-Sampler

The Mirage Digital Multi-Sampler, a new eight-voice, polyphonic MIDI controlled sampling instrument from Ensoniq (Malvern, PA) features all the sound generating and sampling capabilities of the Mirage digital sampling keyboard—minus the keyboard. This rack-mountable unit can be connected to any MIDI keyboard or controller and not only offers the sounds of actual acoustic instruments, it also responds to pitch bend, modulation, aftertouch and breath control effects sent over MIDI channels. Features include a

—PAGE 163



Magical Stereo EFX.

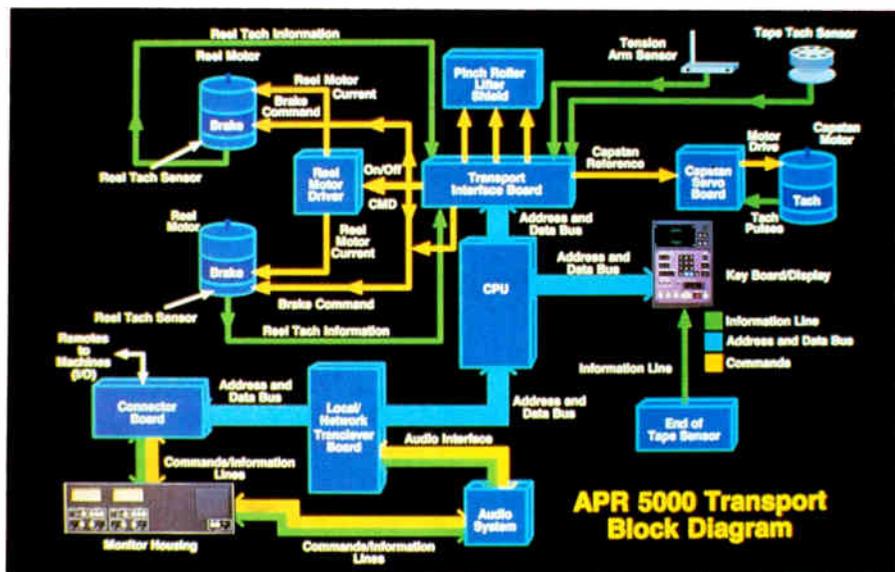
Poof! We've got a little magic box which will dramatically transform your intrinsically mono devices—digital reverbs, drum machines, and synths—into pseudo-stereo. The Orban 245F Stereo Synthesizer has achieved legendary status due to its perfect stereo imaging with no phase cancellation in mono when the stereo channels are summed.

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Circle #042 on Reader Service Card



nations: the APR-5001 ¼-inch width full track mono, APR-5002 ¼- and ½-inch 2-track stereo with center track IEC time code capability with internal SMPTE/EBU synchronizer, generator, and auto-locator display. The 5001 and 5002 are available in low speed (3.75, 7.5, 15 ips) and high speed (7.5, 15, 30 ips) versions, the 5003 is available only in the high speed version. All three models will accommodate 12½-inch reels, and are equipped with a monitor speaker unit.

Several options are available for the desk-top recorders: variable profile stand, remote control, and balanced transformer isolated inputs/outputs may all be added in the field. Rack mount conversion and editing scissors must be installed at the factory. The APR-5002 and floor stand as supplied for this field test is priced at \$8,000. The APR-5003

Sony APR-5002

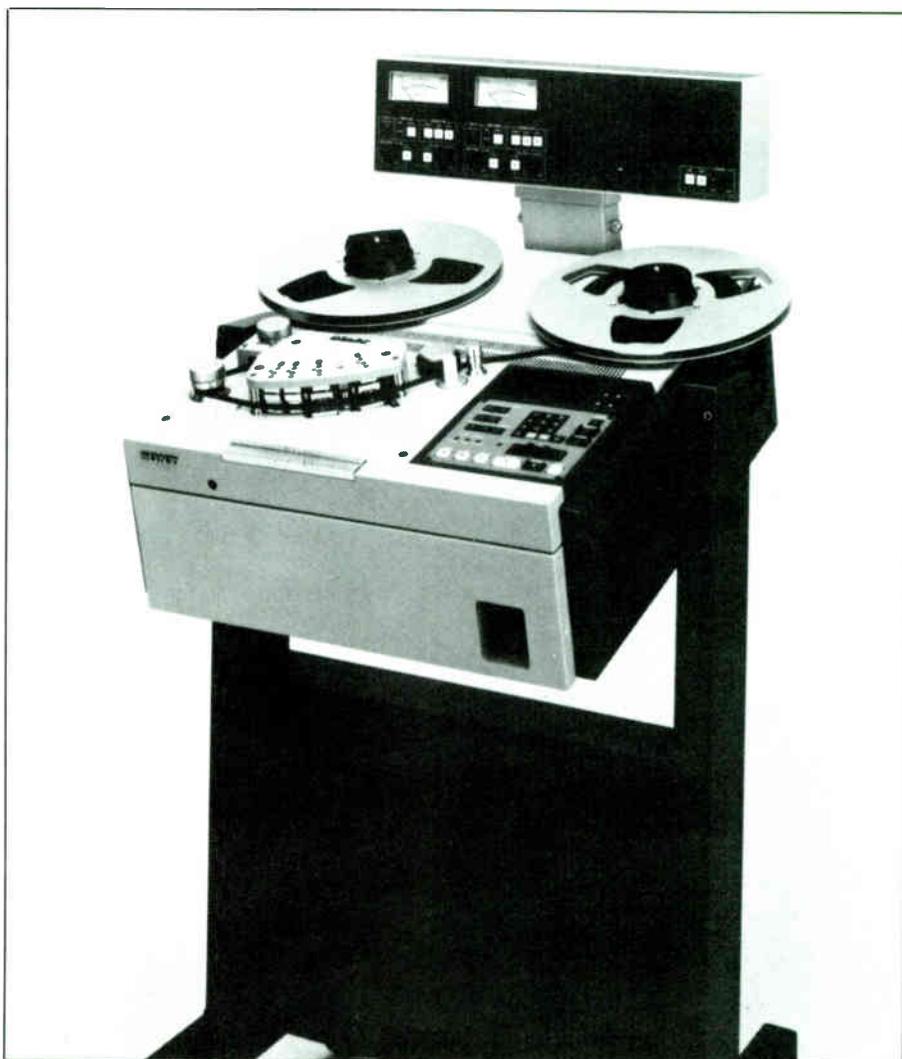
by Ken C. Pohlmann and John Monforte

The JH-110 series of professional tape recorders are ubiquitous fixtures in recording and broadcast studios throughout the world; more than 6,000 JH-110s, with no fewer than 140 different model designations, were sold by MCI over a ten year period. But with Sony's acquisition of MCI, and the pressures of technological evolution, fueled by the growing availability of digital recorders, the sun was clearly setting on the JH-110.

The APR-5000 series of recorders replaces the JH-110; it is manufactured in the Sony Professional Audio Products' Ft. Lauderdale facility. The design is wholly new, and borrows very little from the JH-110; table-top, rack mount, and stand placement is available, there are serial and parallel control ports compatible with SMPTE/EBU networking protocols, a spot-erase function, a die-cast transport chassis, and an integral splicing block. There is also a tape counter with one time code frame resolution, a manual velocity control (MVC), ±50% varispeed, automatic reel size sensing and microprocessor audio alignments with non-volatile preset memory.

Configurations

The APR-5000 series has three incar-



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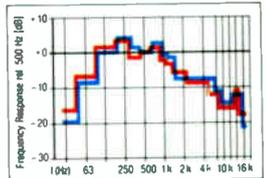
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This chart shows a frequency spectrum analysis of the studio 1/4" master tape (15 ips) of part of a recording compared with a prerecorded chrome cassette of the same passage duplicated at high speed at 120 μ s normal equalization.

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with stand is priced at \$9,500.

The APR-5002 is packed in a single box; the deck and meter housing are separated, and require assembly. Connecting cables for uncalibrated send/returns, headphone send/returns, meter/status, logic interconnect, and power must be connected to sockets in the meter housing. When assembled, the desk-top deck is 480mm wide, 590mm deep, and 380mm high, and weighs in at 91 pounds.

Interfacing and Connections

The APR-5000's back panel contains numerous connectors including AC power cord, ground lug, XLRs for audio inputs and outputs, XLR time code inputs and outputs, a 9 pin D-type connector for noise reduction switching,

two BNC-type connectors for test signal inputs and outputs, a 50 pin D-type parallel transport remote connector, and a pair of 9 pin D-type connectors for serial remote control and tributary and bus control extension.

The parallel remote connector contains the following outputs: a regulated 5 volt power source, capstan reference frequency and status lines. Inputs include: all transport and audio commands, the capstan injection frequency, and a direction command. A fader start command is also available for broadcast applications. The serial remote connector is designed to be upwardly compatible with the SMPTE/EBU networking protocols when and if they are established.

Mechanical Design

The APR-5000 series machines do carry some semblance to their JH-110 ancestors. First, there is an autolocator and a servo controlled tension system. These are now common among recorders designed today, although the JH-100s pioneered the concept. There is also an "MVC," or manual velocity control, which allows simplified searching and cueing of the tape or, alternatively, controlled speed and tension in fast wind modes. This provides a smooth, even packing of the tape for storage.

The tape path also shows some similarity to the older machines. A non-magnetic ceramic capstan shaft is used. The head block contains the same mechanical components used in the older models. The mechanical adjustments of head wrap, zenith and azimuth are performed in an identical fashion. The same flutter filter is used and, as before, there are the two guides on the outside ends of the assembly that determine the vertical positioning of the tape and allow for some wrap as well.

The remainder of the tape path departs significantly from past designs. A "smart" end-of-tape sensor is used to detect if tape is threaded. It is much less sensitive to changes in ambient light and should never require a sensitivity adjustment. Hall effect sensors are used to measure tape speed and position, as well as tension, making them more immune to the dust and dirt buildup that comes with age. The clutched reversing idler of past designs has been replaced by an electronic flutter damper which allows the machine to reach its flutter specification quickly when put in play, and continuously monitors the supply side tension.

All the tape path components are mounted on a precision milled cast aluminum deck frame that insures precise positioning of all the guides and motors. Each component can be independently adjusted, allowing for simplified maintenance.

Bias and erase signals are generated by a 400 kHz oscillator. While most recorders use lower frequencies, the use of a higher frequency prevents the bias traps from bandlimiting the audio signal and causing phase errors, making it possible to have high frequency response out to almost 30 kHz. Also the "bias squeal," heard when rocking the tape for editing, is less audible. The bias is applied or removed to the record head after a delay that is equal to the time it takes for the tape to travel from the erase to the record head. This provides for accurate punch-ins. To avoid audible thumps when going in and out of record, erase and record bias are applied and removed gradually.

Operation

The primary controls and displays

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for the APR-5000 series are located on the transport control panel on the top plate. In the edit mode, tape tension is relaxed: if the play button is pressed, the supply reel is activated, while the take-up reel is not. Tape speed is selected with a single button; subsequent depressions cycle through the three speeds indicated by three LEDs. A locate button causes the transport to fast forward or rewind to the location shown in the locate display. The repeat button can be used for looping. A vari-speed button causes a speed change of $\pm 50\%$, and has two operating modes: when pressed once, speed setting may be altered with the numerical keypad, but the machine stays in a "fixed" mode (LED flashes); when pressed twice, capstan speed is set to variable and can be changed with the MVC control. The MVC thumb switch and LED indicator controls tape motion when in the stop, locate, or fast modes; it is not operational in the play mode unless vari-speed has been selected.

Two numerical displays show current tape time, and locate time in hours, minutes, seconds, as well as frames in time code mode, or tenths of seconds in timer mode. A numerical keypad allows the user to enter values to the locate time display, or enter percentage of deviation when in the vari-speed mode. The +/- key changes the sign of the locate time display. The STO and RCL keys are used to store and recall values in the 30 transport memory locations; the locate time display showing the time being stored or recalled. A time code display button, operational only on the APR-5003, places time code time in hours, minutes, seconds and frames into the numerical display.

A lifter defeat button may be used to disable the lifters and unmute the output while in a fast mode. A shield defeat button may be used to lower shields while in play or record modes. A spot erase button disables the record head with the erase head on, so that tape can be erased without bias from the record circuitry. The spot erase mode is entered by pressing the spot erase button, and the record button, with the appropriate channels in the record ready mode, allowing the reels to be moved by hand to erase brief noises.

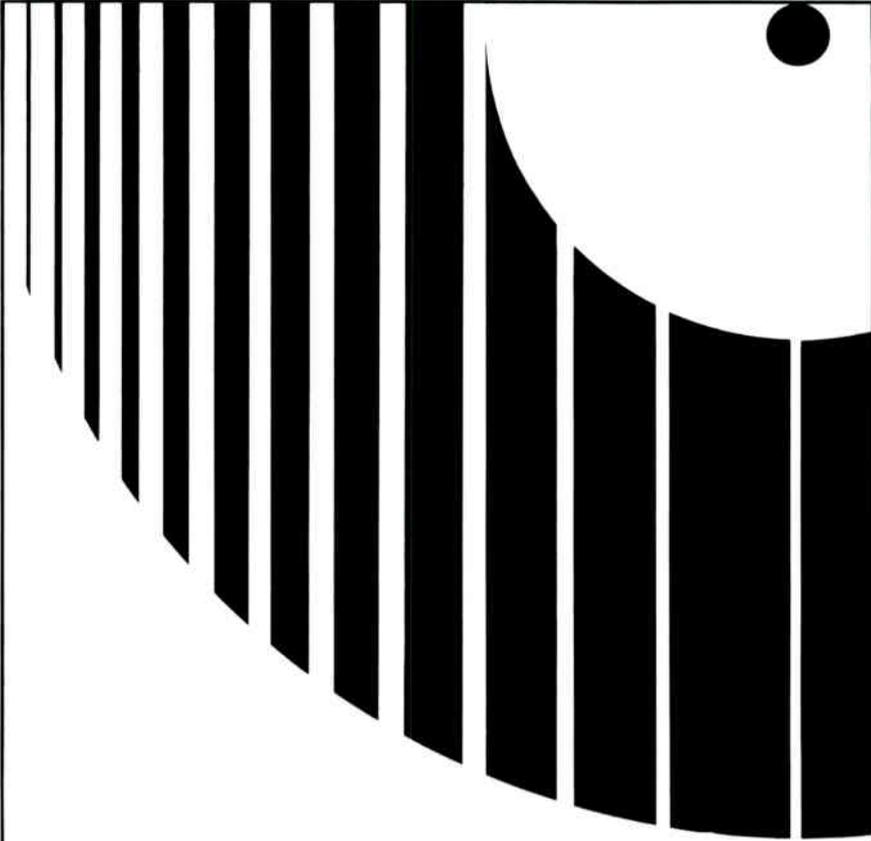
Local and network buttons determine origin of machine control. When in the local mode, the panel controls or parallel remote are active. When in the network mode, the serial remote control is active. When both modes are simultaneously selected, all control origins are enabled, on a first-come-first-serve basis. A time code generator button enables the internal time code generator, as available on the APR-5003 model. The chase button slaves the APR-5003 model to an external time code source.

The meter housing contains meters, controls and displays for the audio cards, and monitor speaker. Two identical audio channel modules contain six subsections: alignment select indication, record ready, monitor selection, record level, output level, and the VU meter. The alignment select indication (ALN) is an amber LED showing whether or not that channel is selected during an alignment operation from the alignment control panel. The record subsection contains two status LEDs that show if the bias and erase signals are active; during normal recording, both are illuminated; during spot erasing, only the erase LED is on. The record ready button selects record enable or disable.

The monitor subsection contains re-

pro, sync, and input switches to select the origin of the audio output. The record level subsection contains an uncal button which places the input level under control of the uncal vernier. The output level subsection also contains an uncal button, and uncal vernier. The VU meter comes factory set with +4 dBu being equivalent to 0 VU (0 dBu = 0.778VRMS). Different references may be selected from a potentiometer on the channel board.

A monitor speaker module is supplied with all versions. It is capable of delivering a clear sound at a reasonable level, something that seems to be all too uncommon when compared to many other recorders. Two buttons, track one select, and track two select, are used to select



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tine maintenance adjustments should be familiar to studio technicians. The headstack is removed by unscrewing three Totsu screws; inside is a DIP switch package for programming the stack's format so the microprocessor can identify which headstack is installed. The top cosmetic cover may be removed by first removing the headstack, pinch roller, and the four Totsu screws. This permits access to most transport adjustments including the spindles, brakes and tach sensors for the reel motors, the capstan motor assembly, all tape guides, the transport control panel keyboard, the tape tach sensor, the pinch roller

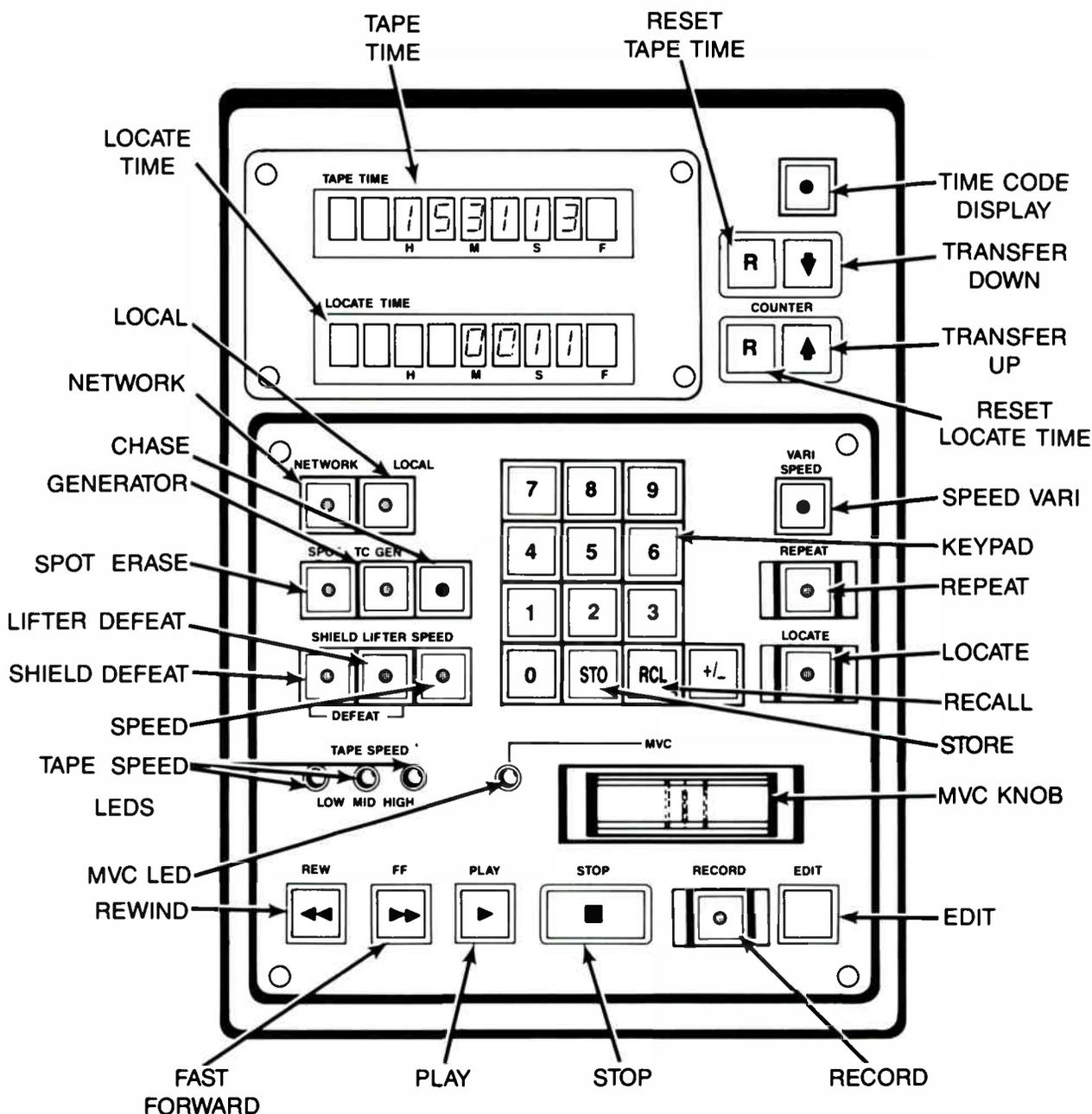
adjustment, the end of tape sensor, flutter arm and tension sensor, and lifters. The four audio cards are housed in a front-loading card cage, found behind the front alignment panel, as is a 5,000-hour elapsed time meter.

The Manual

The APR-5000 series machines come with one of the most complete service manuals available. Like previous Sony/MCI products, there are the requisite schematics, block diagrams, wiring diagrams, alignment procedures and theory of operation. In this manual (and presumably the manuals for future Sony

products) several other useful sections are added. There is an extensive section on operation that is laid out in a step-by-step fashion which can acquaint the user with the unique features of the machine, and is so complete even a novice could learn to operate it. There is a section that thoroughly treats the installation, even stating the wiring and protocols required for synchronizer and noise reduction interface. Exploded diagrams of most sub-assemblies are given. A complete list of part numbers are given with each drawing along with an indication of whether it is kept in stock or (in the case of non-wearing parts like

Transport Control Panel



speaker grills or wiring harnesses) it needs to be specially ordered. There is also an appendix that contains useful information such as a glossary of all the mnemonics used for the signal lines in the schematics, and a complete set of pinouts for all the integrated circuits used.

Maintenance Requirements

Sony has made the effort to insure the APR-5000 series require a minimum of service. Almost all light bulbs have been eliminated. Most keys contain an LED status indicator, and even the transport controls are backlit by arrays of colored LEDs. The only remaining lamps are used to illuminate the VU meters (there are two used per meter). All devices touching the tape (with the obvious exception of the heads themselves) are non-magnetizable so demagnetizing is less necessary. Still they recommend demagnetizing at 20-hour intervals. There are only five other periodic service requirements: cleaning the heads and fixed guides (ten hours), cleaning moving guides (100 hours), checking tape tension (500 hours), checking motors and brakes (1,000 hours), and renewing the hours meter (5,000 hours). They also emphasize that the checks to be performed do not necessarily imply adjustments. For instance, a tension check may indicate some bearings needing replacement, thus restoring proper tension and flutter specification.

On the test bench, the APR-5002 met all of its specifications. A small amount of gap scattering was observed. It should be noted that all multi-track heads contain some scattering, and there is variation to be found among manufacturers and to a lesser extent among individual heads of a given design. The amount shown here is not severe and few manufacturer's heads can outperform this.

The ergonomics of the APR-5002 are generally very good; the angled tape path presents no problems, and head access for editing is excellent. Only a few minor details bothered us; for example, the head lifters cannot be partially manually engaged to monitor during fast modes.

Conclusion

In summary, the APR-5002 features several significant evolutionary steps in analog tape recorder design. Continuing refinement in transport mechanics, use of microprocessor-controlled alignment with presets, inclusion of features such as a communications processor, center track time-code, and spot erase, guarantee widespread applicability in many diverse environments. This thoroughly up-to-date recorder, in a small package, at a very competitive price, should be met with acceptance in the audio community. ■

The Fostex RM780 and SW12 Monitor System

by Mark Lewer

The engineers at Fostex have really outdone themselves this time. Their new RM780 and SW12 speakers go a long way towards satisfying every engineer's need for performance and flexibility. These monitors were designed

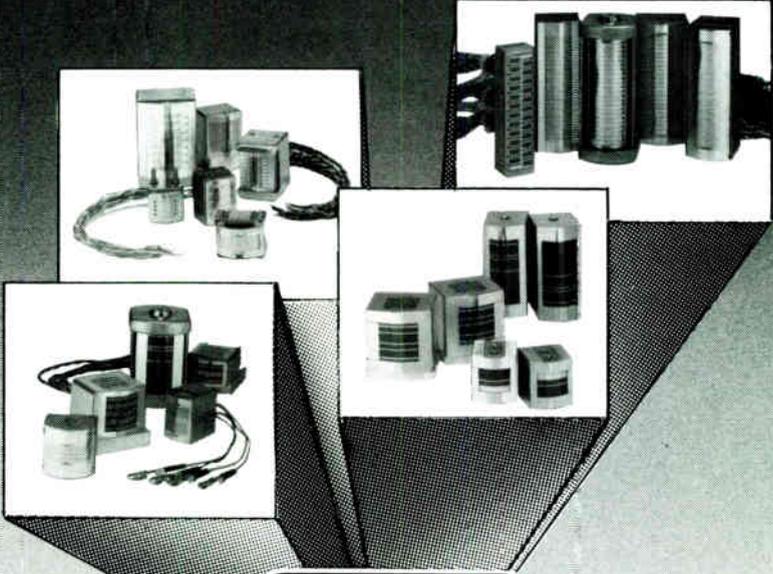
from the ground up as precision tools for the demands of professional ears.

Fostex set out to design a full bandwidth monitor system that would stand up to the test of digital audio. Furthermore, every effort was taken to make the speaker's imaging abilities able to meet

—PAGE 105

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—FROM PAGE 103

the demands of stereo, in television, film or video. Most importantly though, a monitor system should allow one to hear the program material as it is, without any coloration added by the speakers or the environment around them.

Fostex answered the challenge with the combination of RM780 and SW12. Their design includes a number of smart features that overcome these problems. Together, they form a monitoring system that is both functionally and sonically well thought out.

Fostex designed the RM780 as a near field monitor. The near field experience incorporates two ideas. First, the speakers are to be placed so that the listener is in the near field, within the critical listening distance. Remember that the critical distance is that point at which the amount of direct sound equals the amount of reflected sound. Beyond this point, room reflections become the predominant contributor to the sound that arrives at one's ears. Within the critical distance, the listener hears more direct than reflected sound. Fostex recommends putting them on stands above and in front of the console, for optimum performance.

The second near field idea involved controlled dispersion. This type of de-

sign avoids the presence of room reflections. Monitors suffering from uncontrolled dispersion, on the other hand, energize the room causing it to "sound off" according to its dimensions and surface coverings. Instead, the RM780 creates a relatively narrow, cardioid-shaped dispersion pattern (or polar response) which is both horizontally and vertically symmetrical. This allows one to move around in front of the speakers without hearing a change of balances between the instruments in the mix.

The design of the tweeter utilizes the same RP (Regulated Phase) thin film technology that Fostex patented and used in both their headphones and microphones. With manufacturing techniques similar to those of semiconductor manufacture, a tiny voice coil is printed directly onto the diaphragm. This diaphragm is then suspended in a 2-inch voice coil gap surrounded by some heavy duty magnets used to energize the unusually large gap. This creates



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an essentially edgeless device which can be driven with absolute uniformity over a wide dynamic range. What does all this mean? There's no mechanically-induced distortion from the tweeter. High frequencies sound natural, without straining to meet the demands. Best of all, the music sounds the same at every listening level.

The tweeter's planar design has the added benefit of an unusually flat impedance curve. Even well beyond 20kHz, the nominal impedance is 8 ohms, which makes them less susceptible to the burn of clipping amps.

The tweeters are mounted concentrically in an 8-inch driver, thereby creating a single point-source. This, in turn, helps make the imaging more clearly defined. The coaxial mounting shows a lot of ingenuity, with its complementary push/pull double spider configuration. The double spider design is an improvement over the single spider designs of the past, which tended to suffer from distortion induced by the material's compliance. Fostex tests have shown that the double spider design cancels these effects.

The engineers at Fostex then found the right mounting depth so that the drivers are phase and time coherent. When using monitors without this coherence, the sound is smeared and the image is blurred because the fundamental and harmonics all arrive at different times. The precision design of the RM780 overcomes this problem and delivers the program with complete phase and time integrity. Imaging is clear and precise in both horizontal and depth placement.

The RM780 is a vented reflex-type speaker whose dimensions are 17" x 10" x 10" (H x W x D). The entire RM series has a flat frequency response from 60 to 20k Hz. The sensitivity at 1 watt/1 meter is 90 dB. The distortion measurements at 10 watts show less than 2% second harmonic distortion, and less than 3% third harmonic distortion. The cross-over frequency is 125 Hz.

A lot of what I like in music is below 125 Hz, and I liked what I heard from the SW12. This modular woofer's frequency response is flat from cross-over to 40 Hz. The box's dimensions are 21" x 17" x 10", and it has a 12-inch driver. Fostex designed the whole SW series as a modular woofer complement to the RM series; every model from both series has the same cross-over frequency so one can customize for one's own particular needs.

The idea of a "modular woofer" is quite different from the older idea of a "sub-woofer." The latter usually requires one speaker, common to both left and right. This speaker was usually hidden somewhere in the room. The SW12s are designed to be used one per channel,

with the added feature that their dimensions allow them to attach to the RM780 and act as a one-piece unit with it. This might make the RM780 a little harder to keep in front of the console, however. A switch was provided on the front of the RM780, therefore, to change the speaker's dispersion pattern to fit the 2-pi environment of a wall soffit. Unfortunately, Fostex didn't provide a 1-pi mode for corner soffit placement. An alternative solution is simply to place the SW12 pair conveniently, since low-frequency information does not contribute as much to stereo imaging as do mid- and high-frequencies.

The use of a modular woofer means that the excursion required by the mid driver will be less. The distortion produced by it will therefore also be less. This is significant for a number of reasons, most importantly the effect on the speaker's apparent performance. Since

You also get a lot of flexibility. Since the same coaxial design is used throughout the entire RM series, you hear the same sound except for the low-end, depending on the combinations that you buy. In this way, a studio complex can use different configurations of RM and SW speakers in different rooms to achieve the same sound in each. You can tailor your purchase to your own uses or installation. Since they are time aligned, you can mount them horizontally or vertically. Fostex even made them rack-mountable, a useful feature in video or remote truck set-ups. You can use the speakers in either 2-pi or 4-pi environments. The low profile of the speakers requires only 17 inches of soffit space.

Fostex made the system affordable as well. At \$1,500 per pair, this is a monitor system that both studios and independents might want to look into. ■



the human ear is more sensitive to distortion in higher frequencies than lower ones, relinquishing the mid driver from the task of extreme excursions yields an audible drop in the level of distortion. The bulk of the distortion is below 100 Hz, where it is less noticeable. The midrange sounds clean and unobtrusive. Imaging is improved once again, since there is less distortion in the bandwidth that facilitates imaging.

The limited excursion of the driver also means that the system can take a lot of power. Fostex's advertisements claim that 500 watts instantaneous pink noise (broadband) can be handled by the RM780. The flat impedance of the tweeter enables it to handle 2500 watts. The system is efficient, though, and Fostex recommends 150 watts continuous program power, 75 watts continuous pink noise.

So what does the system deliver? You get a point-source, phase and time coherent near-field monitor with the bandwidth of a 12-inch system. This is a full reference system, not to be confused with frequency-limited monitors like Auratone Sound Cubes or the Yamaha NS-10. You also get precision imaging, and headroom for equalization. Best of all, this system sounds great at either very loud or very soft monitoring levels. The reproduction by the speakers is natural, and they're easy to listen to, even for long periods of time.

Hill Audio DX500 Amplifier

by David P. Ruttenberg

Someone once said: "Good things come in small packages." While the audio industry has witnessed an overwhelming amount of miniaturization in recent years, someone finally took the famous adage one step further. The DX500 amplifier from Hill Audio, Inc. confirms this and more, namely: "Big things come out of small packages."

Hill Audio has been a leading manufacturer of audio components in England for the past 13 years. Their product line consists of half a dozen consoles, the M-4 loudspeaker (which was heard throughout the British Live Aid concert) and power amplifiers, the largest of which is capable of delivering a hefty 3000 watts into a 4 ohm load.

The DX500 is the smallest in power of Hill Audio's amplifier family, weighing in at 280 watts per channel. When compared to Hill's DX1000, DX1000A, DX2000, and DX3000 amplifiers (at 1000, 1500, 2000 and 3000 watts, respectively), the DX500 appears to be the baby of this family. However, when



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monophonically bridged, the DX500 will deliver 1200 watts into a 4 ohm load. All of this power is available in a rack mountable amplifier that weighs only 33 pounds and takes up only two units of rack space (3.5 inches high).

The DX500's design is well thought out and the amplifier performs quite well when compared to the specifications of others in its class.

Control Layout

The unit's appearance is very uncomplicated. Front panel switches include: two rotary knobs that provide control of individual channel input sensitivity; a single recessed Stereo/Bridged-Mono switch; two green LED indicators per channel that signify amount of signal present; two red LED indicators that the display peak overloaded for each channel; and a separate power switch with accompanying LED and protection circuit indicator.

The back panel proves to be equally simple, as well as versatile. Power connections are made possible via an attached AC cord which is connected to a 20 amp fuse. Two thermally activated AC fans are utilized to keep the DX500 operating at optimal temperature. Output signals are easily accessible via two sets of three-way banana-post terminals.

The amplifier will accept balanced and/or unbalanced signals from either XLR, stereo 1/4-inch or mono 1/4-inch plugs. It is at this point that the versatility of the DX500 becomes apparent—connections to this amplifier need not be of similar type. In fact, a channel that may otherwise not be in use can be utilized by appropriately connecting one channel's 1/4-inch mono jack into the adjacent channel's XLR input. In this manner, "slaving" one DX500 to another involves nothing more than a patch cord.

Operation

After connecting an audio signal to the DX500, stereo or bridged-mono operational mode is achieved by placing the recessed front panel switch in the appropriate position and re-wiring the speaker outputs. Input sensitivity is selected by dialing up the maximum output voltage of the device used to drive the amplifier. Both sensitivity knobs are graduated from infinity to 1.55 volts, the latter figure being the minimum amount of voltage necessary to develop maximum rated output power.

The protection circuitry incorporated

in this amplifier enables the engineer to confidently push the DX500 to its limits without causing any damage. Under extreme operating conditions, the relay circuit will protect the amplifier from malfunctioning. Should this circuit become activated due to, say, overdriving, the DX500 will shut down, resetting itself in less than three seconds. Should the malfunction persist, the amplifier will continue to reset itself. Following the third attempt through this reset cycle, the amplifier will power itself off, thus forcing the user to trouble-shoot the problem. The engineer can then resume normal operation by simply returning the power switch on the DX500's front panel to its normal "on" or downward position.

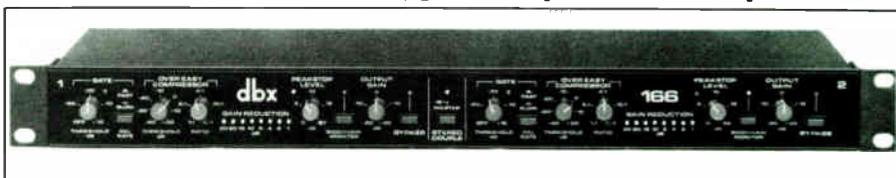
Heat dissipation, a problem encountered by all power amplifiers, is uniquely controlled. All positively driven devices are common to one heat sink, while all negatively driven components are common to another. This design enables heat to be uniformly dissipated throughout the entire amplifier. Unlike other amplifiers, the DX500 will not shut down the entire amplifier until both heat sinks reach maximum operating temperature. Since the amplifier's entire casing is part of the heat dissipation design, cumbersome heat sinks are avoided, thus reducing the size and total weight of the DX500.

Additionally, protection against high operating temperatures is achieved by two AC fans. These fans are turned on when the amplifier reaches an operating temperature of 50°C (122°F).

Performance

The DX500 amplifier performed remarkably well under a variety of conditions. One listening test was conducted using digitally recorded Compact Discs as sound source material. I felt that the DX500 handled the dramatic changes in signal level with ease in the home listening environment. In the studio, the DX500 proved to be more than adequate as a main speaker amplifier. It did not color the sound of the analog masters as it faithfully reproduced the original source material. Under the spotlight, the DX500 proved to be a most powerful performer. During a live concert, the amplifier continued to deliver a distortion-free signal at extremely high output levels. Throughout the performance tests, the DX500 ran at a very comfortable operating temperature; thus, the AC fans were never activated.

dbx Model 166, a dual channel, gated compressor/PeakStop™ limiter.



On the Bench

Technically, the engineers at Hill Audio have a winner in their smallest amplifier. Most specifications were easily met under a wide variety of input test signals. In the case of frequency response, the unit I tested far out-performed factory specifications; namely: at 10 Hz the response was down -.3dB while at 20 kHz, the response was down only -.1dB.

This wide response is accomplished by using a unique transformer coupled driver. This circuitry, dubbed "Total Symmetry," features two identical ultra-linear NPN output devices that, when properly configured in a "Super A" sliding bias network, provide a more linear response than conventional amplifiers. Additionally, the isolated transformers eliminate any possibility of introducing DC voltage into a speaker.

The Total Harmonic Distortion of the DX500 met factory specification within 0.25dB of rated power with only 0.012 percent. Distortion was found to decrease as the amplifier's temperature increases. IMD SMPTE was better than .003 percent. The noise level was measured at -104.5 dB-A weighted.

Output gain was measured at 30 dB in stereo mode and 33 dB in bridged-mono mode. The output power was measured at 312.5 watts RMS into an 8 ohm load—also surpassing factory specifications.

The DX500's manual is precise and clear. All operation and set-up information is neatly presented in a ten-page booklet that includes a schematic drawing. All components have a warranty period of five years, except for moving parts which are covered for two years.

The DX500 retails for \$1,099. For more information, contact Hill Audio at 5002-B North Royal, Atlanta Drive, Tucker, GA 30084, (404) 934-1851. ■

dbx 166 Professional Dynamics Processor

by Knox McCormac

The latest product from dbx is not new, but rather an improvement on an old standard. dbx has taken their 160 compressor and added some new twists. As a result, the compressor (called the dbx 166) now includes a noise gate, peakstop circuitry and a sidechain input to further extend its applications possibilities.

The dbx 166 is a dual channel mono compressor with the capability of stereo

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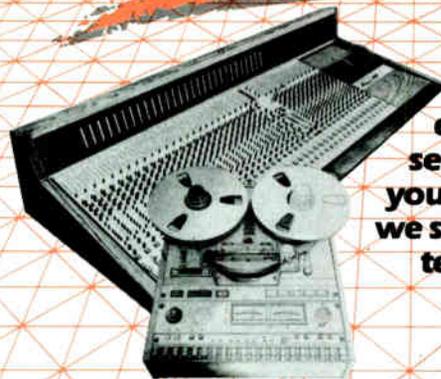
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coupling the two channels. With a frequency response of 20 Hz to 20 kHz and a maximum THD of 0.2 percent, the 166 can be used in many applications without the loss of valuable program information.

The front panel is divided into two channels by the stereo couple switch and LED. This feature enables the user to change the two channel mono compressor into a stereo unit. By enabling the stereo function, all of channel two's controls, except for the bypass and sidechain monitor controls, are overridden by channel one's. In the stereo mode, channel one's and channel two's detection circuitries are connected to each other providing true RMS levels of the combined signal. One benefit of this is to provide stereo compression without the loss of imaging.

On the far left of channel one are the gate controls, one of the new features. Both the threshold and the release time of the gate are adjustable, while the attack time, 2 ms for 28 dB (70 percent return to unity gain) and the amount of attenuation, 40 dB, is factory set. The threshold can be varied from +10 to below -60 dBv with the lowest setting turning the gate completely off. Unlike the threshold, the user has a choice of only two release times, slow or fast. In the slow position the gate releases at a rate of 10 dB/second, while in the fast position the gate releases at a rate of 1000 dB/second which is fast enough to tighten up the sound of many instruments.

To the right of the gate are the threshold and ratio controls of dbx's well-known Over Easy compressor. The threshold for the 166 is continuously variable from -40 to +20 dBv. Likewise, the ratio is also continuously variable from 1:1, no compression, to infinity:1, full limiting. However, the attack time (program dependent), from 15 ms for 10 dB to 3 ms for 30 dB, and the release time, from 8 ms for 1 dB to 400 ms for 50 dB (125 dB/second rate) are all factory set.

Another new addition to the dbx compressor is the peakstop circuitry. This lets the user set the maximum peak output level, variable from 0 to +20 dB. When the input to the peakstop exceeds the desired setting, the circuitry rounds the input off without chopping the signal off. By rounding the input, the peakstop reduces the amount of higher order harmonics, which can be damaging. An LED comes on whenever the level of the peakstop circuit is exceeded. Peakstop can also be disabled by setting the level to +20 which is the maximum output level of the 166. Being the last circuit the audio signal passes through, peakstop always controls the output regardless of any other control including the output gain.

Next to the peakstop level control is the sidechain monitor switch and LED.

The sidechain lets the user alter the threshold of the compressor as a function of the device used in the sidechain. Equalizers are typically used in the sidechain to make the threshold frequency-dependent, but other peripheral gear may be used. Pushing the sidechain switch connects the sidechain input directly to the audio output, letting the user monitor the sidechain during setup.

Output gain is the next control on the front panel. The overall gain of the 166 is continuously variable from -20 to +20 dB, the maximum output of the device. As mentioned before, the output gain is not the last circuit in the signal path although it too is independent of any other control.

The final control on the channel is the bypass switch and LED. This switch connects the input directly to the output even in the absence of power, enabling the user to compare the input to the processed sound.

Dividing the compressor and gate from the output section of the channel are the gain reduction LEDs. These LEDs are divided into eight segments showing from one to 30 dB of attenuation. The LEDs show how much the signal is being attenuated by the gate, the compressor, or both.

Channel two is exactly the same as channel one. When stereo coupled, the only controls that are not coupled to channel one are the bypass and sidechain monitor switches.

All the connections on the dbx 166 are 1/4-inch phone jacks located on the rear of the unit. The two inputs are both balanced electronically with differential amplifiers; however, they can be used with unbalanced sources. To use the balanced inputs, a three circuit phone plug is required. Although the two outputs can be used with unbalanced or balanced loads, they are unbalanced single-ended line amplifiers that are capable of driving a 600 ohm or greater load to +21 dBv. The sidechain input is also unbalanced and will work with balanced or unbalanced sources but will unbalance a balanced source.

Included with the dbx 166 are rack ears for mounting the 166 and rubber feet for table top use. The instruction manual includes hints on using the 166's multiple features.

At first glance, the 166 is not impressive-looking. The top and bottom are made of plastic, and the inputs and outputs are all 1/4-inch phone jacks. Thus one might assume this unit was targeted at bass and keyboard players rather than recording studios. But after I started testing the 166, my opinion changed.

I first tried the 166 on several different instruments including drums and keyboards. Adapting the compressor from one instrument to another was no problem because of the natural layout of the

controls. I used the dbx 160 for listening comparison. To my surprise, the 166 out-performed its older brother. The dbx 166 Over Easy circuit seemed to have a more musical presence to it because it did not clamp down as fast as the 160. Having the gate on the same unit also proved to be an asset. I was able to control bleed from the other instruments in the room without tying up my other noise gates. I was also impressed with the sidechain input. No longer was I forced to compress the entire program, but could make the compressor frequency-dependent. The sidechain also proved itself when I used it as a keyed gate. I wanted to add a low drone to the snare sound and with this sidechain input, the task was simplified. At first it was a little tough to set the sidechain up for the desired control, but after some use the procedure became easier. The only weak point in comparing the 166 to the 160 is that the 166's meter only reads gain change while the 160's meter is switchable from input level to output level to gain change. This feature was not one that I readily missed until I wanted to check my output levels.

As the second part of my test, I benched the dbx 166 and ran it through some tests. I discovered that the 166 matched or surpassed the specifications supplied by the company. For the frequency response, I found that at 20 Hz the output was only down 0.1 dB while at 20 kHz the output was down only .3 dB. I finally got a drop of 1 dB around 36.6 kHz. I then looked at how well the peakstop rounded the output waveform. The peakstop lived up to its name by evenly rounding off the output without letting the peaks through. However, when the peakstop was driven hard by the output level control, some squaring off of the waveform appeared, but the warning LED comes on well in advance of this. I also looked to see how well the gate reduced the output level. With no compression, I found that the gate dropped the output level 40 dB, while at maximum compression the drop was 80 dB. As for the other tests, the dbx 166 lived up to its specifications. The THD at maximum compression was 0.2 percent at 1 kHz, 0 dBv. Also, the output gain is variable from -20 to +20 dB with a maximum of +21 dBv output, while the maximum input level is +24 dBv.

As a compressor, the 166 works quite well, but with the addition of the gate, peakstop and sidechain input the unit becomes a versatile, well-rounded dynamics processor. The only change I could suggest for the dbx 166 would be the addition of an input/output meter, but even that is not a necessity.

The dbx 166 has a suggested retail price of \$549. For more information, contact dbx, 71 Chapel St., P.O. Box 100C, Newton, MA 02195. ■

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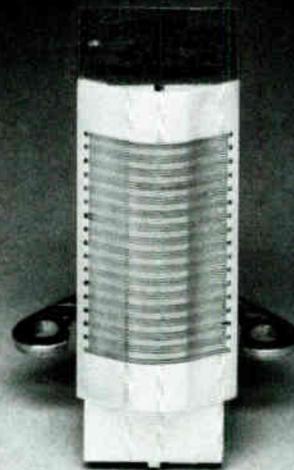


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F E E D B A C K

Dear Mix,

We at Jaffe Acoustics, Inc. would like to commend William Johnston's excellent article on the application of "electronic architecture" to the recording studio.

Some additional clarification would be helpful.

Although Mr. Johnston indicates that the technology has yet to be applied to studios, there are to our knowledge presently three such facilities. An ERES installation with a special reverberation device (co-developed by Industrial Research, Inc. and Jaffe Acoustics) is available in NBC Television Studio 8H in New York City, to be set up for the origination of musical events. The system was designed for the "Live from Studio 8H" broadcasts by the New York Philharmonic in a studio that otherwise presents practically no ambience cues for musicians. The Southwest German Radio (SWF) studios in Baden-Baden and the new Limehouse Productions Studio 1 in London both have Philips Multi-Channel Reverberation (MCR) systems. MCR has 72 to 90 channels with individual microphones and loudspeakers. The concept is somewhat similar to AIRO's Assisted Resonance (AR), except that Helmholtz resonators are not used and each channel carries a broader bandwidth. A combination of bandpass and narrow filters is employed in each channel, and, like AR, the system allows variable reverberation times.

An Electronic Reflected Energy System (ERES) can provide three elements: early reflections, bass "warmth" (in the time zone between early reflections and reverberant onset), and effective room cubage increase for reverberant field extension. The ERES digital reverberator is a large-memory single-pass device having no electrical recirculation and deliberately having density less than that of a room. These features allow the room's own reflective patterns to develop the reverberant character, avoiding coloration that occurs when a high-density reverberator is employed to extend room reverberance. Post-processing through time offsets from speaker to speaker, and pseudo-random phase modulation of each release channel by infrasonic signals, provide perceived diffusion, three-dimensional animation, and greater gain margin.

If a studio's actual walls are absorbent, ERES can make them sound more distant as well as closer. In this case, the

size of the studio becomes relatively unimportant and a great variety of spaces can be simulated.

A very effective recording technique involves setting up only a few ERES loudspeakers surrounding a simple stereo microphone array, activating only the volume immediately around the mikes but, because of time settings, presenting to the microphones the image of an entire hall. This is also applicable, as Mr. Johnston mentioned, as a post-processing tool in the studio.

The electroacoustic systems at the Silva Hall, Hult Center for the Performing Arts in Eugene, OR, combine an ERES early-field system and an AIRO Assisted Resonance system. It should be clarified that ERES is not available from AIRO. A modular card-frame ERES processor system manufactured under Jaffe Acoustics, Inc. license by Technical Acoustics, Inc., P.O. Box 1438, South Norwalk, CT 06856.

The remarkable flexibility of present-day "electronic architecture" to augment natural acoustics or to create a complete analogy of a given room, make it a tool of great usefulness in the recording and broadcast studio.

Sincerely,
Wade R. Bray
Senior Consultant
Jaffe Acoustics, Inc.

Dear Mix,

I very much enjoyed your recent article on "Strange Reader Mail." Although the average volume of reader mail which I, as a writer, receive has suggested to me that the existence of readers may be a specious rumor, there was one particularly bizarre note that crossed my desk shortly after the appearance of the October issue of *Mix*. I thought I might share it with you:

Dear Mr. Oppenheimer,
I am sick and tired of reading your anti-internal combustion engine articles in Mix. I have been breathing badly polluted air for all my life and, aside from stunted growth, nose bleeds, hair loss, coughing, dizziness, fainting spells, and other symptoms, pollution has only heightened my enjoyment of the modern world. Also, such conditioning greatly increases my chances of surviving any impending nuclear holocaust, or a visit to Los Angeles. In the future, you should be careful be-

fore criticizing internal combustion engines. Remember: traffic fatalities help control population growth. If everyone in the Third World had an Oldsmobile and a bottle of Jack Daniels, starvation would be a thing of the past.

Sincerely,
Ken C. Pohlmann
Director
Space-Time Continuum

I am sure that this letter is authentic because the signature is scrawled in "Coppertone Tan," the legendary 65th color of Crayola, found only in southern Florida. Well, I guess even this epistle is better than none, whatever that means.

Yours truly,
Larry Oppenheimer
San Francisco, CA

Dear Mix,

I truly enjoyed the interview with Mr. Zappa in your last issue. As usual, Mr. Bonzai did a spectacular job of exposing the inner emotions of his subject. And yes, I have to agree with Mr. Zappa, if I were given a choice of either having Frank Zappa or my dog as my only friend, I would clearly choose my dog.

Sincerely,
Ed Wanek
Second Story Recording Studio
Canyon Country, CA

Dear Mix,

In a couple of your periodicals, I have seen photos of the Calrec UA8000 56x48 console at Puk and Polar Studios. I would like more information about its patchwork capabilities, automation systems, length, width, height, MIDI interface, and its price for the U.S. market.

In closing, where can I write to get more information about all Trident consoles and where can I write to Calrec?

Thanks truly,
Derrald L. Mote
Groove City, Inc.
Fairfield, CA

Dear Derrald,

Information on the UA8000 console can be obtained from Audio + Design/Calrec Inc., P.O. Box 786, Bremerton, WA 98310. Trident USA, Inc. is located at 308 N. Stanley Ave., Los Angeles, CA 90036.

Dear Mix,

With reference to Paul Matthews' article on synchronization in the September issue of *Mix*, I would like to point out that whether time code is drop- or non-drop-frame does not necessarily imply a difference in frame rate. While it is true that drop-frame is often employed in video-referenced (59.94 Hz frame rate) time code for the purpose of correcting the real time display anomalies that would otherwise occur, it is not always employed. Thus, it is possible to lock-drop and non-drop time code if the synchronizer used is capable of making the appropriate corrections in the address comparison calculations. Further, synchronization of dissimilar frame rate time codes is actually quite common, as in the case of film-to-video and video-to-film transfers where the speed of the program material is actually "bumped" down or up by the ratio 60:59.94. This occurs as a medium referenced to one frequency, adjusted to agree with one referenced to another, very slightly different frequency. In this case, the slave synchronizer will adjust the speed of the slave such that the frame rate of its time code equals that of the master. It is often in this context that one finds non-drop frame time code referenced to 59.94 Hz.

Sincerely,
Philip A. Mendelson
The Post Group

Dear Mix,

Thank you so much for Barry Fox's fine article on Ambisonics in the October, 1985 issue. *Mix* readers may be interested to know that Ambisonic broadcasts in the 2-channel UHJ Ambisonic format are presented regularly as part of our normal broadcast schedule. We present not only commercial Ambisonic disks but also produce a wide variety of Ambisonic programs. We have aired Ambisonic interviews (broadcast on location), jazz and classical music concerts, and have just completed two radio plays which will air in the near future.

KWMU FM is proud to have premiered Ambisonic broadcasting in the U.S. in May of 1984. This past summer we recorded the world premiere performances of two new operas produced by Opera Theatre of Saint Louis. The operas were taped Ambisonically and digitally for national distribution by National Public Radio, becoming the first nationwide Ambisonic broadcasts. We have had good reaction to our surround sound broadcasts and plan this year to expand our offerings.

Sincerely,
Barry Hufker
Production Manager
KWMU FM, St. Louis

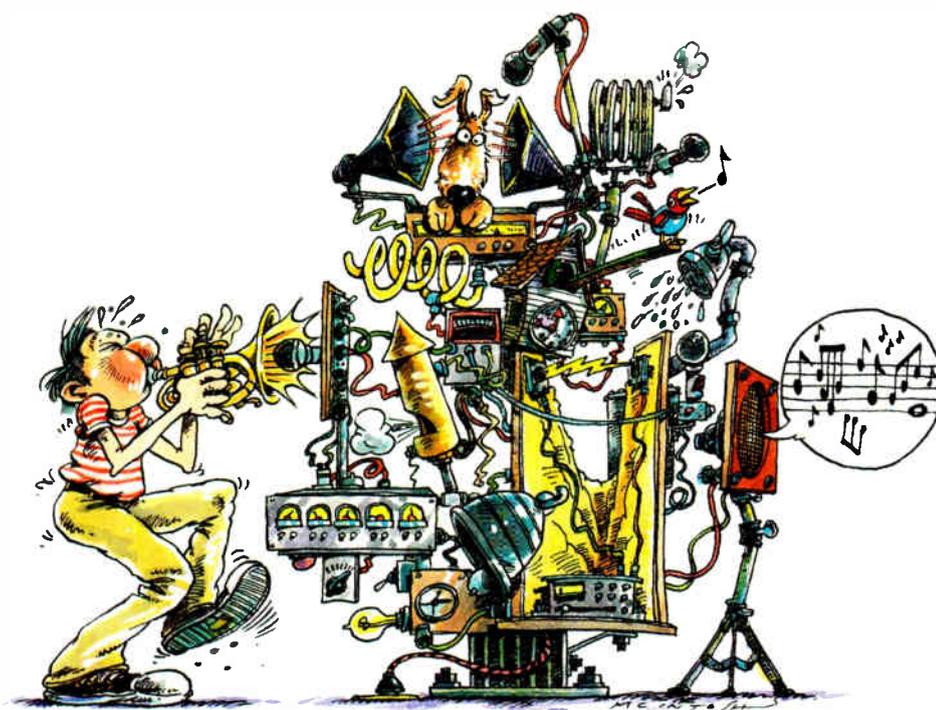
—FROM PAGE 10

Systems, Inc. of Newport Beach, CA, completed a total custom monitor system for a new video sound effects and audio sweetening production facility called *Post Logic Studios, Hollywood*. Post Logic's format is 3/4-inch and one-inch video for stereo. They also feature a custom SSL 6000 console... *Eldorado Recording Studio* in Hollywood has just added the latest Studer A/80 Mark IV 24-track recorder. Additional equipment updates include a pair of George Massenburg pre amps; a pair of Massenburg equalizers; Kepex II noise gates; Drawmer noise gates; and a Roland SDE 3000 digital delay... *Evergreen Studios* in Burbank, CA, has replaced the drivers in their three UREI 813 monitors in Studio A with Cetec Gauss components, Model 3588 15-inch coaxials and 4583A 15-inch woofers. Evergreen is now designing their own cabinets for the Gauss loudspeakers which will be bi-amped... *Smoketree Studio* in Chatsworth, CA, has installed a Neve 8078A 76 input console... *Different Fur Recording* in San Francisco has changed ownership. Chief engineer *Howard Johnston* and studio manager *Susan Skaggs* completed negotiations with *Patrick Gleeson* for the purchase of the multi-track facility... *Brewery Sound Recording* in Costa Mesa has re-opened its upgraded 16-track computer-automated recording facility, featuring state-of-the-art audio and video recording machines. The re-modeled studio now features equipment by Otari, Allen & Heath, Lexicon, Neumann, and AKG, as well as a spacious recording room with isolated vocal and drum booths... Ron Webb has been named VP in charge of sales and marketing for *Leo's Audio & Music Techniques* of Oakland, CA. Webb has ten years experience in the field; his most recent job was western regional sales

manager for ADM Technology... *Live Oak Studio* in Berkeley, CA, has expanded their facilities by adding a gorgeous new lounge/listening room and a landscaped park area with redwood decks and brick patios for their musicians' enjoyment. In addition to their IBM controlled disk-based mixing system, Disc-Mix II, the studio is now offering a composer's software program... *SwingStreet Studios* is a new 24-track recording facility designed by Jack Edwards. The Quad-Eight/MCI control room features a UREI Time Aligned, JBL, Auratone monitoring system tuned by George Augspurger. Outboard gear includes Lexicon 224 digital reverb and Super Prime Time; UREI and Teletronix limiters; ADR-Scamp rack with auto-pan, and additional equipment by Aphex, Eventide, Pultec, and AKG. Larry Lauzon is studio manager and Martin Ashley is chief engineer... *Cotton Row Recording*, Memphis, TN, recently purchased the AMS DMX 15-80S and the AMS RMX 16 units for their 24-track studio... *Sound International Corporation* an audio-video post-production facility in Miami has announced the opening of its 24-track recording studio. The studio consists of an Otari MTR-90 II, Soundcraft 2400 board and a comprehensive MIDI system w/EMU II, DX-1 and MIDI-Simmons set-up... *Terry Cox* has joined *MixMasters* of San Diego as chief engineer for audio and video productions. Cox formerly was chief engineer at *Bee Jay* and *Starke Lake Studios* in Florida... *Long View Farm* in North Brookfield has redesigned their Studio B, and installed a Sound Workshop Series 34 console w/ARMS automation; a MCI JH 24-track; Studer A80 2-track; Lexicon 224XL digital reverb, Super Prime Time, PCM 42; and DeltaLab DL2 and DL4 DDLs; UREI and dbx limiter/compressors; Ashly noise gates and much more...

Bob Montgomery (R), producer and president of Franklin, Tennessee's famed Bennett House recording studios, and Steve Schaffer (L), president of Music Resources, recently announced that the two facilities had joined forces. Although both businesses will continue to retain separate identities, they will operate under one roof in separate wings of Bennett House's homey 19th Century mansion in Franklin. Both of Bennett House's studios have dual 24-track machines with sync. Music Resources, which in 1983 became the Nashville area's first production service specializing in the electronic and computerized production of music, brings to the complex the latest and most powerful high-tech computer synthesizer equipment, along with drum machines, sequencers, keyboards, and synchronizing devices.





HARRY, THERE *HAS* TO BE AN EASIER WAY.

MEMO:

Listen, Harry, I *know* you keep saying we need "creative sound processing" to stay competitive. I *loved* the way you hung the mikes inside a 24-gallon aquarium for the Fred's Fish Food jingle (too bad Fred's singing goldfish dropped dead, though). And your reverse hyperspatial time-delay effects for the "H.G. Wells Concerto" were *incredibly brilliant*. Real award-winning stuff.

But I gotta tell you: these complicated setups of yours are driving me crazy. First I spend *all day* rigging equipment. Then I go *all night* de-bugging the effects so they sound right.

Harry, there just *has* to be an easier way to produce interesting acoustic environments.

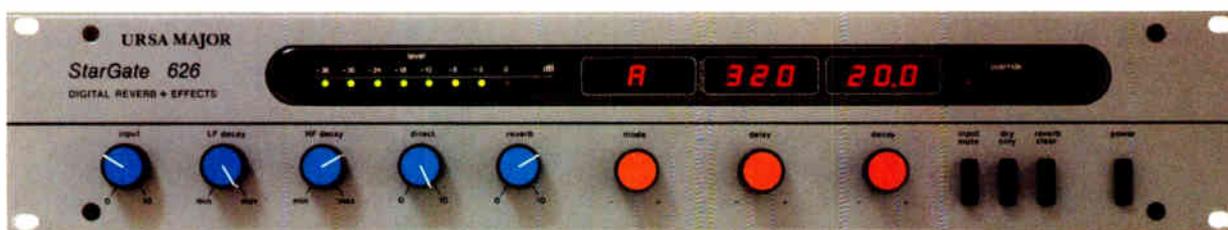
And I think I found it: Ursa Major's new *StarGate 626*. The 626 puts just about every effect we need—digital reverb, delays, and special effects—inside *one box* with *one set*

of controls. The reverb programs all sound *absolutely professional* (this is an Ursa Major unit, after all)—but the 626 goes way beyond straight reverb. There's mono and stereo delay lines, for example, an effect called "reverse reverb," a stereoized dual echo, and the brightest plate simulation I've ever heard. Plus a lot more—16 pre-tuned "rooms" in all, with 256 possible *variations* on each effect.

Anyway, Harry, I want you to cancel everything on your calendar tomorrow morning. I'm taking you to hear a *live demo* of the 626. Don't forget the checkbook, either. We *need* this thing—and the sooner the better.

Regards,

THE STARGATE 626



URSA MAJOR, Inc.

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Telex: 921405 URSAMAJORBELM

Circle #054 on Reader Service Card

by Craig Anderton

One of the more interesting news items this month doesn't involve a musical instrument, but a large scale integrated circuit. Nippon Gakki, Yamaha's parent company, has developed a MIDI Communications Controller, basically a "smart UART" designed to handle MIDI communications functions. In sample quantities the chip is currently costing about \$10, but if production ramps up to the anticipated 30,000 units per month, costs may decrease. What does this mean to musicians? Since the chip relieves an instrument's on-board computer of having to deal with MIDI details, overall system speed and efficiency should be improved, thus reducing some of the data stream "clogging" problems that MIDI users have experienced.

CORRECTION & ADDITION

In the October *MI Update*, I mentioned that the Amiga offers 12-bit sampling. That should have read "the equivalent of up to 12-bit sampling;" according to a local Amiga software developer, like many other digitizing devices the Amiga samples with 8-bit companding techniques. What this means is that resolution increases to the equivalent of 12 bits at low levels, and decreases to around 6 bits at high levels, where quantization noise and other problems tend to be masked. It's a fine point, and no one has written in to complain, but I just thought you ought to know. . . .

Speaking of fun with computers, musicians are starting to discover that Commodore-64s and Apple IIs are a bit like 4-track tape recorders—powerful in the right hands and extremely useful, but ultimately limited for sophisticated applications. The solution? More computing power, such as an IBM PC or Macintosh. Recent price cuts on PCs and PC clones have made this system more affordable, which helps explain some of the new software appearing for the PC.

Syntech, who offer the nifty Studio I program for the Commodore-64, are branching out to the PC. Their DX-TX EZ Voice (\$399.95) is a DX/TX editing and storage program that features four editing screens (operator information, color algorithm diagram, envelope generator graph, and operator graph). All screens except the color algorithm diagram can be printed out for hard copy data on your sounds, and this is indeed a handy feature. Each disk can hold up to 110 sounds, which can be transferred

to the DX-7 or TX modules one voice at a time. Sight & Sound Software, whose Commodore-64 software by jazz guitarist Ryo Kawasaki sold very well, has at long last unveiled their IBM PC sequencer. MIDI Ensemble (\$495) features auto-locate, elapsed time measurement (real time or frames), tape sync, MIDI clock, and (all right!) MIDI song position pointer. Two hundred fifty five tracks allow for making copies, collapsing multiple tracks into "perfect" takes, and general experimentation. All editing is done with easy-to-understand graphics; there is also a built-in text and graphics editor for creating a page of comments or diagrams that is saved with each song file. And Octave-Plateau's Sequencer Plus has now been around long enough to move up to Rev 2. The latest version lets you call up "windows," even during playback, to provide instant access to virtually all of the sequencer's capabilities. A new MIDI Menu makes it easy to see and edit pitch bends, program changes, controller and after-touch data, and modify these in a step time; external MIDI sync and many other convenience features have also been added. Sure, the prices for PC software are higher than what you might be used to paying for music software for other machines—but it takes more work to develop programs for more capable computers. (That's why Mac software is also relatively expensive.)

Of course, to use these new IBM programs you're going to need a suitable interface. Octave Plateau's OP-4001 MIDI Interface (\$295) is a direct replacement for the Roland MPU-401 intelligent interface. The OP-4001 provides improved sync capability, un-pitched audio metronome output, and eliminates the need for an interface card and cable. Like the MPU-401, the OP-4001 handles all timing and buffering of MIDI information, making it possible for the host PC to support fully professional sequencer software. Passport Designs, makers of one of the most popular first generation interfaces for the Commodore-64 and Apple II family, have just released the Passport MIDI Pro Interface for the Apple IIc, IBM PC, and Macintosh. This intelligent interface incorporates full sync capabilities including MIDI tape, clock, drum, and footswitch; for those who like to write code, the Pro Interface manual includes all necessary information to allow people to write software for the new interface.

The Commodore-64 is still getting its share of attention, however. Syntech's

DX-TX Master (\$149.95) is a DX/TX-compatible sound editing and storage program. Each disk is supplied with 320 DX-7 sounds; the program offers elaborate editing features that can be stored to disk along with performance parameters.

In the world of synthesizers and sampling, it looks like Sequential has a hit on their hands with the Prophet-2000 sampling keyboard. While it doesn't have the simplest user interface in the whole world, for its \$2,500 list price you're getting very high-quality sound thanks to true 12-bit sampling. Interestingly, with the exception of Akai's S612 rack-mount sampler, most of the currently popular moderate-cost sampling devices are American (Ensoniq, E-mu, and Sequential); however, the rumor mill continues to mention Casio and Roland as upcoming contenders. And what of Yamaha? Apparently, musicians are so enamored of their FM-technology products (including the new "entry-level" DX-21 synthesizer) that the company is mostly interested in continuing to pursue this type of synthesis. In fact, they've just come out with the YPR-6, a cute, under-\$300 list, FM-technology-based portable electric piano with a five-octave velocity sensitive keyboard. There's no MIDI, but you can't expect everything from an instrument that's this cost-effective.

Our final item this month is J.L. Cooper's MIDI Disk. I've always admired Jim Cooper for his ability to develop useful, roadworthy products that make the musician's life easier, and the MIDI Disk is no exception. This 3.5-inch micro-floppy disk drive can interface with any MIDI synth, sequencer, or drum machine that can perform a MIDI data dump through the MIDI cables. Loading data from disk is ten to 20 times faster than tape, and far more reliable. Different disks make the MIDI Disk compatible with different machines; versions are currently available for Yamaha's DX-7, QX-7, TX-7, and RX-11, as well as Sequential Circuits' Drum Traks and the J.L. Cooper Sound Chest II. Other versions will be available soon, including one for E-mu's SP-12 sampling drum machine. . . . which means that SP-12 owners will be able to choose between either the slow-but-cheap Commodore-64 disk drive, or the fast-but-costly MIDI Disk.

That's all for this month, but I'll be back in four weeks. Send press releases, news, and rumors to me c/o Mix, 2608 Ninth Street, Berkeley, CA 94710. ■

prophet 2000

Digital Sampling Keyboard Instrument

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



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

The Prophet 2000 comes with multiple wavetables stored in on-board memory for building "traditional" synthesizer sounds. You can play these sounds alone or in conjunction with sampled

sounds by splitting the keyboard or layering sounds on top of each other. The on-board 3½-inch disk drive provides you with a fast and easy method of storing your sounds and custom programs.

The Prophet 2000 features complete MIDI implementation, as well as very impressive arpeggio capabilities including programmable up, down, assign, extend, auto-latch, and transpose modes.

Superior sound quality has long been a trademark of Prophet instruments. The Prophet 2000 adds to this legacy.

Visit your Authorized Sequential Dealer today and ask for a demonstration. Listen to the sound. The superior quality of the Prophet 2000 is as unbelievable as its low price!

SEQUENTIAL

For a complete catalog, please send \$2.00 to Sequential, Inc., 3051 N. First St., San Jose, CA 95134. Price subject to change without notice.

A COMPUTER CHRISTMAS

by Bruce Nazarian

Over the course of this year's columns, we have discussed many methods of eliminating or reducing problems that are inherent in synchronous recording. This month, we'll take a break from the normal proceedings of this column. In the proper holiday spirit, I am offering you all a Gnome Christmas gift... a computer program that I wrote earlier this year.

Although the program was originally written in Applesoft™ BASIC, the programming language used on the

Apple II™ microcomputer, it is generic enough to be easily translated to almost any microcomputer running some version of BASIC. Even though this is a short program, it has saved me many minutes of time that would have otherwise been spent trying to compute digital delay parameters, clock rates, etc., in the heat of a session. I call the program "Beatfinder." In its most current revision (Version 4.5), this program will perform several useful functions. Give it a tempo (in BPM - Beats Per Minute) and Beatfinder will calculate and display:

- Beats-Per-Second, Seconds-Per-Beat,

and Seconds-Per-Bar;

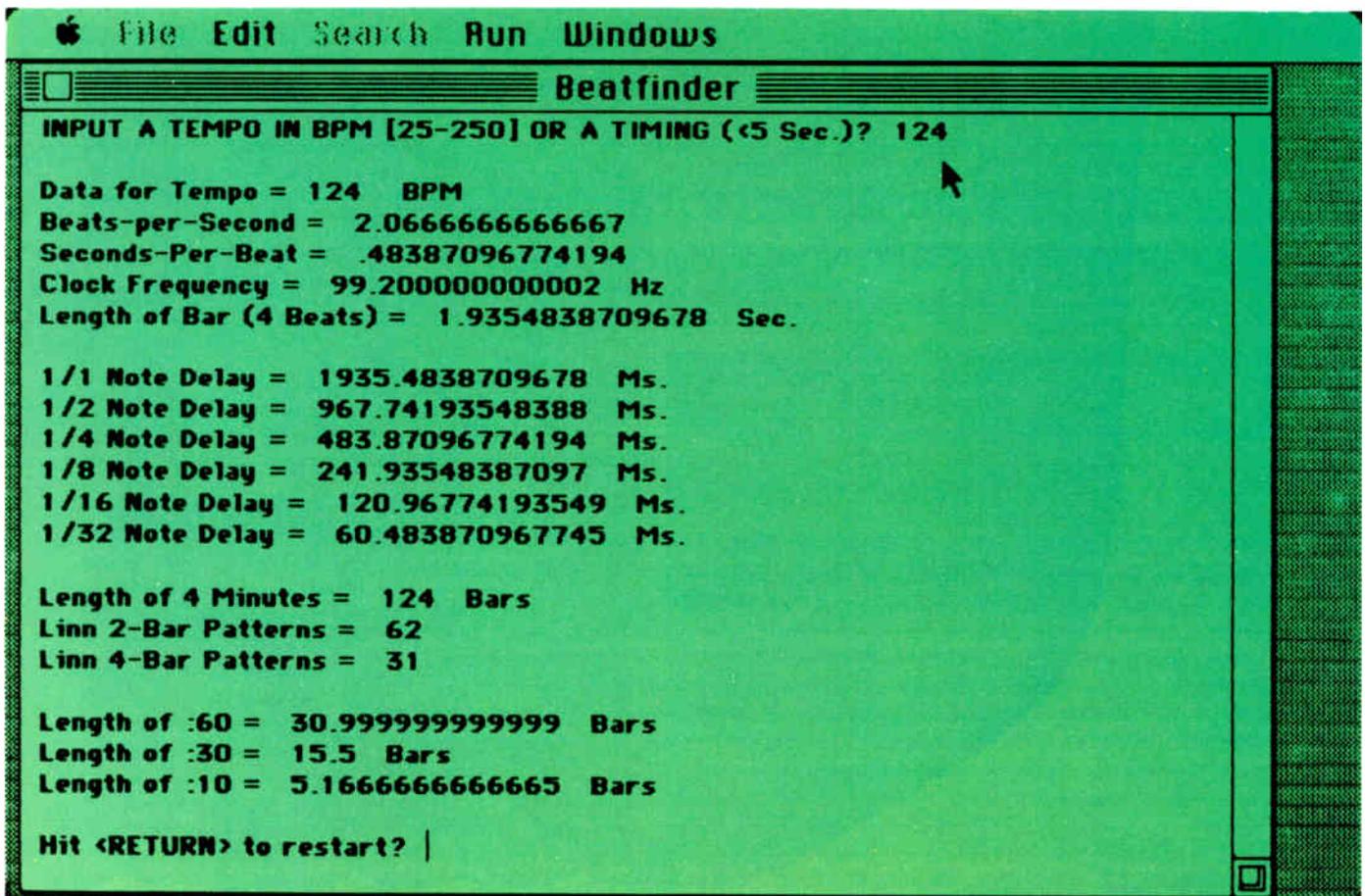
- Digital delay times needed to produce whole note, half note, quarter note, eighth note, sixteenth note and other musically useful delay intervals. This is perfect for the new DDLs with digital readouts.

- The number of four-beat measures in a given length of time. (I use this a lot for 60- and 30-second commercials or jingles.)

- Other pertinent information that is useful to the computerized musician, engineer, or producer.

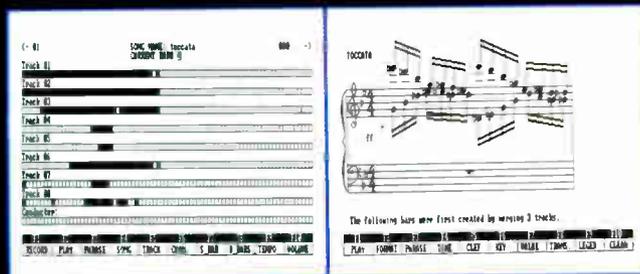
One of the latest things added to the

Figure 1 — Sample Macintosh™ Video display for Beatfinder. The arrow points to the user's Tempo entry (124 BPM).



MPS

In this confusing new world of music software someone has finally created a computer program that is so powerful that it allows musicians to forget about learning computerese and get back to what they like doing best—music. Only now with more control and creative potential than ever before. Behind this program is the same company responsible for some of the music industry's greatest achievements. The company, of course, is Roland. And the product is called MPS. It stands for the Music Processing System. What if a musician could harness the same computer power to create music that writers use in word processing? That's exactly what MPS does. It gives you the creative freedom to develop, edit and shape your ideas into a complete piece of music, all under computer control, totally at your direction. Working together with Roland's MPU-401 intelligent interface, any IBM PC (or compatible) computer and your MIDI instruments, MPS takes you every step of the way from first inspiration to a beautifully realized printed score. The MPS system's power is unleashed in its three operating



Song Mode: Arrange Page **Score Mode: Analysis Page**

modes: Song, Score and Print. All modes are totally interactive, so that any change made in one is automatically made in the others. In the Song Mode, you assemble musical phrases into complete compositions. Use any MIDI instrument as an input device. Once phrases are entered, they can be altered, edited, combined and recombined at will. MPS Software gives you eight tracks to fill with music. Each track can be assigned to any of 16 MIDI channels and used to drive any MIDI instrument. Merge tracks or phrases as needed and reassign MIDI channels to check out how a passage sounds on different instruments. A clear, concise on-screen display keeps you up to date on track status on a measure-to-measure basis. The process continues as you move on to the Score Mode. Here, the music you've created becomes a graphic score, which can be further polished and perfected. You define keys, clefs and time signatures, assign accidentals and rests...even change the direction of note flags and stems for a highly legible, musically correct score. There are three different areas on the staff to spell out song lyrics, verbal cues and instructions—everything you want to put into words. When you've finished perfecting your score, you're ready for the MPS Print Mode. Everything you've put into your on-screen score can be transformed into an attractive hardcopy printout via the MPS Hi-Resolution Print Mode. As always with MPS software, you're in control. "Cut and paste" your score to meet your own specific needs. You can print out single parts for individual players or a complete score representing your entire composition. Print copies on your computer's standard printer with or without song lyrics or in any quantity you desire. Break into the future of electronic music production—harness the power of Music Processing with the MPS—the Roland of Music Software. For more information contact: Roland Corp US, 7200 Dominion Circle, Los Angeles, CA 90040 (213) 685-5141. **Hardware Required:** IBM-PC or full compatible (256K minimum, up to 640K), 2 disk drives recommended, IBM color graphics card and CRT monitor, Roland MIF-IPC interface card, Roland MPU-401 MIDI Processing Unit, Any MIDI-equipped Instrument(s), Optional dot matrix graphics printer (IBM compatible). 



Roland Music Software Series
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MIDIMAC Interface \$125

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- Holds up to 48,000 MIDI events (24,000 notes) in up to 26 sequences of 10 tracks each
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- Edit tracks just like on a tape recorder; specify bar & beat to punch in and punch out

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- Save synthesizer sound "patches" on disk instead of expensive RAM cartridges or inconvenient tapes
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- Includes sound libraries

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Opcode Systems
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(415) 321-8977

Circle #057 on Reader Service Card

Even though this is a short program, it has saved me many minutes of time that would have otherwise been spent trying to compute digital delay parameters, clock rates, etc.

program was the ability to accept a stop-watch timing of a four-beat section of music (i.e., 1.96 seconds), and convert it to its equivalent BPM reading, which it then displays on the video monitor. I have included a screen printout of Beatfinder in action on a Macintosh™ so you can see what the video screen should look like.

A FEW BASIC POINTERS

To avoid misunderstanding, let me clarify the following points about Beatfinder's BASIC program code:

- Mathematical operations use the standard symbols: Addition "+," Subtraction "-", Multiplication "*", and Division "/"
- Enter every BASIC statement *exactly as written*, punctuation, blank spaces and all. Be especially careful in PRINT statements!
- If you still have an error, check your syntax very carefully.

I hope that you will find Beatfinder as useful a production tool as I have. MIDI Christmas to you all and Happy Computing!

10 "BEATFINDER" - Music math processor - Version 4.5 - 8/85

20 ©1985 - Bruce Nazarian - All Rights Reserved

30 You may use this program on an individual basis without fee.

40
50 This program accepts a tempo input from 25 - 250 BPM

60 and displays various musical/mathematical timing data.

70 Entering a tempo of less than 5 BPM will cause the program to treat the input as a decimal stop-watch timing, which it

90 will convert to the appropriate BPM.

92 You may delete any line beginning with an apostrophe (').

94
98 **SETUP and INPUT**

100 TEXT:HOME:CLEAR 'Set text mode, home cursor, clear video screen.

110 INPUT"INPUT A TEMPO IN BPM [25-250] OR A TIMING (<5 Sec.);T

120 IF T>250 THEN GOTO 100 'Traps a too large entry

130 IF T>5 AND T<25 THEN GOTO 100 'Traps a too small entry

140 IF T<=5 THEN T=240/T'Detects a timing, converts to a tempo
150 PRINT:PRINT"Data for Tempo=";T;"BPM"

154 '
155 **COMPUTE TIMING ELEMENTS**
156 '

160 BPS=(T/60) 'Compute Beats-Per-Second value.

170 HZ=BPS*48 'Frequency of 48X clock signal.

180 SPB=60/T'Compute Seconds-Per-Beat value.

190 BAR=SPB*4 'Compute length of a 4 beat bar.

200 T1=SPB/1*1000 'T1 is one beat's delay time (in msec.)

204 '
206 '

208 **DISPLAY TIMING ELEMENTS**
209 '

210 PRINT"Beats-Per-Second=";BPS

220 PRINT"Seconds-Per-Beat=";SPB

230 PRINT"Clock Frequency=";HZ;"Hz"

240 PRINT"Length of Bar (4 Beats) =" ;BAR;" Sec."

250 PRINT" "

260 PRINT"1/1 Note Delay=";T1*4;" Ms."

270 PRINT"1/2 Note Delay="; T1*2;" Ms."

280 PRINT"1/4 Note Delay=";T1;"Ms"

290 PRINT"1/8 Note Delay="; T1/2;" Ms."

300 PRINT"1/16 Note Delay="; T1/4;" Ms."

310 PRINT"1/32 Note Delay="; T1/8;" Ms."

320 PRINT" "

330 PRINT"Length of 4 Minutes=";T;"Bars"

340 PRINT"Linn 2-Bar Patterns=";INT (T/2)

350 PRINT"Linn 4-Bar Patterns=";INT (T/4)

360 PRINT" "

370 PRINT"Length of :60=";60/BAR;"Bars"

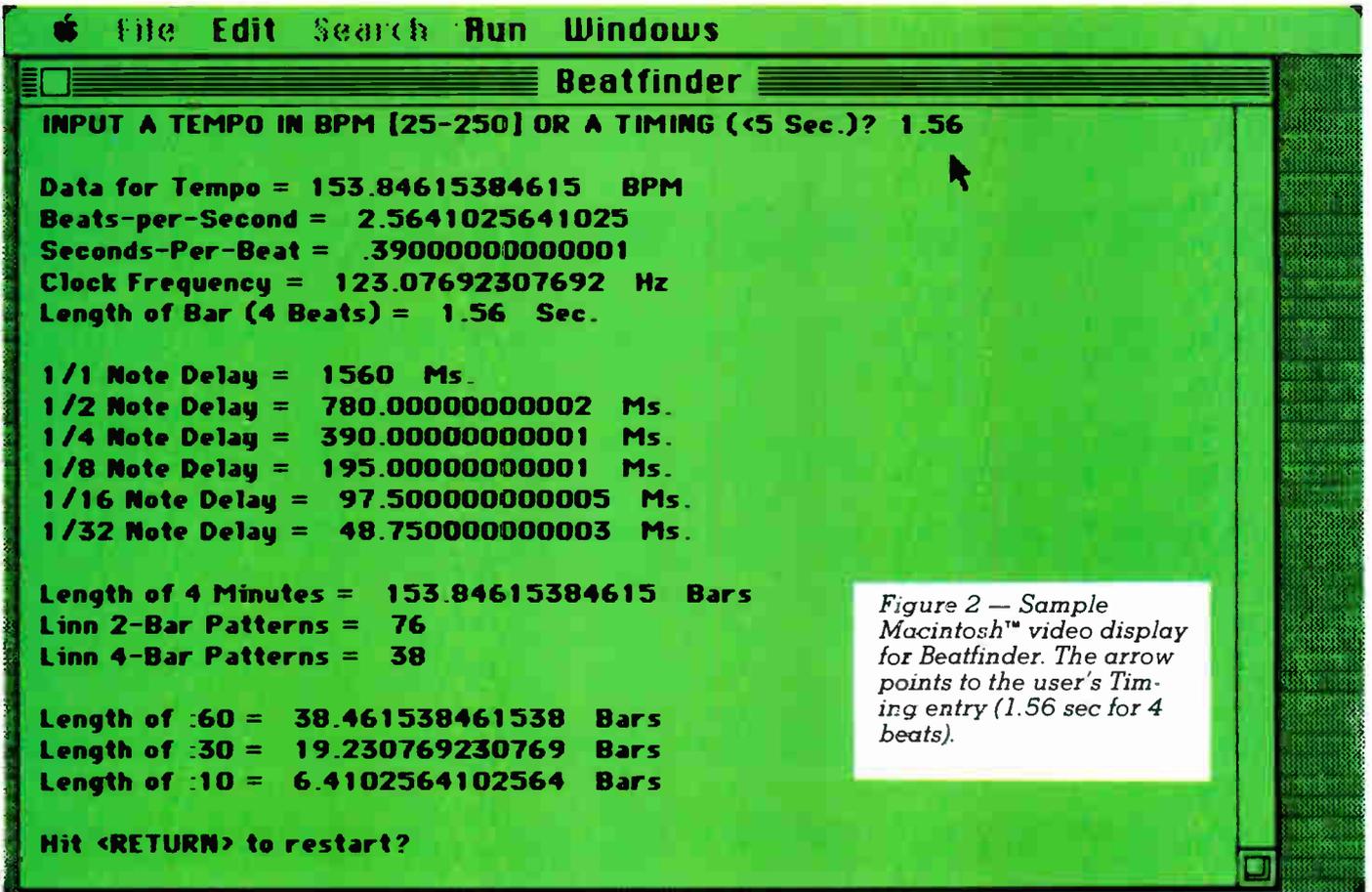
370 PRINT"Length of :30=";30/BAR;"Bars"

370 PRINT"Length of :10=";10/BAR;"Bars"

380 PRINT:INPUT"Hit<RETURN>to restart"; A\$

390 GOTO 100

400 END



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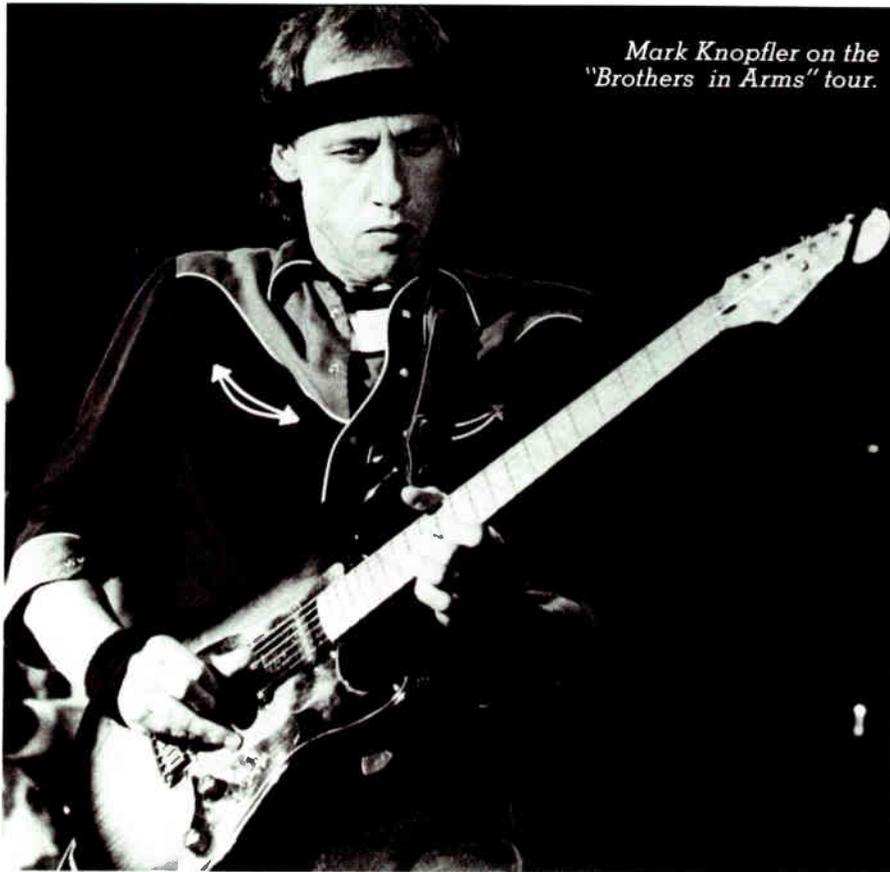
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SOUND ON STAGE



Mark Knopfler on the "Brothers in Arms" tour.

PHOTO: CHRIS WALTER/PHOTOFEATURES

Dire Straits Sultans of Sound

One of the most amazing success stories of 1985 must surely be Dire Straits' ascension to the top of the charts after years of only critical and cult popularity. "Money for Nothing," Mark Knopfler's biting lampoon of the prevailing rock video culture, helped bring the band to the masses for the first time since "Sultans of Swing" (ironically, it was the group's big MTV breakthrough, too) but the album was an across-the-board hit on FM radio, also, and Dire Straits' 50-date American tour cemented their position as one of the most inspiring aggregates in pop. By contemporary touring standards, Dire Straits travel lightly. Their music relies more on the subtle interplay between band members than high volume and visual trickery. The past year found the band playing in a wide variety of venues, ranging from relatively intimate halls such as the Tennessee Performing Arts Center in Nashville (2,400 seats) and

Atlanta's magnificent Fox Theater (4,500 seats) to countless civic auditoriums (most 8,000 to 15,000 seats) and one-of-a-kind concert sites like Red Rocks amphitheater in Colorado and Radio City Music Hall in New York City. So a flexible sound system was a must for the band.

The British group utilized three companies to assemble their tour gear—Delicate Productions of Camarillo, California, Concert Sound Ltd. of London, and Audio Support of Irvington, NY, (who supplied the Meyer Sound Labs speakers). A seven-person sound crew followed the tour: Peter Granger was house engineer; Adrian Fitzpatrick was monitor mixer; and Robert Collins, Steve Nenezia, Steve Dabbs, Bobby Daniels and John Doerschuk worked as engineering assistants in various capacities.

The equipment specifications for Dire Straits' "Brothers in Arms" tour were as follows:

Loudspeakers: 48 Martin 2 x 15-inch, 24 Martin 2 x 12-inch, 48 Renkus 2-inch, 48 Emilar 1-inch extended frequency, 14 Meyer MSL-3 (vocal system).
Monitors: 22 Martin LE-200 and LE-200A.

Power amps: AB1200, Carver PM 1.5, BGW 750; total power: 60 kilowatts.

Consoles: Midas Pro 40s (main and monitor).

Crossovers: Brooke-Siren MCS & FDS, Meyer M-3.

Processing: Lexicon 224, Lexicon Super Prime Time, Klark Teknik DN-780, Eventide Harmonizer, Klark Teknik EQs, Ashly parametrics, Orban parametrics, dbx 900 series.

• • •

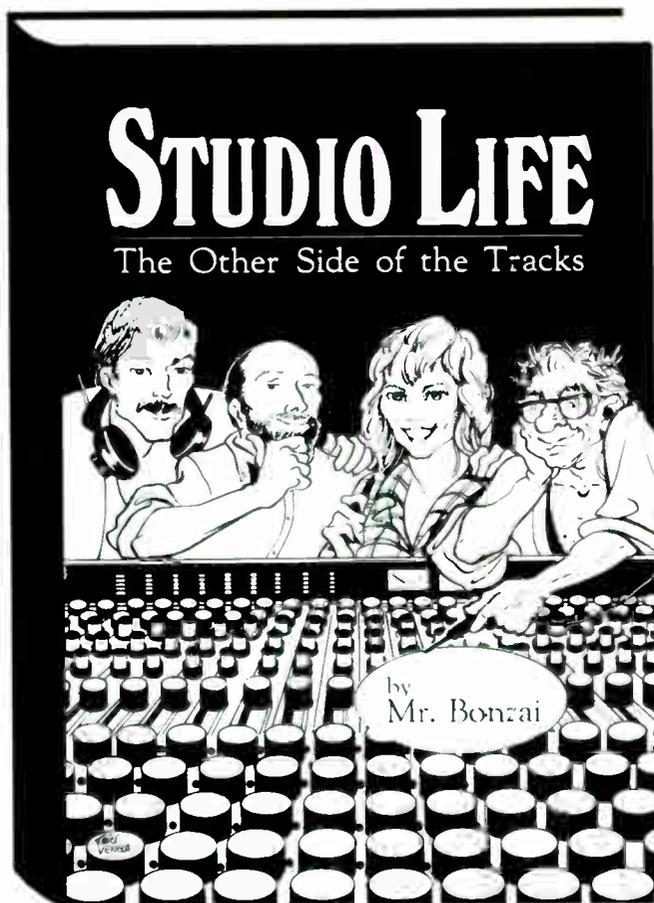
Tallahassee's New Entertainment Complex

Most of Florida is enjoying an unprecedented economic boom these days, as the population shift from the industrial northeast to the sun belt continues, and northern businesses by the score search for inexpensive real estate and a cheaper labor force. The music business continues to thrive, too, with studios reporting strong business and new live music venues springing up all the time. One of the most interesting new additions to the Florida music scene is The Musical Moon, a beautiful showcase club that opened in the state capital, Tallahassee, in late April.

The Musical Moon is a classic example of how an ingenious developer can take an ordinary building and turn it into an extraordinary place to see and hear live music. Just a year ago, the site was a cavernous A&P supermarket, but owners/developers Grant Peeples and Scott Carswell constructed some attractive arch structures around the once-bland facade, and of course the inside of the store was completely gutted and re-built into a split level entertainment complex that includes the multi-tiered club and an additional downstairs bar called the Silver Moon Lounge. In all, Peeples and Carswell spent about \$2.5 million on the club, which was described by one Florida writer as "a jewelbox setting for party-goers, a place that makes you feel like you're inside a rock video."

So far Musical Moon has favored an eclectic booking policy, snaring such diverse headliners as country singer

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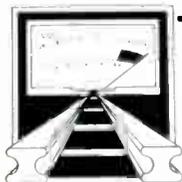
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MUSIC NOTES



PHOTO: COLM HENRY

Tom Waits Takes On New York

by Rip Rense

Every few years or so, Tom Waits has a baby and an album. Or rather, his wife has a baby, and Tom has an album. In 1983, it was *Swordfishtrombones* and a little girl. Now it's *Rain Dogs* and a large boy.

(It can be reported here that father, baby, and album are all doing fine.)

Rain Dogs, Waits' tenth LP, also entered the world with a large presence. There are *nineteen* tracks on it. The vision is sweeping and varied. It's an

extension of Waits' past work, notably the experimental textures of *Swordfishtrombones*, but it is different—maybe just fuller and warmer. There are guitars this time to go with the delightfully preposterous orchestration (bowed saws, violins, horns, lujon, paradise drums, trombones, among other things), including the sinewy guitar of Keith Richards.

Critics are calling it Waits' best; an artistic breakthrough and all that second-guessing kind of stuff. They're calling it the missing link between Captain Beefheart and Dr. John, which does not really do justice to Waits, the doctor, or the captain. The album is a collection of sound-sculptures, word-sketches of disenfranchised souls and some nice tunes. There is some fairly scalding rock and

roll on it, and there are some unabashedly melodic ballads. Some of it is poetry, some of it is hilarity. The imagery is abstract and sentimental, quiet and raving, and as absurdly juxtaposed as vagrants on Madison Avenue.

No, Waits' voice has not changed. It's still a stable marriage of rasp and growl, with occasional affairs with howl and whisper. But Waits has changed a lot since the days of *Small Change*, his rich, poignant, bawdy and sorrowful breakthrough of 1975—or even since his smooth, Academy Award-nominated soundtrack from *One From the Heart*. He can still write that way, crafting stylized songs and stories, but he's listening to his own inner workings these days. As he said about *Swordfishtrombones*:

"I tried to listen to the noise in my head and invent some junkyard orchestral deviation—a mutant apparatus to drive this noise into a 'wreck collection.'"

Waits used anything necessary to achieve this on *Swordfishtrombones*, and he continues the tradition on *Rain Dogs*. This is not a slickly produced state-of-the-shrink-wrapped art work. Waits produced *Rain Dogs* himself, cajoling musicians and engineers into realizing the sounds he imagined. It's challenging to listen to.

Which is to say, if you like Howlin' Wolf, Kurt Weill (Waits recorded his "What Keeps Mankind Alive" for a new Weill tribute album on A & M), Bertolt Brecht, Stravinsky, Raymond Chandler, the Rolling Stones, Big Mama Thornton, Hound Dog Taylor, Jack Kerouac, Harry Partch, and *Wheel of Fortune*, you'll probably enjoy this record.

Waits lives in New York these days. He left L.A. a few years ago to find stimulus and inspiration enough to write a play/musical called *Frank's Wild Years* (based on the *recitativ* from *Swordfishtrombones*) with his wife, Kathleen Brennan.

We find Tom at home early on a Sunday morning at the in-laws' house in New Jersey, contentedly sipping beer fresh from a stream that flows through the estate...

Mix: 'Morning, Tom. Get you up?

Waits: (coughing) No, just got back from church. Played a little golf this morning. I like to get in about nine holes before breakfast. And then we went out to the track, and then to early services. Let me get my spikes off here...and my prayer robe. Well, let's see... Where should we begin?

Mix: With the new record. The previous album, *Swordfishtrombones*, was a real departure for you. Much more abstract, compared to earlier work. The new album continues that, but feels warmer...

Waits: It's more of an extension of *Swordfishtrombones*. A little more developed, and with a more ethnic feeling. "Singapore," "Rain Dogs," "Gun Street Girl"—it's kind of an interaction between Appalachia and Nigeria. So, I think it's more affirmative; stronger for me. Seeds for it were all there in the last record, I think.

I was working with textures, really. The main thing I found out working in studios, and with engineers, is that a lot of things can really be obtained later on in the recording process. I'm one of those guys who likes to get it now. If you're looking for a certain sound or a certain color, it feels like it belongs to you more if you killed it and ate it—rather than purchased it and pulled it out of a box. There's so much you can do in a studio nowadays, it makes a lot of that very organic process unnecessary. But I still feel compelled to go through the whole ritual of banging on things in a room until you hear the sound you want—even if it means hitting a chest of drawers in a bathroom with a very large stick. Then the sound becomes your own rather than something you can obtain for a nominal service charge.

Mix: Is there a unifying theme on *Rain Dogs*?

Waits: I tried to make everything hang together in some way. I think that if there is any corporeal union there, it is that everybody is held together by pain and discomfort.

Mix: "Everybody" being the characters in the songs?

Waits: Yeah. In New York, you see all these dogs out on the street looking lost. They kind of look up at you like "scuse me, sir, can you uh... [deep voice] can you help me?" Cause the rain washed away all the scents; the way they got wherever they got. So they can't find their way back home. Most of the people in the stories are people who made a turn here, made a turn there; went through a door and somebody picked 'em up and they went down the road. Before they knew it, they were lost...

"Singapore" is like that. Richard Burton is in uh, Taiwan. So I tried to keep it knit together in that manner. They all share something. Especially in trying to put 19 songs together. Find a tray big enough to put 'em all on.

Mix: Why 19 songs?

Waits: I figured it would just be a question of natural selection, and the ones that weren't strong enough wouldn't

make it. But everything seemed to be able to get through the cut. And mastering it, well, the engineer said we can get it all on there, if you want. So I said, "do it."

Mix: "Tango Till They're Sore"—you've got to explain this one to me, Tom. The images are, uh, what do rock critics say? *Evocative!* "Let me fall out of a window with confetti in my hair"?

Waits: It's really like a German somewhere between Berlin and New Orleans, I guess. It deals with the Great Beyond and all that. It's pretty simple. I had a friend who had fallen out of a window a couple years ago. Sent me a letter, saying "May you always have confetti in your hair." It's like a toast, you know, "here's champagne for my real friends, and here's real pain for my sham friends." So it's kind of a little dance; the last fling before going over the edge of the cliff. Just a guy getting all his affairs in order before he goes to the boneyard. His last wish was "let me fall out of a window with confetti in my hair." I was trying to make it like, uh, Marlene Dietrich in bed with the king of the kitchen knife guitar...

Mix: *Rain Dogs* feels like your impressions of New York. It's real busy, compared with *Swordfishtrombones*, which was recorded in L.A. Is most of the imagery inspired by New York?

Waits: The album is kind of my impression of a lot of things that have happened to me since I moved to New York. In that sense, there are places in the record that come from just that; just being here. Particularly in the summer in New York, where half of the city sleeps outdoors in a doorway, and so many of them are completely deranged. It really does take on a rather surreal quality.

Mix: There's one song, "9th and Hennepin," which is a corner in Minneapolis, last I looked...

Waits: That street corner lingers. I'd say the corner is like Minneapolis, but the story and events are New York. I really like the sound of 9th and Hennepin. I like the word *Hennepin*. But the story is really more Washington and Horatio, which is a dark little neighborhood in lower Manhattan between Canal and 14th. Where it gets like, well, it gets like a sado-masochistic version of Porgy and Bess. Big red Cadillacs and enormous black guys with their shirts off and all these very dark and terrible wharf bars. They're lost; everybody's lost.

Mix: You had some trouble getting used to things there, then? Living in L.A. is a different kind of surreal.

Waits: Just to walk out to get coffee became kind of a real experience. It's difficult. It's real hard to live back here with a family. Manhattan is like living

inside of an engine. Actually, I came here for the quiet. I was misinformed.

Mix: Didn't I tell you that?

Waits: I think it was you. I told you I was looking for some place to get away, some place where a man can live his life full measure, where you can raise a family, smell the roses, and you said Manhattan.

Mix: It was quiet when I was there.

Waits: We've moved nine times since we got here. You have to keep moving. They keep pulling things out from under you. It's like an emergency ward, the whole city. The very things that you end up complaining about are the same things you enjoy, in a way. Musically, there's a lot. I like hearing music through the walls, you know, and you definitely hear that. Little Spain, Little Italy, Chinatown, Russian cab drivers... the whole thing is a real junkheap of humanity.

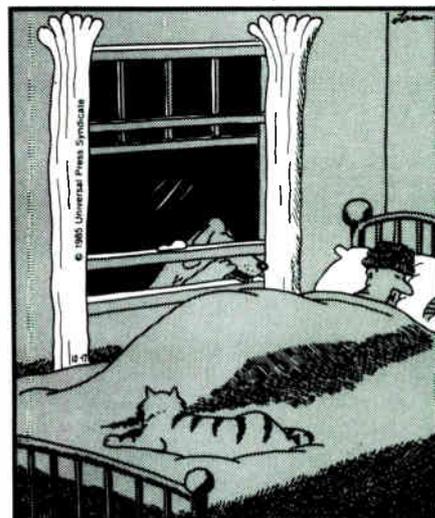
Mix: As inspiring as it is annoying...

Waits: The whole city is... like your bathroom. People have to get so crowded in together that they erect invisible walls, and only they know that they're there. You come out of your door, and a guy literally falls into you, having a stroke. A guy a block away is going to the bathroom, screaming at his mother out the window. A woman wearing nothing but a blanket, bald as an egg, is singing "Strangers in the Night" in the middle of 14th Street.

It stimulates your dreams. Your waking dreams. The contrasts are so devastating; the juxtaposition of things, in terms of fabric, economy, color, tragedy and comedy—all crying in the same beer. It really gets very direct. So you either accept it or... Well, first, it drives you crazy, and you try to retain what you had when you came here. Pretty

THE FAR SIDE

By GARY LARSON



"Puuuuut the caaaaat ouuuuuuuuu... Puuuuuut the caaaaat ouuuuuuuuu..."



PHOTO: ANTON CORBIJN

soon it's like rain dogs—you end up having to get some on you, in order to survive here. You end up having to laugh at things that appalled you when you first arrived. You have to check something at the door. You put all your things in a little plastic bag, you know, and they keep it for you.

At the same time, the city is disintegrating before your eyes, and the other half is being designed. Some of that I tried to get in the record.

Mix: The atmosphere is dream-like. Seems like you were looking around with one eye wide awake and the other asleep.

Waits: It's like when you take a train to Philadelphia. Sometimes, you look out the window, and you feel Manhattan leaving you; going away from it, you feel the pull of it start to dissipate. You see places in it from the safety of a train, with your newspaper, and your coffee, and warm yellow windows, and you look into the city... It's more like a guy on a train dreaming. In the end, he says, "I've seen it all from the yellow windows of the evening train."

Mix: I know you like the Stones, but how did Keith Richards wind up on the record?

Waits: Well, I had a couple of songs I thought he'd like. They were kind of inspired by him. So... animal-like, I found myself thinking about him, and I would identify certain songs for a long time as Keith Richards-style things. I would just write that in the song list, so I knew which one it was. Just kind of jokingly, we would be running through one of them and would get to a certain point, and I would say "Take it, Keith"... Finally I said, 'well why don't I just try, on a lark, give him a call, and see what happens.' I didn't know where he was or what he was doing or anything. Just took a shot. It so happened he was on his way to New York to work with the Stones on an overdub for a record they're working on. And he's here. And it happened.

He came down and we played until about four in the morning. Went through a bottle of Rebel Yell. Sour mash. Lighter fluid. He's something. He has a *guitar valet* named Alan Rogan, and it's unbelievable. Goes everywhere with him. Like a twisted version of "Arthur." It's quite something to behold. It was really a great experience for me. He played on three things: "Union Square," "Blind Love," and "Black Mariah." I had him in mind for "Black Mariah."

Mix: Which has nothing to do with poker...

Waits: It's more like, well, there's a lot of different stories, but a Mariah is a paddy wagon—also a hearse. There was a woman in New Orleans known as Big Black Mariah, and she ran a cat house. When the cops would come, it was her that blew the whistle, so people said, and she was getting paid off on both sides. After that, any time the cops were coming, people would say it was the Big Black Mariah, and then down through the years it became a hearse. When the grim reaper was on his way. *Like a rag out in the wind.* Most of the references in the song have to do with dying. *He's got to do the story with the old widow Jones.* Rag in the wind—that's like hanging from a rope. Do the story with the widow Jones—that's laying down for death...

Mix: "Blind Love." Do we have country-and-western here, Tom?

Waits: I'm afraid so. I don't think it could be confused with anything else. I tried to get it to have some of that roadhouse feel. It's not Nashville or anything.

Mix: You moved to New York to work on the stage play/musical, *Frank's Wild Years*. You and Kathleen finished it, and it's going to open in Chicago next summer. That's all I know about it.

Waits: It's a play with a story. I would like to think of it as conventional, only I don't feel any rapport with *The Music Man* or *My Fair Lady* or any of the real tragic American light opera, and I don't want to end up being involved in something that makes me weep. In a sense, it deals with the crumbling dreams of a despondent and hopeful American from a small town—a place called Rainville. Somebody shot the "G" off the population sign with a 20-gauge, and it's been Rainville ever since; they even changed it in the Hall of Records.

It's what happens to Frank after he leaves... He goes to Las Vegas, tries to make a big splash as an accordion player-entertainer, ends up in a downward spiral until he is despondent, penniless, and he dreams his way back home.

It's kind of a cross between *Eraserhead* and *It's a Wonderful Life*. He goes into a trance, and wakes up in the bar he used to call home. And then he relives the tragic last ten years of his odyssey, and his friends re-live it with him. I'm gonna play Frank. And we need a dwarf bartender.

Mix: Anything else you want to say about it?

Waits: It's got music and girls and it's coming to a theater near you. ■

—MORE NOTES ON PAGE 130

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—FROM PAGE 128

Robby Krieger's "Noisuf"

by Rip Rense

Not since Wilt Chamberlain tried boxing, or Eldridge Cleaver designed men's clothes, or Linda Ronstadt sang opera, has there been such a dramatic career re-direction.

Robby Krieger is playing jazz.

Okay, well, it's not *that* dramatic.

And the ex-Doors guitarist: is not *exactly* playing jazz. He's not *exactly* playing rock, either—and he's not playing fusion.

"We call it, 'noisuf,'" Krieger explained (or didn't explain).

"Well, it's 'fusion' spelled backwards."

Ah, that explains it.

"Fusion is rock music played by jazz musicians. Noisuf is jazz music played by rock musicians."

Yeah. Anyway, it's all part of a natural growth, he says, part of "getting a little more outside," meaning "away from pentatonic Chuck Berryism that most rock guitarists are tied up by," and more into, well, *noisuf*. He's taken a few friends with him: ex-Mother (and Grandmother) Don Preston (keyboards), Zappa alumnus Arthur Barrow (bass), and drummer Bruce Gary (Jack Bruce Band, The Knack).

The first LP, a live show of works by Krieger, Preston, and Barrow, is *Robby Krieger*—and it is one of the first releases by Cafe Records, Mobile Fidelity Sound Lab's new label exclusively for new music.

"I wouldn't call it pure jazz," Krieger

said from his long-time Benedict Canyon home, a hop and a skip from the Sunset Strip where he played with the Doors so long ago. "Usually you have what you call fusion, which is jazz musicians playing rock—or trying to play rock. Not very often is it the other way around. That's what we're doing, and it comes out a little different."

Jazz purists would probably consider Krieger's background a negative. Yet those who have not heard him since the days of his dreamy, disfigured Doors solos, will be surprised. The man is no slouch. His stuff wouldn't raise an eyebrow at KKKGO. He can noodle-out prettily effectively.

"Some might consider it a handicap, but on the other hand, rock musicians are thought to have more of a soul; more feeling and spontaneity as far as *their* material is concerned," he said. "When jazz musicians try to play rock, it always sounds... stiff. Too slick, almost."

"I think it might be more accessible to the rock and roll listener, to listen to *noisuf*. You know, if they want to get into jazz, try this."

This is not Krieger's first sojourn into jazz. He's been playing around L.A. for years, frequently leaning away from rock and roll. He released an album, *Robby Krieger & Friends*, a couple of years ago for Blue Note. (One of the "friends" was drummer Gary.) He played with Preston in L.A. clubs for years. Barrow was a friend of Preston's. There were short tours and studio work (one of the weirder jobs was playing with Barrow on the *Willio and Thillio* album with Clarence McDonald, the voice of Donald Duck).

The new LP was recorded live at the Variety Arts Theater in downtown L.A.

Krieger produced the session, which was engineered by Mike Smith and recorded using the proprietary MS microphone technique, which ensures a three-dimensional sonic effect. The music—whether reflective, frenzied, or funky—feels warm. Warmer, perhaps, than a lot of jazz, and a lot of fusion. Krieger's sound is recognizable from his Doors work, but cleaner, busier, and prettier. (He uses a Gibson 355 mono guitar, a Ramirez Flamenco guitar, and Fender Twin Reverb amplifiers.)

"I've just technically gotten better; faster. That's the only change or evolution. I never really listen to anybody, to copy them. I listened to Alan Holdsworth for awhile—you know, the English guitarist who is incredibly fast with the wah-wah pedal. But I got tired of him. Other than that, nobody new. Oh, there's that guy who plays with his right hand *tapping* on the strings. Can't think of his name. Listened to him, but he kind of leaves me cold."

His source of inspiration remains himself, and certainly his past. Soft-spoken Krieger is 39 now. Yes, he still sees ex-Doors John Densmore and Ray Manzarek. They're good friends, and still knee-deep in leftover Doors business. Krieger and the others will be consulting on an upcoming Doors movie bio produced by Bill Graham—trying, in Krieger's words, "to keep the lid on it; trying to make it so it's not hokey."

The resurgence of Doors popularity in the '70s and '80s didn't take him by shock. Krieger's voice took on a slightly cosmic tone:

"It didn't just happen all at once, you know. It sort of never went away. A couple of things happened: *Apocalypse Now* and the book, *No One Here Gets Out Alive*, but the point is, they never stopped playing the records on the radio."

And how does the new venture into *noisuf* stack up against the fabled old days?

"Oh, I miss the old days quite a bit, but there's a lot of things I don't miss," said Krieger. "I don't dwell on it." ■

Jeff Berlin

The Power of Notes

by Robin Tolleson

"If you play rock and roll, you're playing notes like in any other kind of music," says Jeff Berlin, "but it's the *sensation* of rock and roll—it's the concept of guitar *sounds*, that is your main direction. What I come from first is the notes aspect, so I understand the power of notes and theory and harmony. When I get into the mental attitude of a good rock band—that emotional outpouring

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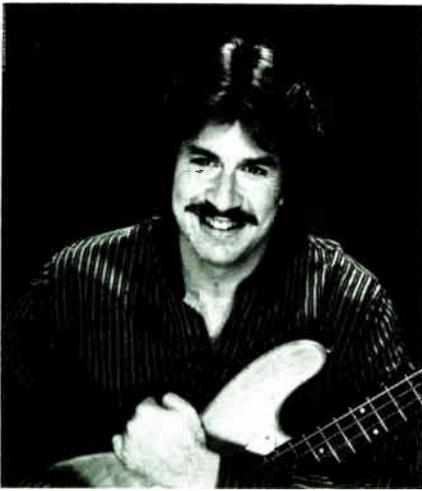


PHOTO: KRISTEN DAHLIN

of feeling—I've got a lot more guns to make sound."

The mustachioed 32-year-old bassist has put in flight time with trend-setting drummer Bill Bruford, guitar stylist Allan Holdsworth, keyboard/guitar whiz David Sancious, Toots Thielemans, Ray Barretto and Gil Goldstein, among others. The recently released *Champion*, his first solo album, was produced by guitar ace Ronnie Montrose, and features drummers Steve Smith (Journey, Jean-Luc Ponty) and Neal Peart (Rush). Not surprisingly, Berlin considers this album his definitive rock statement. Journey's Neal Schon tears out some lead guitar on "Subway Blues," and keyboardist T Lavitz, formerly of The Dregs, turns in one of his finest outings to date, particularly on "Three Nighter." Recorded at The Music Annex in Menlo Park, CA, *Champion* features six Jeff Berlin compositions, a Cannonball Adderly tune, and "Dixie."

Berlin's father was an opera singer, his mother a pianist, and he studied classical violin from an early age, getting his fundamental education in music that way. It made his switch to electric bass, done completely on his own, that much easier. "It wasn't difficult to teach myself the bass clef because I read the treble clef so well," he says. "It was the music that came first, so I just applied my music to the bass. People may just get a guitar and get guitar sounds, and that's valid to a point, but the real successful musicians have started out with a note-oriented concept and developed the concept of the notes on the instrument."

The bassist attended the Berklee School of Music in Boston for three semesters, adding to his harmonic sense, but he was frustrated by what he calls a "bad Boston jazz attitude." Instructors insisted he play acoustic bass, he refused, stuck to the electric and didn't stay at the school to get a degree. Today, Berlin teaches a couple days a week at the Bass Institute of Technology in Los Angeles, a school that welcomes

electric players, he says.

"I want to do a rock band, an out-and-out heavy rock group," Berlin half-shouts, "because I like rock as a feel, although musically sometimes it doesn't quite get to me. I also want to do more jazz, because jazz is the most singularly challenging and instantaneously rewarding music that I can think of. The idea of instantly creating lines, melodies and chord sounds is thrilling. And it always changes."

One of the bassist's major solo statements on *Champion* comes during "20,000 Prayers," and it's one that will definitely make listeners take notice. "I like to solo, and I practice soloing at home," Berlin says. "I'm getting better at it all the time, getting more mature with it. But I didn't want to make a record that was bass from start to finish."

The solo is so coherent that it sounds like it's written out. Berlin says he frowns on that practice, however. "I just practice my part. I practiced the dickens out of those chord changes on '20,000' for a long time so I could get ready—so that when I went in and finally had to do my solo I was going to be ready to really level. I knew the changes so well that I could play them and really get inside my instrument and just get out the best lines that I could. I just solo, and when it sounds good I say, 'That's it.'"

He did have to work out part of his "Dixie" solo on *Champion*. "I heard that Chet Atkins and Johnny Winter used to play 'Dixie' and 'Yankee Doodle' at the same time on their guitars. I never could find the record, so I said, 'Well, let me see what it sounds like on the bass.' I had to force my brain to hear two melodies, and I just went half-inch by half-inch until I finally finished it. I practiced it until I could simply do it at any tempo." Berlin's "Dixie" is a multi-timbral effort, full of sound and texture. It's done completely live, with no overdubs, and is as impressive as anything recorded with a bass since Jaco Pastorius did "Donna Lee" on his 1976 debut. "I've investigated other possibilities on my bass," says Berlin. "If a piano player can play chords, why can't I?"

"Motherlode" is another somewhat deceiving two-handed chordal effort on *Champion*. "It sounds like a guitar, but it's bass, and it sounds like five notes," the player explains. "I never knew a bass to play quite like that. It's not that it's so ridiculously innovative. Right now I'm probably the best chordal bass player around, but the whole thing about young people that listen to music is that in a year or two I probably won't be anymore. Young people who listen to records benefit immediately from all the years it took a musician to get the way that they got." Berlin gets a kick out of the Boris Beckers of Bass who are out there eating up *Champion* at this very

moment. "I had that album out for two weeks and some guy came up to me and played 'Dixie.' He said, 'I want to show you something,' and he played it. There are too many young, great players around," he laughs.

Berlin's tenure with Bill Bruford (1977-1980) gave him some of his widest exposure, beginning on Bruford's *Feels Good to Me* after a good word was put in about the bassist by keyboard player Patrick Moraz. Berlin wowed audiences in large clubs across the U.S. and Europe, going on to record *One of a Kind*, *The Bruford Tapes*, and *Gradually Going Tornado* with the drummer. He was also in on the composing of several Bruford staples, including "Five G," "The Sliding Floor," and "Joe Frazier," a tune the avid boxing fan wrote during the Thrilla in Manila.

When Bruford quit his own group to go back to help re-form King Crimson, Berlin went along to try things out. But he didn't mesh with Crimson, a band already quite busy in its guitar section. "I was the wrongest guy in the world for that band, and Robert [Fripp] and I knew it instantly. He wanted a bass player who just played simple, functional bottom. I can do that and enjoy doing it if I'm hired as a sideman to do it. But in a band I would prefer not to play that way. A band is a place where you should play what you want to play."

Berlin's bass is custom-made, a '62 Fender Jazz neck on a '67 Precision body. He, his family and friends know it as "The Blonde." Berlin owns up to being "pretty ignorant" about effects, but says a tour with Allan Holdsworth and his rig the size of a middle linebacker in 1983 (following the *Road Games* LP) opened his eyes a bit. "I use some chorusing and some analog delay for certain things," says the bassist, "but I would like to increase my effects concept. I have to keep looking. That's kind of fun." Carl Thompson bass strings, Bartolini pickups, Yamaha amps and 15-inch speakers, and the Badass Bass Bridge by Leo Quan complete Berlin's current setup.

The native of Great Neck, NY, says his major influences on bass include Jack Bruce, Francis Rocco Prestia (Tower of Power), Bobby Vega (Sly and the Family Stone), and Paul McCartney. Rush's Geddy Lee and Jack Blades of Night Ranger ("one of the United States' best funk bass players, and nobody knows it") are also taking a more note-oriented approach to the instrument these days, according to Berlin. Although he admits to being influenced by these players, Berlin has always made a conscious effort to not sound like anyone else.

"When strong musicians come along, it's an easy thing for someone of that instrument to sound like them," he says.

"The problem with that is that it stops you dead in your tracks. An individual never has a chance to explore his own possibilities. So when fretless bass became popular, when the Alembic bass became popular, I just turned and ran from that, and said whatever anybody else does on bass I'm going to try not to do." ■

From Player to Producer:

David Hungate Steps Through the Glass

by Linda Johnson

Dad always wanted him to be a saxophone player, but no—instead he picked up the bass, dropped out of college, ran off to tour with Sonny and Cher, and later joined one of those rock groups (Toto, wasn't it?). And recently, he produced Chet Atkins, of all people.

So maybe Dad was wrong.

Indeed, bassist David Hungate has become extremely successful since he went against his father's wishes and left behind his hometown of Troy, Missouri,

for bigger and better things in Los Angeles. He has, so to speak, been there and back, having spent 15 years as a session player recording and touring with the likes of Boz Scaggs, Ronnie Milsap, Crystal Gayle, Olivia Newton-John, and Diana Ross—not to mention four years as a member of Toto—before moving back to Tennessee with his wife and two sons to try his hand as a producer.

Toto would be many musicians' dream gig. The band was formed by session aces as an outlet for their own material, and throughout Hungate's tenure they continued to balance their own recording and touring with work backing artists in a variety of styles. "Fame is a pain in the ass," says Hungate. "I was always happier being a session player than doing the road thing. Being in a band is hard, no matter how good they are, because it's so structured, and coming from a diverse musical background, I eventually found it frustrating."

Hungate continued his work as a session player after leaving Toto, and now, with experience in country, jazz, pop and rock, he has collected enough know-how to give life on the other side of the studio glass a serious try. "My background definitely helps in produc-

ing," he says. "I've always been a fan of a lot of different kinds of music. I like it all when it's good, and if you know what any style of music should sound like when it's being done well, it is a definite advantage."

Although he is happy with his first two productions in Nashville—Chet Atkins and the group Atlanta—Hungate is hesitant to discuss his methods. "At this point, I don't feel qualified to pronounce on what it is to be a producer," he says, "because I'm still experimenting."

Well, then, how has it affected him as a player?

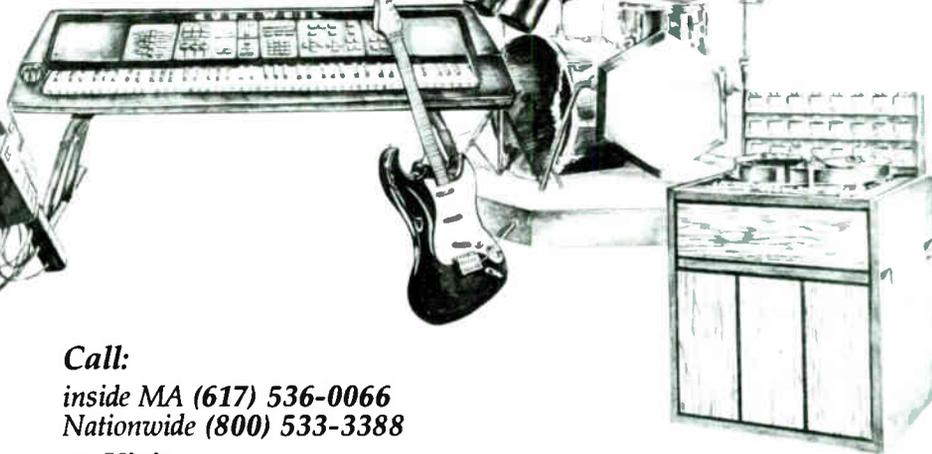
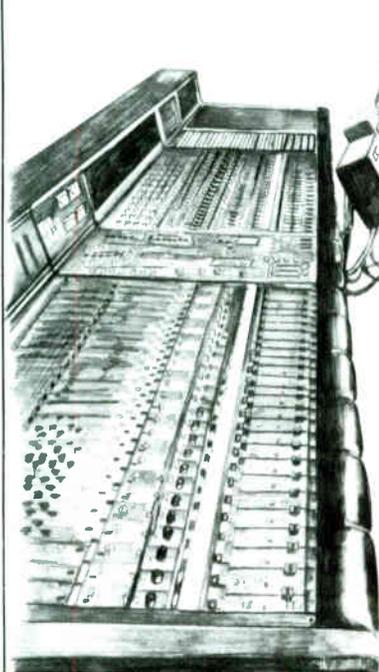
"It's made me more considerate, because for the first time I understand the full extent of the responsibility that's on a producer's shoulders. As studio players, Toto was outrageous. We could get away with just about everything. We did some self-indulgent things—mooned artists, set the drums on fire, stuff like that—which was fun. But I realize now how crazy it all was.

"One of the main differences between my viewpoint and that of a lot of producers is that I have been in sessions for the past 12 to 15 years—as a player—and I've seen all the great producers, from George Martin to Quincy Jones," says Hungate. "I've seen how they all work. I've seen both the right and wrong

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way to do it, and as a result, I've got a pretty good idea of what *not* to do. And that's exactly why I finally made the decision to get into production."

Farm Aid

A Rescue Effort for the American Dream

by Moira McCormick

It didn't make as much money as its organizers had hoped, but Farm Aid does appear to have fulfilled its potential as a consciousness raiser. The all-star country and rock and roll marathon, held September 22 in the Memorial Stadium at the University of Illinois in Champaign, was intended to alert non-rural America to the financial plight of America's family farmers. And if the \$10 million raised through pledges, ticket sales and merchandising was only a fifth of what co-organizer Willie Nelson had predicted, it's certain that previously unaware segments of the population were made to realize that an American way of life is in grave danger. (Incidentally, Nelson may yet see his \$50 million: the 1-800-FARMAID pledge number will remain in operation for a year.)

There are a number of possible reasons for the financial shortfall of Farm Aid. Perhaps the public doesn't view the farmers' plight with the same sense of urgency as it does the Ethiopian famine for which the immensely successful Live Aid concert was staged two months before. During the Live Aid telecast, harrowing images of starving people were shown repeatedly, giving donors a clear picture of their dollars' destination. Farm Aid's organizers, on the other hand, were unclear as to how the funds would be spent; they continually stressed that the publicity was more important than the money.

Another factor was that many areas of the country saw only three prime-time hours of Farm Aid on television. The Nashville Network's complete coverage was unavailable in non-cabled communities (a substantial portion of the country including such major cities as Chicago).

The show itself was worth much more than the \$17.50 admission. Individual performances ranged from above par to incendiary, with barely a ragged edge to be heard. Set changes were swift, thanks to the same 60-foot revolving stage used at Live Aid.

The 78,000 people in attendance, spirits undampened by the rain which fell from the 10 a.m. start until mid-afternoon, were treated to 14 hours of American music, from mainstream country to radical rock: Merle Haggard, Loretta

(L to R) David Allan Coe, B.B. King, Willie Nelson

Lynn, George Jones, Alabama, X, The Blasters, Lou Reed, Sammy Hagar with Eddie Van Halen (The boorish Hagar disqualified himself from the prime time telecast by mouthing non-stop obscenities, causing followup act Lone Justice to be left out as well.), John Cougar Mellencamp, Tom Petty, John Fogerty, Don Henley, Neil Young, Foreigner, Waylon Jennings, Johnny Cash, Dottie West, Willie Nelson, Kenny Rogers, Southern Pacific, Lacy J. Dalton, and many others.

Co-organizers Nelson, Mellencamp and Young were joined by Haggard to open the proceedings with Haggard's farm tribute, "Amber Waves of Grain." Nelson took the stage many more times during the course of the day. What the hell? It was his show.

As with Live Aid, interested groupings of performers provided frequent highlights. Bonnie Raitt and Rickie Lee Jones teamed up and raised goosebumps with John Prine's "Angel from Montgomery." Randy Newman joined Billy Joel and band onstage in a dual-piano setup. John Denver sang with the Nitty Gritty Dirt Band. Bob Dylan deliv-



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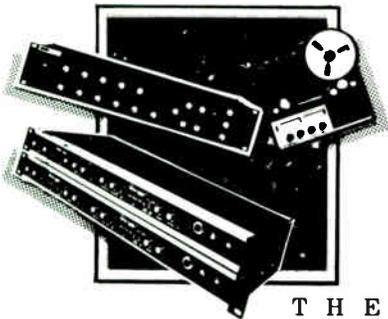


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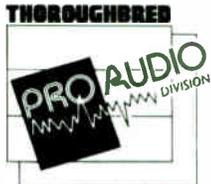
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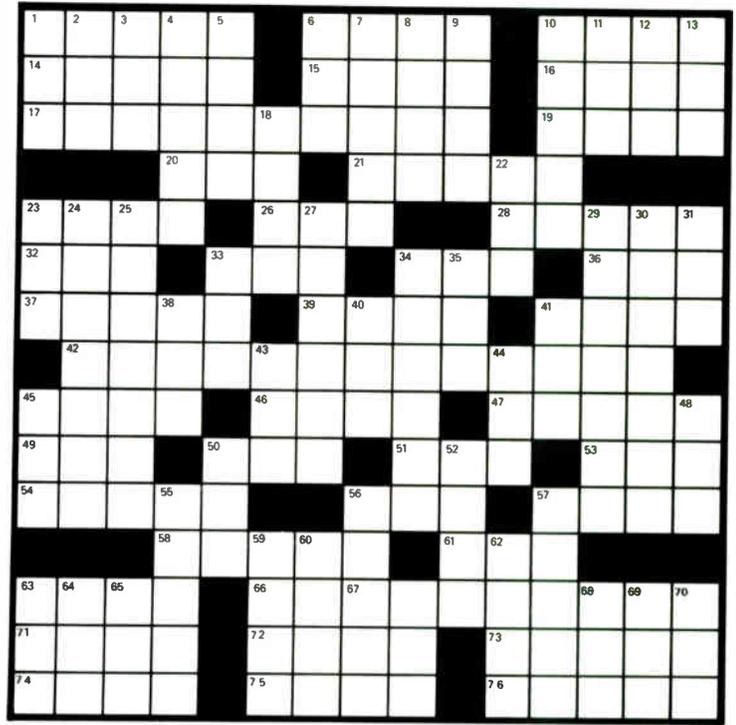
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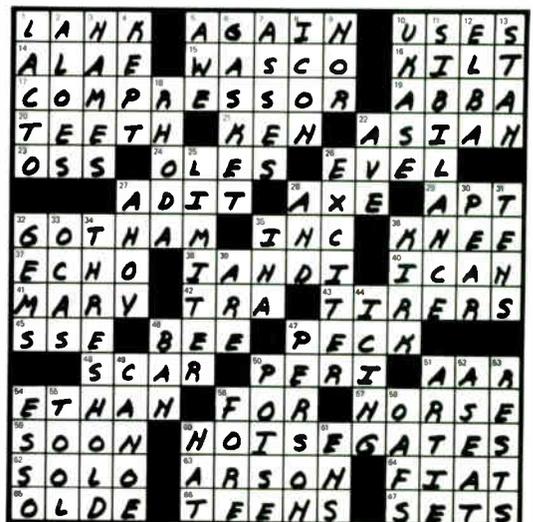
ACROSS

- Unit of capacitance
- Vent a tirade
- For now, still a studio necessity
- John Doe's significant other
- Seaweed or pond scum
- Fess Parker's hatchet man
- Unit of frequency
- Satirist Sahl
- Noise
- Eddie Haskell, e.g.
- Peak
- "Fire and _____" Benatar hit
- Critic's cliché
- Self, to Miss Piggy
- "_____ glance"
- Society's child
- Off-used initials
- Classifies; divides up
- Anna's adopted country
- Child's disdainful adjective
- Urgent matter to a maker of platters
- "This Masquerade" composer
- "Tonight Show" theme's composer
- Mrs. Meir
- Goof; slip up
- Self, to the rest of us
- Gymnast's friend on the floor
- Guitar adjunct
- German port
- Producer Garay
- Complimentary
- Do this to your hair but not to your kid brother
- Art-rock patriarch
- Word with Georgia or high
- Great name for a mastering engineer
- Reverb component
- Rhodes component
- Network announcer
- Ten to a customer, ideally
- "_____ take"
- Green card applicant

- Chinese calendar critter
- Looking-glass tripster of literature
- "Rite of Spring" composer, to pals
- "Life in the Fast _____"
- A good cigar and a place to smoke it
- Language-lesson word
- _____ diem
- Social training of a sort
- Zappa kid's middle name
- "_____ Tide"
- A popular studio item
- Trafficker in hoops and staves
- Hall of _____
- Pit boss' milieu
- Off-heard mispronunciation
- "Nobody _____ but..."
- _____ of the land
- Beast of burden, or a burdensome bloke
- Portuguese navigator

- Major British record label
- Seven-_____ split
- What you do to a pact in Tinseltown
- Chemical prefix
- Reagan's union
- NCO
- Pinky, Peggy or Bruce
- Imitate
- Chem. suffix
- Arabic letter
- Belief system
- Blood vessels
- Optician's adjective
- _____ Spumanti
- Playlet
- Vinous valley
- Vietnamese New Year
- Environment prefix
- Revolutionary hero of the '60s
- Princess and the _____
- Numerical prefix
- Lyrical poem
- Dutch, to some

SOLUTION TO NOVEMBER



DOWN

- _____ de lance
- Instrument (slang)
- Minister's abbrev.
- CRT element
- A good source of nutrition

Loretta Lynn, Merle Haggard

ered a raw, seething set backed by Tom Petty & the Heartbreakers, with Willie noobtrusively chiming in on guitar. Roger McGuinn performed "Turn, Turn, Turn" with Vern Gosdin. And Daryl Hall rendered killer versions of The Chilites' "Oh Girl," his own "Every Time You Go Away," and "Expressway to Your Heart" with musical support from Joel, Raitt, guitarist G.E. Smith of the Hall & Oates band, and bassist John Doe of X.

John Fogerty, appearing before a paying crowd for the first time in 13 years, sounded like he'd never left. Knocking off a swampy "Old Man Down the Road," sassy "Vanz Kant Danz," and an inexplicable (considering his wealth of new material) cover of "Knock on Wood," the former leader of Creedence Clearwater Revival received one of the biggest ovations of the day.

Not so well received was Joni Mitchell, who was placed next to last in the running order. Her impressionistic solo acoustic set was way too low-key for that point in the proceedings.

Throughout the day, performers were ushered into the media tent for brief press conferences. Most of the high-powered talent showed up, save for Dylan, Fogerty, Mitchell, and a few others. Illinois governor Jim Thompson, surreptitiously stumping for re-election, and Senator Tom Harkins of Iowa, plugging his controversial farm reform bill, also put in appearances.

David Allan Coe, as formidable-looking as ever, denounced the Federal Reserve Bank as the wellspring of the country's financial woes. X's Exene Cervenka, asked why her band supported the farmers, replied, "Because we eat, like everybody else." Tom Petty, monosyllabic and a little bit flaky, allowed as how he came from a farming family (as did a surprising number of the artists interviewed). Lou Reed said he became aware of the farmer's plight via a rural retreat he's owned for the last eight years and noted, "There's great power in rock and roll and country music, to unify people, to transcend politics. This is a human concern." And Neil Young, accompanied by a somber Timothy Hutton, surprised more than a few attendant journalists when he came out in favor of a strong national defense.

One of the day's more interesting comments was Daryl Hall's remark, "This is like a picnic—Live Aid was more like Nazis." Also noteworthy was John Fogerty's response to MTV's Mark Goodman, asking what Fogerty thought of Farm Aid's bringing country and rock and roll together: "I've never separated the two."

Probably the most memorable aspect of Farm Aid, for anyone who had access



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Neil Young

PHOTO: PAUL NAIKIN/PHOTO RESERVE, INC.

to the artists' trailer and tent area, was the concentration of legendary faces in one place. Exene was following other performers around with a video camera. There was a graying Arlo Guthrie, not performing but along for the ride, obliging a college DJ with a station ID. Dylan posed for pictures with B.B. King (who was just about the only black performer on the bill). Dylan, Petty and Reed chatted amongst themselves outside a trailer, while Daryl Hall and Joni Mitchell sat engrossed in a conversation a few yards away.

There was June Carter Cash bending over to tell daughter Carlene Carter an amusing story about Eddie Van Halen. Johnny Cash and Waylon Jennings strode by, looking the way legends ought to look. And Randy Newman paused on his way through a tent to

watch Neil Young and the International Harvesters on a TV monitor.

Flaws aside, Farm Aid was important, entertaining, and unforgettable. The public's been made aware of the farm problem; one can only hope the event's impact will continue. As David Allan Coe put it, "Ever since 'We Are the World,' the entertainment industry has realized that we have a lot of power if we band together for a cause. This is not 'the Woodstock of the '80s'—this is the American Dream come true." ■

The Hooters: from Lauper to "Zombies"

by Bruce C. Pilato

"'The Hooter' is the nickname we

gave to our Hohner Melodica," explains Eric Bazilian. "It's kind of a harmonica with a keyboard." The perky and piercing sound of the Melodica has become the trademark sound of the group fronted by guitarist/songwriter Bazilian, and his partner, keyboardist Rob Hyman, so it made sense to call it The Hooters.

While most of the records on the radio are showing off flashy arrangements, monster drum mixes, intense keyboards and digital sound sampling, The Hooters have decided to rock and roll in a more traditional way. Their first album is filled with '60s pop spirit, Beatlesque harmonies and a tasty blend of acoustic instruments, rounded off here and there with touches of reggae.

On the afternoon we spoke in New York City, Bazilian was laughing to himself, thinking about all the record companies (including Columbia, their current label) that turned The Hooters down and told them to change their name and/or make their music more modern, and in some cases even suggested they hang it up altogether. But Bazilian, Hyman, and manager Steve Mountain never gave in.

Their break came in 1984 when CBS staff producer Rick Chertoff, a close friend and musical collaborator, asked Bazilian and Hyman to help write and record an album with then-unknown Cyndi Lauper. The result was *She's So Unusual*, and the rest (as they say) is history.

The success of The Hooters' first album, *Nervous Night*, spearheaded by the single "All You Zombies" and bolstered by a tour opening for Don Henley, proves that The Hooters were right to stick to their guns. Radio and video have taken a liking to them, and Columbia Records is now firmly committed to them.

Hyman, Bazilian and Chertoff met at the University of Pennsylvania's Synthesizer lab nearly 13 years ago. They began writing songs together and formed a band called Wax, with Chertoff on drums. After leaving college, Chertoff landed an A&R gig at Arista Records, where he signed and produced Baby Grand—whose personnel included Bazilian, Hyman and Carmine Rojas (who has played bass with David Bowie, Mick Jagger, and John Waite). Baby Grand's two albums received favorable reviews but didn't sell well, and after Arista dropped them in 1980, the band broke up.

But Bazilian and Hyman stuck together; they had work to do. "The thing that made ending Baby Grand bearable," says Bazilian, "was that Rob and I started doing what we really wanted to do: play to real audiences of human beings and bring our music to people who cared about us." The band they formed was The Hooters.

There were some hairy times at first, but the group eventually fell into good,

Rob Hyman (L) and Eric Bazilian of The Hooters.

steady work and began building their audience in their hometown of Philadelphia and in other Northeastern cities. By 1983, says Bazilian, "We were drawing more people than ever, but we were burning out because there was no end in sight—there was no next step. Record companies weren't beating our doors down, and we didn't know where we were going to go from there. The next thing would have been fewer people coming, and that's what we wanted to avoid.

"We had to pull the plug for awhile and recharge our batteries. Things had gotten out of hand. Rob and I had lost control of ourselves as well as the band. When we stopped writing together, we knew it was time to do something." So, in a move that shocked the Philly music scene, Bazilian and Hyman broke up the band.

That's when the call came from Chertoff, who had moved from Arista to Columbia Records. Lennie Petze of sister label Epic/Portrait had asked Chertoff if he'd be interested in producing former Blue Angel vocalist Cyndi Lauper. After meeting her and hearing her sing,



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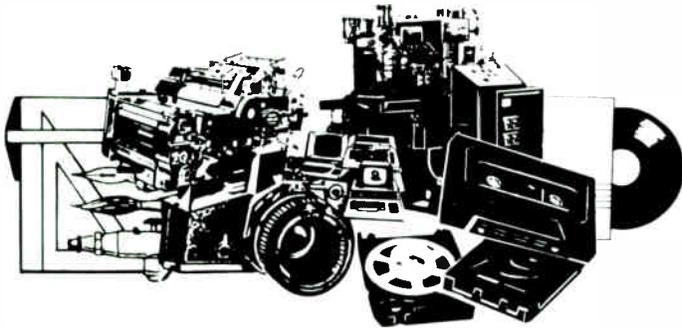
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Chertoff enthusiastically took on the project. And he knew just who he'd get to help him.

"Rick brought her to see us," Bazilian recalls, "and a few weeks later she came to Philly, and Rob and I—along with our keyboards, guitars, drum machines and my Portastudio—got together with Rick and started making demos, which eventually became the album.

"Rob and I arranged all the songs with Rick and Cyndi, and we played 90 percent of the instruments. After we cut the tracks with the Linn, Anton Fig came in and overdubbed live drums on some things. 'Girls Just Wanna Have Fun,' for instance, was just Linn kick and snare—no hi-hat—Roland 808 handclaps, and the room mikes of Anton's snare. Neil Jason played some bass on the album, and I played bass and Rob played a lot of synth bass."

Hyman and Lauper co-wrote "Time After Time," which earned a Grammy nomination for Song of the Year, and although Hyman and Bazilian received no other writing credits on the album, he claims their contributions were indeed very major. "It's a fine line between arranging and writing," Bazilian notes. "Take 'Girls,' for instance. We couldn't do it the way it was written. We tried and tried, and finally we said, 'Let's start over.' Cyndi tried to slow it down, and then I started playing this guitar riff, Rob started playing the keys, Cyndi started singing—and BOOM! It was this whole different song."

After *She's So Unusual* blasted into the charts, Lauper asked Hyman and Bazilian to join her backup band for what would become a solid year of touring. They declined. "We had The Hooters to do," says Bazilian. "We really wanted to do our band."

Hyman and Bazilian reunited with their original drummer, David Uoskkinen, and added guitarist John Lilley and bassist Rob Miller of Robert Hazard's Heroes. Shortly thereafter, Miller was nearly killed in a car crash. He has since recovered, but the band had no choice but to replace him with Andy King.

Despite Bazilian's and Hyman's success with Cyndi Lauper, the reconstituted Hooters didn't have much luck landing a record deal. So they decided to release their own album. *Amore* included several songs which were later re-recorded for *Nervous Night*. In six months, with only two radio stations playing it, the album sold 100,000 copies in the Philadelphia area alone.

Now there was no ignoring The Hooters. Many labels showed interest, but the logical move was to CBS, where they could be reunited with their friend and producer, Rick Chertoff. "The main reason we have him is that we trust him," Bazilian asserts.

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Steel the One:

Andy Narell

by Robin Tolleson

As steel drumming's best-known ambassador of jazz, Andy Narell seems to have no peer. And as he becomes more accessible to the country's mainstream through work on film and television soundtracks, his own records seem to be noticed more. His latest release, *Slow Motion*, is the most successful yet in bridging the gap between Caribbean, jazz, and rhythm and blues.

Narell's dad, Murray, a social worker on the Lower East Side of Manhattan, was looking for programs to get neighborhood kids interested in something. He found great success organizing steel drum bands, ran steel band festivals in New York, and made two lifelong converts to the pans in his young sons, Andy and Jeff. "My brother and I used to hang out and watch, and we got real interested," Narell says. "Then we got a few pans of our own and started playing, and got some friends interested and we started a band when we were little kids."

Narell began learning about the different kinds of pans in the "orchestra," and designing his own sound. "There are lead pans, which they call tenor pans in Trinidad," he explains. "Double tenors and double seconds, double guitars, triple guitars and triple cellos and a couple kind of quadrasonic pans, and tenor basses and low basses. Basically, it covers the whole range, with lots of variations. You can design any range you want, and if you can build it, you've got a new instrument.

"It's an orchestral art form," he con-

tinues. "They have the full range of soprano down to bass, with all kinds of instruments in between to cover all the ranges. Everybody looks at their particular needs, and innovation has been a big part of what's kept pan alive. There's always new stuff. It's not limited to one family of instruments that are locked in."

Apart from playing the pans, Narell plays piano and synthesizers, and drum set. He studied classical and jazz piano as a youngster, then majored in music at University of California at Berkeley. In fact, Narell earns a good chunk of his living as composer/arranger for hire. He's written music for Apple computer TV commercials, just completed work on an upcoming Jane Fonda Ca-

ribbean Workout video, and is currently working on music for the TV pilot *Geo*, based on the magazine of the same name.

The steel player did the score for Rob Nilsson's slice out of the lives of a couple of cab drivers, *Signal 7*, and is working on the same director's *On the Edge*. Narell has performed on the steel pans on such albums as Patti Labelle's *Tasty*, Manhattan Transfer's *Mecca for Moderns*, Greg Kihn's *Citizen Kihn*, and Aretha Franklin's *Who's Zoomin' Who*. He's contributed steel work to such film soundtracks as *Ghostbusters*, *Trading Places*, *48 Hours*, and played on the memorable break-dancing sequence in *Cocoon*.

—PAGE 142

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—FROM PAGE 141

Ellie Mannette built most of the instruments that Narell plays, including his soprano and tenor drums, and Narell refers to Mannette as a pivotal figure in the history of steel drum development. "He created the patterns and the styles of the instruments that I play. He's really the first guy to successfully tune steel pans to notes of the scale, and numerous other innovations that were really important with the development of each of the different instruments in the orchestra. And he's still among the elite handful of tuners that are the best in the world." Mannette, and the others of which Narell speaks, are from Trinidad, the Caribbean Island where steel playing originated.

Narell recorded his first album as leader, *Hidden Treasure*, for Inner City in 1979. Even then, the mainstays of the group were percussionist Kenneth Nash, and guitarist Steve Erquiaga, along with bassist Rich Girard. That band stayed together until last year, when Girard departed the group. "In a way, it was a highly unwieldy combination in that we were always trying to cover the area of the drums," Narell says. "And every tune was sort of, 'How are we going to deal with it this time?' The question of the traps. And when Rich left, I felt like in addition to replacing the bass player the chemistry of the band was going to change. I wanted to make that change. I wanted to get a drummer who had a good feel, was an excellent timekeeper and real fluid on the drumset, and free Kenneth up to play congas and percussion."

Last year saw the additions of Keith Jones on bass and William Kennedy, the band's first-ever full-time trap set drummer. Up until that time, Nash had incorporated elements of the trap set in with his percussion rig, and Narell had at times sat behind a kit. "In approaching William in the beginning, I saw that he didn't have to play a lot to make this stuff happen. He didn't have to play a lot of notes to have a really happening sound and feel. But he's also made a lot of specific accommodations to letting Kenneth [Nash] pursue the concept that he's had for five years. It's been interesting that way," the leader says, "real healthy. It's been a real good thing for everybody all around."

Wittingly or not, the additions of the nimble Jones and Kennedy on full-time kit give the Narell group a much more defined, grooving sound on *Slow Motion*, something the new breed of mellow R&B-jazz stations should be latching on to big time. "I felt like we were drifting towards stuff that was more rhythmically locked and funkier, and I wanted to do that. Both Keith and William have a strong background and strong feel in those directions," Narell

says. "Keith's a real rhythmic player."

On *Slow Motion*, Narell uses the pair of pans called double seconds quite a bit. He often overdubs another pair of double seconds, splitting the drums far left and right in the mix, and puts a lead (tenor) pan right in the middle. "The double seconds have a smooth attack, and I play them pretty light in the studio," Narell says. "I'll put a pair of matching condenser mikes, something like a 451 (AKG), real close to the instrument, right above it, and then just experiment and find different kinds of real smooth tube microphones higher up and farther away in the room, and blend that in."

Steel pans aren't the easiest instruments to record. "You have to somehow get right next to each note, and that's real difficult," Narell says. He has yet to find a suitable system of using pickups, and prefers to just spend the time finding a good blend of microphones to do the job. "Anything you do with microphones is not the same as the sound in the room just standing six feet away from it. With miking, I feel like you choose sounds. You choose a perspective. You go in there tight and you grab it and use that sound. Drum set miking is a similar kind of thing. You use very tight, intimate kind of miking, combined with more room ambient miking, and you try to put together a sound that way."

Basic tracks for *Slow Motion* were recorded at Fantasy Studios in Berkeley, in Studio C with Leslie Ann Jones engineering. Pan overdubs were done largely in Fantasy's B, with its hardwood floors and high ceilings. "They hadn't put in the new console yet," recalls Narell, "so we cut most of those tracks completely bypassing the console and just going through a Neve mixer with no EQ. We did a little minor EQ at the mix, but mostly we did microphone combinations." Narell worked with engineer Stephen Hart on the pan overdub sessions.

"I find the lead pan has a lot bigger dynamic range, and it's a lot spikier," says Narell. "And I have a lot of high frequency problems with condenser mikes. I keep them away. They tend to get real edgy and don't like the peaks. I usually stick a real big diaphragm kind of dynamic mike, like an RE-20 or something, right into the pan to get as much low frequency and punch as I can out of it. And then I'll use tube mikes in the room, again for room ambience. And sometimes I might stick a nice smooth tube right in the pan, a U-47 or something. Then I play it lighter. If I'm going to play live and do solos, then I definitely want a dynamic mike right in there."

Some overdubs on *Slow Motion* were also done at Nash Studio in Oakland, a 24-track facility belonging to percus-

sionist Kenneth. "It's a good, clean studio," comments Narell. "It's got a real nice piano when you need to use it, and it's small. I wanted to cut the basics in a nice, big room where we could put the drums out in the center of a good, live room. But I find I can do different kinds of overdubs at real specific smaller studios and save some money. I did my pan overdubs at Fantasy B because it's a high room and it's got the hardwood, and you can get good ambient sounds on the pans. Basically, I can record my pans anywhere that they sound really good and live."

Narell prefers to mike his pans from the top, but has found many people who prefer to put the mikes up underneath. While playing some shows recently in Trinidad, Narell was given a hard time by sound engineers there who were used to miking the other way, but he stood his ground. "I said 'no, this is my sound, I want it on the top.' I think I get better focus up there. I'll put my head down in the pan real close and listen to that, and that's the sound I think I want the mike to be capturing."

About this one point of live miking, Narell appears to be close-minded. But on the whole, he's constantly looking for new and better, more imaginative ways to capture the sound of the steel pans. "I don't adhere to any particular school of purism that says you're going to capture one perspective, use no EQ, no limiting or no noise gates. I'll go for anything if we can put together a hip sound." ■

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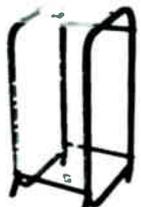
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PHOTO: TOM COPI

doesn't have to try anything drastic to be fresh; it just comes naturally for the saxophone great. Shorter has already had the career of about three musicians, and now, at 52 years of age, he's released *Atlantis*, his first solo record in almost ten years, full of mettle and melody.

After graduating from New York University in 1956 as an art major with a minor in music, Shorter joined up with Art Blakey's Jazz Messengers. Four years later he joined Miles Davis' band, and began incorporating the soprano sax along with his tenor. There he began to refine his composing as well, jotting out such efforts as "E.S.P.," "Footprints," "Prince of Darkness," "Nefertiti" and "Pinocchio," and adding distinctive touches to Miles' ground-breaking late '60s LPs. It was 1970 when Shorter, along with keyboardist Joe Zawinul (also a Miles alumnus) and bassist Miroslav Vitous, created Weather Report, the jazz group that's proven most resilient, successful and trailblazing. The band is given to the influx of great young musicians, and as the talent shifted and Zawinul became increasingly prolific, Shorter's compositional contributions to Weather Report's albums shrunk to a couple of songs per disk.

Shorter, who released a dozen albums on Blue Note in the 1960s and early '70s, had a big hand in writing everything on *Atlantis*. His band pretty much stayed set up in the big 40' x 50' studio at Crystal for a month, according to the session's recording engineer, Howard Siegel. "Everybody was in the studio; that's the way Wayne wanted it," he says. "And they were all sort of in a circle facing each other. We had Wayne in an isolation booth that you can roll around, and actually a lot of the live saxophone was used. A lot of the guides he played just to show the musicians had a lazy sort of easy feel, and we ended up using them. Immediately after doing a take, if we liked it, I made him patch certain spots where he was talking more, giving more instructions than playing or something."

Atlantis features the tasty doubling of Shorter's saxes with the flute work of Jim Walker, especially captivating during the waltzing "Three Marias" or the sly "Who Goes There!" "The engineer got the sound together as Jim and I did it," Shorter says. "We play melody parts on nearly everything. There was no other [lead] instrument or person, except on 'Endangered Species.' Therefore, I think the album has its own separation quality. It didn't take long to mix, even

WAYNE SHORTER

Atlantis
Columbia FC 40055

by Robin Tolleson

Produced by Wayne Shorter; engineered by Howard Siegel; assistant engineer: Jim McMahan; recorded and mixed at Crystal

Sound Recording Studios, Hollywood, CA; ("Endangered Species" produced by Shorter and Joseph Vitarelli; engineered by Rick Hart; recorded and mixed at Producers I and II and Meta Music, Los Angeles); mastered by Bernie Grundman, Hollywood, CA.

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though there were nine songs on it."

"It was actually—on certain levels—kind of hard to mix," says engineer Siegel, "because of the fact that it was all cut live. Everybody played at the same time, so there's natural leakage on the tracks of all the other instruments. And if what you're trying to do is get a specific sound out of something, you may be screwing with the sound of another instrument. So it's a tender balance."

Siegel, whose previous engineering credits include David Sanborn's *As We Speak* and Weather Report's latest, *Sport-in' Life*, gets great signals on the out-vamps of "The Last Silk Hat," from Shorter's rich and brusk mini-section of tenors and the darting soprano. "I'd usually use two mikes on Wayne," the mixer says, "one at the bell and one off to the side to catch the resonance of the horn. More often than not we'd use tube microphones for the main pickup, and just a very clean microphone for the side pickup. It was all condenser mikes with Wayne. The board we recorded the whole thing on was transformerless. The only transformers in the whole chain were either in the microphones or in the Studer tape machine."

Assistant engineer Jim McMahon and Siegel both credit the studio's 48 x 24 x 32 Crystalab system console for the record's clarity. "I'd love to buy a couple," Siegel says. "There are a couple of studios I'd put them in right now. It's a transformerless console which can be designed without the use of choke as well, to eliminate the ringing and other problems associated with choke. Andy Berliner over at Crystal masterminded that one."

"Endangered Species" is the album's only track with electronic keyboards, with Joe Vitarelli on Synclavier and Fairlight. But instead of a Herbie Hancock "Rockit," the resulting feel and sound is still so typically Shorter that it hardly stands apart from the rest of the energetic material, electronic or not. "It wasn't really like a techno-pop," says Shorter, "it was more like an organic something. Maurice White called me yesterday, and he was talking about how he liked 'Endangered Species.' He just said how it had a warm something in there."

Warm is a word that comes immediately to mind when listening to Wayne Shorter's music, whether he's playing "Eye of the Hurricane" with the V.S.O.P. band, or wrenching "A Remark You Made" with Weather Report. He made sure the warmth was there on *Atlantis*, too. "I want to keep that thing going like that," the saxman says. "I don't want to let nothing tear it down or take away from it, or instill some cold weather shots in the music," he laughs. "Even though people were reading everything [during the recording], they still got the

warm climate in there. Yaron Gershovsky on piano and [drummer] Alejandro Acuna—he doesn't have to be blasting and kicking the drums to death. He caught the essence of something and stayed right there. Larry Klein, the bass player, and all the other people, the singers and everything."

"Yaron would come in an hour or two hours early because he listened to the tape the night before and thought he could do better on the piano parts," Siegel says. "Wayne said anytime anyone wants to come in and do it, let 'em do it. Several times we replaced piano parts or bass parts or whatever because the musicians just thought they could do it better or had an idea or something. I was amazed by the personal attention put in by the musicians."

Shorter tried to cut as much of the record live as possible, a goal not always met, what with Klein also working on Joni Mitchell's album, Acuna involved in Al Jarreau's new project, and Ger-

"Warm" is a word that comes immediately to mind when listening to Wayne Shorter's music.

shovsky being Manhattan Transfer's musical director. "I didn't try to alter it or get too crazy with the electronics," says Siegel. "I tried for the cleanest recording I could."

Siegel put in a lot of ear work on the acoustic piano sounds on *Atlantis*, and his time placing the U-87s pays off on the vinyl. "Sometimes I would go into the studio with a pair of headphones on, have him play, and actually listen while I'm moving them," the engineer says. "It's sort of a personal thing. With pianos, I can't have an assistant move mikes. I've got to go out there and look and think about it, see which strings he's playing and stick my ear right in there against the strings and see where I want the mike to be."

"There's a certain sound I was going for that you can get out of U-87s that I've never heard out of any other mike, and I can only describe it as I described it to Yaron, as 'orange.' So I kept moving the mikes around until I got just a certain quality of the ringing of the strings, and a mixture of brilliance and warmth that I wanted. And it had to be changed from song to song, because the mikes had to be in a certain position over the strings that were actually being played.

U-87s are very directional, so I had to move the mikes to accommodate the ranges that he was playing in on different songs."

"Shere Khan The Tiger," a song Shorter contributed to Devadip Carlos Santana's *Swing of Delight* album, shows up here with a slight facelift. "The character comes from *The Jungle Book* by Rudyard Kipling. It's a resting, kind of," Shorter explains. "I know that it gives out a tranquil effect. I don't know who the effect lands on, but it gives out a tranquil something right in the middle of the second side, where it's needed before that rumbling happens at the end of 'On The Eve of Departure,' that part where the lower voices, the bass, piano and tenor do those little runs, those background kind of runs, like the motor of a rocket ship taking off."

Shorter makes use of the human voice on *Atlantis* as well, actually employing something of an all-star cast. Nani (wife of bassist Bunny) Brunel and Diana (wife of Alejandro) Acuna vocalize on "Atlantis," while a chorus of Sanaa Lathan (daughter of director Stan Lathan), Kathy Lucien (daughter-in-law of Jon Lucien) and Dee Dee Bellson (daughter of Pearl Bailey and Louis Bellson) sings the Edgy Lee lyrics on "When You Dream." Shorter, who dedicates the album to his daughters, Iska and Miyako, also wrote a song called "Criancas," Portuguese for "children."

"'Criancas' has a lot of repetition in there," says Shorter. "I deliberately had it done like that because I was just thinking about children and how they do a lot of things that repeat. They say things over and over again, 'na na na na na.' And if something tickles them, they want to see it again, 'Do it again, do it again.' I think they're born into repetition, eating and sleeping. If you break a child's repetition cycle in its early days, it goes nuts."

Atlantis does not distinguish itself with round after round of soloing, but rather with the melodic invention of composer and arranger Shorter, as he winds through the slick grooves without ever throwing out the exact same thought twice—or so it seems. "It's conspicuous that there aren't many repeated things, but inconspicuously I readily repeat what I call constants. Constants and variables," Shorter says. "The variables you hear, that seem not to repeat, that's valid there. But the mundaneness of something that's constant, that's something that incorporates repeat and unchanging and even goes as far as to be . . . I like this, neither the same nor different. The actual function of life as it grows involuntarily—the functions that are happening regardless of you that seem to repeat—there's something valuable going on here, you know, that's just been overlooked for like 250,000 years." ■

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by Elizabeth Rollins

Production Notes: Huey, Monk & Carly

The news on *Huey Lewis* these days is that there will be no new album for Christmas, but a new long-form video. *David Rathod* of San Francisco directed new material for the 46-minute piece, *Huey Lewis & the News: Video Hits*, which contains 13 of the band's songs and "some unusual material that many people may have not seen before," according to producer *Cristi Janaki Rathod*. Choice cuts include the lovable sportsmeisters inaugurating the 1984 baseball season singing the National Anthem *a cappella* at an Oakland A's game, and a new video of "Is It Me?" featuring photographs of each band member from childhood through the present. Rathod used the song "Back in Time" from the movie *Back to the Future* to cut a "making of" video using out-takes and behind the scenes footage. Don't miss Huey goofing around with a C-clamp on his head. "Some of our Lies are True" and "Don't Ever Tell Me You Love Me" are two older videos directed by Kim Dempster that are part of the package. At press time, Chrysalis Records had not yet chosen a distributor for *Video Hits*.

Another Bay Area band has released its first video on Atlantic Records: *Eddie & the Tide*, with "One in a Million" from the *Go Out and Get It* album. *Rod McDonald* directed, with *Bobby Corona* of the Keystone Family producing. Post-production was done at *Positive Video* in Orinda, CA. . . Director *Francis Delia* was busy directing two videos in Northern California: "We Built This City," from *Starship's Knee Deep in the Hoopla* album on RCA, and "With One Look," from Rupert Hine and Fiddler *Cy Curnon* (a song featured in the movie, *Better Off Dead*). The *Wolfe Company* of L.A. produced for MCA Records, and both were posted at *One Pass Film & Video*, San Francisco. . . The San Francisco International Film Festival got off to a good start in late September with a

documentary on the work of *Thelonus Monk*, called *Music in Monk Time*. Writer/producer *Stephen Rice* blends classic footage of Monk performing for European TV with interviews and performances by Carmen McRae, Dizzy Gillespie, and Monk's former sidemen Charlie Rouse, Larry Gales, and the late jazz genius' son, drummer T.S. Monk.

As for facilities in New York: *Charlex* has earned yet another award, an Emmy for Outstanding Graphic Design and Title Sequence for the opening to *Saturday Night Live*. Company principals *Charlie Levi* and *Alex Weil* have also been busy creating a new frame-by-frame, colorized opening for *I Love Lucy* episodes for release on CBS Home Video. . . Three years ago, fashion designer *Norma Kamali* and producer *Sandra Harper* began experimenting with some of the first fashion videos, which have proven to be successful marketing tools. Recently, Kamali tried a fresh approach by using six songs from *Carly Simon's* current album, *Spoiled Girl*, on the soundtrack to her new 28-minute fashion tape. The voice of an "'80s woman" is laid over the music to present a sympathetic view of the problems modern women face. The soundtrack was recorded and mixed at *National Video Center*, New York. . . *Eddie Murphy's* first music video, "Party All the Time" was shot and edited in five days, according to producer *Fay Cummins* of *N. Lee Lacy*. Jimi Hendrix's old recording studio, Electric Lady, provided the location, and editing was done at *Unitel* by *Greg Dougherty*. . . *Bell One Productions*, New York, has been following Columbia Records' band *The Hooters* around with a 35mm camera on their first cross-country tour. Footage was shot of live performances in San Francisco, Seattle, and other cities. Bell One also produced the band's "And We Danced" video from the *Ner-*

vous Night album, with *John Jopson* directing.

On the Los Angeles production front: Hollywood's *Pacific Video* and the *Droid Works* (an affiliate of Lucasfilm, Ltd. and Convergence Corporation) are offering a new disk-making service for EditDroid™ users. Pacific's "electronic workprint" service provides film-to-tape-to-disk transfer, or tape-to-disk transfer from any film or videotape format, including telecine transfer and digital audio syncing from original negative. This Electronic Negative Assembly with Digital Audio (ENADA™) process eliminates the need for out-of-laboratory syncing or 35mm mag transfer, according to VP of marketing and sales, Leon Silverman. . . That *Tom Petty* video, "Don't Come Around Here No More," which won for Best Special Effects in the MTV Music Video Awards, was edited by *Peter Cohen* at *The Post Group* in Hollywood. Cohen, who can also claim credit for videos such as John Cougar Mellencamp's "Authority Song" and Chicago's "Hard Habit to Break," used three channels of ADO on the Petty piece, which was produced by *Overview Productions* of New York, and directed by *Jeff Stein*. *Don Henley's* "The Boys of Summer," which won Best Video in the same competition, was edited by *Dave Pincus* at *The Post Group*, as well. *Jean-Baptiste Mondino* directed with *Randy Skinner* producing. . . *Unitel's* one-year-old Hollywood post-production division on the Paramount lot has been raking in the mu-vid biz with the likes of the Pointer Sisters, Ratt, Heaven and Air Supply, but they're also editing a number of TV shows, including NBC's *Family Ties*, ABC's *Mr. Belvedere*, and *Mathnet* for Children's Television workshop.

Simon & Schuster: The Presses are Rolling, and so are the VCRs

In the past six months, the book publishing company *Simon & Schuster* has entered the home video publishing industry by acquiring and distributing existent programming. This month, however, the audio and video publishing division releases its first original project in association with The American Cancer Society. The 45-minute tape called *How to Quit Smoking* costs \$29.95—or the price of about a three-and-a-half week supply of nicotine sticks for a moderate smoker. Producer

Jeffrey Nemorovski shot and posted at One Pass Film & Video in San Francisco.

VP of marketing for the audio and video division, Ellen Stolzman, says she's releasing *How to Quit Smoking* just in time for the new year. "That's when everybody says their New Year's resolution is to quit, and it's certainly less expensive to buy this tape than to go to one of those programs," says Stolzman. "Plus, you can watch the tape at a time that fits into your own daily schedule."

Her department is concentrating on "high-end entertainment product and material that we can convert to video from books—not feature films," says Stolzman. Some Simon & Schuster video titles include: *The Jewel in the Crown* and sequel *Staying On* licensed from Britain's Granada Television, *How to Enjoy Wine* adapted from the book of the same title by Hugh Johnson, and a series of six one-hour Sherlock Holmes adventures.

Non-fiction, and specifically how-to books are being made into audio tapes. "More and more people want the information from books, but they want to listen to tapes in their cars, or they're busy and like to do more than one thing at a time," Stolzman explains. What do people want to know? *How to Make Love to a Man*, by Alexandra Penney,

How to Get Your Point Across in Thirty Seconds, by Milo Frank, and *A Woman Coming of Age*, by Jane Fonda, are some titles currently shipping.

Interactive Video— New Equipment, New Interest

The *International Interactive Communication Society* (IICS—see *Mix*, April, 1985) has expanded to include chapters in nine cities: San Francisco, Los Angeles, New York, Seattle, Dallas, San Diego, Boston, Denver and Vancouver. The Dallas chapter kicked off their first meeting last summer with "Visions '85," a symposium featuring vendors and programmers. Four hundred people showed up, according to IICS president Richard Haukom.

Haukom himself was busy in September designing and presenting instructional materials to Sony marketing managers during a seminar on the new *Sony View System*. The company has substantially upgraded its component laserdisk offering with the new LDP-2000 laserdisk player, and the SMC-2000 MS-DOS computer controller (which both fit into one rack-mountable box). Major improvements on the old LDP-1000/SMC-70 system include: a lightweight diode laser, motorized front loading system, enhanced flexibility

because of modular boards for different functions, RGB output from both the computer (for graphics) and the player (for video), a color pallet with 4,096 choices (256 colors on screen at a time) and four times the resolution of the previous system (640 x 400 pixels). The View system comes with 256k out of the box, but a 512k board is available, which will please serious programmers. Virtually all IBM compatible software will run on the system, as well.

Meanwhile, on the audio-for-video front: *Laserdata* of Cambridge, MA, has released the *Trio Encoder™*, a stand-alone encoder capable of pre-mastering still frame audio and digital segments on one-inch video tape. The company is working on various configurations: as a slave device to a studio editor, as a dedicated audio and digital data encoding system for a one-inch VTR, and in conjunction with a VTR/PC authoring system. The Trio Encoder is designed to digitize audio at one of three sound quality levels, format audio and digital data with added correction bits, and encode segments into an analog video signal for recording onto one-inch tape. Up to 75 hours of digital audio and 800 megabytes of digital data can be recorded on one side of a video disk. ■

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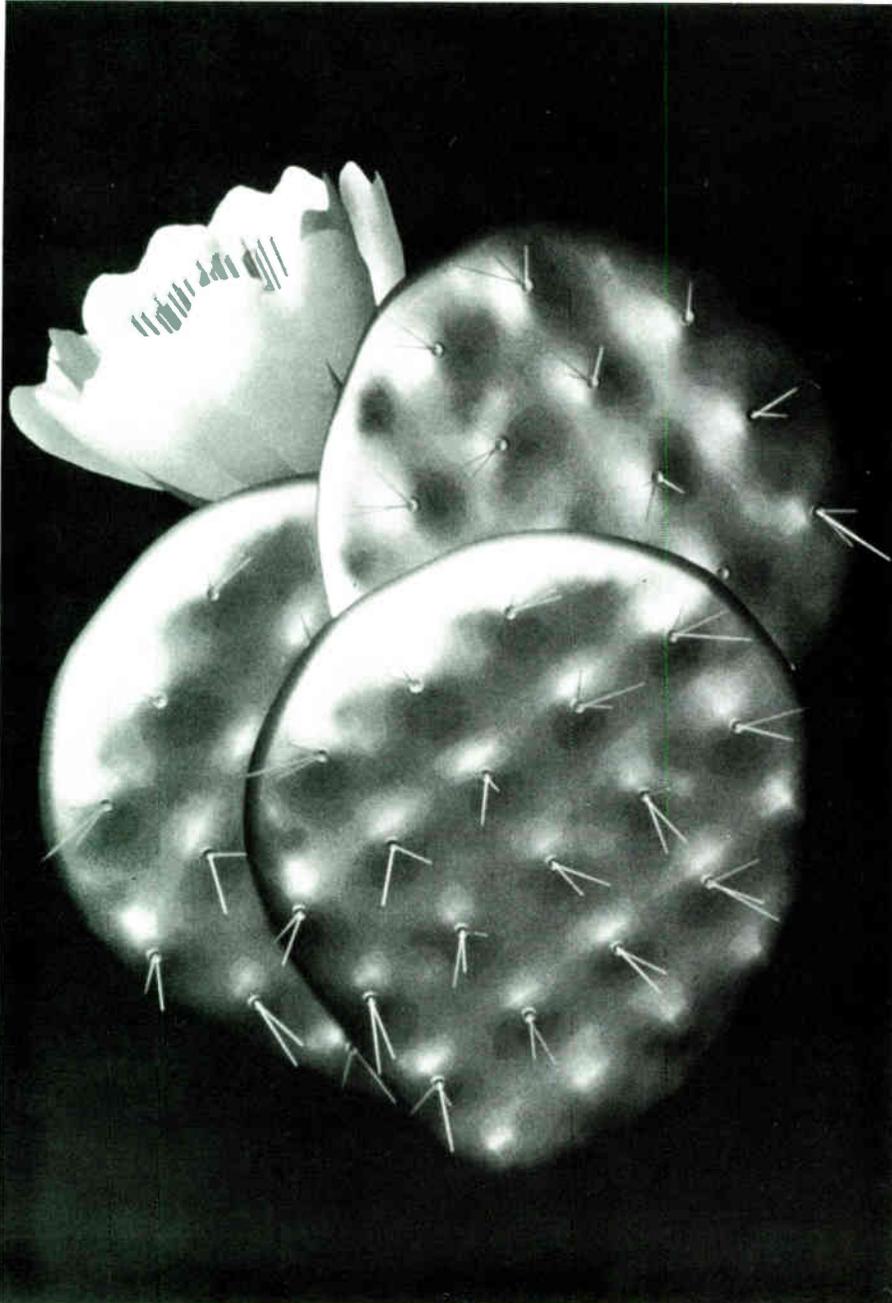
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COMPUTER ANIMATION FOR VIDEO PRODUCERS

Ron Scott's (©1985) flowering cactus (here reproduced monochrome) demonstrates the resolution of Cubicomp's PictureMaker™ system.



by Lou CasaBianca

Overview

Affordable personal computer graphic systems are beginning to make their appearance in design studios as a tool for professional quality audio-visual presentations, animation and print publishing. Until recently, PCs lacked the sophistication to produce high quality visual media. In last month's MVP we reviewed some of the low cost (under \$15,000) personal computer graphics systems available as video tools. In this month's column we'll look at one of the more powerful graphic work stations now available for television production.

There is a blending of computer graphics and video effects that characterizes the look of prime time television today. Custom computer mainframe and software services provided by production houses are used primarily for scene simulation and 3-D in feature films, TV commercials, and title segments. Recent developments in computer and software design make the possibility of owning 3-D and modeling systems feasible. Systems that are specialized in the creation of 2-D illustration, titling, logos, promos, news and industrials can be supplemented with video switcher functions, such as wipes from external video to computer graphics, and by the use of motion-control using computer-controlled models and cameras.

Big-budget projects by well-financed corporations and the networks are the prime source of business for 3-D production houses. It is becoming more and more feasible for video post-production houses and independent producers to purchase their own systems for in-house use. A producer who might spend \$2,000 to \$3,000 a finished second, or \$60,000 to \$90,000 for a 30-second commercial, can afford to buy some of the newer systems for almost half the price of one high-end production. The extra time it takes to render solid 3-D objects with these new systems is an inconvenience many producers are willing to deal with in return for open access to systems that offer unlimited creative potential.

Design Factors

The key capabilities to look for in a given computer graphic system include: (1) the ability to do fast freehand illustration with a digitizing pad or mouse. (2) smooth shading and rendering of

How to make a living as a recording engineer.

It's no wonder that being a successful recording engineer is so appealing. In the magic environment of the studio, today's top engineers make a very good living by knowing how to bring music to life.

If you're serious about becoming an engineer whose services are constantly in demand by the music industry, there's something you should know. More than ever

before, the hottest engineers will be those with the skills of both a technician *and* a musician. And now there's one place where you can develop your technical and musical awareness hand-in-hand—at the acclaimed Grove School of Music in Los Angeles.

Grove's new Recording Engineering Program is an intensive one-year course of study that gives you an exceptionally well-rounded approach to making music sound better. Grove instructors are working professionals based here in the entertainment capital of the world, where opportunities are at your doorstep in more studios and concert halls than you'll find anywhere else. Students from more than 30 countries have found the Grove School to be the most *practical* place to launch their music careers.

1. Meet the versatility challenge.

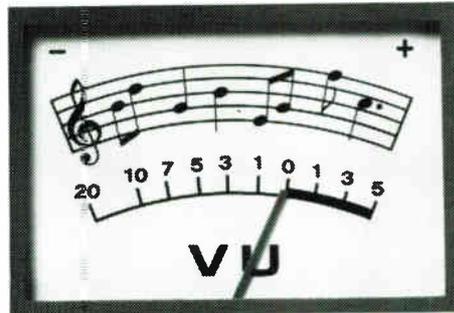
Every recording, mixing and sound reinforcement situation is different. That's why the Grove program gives you such a broad range of experience, getting you comfortable engineering everything from 5-piece rock bands to 18-piece big bands to 40-piece orchestras.

You'll work with a full spectrum of acoustic to electronic music, from Top 40 to film and television scores. And you'll learn sound reinforcement techniques for a wide variety of live music applications.

2. Get consistent hands-on experience.

There's no substitute for learning by doing. So you'll regularly have projects in Grove's two in-house studios, as well as taking advantage of the program's ongoing access to state-of-the-art 24-track facilities in the Los Angeles area.

To get the most from your time in the studio, you'll cover your technical bases with courses in acoustics, electronics, studio installation and equipment maintenance. You'll also learn studio management procedures to help prepare you for the business end.



3. Hear music through a musician's ears.

The most talented engineers are usually musicians as well. The Grove program is designed to insure that you'll *understand the music* you're recording, and that you'll be able to *effectively communicate* with musicians on their own terms. Grove's outstanding courses in eartraining,

harmony, sightreading and rhythm section arranging will result in some great advantages for you when you're behind the board.

4. Prepare for related opportunities.

Successful engineers often expand their careers into related fields like record production and music video. Grove offers professional workshops in both these areas, as well as many others ranging from Songwriting to Synthesizers to Drum Machine Programming. You can build these into a customized course of study, and we'll help you tailor a complete package to fit your personal career goals.

5. Get a competitive edge.

The Grove Engineering Program begins each January and July. You may qualify for financial aid. And if you're concerned about getting a college degree, our accredited courses can be part of your B.A. in Commercial Music through our affiliation with Laverne University.

So if you want to make a living as an engineer, we'll send you more information. Just send us the coupon below to see how you can get a competitive edge, or call us at (818) 985-0905.

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I'd also like more information on the other programs checked below:

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General Musicianship Program

Vocal Program

Keyboard Program

Guitar Program

Bass Program

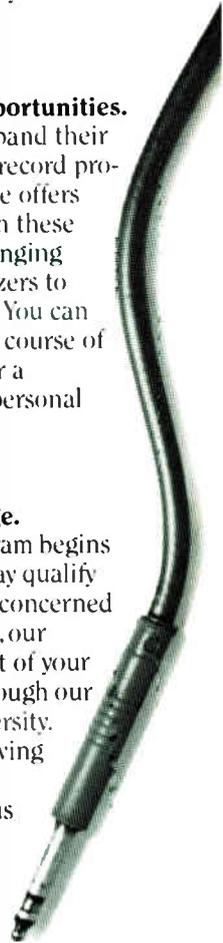
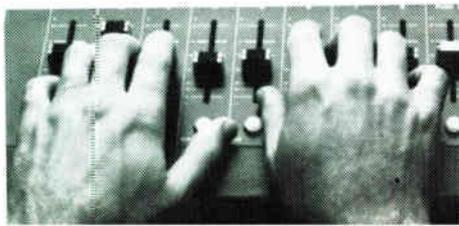
Percussion Program

Composing and Arranging Program

Film Video Composition Program

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World Radio History



surfaces and backgrounds.

(3) anti-aliasing to eliminate the "jaggies" on edges.

(4) photo-composition layout

(5) a varied selection of text fonts

(6) real-time animation

(7) 3-D rendering

(8) video input and output capability

Bit-mapped images were originally used in broadcast because of their convenience in almost instant interactive design. The screen is broken down into 262,144 dots along 512 lines. The other method of generating graphics on a computer screen is with the use of algorithms which are essentially mathematical equations or vector models of the image's geometry. Algorithms are "intelligent" representations of the graphic image that can be recalled from memory. The computer remembers images as objects in three-dimensional space; it can rotate, contract, expand or reflect light off of its surfaces. Vector systems take more time to render on the screen, display fewer colors, and generate high resolution graphics for slide and print applications.

The MCI-Quantel Paintbox™ has become one of the most widely used video art and computer graphics systems in broadcast TV. From the look of the Cars' "You Might Think I'm Crazy," to its extensive use in commercials currently on-the-air, the Paintbox has become one of the most flexible creative tools available. Paint systems are particularly adept at grabbing a video image and converting it to bit-mapped digital information. In broadcast television, speed is critical. Paint systems can use a video image of a photo or a real object photographed by a graphics camera, as a template or tracing for illustration. How-

ever, the stunning 3-D visual effects available through the use of object-based systems have created a demand for their use in all forms of entertainment and marketing communications.

RGB/NTSC

Although every computer graphics work station uses a video display, this does not necessarily mean that it outputs a useable video signal. The video image within the computer is generated first as a digital form of RGB (Red-Green-Blue) video. American TV sets are designed to generate a signal in accordance with North American Television Standards (NTSC) and cannot handle RGB images. To get RGB on TV, an encoder is used. Or in some cases the RGB signal is filmed directly off of an RGB monitor and then the film is converted to video. RGB signals are much cleaner and sharper than NTSC color. Color computer graphics systems use digital RGB to create and maintain high quality images that are free of electronic noise.

When digital recorders become available they will probably record images in digital NTSC, which is currently being used in "frame stores" for typical broadcast computer applications such as news, weather, and sports graphics. RGB is noticeably degraded when encoded to NTSC. At this time, the best option is component video which separates NTSC video into its luminance and chromance components. This process requires transcoding and encoding to generate component output. At some point in the future we can expect a video image to be generated in digital computer graphics and then processed, recorded and edited digit-

ally. Since TV sets at home are still NTSC, the last step will require downloading the image to NTSC analog for broadcast. Much of the image quality, resolution and intensity is sacrificed in this process. Computer graphics designers must learn to work with—and around—the limitations of NTSC. In feature films and TV commercials, the option most often used is shooting the RGB monitor with 16 or 35mm film which preserves most of the quality designed into the image in the first place.

The typical elements involved in a computer graphics work station are: a personal computer, graphics software, an expansion board or chassis for the PC, a video input camera, a color monitor and a printer for hard-copy.

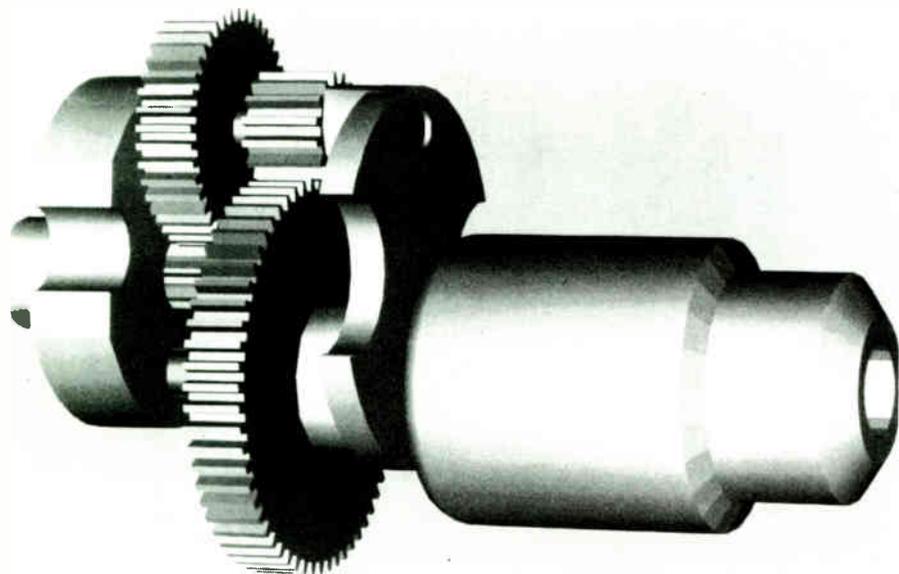
Cubicomp

Earlier this year, I was commissioned to design and direct the production of an on-air animated ID and logo package. The facility selected by the client was your classic unionized production house. The resident computer animation system cost more than \$1.3 million, occupied about 800 square feet of production space, and required three people to operate it. There was a chief editor (\$60K per annum), an assistant editor (40K per annum) and a tape operator (\$30K per annum). It took three days and about \$40,000 to complete the package. Subsequent to the production, Cubicomp Corporation released PictureMaker™, a high-performance video animation system that generates professional-quality 3-D images on an IBM or IBM-compatible computer. I had the opportunity to meet with the Cubicomp designers in Berkeley and to produce a test using the same storyboards that I had used on the production house system. In a nutshell, we were able to duplicate functions done by the other system with about the same resolution and, in most cases, the Cubicomp did them easier and faster.

In effect (exclusive of personal computer and outboard equipment such as tape decks, graphic cameras, etc.) we could have bought the Cubicomp for what essentially was a one-time production fee for studio services by the hour. It was an explicitly graphic example of the rapid rate of evolution in this kind of technology. This is not to say that the main-frame computer graphic scene simulation systems used in network commercials can be replaced by a personal computer, but it is indicative of the major advances made in the price-performance capabilities of the hardware designs and software enhancements used in these new systems.

The Cubicomp system costs about \$30,000 plus outboard gear. The PictureMaker capabilities include: animation with the ability to interpolate and create in-between frames; modeling

The Cubicomp system also allows the creation of three-dimensional motionial images. ©1985, Wilson Burroughs)



three-dimensional objects with smooth shading, textured, and transparent surfaces with multiple light sources; sequencing images into programmed sequences; tiling with standard and custom fonts; and paint programs that can be used in backgrounds and special effects. The system allows the creation of solid models of virtually any shape, with as many as 65,536 colors in a single image, as well as 3-D titles, logos and computer-generated storyboards. This includes a "motion scripting" capability which permits the preview of animated sequences before an animated sequence is recorded.

Cubicomp's CS/16 16-bit graphic frame buffer stores and displays two 512 x 512 pixel frame images at 16 bits per pixel. The frame buffer has full genlock capability and accommodates NTSC and PAL line rates. A video key channel feature permits the mixing of video signals with computer graphics for simultaneous display of video and computer-generated images. The system is operable in two software modes, 16-bit full color and 12-bit color map.

PictureMaker is relatively easier to use than other systems with its power and capabilities. It can be mastered by operators with no programming experience. A background in graphic design, animation, and familiarity with other

graphics systems will only serve to help a perspective user get up to speed that much more quickly. Its menu-driven command structure presents options in plain English, and avoids computer jargon when possible. The use of a digitizing pad allows much of the interaction with PictureMaker to be controlled with a stylus and, to a lesser degree, with the keyboard. The package links modeling, composition, animation, rendering, tiling and painting in functional modules.

Computer-aided-design (CAD) capabilities are provided by ModelMaker, Cubicomp's solid modeling software. Once a logo or any 2-D shape is on the screen, it can be extruded or rotated on its axis to form a three-dimensional wireframe. A half-circle, for example, can be swept into a sphere; a character can be extruded into a block letter. Wireframe models can be rendered into high-quality shaded images. Surfaces maintain true perspective, and with the number of display colors available providing shading and texture, 3-D objects look extremely realistic. The artist/operator can vary the direction of light hitting the object and use multiple light sources for greater depth and intensity.

Complete control of animated movement is possible by moving rendered objects through user-defined paths in 3-D space. The speed and trajectory

can be easily adjusted in the design process. Storyboards and finished animation can include sequences of moving objects, special effects, backgrounds and digitized video. Two- and three-dimensional titles can be generated from a library of fonts which can also be customized to create original fonts. Design one letter in the system and it will automatically create a complete matching alphabet. The library can also store geometric objects so that images do not necessarily have to be built from scratch. Time Art's Lumena "paint" package is used to design backgrounds and add special effects with variable brushstrokes to 3-D images. Lumena also provides video digitizing, 2-D typography, and cel animation.

Cubicomp was the first manufacturer to offer solid modeling on a micro-computer. The introduction of PictureMaker continues to establish the company's strength and design leadership in animation and paint design for video producers. Some of the special effects seen in *2010* and *Starman* were created on the Cubicomp. The cost-effective access that this system provides should help put this technology in schools and independent production houses. Users are just beginning to scratch the surface of its virtually open-ended animation and creativity design capabilities. ■

ABCD?

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ing to obtain the original 2-track master.

Duplication

After the bin loop master tape has been produced, it is ready to be tailored for use in the bin loop reproducer. The master is loaded into the bin and the ends are spliced together. An index mark is placed on the tape so the beginning of the loop can be detected. This index mark is used to trigger a cue tone generator which records a low frequency tone into the cassette tape (usually 10Hz or less at real time speed). This tone is detected in the loading process and is used to detect the separation between adjacent programs.

The slave recorders are loaded with hubs of blank cassette tape. This tape comes in many different grades, lengths, and thicknesses. Typical cassette stock is between 8,500 feet and 14,000 feet in length, and between .40 and .70 mils thick. Thicker stocks are used in shorter programs—i.e. C-60 or less. The yield for a single pancake of tape is 32 C-90s for an 11,500 foot hub, 31 C-60s for an 8,200 foot hub, and 42 C-46s for an 8,200 foot hub of tape.

Many different grades of tapes are available for almost any conceivable application. Certain voice grade formulations double as head relapping film. Premium chromium dioxide and cobalt-doped formulations are available which offer truly high quality sound. In fact, the improvement in tape formulations has helped considerably in the improvement in cassette performance.

The current industry standard system—the Electro Sound 8000—boasts frequency response specs of 30Hz to 16kHz +/- 2dB at 64:1 times normal speed using a 3.75 ips master and 30Hz to 18kHz +/- 2dB at 32:1 times normal speed using a 7.5 ips master. Wow and flutter specifications have been reduced to the point where the system will add no more than .05 percent WRMS to the wow and flutter present on the master tape. The slave recorders utilize an 8MHz bias frequency and move tape at 60 ips or 120 ips dependent on the system and its configuration. The hardware has improved to the point where we are now able to produce extremely high quality cassettes in mass quantities.

Further Developments

Recently the industry has seen the integration of Dolby HX-Pro into the cassette duplication system. This has been accomplished for both the bin loop recorder and the slave recorders. HX-Pro is a single-ended headroom extension system. It is not a noise reduction system and requires no decoding.

HX-Pro is basically an active bias circuit. Any signal sent to the recording head acts as a bias for the signal to be

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recorded, with high frequencies being more effective. Any part of a signal that has a frequency five times that of another will provide fully effective bias conditions for the lower frequencies. This is known as mutual biasing. Therefore, with a fixed bias, actual bias conditions for low frequencies are constantly shifting due to the high frequency content of the signal being recorded.

HX-Pro thus monitors the high frequency content of the signal, and presents a constant active bias for low frequencies, moving the bias level closer to optimum bias for high frequencies. Thus, the advantage of HX-Pro is substantially increased headroom for high frequencies. The implementation of Dolby HX-Pro in high speed cassette duplication has led to significant gains in frequency response and high frequency MOL from currently available tape stocks. HX-Pro is especially effective since it can be utilized with no need for the consumer to become involved, as in the case of noise reduction techniques.

Loading, Printing and Packaging

After the cassette pancakes have been recorded, they are loaded into shells on automated loading equipment. The tape is threaded onto the machine and the machine reads program until it finds the cue tone. A C-0 cassette (a cassette with only a few feet of leader already spliced in the shell), is placed in a jig, and the leader is extracted. The loader will now splice the beginning of the program into the shell at 1,200 ips, find the next cue tone, and splice the tail onto the leader. Sounds easy? This all happens in about seven seconds for a C-60 program.

The King 790 loader is actually a remarkable and complex machine. The computer, for instance, built into a King 790 has over 40 diagnostic checks it does automatically, to alert the operator of errors. These loaders are highly sophisticated and are very sensitive to errors from splicing, vacuum pressure, program length, cue tones, etc.

The loaders are especially sensitive to the shell construction. A hot issue right now in cassette duplication, the much-maligned C-0, is one of the most critical elements of the cassette duplication process. First of all, the cassette must stand up to all kinds of abuse—falling from unexpected heights, being stored in glove boxes in mid-summer, vicious tape transports, and a day at the beach in the sun (and sand!). Even more important, the cassette shell must allow for smooth, even movement and exact alignment of the tape with respect to the tape player. This means slip sheets must allow for stable motion of the tape pack at all times, and the guides must be perfectly perpendicular to the plane of the shell to minimize azimuth error.

Structural stability requires the shell to be stiff. The industry has generally embraced the sonic weld shell which is, without a doubt, structurally superior to the common five screw shell used by the consumer blank tape manufacturers.

An entire article could be written on the cassette shell and the current issues affecting it, but the important thing to realize is that the shell is a critical component of the overall sonic as well as structural quality of the cassette. A few cents invested in a higher quality shell will reap huge dividends both sonically and from a production standpoint. Poor shells always load poorly. This in turn will cause higher labor costs, considerable waste, and a greater chance of imperfect product reaching the market.

After the programs have been loaded into the shells, they are ready to be labeled and packaged.

Labeling of the cassette occurs one of two ways; either they are printed directly with ink on the shell, or a pre-printed pressure-sensitive paper label is applied. Both methods are usually performed with high speed automated equipment which will apply labels at a rate of around 100 cassettes per minute. After the cassettes are labeled, they are inserted into hinged plastic boxes along with a paper insert or J-card containing the artwork, lyrics and credits. This is often done by hand, although there are automated systems used by the major duplicators to load the cassette boxes.

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That's right, Sony's new CCP-110 audio cassette copier packs more features in a smaller and lighter package than its predecessor, the Sony CCP-100. Sony's electronic wizardry tells you if the recording cassette is too short, but only when there is a signal on the master. In if doubt, the CCP-110 stops right there so you can check the copy. End of audio sensing and track select let you combine and edit masters simply and automatically. And there's more: You can add a two-copy slave (CCP-112) and both models include the exclusive Sony brushless and slotless (BSL) motors and, of course, the record and playback heads carry the **EXCLUSIVE SONY TWO-YEAR WARRANTY** against head wear.

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The product is now sealed in a clear plastic wrapper. Two methods are generally used. The first is the "cigarette" type folded corner technique which is often used by the blank tape manufacturers. The alternate method is to shrink-wrap the cassette in the same manner as vinyl albums. Once this is accomplished, the cassette is ready to embark on a journey to the consumer where it will hopefully provide many hours of enjoyment.

Quality Control

The single element that ties all the aspects of the cassette manufacturing process together is quality control. Quality is something that is built into a product and requires constant monitoring if it is to remain consistent from piece to piece. Just purchasing good materials is not enough to ensure a stable product. Constant monitoring and checking of each step of the process is necessary in order to maintain the integrity of all the links in the chain. Automation has played a large part in the improvement of cassette quality control. The Capitol XDR process utilizes sweep tones on each program which are checked by a computer to monitor performance. In essence, the XDR process is a philosophy as much as it is a system. It emphasizes the importance of optimizing the performance of each step and monitoring this performance level by extensive quality control.

The duplication equipment being manufactured today is capable of incredibly high fidelity. Unfortunately, overemphasis on cutting costs and faster turn-around times compromises the performance of the systems. This is aggravated by the fact that artists and record labels still perceive the vinyl disk as being the "legitimate" end product and consider the cassette version unworthy of the same amount of attention despite the recent sales figures.

Hopefully the arrival of the Compact Disc will help to push the record labels and independents to think twice about the quality of the product that they produce. A lot of progress could be made by asking all the duplication plant personnel and administrators one simple question: "Do you think the cassette you produce is worth \$8.98?" An honest reply will do much to assess the quality standards in place and will perhaps help raise the standards toward long term viability as the leading music distribution medium. Further advancements in the state-of-the-art such as the widespread implementation of the 7.5 ips bin loop masters at 480 ips, continued research into the development of a digital bin, and the improvement of quality control methods will help to keep the cassette a strong competitor on the consumer market for years to come. ■

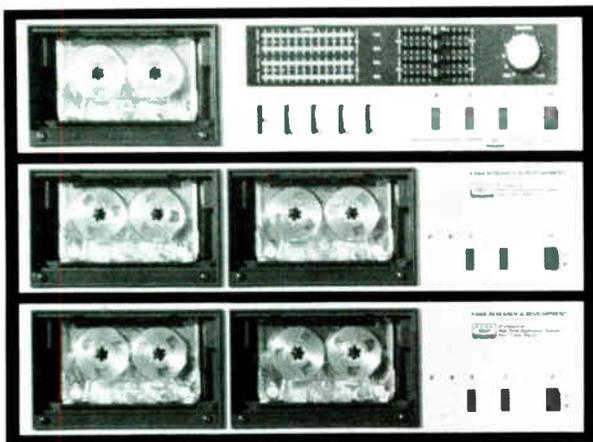
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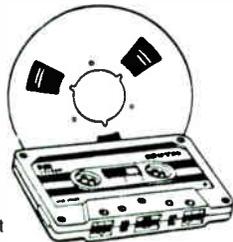
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—FROM PAGE 54

By using a 7.5 ips master (more about this later) the bin is able to achieve higher output levels at shorter wavelengths than the majority of its competitors, thus helping to preserve the integrity of the original recording. The improvement in tape handling is due to the way the engineers from Concept Design have combined pneumatic technology with modern servo design, resulting in the tape being transported in a controlled and precise manner. The major features of the bin can be seen in Fig. 1, and the principle of operation in Fig. 2.

Three capstans are used to transport the tape. A moving belt located in the bottom of the bin is used to convey the tape across the base. Of the three capstans, one—the reference capstan—is synchronous while the other two are servo-ed to vacuum sensors. A synchronous motor was chosen for the reference capstan to ensure that the speed of the bin remained in step with the synchronous motors used to drive the slave capstans. Otherwise variations in pitch may occur.

An interesting feature of the two servo-controlled motors is that they are driven by two linear amplifiers which have been converted for DC operation. Another feature of the servo is that, unlike many other vacuum column sensors which work on photo-electric cells, analog computers actually measure the variations in vacuum caused as the tape loop moves up and down the column.

Once the bin has been loaded with tape and it is switched to standby, the

With the advent of new types of tape, improved record heads, electronics, and the development of Dolby HX Pro, it became clear that it was the master and not the slave, or its tape, that was restricting quality.

pinch rollers engage and power is applied to capstans one and three to take up any slack in the tape and to form the tape loops inside the vacuum columns. When the tape is located correctly, the sensors instruct the capstans to stop rotating, and the tape is firmly but gently held in a state of equilibrium.

In the "run" mode, the reference capstan begins to turn. As it does so, tape is pulled across the heads. At the same time, the tape is pulled out of the first

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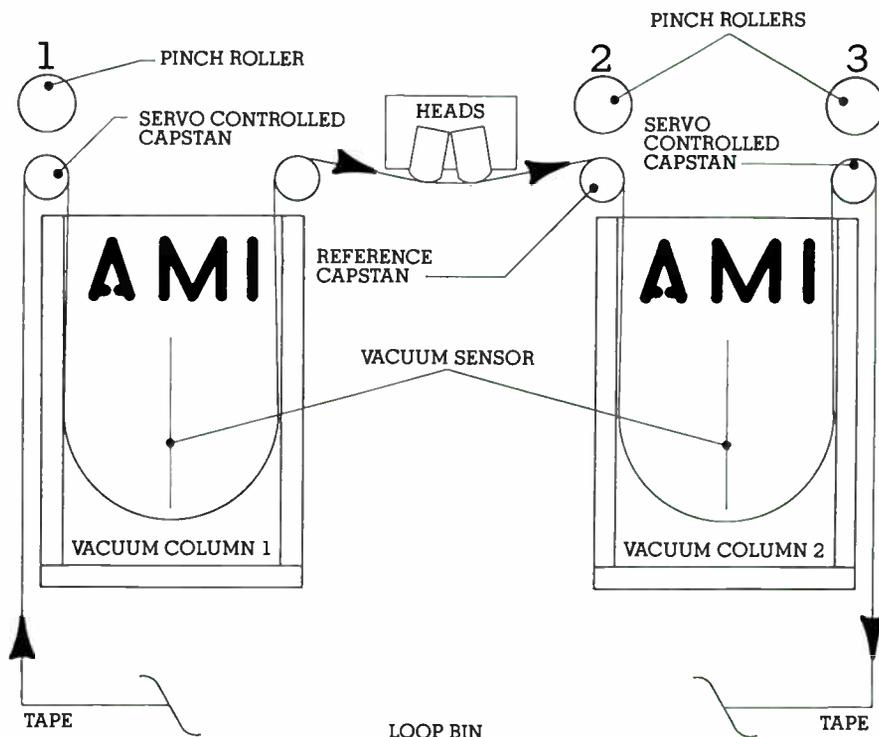
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FIGURE TWO



vacuum column and fed into the second. This movement is detected by the sensors which instruct the other two capstans to rotate at the same speed as the reference capstan in order to maintain the position of the loops inside the vacuum columns. Therefore, capstans one and three faithfully follow the speed of the reference capstan as it increases to a linear speed of 480 ips, or as it slows to a stop when the bin is switched off.

One immediate advantage of this system is that the section of tape located between the two vacuum columns is isolated from the rest of the bin. This provides constant tension as the tape passes across the replay heads. Constant tension across the heads is crucial in maintaining audio output at high frequencies and preventing an irregular cushion of air being built up between the heads and tape. The balanced columns reduce work load of the reference capstan motor, allowing it to maintain the correct speed more accurately.

Even before it reaches the first capstan, the erratic tension variations, caused by loops of tape inside the bin, are greatly reduced by the use of a stabilizer and a large diameter vacuum guide around which the tape must pass before it reaches the capstan. After leaving the third capstan, the tape is fed across a unique vacuum deceleration unit which is designed to slow

Table 1 - Replay Calibration			
Reference level.	Otari MTR-10	185 nWb/M	
S.T.L. call. Tapes.	Nakamichi 1000 ZXL	160 nWb/M	
Replay frequency response.	Otari MTR-10		
	7.5 ips	+/- 0.3 dB	20Hz/20kHz
	3.75 ips	+/- 0.5 dB	20Hz/20kHz
	Nakamichi 1000 ZXL	+/- 0.5dB + 1.7dB	50Hz/12.5kHz 15kHz
Track formats	Otari MTR-10	7.5 ips	Adjacent
		3.75 ips	Staggered
Tape width	0.5 inch		

the tape down and to let it fall freely into the bin. A moving belt, located at the bottom of the bin, gently inverts the folds of tape as it conveys them, allowing the tape to be lifted off the top of the pack as it exits the bin. All transport functions are controlled by a microprocessor to ensure that the tape is handled correctly, avoiding many of the problems that can lead to premature failure of the master.

As I mentioned earlier, the audio quality of the bin is enhanced due to the speed of the master which is double that used by the majority of other sys-

tems. When the duplicating industry started to duplicate at 64 times normal speed, the master speed was reduced from 7.5 ips to 3.75 ips. At the time, this was acceptable because cassette tapes and slaves were not capable of producing the quality they are today. But with the advent of new types of tape, improved record heads, electronics, and the development of Dolby HX Pro, it became clear that it was the master and not the slave, or its tape, that was restricting quality.

Otari, quickly followed by Studer, developed new master recorders which

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—FROM PAGE 79, FREEDMAN

a semester in the library learning to construct Battery Sound." Because the building itself is solid and well put together, Freedman didn't have to worry about upstairs neighbors. And his knack for sheetrock work gave him another advantage.

"Doing my own construction work was a satisfying experience," he says. "I worked with a few other people, and we decided not to float the floor. The only thing I floated in the control room was the ceiling. I didn't want it rattling. I really didn't have the money to invest in floating then. The studio doesn't have any special acoustic construction like LEDE. I just wanted to save as much money as I could to buy more equipment. As the studio's grown, I've had the parallel development of my composing and technology foremost in my mind.

"Most of my equipment choices were economic," he admits. "In my price range I had a choice of a Trident or an MCI board. I'd been to MCI's training school in Fort Lauderdale, and I knew that Dave Harrison had been around in the early days. When someone at Martin Audio suggested that I look into a Harrison board, I took a risk and bought it. It's always a risk buying a new board, and I bought the tenth board they built. But I didn't want to be another MCI studio; I wanted to be a little 'sexier.' My control room is so small (20' x 16' x 10') that you couldn't put a big board in anyway. I didn't have a budget for automation either. But the Harrison turned out to be one of the best purchases I've ever made, though I must admit I was in a state of shock when I first saw it. It looked like a toy, it was so small. But it's super clean and fantastically reliable. I especially recommend it if you mix by yourself. It doesn't have all the bells and whistles, but it's one-third or one-quarter the price."

When Otari came out with their second generation of tape machines, Freedman tried the product and liked it. "I could have gotten a whole MCI package for less money than I spent, but I wanted to go with the Otari, and I haven't regretted it yet."

Currently, recorders in Battery Sound include the Otari MTR90-II 24-track, an MCI 110B 8-track, Otari MTR-10 and Otari 5050B, and Tascam 112B recorders. Favorite amps include Crown, McIntosh and Hafler, and Freedman is happy with his Big Reds, JBL 4401 and Auratone speakers. For outboard gear, he chose Lexicon 224X, Lexicon PCM-60 and Lexicon PCM-42, an Eventide Harmonizer, a Scamp Rack, DeltaLab DL-2 Acousticcomputer, UREI LA-4 and dbx 162 compressor-limiters, UREI dual parametric equalizers, Garfield Electronics Mini-Doc, and a Live echo chamber.

Neumann, AKG, Sennheiser, Beyer, Shure and Electro-Voice microphones are available at Battery Sound. Instruments in Freedman's arsenal include a Fairlight CMI 2X, LinnDrums, a Steinway B, a Voyetra 8, Yamaha DX7s, Roland Juno-60, ARP 2600, Hammond B-3, Farfisa, Fender Rhodes and Slingerland drums, as well as an extensive sound library with everything from barking dogs to crash sounds.

The advent of the computer music age has inspired Freedman, but he is aware that "things are getting scary for the instrumentalist. Now that you can sample acoustic instruments, you can hear a violin sound and add it. But though a computer can't sound like Miles Davis or Jimi Hendrix, the memory is such that now you can capture phrasing, so instead of just single notes, if you like the way someone plays, you can capture not only the notes, but the whole phrasing. You can get the feel, the emotion, the way someone breathes, into your computer. That's heaven for a composer, but hell for the guy who plays cello."

Battery Sound's staff is comprised of studio manager Psquani Frates, engineer Erik Liljestrand, Freedman's wife, vocalist Abby Wolff (who also assists in publicity and management) and Freedman himself. Owning the studio gives him the power to control when the studio will be rented out, enabling him to work on projects of his own, notably *Powerman*. He calls his indie label/project, "an explosive alternative to pop/rock muzak." The fourth album on his own Battery Sound label was just released, titled *One Piece at a Time*.

"I'm really puzzled by today's music scene," Freedman says. "There are great rhythm sections, great sounds, lousy songwriting and the melody has been replaced by the bass drum so we can all boogie while Rome burns. I feel we're in a stage right now that's reminiscent of the early '60s, between Elvis and The Beatles; very homogenous."

Clients from all over the city make the trek downtown to Battery Sound, though the proximity of Wall Street attracts some corporate firms, such as Drexel & Lambert for voice-over work. Regular clients include Peter Zummo, David Van Tieghem, Arthur Russell and Peter Gordon.

"We have record dates, jingles, basically the same range that any studio draws," Freedman says. "But what makes us different is our attitude. When people ask me if I live in the studio, I take it as a compliment. I view Battery Sound this way: I'm a composer, and an engineer, and I'm doing something that's good for the industry. That's where the glory is, in a synthesis of technology and musical ideas. That's our goal here, to pull that synthesis off." ■

—FROM PAGE 159, DUPE

incorporated Dolby HX Pro and allowed much higher levels of HF to be recorded at 3.75. Even so, it was still apparent that the real answer to quality was to use a master which had been recorded at 7.5 ips. Those who now run at 64:1 on 3.75 ips masters may well think that these are bold words, so let me present the results of some tests I performed using two Otari MTR-10s and a Nakamichi 1000 ZXL. I think you will find the results both interesting and conclusive.

To begin with, the playback amplifiers of all three machines were set up with the appropriate calibration tapes. While we achieved a perfectly flat response on the Otari MTR-10s, the 1000 ZXL had a slight rise at the top end of the frequency response due to the difference in opinion of Nakamichi and the I.E.C. concerning the 120 microsecond replay equalization curve. On a personal note, I think Nakamichi should fall in line with the rest of the industry and would advise all professional users of their machine to set their Nakamichi decks to the I.E.C. standard which has been universally accepted.

The tests were carried out using a Sound Technology 1510A Tape Recorder/Audio Test system.

[Table 1]

Using the Sound Technology analyzer, the high frequency maximum output level (M.O.L.) of various tapes was measured on the three machines.

Note: Although Sound Technology refers to this test as M.O.L. I would rather refer to them as compression, for this is what it really is. The analyzer is increasing the input signal in one decibel steps and measuring the amount of compression.

[Table 2]

As the results show, the 3.75 ips master has far less output than the 7.5 ips master, or indeed the cassette, at high frequencies.

As a further development of this test, we connected the Nakamichi in series following the master recorder and tested the overall dynamic range.

The dynamic range was determined by measuring the CCIR weighted bias noise and the M.O.L. at 1kHz (3% D3) and 15kHz (as detailed).

[Table 3]

The difference in dynamic range between the two master speeds is 7.0 dB when using chrome tape and 3.0 dB with ferric tape.

These figures are obviously significant, showing clearly that the restriction in high frequency performance is the master itself and not the cassette tape and while it is fair to say that a real time recorder like the Nakamichi 1000 ZXL can out-perform a high speed slave, we must remember that the Nakamichi did not have the benefit of

Dolby HX Pro.

These tests, when repeated on both Otari MTR-10s and Studer A80s, showed minor differences. Additional testing with Ampex and Agfa tape showed no significant differences either. Therefore, the dramatic reduction and high frequency M.O.L. must be related to the slower 3.75 ips mastering speed, rather than to the tape or the machine.

Laboratory results are one thing, direct comparison is another, even if you do not have "golden ears." During a recent demonstration in San Francisco and before many of their peers, AMI/Concept Design carried out the ultimate in A/B comparisons by comparing a Compact Disc with a high speed duplicated cassette. While the audience watched, AMI made a running master from the CD, duplicated it onto BASF chrome tape at 64:1 using the 480 ips bin, and after loading the tape into a cassette, played it back on the Nakamichi. The result was the best sound quality I have ever heard on pre-recorded cassette, and I was not alone in this opinion.

In developing the new bin, Concept Design has reached a new level in analog duplicating technology which could make a significant contribution to improving this popular medium. ■

Table 2 - High Frequency Compression (M.O.L.)

Chrome Cassette tape and Ampex 456 B 7.5 & Agfa 526 B 3.75					
Tape.	Input.	Cassette	7.5 ips	3.75 ips	
20kHz	+ 5.0	-22.0	+1.8	N/A	
	0.0	-16.1	+1.2	N/A	
	- 5.0	- 6.1	+1.7	-18.6	
-10.0	- 2.3	- 2.1	-2.3		
	Freq.	Input.	Cassette	7.5 ips	3.75 ips
	15kHz	+ 5.0	-11.3	0.0	N/A
	0.0	- 4.2	-0.1	-8.0	
	- 5.0	- 1.6	-0.3	-3.2	
	-10.0	- 0.9	-0.4	-0.2	
Freq.	Input.	Cassette	7.5 ips	3.75 ips	
	10kHz	+ 5.0	- 4.0	-0.3	-4.7
	0.0	- 1.0	-0.1	-0.8	
	- 0.5	- 1.2	0.0	-0.9	
	-10.0	- 0.7	-0.2	-0.7	

Table 3 - Dynamic Range of Otari MTR-10/Nakamichi 1000 ZXL

Master Speed	Tape Master	Cassette	Dynamic range	
			1kHz	15kHz
7.5	Ampex 456	BASF Chrome	53.0	49.0
7.5	Ampex 456	BASF LHD	51.5	42.5
3.75	Agfa 526	BASF Chrome	50.3	42.8
3.75	Agfa 526	BASF LHD	50.5	39.0



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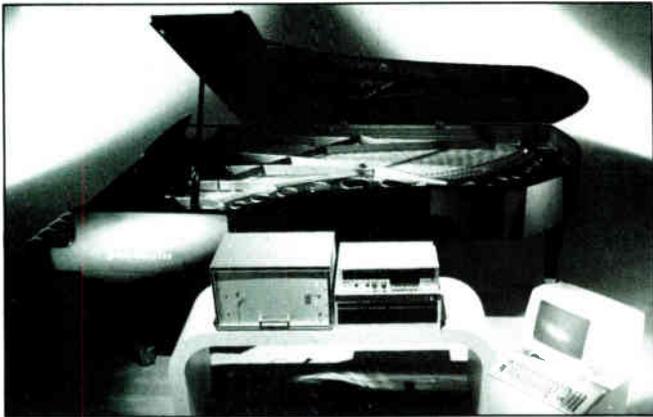
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—FROM PAGE 95

built-in 3½-inch disk drive, an available library of sounds and programs (ranging from orchestral voicings to special effects), and 128K of internal memory for user-sampling. The Mirage Digital Multi-Sampler is priced at \$1,395, including two Ensoniq sound library diskettes.

Circle #154 on Reader Service Card



Bosendorfer Computer Piano System

A computer-based system to enhance recording and expedite studio sessions has been announced by Bosendorfer Pianos of Vienna and Kimball International, Inc., of Jasper, Indiana. Named the Bosendorfer 290 SE, the system is built into the 9-foot, 6-inch Imperial Bosendorfer grand piano, and operates by scanning the keyboard 800 times per second as the piano is being played, digitally coding all piano functions, then recording them on audio tape. The tape playback activates the piano to reproduce the performance with every note, every nuance the same as it was originally performed. By loading the performance onto the computer, any aspect of that performance can be edited at the computer. The system's precise playback capability also allows for more experimentation with microphone selection and placement.

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telcom c4E Compander Card

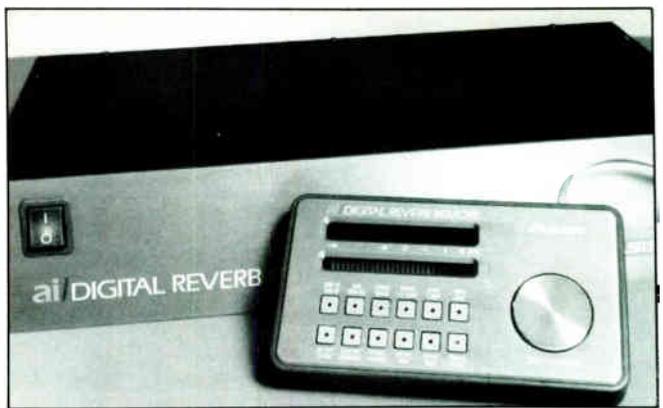
ANT Telecommunications have unveiled their telcom c4E compander card, designed for audio noise reduction applications in audio and video recorders, as well as satellite, cable, microwave, and line transmissions. The new card has the benefits of a more compact design (4x6¼x¾ inches) with reduced power consumption, while still offering full interchangeability with other telcom c4 cards. The compact, double-sided c4E card contains 70 op amps and 8 VCAs on one side; the other side has 350 surface mounted devices. External LEDs indicate operational status: encode on, ID tone to encode line/decode line, and decode on. The c4E is available for both OEM and end-user applications and is distributed in the U.S. by Solway, Inc., of Hollywood, Florida.

Circle #156 on Reader Service Card

Electro Sound Series 5000 Update

Electro Sound, Inc. of Sunnyvale, California, have announced that their Series 5000 high speed duplicating system is now available in 64:1 as well as 32:1 configurations. The modified equipment has a frequency response that is ± 2 dB out to 10 kHz. Slave prices will remain the same at \$8,200 each, and the master equipped with 32:1/64:1 convertible options will sell for \$16,400. Masters with 32:1 only will continue to sell for \$15,500. Conversion kits for existing 5000 systems are also available.

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Alesis AI Digital Reverb

The AI system from Alesis (Los Angeles, CA) is a mono in/stereo out digital reverb package comprised of a rack mounted processor and a hand-held remote (linked to the main unit via a standard, 6-conductor modular telephone-type cable). All system controls, parameter manipulation and program storage is contained in the remote, for complete portability—developed programs can be stored in the remote's memory for use with any other AI processor at any other location. Ninety user program spaces are provided in non-volatile memory, as are ten factory "seed" programs.

In addition to modifying, recalling and storing programs, the remote also allows naming programs (up to 12 characters), and accessing a large bank of "help" messages. Variables accessible via the remote include level meter input select, MIDI channel, memory protect, system gain, high/low frequency response limits, stopped decay time, running decay time, reverb size, dynamic decay delay, low/mid frequency decay time ratio, low/mid crossover frequency, reverb depth, HF damping, early and late diffusion, slapback delay, slapback amplitude, and predelay.

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Shure FP42 Stereo Mixer

Shure Brothers Inc., Evanston, Illinois, have introduced the FP42 Stereo Mixer, designed for professional stereo remote broadcast and field production applications. The FP42 provides users with two outputs (one for each stereo channel) and four input channels, all switchable for mic- or line-level operation. Each input channel includes a level control, center-detented stereo pan pot, and a pull-pot cueing feature for cueing or checking each input via headphones. The FP42 also features a concentric stereo master level control for additional mixing flexibility.

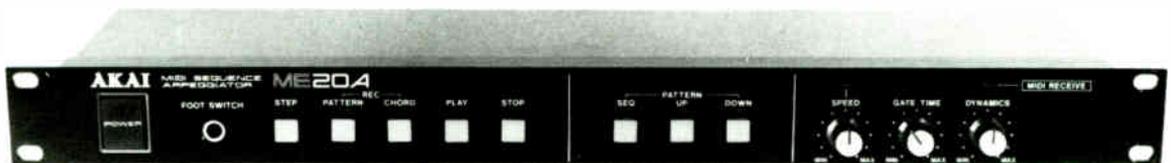
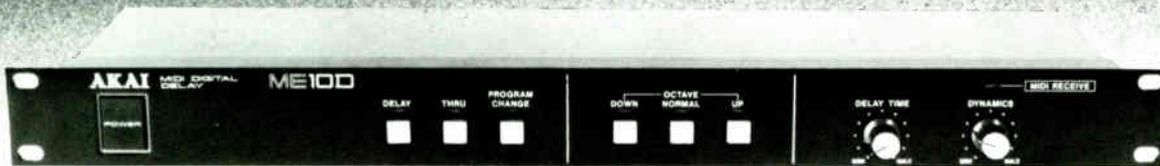
The mixer, priced at \$700, may be AC or battery operated and includes a tone oscillator for line and level checks, a direct mix bus, and phantom power for condenser microphone operation. The dual VU meters, which are calibrated for +4 and +8 dBm, also are equipped with LED overload indicators.

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ME-10D

MIDI DIGITAL DELAY

The ME-10D directly delays the MIDI signal with a maximum of 1000 M/Sec. Also, you can raise or lower the MIDI signal by one octave. Superb frequency response is achieved that was previously impossible by applying delay to the audio output! Try it . . . you'll buy it!

\$149.95

ME-15F

MIDI DYNAMICS CONTROLLER

Now, utilizing the ME-15F, the MIDI signals can be intelligently mixed together without deterioration of sound quality. Only now is it possible to interconnect two sequencers through the ME-15F to change the dynamic data at the data editing stage.

Every MIDI player needs this controller in his system.

\$149.95

ME-20A

MIDI SEQUENCE ARPEGGIATOR

The ME-20A Sequence Arpeggiator allows you to play arpeggios with the chords that have been input from a MIDI keyboard and other instruments. This device also can be used as a polyphonic sequencer up to 1056 notes with step-by-step input. Three different arpeggio patterns including up, down and sequence can be selected from the front panel. Sequences and arpeggio patterns with rests can easily be arranged. The ME-20A is ideal during rehearsals and live performances because of the volume for just the arpeggios, staccatos and regattos.

This arpeggiator is an effects device that is a must for every performance!

\$149.95

\$10.00 Factory Rebate!
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Another Product of 

For more information, contact:

AKAI PROFESSIONAL PRODUCTS

P.O. Box 2344, Fort Worth, Texas 76113
Telephone (817) 336-5114, Telex 163203 IMCTX UT, FAX (817) 870-1271

Circle #092 on Reader Service Card

World Radio History

TAPES

TO

DISK

Listings of Mastering, Pressing and Tape Duplication Facilities
Throughout the United States

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CENTRAL	PAGE 180
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OUTSIDE U.S.	PAGE 205

Mix listings procedure: Every month, **Mix** mails questionnaires to recording studios and/or other vital facilities and services for the recording, sound and video production industries. Basic listings (name, address, contact) are provided free of charge. Extended listings (equipment, credits, specialization), and photographs or company logos may be included at a nominal charge. If you would like to be listed in a **Mix** Directory, write or call Lauri Newman, **Mix** Directories, 2608 Ninth Street, Berkeley, CA 94710, (415) 843-7901.

Upcoming Directory Deadlines:
Video Production & Post-Production Facilities:
January 2, 1986
Northeast U.S. Recording Studios:
February 3, 1986
Remote Recording & Sound Reinforcement:
March 1, 1986

TAPE TO DISK

Listings of Mastering, Pressing and Tape Duplication Facilities Throughout the United States

Eastern

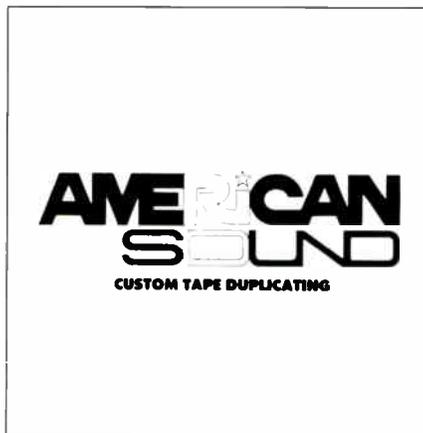
AAA RECORDING STUDIO
MASTERING, PRESSING, TAPE DUPLICATION
CD SERVICES
130 W. 42nd St. (Room 551), New York, NY 10036
(212) 221-6626
Contact: Warren Allen Smith, owner

ALPHA RECORDING INC.
TAPE DUPLICATION
207 S. Mulberry St., Elizabethtown, KY 42701
(502) 765-7899
Contact: Jim Cottrell, manager

ALPHA RECORDS, INC.
PRESSING
1400 NW 65th Ave., Plantation FL, 33313
or Box 15011, Ft. Lauderdale, FL 33318
(305) 587-6011
Contact: Dick Smith, president

AMERICAN MULTIMEDIA INC.
MASTERING, TAPE DUPLICATION
Rt. 8, Box 215-A, Tucker St. Ext., Burlington, NC 27215
(919) 229-5559
Contact: Tim Mellard, plant manager

AMERICAN SOUND/ATLANTA
TAPE DUPLICATION
2225 Faulkner Rd. N.E., Atlanta, GA 30324
(404) 633-4577
Contact: Stan Lester, regional sales mgr.
TAPE DUPLICATION
Duplicator: Electro Sound Models 8000, 6000, 4000.
Capacity: 10,000.
Method of Duplication: In cassette, bin loop.
Mastering Equipment: Ampex, Revox, Dolby, dbx, Audio-arts, Pultec, JBL, Tascam.
Tape Used: Capitol Magnetics, CBS.
Shell Used: ICM, Magnetic Media Review.
Duplicating Speed: 32:1 stereo; 64:1 mono; 32:1 8-track.
Loading Equipment: King Instruments 790, 760, 600.
Packaging Equipment/Fulfillment Services: Shape inserters, Scandia wrappers.
Rates: Upon request.



AMERICAN SOUND/ATLANTA
Atlanta, GA

Other Services: Video duplication: Sony BVH 2000 (2 hr. oap.), Sony 5800, Panasonic AG 68005 Hi-fi, Sony SLO-1400 Beta Hi-fi, Sony 5600, King 590 loader.

APON RECORD CO. INC.
MASTERING, PRESSING, TAPE DUPLICATION
P.O. Box 3082, Steinway Station
Long Island City, NY 11103
(718) 721-5599
Contact: Andrew M. Poncic, president

PAT APPLESON STUDIOS, INC.
TAPE DUPLICATION
1000 NW 159th Dr., Miami, FL 33169
(305) 625-4435
Contact: Pat Appleson, president

ASSOCIATED AUDIO SERVICES
MASTERING, TAPE DUPLICATION
18 Westchester Ave., Portchester, NY 10573
(914) 937-5129
Contact: Andrew Dolph, chief

ATLANTIC STUDIOS
MASTERING, CD SERVICES
1841 Broadway, New York, NY 10023
(212) 484-6093
Contact: Frank Tabino, asst. manager
MASTERING
Cutting Lathes: Neumann VMS-70, Zuma, SAL-74B.
Console: Transformerless Neumann.
Tape Machines: Studer A-80.
Monitor Speakers: UREI 838, w/Bryston 4B (bi-amped).
Signal Processing: Sonlec parametric, EMT compressor, EMT-252.
Engineers: Dennis King, Sam Feldman, Elliott Federman.
Rates: 12-inch, \$110; 7-inch, \$40.
Credits: Springsteen, Led Zeppelin, Genesis, Foreigner, Yes, AC/DC, Rolling Stones, Carly Simon.
Other Services: Digital mastering, direct-to-disk.
COMPACT DISC
Preparation/Manufacturing: Sony 1610, DAE 1100, BVU-800 Compact Disc mastering system; computer controlled Compact Disc analyzer.

AUDIBLE IMAGES
TAPE DUPLICATION
22 Cambria Point, Pittsburgh, PA 15209
(412) 821-2648
Contact: Jay Dudt, owner

AUDIO ANTICS
TAPE DUPLICATION
89 Massachusetts Ave., Boston, MA 02115
(617) 731-9449

AUDIO CRAFT CO.
MASTERING, TAPE DUPLICATION
2701 E. Sunrise Blvd., Suite 401
Ft. Lauderdale, FL 33304
(305) 563-0553, Toll Free 1-800-432-0405 (FL)
Contact: Joe Smith, Mark Auld, managers

MASTERING
Tape Machines: Nakamichi digital processing, Otari, Revox, Technics.
Signal Processing: EXR, Burwen, UREI, Orban, dbx, Dolby, Symetrix, Thompson, Technics, Crown.
Engineers: Mark Auld.
Rates: Upon request.
TAPE DUPLICATION
Duplicator: TEAC, MCI, Sony, Real-time duplication, bin loop.
Capacity: Growing.
Method of Duplication: Cassette, bin loop.
Tape Used: Agfa, 1612, BASF, Chrome.
Shell Used: Magnetic Media, Shape.
Duplicating Speed: 1-7/8-64:1.
Loading Equipment: King.
Packaging Equipment/Fulfillment Services: Yes.
Rates: Upon request.
Other Services: Video duplication, VHS & Beta Hi-duplication.

AUDIO DIGITAL INC.
div. Studio Magnetics Group
TAPE DUPLICATION
12 Long Island Ave., Holtsville, NY 11742
(516) 289-3033
Contact: Paul Glantzman, sales manager

AUDIO IMAGE
TAPE DUPLICATION
95 Little Tree Ln., Hilton, NY 14468
(716) 392-9500
Contact: Larry Ellis, owner

AUDIO RECORDING AND DUPLICATING
TAPE DUPLICATION
323 Santa Villa Dr., Milton, FL 32570
(904) 994-9297
Contact: Ty Bracken, owner, engineer

AUDIO VISUAL COMMUNICATIONS INC.
TAPE DUPLICATION
435 Crooked Ln., King of Prussia, PA 19406
(215) 272-8500
Contact: J. Butterworth, president

AUDIOMATIC/AUDIO MATRIX
TAPE DUPLICATION, CD SERVICES
400 Madison Ave., New York, NY 10017
(212) 308-6888
Contact: M.B. Gelland, president
TAPE DUPLICATION
Duplicator: Electro Sound.
Method of Duplication: Bin loop.

Duplicating Speed: 64:1 / 32:1.
Other Services: Sale of duplicators, loaders, Apex on cassette printer, etc.
COMPACT DISC
Preparation/Manufacturing: Manufacturer of Electroforming equipment for C.D. fathers, mothers, stampers.

BEECHTREE RECORDING STUDIO
MASTERING
2804 Beechtree Dr., Sanford, NC 27330
(919) 774-8926
Contact: Bill Tripp, president

BLACKWOOD MUSIC GROUP
MASTERING, PRESSING, TAPE DUPLICATION
Box 17272, Memphis, TN 38187
(901) 377-8825
Contact: Ron Blackwood, president/owner

BROCCOLI RABE ENTERTAINMENT COMPLEX
CD SERVICES
15 Gloria Ln., Fairfield, NJ 07006
(201) 575-7460
Contact: Bo-Blaze, studio manager

BURG MUSIC COMPANY
TAPE DUPLICATION
219 M St. NW, Washington, DC 20001
(202) 737-9111
Contact: Jerome Washington, operations mgr.

BURLINGTON AUDIO TAPES, INC.
TAPE DUPLICATION
106 Mott St., Oceanside, NY 11572
(516) 678-4414
Contact: David J. Schwartz, V.P./mktg.

CAMBRIDGE VIDEO GROUP
MASTERING, TAPE DUPLICATION
77 Huron Ave., Cambridge, MA 02138
(617) 876-5682, 884-2826
Contact: David Titus, producer

CAPE COD AUDIO
TAPE DUPLICATION
80 Enterprise Rd., Hyannis, MA 02601
(617) 775-1710
Contact: Chip Davis, president

CASSETTE PRODUCTIONS INC.
TAPE DUPLICATION
109 Prospect Pl., Hillsdale, NJ 07642
(201) 666-3300
Contact: Wendy Konins, V.P.
TAPE DUPLICATION
Duplicator: 6 custom designed Dubbings high-speed duplicators w/ 14 slaves each.
Capacity: 70,000.
Method of Duplication: In cassette, bin loop.
Mastering Equipment: Ampex, Otari.
Tape Used: BASF CrO₂, BASF LHD, Ampex 406/407.
Shell Used: Various.
Duplicating Speed: 8:1, 16:1, 32:1.
Loading Equipment: King 790, TTL 515.
Packaging Equipment/Fulfillment Services: All forms.
Rates: Write for price lists.
Other Services: 1:1 Audiophile duplication; high-speed in-cassette duplication.

CELESTIAL SPIRIT MUSIC
TAPE DUPLICATION
P.O. Box 300, New Lebanon, NY 12125
(518) 794-7860
Contact: Mikhail Horowitz, owner/chief eng.

CENTRAL AUDIO VISUAL
TAPE DUPLICATION
1212 S. Andrews Ave., Ft. Lauderdale, FL 33316
(800) 447-TAPE, (FL) (800) 432-3756
Contact: Gail Fitzgerald, production mgr.

DICK CHARLES RECORDING
MASTERING, TAPE DUPLICATION
130 W. 42nd St. #1106, New York, NY 10036
(212) 819-0920
Contact: Dick Charles, president/owner



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DMM Custom Pressing—
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CHARLIE & CO.
TAPE DUPLICATION
 5500B Crestwood Blvd., Birmingham, AL 35212
 (205) 592-3601
 Contact: Charles Colvin, president

CHESTNUT SOUND, INC. RECORDING STUDIOS
TAPE DUPLICATION
 1824 Chestnut St., Philadelphia, PA 19103
 (215) 568-5797
 Contact: Joseph F. Alfonsi, Jr., president; Leslie Chew, audio engineer.

COMMUNICAIDS, INC.
TAPE DUPLICATION
 229 N. Henry St., Alexandria, VA 22314
 (703) 549-4424
 Contact: Greg Powers, audio engineer

COOK LABORATORIES, INC.
MASTERING, PRESSING, TAPE DUPLICATION
 375 Ely Ave., Norwalk, CT 06854
 (203) 853-3641
 Contact: Emory G. Cook, president

COTTAGE INDUSTRIES
TAPE DUPLICATION
 P.O. Box 40, Providence, RI 02901
 (401) 273-8473
 Contact: Stewart Counts, owner

CRAIG RECORDING STUDIOS
TAPE DUPLICATION
 Suite 101, Benjamin Fox Pavilion, Jenkintown, PA 19046
 (215) 885-8600
 Contact: Michael Gallagher, manager

CRYSTAL CITY TAPE DUPLICATORS, INC.
TAPE DUPLICATION
 48 Stewart Ave., Huntington, NY 11743
 (516) 421-0222
 Contact: Frank Russo, president

TAPE TO DISK

Listings of Mastering, Pressing and
 Tape Duplication Facilities
 Throughout the United States

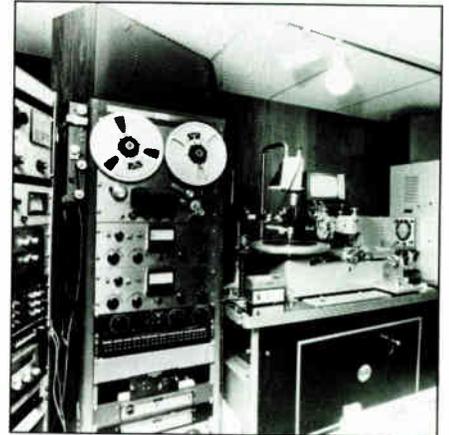
Eastern

TAPE DUPLICATION
 Duplicator: Otari DP7500 bin loop system.
 Capacity: 12,000 pieces per shift, per day.
 Method of Duplication: In cassette, bin loop.
 Mastering Equipment: Otari MTR-12, 2-track; Otari MTR-10 4-track w/Dolby HX.
 Tape Used: CBS.
 Shell Used: Data Packaging, IPS.
 Duplicating Speed: 32:1, 64:1.
 Loading Equipment: King, Electro-sound.
 Packaging Equipment/Fulfillment Services: Shrink wrap, inserts, custom labels.
 Rates: Please contact Frank Russo for rates.
 Other Services: Apex on-cassette printing.

CUE RECORDINGS INC.
TAPE DUPLICATION
 1156 Ave. of Americas, New York, NY 10036
 (212) 921-9221
 Contact: Bruce Kaiser, VP.

CUSTOM RECORDING & SOUND, INC.
TAPE DUPLICATION
 1225 Pendleton St., Box 7647, Greenville, SC 29610
 (803) 269-5018
 Contact: Jere Davis, general mgr.

CUSTOM TAPE DUPLICATORS, INC.
TAPE DUPLICATION
 341 Hill Ave., Nashville, TN 37210
 (615) 256-1728
 Contact: Michael Tant, general mgr.



THE CUTTING EDGE
 Ferndale, NY

THE CUTTING EDGE
MASTERING, PRESSING, TAPE DUPLICATION
 P.O. Box 217, Ferndale, NY 12734
 (914) 292-5965
 Contact: Paul Gerry, owner/chief cutting engineer.
MASTERING

Cutting Lathes: Scully Lathes w/Westrex 3DII cutterhead; Ransteele Audio 250 watt/channel cutting amps; video monitoring.
 Console: Custom-built, suited for direct to disk.
 Tape Machines: Ampex 351 specially modified for tape to disk transfer.
 Monitor Speakers: JBL 4311s, Auratone, Altec Voice of The Theatre.
 Signal Processing: Fairchild 670 compressor; Ashly Parametric EQ, graphic EQ, Pultec EQ, UREI 1176N, Dolby A&B, dbx I and II, Aphex Exciter, Symetrix noise reduction, UREI 550 filter, Fairchild Conax HFL, other misc. outboard gear.
 Engineers: Paul Gerry.
 Rates: 12-inch, \$90/side; 7-inch, \$40/side; client attendance, \$65/hr; other services available—write for brochure.
 Credits: List available on request.
 Other Services: Direct to disk, plating, pressing, tape duplicating, sleeve and jacket production.

PRESSING
 Presses: All 12-inch production is audiophile quality by an outside facility if needed.
 Rates: On request—also included in brochure.
 Other Services: Labels, design and jacket production, printed sleeves—7" and 12".

TAPE DUPLICATION
 Rates: On request—also included in brochure.
 Other Services: Packaging, art work, label, insert design.

D & G MASTERING
MASTERING, PRESSING
 P.O. Box 370, Englishtown, NJ 07726
 (201) 446-2411
 Contact: Don Van Gorden, owner

DEE-BEE RECORDING SERVICE
TAPE DUPLICATION
 704 9th Ave. So., Myrtle Beach, SC 29577
 (803) 448-8091
 Contact: Stan Deppen, partner

DESTINY RECORDING STUDIO
PRESSING, TAPE DUPLICATION
 81 Nassau Ave., Wilmington, MA 01887
 (617) 658-8891
 Contact: Larry Feeney, owner/engineer

DISC COMMUNICATIONS LTD.
MASTERING, PRESSING, TAPE DUPLICATION
 1776 Broadway, New York, NY 10019
 (212) 246-6696
 Contact: Jerry Boxer

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DISC MASTERING, INC.
Nashville, TN

DISC MASTERING, INC.
MASTERING, TAPE DUPLICATION, CD SERVICES
Thirsty Music Sq. West, Nashville, TN 37203
(615) 254-8825

Contact: Randy Kling, president

MASTERING

Cutting Lathes: Neumann VMS 70 Lathe w/SX-74 head.
Console: Neumann SP75 console w/Neve 2087 custom EQs.

Tape Machines: Studer A-810, Studer A-80 MK II.
Monitor Speakers: Tannoy Super Reds (Lockwood Cabinets), Tannoy NFM-8s, Auratones, Tannoy SRM-10Bs.

Signal Processing: Neve 2087 EQ, Neve limiter/comp., Neumann SAL 74B cutting amplifier.

Engineers: Randy Kling.

Rates: Available upon request.

Credits: Alabama, Chet Atkins, Elvis, James Galway, Mickey Gilley, Vern Gosdin, Waylon Jennings, The Kendalls, The Kinks, Jean Knight, Cristy Lane, Willie Nelson, Dolly Parton, Charley Pride, The Platters, Jerry Reed, Joe Stampley, George Strait, Jimmy Sturr, Jimmy Swaggart, Sylvia, The White Animals, Roger Whittaker, and various Motown artists.

Digital projects on Charley Pride, Moe & Joe, and Porter Wagoner. Disc Mastering was named Country Awards-Mastering Studio 1985, by *Pro Sound News*.

Other Services: Can accommodate all digital formats; Neve digital console (DTC-1), CD master preparation w/PQ coding available October, 1986.

TAPE DUPLICATION

Duplicator: Studer/Revox A-710, B-710 MK II.

Capacity: 160/12 hour day.

Method of Duplication: In cassette.

Mastering Equipment: See list of equipment under mastering.

Tape Used: Capitol Magnetics cobalt tape, TDK.

Shell Used: State-of-the-art, high-tech shells, custom per client.

Duplicating Speed: Real-time (1 x 1).

Loading Equipment: Manually loaded.

Packaging Equipment/Fulfillment Services: Inquire.

Rates: Available upon request.

Other Services: Direct on-cassette printing with minimum order.

COMPACT DISC

Preparation/Manufacturing: Neve digital console (DTC-1), CD master preparation w/PQ coding available October, 1986.



DISKMAKERS INC.
New York, NY

DISKMAKERS INC.

MASTERING, PRESSING, TAPE DUPLICATION

153 W. 46th St., New York, NY 10036

(212) 302-4140, (800) 468-9353

Contact: Ray Kissel, V.P.

PRESSING

Presses: Tracey Val-9.

Capacity: 5,000,000/yr.

Vinyl Used: Tenneco.

Rates: Send for price list.

Other Services: Color separations, jacket printing, 7" & 12" sleeve printing.

TAPE DUPLICATION

Duplicator: Electro Sound.

Capacity: 60,000/wk.

Method of Duplication: Bin loop.

Mastering Equipment: Ampex.

Tape Used: CBS.

Shell Used: Shape.

Duplicating Speed: 32:1.

Loading Equipment: King.

Packaging Equipment/Fulfillment Services: Apex printing, Poly wrap.

Rates: Send for price list.

EASTERN STANDARD PRODUCTIONS INC.

TAPE DUPLICATION

26 Baxter St., Buffalo, NY 14207

(716) 876-1454

Contact: Mark S. Mekker, president

EBS, INC.

TAPE DUPLICATION

P.O. Box 66, Moore, SC 29369

(803) 574-6104

Contact: Duane Evans, president

E.J. PRODUCTIONS

TAPE DUPLICATION

138B Welsh Dr., Lancaster, PA 17601

(717) 397-8904

Contact: Eric W. Johnson, president

ELECTRO SOUND

TAPE DUPLICATION

1290 Motor Pkwy., Hauppauge, NY 11788

(516) 234-2010

Contact: Jim Donahue, general manager

CORPORATE OFFICES

800 Veterans Memorial Hwy., Hauppauge, NY 11788

(516) 724-3700

ELECTRIC MOUNTAIN SOUND, INC.

TAPE DUPLICATION

2021 12th St., Sarasota, FL 33577

(813) 366-2622

Contact: Terry F. Donato, president/owner

THE ENTERTAINMENT GROUP, LTD.

MASTERING, TAPE DUPLICATION

348 Willis Ave., Mineola, NY 11501

(516) 747-5100

Contact: Gregg Raffo, V.P.

EUROPADISK, LTD.

PRESSING

75 Varick St. 4th floor, New York, NY 10013

(212) 226-4401, Telex 710-581-2034

Contact: Mic Holwin, Larry Bassman, production managers

MASTERING

Cutting Lathes: Neumann VMS 82 - DMM (Direct Metal Mastering).

Console: Neumann SP-79-B Disk Mastering console for DMM.

Tape Machines: Sony PCM-1610/DMR2000, Studer DAD-16, Sony 15/30 Preview.

Monitor Speakers: James B. Lansing 250 TI.

Signal Processing: Neumann U-473 lim/comp, OE-DUO parametric EQ, VAB vertical limit.

Engineers: James P. Shelton.

Rates: Call for rate card and brochure.

Credits: Madonna, Asia, James Galway, Vienna Phil., New York Phil., Yo Yo Ma, Columbia Masterworks, RCA Red Seal, Warners, Atlantic, Sire, Island.

Other Services: Direct Metal Mastering central plating and audiophile LP record pressing. Equipped for all digital and analog formats.

PRESSING

Presses: (4) Toolex-Alpha, (2) Hamilton.

Capacity: 12,000 LPs/day.

Vinyl Used: Teldec, exclusively.

Rates: Call for brochure and rate card.

Credits: RCA Red Seal, Telarc, Franklin Mint, Musical Heritage, Seiel, Moss MG.

Other Services: The U.S.' only complete Direct Metal Mastering (DMM) mastering, plating and pressing facility.



EVA-TONE INCORPORATED
Clearwater, FL

EVA-TONE INCORPORATED

MASTERING, TAPE DUPLICATION

4801 Ulmerton Rd., Clearwater, FL 33520

(800) EVA-TONE (In Florida 813-577-7000)

Contact: James M. Dunne, V.P./mktg./sales

MASTERING

Cutting Lathes: Scully LS-76.

Console: Custom.

Tape Machines: MCI, Ampex.

Monitor Speakers: Altec Lansing.

Signal Processing: UREI, Sontec, Orban, AMS, Dolby, dbx.

Engineers: Wayne McElhose, Alan LaVerso.

Rates: On request.

TAPE DUPLICATION

Duplicator: Celec Gauss 2400 (2 systems - 10 slaves); Telex 6120 (7 slaves).

Method of Duplication: In cassette, bin loop.

Mastering Equipment: MCI bin loop recorders.

Tape Used: Capitol Magnetics HOLN; Agfa Magnetite, BASF chrome.

Shell Used: ICM; Mag Media; Greencor.

Duplicating Speed: 32:1, 64:1, 128:1; 16:1 (Telex).

Loading Equipment: King, TTL.

Other Services: Stoddard-Apex labelers, J-card printing, mailing.

EXECUTIVE RECORDING LTD.

MASTERING

300 W. 55th St., New York, NY 10019

(212) 247-7434

Contact: Gene Sayet, the boss.

FALK RECORDING SERVICE

TAPE DUPLICATION

7914 Fegenbush Ln., Louisville, KY 40228

(502) 239-1010



FORGE RECORDING STUDIOS, INC.
Malvern, PA

FORGE RECORDING STUDIOS, INC.

TAPE DUPLICATION

P.O. Box 861, Valley Forge, PA 19461

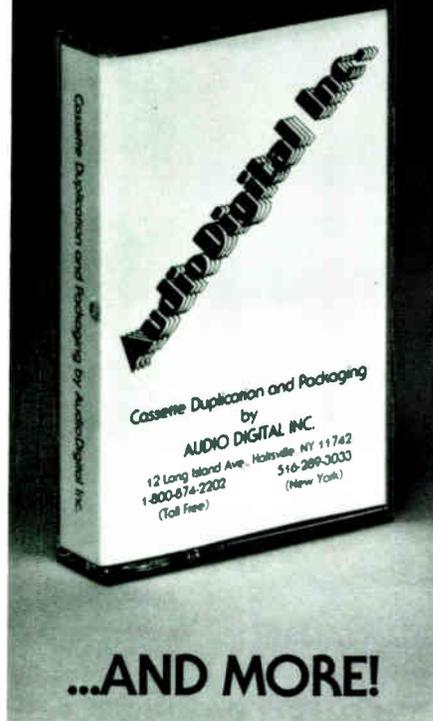
119 Great Valley Pkwy., Malvern, PA 19355

(215) 935-1422, 644-3266

Contact: Warren R. Wilson, president

—CONTINUED ON PAGE 170

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YOU'D EXPECT...**



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Duplication on
Agfa 612 Magnetite
at Reasonable Prices**

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and Demo Tape

1-800-331-0405

Circle #096 on Reader Service Card

TAPE TO DISK

Listings of Mastering, Pressing and
Tape Duplication Facilities
Throughout the United States

—FROM PAGE 169

MASTERING

Machines: Ampex ATR-104; Scully, 3M 8-track 1".
Console: Audiotronics.
Tape Machines: Ampex ATR 102 ¼" & ½".
Monitor Speakers: JBL.
Signal Processing: Valley People noise gates; graphic EQ;
AKG reverb; all type noise reduction, dbx limiters.
Engineers: WR. Wilson.
Rates: \$35/hr. plus tape-reel & box.
Other Services: Label printing and packaging.
TAPE DUPLICATION
Duplicator: 2-MTI.
Capacity: 10,000/day.
Method of Duplication: Bin loop 64:1, 32:1 ½".
Tape Used: Agfa, Ampex, CBS, BASF, Mag Media.
Shell Used: Mag Media, IPS, Elmar, MTI, Shape.
Duplicating Speed: 64:1, 32:1.
Type of Loading: King 790.
Packaging Equipment/Fulfillment Services: All packag-
ing and drop shipping services.
Rates: Upon request.

FRANKFORD/WAYNE MASTERING LABS, INC. MASTERING, CD SERVICES

1697 Broadway, 14th floor, New York, NY 10019
(212) 582-5473
Contact: Norvell Miller, general manager; Tom Steele, president/
chief engineer

MASTERING

Cutting Lathes: (4) Scully/Ranstele automated quartz
lock lathes w/Block Compudisk computers and Neumann
SX-74/Ranstele Cutter Drive Systems; (2) Neumann lathes
w/Technics quartz drive and Neumann SX-74/SAL-74B
Driver and Block Compudisk control computers; (2) Scully
Westrex lathes w/Capps computer and Westrex 3DIIAH
cutterheads and Ranstele Driver Systems.
Console: (5) Custom/proprietary Ranstele Audio con-
soles w/full equalization and processing facilities; analog
and digital capable; transformerless.
Tape Machines: (5) Sony/MCI JH-110M ¼" and ½". (3)
Sony/MCI JH-110C 2-track, (6) Technics RS-1520 profes-
sional 2-track, (4) Technics cassette decks, Sony 2700 Beta
Hi-fi, (2) Ampex AG-440B 2-track. Digital: Sony BVU-200B,
Sony DMR-2200, Sony VO-5800, Sony 2300 Betamax used
with Sony PCM-10/100, Sony PCM-10/F1, Sony PCM-1600
/1610 digital processors, Sony/MCI and Studer DASH
recorders when available.
Monitor Speakers: (6) JBL-3450B biamped, (2) JBL-4343B
biamped, (2) JBL-4330a, (2) JBL-4311s, (2) B&W 701s, (6)
ADS 300s, (4) Auratone 5Cs, (2) Technics 6060s, (2) Altec
604/Mastering Labs.
Signal Processing: Equalizers by Sontec, UREI, ITI, Pultec,
Ranstele Audio, Orban, Technics Professional, Soundcrafts-
man Pro. Limiters/compressors by Sontec, CBS Labs. Noise
reduction by Dolby and dbx. Proprietary audio processing
equipment by Ranstele Audio. Digital processing by AMS
and Sony.
Engineers: Tom Steele (chief eng.), Herb "Pump" Powers,
Jr., Tom Coyne, Dominick Romeo, Carlton Batts, Chris Geh-
ringer, plus freelance when applicable.
Rates: Client attendance, \$170/hr; LP masters, \$125/side;
45 masters, \$45/side; 12" single masters, \$90/side; LP D/F
refs, \$130; 12" D/F refs, \$75; 45 D/F refs, \$50. Other rates,
including custom pressing packages and digital/CD pre-
pared tapes available upon request.
Credits: Sade, Shannon, Madonna, Scritti Politti, Dan Hart-
man, Radiance, ABC, Paul Young, O'Jays, Teddy Pender-
grass, Debra Harry, Kashif, Human Body, Diana Ross, Fat
Boys, Newcleus.

FRANKFORD/WAYNE MASTERING LABS, INC. MASTERING, CD SERVICES

134 N. 12th St., Philadelphia, PA 19107

(215) 561-1794

Contact: Lynn Steele, gen. mgr.; Clara McLeod, studio mgr.

MASTERING

Cutting Lathes: (3) Scully/Ranstele lathes with Block
"Compudisk" digital control computers equipped with Wes-
trex 3DIIAH cutterheads/Ranstele driver systems; Neu-
mann with Block Compudisk computer and Neumann SX-
74/Ranstele cutterhead driver system.
Console: Custom/proprietary by Ranstele Audio.
Tape Machines: Sony/MCI JH-110M-B ¼" and ½".
Sony/MCI JH-110C 2-track, Technics Pro 1520, 3M M-64
2-track, Ampex/Inovonics custom 2-track, Technics M-65
cassette. Digital recorders/processors: Sony PCM-10/100,
PCM-F1, Sony SL-2300 Beta, Sony VO-5800 U-matic, Sony
PCM-1600/1610 system available from F/W New York.
Monitor Speakers: (2) JBL 4343B, (2) JBL 4330, (2) Altec
604/Mastering Lab, (2) JVC Mini-Monitors, (2) KLH-6.
Signal Processing: Equalizers/filters by Sontec, UREI,
Soundcraftsman Professional; limiters/compressors by Son-
tec, UREI and CBS Labs; proprietary processing equipment
by Ranstele Audio; digital delay systems: Ampex ADD-1,
AMS 15-80.

Engineers: Nimitr "Nim" Sarikananda, Tom Steele.
Rates: LP masters, \$125/side; 45 masters, \$45/side; 12"
single masters, \$90/side; LP ref D/F, \$130; 45 ref D/F, \$50;
12" single ref D/F, \$75; client attendance while mastering,
\$125/hr additional. Other rates upon request.
Credits: The Sound of Philadelphia, Patti LaBelle, The
O'Jays, Grover Washington, Jr., Roxanne, Jones Girls, and
many others.

Other Services: Custom pressing orders—LP, 12" singles,
and 45s.

COMPACT DISC

Preparation/Manufacturing: Analog to Sony PCM-F1,
PCM 10/100 or PCM-1600/1610, PCM-F1 to PCM/1600/
1610.

GALAXY SOUND STUDIOS

TAPE DUPLICATION

1508 Harlem, Tennessee
(901) 274-2726

Contact: Larry Henderson, studio mgr.

GEORGETOWN MASTERS

MASTERING, CD SERVICES

33 Music Square West, Suite 108-B
Nashville, TN 37203
(615) 254-3233

Contact: Denny Purcell, direction eng.

GEORGIA RECORD PRESSING PRESSING

262 Rio Circle, Decatur, GA 30030
(404) 373-2673

Contact: Keith Fields, general mgr.

GLOBE RECORDING STUDIO

MASTERING, TAPE DUPLICATION

1313 Dickerson Rd., Nashville, TN 37207
(615) 226-0812

Contact: Darryl Marlow, technician

GREENCORP, INC.

TAPE DUPLICATION

3505 S. Ocean Dr., Suite 1216, Miami, FL
(305) 925-0707

Contact: David Goldstein, president

GRENADIER

TAPE DUPLICATION

10 Parkwood Ave., Rochester, NY 14620
(716) 442-6209 eves. & weekends

Contact: Tom Greene, owner

TAPE DUPLICATION

Duplicator: Nakamichi realtime (also high speed).

Capacity: 800/day - realtime.

Method of Duplication: In cassette.

Mastering Equipment: Full 24- & 16-track studio & master-
ing facilities available to 2-track analog including noise
reduction.

Tape Used: Agfa Magnetite.

Shell Used: Mag Media.

Duplicating Speed: Realtime 1:1.

Packaging Equipment/Fulfillment Services: All printing
& packaging options available.

Rates: Super quality realtime duplication at high speed
pricing. Please call.

Other Services: Full service multi-track recording/high
speed in cassette duplication (Telex)/highest quality real-
time cassettes.

A.C. HAMPSON PRINTING CO., INC.

168 City Hill St., Union City, CT 06770
(203) 729-2294

Contact: Lucy Pierpont, sales

HANSEN RECORDING
MASTERING, TAPE DUPLICATION
 Capt. Foster Ln., Norwell, MA 02061
 (617) 826-8637
 Contact: Torben Hansen, owner

GEORGE HEID PROD.
TAPE DUPLICATION
 701 Washington, Pittsburg, PA
 (412) 561-3399
 Contact: George Edward Heid, owner

HELFRICH RECORDING LABS
MASTERING, TAPE DUPLICATION
 4444 E. Texas Rd., Allentown, PA 18103
 (215) 395-5511
 Contact: Pete Helfrich, owner

LAWRENCE HERBST INVESTMENT TRUST FUND, INC.
 P.O. Box 741, Lake Charles, LA 70602
 Contact: Dr. Lawrence Herbst, president & admin.

HRM, LTD.
PRESSING, TAPE DUPLICATION
 15 Gilpin Ave., Hauppauge, NY 11788
 (516) 234-0200
 Contact: Brian Wilson, V.P. sales & mktg.

HUB-SERVALL RECORD MFG. CORP.
PRESSING
 Cranbury-So. River Rd., Cranbury, NJ 08512
 (609) 655-2166
 Contact: Barry Ruegg, V.P. sales; Jean Stembel, director customer relations
PRESSING
 Presses: (11) 12" Tracy-Val presses with Hamilton automation.
 Capacity: 25,000/day.
 Vinyl Used: Keyser, Vitec.
 Rates: Upon request.
 Other Services: Plating, jacketing, labels, DJ services, distributor shipping.



IAN COMMUNICATIONS GROUP, INC.
 Wilmington, MA

IAN COMMUNICATIONS GROUP, INC.
TAPE DUPLICATION, CD SERVICES
 10 Upton Dr., Wilmington, MA 01887
 (617) 658-3700
 Contact: Richard Berberian, president
TAPE DUPLICATION
 Duplicator: Otari DP-7000 system, Otari DP-80 w/HX-Pro.
 Capacity: 10,000 C-60 per day.
 Method of Duplication: Bin loop.
 Mastering Equipment: Otari MTR-10-4 LXI.
 Tape Used: Agfa 611, Alga 619, BASF Shell Used: IPS.
 Duplicating Speed: 32:1, 64:1.
 Loading Equipment: AVA 20CL.
Packaging Equipment/Fulfillment Services: Tapemate automated labeling and boxing; complete packaging and fulfillment services.
 Rates: Rate card for orders under 2,000 units; larger units on basis.
Other Services: Full in-house: graphics, typesetting and commercial printing.
COMPACT DISC
Preparation/Manufacturing: CD preparation and mastering from any format to 1610. Rates on request.

INDEPENDENT CLASSICAL RECORDING
TAPE DUPLICATION
 170 West 73rd St., #3C, New York, NY 10023
 (212) 799-0690
 Contact: Dongsok Shin, owner

INDEPENDENT PRODUCERS CORP.
TAPE DUPLICATION
 1609 McGavock St., Nashville, TN 37203
 (615) 244-4236
 Contact: Gail Pollock, production coordinator

INTERNATIONAL CUTTERHEAD REPAIR
MASTERING
 194 Kings Ct., Teaneck, NJ 07666
 (201) 833-4421
 Contact: Sharon Rand, owner/president

KEWALL RECORDING STUDIO & TAPE DUPLICATION
TAPE DUPLICATION
 77 Bayshore Rd., Bayshore, NJ 11706
 (516) 586-2486
 Contact: Keith Gutschwager, owner/engineer

KINURA RECORDS
MASTERING, PRESSING, TAPE DUPLICATION
 Box 660236, Miami Springs, FL 33166
 (305) 887-5329
 Contact: C.R. Hertzburg, owner

THE LACQUER PLACE, INC.
MASTERING
 50 Music Square West, Suite 201, Nashville, TN 37203
 (615) 329-4951
 Contact: Ted Fuller, owner
MASTERING
 Cutting Lathes: Scully w/Capps Computer & Westrex RA-1700 cutting system.
 Console: Custom transformerless.
 Tape Machines: MCI 1/2" & 1/4" mastering deck.
 Monitor Speakers: "Big Reds," Auratones.
 Signal Processing: Compressor/limiters, parametric EQ, filters, Dolby A, dbx 187.

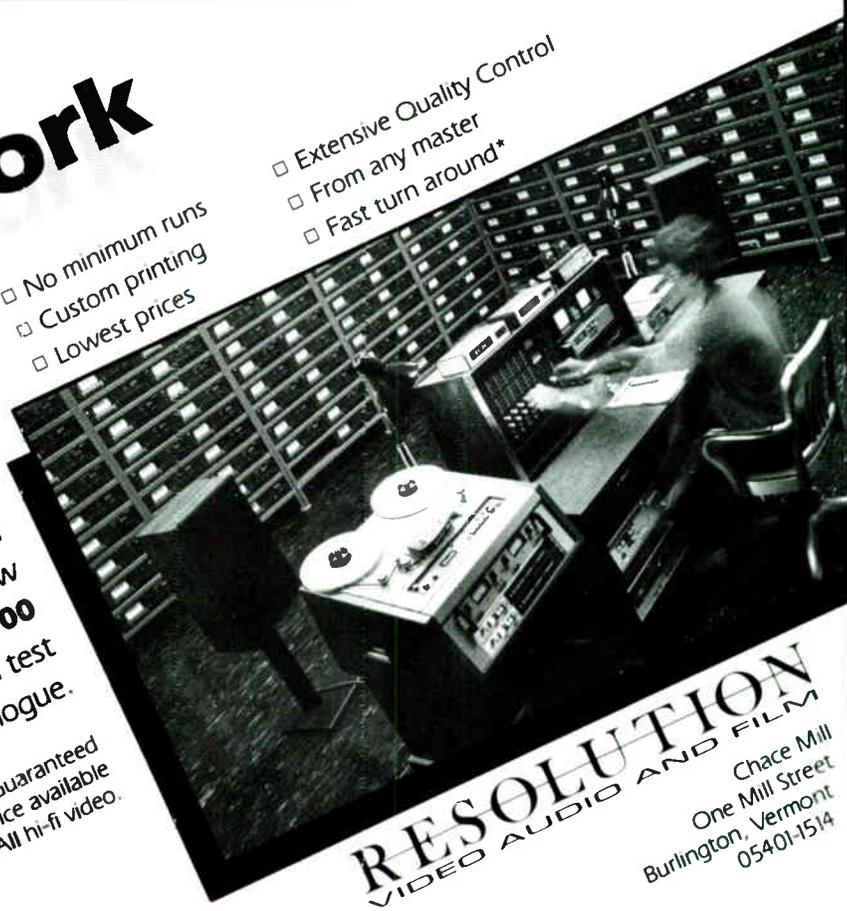
—CONTINUED ON PAGE 172

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EVA-TONE

EVA-TONE INCORPORATED
P.O. Box 7020, Clearwater, Florida 33518
1-800-EVA-TONE (in Florida 813-577-7000)

Circle #099 on Reader Service Card

**TAPE
TO
DISK**

Listings of Mastering, Pressing and
Tape Duplication Facilities
Throughout the United States

—FROM PAGE 171

Engineers: Doug Lawrence, chief engineer.

Rates: Call for rates.

Credits: Under new management with 7 years experience, and over 10,000 records to its credit. The Lacquer Place is prepared to deliver quality product at a reasonable price.

Other Services: Tape copies, consultation.

**LAKE RECORDING STUDIO & VIDEO DEMOS
MASTERING**

RFD 2 Putnam Hill Rd., Sutton, MA 01527

(617) 476-3366, (617) 476-3225

Contact: Phil Berube, owner/engineer

**GERALD LEWIS RECORDING
PRESSING, TAPE DUPLICATION**

216 S. Pershing Dr., Arlington, VA 22204

(703) 521-1871

Contact: Gerald Lewis, owner

LION RECORDING SERVICES, INC.

TAPE DUPLICATION

1905 Fairview Ave., NE, Washington, D.C. 20002

(202) 832-7883

Contact: Richard Lion, sales manager

TAPE DUPLICATION

Duplicator: Audio/Tek, 12 slaves, 8 mono, 4 stereo.

Capacity: 20,000 per day.

Method of Duplication: Bin loop.

Mastering Equipment: Studer.

Tape Used: Agfa, BASF

Shell Used: Magnetic Media, ICM

Duplicating Speed: 32:1.

Loading Equipment: TTL.

Packaging Equipment/Fulfillment Services: Shrink wrap.

Other Services: Labeling, boxing, packaging and shipping.

LOCATION RECORDING, INC.

TAPE DUPLICATION

122 E. Rocks Rd., Norwalk, CT 06851

(203) 371-4757

Contact: Anthony M. Scalisi, chief eng.

LORANGER MANUFACTURING CORPORATION

TAPE DUPLICATION

10-48 Clark St., Warren, PA 16365

(814) 723-8600, (800) 633-0455

Contact: Robert Loranger, president; Kate Campana, tele-marketing dir.

TAPE DUPLICATION

Duplicator: Electro Sound 8000 Series.

Capacity: High volume.

Method of Duplication: Bin loop.

Mastering Equipment: Otari MTR-10, LX4 w/Dolby HX.

Tape Used: Agfa 526.

Shell Used: Loranger.

Duplicating Speed: 64:1, 32:1.

Loading Equipment: King 790.

Packaging Equipment/Fulfillment Services: Scandia packager, bag sealer, blister cards.

Rates: Call.

Other Services: Blank tape, Coleco Adam duplication, realtime duplication.

MAGNETIK PRODUCTIONS

PRESSING, TAPE DUPLICATION

1533 Cherry St., Philadelphia, PA 19102

(215) 563-2010

Contact: Jeff Chester, engineer

MAKIN TRACKS
TAPE DUPLICATION
 75 Summer St., Chelmsford, MA
 (617) 256-4051
 Contact: Hank Rome, engineer

MARION RECORDING STUDIOS
 7 Burdett Place, Fairview, NJ 07022
 (201) 945-1517
 Contact: David C. Bellochio, owner/operator

MARK CUSTOM RECORDING SERVICE
MASTERING, PRESSING, TAPE DUPLICATION
 10815 Bodine Rd., Clarence, NY 14031
 (716) 759-2600
 Contact: Vincent S. Morette, president
MASTERING
 Cutting Lathes: Neumann VMS-70/SX-74.
 Console: Neumann SP-272 transformerless.
 Tape Machines: Studer, Ampex, Nakamichi DMP-100, Beta.
 Monitor Speakers: UREI 813, Yamaha NS-10, Westlake BBS6, various JBL.
 Signal Processing: UREI, dbx, EMT, EXR, Dolby, Polytusion, Lexicon.
 Engineers: Robert Grotke.
 Rates: On request.
TAPE DUPLICATION
 Duplicator: (52) Nakamichi LX-5 "Real Time".
 Capacity: 400 C-60 per 8 hr. shift.
 Method of Duplication: In cassette.
 Mastering Equipment: All formats.
 Tape Used: Agfa Chrome, Magnetite.
 Shell Used: IPS.
 Duplicating Speed: Real time 1 1/2 ips.
 Loading Equipment: Tapematic.
 Rates: On request.
 Other Services: Complete graphics and printing.

MASTER CUTTING ROOM
MASTERING
 321 W. 44th St., New York, NY 10036
 (212) 581-6505
 Contact: Patti Joblon, traffic mgr.



MASTER MIX
 Nashville, TN

MASTER MIX
MASTERING
 1808 Division St., Nashville, TN 37203
 (615) 321-5970
 Contact: Carol, traffic mgr.

MASTERING
 Cutting Lathes: Neumann VMS 70 w/Technics quartz direct drive & Zuma audio preview computer, Neumann SAL 74B transformerless cutter rack, SX-74 cutter head.
 Console: Neumann SP-77 transformerless console.
 Tape Machines: Studer preview machine, 1/2" and 1/4", Studer copy machine.
 Monitor Speakers: John Meyers and Rogers powered by Times One & Hafler amplifiers.
 Signal Processing: Sontec & Neumann equalizers, Sontec and NTP compressors, Dolby and dbx available.
 Engineers: Hank Williams.
 Rates: Call Carol.
 Credits: Lee Greenwood, Deborah Allen, Eddie Rabbitt, Earl Thomas Conley, Statler Bros., Ed Bruce, Sandi Patti, Bill Gaither Trio, and Al Green.
 Other Services: Necam II, Otari equipped remix room, Sony digital.

MASTER SOUND STUDIOS INC.
MASTERING, PRESSING, TAPE DUPLICATION,
CD SERVICES
 1227 Spring St. NW, Atlanta, GA 30309
 (404) 873-6425
 Contact: Bob Richardson, president

MASTERCRAFT ELECTROPLATING INC.
MASTERING, PRESSING
 801 Magnolia Ave., Elizabeth, NJ 07201
 NJ (201) 354-4404, NY (212) 765-7467
 Contact: Desmond Naraine

MASTERDISK CORP.
MASTERING
 16 W. 61st St., New York, NY 10023
 (212) 541-5022
 Contact: Jill Dix, general mgr.



MASTERFONICS INC.
 Nashville, TN

MASTERFONICS INC.
MASTERING, TAPE DUPLICATION, CD SERVICES
 28 Music Square East, Nashville, TN 37203
 (615) 327-4533
 Contact: Margaret or Brenda, office mgrs.
MASTERING
 Cutting Lathes: Neumann/Zuma, Scully/Capps.
 Console: Neumann.
 Tape Machines: Studer, Ampex, JVC digital, Sony
 Monitor Speakers: Westlake, custom.
 Signal Processing: Lots!
 Engineers: Glenn Meadows, Benny Quinn, Milan Bogdan, Butch Carr, Lois Walker.
 Rates: \$130/hr; \$125, LP masters; \$50, 45 masters (per side).
 Credits: Average 50% Country Billboard Charts.
 Other Services: CD preparation, digital editing, format conversion to, from: F1, JVC, Sony.
TAPE DUPLICATION
 Mastering Equipment: JVC digital, F1 Sony, 1/2" and 1/4" analog.
 Tape Used: TDK SA or SAX.
 Duplicating Speed: Real time.
 Rates: Inquire.
 Other Services: Real time cassette duplication (small quantity) 100 or less; high quality.
COMPACT DISC
 Preparation/Manufacturing: Preparation for compact disc, inquire for prices.

MD AUDIO PRODUCTION
MASTERING, TAPE DUPLICATION
 2050 Peachtree Industrial Ct. Suite 113C
 Chamblee, GA 30341
 (404) 458-3692
 Contact: Diane Mitcham, manager

MEMPHIS COMMUNICATIONS CORPORATION
TAPE DUPLICATION
 1381 Madison Ave., P.O. Box 41735, Memphis, TN 38174
 (901) 725-9271
 Contact: Scot Berry, asst. mgr. technical services

MIAMI TAPE INC.
MASTERING, PRESSING, TAPE DUPLICATION
 8180 NW 103rd St., Hialeah Gardens, FL 33016
 (305) 558-9211
 Contact: Carlos O. Garcia, president

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call for registration info

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TAPE TO DISK

Listings of Mastering, Pressing and
Tape Duplication Facilities
Throughout the United States

MILBRODT COMMUNICATIONS, INC.
dba Music & Sound Design Studio
1425 Frontier Rd., Bridgewater, NJ 08807
(201) 560-8444
Contact: Bill Milbrodt, president

MULTITAPE
TAPE DUPLICATION
2112 18th St. NW, Washington, D.C. 20009
(202) 332-1522
Contact: Bruce F. Moyer, president

MUSIC MASTERS, INC.
MASTERING, PRESSING, TAPE DUPLICATION
1212 16th Ave. S., Nashville, TN 37212
(615) 327-4067
Contact: Marge Tanimoto, president

MUSIC SQUARE MANUFACTURING
MASTERING, PRESSING, TAPE DUPLICATION,
CD SERVICES
50 Music Square West, Suite 205, Nashville, TN 37203
(800) 228-9081
Contact: James E. Gray, sales mgr.

Other Services: Editing, reference acetate, 1/2-speed cutting, tape duplication, album packaging.

PRESSING

Presses: (24) Southern Machine & Tool automatics, LPs and 45s.

Capacity: 1,000,000/month.

Rates: 58 LPs, 28 45s, large runs per quote.

Credits: Same as mastering.

Other Services: Complete record packaging.

NATIONAL CASSETTE SERVICES, INC.
TAPE DUPLICATION
613 N. Commerce Ave., P.O. Box 99
Front Royal, VA 22630
(703) 635-4181
Contact: Michael D. McCool, president

NATURAL INNOVATIONS CO.
TAPE DUPLICATION
1756 Broadway, Suite 29K, New York, NY 10019
(212) 489-7204
Contact: Walter Kaye, owner

NEXT STATION STUDIOS
MASTERING, TAPE DUPLICATION
254 New Norwalk Rd., New Canaan, CT 06840
(203) 966-7124, (203) 972-3929
Contact: Michael Smolen, V.P.



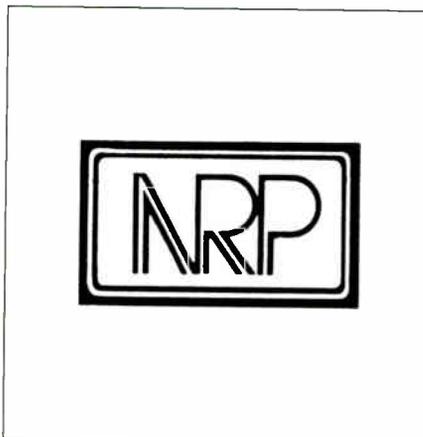
L. NIX & CO. INC.
Memphis, TN

L. NIX & CO. INC.
formerly Ardent Mastering Inc.
MASTERING
2000 Madison Ave., Memphis, TN 38104
(901) 725-0855
Contact: Larry Nix, president
MASTERING
Cutting Lathes: Neumann VMS-70 w/Zuma digital computer control.
Console: Neumann.
Tape Machines: MCI 1/2" 2-track available, Mitsubishi digital.
Monitor Speakers: JBL.
Signal Processing: Neve limiter/compressor, EQ; Neve, Neumann; Outer Ear; Dolby, dbx.
Engineers: Larry Nix, Al Smith, chief engineer.
Rates: On request.
Credits: Bar-Kays, Amazing Rhythm Aces, Jessie Winchester, Robin Trower, Charlie Rich, ZZ Top, Staple Singers, Paul Butterfield, ConFunkShun, J. Blackfoot, Isaac Hayes.

NORTHEASTERN DIGITAL RECORDING, INC.
CD SERVICES
1108 Boylston St. Suite 303, Boston, MA 02215
(617) 353-0963, 753-1192
Contact: Toby Mountain, president

OMNI RECORDING STUDIOS, INC.
TAPE DUPLICATION
44 Abbott Ave., Morristown, NJ 07960
(201) 539-8804
Contact: Rick Kerner, president

OMNI TAPE CORP.
MASTERING, TAPE DUPLICATION
11 Teaneck Rd., Ridgefield Park, NJ 07660
(201) 440-8846
Contact: Peter D'Antoni, V.P.



NASHVILLE RECORD PRODUCTIONS, INC.
Nashville, TN

NASHVILLE RECORD PRODUCTIONS, INC.
MASTERING, PRESSING, TAPE DUPLICATION
469 Chestnut St., Nashville, TN 37203
(615) 259-4200

Contact: George Ingram, co-owner.

MASTERING

Cutting Lathes: Neumann, Zuma & Capps computer two.
Console: Sphere & Neve.

Tape Machines: Studer & MCI.

Monitor Speakers: Electro-Voice Sentry 3s.

Signal Processing: Parametric & graphic EQ, reverb, compressor/limiter.

Engineers: Glen Bullard, chief eng.; John Eberle, studio mgr.; Doug Lawrence, engineer.

Rates: \$80/side, 12"; \$30/side, 7".

Credits: Ronnie Milsap, Amy Grant, Rick & Jenice Carnes, Richard Lee, Sha-Na-Na, Tupperware, American Airlines, U.S. Gov't., PSA, Sperry New Holland, Drifters, Bill Anderson, Dan Seals.

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—FROM PAGE 86, UPDATE

no longer cope at our existing factory. The new premises will give us greater research and development facilities. As a consequence, we will be expanding our areas of research, particularly with reference to the digital control of audio. We are very committed to this field of development and strongly feel that the next generation of audio consoles will have greater emphasis on software control."

Abbey Road Offers PQ Editing For Compact Disc

Following the refurbishment of London's Abbey Road Studios One and Two, the facility has upgraded its highly successful Compact Disc preparation room with the addition of the Philips PQ Subcode Editor—one of the first in the U.K. The Philips LH-04425 Subcode Editor enables Abbey Road's digital audio post-production engineers, Peter Mew and Peter Vince, to add the vital, highly-accurate track and index number data to Sony 1610 digital master tapes destined for CD production. The cost of preparing a fully PQ-Encoded 1610 master is a £300.

Berlin's Studio 54 Goes DASH

West Berlin's chart-topping Studio 54, owned by Music Publishers Budde KG whose artists include Alphaville, George Kranz, Veronika Fischer, The Insisters, and Lake, have taken delivery of a Sony PCM-3324 DASH recorder. Studio 54 joins Hartmann Digital of Bavaria and the broadcast station West Deutsche Rundfunk as the third German facility to install a PCM-3324.



Sony PCM-3324 digital multi-track.

Fairlight Wins Australian Export Award

Fairlight was founded in 1975 with the idea of developing "the ultimate music synthesizer." Ten years later, the company is internationally known for its state-of-the-art computer based mu-

sical instrument, the Fairlight CMI. In 1985, Fairlight has won the "Exporter of the Year, Science and Technology" Award. The Sydney-based company exports 90 percent of its production.

The company was started by two electronics enthusiasts, Kim Ryrie and Peter Vogel, with the aim of creating a much more sophisticated music synthesizer than was then available. The idea of the CMI evolved in Fairlight's workshop in the basement of Kim's grandmother's home on Sydney's waterfront, and was unique in its capacity to "sample" natural sounds which could be played on a music keyboard in standard musical pitch.

Growing rapidly in the past few years,

Fairlight now employs over 60 people in its Sydney office and factory. Approximately one-third are employed in research and development, providing continuous software and hardware updates so that products keep abreast of rapidly-changing technology.

Already introduced at the AES Convention in New York City, the third generation of the Computer Musical instrument will appear at the end of the year. The CMI "Series III" incorporates many of the features of the current CMI, but significantly expands and polishes its functions, offering what is virtually an independent sound production system capable of "orchestrating" up to 80 music channels. ■

The Fairlight CMI "Series III"



O.T.L. PRODUCTIONS
MASTERING, PRESSING, TAPE DUPLICATION
121 Concord Rd. Sudbury, MA 01776
(617) 897-8459

Contact: David "db" Butler, chief engineer

MASTERING

Credits: "The Blend," MCA Records; Randy Roos, "Mistral"
Spoonfed Records.

Other Services: Custom mastering supervision—guaranteed results.

PRESSING

Other Services: Custom pressing supervision. We guarantee quality and satisfaction.

TAPE DUPLICATION

Duplicator: Otari

Method of Duplication: In cassette, bin loop.

Tape Used: Agfa, BASF

Duplicating Speed: 8:1, 32:1, 64:1.

Other Services: Custom supervision from mastering to finished product. Guaranteed quality and satisfaction.

P & P STUDIOS INC.

TAPE DUPLICATION

17 Viaduct Rd., Box 4185, Stamford, CT 06907
(203) 359-9292

Contact: Edgar Bernstein, VP. marketing

PEABODY RECORDING STUDIOS

TAPE DUPLICATION

1 E. Mt. Vernon Place, Baltimore, MD 21201
(301) 659-8136

Contact: Alan P. Kelauber, director of recording

PERLMAN INC.

CD SERVICES

505 Redwood Dr., Box 353, Cedar Hurst, NY 11516
(516) 295-5395

Contact: Bradley J., Perlman Productions

PETER PAN INDUSTRIES

MASTERING, PRESSING

88 St. Francis St., Newark, NJ 07105
(201) 344-4214

Contact: Al Cohen, custom pressing sales mgr.

TAPE TO DISK

Listings of Mastering, Pressing and
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Eastern

POLYGRAM RECORDS TAPE FACILITY
MASTERING, CD SERVICES

10 Distribution Blvd., Edison, NJ 08817
(201) 287-1222

Contact: Dennis M. Drake, studio mgr./chief eng.

PRC RECORDING CO.

PRESSING, TAPE DUPLICATION

422 Madison Ave., New York, NY 10017
(212) 308-2300

Contact: David Grant, president

THE PROCESS RECORDING STUDIOS INC.

3404-E W. Wendover Ave., Greensboro, NC 27407
(919) 855-1941

Contact: Adrienne Hardy, studio mgr.

PROFESSIONAL SOUND FILM & VIDEO, INC.

TAPE DUPLICATION

136 Arlington St., Boston, MA 02116
(617) 423-0007

Contact: Vincent R. Parla, Jr., president

PROGRESSIVE MUSIC STUDIOS

TAPE DUPLICATION

2116 Southview Ave., Tampa, FL 33606
(813) 251-8093



PROJECT 70 AUDIO SERVICES, INC.
Atlanta, GA

PROJECT 70 AUDIO SERVICES, INC.

TAPE DUPLICATION

777 Lambert Dr., Atlanta, GA 30324
(404) 875-7000

Contact: Paula Vester, customer services

TAPE DUPLICATION

Duplicator: Electro Sound 6000 w/6 slaves (mono), Ampex
BLM 200 w/10 slaves (stereo).

Capacity: 8000 cassettes per day (2 shifts).

Method of Duplication: Bin loop.

Mastering Equipment: Otari MTR-10, Scully 280, Ampex
AG440/FR1100, Hill Multimix, Lang PEQ2.

Tape Used: Capitol HOLL, GS-1, Agfa 611, 811.

Shell Used: Mag Media sonic weld, Mag Media live screw.

Duplicating Speed: 32:1.

Loading Equipment: (2) King 790 w/Concept Design
Splitters and software.

Packaging Equipment/Fulfillment Services: Heat and
pressure sensitive labeling, shrinkwrap, etc.

Rates: Upon request a published price list will be sent.

Other Services: Pulsing for slide sync, recording studio for
narration, in-house label printing.

QTI, INC.

A subsidiary of RCA

TAPE DUPLICATION

108 Monticello Rd., Weaverville, NC 28787
(704) 658-2000

Contact: Tom Stevens, manager, materials

QUIK CASSETTE CORP.

TAPE DUPLICATION

250 W. 57th St., Suite 1400, New York, NY 10019
(212) 977-4411

Contact: Ron Klipstein, technical mgr.

THE RECORDING STUDIO

TAPE DUPLICATION

036 Biddle Music Bldg., Duke University
Durham, NC 27708
(919) 664-3460

Contact: Frank Konhaus, manager

REEL DUPLICATORS

TAPE DUPLICATION

723 7th Ave., New York, NY 10019
(212) 398-9550

Contact: J. Ragovoy, president

RELIANCE AUDIO VISUAL CORPORATION

TAPE DUPLICATION

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Contact: Gil M. Meyer, president

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Burlington, VT

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TAPE DUPLICATION
1 Mill St., The Chace Mill, Burlington, VT 05401
(802) 862-8881
Contact: Linda A. Citro, V.P.
(Please see ad in current issue)

RICHARDSON RECORDING
TAPE DUPLICATION
1938 Baltimore Annapolis Blvd., Annapolis, MD 21401
(301) 757-6699
Contact: Charles A. Richardson, president

RKO TAPE CORP.
TAPE DUPLICATION
3 Fairfield Crescent, W. Caldwell, NJ 07006
(201) 575-8484
Contact: Hugh Wallace, V.P./gen. mgr.

ROAR PRODUCTIONS INC.
PRESSING, TAPE DUPLICATION
6655-H Dobbin Rd., Columbia, MD 21045
(301) 596-0600
Contact: Steven Rosch, president

ROMABA RECORD PRESSING CORP.
TAPE DUPLICATION
33 34th St., Brooklyn, NY 11232
(718) 499-3060
Contact: Theodore Kolsky, president

S & S CUSTOM TAPES, INC.
TAPE DUPLICATION
Rt. 4, Box 328-A, Church Hill, TN 37642
(615) 357-TAPE
Contact: Mike Shipley, president
TAPE DUPLICATION
Duplicator: Electro Sound; master & 10 slaves.
Capacity: 84,000/week.
Method of Duplication: Bin loop.
Mastering Equipment: Studer A80 2-track, Studer A80 8-track, Studer A80 QC.
Tape Used: 3M, Ampex, Capitol.
Shell Used: (5) Screw.
Duplicating Speed: 16:1.
Loading Equipment: Automatic.
Packaging Equipment/Fulfillment Services: Apex direct to shell printing, auto insert, Scandia automatic high speed wrapper.
Rates: Call or write for quotes.
Other Services: Full service for cassette and 8-track, insert printing, pancake duplicating, running masters (1"), supplier to other duplicators.

SADLER RECORDING STUDIO, INC.
TAPE DUPLICATION
118 E. 28th St., New York, NY 10016
(212) 684-0960
Contact: John Sadler, president

ST. JOHN & FRIENDS INC.
TAPE DUPLICATION
1830 NE 153rd St., North Miami Beach, FL 33162
(305) 945-6444
Contact: John St. John, president

SANDCASTLE PRODUCTION
TAPE DUPLICATION
Wade Hampton Mall, Suite 109, Greenville, SC 29609
(803) 235-1111
Contact: Christopher Cassels, manager
TAPE DUPLICATION
Method of Duplication: In cassette.
Mastering Equipment: Ampex AG-440.
Tape Used: Grandmaster I & II, Studio Magnetics, Agfa, TDK, Scotch, TEAC.
Shell Used: (5) Screws.
Duplicating Speed: Real Time.
Loading Equipment: Electro Sound.
Rates: Reasonable.

SERVISOUND INC.
MASTERING, TAPE DUPLICATION
35 W. 45th St., New York, NY 10036
(212) 921-0555
Contact: Chris Nelson, V.P.; Dave Teig, studio manager.

MASTERING
Rates: Call for rates.
Other Services: Recording studios; (5) music & post-production w/video (audio) layback facilities.
TAPE DUPLICATION
Duplicator: Electro Sound 5 slaves, Ampex 4 slaves, Otari 5 slaves.
Capacity: 2500 C-30/day; 2000 C-90/day; 500 30 min. reels/day packed and shipped.
Method of Duplication: In cassette, Bin loop.
Mastering Equipment: ¼" & ½" tape 15, 7.5, 3.75 ips, Kepex, dbx comp, de-esser.
Tape Used: Reels: Ampex 642; cassette: Ampex 614, 615 high bias, Ampex 610.
Shell Used: Black/White C-0.
Duplicating Speed: 32:1.
Loading Equipment: Superscope cassette winders.
Packaging Equipment/Fulfillment Services: Complete fulfillment service.
Rates: Please call for rates.
Other Services: Complete video post services from 1" and ¾", 1" Studer video layback, voice to picture, ½" up to 2" 24-track mixing facilities.

SMITH & ASSOCIATES, INC.
TAPE DUPLICATION
214 Doverwood Rd., Fern Park, FL 32730
(305) 331-6380
Contact: Hillary (Mel) Smith, president

SOUND-ARTS COMPANY, INC.
TAPE DUPLICATION
5 Cindy Lane, Oakhurst, NJ 07712
(201) 493-8666
Contact: Frank M. Gspann, V.P.
TAPE DUPLICATION
Duplicator: Otari DP-85, Otari DP-7000, DP-4050 (26 slaves).
Capacity: 30,000/day.
Method of Duplication: In cassette, bin loop.
Mastering Equipment: Otari MTR-10s, Otari MX-5050, Scully.
Tape Used: Agfa, Columbia, BASF.
Duplicating Speed: 480 ips, 240 ips, 64:1, 32:1, 8:1 ratios.
Loading Equipment: King 790s.
Packaging Equipment/Fulfillment Services: Shrink film, etc.
Rates: On request.
Other Services: Computer software duplication, cassette and disk.

SOUND TECHNIQUE INC.
MASTERING
130 W. 42nd St., New York, NY 10036
(212) 869-1323
Contact: Gladys Hopkowitz, president

SOUND INVESTMENT CORP.
TAPE DUPLICATION
34 P'Tree Dekalb Airport, Chamblee, GA 30341
(404) 458-1679
Contact: Doug Wilmer, president; Lou Simmons, sales mgr.
TAPE DUPLICATION
Duplicator: (6) Pioneer CT-5, Technics RSM 85 MK II.
Capacity: Up to 100/day depending upon length.
Mastering Equipment: Otari 5050 MK II, Technics RSM 85 MK II.
Tape Used: Agfa 611, Capitol CS-1, Fuji FR, TDK SA.
Shell Used: Mag Media on bulk tape.
Duplicating Speed: 1 ½ ips—real time, master: 15, 7 ½ ips.
Packaging Equipment/Fulfillment Services: Computer labels, Norelco box.
Rates: Depends on length.
Other Services: Audio production, editing, voice recording, slide and video presentations.



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TAPE DUPLICATION
645 Broadway, New York, NY 10012
(212) 260-5226
Contact: Brett Alan Sommer, president

SOUNDS OF WINCHESTER
P.O. Box 574, Winchester, VA 22601
(703) 667-9379
Contact: Jim McCoy

SOUNDS, REASONABLE!
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5400 Jennifer Dr., Fairfax, VA 22032
(703) 250-9355
Contact: Fred Wygal, owner/operator

SOUNDTEK INC.
MASTERING, PRESSING, TAPE DUPLICATION
1780 Broadway, Suite 204, New York, NY 10019
(212) 489-0806
Contact: Ed Remusat, chief eng.

SOUTHERN AMERICAN RECORD PRESSING CO. INC.
PRESSING
305 11th Ave. So./Industrial Blvd., Nashville, TN 37203
(615) 256-2521
Contact: Martha Ivanits, sec./treas.; Larry Jennings, sales mgr.



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Lionville, PA

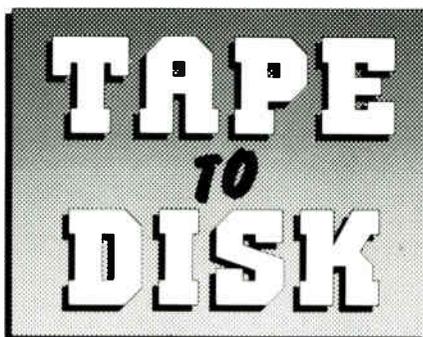
SPECTRUM MAGNETICS, INC.
TAPE DUPLICATION
Marsh Creek Corporate Center, Lionville, PA 19353
(800) 441-8854, (215) 363-6300
Contact: John O. Yoder, VP./sales mgr.

TAPE DUPLICATION
Duplicator: Ampex BLM 200A w/10 slaves.
Capacity: 15,000 per day.
Method of Duplication: Bin loop.
Mastering Equipment: Studer A80 MK II, Ampex ATR-800 (7 1/2, 15, 30 ips).
Tape Used: BASF, IPS, BASF Chrome.
Shell Used: ICM, IPS, Auriga, API.
Duplicating Speed: Music 32:1, voice 64:1.
Loading Equipment: AVA
Packaging Equipment/Fulfillment Services: Packaging and fulfillment available.
Rates: Upon request.
Other Services: Production samples on request.

SPLICE OF LIFE, INC.
TAPE DUPLICATION
6 Sparhawk St., Brighton, MA 02135
(617) 782-3384
Contact: Amie Beth Doft, owner

STANDY RECORDS
MASTERING, PRESSING
760 Blandina St., Utica, NY 13501
(315) 735-6187
Contact: Stanley Markowski, president

THE STAR STUDIO
TAPE DUPLICATION
75 Webster St., Worcester, MA 01608
(617) 756-8890
Contact: Tracy Gaumont, studio mgr.



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STARSTRUCK SOUNDLABS
TAPE DUPLICATION
P.O. Box 161, Hicksville, NY 11801
(516) 931-7231
Contact: Pete Durso, owner/operator

STERLING SOUND, INC.
MASTERING, CD SERVICES
1790 Broadway, New York, NY 10019
(212) 757-8519
Contact: John Kubick, studio mgr.

STUDIO K GOSPEL RECORDING
TAPE DUPLICATION
P.O. Box 177, 79 Lewiston St., Mechanic Falls, ME 04256
(207) 345-9073
Contact: Stephen Kilbreth, director

SUN PLASTICS CO. INC.
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PRESSING
900 Passare Ave., E. Newark, NJ 07029
(201) 482-6749, (212) 349-0977
Contact: Vicky Salerno, sales mgr.

SUNSHINE SOUND, INC.
MASTERING
1650 Broadway, New York, NY 10019
(212) 582-6227
Contact: Frank I. Trimarco, president

SUPERDUPE
TAPE DUPLICATION
395 Madison Ave., New York, NY 10017
(212) 683-6854
Contact: Keith Gordon, president

SWEETSONG PRODUCTIONS/THE MUSIC FACTORY
MASTERING, PRESSING, TAPE DUPLICATION
P.O. Box 2041, Parkersburg, WV 26102
(304) 489-2911
Contact: Frank A. Limbacher, studio mgr.

SYSTEMS TWO RECORDING STUDIO
TAPE DUPLICATION
2949 Avenue U, Brooklyn, NY 11229
(718) 332-5429
Contact: Nancy Goll, studio mgr.

THE TAPE COMPLEX INC.
TAPE DUPLICATION
4 Haviland St., Boston, MA 02115
(617) 437-9449
Contact: Peter Cecere, president; Kathryn Torda, V.P.

TAPE DUPLICATION
Duplicator: Aiwa models 350 & 660.
Capacity: 100 copies per run.
Method of Duplication: In cassette.
Mastering Equipment: 1/2-track, 1/4-track, digital, cassette.
Tape Used: Ampex GM I & II, Agfa 611, 612, 627.
Shell Used: 5-Screw Magnetic Media & IPS.
Duplicating Speed: Real Time.
Loading Equipment: TTL 515B.
Packaging Equipment/Fulfillment Services: 48-hour service; outboard gear available.
Rates: According to length & quantity.
Other Services: Custom cassette loading (blank), mastering tape, accessories for mastering, cassette accessories.



The Tape Complex Inc.

THE TAPE COMPLEX INC.
Boston, MA

TAPE TIME CORPORATION
PRESSING, TAPE DUPLICATION
161 Massachusetts Ave. Suite 201, Boston, MA 02115
(617) 266-3131

Contact: Raymond Fournier, president
PRESSING
Other Services: Brokerage.
TAPE DUPLICATION
Duplicator: Otari.
Capacity: 10,000/day.
Method of Duplication: In cassette, bin loop.
Mastering Equipment: Scully, Otari.
Tape Used: Agfa, Ampex.
Shell Used: ICM, IPS.
Duplicating Speed: 480 ips.
Loading Equipment: Otari, Telefunken.
Packaging Equipment/Fulfillment Services: Shrink-wrap.
Rates: Send for catalog of rates.
Other Services: Studio facility available; we sell any length blank tape product in reel or cassette, authorized Maxell distributor.

TAPEMAKER
TAPE DUPLICATION
48 Urban Ave., Westbury, NY 11590
(516) 333-2700
Contact: Art Brandwein, president; Matt Polakoff, gen. mgr.

TELSTAR RECORDING
TAPE DUPLICATION
2074 17th St., Sarasota, FL 33580
(813) 365-0337
Contact: Rick Moulton

TIKI RECORDING STUDIOS, INC.
TAPE DUPLICATION
186 Glen Cove Ave., Glen Cove, NY 11542
(516) 671-4555
Contact: Lia, studio mgr.; Fred, owner/chief eng.

THE TIME MACHINE
MASTERING, TAPE DUPLICATION
1312 Alhambra Way S., St. Petersburg, FL
(813) 867-1663
Contact: Steve Repetti, president

TODAY VIDEO, INC.
MASTERING, TAPE DUPLICATION
45 W. 45th St., New York, NY 10036
(212) 391-1020
Contact: Beverly Seeger, president

TRACYVAL CORPORATION
RECORD PLATING
201 Linden Ave., Somerdale, NJ 08083
(609) 627-3000
Contact: James Miller, president; Joan Miller, sales mgr.

TRAIL RECORDS
PRESSING, TAPE DUPLICATION
P.O. Box 3860, Kingsport, TN 37664
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Contact: Tilford A. Salyer, president/owner

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1200) CRITICAL LISTENING COURSE, F. Alton Everest This invaluable course specifically addresses the important nuances of the audio world. The 106-page training manual with ten pre-recorded lessons on cassette tapes lead you from basic to advanced listening techniques in increasing progression. Topics include estimating frequency, frequency band limitations, sound level changes, components of sound quality, frequency response irregularities, various types of distortion, reverberation effects on speech and music, signal vs. noise, and voice colorations. \$129.95

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1481) PRINCIPLES OF DIGITAL AUDIO, Ken Pohlmann This brand new release is a clear and concise overview starting with the fundamentals of d.a. and comprehensively covering recording, reproduction, media, error protection, the Compact Disc and more. The majority of the data, formulas, and illustrations has never before been published, which makes this an excellent addition to the literature in the field. Appropriate for skilled engineers or novices. 284 pp.(P) \$19.95

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3580) FOUNDATIONS OF COMPUTER MUSIC, Edited by Curtiss Roads & John Strawn This superb reference book from MIT is the most complete overview of the field for serious students and practitioners. In four sections it covers Digital Sound-Synthesis Techniques, Synthesizer Hardware and Engineering, Software Systems for Music, and Perception and Digital Signal Processing. It contains many classic articles in revised and updated versions and should be in every contemporary composer's library. 736 pp.(H) \$50.00

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 Contact: Jim Beck, owner

TRUSTY TUNESHOP RECORDING STUDIO
TAPE DUPLICATION
 Rt. 1, Box 100, Nebo, KY 42441
 (502) 249-3194
 Contact: Elsie Childers, owner



TRUTONE RECORDS
 Haworth, NJ

TRUTONE RECORDS
MASTERING, PRESSING, TAPE DUPLICATION,
CD SERVICES
 163 Terrace St., Haworth, NJ 07641
 (201) 385-0940
 Contact: Adrienne Rowatti, studio mgr.
MASTERING
 Cutting Lathes: Neumann VMS-7G. Scully w/Capps Variable Pitch I.
 Console: Neumann, Custom, and Studer.
 Tape Machines: Studer A-80, Studer A-810, Studer B-67, Ampex ATR-102, MCI JH-110B.
 Monitor Speakers: UREI 813, JBL, Yamaha, Auretone.
 Signal Processing: Neumann, Pultec, UREI.
 Engineers: Carl Rowatti, Phil Ausin, Steve Robb.
 Rates: Upon request.
 Credits: Upon request.
 Other Services: Compact Disc masters, high quality short run pressing and cassette duplication. Sony PCM-1610 & F1 mastering.
COMPACT DISC
 Preparation/Manufacturing: Assembly & preparation of Sony PCM-1610 tapes for CD.

UNDERWOOD AUDIO
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 Bldg. 34A, DeKalb/Peachtree Airport
 Chamblee, GA 30341
 (404) 457-1268
 Contact: Hamilton Underwood, owner/engineer

UPSTREAM RECORDING SERVICES
 P.O. Box 3634, Langley Park, MD 20787
 (301) 270-2568
 Contact: Alan Wonneberger, owner

USC SOUND ENTERPRISES
MASTERING, PRESSING, TAPE DUPLICATION
 190 Waynoka Lane, Memphis, TN 38111
 (901) 458-0275
 Contact: Rodney Peppenhorst, owner/engineer

VARIETY RECORDING STUDIO
MASTERING, PRESSING, TAPE DUPLICATION,
CD SERVICES
 130 W. 42nd St. Room 552, New York, NY 10036
 (212) 221-6625
 Contact: Fred Vargas, owner

VILLE PLATTE RECORD MFG. CO.
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 (215) 763-2825
 Contact: Frank Virtue, president



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 Murfreesboro, TN

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MASTERING, PRESSING, TAPE DUPLICATION
 1142 Haley Rd., P.O. Box 956, Murfreesboro, TN 37130
 (615) 890-3222
 Contact: Jim Lenahan, president

MASTERING
 Cutting Lathes: Neumann VBS-70 SX-74 heads.
 Console: SP-75 Neumann/Neve.
 Tape Machines: Studer A80-810.
 Monitor Speakers: Tannoy.
 Signal Processing: Neve/Neumann.
 Engineers: Randy Kling, Disk Mastering.
 Rates: Available upon request.
 Credits: Alabama, George Strait, Dolly Parton, Moe Bandy, Joe Stampley.

Other Services: Digital mastering.
PRESSING
 Presses: SMT 8 automatics.
 Capacity: 18,000 LPs; 24,000 7".
 Vinyl Used: Vitec Quiex 1 and 2.
 Rates: Available on request.
 Other Services: Printing 4-color jackets, brochures, labels.

TAPE DUPLICATION
 Duplicator: Electro Sound 8000 HX-Pro.
 Capacity: 30,000 per day.
 Method of Duplication: Bin loop.
 Mastering Equipment: Studer
 Tape Used: Agfa, BASF.
 Shell Used: Shape, Magnetic Media.
 Duplicating Speed: 32:1, 64:1.
 Loading Equipment: King 790.
 Packaging Equipment/Fulfillment Services: Apex printing; Scandia wrapping and labeling.
 Rates: Available on request.
 Other Services: Specialized package.

V.P. RECORDS INC.
 170-21 Jamaica Ave., Jamaica, NY 11432
 (718) 291-7058
 Contact: Christopher Chin, V.P./gen. mgr.

W.B.S. CASSETTE DUPLICATOR
MASTERING, TAPE DUPLICATION
 467 Chestnut St., Nashville, TN 37203
 (615) 242-1800
 Contact: Jerry West, sales mgr.

WOODLAND SOUND STUDIOS
MASTERING
 1011 Woodland St., Nashville, TN 37206
 (615) 227-5027
 Contact: Glenn Snoddy, gen. mgr.

WRS, INC. — SEMPLE STREET SOUND
TAPE DUPLICATION, CD SERVICES
 210 Semple St., Pittsburgh, PA 15213
 (412) 687-3700
 Contact: Victor Levites, studio mgr.

YOSH PRODUCTIONS
MASTERING
 1900 Washington St., Auburndale, MA 02166
 (617) 965-6883
 Contact: Sigal Yohsbe, manager

Central

AARD-VARK, INC.
TAPE DUPLICATION
 335 S. Jefferson, Springfield, MO 65806
 (417) 866-4104
 Contact: Bill Jacobsen, owner
TAPE DUPLICATION
 Duplicator: Telex.
 Capacity: 1000 C-60s per 8 hours, stereo & mono.
 Method of Duplication: In cassette.
 Mastering Equipment: 8-track recording studio.
 Tape Used: 4 grades; voice, music, Magnetite, chrome.
 Shell Used: 5 screw with strip liners.
 Duplicating Speed: 16 to 1.
 Loading Equipment: King loader.
 Packaging Equipment/Fulfillment Services: Full packaging, cello wrap.
 Rates: Vary w/quantity, call for quotes.
 Other Services: Printed inserts & labels.

A & F MUSIC SERVICES
TAPE DUPLICATION
 2834 Otsego, Pontiac, MI 48054
 (313) 682-9025
 Contact: Frank Merwin, owner



A TO Z AUDIO
 Fairview Park, OH

A TO Z AUDIO
TAPE DUPLICATION
 21929 Lorain Rd., P.O. Box 26087
 Fairview Park, OH 44126
 (216) 333-0040
 Contact: Duane Aberca, Greg Zarnoski, partners
TAPE DUPLICATION
 Duplicator: 4-track Telex 300 (reel and cassette masters and slaves), Recordex 33011 1 to 15, New Magnefax LB72 mono hi speed bulk duplicator.
 Capacity: 1000 C-60s/day, 2 or 4 channel stereo reels dependent on format.

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AWARD RECORD MFG., INC.

5200 West 83rd Street, Los Angeles, California 90045

(213) 645-2281

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Method of Duplication: In cassette.
Mastering Equipment: Revox, Nakamichi, TEAC.
Tape Used: Mono: BASF LNS; stereo: BASF LHD & pure chrome.
Shell Used: Shape Mark 10 (3-piece, 5 screw, clear), black, white or grey, 5 screw, chrome notch, tab in/tab out.
Duplicating Speed: Mono: 30 ips; stereo: 15 ips.
Loading Equipment: King & Superscope.
Packaging Equipment/Fulfillment Services: Blank and printed labels, inserts, boxes and albums.
Rates: Please call for pricing info. (Best prices on bulk blank cassettes!)

ACME DISTRIBUTORS
MASTERING, TAPE DUPLICATION
Box 8123 (5644 Holmes), Kansas City, MO 64112
(816) 444-8123
Contact: Shirley Black, president

ACME RECORDING STUDIOS
TAPE DUPLICATION
3821 N. Southport, Chicago, IL 60613
(312) 477-7333
Contact: Jim Rasfeld
TAPE DUPLICATION
Duplicator: Technics transports w/custom electronics.
Capacity: 2000/day.
Method of Duplication: In cassette.
Mastering Equipment: Sony PCM-501 ES, Beta or VHS master, Technics 1500 1/2-track & 1/4-track, Dolby & dbx N.R.
Tape Used: Ampex, Mag Media.
Shell Used: Shape and Film.
Duplicating Speed: Real Time only.
Loading Equipment: Tape-matic.
Packaging Equipment/Fulfillment Services: Shrink-wrap, typesetting, printing, insertion, in-house.
Rates: On request.
Other Services: Digital mastering, editing, safeties, EQ'd transfers, record manufacturing, jacket & j-card printing, 16-track studio, 24-hour service.

ACTION SOUND STUDIO
TAPE DUPLICATION
Rt. 2, Box 213, Wimberley, TX 78676
(512) 847-3853
Contact: Marc Kingston, manager/engineer

ALL NIGHT RECORDS
MASTERING, PRESSING, TAPE DUPLICATION
208 1/2 N. Washington, Eldorado, AR 71730
(501) 862-0731
Contact: David Feinberg, op. exp.

AMERICAN SOUND CORP.
MASTERING, TAPE DUPLICATION
25133 Thomas Dr., Warren, MI 48091
(313) 536-9100
Contact: Don Armstrong, sales mgr.

A.M.P. SOUND, INC.
TAPE DUPLICATION
2936 N. 33rd St., P.O. Box 4709, Lincoln, NE 68504
(402) 466-8519, (800) 835-7427, ext. 182
Contact: Mike Clancy, president; Todd Beers, nat'l acct. rep.
TAPE DUPLICATION
Duplicator: Magnefax Model 7574, stereo.
Capacity: 2,303 C-45 cassettes per shift.
Method of Duplication: Bin loop.
Mastering Equipment: Technics 1/4" 2-track Model 1500, 4-track Model 1506, dbx 150, Dolby B, UREI 546.
Tape Used: Agfa, Ampex, BASF.
Shell Used: Lenco, Magtek, Shape, IPS.
Duplicating Speed: 16:1.
Loading Equipment: King automated loaders.
Packaging Equipment/Fulfillment Services: "On-cassette" printing, full packaging.
Rates: Dependent on job.
Other Services: Blank cassette loading, wholesale video—VHS, Beta, & 3/4" (Maxell, Ampex), video duplication; wholesale computer tape & diskettes.

ANGEL RECORDING STUDIO
TAPE DUPLICATION
4435 Mayfield Rd. Suite 6, Cleveland, OH 44121
(216) 382-6036
Contact: Mark Luthardt, owner

ARC ELECTRONIC SERVICES INC.
TAPE DUPLICATION
2557 Knapp N.E., Grand Rapids, MI 49505
(616) 364-0022
Contact: Ron Harkai

Dear Santa,
For Christmas I would like a system designed and installed in my recording studio. I will need custom fabrication because of the room's unusual configuration. Of course I want the finest professional audio equipment: a 24-track tape machine, mixing console, monitors, a synchronizer, microphones and the various hardware I'll need to hook it all up.
On second thought, why don't you and the elves save yourself some trouble and just give me a gift certificate to L.D. Systems. They can provide all of the above, in addition to servicing everything they sell.
Thanks, Santa!



467 W. 38th St.
Houston, Texas 77018
(713) 695-9400

Best wishes
for happy holidays
and a great 1986
from the people at
L.D. Systems.

Sincerely,
Louis C. Harkai

professional sound and lighting sales • services • rentals

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Cassette and Pancake

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Toll Free 1-800-821-1599

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TAPE TO DISK

Listings of Mastering, Pressing and
Tape Duplication Facilities
Throughout the United States

Central

ARS RECORDING STUDIO
TAPE DUPLICATION
11628 Pulaski, Alsip, IL 60658
(312) 371-8424
Contact: Gary Cobb, manager

AUDIO ASSOCIATES
TAPE DUPLICATION
3200 "O" St. Suite #2, Lincoln, NE 68503
(402) 474-3111
Contact: James Rupert, owner; Steve Rall, mgr.

AUDIO GRAPHICS
TAPE DUPLICATION
13801 E. 35th St., Independence, MO 64055
(816) 254-0400
Contact: Jerry Riegler, owner

AUDIO RECORDING STUDIOS INC.
MASTERING, TAPE DUPLICATION
601 Rockwell Ave., Cleveland, OH 44114
(216) 771-5112
Contact: Bruce Gigax, gen. mgr.

AUDIO TAPE PRODUCTIONS
TAPE DUPLICATION
413 W. Cherry St., P.O. Box 428, Pottersville, MI 48876
(517) 645-7561
Contact: Dean Bredwell, owner

AUDIOCRRAFT
TAPE DUPLICATION
915 W. 8th St., Cincinnati, OH 45203
(513) 241-4304
Contact: E.T. Herzog, Jr., president

THE BARN RECORDING STUDIO
St. Rd. 28 West, P.O. Box 256, Alexandria, IN 46001
(317) 724-7703
Contact: Jim Rogers, manager

BODDIE RECORD MFG. & RECORDING INC.
MASTERING, PRESSING, TAPE DUPLICATION
12202 Union Ave., Cleveland, OH 44105
(216) 752-3440
Contact: Louise Boddie, VP.

BOYD SOUND STUDIO
MASTERING, TAPE DUPLICATION
P.O. Box 682, 103 N. Ballard St., Wylie, TX 75098
(214) 442-1620, (214) 442-5530
Contact: Anthony D. Boyd, engineer/producer

CASSETTE SERVICES
TAPE DUPLICATION
815 N. Douglas St., Arlington Hgts., IL 60004
(312) 398-8403
Contact: Willis J. Connor, owner
TAPE DUPLICATION
Duplicator: Magnifax, Telex, Pentagon
Capacity: 3000 plus per shift
Method of Duplication: In cassette, bin loop.

Mastering Equipment: Revox.
Tape Used: Agfa, BASF, Ampex, Magnetic Media
Shell Used: Magnetic Media.
Duplicating Speed: 30 ips.
Loading Equipment: King 780s.
Rates: Write for price schedule.
Other Services: Distributor for Telex and Pentagon duplicators, new and used in-cassette duplicators.

CAVALIER PRODUCTIONS
TAPE DUPLICATION
3412 Erie Ave., Cincinnati, OH 45208
(513) 871-8818
Contact: Ed Foss, dir. operations

CLAYTON STUDIOS, INC.
MASTERING, TAPE DUPLICATION
1126 S. Big Bend, St. Louis, MO 63117
(314) 781-6200
Contact: Robyn Goffstein, VP.

CLOCKWERKE SOUND STUDIO, INC.
TAPE DUPLICATION
1328 Linda St., Cleveland, OH 44116
(216) 331-2210
Contact: Greg James, president

CONCEPT PRODUCTIONS, INC.
TAPE DUPLICATION
2984 Triverton Pike, Madison, WI 53711
(608) 271-2606
Contact: C. Dan Geocar, production dir.

CREATIVE IMAGES
MASTERING, TAPE DUPLICATION
1321 N. Summit St., Toledo, OH 43604
(419) 241-5961
Contact: Cheryl Clark, studio mgr.

CREATIVE SOUND PRODUCTIONS
TAPE DUPLICATION
9000 Southwest Freeway, Ste 320, Houston, TX 77074
(713) 777-9975
Contact: Edward Smith, president
TAPE DUPLICATION
Duplicator: Otari bin loops (3 slaves), Infonics (3 slaves).
Capacity: 6,000 per shift.
Method of Duplication: In cassette, bin loop.
Mastering Equipment: Otari 1/2" 4-track, Ampex 2-track & 4-track
Tape Used: Agfa 611/811, Magnetite 12, Chrome 627/827, Ampex 615/616, Capitol Q18.
Shell Used: IPS Premium S-screw, Data Pak.
Duplicating Speed: 16:1, 32:1.
Loading Equipment: King automatic loaders, Tape Matic 2000.
Packaging Equipment/Fulfillment Services: Custom labels, full-color caseliners, automatic labeling, shrink, in-house graphics & design.
Rates: Call for quotations.
Other Services: Custom bulk tape loading to any length w/Ampex, Agfa, Capitol. Catalog available upon request.

DAL AUDIO PRODUCTIONS LTD.
TAPE DUPLICATION
1906 N. 6th, Ft. Smith, AR 72904
(501) 782-2454
Contact: Lenny or Dan, owners

DANGER RECORDING
TAPE DUPLICATION
366 N. Prior Ave., St. Paul, MN 55104
(612) 645-8650
Contact: David Erbele, president

DIGITAL AUDIO DISC CORPORATION
MASTERING, CD SERVICES
1800 N. Fruitridge Ave., Terre Haute, IN 47804
(812) 466-6821
Contact: Michael Ellis, editing supervisor

MASTERING
Console: Sony K1105, 1106, 1107 digital mixing console; DAE-1100 digital editor DAQ-1000, PQ generator.
Tape Machines: Sony BVU-800BK, MCI JH-110 1/4" & 1/2", Mitsubishi X-80.
Monitor Speakers: Custom Hidley enclosures w/TAD components.
Signal Processing: Dolby A & dbx noise reduction; Studer SFC-16 sampling rate converter.
Rates: On request.
COMPACT DISC
Preparation/Manufacturing: Complete compact disc mastering including PQ encoding; analog to digital conversions; digital to digital conversions (Mitsubishi, JVC, 3M, Soundstream); digital equalization, and digital editing.

Back Issues

- 1984 February, **Independent Engineers & Producers.** NAMM Show. Allan Holdsworth. Keyboard Artists Forum. Ronnie Lane.
- 1984 March, **Southeast Studios.** Microphone Special Report. Sound in Australia. Religious Recording. Oak Ridge Boys.
- 1984 April, **Video Production & Post Production Facilities.** Video Supplement. Time Code Primer. Jeff Baxter Interviews Brian Setzer.
- 1984 May, **Northeast Studios.** Digital Recorder Forum. Studio Computers. Roger Nichols. NASA Sound. Robert Moog. Jim Boyer and Billy Joel.
- 1984 June, **Remote Recording & Sound Reinforcement Listings.** Computer Music. Big Country. George Benson Studio. Chrissie Hynde.
- 1984 July — SOLD OUT**
- 1984 August — SOLD OUT**
- 1984 September, **Southern California Studios.** Film Sound '85. Digital Resource Guide. Interactive Disks. Jeff Beck.
- 1984 October, **Fall AES New Products.** New York Soundstages. Lindsey Buckingham. Optical Disk Update. Amadeus. Steve Miller.
- 1984 November, **North Central & Canadian Studios.** Video Supplement. SMPTE Conference. Canadian Spotlight. Fee Waybill.
- 1984 December, **Tape to Disk Listings.** Mastering Engineers Forum. Bell Labs. Compact Discs. Rupert Hines. Hal Blaine.
- 1985 January, **Northwest Studios.** Superbowl Sound. Springsteen on Stage. Ray Parker Jr. Leon Russell.
- 1985 February, **Independent Engineers & Producers.** Brian Eno. The Art of Touring. Roger Powell on MIDI. Les Paul.
- 1985 March, **Southeast Studios.** Loudspeaker Technology. Martin Rushent. "Cotton Club" Sound. John Fogerty. Jim Keltner.
- 1985 April, **Video Production Supplement with Facilities Listings.** Compact Power Amps. Radio Recorders' Harry Bryant. Eurythmics. Phone Lines Pt. 1
- 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.

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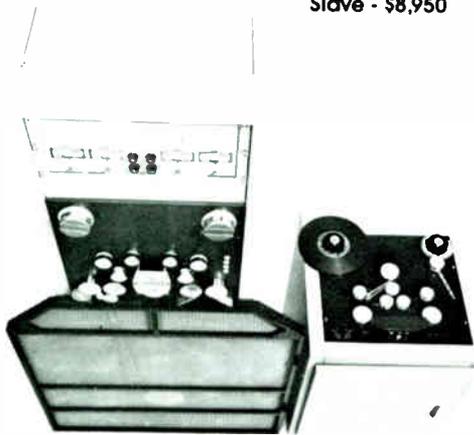
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Listings of Mastering, Pressing and
Tape Duplication Facilities
Throughout the United States

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DOMAIN COMMUNICATIONS, INC.
TAPE DUPLICATION
P.O. Box 337, Wheaton, IL 60189
(312) 668-5300
Contact: James Draper, operations mgr.

JOHN DOREMUS INC.
TAPE DUPLICATION
875 N. Michigan Ave. Suite 1801, Chicago, IL 60611
(312) 664-8944
Contact: Tony Angier, studio mgr.

DV PRODUCTIONS
3901 N. Morris Blvd., Milwaukee, WI 53211
(414) 962-8020
Contact: Pat Sheedy, mgr.

ELECTROSOUND
TAPE DUPLICATION
2101 S. 35th St., Council Bluffs, IA 51501
(712) 328-8060
Contact: Dan Minikus, general manager; Tim Rosenthal, plant manager

ELECTROSOUND
MASTERING, PRESSING
1805 W. 44, P.O. Box 476, Shellbyville, IN 46176
(317) 392-4161

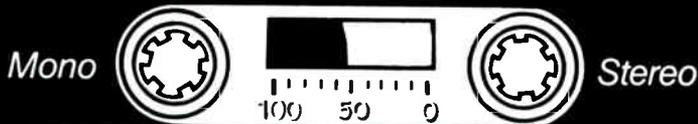
ELEPHANT RECORDING STUDIOS
TAPE DUPLICATION
21206 Gratiot Ave., E. Detroit, MI 48021
(313) 773-9386
Contact: John Gaiser, Allen Abood, owners



EMC PRODUCTIONS
St. Paul, MN

EMC PRODUCTIONS
MASTERING, TAPE DUPLICATION
300 York Ave., St. Paul, MN 55101
(612) 771-1555

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6666 N. LINCOLN AVE. • LINCOLNWOOD, IL 60645

In Illinois Call: (312) 676-9400

Circle #108 on Reader Service Card

also: 6855 Santa Monica Blvd., Hollywood, CA 90038
(213) 463-3282

Contact: Dick Stevens, V.P.; Richard Maxwell, western regional sales mgr.

TAPE DUPLICATION

Duplicator: Electro Sound 8000 & 6400 Series.

Capacity: 20,000 daily.

Method of Duplication: Bin loop.

Mastering Equipment: Otari & MCI.

Tape Used: Capitol & Agfa.

Shell Used: Various—15 standard colors, gold reel avail.

Duplicating Speed: 32:1, 64:1.

Loading Equipment: King/D & D auto loaders.

Packaging Equipment/Fulfillment Services: Boxing, shrinkwrap, drop shipping.

Other Services: Sound recording; high-speed floppy disk duplication; complete packaging, printing, warehousing services available.

GROUP II AUDIO

TAPE DUPLICATION

1480 Dublin Rd., Columbus, OH 43215

(614) 488-0621

Contact: Mark E. Snider, studio mgr.

GRS, INC.

TAPE DUPLICATION

13300 Broad St., Pataaskala, OH 43062

(614) 927-9566

Contact: Claudia Andrews, mgr. cassette services

HIGH FIDELITY RECORDING

TAPE DUPLICATION

1059 Porter, Wichita, KS 67203

(316) 262-6456

Contact: James Stratton, president

HIX RECORDING

1611 Herning Ave., Waco, TX 76708

(817) 756-5303

Contact: David Hix, president; Homer Hix, V.P.

Hix Recording Co., Inc.
(817) 756-5303

HIX RECORDING
Waco, TX

INDUSTRIAL AUDIO

TAPE DUPLICATION

6228 Oakton, Morton Grove, IL 60053

(312) 965-8400

Contact: Lauren Leiter, president

INTERNATIONAL AUDIO, INC.

TAPE DUPLICATION

2934 Malmo Rd., Arlington Hgts., IL 60005

(312) 956-6030, Telex #206817

Contact: Bob Wozniak, prod. control engineer

JOEY RECORDS INC.

MASTERING, PRESSING, TAPE DUPLICATION

6703 W. Commerce, San Antonio, TX 78227

(512) 432-7893

Contact: Joey Lopex, president

TOM JONES RECORDING STUDIOS

TAPE DUPLICATION

220 S. Broadway, Rochester, MN 55904

(507) 288-7711

Contact: Thomas H. Jones, president & gen. mgr.

JOR-DAN, INC.

TAPE DUPLICATION

1100 Wheaton Oaks Ct., Wheaton, IL 60187

(312) 653-1919

Contact: Bob Atkins, production mgr.

KIDERIAN RECORDS PROD.

MASTERING, PRESSING, TAPE DUPLICATION, CD SERVICES

4926 W. Gunnison, Chicago, IL 60630

(312) 253-6175

Contact: George Peck, V.P.

KISHA/UNIVERSAL PRODUCTIONS

TAPE DUPLICATION

520 S. Frances, P.O. Box 1771, South Bend, IN 46634

(219) 234-1619

Contact: Ernie Scarbrough, president

MAGNEFAX INTERNATIONAL INC.

TAPE DUPLICATION

Route 1, Box 764, Rogers, AR 72756

(501) 925-1818

Contact: Dennis Tallakson, president

MEDIA INTERNATIONAL, INC.

TAPE DUPLICATION

247 E. Ontario, Chicago, IL 60611

(312) 467-5430

Contact: Duane Lundeen, president

TAPE DUPLICATION

Duplicator: Ampex, Grandy, Magnefax, Telex (6 lines total).

Capacity: 75,000 units/day.

Method of Duplication: In cassette, bin loop.

Mastering Equipment: Studer & Ampex.

Tape Used: Agfa, BASF, Capitol, Ampex, Columbia.

Shell Used: Elmar, Sorco, Mag Media.

—CONTINUED ON PAGE 186

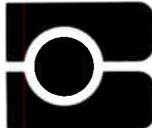
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(513) 621-6389
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RCA TEST TAPES
DEPT M
6550 E. 30th St.
Indianapolis, IN 46219
(317) 542-6427

Circle #112 on Reader Service Card

TAPE TO DISK

Listings of Mastering, Pressing and
Tape Duplication Facilities
Throughout the United States

Central

—FROM PAGE 185



MEDIA INTERNATIONAL, INC.
Chicago, IL

Duplicating Speed: From 4:1 to 64:1, depending on product.

Loading Equipment: High-speed King.

Packaging Equipment/Fulfillment Services: Shrink-wrap, custom boxes, cartons, albums, etc.

Rates: From .21 unit.

Other Services: Duplicating & AV equip. sales, services, design, installation—new, used, reconditioned. (Low cost financing available on some equipment.)

MIDWEST CUSTOM RECORD PRESSING
PRESSING, TAPE DUPLICATION
P.O. Box 92, Arnold, MO 63010
(314) 464-3013

Contact: Rick Schaumberger, president

MOSES SOUND ENTERPRISES
TAPE DUPLICATION
Route 2, Box 548-A1, Catawissa, MO 63015
(314) 257-2345
Contact: Nelson

MOTHER DUBBERS INC.
MASTERING, TAPE DUPLICATION
13626 Gamma, Dallas, TX 75234
(214) 980-4840

Contact: Arnett Peel, president

MASTERING
Console: Tapco-EV 12 x 4 x 2 x 1.
Tape Machines: Ampex 440, MCI JH-100B, TEAC 80-8, 40-4.

Monitor Speakers: ADS 810s.

Signal Processing: UREI LA-3A, UREI 1176LN, Crown EQ11, dbx 157, UREI 565.

Engineers: Russell Smith.

Rates: \$50/hr. studio mastering; \$30/hr. editing.

TAPE DUPLICATION

Duplicator: Infonics 200A, Magnetax bin loop.

Capacity: How many would you like? We'll meet your deadline!

Mother Dubbers, Inc.

MOTHER DUBBERS INC.
Dallas, TX

Method of Duplication: In cassette, bin loop.

Mastering Equipment: Ampex, MCI.

Tape Used: Aqfa PE 611, BASF, CBS, Ampex.

Shell Used: Magnetic Media, Lenco and data packaging.

Duplicating Speed: In cassette, 10:1; bin loop, 45:1.

Loading Equipment: Automatic King model 700s.

Packaging Equipment/Fulfillment Services: Labeling, cassette binders, poly & Norelco boxes, shrinkwrapping—full packaging service available.

Rates: Call (214) 980-4840 and ask for A. Peel.

MUSICMAN'S RECORDING STUDIO

TAPE DUPLICATION

1844 S. Smithville Rd., Dayton, OH 45420
(513) 256-8731

Contact: Perry Scott

NEW LIFE TAPES

TAPE DUPLICATION

3174 W. 70th St., Cleveland, OH 44102

(216) 631-5868

Contact: Don Loving, mgr.

NORWEST COMMUNICATIONS INC.

TAPE DUPLICATION

123 S. Hough St., Barrington, IL 60010

(312) 381-3271

Contact: Mark Karney, president

OAK RECORD MASTERING LAB

MASTERING

8830 S. Nashville Ave., Oak Lawn, IL 60453

(312) 599-6222

Contact: Ed Stryszak, owner

OB STUDIOS

TAPE DUPLICATION

5932 N. Grove, Oklahoma City, OK 73122

(405) 721-3727

Contact: Larry G. Orear, owner

ORANGE PRODUCTIONS

TAPE DUPLICATION

6055 W. Fondulac, Milwaukee, WI 53218

(414) 461-3600

Contact: Linda Radtke, business mgr.

O.S.U. OFFICE OF LEARNING RESOURCES

TAPE DUPLICATION

164 W. 17th Ave., Rm. 63, Denney Hill

Columbus, OH

(614) 422-9689

Contact: David Jones, mgr.

PIONEER RECORDING STUDIO, INC.

4238 Ramsgate, Bloomfield Hills, MI 48013

(313) 855-1466

Contact: Gary Rubin, president

PLUM RECORDING & PRODUCTION

MASTERING, PRESSING, TAPE DUPLICATION

5988 Silverylane, Dearborn Hgts, MI 48127

(313) 277-0082

Contact: Tom Trip, owner; Cene Gavril, manager

POLYCOM TELEPRODUCTIONS
TAPE DUPLICATION
 201 E. Erie, Chicago, IL 60611
 (312) 337-6000
 Contact: Barbara Mott, video service manager

PRECISION AUDIO, INC.
TAPE DUPLICATION
 18582 US 20, Bristol, IN 46507
 (219) 295-7493
 Contact: Larry Becker, production mgr.
TAPE DUPLICATION
 Duplicator: Modified Liberty bin, Intonics, Telex.
 Capacity: 20,000/week.
 Method of Duplication: In cassette, bin loop.
 Mastering Equipment: Ampex 440C 1/2".
 Tape Used: Ampex, BASF, Columbia Magnetics, Agfa.
 Shell Used: Mag Media, Elmar.
 Duplicating Speed: 16:1.
 Loading Equipment: King 790.
 Packaging Equipment/Fulfillment Services: ITI
 Labeller.

PREMIER FILM AND RECORDING CORP.
 3033 Locust, St. Louis, MO 63103
 (314) 531-3555
 Contact: Grace Dalzell, secretary/treas.

PRESCO PRODUCTIONS
TAPE DUPLICATION
 4366 W. 66th St., Cleveland, OH 44144
 (216) 749-7244
 Contact: John Presby, owner

BUD PRESSNER RECORDING SERVICES
MASTERING, PRESSING, TAPE DUPLICATION
 4839 S. Broadway, Gary, IN 46409
 (219) 884-5214
 Contact: Bud Pressner, owner/eng.



PROGRAMMING TECHNOLOGIES, INC.
 Lincolnwood, IL

PROGRAMMING TECHNOLOGIES, INC.
MASTERING, TAPE DUPLICATION
 6666 N. Lincoln Ave., Lincolnwood, IL 60645
 (312) 676-9400, (800) 251-TAPE
 Contact: William P. Bennett, president
MASTERING
 Console: Tascams.
 Tape Machines: Otaris.
 Monitor Speakers: Infinity & Genesis, Auratone.
 Signal Processing: Dolby, dbx, UREI, MXR, Orban, Even-
 tide, Studio Technologies, Inc.
 Engineers: Three.
 Rates: Studio: \$50/hr, control room: \$35/hr.
 Other Services: Music and sound effects library.
TAPE DUPLICATION
 Capacity: 100 slaves.
 Method of Duplication: Open reel, common mandrel.
 Tape Used: Ampex, BASF
 Duplicating Speed: 32 ips.
 Loading Equipment: 24 King loaders.
 Packaging Equipment/Fulfillment Services: Shrink-
 wrap and special packaging.
 Other Services: Studio recording, mixing, music and
 sound effect library.

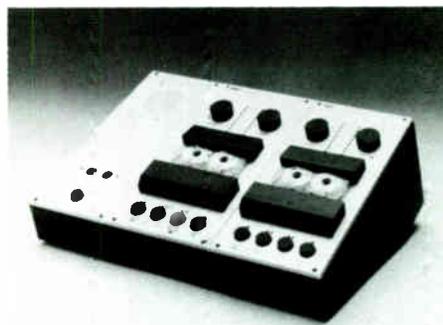
PUBLIC INTEREST AFFILIATES
MASTERING, TAPE DUPLICATION
 213 W. Institute Pl. Suite 204, Chicago, IL 60610
 (312) 943-8888
 Contact: Brad Soul, president



Introduces:

**THE GRAFF HSCD2 HIGH SPEED
 CASSETTE DUPLICATOR**

- Modular System—No Limit to Slaves.
- 4 Tracks at 16 Times Normal Speed in One Pass.
- Three Motor Direct Drive—NO BELTS!!!
- CMOS Logic Motor Control.
- Less Than 0.1% Speed Variation.
- Servo Tension Control Prevents Tape Stretch.
- Rigid Transport Casting.
- Crystal Controlled 1MHz Bias.
- Extended Frequency Response.
- Low Crosstalk.
- Individual Level Controls with LED Indicators for Each Stereo Signal.



No More Belts and Clutches, But All The Bells and Whistles.
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120 S.W. 21st Terrace, C-104 Fort Lauderdale, FL 33312
 Tel: (305) 791-1501, TLX (WU) 75 3027 ESL FTL UD

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**RECORDING STUDIOS AUDIO & VIDEO
 LOWEST PRICES ON
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Ampex 456 Grand Master Studio Mastering Tape

Metal Reel	97G111	2"	\$108.65
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Metal Reel	273111	1/2"	28.98
Metal Reel	17311J	1/4"	16.40

AMPEX Videocassettes

Catalog Number	CTY.	SUGG. QTY.	LIST	(1 Carton)
197 BCA-10	10		\$26.25	\$11.20
197 BCA-20	10		30.86	12.60
197 BCA-60	10		46.97	18.95
187 KCA-60	10		45.29	16.20
187 KCA-30	10		31.69	11.50
196-1630 CA	5		73.10	43.95

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 All AMPEX Tape Products
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Lowest Prices on ALL AMPEX Audio & Video Tape!

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- * AMPEX 187 & 197 3/4" U-MATIC Videocassettes
- * AMPEX Broadcast Video Tape 1" Helical
- * "Custom" Loading of BASF Pure Chrome Audio Cassettes
 (Price Example 5M C-30 @ .69¢)



Hix Recording Co., Inc.

Hix Recording Co., Inc.
 1611 Herring
 Waco, Texas 76708
 (817) 756-5303

Limited Time Offer. Special Expires 10/31/85.

Circle #114 on Reader Service Card



Q.C.A., INC.
Cincinnati, OH

Q.C.A., INC.
MASTERING, PRESSING, TAPE DUPLICATION
2832 Spring Grove Ave., Cincinnati, OH 45225
(513) 681-8400

Contact: Amber E. Hines, sales rep.

MASTERING

Cutting Lathes: Neumann VMS66 w/Zuma disc computer.

Console: Neumann SP 172.

Tape Machines: MCI JH-100M, Otari MTR-10.

Monitor Speakers: UREI 811s, Eastern Acoustics.

Signal Processing: UREI LA-3As, Sontec parametric EQ.

Engineers: Todd Deasey.

Rates: LP, \$90/side; 7" 45, \$37.50/side.

PRESSING

Presses: (5) SMT automatic 12" presses, (2) SMT automatic dual 7" presses.

Capacity: 15,000 LPs per day; 15,000 7" per day.

Vinyl Used: Vitex, Quiex.

Rates: Call sales department.

Other Services: Typesetting, color separations, jacket & sleeve printing, packaging, shrinkwrap.

TAPE DUPLICATION

Duplicator: Cetec Gauss 2400 w/Dolby HX Pro.

Capacity: 9,000 per day.

Method of Duplication: Bin loop.

Mastering Equipment: Neumann SP172 transfer console,

Otari MTR-10-4LX.

Tape Used: Agfa Magnetite.

Shell Used: Shape Mark I or Shape Mark 10.

Duplicating Speed: 32:1, 64:1.

Loading Equipment: King 793.

Packaging Equipment/Fulfillment Services: 4-color insert printing, packaging & wrap.

Rates: Call sales department.

QUALITY CASSETTE SERVICES

TAPE DUPLICATION

403 S. Woodlawn St., Wheaton, IL 60187

(312) 668-2787

Contact: John Peluso, Mary Newitt, owners

QUALITY MEDIA PRODUCTIONS

TAPE DUPLICATION

1425 W. Whittaker, Salem, IL 62881

(618) 548-2031

Contact: Keith Bailey

RADEX RECORDING STUDIOS

MASTERING, PRESSING, TAPE DUPLICATION,

CD SERVICES

890 W. Galena Ave., Rockford, IL

(815) 235-9797

Contact: Dexter R. Witt, owner

RDM AUDIO SERVICES

TAPE DUPLICATION

P.O. Box 9194, 2551 Texas Ave. S., Suite G

College Station, TX 77840

(409) 696-8273

Contact: James Haislet, owner

RICHARDSON TAPE

TAPE DUPLICATION

#1 Collins St., Box 570-A, Mountain View, AR 72560

(501) 269-3908

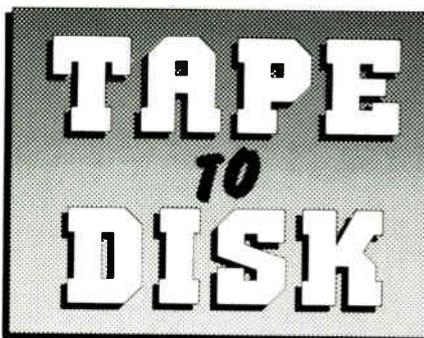
Contact: Aubrey Richardson, owner

TAPE DUPLICATION

Duplicator: JVC & Technics.

Capacity: 400 per shift.

Method of Duplication: In cassette.



Listings of Mastering, Pressing and
Tape Duplication Facilities
Throughout the United States

Central

Mastering Equipment: Otari, Crown, Technics, Technics digital.

Tape Used: Ampex, Mag Media.

Shell Used: Mag Media

Shell Used: Real Time, 1:1.

Loading Equipment: Audico.

Packaging Equipment/Fulfillment Services: Shrink-wrap & computer labels (daisy wheel).

Rates: 500 4-color insert, side 1 & 2 labels, NSB Box, Shrink-wrap—\$675 total cost. Other prices on request.

Other Services: Each cassette is checked for Q.C. We do small orders for demos (25 & up). Call for prices.

ROME RECORDING STUDIOS

MASTERING, PRESSING, TAPE DUPLICATION

1414 E. Broad St., Columbus, OH 43205

(614) 253-4418

Contact: Jack Casey, president

RON ROSE PRODUCTIONS LTD.

MASTERING, TAPE DUPLICATION

29277 Southfield Rd., Southfield, MI 48076

(313) 424-8400

Contact: Don Wooster, V.P.

MASTERING

Console: NEOTEK, Soundcraft, Tascam.

Tape Machines: MCI, Otari, Tascam.

Monitor Speakers: UREI, JBL.

Signal Processing: Valley People, Aphex, Orban, Lexicon, Eventide.

Engineers: Nine.

Rates: Recording \$90, audio post \$190.

Other Services: ¾" video editing, commercial recording

24-track audio post-production for video, 1" and ¾".

TAPE DUPLICATION

Duplicator: Telex 6120, 300 Magnafax ¼" & ⅛".

Capacity: 3,000 C-60 per day, 2,500 reel to reel per day (3-min.)

Method of Duplication: In cassette, bin loop.

Mastering Equipment: MCI, Otari, Tascam.

Tape Used: Ampex 456, 632; Agfa 619, 819, 611, 811; BASF TP-18CR.

Shell Used: ICM, Mag Media, Shape Inc.

Duplicating Speed: 60 ips reel to reel, 90 ips-cassette

1:1/16:1.

Loading Equipment: (2) King loaders.

Other Services: Labeling, boxing, expediting.

Rates: Call.

Other Services: New studio and duplication in Tampa, FL.

(813) 873-7700. Computerized expediting and shipping.

R.P. PRODUCTS, INC.

P.O. Box 54, Highland Park, IL 60035

(312) 433-4575

Contact: Roy Pink, president

RUBINO MUSIC CTR INC.

2524 Portage Mall, Portage, IN 46368

(219) 762-3169, 762-1664

Contact: J. Rubino, president

SOLID SOUND, INC.

TAPE DUPLICATION

P.O. Box 7611, Ann Arbor, MI 48107

(313) 662-0667

Contact: Rob, president; Will, V.P.

SONIC SCULPTURES

MASTERING

636 Northland Blvd., Cincinnati, OH 45240

(513) 851-0055

Contact: Lan A. Ackley, president

SOUND 80

TAPE DUPLICATION

4027 IPS Center, Minneapolis, MN 55402

(612) 339-9313

Contact: Jan Erickson

SOUND IMPRESSIONS, INC.

TAPE DUPLICATION

110 River Rd., Des Plaines, IL 60016

(312) 297-4360

Contact: Bill Holtene, VP.

SOUND RECORDERS

MASTERING

206 S. 44th, Omaha, NE 68131

or 3947 State Line, Kansas City, MO 64111

(402) 553-1164, (816) 931-8642

Contact: Cleve Baker, Jim Wheeler

SOUND RECORDERS, INC.

TAPE DUPLICATION

4031 Guadalupe, Austin, TX 78751

(512) 454-8324

Contact: Miles Muller, president

TAPE DUPLICATION

Duplicator: Electro Sound 8000, Magnafax

Capacity: Thousands per day.

Method of Duplication: Bin loop.

Mastering Equipment: Studer & Ampex. All in a correct acoustic environment.

Tape Used: Agfa, BASF

Shell Used: Various.

Duplicating Speed: 32:1, 64:1.

Loading Equipment: King fully automatic loaders.

Packaging Equipment/Fulfillment Services: Complete

labeling, packaging and shrinkwrapping.

Rates: Nationally competitive.

Other Services: In-house printing, assembly, and warehouse facilities.

THE SOUNDMAKERS

PRESSING, TAPE DUPLICATION

1000 E. 80th Pl., Merrillville, IN 46410

(219) 769-1515

Contact: Dick Hutter, managing dir.

SOUNDVISIONS

TAPE DUPLICATION

P.O. Box 2055, River Grove, IL 60171

(312) 453-1829

Contact: Bruno Strapko, owner

SOUTHERN RECORDING

MASTERING, TAPE DUPLICATION

56 E. 53rd Pl., Tulsa, OK 74105

(918) 747-7380

Contact: John Southern, owner/engineer

SPECIAL RECORDINGS, INC.

TAPE DUPLICATION

3026 E. Grand Blvd., Detroit, MI 48202

(313) 873-4655

Contact: Anthony Caminita, V.P./gen. mgr.

STREETERVILLE STUDIOS

TAPE DUPLICATION

161 E. Grand Ave., Chicago, IL 60611

(312) 644-1666

Contact: Bob Dolan

STUCKY AUDIO SERVICE

TAPE DUPLICATION

1412 W. 5th St., Newton, KS 67114

(316) 283-7597

Contact: Homer Stucky, owner

STUDIO 91

TAPE DUPLICATION

University Blvd., Berrien Springs, MI 49104

In Michigan (616) 471-3402; (800) 533-5353

Contact: Ted Green, director

TAPE DUPLICATION

Duplicator: Infonics: (2) reel masters, (1) cassette master, 16 slave positions.

—CONTINUED ON PAGE 190

GRD GIVES YOU THE HOT SOUND OF REAL-TIME EVERY TIME

PHONE: (602) 252-0077

**WRITE: REAL-TIME BY GRD
P.O. BOX 13054, PHOENIX, AZ 85002**



CONSISTENCY

GRD sets the standards for high quality cassette duplication. Our in-house maintenance and repair department works 2,000 hours a year making absolutely sure each Real-Time cassette is perfect. Personal attention is given to each tape as it is duplicated. We listen in on each tape to maintain super-standard quality and consistency.

DIGITAL REAL-TIME

A Digital Master duplicated in Real-Time sounds incredible! There is no comparison to a Real-Time Digital cassette. GRD's Digital Mastering Service is only \$38.00 per album.

HIGH-TECH EXTRA

The GRD Real-Time system is wired with Audiophile low-capacitance cable. Your punchy projects will stay clean and punchy. Our recorders sound great. We use Denon DR-F8's and Tascam 122 studio recorders exclusively. All our Real-Time Recorders are 3 head, top performance machines.

Circle #115 on Reader Service Card

—FROM PAGE 188

Capacity: 3,000 to 5,000 per week.
Method of Duplication: In cassette.
Mastering Equipment: KLH Dynamic noise filter DNN 1201A, TEAC 3340S, Studer/Revox B-215, (2) ATR-800, (2) ATR-700, (2) Technics 1700, dbx Type 1 noise reduction, dbx 166 compressor/limiter, Advent Dolby B noise reduction.
Tape Used: Agfa Gevaert, BASF, Magnetic Media.
Shell Used: Magnetic Media.
Duplicating Speed: 10:5:1.
Loading Equipment: King 780, Superscope.
Packaging Equipment/Fulfillment Services: Shrink-wrap, customer service department.
Rates: Highest quality at competitive rates, call for price list.
Other Services: Custom length blank cassettes.

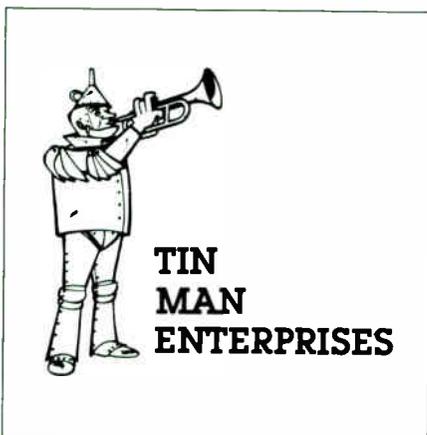
STUDIO PRESSING SERVICE
MASTERING, PRESSING, TAPE DUPLICATION
2584 Petworth Ct., Cincinnati, OH 45236
(513) 793-4944

SUMA RECORDING STUDIO
MASTERING, PRESSING, TAPE DUPLICATION,
CD SERVICES
5706 Vrooman Rd., Cleveland, OH 44077
(216) 951-3955, (216) 352-9802
Contact: Michael Bishop, studio mgr.

SUNSET STUDIO
TAPE DUPLICATION
117 W. 8th, Hays, KS 67601
(913) 625-9634
Contact: Mark Meckel, owner

SUTTMAN PRODUCTIONS
TAPE DUPLICATION
P.O. Box 72, Dayton, OH 45409
(513) 299-4578
Contact: Eric Suttman, owner

TECHNISONIC STUDIOS, INC.
MASTERING, PRESSING, TAPE DUPLICATION
1201 S. Brentwood Blvd., St. Louis, MO 63117
(314) 727-1055
Contact: Edward Canter, president



TIN MAN ENTERPRISES
St. Louis, MO

TIN MAN ENTERPRISES
TAPE DUPLICATION
2800 Yellow Brick Rd., St. Louis, MO 63129
(314) 464-4046
Contact: Al Bussen

TMB RECORDING SERVICES
MASTERING, TAPE DUPLICATION, CD SERVICES
7711 Juniper Dr., Prairie Village, KS 66208
(913) 341-1973
Contact: Troy, owner/engineer

TRACK ONE AUDIO SERVICES
TAPE DUPLICATION
P.O. Box 2775, Country Club Hills, IL 60477
(312) 799-8096
Contact: Morris Jones, owner

TAPE TO DISK

Listings of Mastering, Pressing and
Tape Duplication Facilities
Throughout the United States

TRIAD PRODUCTIONS
TAPE DUPLICATION
1910 Ingersoll Ave., Des Moines, IA 50309
(515) 243-2125
Contact: Richard F. Trump, president

THE 25TH TRACK REAL TIME
TAPE DUPLICATION
309 E. Vicksburg, Broken Arrow, OK 74011
(918) 455-2459
Contact: Walt Bowers, owner/manager

STEVE TWITCHELL/PRODUCTION
TAPE DUPLICATION
P.O. Box 982, Columbia, MO 65205
(314) 875-6715
Contact: Steve Twitchell, Tammi Mann

WORLD CLASS TAPES
TAPE DUPLICATION
P.O. Box 7611, Ann Arbor, MI 48107
(313) 662-0669
Contact: Donna or Patrick, tape operations

Western

A & G ASSOCIATES, INC.
TAPE DUPLICATION
4815 SW Macadam, Portland, OR 97201
(503) 221-1220
Contact: Mark Dustan, sales assoc.

A & G ASSOCIATES, INC.
TAPE DUPLICATION
109 Minna St., Suite 557, San Francisco, CA 94105
(415) 538-9648
Contact: Tom Dziekonski, consultant

A & G ASSOCIATES, INC.
TAPE DUPLICATION
433 Fairview Ave. No., Seattle, WA 98109
(206) 621-9222, (800) 426-9233

A & M RECORDS
MASTERING
1416 N. La Brea Ave., Los Angeles, CA 90028
(213) 469-2411
Contact: Sandi Johnson

AAPEX TAPE DUPLICATION
TAPE DUPLICATION
350 E. Todd Rd., Suite A, Santa Rosa, CA 95407
(707) 585-1132
Contact: Theresa Stoops, acct. supervisor
TAPE DUPLICATION
Duplicator: Kaba Research real time duplication system with 54 positions.
Capacity: 2,000 per day.
Method of Duplication: In cassette.
Mastering Equipment: MCI JH-110-C14 2-VP, MCI JH-110-C-4-VP.
Tape Used: Agfa 469 (mastering), Agfa Magnetite 12 and BASF Chrome (duplication).
Shell Used: Mag Media, Filam, ICM, Shape (upon request: additional charge).

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duplication."

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AAPEX TAPE DUPLICATION
Santa Rosa, CA

Duplicating Speed: 1:1, 2:1.
Packaging Equipment/Fulfillment Services: X-Rite shrinkwrap machine, Auto-Label labeller.
Rates: Rates upon request, please call.
Other Services: Sonic enhancement, analog to digital mastering (Sony 501 digital processor, Beta format required), full graphic design department for cassette inserts and album covers.

ABBEY TAPE DUPLICATORS, INC.
TAPE DUPLICATION
9525 Vassar Ave., Chatsworth, CA 91311
(818) 882-5210
Contact: Nick Steed, sales rep.

ACCURATE SOUND CORPORATION
TAPE DUPLICATION
3515 Edison Way, Menlo Park, CA 94025
(415) 365-2843
Contact: Ronald M. Newdell, president

ADVANCE RECORDING PRODUCTS
TAPE DUPLICATION
7190 Clairemont Mesa Blvd., San Diego, CA 92111
(619) 277-2540, (800) 854-1061, (800) 858-1061 In Cal.
Contact: Pamela Hamilton, sales mgr.

ADVENTIST MEDIA CENTER
MASTERING, TAPE DUPLICATION
1100 Rancho Conejo Blvd., Newbury Park, CA 91320
(805) 373-7720
Contact: Eddie Pullen, director—audio svcs.

ALLIED RECORD CO.
PRESSING, TAPE DUPLICATION
6110 Peachtree St., Los Angeles, CA 90040
(213) 725-6900
Contact: David Brown, senior V.P., mktg.

ALSHIRE INTERNATIONAL, INC.
MASTERING, PRESSING, TAPE DUPLICATION
1015 Isabel St., P.O. Box 7107, Burbank, CA 91510
(213) 849-4671, (800) 423-2936 (out-of-state)
Contact: Al Sherman, president

AMERICAL SYSTEMS INC.
TAPE DUPLICATION
30982 Huntwood Ave., Suite 204, Hayward, CA 94544
(415) 471-7451
Contact: Richard T. Kehoe, president

AMERICAN TAPE DUPLICATING
TAPE DUPLICATION
7017 15th Ave. N.W., Seattle, WA 98117
(206) 789-8273
Contact: Terri Hamren, manager/engineer

AMERICAN TAPE WAREHOUSE
MASTERING, TAPE DUPLICATION
700 S. Arroyo Pkwy., Pasadena, CA 91105
(818) 792-6400, (800) 848-TAPE
Contact: Bob Ellsworth, president



AMERICAN TAPE WAREHOUSE
Pasadena, CA

ANNEX STUDIOS
MASTERING
1041 N. Orange Dr., Hollywood, CA 90038
(213) 463-9944
Contact: Thome Nogar, owner

ARCAL PRODUCTIONS
TAPE DUPLICATION
2732 Bay Rd., Redwood City, CA 94063
(415) 369-7348
Contact: Sal Viola, production mgr.

ARIAS RECORDING INC.
MASTERING, PRESSING, TAPE DUPLICATION,
CD SERVICES
1971 N. Hartford St. Un. 82, Chameler, AZ 85224
(602) 899-3316
Contact: Martin Zacharias, president

AT&T RECORDING
TAPE DUPLICATION
501 N. Larchmont Blvd., Los Angeles, CA 90004
(213) 466-7756

Contact: Carol Obegi, sales mgr.
TAPE DUPLICATION
Duplicator: Ampex, Custom.
Capacity: 1-10,000 1/4" or cassette.
Method of Duplication: In cassette and out of cassette.
Mastering Equipment: Studer, Audiotronics, dbx, etc.
Tape Used: Agfa 611 (normal bias), Agfa 627 Chrome.
Shell Used: Data-Pac, Shape, Mag Media.
Duplicating Speed: 1:1, 8:1, 16:1.
Loading Equipment: King.
Packaging Equipment/Fulfillment Services: Computer labels.
Rates: Vary with quality, call for quote.
Other Services: 3/4"/VHS/Beta video copies, V/O recording.

AUDIO CASSETTE DUPLICATOR CO.
TAPE DUPLICATION
5816 Lankershim Blvd. #7, North Hollywood, CA 91601
(818) 762-2232
Contact: Steve Katz, Steve Mitchell

AUDIO RECORDERS
MASTERING, TAPE DUPLICATION
3843 Richmond, San Diego, CA 92103
(619) 296-6355
Contact: John Mullen, owner

AUDIO RECORDING, INC.
TAPE DUPLICATION
4718 38th Ave. N.E., Seattle, WA 98105
(206) 525-7372, 623-2030
Contact: Kearney W. Barton, president

AUDIO VIDEO RESOURCES
TAPE DUPLICATION
50 Broadway, San Francisco, CA 94111
(415) 781-2603

AUDIODYNE
TAPE DUPLICATION
P.O. Box 825, San Jose, CA 95106
(408) 287-3520
Contact: L.R. Chiamonte, president

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Pres. Catero Records

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Newport Beach, California 92660

* HX Professional Originated By Bang and Olufsen

Circle #119 on Reader Service Card

TAPE TO DISK

Listings of Mastering, Pressing and
Tape Duplication Facilities
Throughout the United States

Western

**AUREX-AURIGA PLASTICS
TAPE DUPLICATION**
18711 Rosenau Dr., Villa Park, CA 92667
(714) 637-6800
Contact: Jerry Bronaugh, director—U.S. oper.

**AWARD RECORD MFG., INC.
MASTERING, PRESSING, TAPE DUPLICATION**
5200 W. 83rd St., Los Angeles, CA 90045
(213) 645-2281
Contact: Mary Ansoorian, president



KENNETH A. BACON ASSOC.
Novato, CA

**KENNETH A. BACON ASSOC.
PRESSING, TAPE DUPLICATION, CD SERVICES**
24 Commercial Blvd. Suites E-G, Novato, CA 94947
(415) 883-5041 (CA only), (800) 231-TAPE (outside CA)
Contact: Richard Boroughs, chief eng.

PRESSING
Presses: Lened automated (modified).
Capacity: 20,000 per week (8 hr. shift).
Vinyl Used: Custom blended hi temp. virgin vinyl.
Rates: Call for prices.

Other Services: Typesetting, jacket printing & fabrication, complete packaging, logo & jacket design.

TAPE DUPLICATION
Duplicator: KABA 4-track real time system (100 copy position), KABA RTDS-4TM and 4TS, Otari OM/C2/Z3 (8 s'ave), Alpha 16X (15 slave), Bin system 16X/32X (5 slave).
Capacity: 2,000 real time plus 2,000 high-speed C-45 per shift.

Method of Duplication: In cassette, bin loop, real time.
Mastering Equipment: Otari MX 5050-II 1/2-track 1/4" 4-track 1/2"; Sony PCM.

Tape Used: Agfa, BASF, Sunkyong, Ampex, Scotch.
Shell Used: Kyrac, Lenco, Elmar, Filam, Shape.
Duplicating Speed: 1X, 2X, 8X, 16X, 32X.
Loading Equipment: TTL Model 515.
Packaging Equipment/Fulfillment Services: ITI L-1B labeller, Pack-all shrinkwrap.
Rates: Call for catalog.

Other Services: Packaging, shrinkwrap, custom labels, box liners, binders, recording studio, fulfillment, location recording, narration, pro equipment sales & service.
COMPACT DISC
Preparation/Manufacturing: IVC XLV200B CD Playback.

**BAMCO RECORDS
PRESSING**
1400 S. Citrus Ave., Fullerton, CA 92633
(714) 738-4257
Contact: George Baker, manager

**BATISH RECORDING ENTERPRISES
TAPE DUPLICATION**
1310 Mission St., Santa Cruz, CA 95060
(408) 423-1699
Contact: Ashwin Batish, V.P. marketing

**BAUER AUDIO
TAPE DUPLICATION**
10735 Burbank Blvd., North Hollywood, CA 91601
(818) 763-8606
Visitors by appointment only
Other Services: Short runs requiring fast turnaround and audiophile quality are our specialty, utilizing state-of-the-art duplication and mastering equipment custom modified by Deane Jensen and Steve Hogan. Personalized service is emphasized to match your requirements to our variety of tapes, C-zeroes, packaging, in-cassette, or out-of-cassette duplication processes. Complete project management available including recording truck.

**BONNEVILLE MEDIA COMMUNICATIONS
MASTERING, TAPE DUPLICATION**
130 Social Hall Ave., Salt Lake City, UT 84111
(801) 237-2677
Contact: John Campbell, sales mgr.

TAPE DUPLICATION
Duplicator: (2) Cetec Gauss 1200 bins, (11) Cetec Gauss 1200 slaves.

Capacity: 20,000 units per day
Method of Duplication: Bin loop.
Mastering Equipment: Studer A8080 w/Dolby HX-Pro, Dolby B.

Tape Used: Ampex 615, BASF chrome.
Shell Used: Magnetic Media.
Duplicating Speed: 64:1.
Loading Equipment: King 790 loaders.
Packaging Equipment/Fulfillment Services: Collation and shrinkwrap available.

Rates: Call for bids.
Other Services: Insert and label printing, Apex printing, fulfillment, multi cavity albums. Services available only with duplication order.

**CAPITOL RECORDS, INC.
TAPE DUPLICATION**
1750 N. Vine St., Hollywood, CA 90028
(213) 462-6252
Contact: John Dietz, Sandy Richman, custom production

**CASSETTE PRODUCTIONS
TAPE DUPLICATION, CD SERVICES**
841 South 500 W., Bountiful, UT 84010
(801) 298-8273
Contact: Mark Hanks, manager

**CASSETTE PRODUCTIONS UNLIMITED
TAPE DUPLICATION, CD SERVICES**
5796 Martin Rd., Irwindale, CA 91706
(818) 969-6881
Contact: Keith Myers, V.P. marketing & sales

**CASSETTE PROFESSIONALS
div. of Worldwide Communications
TAPE DUPLICATION**
320 Stewart St., Reno, NV 89502
(702) 322-6292
Contact: Bill Stephens, cassetologist

**CASSETTE TECHNOLOGIES
TAPE DUPLICATION**
Campus Park, Suite 107, 34310 9th Ave. South Federal Way, WA 98003
(206) 874-2185, (206) 952-5055
Contact: Larry Williams, dir. of client services
TAPE DUPLICATION
Duplicator: Otari DP-80 w/Dolby HX-Pro, Infonics 200A 1/2-inch master system.
Capacity: 4,000 per shift w/high quality control.
Method of Duplication: In cassette, bin loop.



**CASSETTE
TECHNOLOGIES**

CASSETTE TECHNOLOGIES
Federal Way, WA

Mastering Equipment: Otari MTR-12 1/2-inch w/Dolby HX-Pro, 7 1/2 ips & 15 ips mastering.
Tape Used: BASF LHD, BASF pure chrome, AGFA upon request.
Shell Used: Shape MK-10, IPS Premium.
Duplicating Speed: 10:1, 32:1, 64:1.
Loading Equipment: King 790s.
Packaging Equipment/Fulfillment Services: Shrink-wrap & custom packaging available.
Rates: Catalogue available upon request.
Other Services: Full graphic design services available. We are dedicated to service, fair prices, and uncompromising cassette quality.

C.A.V.E. RECORDING STUDIO
TAPE DUPLICATION
P.O. Box 3667, Santa Clara, CA 95055
(408) 244-2283
Contact: Brett Tyson, studio manager

CELLAR DOOR STUDIOS
TAPE DUPLICATION
795 W. Amity, Meridian, ID 83642
(208) 888-9242
Contact: Mark Evans, owner

CREATIVE SOUND PRODUCTIONS
**MASTERING, PRESSING, TAPE DUPLICATION,
CD SERVICES**
Sunset-Vine Tower, 6290 Sunset Suite 1026
Hollywood, CA 90028
(213) 871-1010
Contact: Bob Cotterell, president; Hope Burseth, mgr. customer services

THE CREATIVE WORD
TAPE DUPLICATION
17885 B-2 Sky Park, Irvine, CA 92714
(714) 261-8273
Contact: Bryan Hill, president

CUSTOM DUPLICATION INC.
TAPE DUPLICATION
3404 Century Blvd., Inglewood, CA 90303
(213) 670-5575
Contact: Rick Hively, sales mgr.

DAVKORE CO.
TAPE DUPLICATION
1300-D Space Park Way, Mountain View, CA 94043
(415) 969-3030
Contact: Paul Korntheuer, operations mgr.
TAPE DUPLICATION
Duplicator: Magnefax, Sony.
Capacity: 3,500 per shift.
Method of Duplication: In cassette, bin loop.
Mastering Equipment: Revox, TEAC, Ampex.
Tape Used: Magnetic Media, Agfa, BASF.
Shell Used: Magnetic Media, Film.
Duplicating Speed: 24:1.
Loading Equipment: King 790, Electro-Sound.
Packaging Equipment/Fulfillment Services: Full service, shrinkwrap, etc.
Rates: Call for a quote.
Other Services: Complete large run video duplication services.

**You put everything you got
into making your record
the best it can be.**



But before everyone hears your work, they're going to see it. Let the quality of your graphics reflect the excellence they can expect to find in your music.

Stoughton can provide all of your record-related printing needs in one stop. Top-quality lithography and fabrication of jackets and sleeves for both albums and 45's, single or multi-color. Labels in all sizes and styles, including picture disks. And, of course, posters and any other graphic material you may need to promote your product.

If it's worth doing, it's worth doing right. Come to the source.

stoughton printing co.

130 N. Sunset Avenue, City of Industry, CA 91744
From Los Angeles: (213) 686-2753
(818) 961-3678

Quality Printing For The Record Industry Since 1965

©1983 Stoughton Printing Co

Circle #120 on Reader Service Card

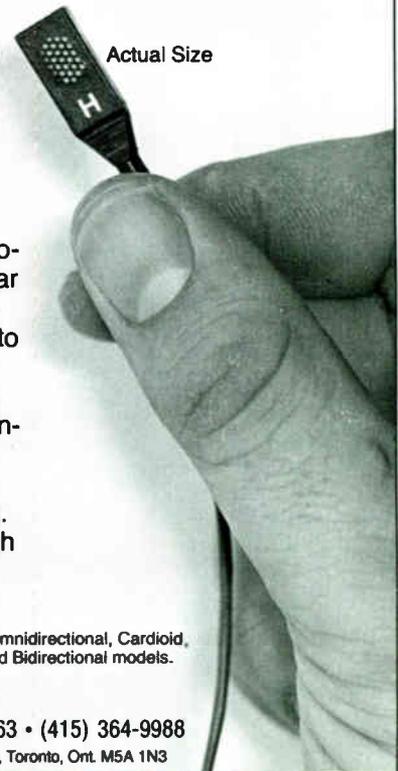
**In A/B tests, this tiny condenser microphone
equals any world-class professional microphone.
Any size, any price.**

Compare the Isomax II to any other microphone. Even though it measures only 5/16" x 5/8" and costs just \$189.95,* it equals any world-class microphone in signal purity.

And Isomax goes where other microphones cannot: Under guitar strings near the bridge, inside drums, inside pianos, clipped to horns and woodwinds, taped to amplifiers (up to 150 dB sound level!). Isomax opens up a whole new world of miking techniques — far too many to mention here. We've prepared information sheets on this subject which we will be happy to send to you free upon request. We'll also send an Isomax brochure with complete specifications.

Call or write today.

* Pro net price for Omnidirectional, Cardioid, Hypercardioid, and Bidirectional models.



COUNTRYMAN ASSOCIATES INC.
417 Stanford Ave., Redwood City, CA 94063 • (415) 364-9988
Canadian Distributor: Gerr Audio, 363 Adelaide Street, Toronto, Ont. M5A 1N3

Circle #121 on Reader Service Card

DAYSTAR PRESS
PRESSING
 P.O. Box 3, Lynwood, CA 90262
 Contact: C. Marshall, owner

DETROIT SOUND STUDIO
MASTERING, PRESSING, TAPE DUPLICATION
 P.O. Box 43609, Los Angeles, CA 90043
 (213) 299-5002
 Contact: Frank H. Jackson, owner

DIGITAL BROTHERS
TAPE DUPLICATION
 1731 Bonaire Way, Newport Beach, CA 92660
 (714) 645-9702, 646-4244
 Contact: Benjamin or Bryan Shaw, owners

DON'S CASSETTES
MASTERING, TAPE DUPLICATION
 7898 Ostrow St. #1, San Diego, CA 92111
 (619) 576-0291
 Contact: Don Nuzzo, owner
MASTERING
 Console: Modified Quantum QM 8B

Tape Machines: Technics 1500, TEAC 3440, Technics RS B57 R (cassette)
Monitor Speakers: Yamaha NS 10M
Signal Processing: dbx 1
Engineers: Don Nuzzo, Vince Lubinsky, Joe Nuzzo, Scott Pongracz
Rates: \$15/hr mastering
TAPE DUPLICATION
Duplicator: Stereo Otari 4050 C2 (5 slaves), Telex 6120 (11 slaves), (2) Otari DP4050 OCF (6 slaves)
Capacity: 1,000 to 2,000 cassette capacity per day
Method of Duplication: In cassette
Mastering Equipment: 1/4 track mastering TEAC 3440, cassette mastering, Technics RS B57 R
Tape Used: Agfa Magnetite & chrome, Sunkyong voice grade
Shell Used: Shape MK 10 clear, Mag Media chrome notch, Sunkyong normal black, Film white
Duplicating Speed: 8:1, 16:1
Loading Equipment: (2) Electro Sound 1800s
Packaging Equipment/Fulfillment Services: Hand labeling, shrinkwrap, hand packaging
Rates: We do good work, guarantee it, and we're very inexpensive. Send for price sheet
Other Services: Cassettes loaded to any length in any quantity, no minimum, quantity discounts are automatic starting at 50

DRAGON STUDIOS
TAPE DUPLICATION
 100 5th Ave., Redwood City, CA 94063
 (415) 366-5575
 Contact: Charles Albert, owner

THE DUPLICATOR
TAPE DUPLICATION
 1404 Franklin St. #410, Oakland, CA 94612
 (415) 832-5171
 Contact: Glenn Davidson, president

ECHO RECORDING CO.
TAPE DUPLICATION
 19 Bel Air Dr., Orinda, CA 94563
 (415) 254-2995
 Contact: David Mears, owner

ELECTROSOUND GROUP INC.
PRESSING, TAPE DUPLICATION
 9545 San Fernando Rd., Sun Valley, CA 91352
 (818) 767-8833
 Contact: Debbi Reagan, west coast sales manager
PRESSING
Presses: SMT-25 presses
Capacity: 50,000 LPs/day; 25,000 7" /day
Vinyl Used: Keycor, Vitec
Rates: Upon request. Call or write.
Other Services: Fulfillment
TAPE DUPLICATION
Duplicator: Electro Sound equip (26 slaves)
Capacity: 50,000 per day
Method of Duplication: Bin loop
Mastering Equipment: Studer
Tape Used: BASF (others upon special request)
Shell Used: Various
Duplicating Speed: 64:1
Loading Equipment: Manual and automatic
Packaging Equipment/Fulfillment Services: Scandia
Rates: Upon request, call or write

EMC PRODUCTIONS
MASTERING, TAPE DUPLICATION
 6855 Santa Monica Blvd., Hollywood, CA 90038
 Contact: Sales director

EMI AMERICA RECORDS
MASTERING
 6920 Sunset Blvd., Hollywood, CA 90028
 (213) 461-9141, ext. 307
 Contact: Tina Hopkinson, studio production mgr
MASTERING
Cutting Lathes: Scully Westrex lathe w/Capps computer
Console: Custom EMI-Abbey Road mastering console
Tape Machines: Sony MCI JH 110M mastering 2-track, ATR 100
Monitor Speakers: Altec 604 Es w/Mastering Lab cross overs, Augsburg room design
Signal Processing: Cybersonics HFL 2 de-esser, Westrex hi-freq limiting
Engineers: Ron McMaster
Rates: 12" lacquers, \$90; 7" lacquers, \$44, EQ and run-down, \$65. Other rates available upon request.
Credits: Sheena Easton, Kenny Rogers, Peter Wolf, Talk-Talk, Kajagoogoo, Stray Cats, George Thorogood, the complete Blue Note catalog.
Other Services: Mastering from a digital source is available, with the rental of digital equipment

THE EXCEL COMPANY
TAPE DUPLICATION
 102 N. Ditmar, Oceanside, CA 92054
 (619) 722-8284
 Contact: Richard Lee, sales mgr
TAPE DUPLICATION
Duplicator: Magnelax, K.A.B.A., Pentagon
Capacity: 1 to 1,000,000
Method of Duplication: In cassette, bin loop
Mastering Equipment: Fully equipped recording studios
Tape Used: Agfa, Magnetic Media
Shell Used: Magnetic Media
Duplicating Speed: 1:1, 2:1 (stereo); 8:1, 16:1 (mono)
Loading Equipment: King loaders (fully automated)
Packaging Equipment/Fulfillment Services: Automated labeling, blister carding, shrinkwrapping, etc.
Rates: Please call for a pleasant surprise.
Other Services: Multi-track recording studio, production studio, synthesized music arranging, spot advertisement production

FANTASY STUDIOS MASTERING
MASTERING
 10th and Parker Streets, Berkeley, CA 94710
 (415) 549-2500
 Contact: George Horn, chief engineer

NOISE REDUCTION FOR UNDER \$10.

MIXING CONSOLES
 SWITCHES
 MICROPHONE CONNECTORS
 SNAKE CABLES
 BATTERY CONTACTS



ALL PLUGS & JACKS
 (XLR, PHONE, PHONO, DIN, MIDI, ETC.)
 PATCHBAYS
 FADERS, POTS
 TERMINAL STRIPS
 SPEAKER TERMINALS

CRAMOLIN®

Even the finest equipment in the world can't guarantee a noise-free recording. One "dirty" connection anywhere in the audio/video chain can cause unwanted noise or signal loss.

"MORE THAN A CONTACT CLEANER"

CRAMOLIN® is a fast-acting, anti-oxidizing lubricant that cleans and preserves all metal surfaces, including gold. When applied to metal contacts and connectors, **CRAMOLIN®** removes resistive oxides as it forms a protective molecular layer that adheres to the metal surfaces and maintains maximum electrical conductivity.

CRAMOLIN® - USED BY THOSE WHO DEMAND THE BEST:

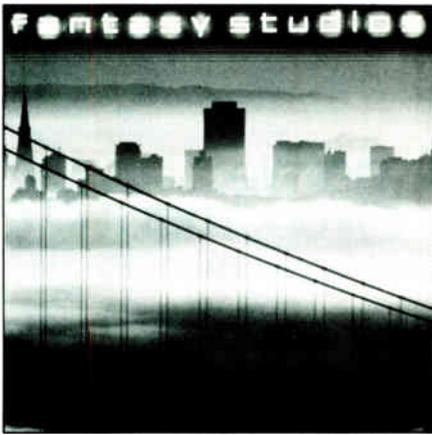
Ampex	General Electric	MCI(Sony)	RCA
Capitol Records	Hewlett Packard	Motorola	Studer-Revox
Dolby Laboratories	McIntosh Labs	NASA	Switchcraft

SINCE 1956

CAIG LABORATORIES INC.

1175-O Industrial Ave., (P.O. Box J) · Escondido, CA 92025-0051 U.S.A. · (619) 743-7143

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FANTASY STUDIOS MASTERING
Berkeley, CA

MASTERING

Cutting Lathes: Neumann mastering system utilizing the Zuma Audio computer.
Console: Sphere console.
Tape Machines: Studer 1/4" & 1/2" tape machines, Mitsubishi X-80 2-track recorder.
Signal Processing: Sontec.
Engineers: George Horn, Gary Hobish.
Rates: Call for rates.
Other Services: Mastering from Mitsubishi digital master tapes. Preparation of digital masters for Compact Disc manufacturing. Editing and equalization mastering from F-1 format.

FAST FORWARD

TAPE DUPLICATION
930 Montgomery St. Suite 303
San Francisco, CA 94133
(415) 989-6245
Contact: Paul Grippaldi, Mark O'Brien, owners

FAST TRACK (RECORDING) STUDIO
MASTERING, PRESSING, TAPE DUPLICATION
1906 E. 115th Pl., Northglenn, CO
(303) 457-0730
Contact: Terry McMurtry

52nd STREET STUDIO
TAPE DUPLICATION
439 S. La Cienega Blvd. Suite 203
Los Angeles, CA 90048
(213) 276-8932
Contact: Neil Posner, president

FINETAPE USA INC.
MASTERING, PRESSING, TAPE DUPLICATION
2802 N. Naomi St., Burbank, CA 91504
(818) 841-0772
Contact: Henry Munoz, buyer

FREEWAY RECORDING, INC.
TAPE DUPLICATION
2248 E. 14th St., Oakland, CA 94606
(415) 532-3700
Contact: Bernie Rivera, owner/president

FULLER SOUND A. V. RECORDING
TAPE DUPLICATION
P.O. Box 65051, Los Angeles, CA 90065
(213) 660-4914
Contact: Mike Fuller, owner

FUTURE DISC SYSTEMS
MASTERING, CD SERVICES
3475 Caluenga Blvd. West, Hollywood, CA 90068
(213) 876-8733
Contact: Gary Rice
MASTERING
Cutting Lathes: Cybersonics-Zuma DM2002 lathe w/Ortofon DSS821 cutting system.
Console: Cybersonics MC2003 automated mastering console.
Tape Machines: Ampex ATR-102M, Mitsubishi X-80 digital, Sony BVU 800DB/1610 digital system.
Monitor Speakers: Custom.



FUTURE DISC SYSTEMS
Hollywood, CA

Signal Processing: Sontec equalizer and limiter/comp.
Engineers: Steve Hall, chief eng.
Rates: Upon request.
Other Services: Complete analog and digital mastering services for compact disc and cassette manufacturing.

THE GARAGE AUDIO AND VIDEO
MASTERING, TAPE DUPLICATION
West Covina, CA
(818) 337-7943
Contact: Patrick Woertink, owner

GARRISON PUTNEY STUDIO
MASTERING, PRESSING
4635 E. Anaheim St., Long Beach, CA 90804
(213) 494-4552
Contact: Clovis Putney, owner/operator

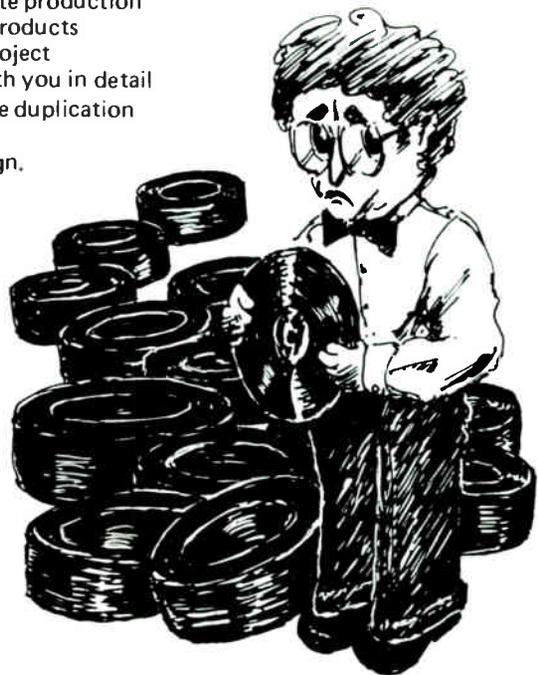
We Can Press Your Records!

(Without making you buy a set of tires for an 18 wheeler!)

QCA, the U.S.'s largest "UNDER ONE ROOF" audio disc & cassette production facility, offers you both the most cost effective & highest quality products & services available. Whether it's a current recording effort, or a project you're contemplating down the road, we'll be happy to discuss with you in detail and furnish complete information on disc manufacturing & cassette duplication from start to finish, including mastering, plating, pressing, printing, jacket fabrication, typesetting & album & label art & design.

QCA's staff of highly specialized craftsmen control every facet of production, assuring you of the highest quality standards in the industry.

Everything is done "UNDER ONE ROOF" insuring cost effectiveness, as well as quality, so, you can avoid paying for those "Tires" that, in other cases, would transport "product parts" (tapes, masters, artwork, printing, "metal work," jackets, labels, etc., etc.) back and forth across the country from one plant to another! And since there is only "ONE PLACE TO CALL" to check on your job's progress, you won't have to pay for that new telecommunications satellite, either! Gosh! You might not even lose any sleep!



The information is yours for the asking, call or write us today!

2832 Spring Grove Ave.
Cincinnati, Ohio 45225 (513) 681-8400

Circle #160 on Reader Service Card

**MASTER CASSETTE & DUPLICATING
TAPE DUPLICATION**
3919 S. 28th St., Phoenix, AZ 85040
(602) 243-3023
Contact: Jack Murray, owner/president

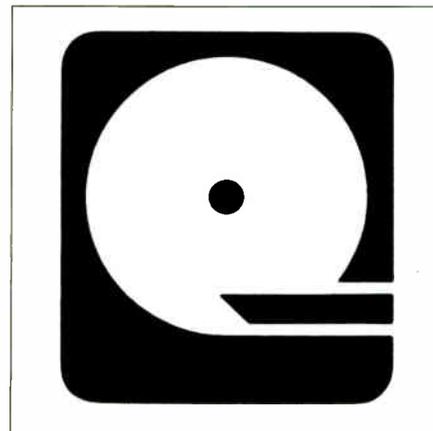
**MASTER DIGITAL INC.
TAPE DUPLICATION**
1749 14th St., Santa Monica, CA 90404
(213) 452-1511

Contact: Paul Addis, V.P. sales
TAPE DUPLICATION
Duplicator: 16 bit digital Sony or analog.
Method of Duplication: Real time only.
Mastering Equipment: Studer B67, Sony PCM-1600, Ampex ATR-100.
Tape Used: TDK SAX reference series, custom loaded to length.
Shell Used: Shape, MK 10.
Duplicating Speed: Real Time.
Packaging Equipment/Fulfillment Services: Color stock, typeset and printed, cards & labels.
Rates: \$3.00 & up.
Other Services: Film & video production, digital audio recording, Compact Disc mastering, videophile, 1" post-production, 1" and 3/4" stereo, VHS Hi-fi and Beta Hi-fi duplication.

**MASTER TRACK PRODUCTIONS
TAPE DUPLICATION**
1524 W. Winton Ave., Hayward, CA 94545
(415) 782-0877
Contact: Linda Rebeck, office mgr.
TAPE DUPLICATION
Capacity: 100,000 units/month.
Method of Duplication: Bin loop.
Mastering Equipment: Studer A-80 MR.
Tape Used: Agfa, BASF.
Shell Used: Magnetic Media, Shape.
Duplicating Speed: 16:1, 32:1.
Rates: Call for detailed price lists.
Other Services: Complete 24-track studio.

**MASTER TRACKS RECORDING & MULTI MEDIA
TAPE DUPLICATION**
402 Loma Alta Dr., Santa Barbara, CA 93109
(803) 966-6374
Contact: T. David Sommers, owner/operator

**THE MASTERING LAB
MASTERING**
6033 Hollywood Blvd., Los Angeles, CA 90028
(213) 466-8589
Contact: Annie Butkiewicz, studio manager



THE MASTERING LAB
Los Angeles, CA

**MCA WHITNEY RECORDING STUDIO
MASTERING, TAPE DUPLICATION**
1516 W. Glenbaks Blvd., Glendale, CA 91201
(818) 507-1041
Contact: Donna Welch, studio manager

**MIRROR IMAGE
TAPE DUPLICATION**
8505 E. Temple Dr., Stony Brook 447
Denver, CO 80237
(303) 694-6642
Contact: George, Jody & Linda
TAPE DUPLICATION
Duplicator: Denon DRM-33, 50 each, 50 Technics B85, 3 heads.
Capacity: 5000 C-30 2 shifts.
Method of Duplication: Real Time.
Mastering Equipment: Technics RS-1500 US.
Tape Used: Ampex, Agfa, BASF, Maxell, TDK, Sony.
Shell Used: Mag Media.
Duplicating Speed: 1 1/2 (Real Time).
Packaging Equipment/Fulfillment Services: Packaging, shrinkwrap, etc.
Rates: As low as 88 cents for C30.
Other Services: Aphex processing, dbx, Dolby B & C.

**MIX-MASTERS STUDIOS
MASTERING, TAPE DUPLICATION**
13755 Bayliss Rd., Los Angeles, CA 90049
Contact: Wallace Todd, president

**ML TAPE DUPLICATING
TAPE DUPLICATION**
6935 Valjean, Van Nuys, CA 91406
(818) 988-2737
Contact: Bill Ball, owner

**MOBILE FIDELITY SOUND LAB
MASTERING, TAPE DUPLICATION**
1260 Holm Rd., Petaluma, CA 94952
(707) 778-0134
Contact: Gregg Schnitzer, dir. product development

**MR. SPEED CASSETTE DUPLICATION
TAPE DUPLICATION**
5816 Lankershim Blvd. #5, North Hollywood, CA 91601
(818) 767-7333
Contact: Mr. Speed, manager of operations

**MUSIC ANNEX, INC.
TAPE DUPLICATION**
970 O'Brien Dr., Menlo Park, CA 94025
(415) 328-8338
Contact: Keith Hatschek, dir. of client services
TAPE DUPLICATION
Duplicator: Otari DP-80 w/Dolby HX-Pro master and 5 slaves.
Capacity: 5,000 C-60 per shift.
Method of Duplication: Bin loop.
Mastering Equipment: Otari MTR-10 w/Dolby HX-Pro, 7 1/2 ips 1/2".
Tape Used: Agfa, BASF
Shell Used: Mag Media, Shape.
Duplicating Speed: 64:1, 480 ips master.
Loading Equipment: King 790s.

TOM HIDLEY ON FM ACOUSTICS AMPLIFIERS

Tom Hidley's continuous strive for the ultimate in State of the Art design is documented all over the world. His wealth of experience allows him to accurately judge the performance of highest class equipment. We asked Tom if he could describe his thoughts on power amplifiers. Here are his words:

"The FM ACOUSTICS amplifier is a 'take charge' device. The amplifier's ability to deal with extreme high power low frequency signals without faltering is absolutely amazing. Transient response, definition and reserve power for the most exacting of monitoring requirements whilst retaining the pure character of music, makes FM ACOUSTICS amplification an absolute necessity in all quality music environments."

"In my opinion FM ACOUSTICS is not a choice, it is a must."

Tom Hidley

FM ACOUSTICS LTD, Tiefenhofstr. 17, CH-8820 Wädenswil/Switzerland
Telephone: 01 / 780 64 44, Telex: 875414 FMAC
US office: FM ACOUSTICS USA, P.O. Box 311, 956170311 Davis CA
Phone: (916) 7586300
In Canada: Perspective Audio P.A. Inc., 23 Chatel, Lorraine, P.Q.
J6Z 3C4 Phone: (514) 621-4087



ATTENTION! SOUTHEAST STUDIOS...



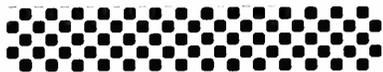
The deadline for returning your questionnaire for the Mix Directory of Southeast Recording Studios is **DECEMBER 13TH**. Don't miss this chance to reach thousands of potential customers who read Mix each month!

If you have not received a questionnaire, call Lauri Newman at (415) 843-7901.

ATTENTION! VIDEO PRODUCTION & POST-PRODUCTION FACILITIES...



The Mix Directory of Video Facilities throughout the U.S. and Canada will appear in the **APRIL, 1986** issue. This year, the listings will be expanded to include the full range of equipment and services your company has to offer.



The deadline for listings is **JANUARY 6TH**. If you have not received a questionnaire, call Lauri Newman at (415) 843-7901.

OUR STUDIOS TOWER OVER EVERYBODY!

- NEVE 8068 and 8108 NECAM
- 2 STUDER A-800 24 TRK
- STUDER A-80 VU MK-III 24 TRK
- Q-LOCK SYNCHRONIZER
- AMPEX ATR 102-104 1/2"
- DIGITAL 2 TRK SONY AND JVC
- DIGITAL 2 TRK MASTERING
- 8 LIVE CHAMBERS
- EMT PLATE • EMT 250



- AMS REVERB & DDL • SUPER PRIME TIME
- LARGE ASSORTMENT OF NEW & CLASSIC OUTBOARD EQUIPMENT AND MICROPHONES
- DIRECT TO DISC MASTERING
- CUSTOM LACQUER AND XDR CASSETTE MASTERING
- STUDIO A (60 x 45)

▼ THE COMPLETE PACKAGE ▼



▲ Studio B ▲

▲ Mixdown C ▲

▲ Mastering Room 1 ▲

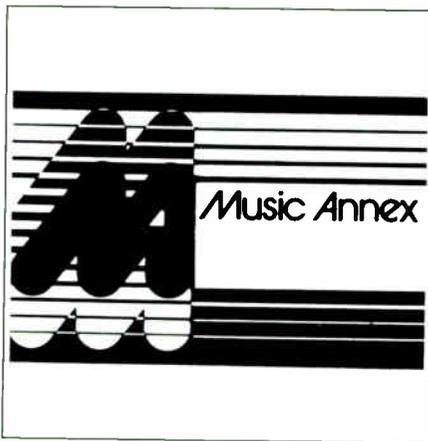
Member of EMI World Music Group which includes such well-known studios as Abbey Road (England), 301 (Australia) and Toshiba EMI (Japan).



M A N
H A T
T A N

Capitol Studios, 1750 N. Vine Street, Hollywood, California 90028 (213) 462-6252, Ext. 442

Circle #127 on Reader Service Card



MUSIC ANNEX, INC.
Menlo Park, CA

Packaging Equipment/Fulfillment Services: Apex (on cassette printing) or paper labels.
Rates: By quote.
Other Services: Complete graphics, boxing, inserts, shrink-wrap and drop ship services. Client master may be either digital or analog.

NORTH COUNTRY MEDIA GROUP INC.
MASTERING, TAPE DUPLICATION
P.O. Box 2244, Great Falls, MI 59403
Loc: 721 2nd St. So., Great Falls, MI 59405
(406) 761-7877
Contact: Margaret Rochman, president

NORTHWESTERN INC.
TAPE DUPLICATION
1224 SW Broadway, Portland, OR 97205
(800) 547-2252, (503) 226-0170
Contact: Bob Lindahl, president

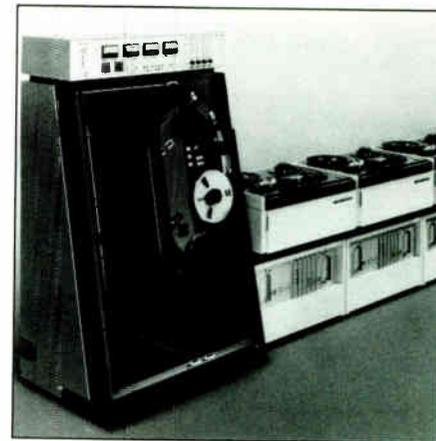
TAPE TO DISK

Listings of Mastering, Pressing and
Tape Duplication Facilities
Throughout the United States

Western

ORPHARION RECORDINGS
TAPE DUPLICATION
P.O. Box 91209, Long Beach, CA 90809
(213) 434-5355
Contact: Jonathan Marcus, Arlene Hasz, owners

OTARI CORPORATION
TAPE DUPLICATION
2 Davis Dr., Belmont, CA 94002
(415) 592-8311
Contact: Sales dept.; Industrial sales mgr.



OTARI CORPORATION
Belmont, CA

PACIFIC LUTHERAN UNIVERSITY/AUDIO SVCS.
TAPE DUPLICATION
121st and Park, Tacoma, WA 98447
(206) 535-7268
Contact: Bob Holden, director of audio svcs.

PANTHEON STUDIOS
MASTERING, PRESSING, TAPE DUPLICATION,
CD SERVICES
6325 N. Invergordan Suite D, Scottsdale, AZ 85253
(602) 948-5883
Contact: Mark "Dash" Hilgers, manager

PHANTASMA SOUND
TAPE DUPLICATION
7935 Fremont Ave., Ben Lomond, CA 95005
(408) 336-2494
Contact: Errol Specter, owner/operator

PHASE ONE
TAPE DUPLICATION
2881 W. Placita Dejun, Tucson, AZ 85745
(602) 743-7361
Contact: Rod Shields, owner

PRECISION LACQUER
MASTERING
1008 N. Cole Ave., Hollywood, CA 90038
(213) 464-1008
Contact: Kate Emerine, studio manager
MASTERING
Cutting Lathes: Tandem Compudisc, Ortofon.
Console: Kenmore.
Tape Machines: Ampex.
Monitor Speakers: Silvertones.
Signal Processing: Hobart.
Engineers: Stephen Marcussen, Schmoll Factor
Rates: Call for information.
Credits: Stevie Wonder, Eurythmics, U2, Jefferson Starship, Stevie Nicks, Tom Petty, Pointer Sisters, Tina Turner, Duran Duran, Barbra Streisand, Joni Mitchell, Pee Wee Herman, Natalie Cole, Barry Manilow.
Other Services: Good food, good coffee!!

PRECISION RECORDER
MASTERING, PRESSING, TAPE DUPLICATION,
CD SERVICES
(818) 787-7778
Contact: Drew Daniels, owner/operator

PRESENT TIME RECORDERS
TAPE DUPLICATION
5154 Vineland Ave., North Hollywood, CA 91601
(818) 762-5474
Contact: Bob Wurster, owner

PROJECT ONE A/V
TAPE DUPLICATION
6667 and 6669 Sunset Blvd., Hollywood, CA 90028
(213) 464-2285
Contact: Dalton Priddy, Brad Bowen, dup. masters
TAPE DUPLICATION
Duplicator: 50 Aiwa ADF 660, 770, 990; Sony VO-5850/
5800, 2C-AG 680G.
Capacity: 600 C-46 Real time per shift.
Method of Duplication: In cassette.
Mastering Equipment: Ampex ATR-102 1/4" & 1/2" 2-track.

A Sound Move!

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- Leading edge technology assures consistent high-quality audio and video cassette copies
- Serving the most discriminating clients in music, government, industry, business & education
- In-house graphics...labeling and printing plus direct mail
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- Call us concerning all your perplexing audio and video cassette problems. Let the Wizard solve them.

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Circle #128 on Reader Service Card

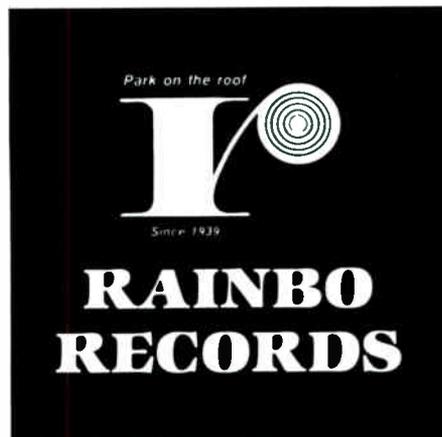


PROJECT ONE A/V
Hollywood, CA

Otari MTR-12, PCM F-1-701, Sony 5850, 5800, 5600, Hi-fi.
Tape Used: Agfa, Ampex, 3M, Maxell.
Shell Used: Agfa, Ampex, 3M, Maxell.
Duplicating Speed: Real time, audio and video.
Packaging Equipment/Fulfillment Services: 4-color jacket, labels.
Rates: Call.
Other Services: New video 3/4" U-matic and 1/2" VHS Hi-fi and Beta Hi-fi duplicator.

PYP DREAMS
TAPE DUPLICATION
3917 Riverside Dr., Suite 9128, Toluca Lake
Burbank, CA 91505
(818) 848-1004
Contact: Phil A. Yeend, owner

QUAD TECK STUDIO/F.D.S. LABS INC.
MASTERING, TAPE DUPLICATION, CD SERVICES
4007 W. 6th St., Los Angeles, CA 90020
(213) 383-2155
Contact: Hank Waring, manager



RAINBO RECORD MANUFACTURING CORP.
Santa Monica, CA

RAINBO RECORD MANUFACTURING CORP.
dba Rainbo Records & Cassettes
MASTERING, PRESSING, TAPE DUPLICATION
1738 Berkeley St., Santa Monica, CA 90404
(213) 829-0355, (213) 829-3476
Contact: Steve Sheldon, prod. supervisor; Jack G. Brown, president
PRESSING
Presses: 24 Lened automatic 7" & 12" presses, 4 semi-automatics.
Capacity: 60M per day.
Vinyl Used: Keyser, Quiex.
Rates: 12" Lacquers 2 sides, \$175; 7" 2 sides, \$102; processing 3 stage 12", \$164; 12" pressure average .55 1/2; 7" average .26.
Other Services: In-house: labels, album jackets for 12" and printed sleeves and inserts for 7"; minimum 1000 lots.
TAPE DUPLICATION
Duplicator: Audio Tech (6 slaves/1 master).
Capacity: 10,000 per 8 hr. shift.

—CONTINUED ON PAGE 202

Need a reliable employee?

Mix Classifieds are the place to advertise for management, sales and technical personnel. They all read **Mix**, the audio industry's largest, most widely-distributed magazine!

To place a **Mix Classified** ad, call Lauri Newman at **(415) 843-7901**. Deadline: 10th of month, two months prior to publication.

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Telex: 215295

Circle #129 on Reader Service Card

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STEREO MUSIC • MONO VOICE

500 to 500,000 QUANTITIES

INDIVIDUAL & ALBUM PACKAGING

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CUSTOM LENGTHS • C2 to C96

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CALIFORNIA: (714) 621-9561

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Circle #130 on Reader Service Card



Professional Music Quality Cassette Duplication

Studer A80 MR Mastering
Gauss Series 2400 Duplication
Dolby HX PRO
King Loading
Apex On-Cassette Printing
Premium Tape & Materials
Optimum Quality Control
Prompt Personalized Service

RAINBOW CASSETTE STUDIO
P.O. Box 472, Taos, NM 87571
(505) 776-2268

Circle #131 on Reader Service Card

TAPE TO DISK

Listings of Mastering, Pressing and
Tape Duplication Facilities
Throughout the United States

Western

—FROM PAGE 201

Method of Duplication: Bin loop.
Mastering Equipment: Otari.
Tape Used: BASF-LHD, BASF Chrome.
Shell Used: Varies.
Duplicating Speed: 32:1
Loading Equipment: King
Packaging Equipment/Fulfillment Services: Scandia.
Apex printer, fulfillment.
Rates: Mastering, \$55; label plate, \$30; J-cards, \$80 minimum for 2000; 40 minutes .75-.70 average; 50 minutes .73-.83.
Other Services: Artwork, insert film & paste-up, \$250-\$200; includes duplication, cassette case & wrap.

RAINBOW RECORDING
TAPE DUPLICATION
34 Jackson, Irvine, CA 92720
(714) 551-5367
Contact: Dale McCart, owner

BILL RASE PRODUCTIONS, INC.
MASTERING, PRESSING, TAPE DUPLICATION
955 Venture Ct., Sacramento, CA 95825
(916) 929-9181
Contact: Bill Rase, president/owner



RECORD TECHNOLOGY, INC.
Camarillo, CA

RECORD TECHNOLOGY, INC.
PRESSING, TAPE DUPLICATION, CD SERVICES
486 Dawson Dr., Camarillo, CA 93010
(805) 484-2747
Contact: Don MacInnis
PRESSING
Presses: S.M.T.
Vinyl Used: Teldec, Keyser, Vitec
Rates: Call or write for price list.
Other Services: Full Matrix processing, complete record packaging.
TAPE DUPLICATION
Duplicator: Cetec-Gauss, KABA.

Method of Duplication: In cassette, bin loop.
Tape Used: BASF Chrome.
Duplicating Speed: Gauss: 32:1, 64:1; KABA: 1:1, 2:1.
Loading Equipment: King instrument.
Packaging Equipment/Fulfillment Services: Complete cassette packaging.
Rates: Call or write for price list.
Other Services: Insert cards, labels, blank cassettes (C-0 thru C-100).
COMPACT DISC
Preparation/Manufacturing: Complete brokerage services available.

THE RECORDING CHAMBER INC.
MASTERING, TAPE DUPLICATION
351 Union Ave. NE, Renton, WA 98056
(206) 235-TAPE
Contact: Dennis Palmer, president

RECORDING ETC.
TAPE DUPLICATION
633 Cowper St., Palo Alto, CA 94301
(415) 327-9344
Contact: Ted Brooks, general mgr.

RECORTEC, INC.
TAPE DUPLICATION
275 Santa Ana Ct., Sunnyvale, CA 94086
(408) 737-8441
Contact: Mathew S. Ceterski, V.P., mktg.

REELTIME RECORDS/AUDIO PRODUCTION STUDIO
MASTERING, PRESSING, TAPE DUPLICATION
7404 Sand Lake Rd., Anchorage, AK 99502
(907) 243-4115
Contact: Bruce Graham, Ginni Davlin

REELTIME TAPE DUPLICATION
TAPE DUPLICATION
125 Altana St., San Rafael, CA 94901
(415) 459-7180
Contact: Tony Johnson, owner
TAPE DUPLICATION
Duplicator: Pioneer 550-10
Method of Duplication: In cassette (direct from master).
Mastering Equipment: Technics 1500, Pioneer 1250, Orban 622B parametric.
Tape Used: TDK SA, TDK D, BASF chrome, Agfa chrome or normal bias.
Shell Used: TDK, Magnetic Media
Duplicating Speed: Real time.
Packaging Equipment/Fulfillment Services: Labels, inserts, boxes available.
Rates: Call.
Other Services: Editing services available. We specialize in high quality music demo reproduction.

REY RECORDING CO.
1931 SE Morrison, Portland, OR 97214
(503) 238-4525
Contact: Rainer Johnson, studio mgr.

RICKS COLLEGE RECORDING SERVICES
MASTERING, TAPE DUPLICATION
Ecom Ricks College, Rexburg, ID 83440
(208) 356-2400
Contact: Trent Walker, studio mgr.

ROCKY MOUNTAIN RECORDING
MASTERING, PRESSING
8305 Christensen Rd., Cheyenne, WY 82009
(307) 638-8733
Contact: Georgia Alexander, sales

ROSE STUDIOS
TAPE DUPLICATION
1098 Rose Ave., El Centro, CA 92243
(619) 352-5774
Contact: Danny Berg, studio mgr.

RUTHER REMOTE RECORDING
TAPE DUPLICATION
1421 Circle Dr., Walla Walla, WA 99362
(509) 522-0438
Contact: Bud Ruther, owner/engineer

SHUR-SOUND & SIGHT, INC.
TAPE DUPLICATION
3350 Scott Blvd. #5, Santa Clara, CA 95054
(408) 727-7620
Contact: Glenn Cardon, V.P.



SHUR-SOUND & SIGHT, INC.

*SHUR-SOUND & SIGHT, INC.
Santa Clara, CA*

TAPE DUPLICATION

Duplicator: Electro Sound (9 slaves), Infonics.
Method of Duplication: In cassette, bin loop.
Mastering Equipment: Revox A-700, Technics 1506, Ampex AG440.
Tape Used: Ampex, Agfa.
Shell Used: Magnetic Media.
Duplicating Speed: 161.
Loading Equipment: (4) King 790 Electro Sound.
Packaging Equipment/Fulfillment Services: Tuck automatic labeler, Great Lakes shrinkwrap.
Rates: Call.
Other Services: Real Time tape duplication, location recording, conferences, seminars.

**SONIC ARTS CORP./THE MASTERING ROOM
MASTERING, PRESSING, TAPE DUPLICATION**
666 Harrison St., San Francisco, CA 94107
(415) 781-6306, 957-9471
Contact: Jamie Maranta, custom accounts



*SONIC ARTS CORP./THE MASTERING ROOM
San Francisco, CA*

MASTERING

Cutting Lathes: Neumann, fully automated and computerized. VG66 amp w/Neumann SX-68 cutting head.
Console: Custom.
Tape machines: Neumann, Telefunken, 3M, Inovonics, Ampex, featuring 1/2" 1/2-track mastering and PCM digital mastering.
Monitor Speakers: Altec 604 w/JBL woofers.
Signal Processing: Parametric and graphic EQ; Inovonics, Dolby A, and dbx noise reduction; UREI and Inovonics limiters; AKG echo chamber.
Engineers: Leo de Gar Kulka, Kenneth Lee.
Rates: Available upon request.
Credits: Phillips, Warner Bros., Concord Jazz, Ralph Records, DDG, Catero, and many local labels.
Other Services: Half speed mastering, digital mastering.
PRESSING
Vinyl Used: Keycor, Teldec.
Rates: Call or write for brochure.
Other Services: Jacket, label and poster printing; colored vinyl, promotional buttons, stickers, matchbooks, and

T-shirts.
TAPE DUPLICATION
Mastering Equipment: 3M.
Tape Used: Agfa PE 611.
Shell Used: Data packaging.
Packaging Equipment/Fulfillment Services: Album art reproduction, labels.
Rates: Call or write for brochure.

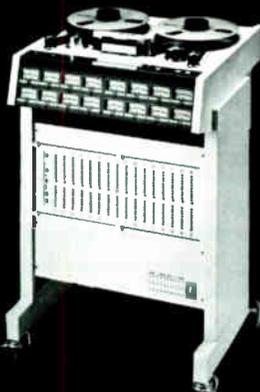
**THE SOUND COLUMN COMPANIES
TAPE DUPLICATION**
46 E. Herbert Ave., Salt Lake City, UT 84111
(801) 355-5327
Contact: Clive Romney, exec. V.P. & gen. mgr.

**SOUND FACTORY RECORDING STUDIOS
TAPE DUPLICATION**
1120 S. Highland, Tucson, AZ 85719
(602) 622-1265
Contact: Steve English, owner

**SOUND MASTER AUDIO/VIDEO
RECORDING STUDIOS
MASTERING**
10747 Magnolia Blvd., North Hollywood, CA 91601
(213) 650-8000
Contact: Barbara, studio manager
MASTERING
Cutting Lathes: Cybersonics with Ortolon cutting amplifiers and head.
Console: Cybersonics.
Tape Machines: MCI, Ampex.
Monitor Speakers: House.
Signal Processing: Everything.
Engineers: Brian Ingoldsby, Ken Ingoldsby.
Rates: On request.
Credits: Elton John, Olivia Newton John, Joe Cocker, many others.
Other Services: 24-track automated recording studio and full production video complex. Live sound reinforcement, remote recording, mobile video, plus underwater video.

—SEE PHOTO ON NEXT PAGE

Proven Success



OTARI MX-70 1" 16 Track Recorder

MX-70 features a microprocessor-controlled constant-tension transport, a full-function remote controller, exceptional audio electronics, and connectors for interfacing to any SMPTE/EBU time code based editing system, controller, or synchronizer. **RETAIL PRICE \$14,950.00**



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- 2 Chassis Sizes: 16 x 8 x 2 and 24 x 16 x 2
 - Fully Modular Construction
 - 12 - 32 Inputs
 - 4 Band EQ, Swept Mids, high/low shelving
 - 8 and 16 Tape Monitors/Effects Returns
 - 8 and 16 Buss Outputs/Subgroups
 - 4 EFX/Cue Sends
 - 4 EFX Send Masters with AFL
 - Transformerless Mic Preamps
 - 48 Volt Phantom Power each Channel
 - Direct Outs on all Inputs
- RETAIL PRICE FROM \$6,495.00**



Our New Location
619 South Glenwood Place
Burbank, CA 91506
(818) 843-6320

Circle #132 on Reader Service Card



—FROM PAGE 205

Loading Equipment: Automatic.
Packaging Equipment/Fulfillment Services: In-house packaging, no direct printing on cassette, complimentary printing of insert card; labels and related printing services available.
Rates: On demand.

**EASTERN SOUND
TAPE DUPLICATION**
48 Yorkville Ave., Toronto, Ontario, Canada M5R 1G1
(416) 968-1855
Contact: John Rowe, sales rep.

ELECTORI CO., LTD.
Mondo Bldg. 1-19-3 Kamiochiai Shinjuku-Ku
Tokyo, Japan (161)
(03) 950-6266
Contact: T. Nakajima, mgr. for int'l dept.

**EMI-ODEON SAK
MASTERING, PRESSING, TAPE DUPLICATION**
Av. San Martin 3590 - (1602) Florida
Pcia de Bs. As. - Argentina
(1) 760-0080, 760-0089
Contact: Mr. E.H. Campilongo, production mgr.

**ENREGISTREMENTS AUDIOBEC CANADA INC.
MASTERING, TAPE DUPLICATION**
600 Ouest Port Royal, St-Laurent
Quebec, Canada H3L 2C5
(514) 384-6667
Contact: T. Tubie
MASTERING
Cutting Lathes: Neumann.
Console: Custom Neve.
Tape Machines: Studer
Monitor Speakers: Tannoy.
Signal Processing: Neve, Fairchild, EMT, Dolby, dbx.
Engineers: J.C. Rabchuk
Rates: On request.
Credits: On request.
Other Services: Cassette duplication and printing on demand; record pressing agent.
TAPE DUPLICATION
Duplicator: Gauss; 2 bins, 9 slaves.

TAPE TO DISK

Listings of Mastering, Pressing and
Tape Duplication Facilities
Throughout the United States

Outside U.S.

Capacity: 2 million per annum.
Method of Duplication: Bin loop.
Mastering Equipment: Neve, Studer.
Tape Used: All major brands.
Shell Used: All major brands.
Duplicating Speed: 32:1.
Loading Equipment: King, tape automation.
Packaging Equipment/Fulfillment Services: Tape Matic, Marden Edwards.
Rates: On request.
Other Services: Disk mastering, printing, record pressing agent.

**ESLAB LABORATORIO ELECTRONICO S.A.
TAPE DUPLICATION**
11 Avenida 12-91, Zona 2, Guatemala Ciudad
Guatemala, Central America
(5022) 530165/530956; Telex 5782 ATEC GU
Contact: Julia O'Meany de Smith, general mgr.
TAPE DUPLICATION
Duplicator: Lyrec (7½ ips master 16 or 32 times).
Capacity: 10,000 per day.
Method of Duplication: Bin loop.
Mastering Equipment: Studer, Dolby, Klark-Teknik.
Tape Used: Agfa PE-619, PE-612.
Shell Used: Own, 3 types available.
Duplicating Speed: 16:1, 32:1 from 7½ ips master.
Loading Equipment: TTL automatic loaders.
Packaging Equipment/Fulfillment Services: All including cellophanning.
Rates: Upon inquiry.
Other Services: Custom label; blank cassettes of all types; C-0 shells.

ESLAB LABORATORIO ELECTRONICO S.A.
Av. Petit Thouars 4620, Lima 18 (Miraflores) Peru
P.O. Box 224
45.5530 / 45.6597; Telex: 25385PU ESTEMAC
Contact: Heinz O. Schieusner, general mgr.
TAPE DUPLICATION
Duplicator: Asona w/8 slaves (16 times original).
Capacity: 3,000 per day.
Method of Duplication: Bin loop.
Mastering Equipment: Studer, Dolby, Dynacord.
Tape Used: Agfa PE-619, PE-612.
Shell Used: Own, 3 types available.
Duplicating Speed: 16:1.
Loading Equipment: Superscope & TTL loaders.
Rates: Upon request.
Other Services: C-0 shells & blank loaded cassettes.

**MIKE JONES ASSOCIATES
MASTERING, PRESSING, TAPE DUPLICATION,
CD SERVICES**
500 Chesham House, 150 Regent St.
London, England W1R 5FA
+44-1-439-6288, 586-5167
Contact: Mike Jones, president

**LISTEN! AUDIO PRODUCTIONS LTD.
TAPE DUPLICATION**
308 Place d'Youville, Montreal
Quebec, Canada H2Y 2B6
(514) 842-9725
Contact: Carole Akazawa, general mgr.

**MANTA SOUND CO.
TAPE DUPLICATION**
311 Adelaide St. E., Toronto, Ontario, Canada M5A 1N2
(416) 863-9316
Contact: Michael Comrie, manager

**MARC PRODUCTIONS LTD.
TAPE DUPLICATION**
1163 Parisien St., Ottawa, Ontario, Canada K1B 4W4
(613) 741-9851
Contact: Guy Tessier, manager of operations

**MCCLEAR PLACE STUDIOS
MASTERING**
225 Mutual St., Toronto, Ontario, Canada M5B 2B4
(416) 977-9740
Contact: Lorraine Hume, traffic mgr.

**MONTCLAIR SOUND
TAPE DUPLICATION**
91 Montclair Ave., Toronto, Ontario, Canada M5P 1P5
(416) 488-0603
Contact: Barry McVicker, president

**NAN HAI AUDIO FACTORY
TAPE DUPLICATION**
Chun Chiao, Fo Ping Kung Rd., Shih Tung Hsia Rd.
Fo Shan, Guangzhou, China
32078
Contact: Leo Chan, producer/director

P.T. P'INDU AUDIO-VISUAL EQUIP. SALES & ENG.
Glodok Plaza F-115, Jakarta-Barat 11110 Indonesia
(62-21) 647777, (62-21) 647779
Contact: Mr. A. Naro, director

**SALISBURY SOUND
TAPE DUPLICATION**
Zuidendijk 227, 3317 NR Dordrecht, Holland
078-184422
Contact: Fred Tollenaar, Renee' Palm, managers

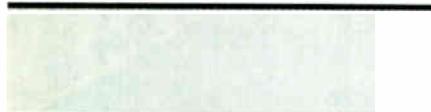
**SUMMIT SOUND SIAD INC.
PRESSING, TAPE DUPLICATION**
Box 333, Westport, Ontario, Canada K0G 1X0
(613) 273-2818

**TSM COMMUNICATIONS
MASTERING, PRESSING, TAPE DUPLICATION**
471 Richmond Rd., Ottawa, Ontario, Canada K2A 0G3
(613) 728-6500
Contact: Joe Anderson, manager/commun. resources

**WORLD RECORDS
MASTERING, PRESSING, TAPE DUPLICATION,
CD SERVICES**
Baseline Rd. W., Box 2000, Bowmanville
Ontario, Canada L1C 3Z3
U.S.A. (800) 263-7798, Canada (416) 576-0250
Contact: Bob Stone, president

MASTERING
Cutting Lathes: VMS 80 Neumann.
Console: Neve.
Tape Machines: Studer, MCI, Ampex.
Mastering Equipment: Various.
Tape Used: Various.
Rates: Included with custom pressing & tape duplication service offered.
Credits: Canada's largest custom manufacturer and packager.
Other Services: 20-page color guide available free on request. Sony digital, ½", and half-speed mastering. Prepaid air delivery to all US accounts.
PRESSING
Presses: Lened.
Capacity: 7" & 12".
Vinyl Used: Keycor.
Rates: Complete custom pressing & packaging service.
Other Services: Direct-to-board high gloss jackets, in-house typesetting, commercial artists, color separations, special 45 & LP, cassette packaging.

TAPE DUPLICATION
Method of Duplication: Bin loop.
Mastering Equipment: Neve, Studer.
Tape Used: BASF Chrome.
Shell Used: Custom.
Duplicating Speed: Various.
Packaging Equipment/Fulfillment Services: Complete service.
Rates: Package rates.
Other Services: Graphics, direct cassette shell imprinting.
COMPACT DISC
Preparation/Manufacturing: Complete manufacturing & packaging service.



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16. I certify that the statements made by me above are true and complete.



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Residential and commercial soundproofing and renovations.
PO Box 884 Woodstock, NY 12498
914-331-1726

*Currently completing the 40-track automated Dreamland recording facility, just outside of Woodstock, NY.

Employment Offered

New York City area — Sales Positions for recording and sound department of world famous Sam Ash Music Stores. Call David Ash or Paul Ash. 1-800 4 SAM-ASH (NY 1-800-632-2322). 124 Fulton Ave., Hempstead, NY 11550.

One of the largest pro audio dealers in the L.A. area seeks top notch salesman. Must have at least three years sales experience with working/technical knowledge of pro audio equipment. Contact Bob at (818) 843-6320.

EXPERIENCED ENGINEER WANTED

All new, advertising/synth-oriented 24-track recording studio opening in Wash., D.C. multi-media production complex. Need experienced engineer for jingle, music and VO/sfx projects. Tech experience preferred. Send resume, references and salary requirements to: PRI, 321 Wye Mill Ct., Gaithersburg, MD 20879.

RADIO TELEVISION Assistant or associate professor of audio services: Rank dependent on qualifications. Masters degree pref., bachelors degree and two years experience as an audio engineer required. Responsible to teach audio production courses, revised courses and develop new courses. Supervise all phases of audio production including music and music video production. Serve as a consultant on planning, design purchasing & installation of equip. Functional supervision of faculty staff and students using audio production facilities. Salary \$1,800 to \$2,200 per month depending on qualifications. A ten month appt. w/ the possibility of ext. to 12 months. Start Jan. 1986. Send letter of appl., current Vita, salary history and three current ref to: Marvin Smith, Chairman, Dept. of Radio

TV, Eastern Washington University, Cheney, WA 99004 E.O.E.

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interconnecting points. The result is an unbelievably durable "brazed" wire windscreen that will hold together under the most severe abuse. After the ball windscreen is formed, brazed and coated, a precision urethane foam pop filter is fitted to minimize the undesirable proximity effects. This special acoustically transparent foam protects the entire sound system by breaking up explosive high SPL pressure waves created by close vocals or close miking



percussion instruments. For those applications requiring even more acoustic screen from wind noise, etc., Peavey offers special external colored wind noise filters that slip over the screen and internal pop filter.

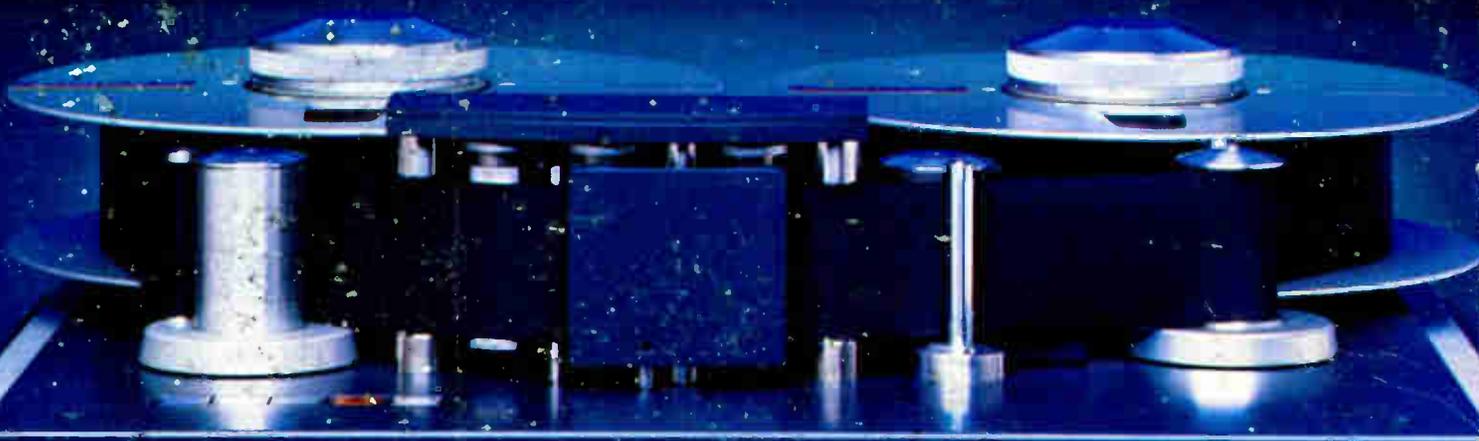
While outwardly, the appearance of the Celebrity Series is somewhat conventional, the aspect of "feel" has been given heavy emphasis since our experience has shown that performers prefer a unit that not only sounds right and looks right, but must also have a comfortable balance, weight, and overall tactile characteristics.

Special "humucking" coils (models CD-30™ & HD-40™) have been designed into the microphone element that effectively counter-balance any hum that might be picked up from external sources. Performers who play clubs where hum from light dimmer switches or other sources are a problem can appreciate this unique feature.

We invite comparison of our Celebrity Series with other cardioid microphones. You'll see why we feel that in terms of performance, features, and price, there is no competition.



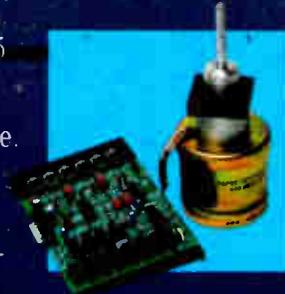
For a complete catalog featuring the entire line of Peavey sound reinforcement equipment send \$1.00 to Peavey Electronics, Dept. A, 711 A Street, Meridian, MS 39301



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stan motor delivers variable speeds in excess of 45 ips with heavy-duty performance. And in video applications, external frequency or voltage controllers easily interface with the Mark III.



configuration allowing timely and hassle-free maintenance. We've also added new audio channels with low frequency record and replay trim, adjustable phase compensation and available sync head transformer.



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