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MIX

Bob Clearmountain on Digital Editing

Audio for The Who's "Tommy" Broadcast

THE RECORDING INDUSTRY MAGAZINE

Directory: Mastering, Pressing and Duplication Facilities



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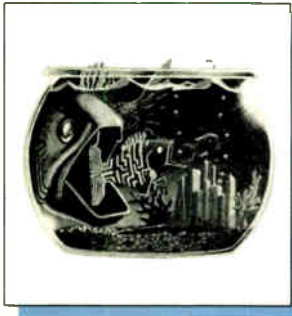
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World Radio History



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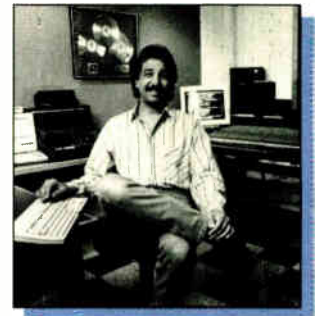
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JOHN ARRIAS

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FROM THE EDITOR

Founded 1977 by
David M. Schwartz and Penny Riker Jacob



Cover: Solid State Logic's ScreenSound Digital Audio System, shown here at Post Logic studios in Hollywood, with the Solid State Logic SL 6000 G Series console in Studio A. Photo: Elizabeth J. Annas. Inset: George Horn, mastering engineer at Fantasy Studios in Berkeley, California. Photo: Phil Brody.

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Anyone who operates a recording studio is familiar with the difficulties of keeping the doors open and building a successful business. Managing the demanding financial requirements, maintaining complex and sensitive equipment, cultivating happy clients and staff, and staying competitive in the shadow of rampant technical obsolescence are but a few of the worries on the minds of the head honchos. But there are other potentially devastating situations that can make these concerns all but insignificant, as we have unfortunately been witness to this season.

Earthquakes, hurricanes and other severe forces of nature challenge business owners into quick decision-making and rapid damage-control actions. Health and safety are the top priorities, of course. But business preservation is an important second concern. How do studios ride out such extraordinary situations and what do they learn from them? Certainly no one can predict the degree of damage faced in such events, but a healthy dose of prevention can put you in a better position to respond in times of emergency.

The 7.1 quake that shook the Bay Area in October forced many studios to examine their preparedness. Common comments from studio operators included: "Our damage was minimal, thanks to our heavy construction and our floated floor"; "The power outage was damaging to our older computers"; "We need to rebuild our shelving and storage areas more securely"; "We were quick to run around and turn off our circuit breakers so we didn't have surge problems when the power came back on"; and "I'm glad we back up our computers every day!"

Many, damaged or not, have lost business due to the time it takes for the clients to re-book their schedules and get back to normal working modes. This is an area that is even less predictable than how well the facility rides out the event itself. The aftermath, the long days of trying to put back the pieces, can be most difficult for those unprepared.

Emergency preparedness may seem like excessive attention to unlikely possibilities...until the unthinkable happens. We urge you to take the time and resources to make sure that your operation can deal with disasters. If you aren't sure where to find out such information, call your local fire department for advice. Better safe than sorry.

A final note...Our best wishes to assistant editor Linda Jacobson, who moves on this month to a new phase of her distinguished career. We'll miss you, Linda.

Keep reading,

A handwritten signature in black ink, appearing to read 'David Schwartz'.

David Schwartz
Editor-in-Chief

With nine work stations of we'd like to introduce



Forgive us if we sound a little pompous. It's just we find ourselves in a curious position. Over the past several years, everyone and their brother has introduced a so-called "work station." When, to our way of thinking, they really aren't work stations at all.

To us, a work station should have the most sophisticated sequencer available. And in fact, our new W-30 does. It features 16 tracks, microscope editing, full compatibility with both Roland MicroComposers and Directors "S" Sequencing software, to say nothing of the friendliest user interface there is.

To us, a work station should also be designed around a sampler rather than a synthesizer. What this does, more than anything else, is make the system remarkably versatile. It's a whole lot easier to make a sampler sound like a synthesizer than the reverse. And speaking of sounds, those from the W-30

can be processed through either eight polyphonic outputs or a mix output.

To us, a work station should possess an excellent memory. Which is why we've equipped the W-30 with a one mega-



Because the W-30 uses the same disks as the S-50 and S-550, you won't need to build a sound library. It already exists.

n the market, the first.

Nor does its versatility end here, because the Roland W-30 not only puts



If you squint you can probably make out the fact that the new Roland W-30 has eight polyphonic individual outputs which allow any sound to be routed individually to a mixer.

a 3.5" floppy disk drive at your disposal, it also gives you the ability to access additional data by using either a CD-ROM or a hard disk connected to an optional SCSI interface.

Of course, a work station should be able to express itself too. Which is why we've made our 61-note keyboard sensitive to both velocity and after-touch.

And it should be easy to use. Hence, the W-30 uses a large, state-of-the-art 240x60 dot LCD display that's capable of providing more useful information at one time than ever before.

But before we go, let us take this moment to pose a hypothetical ques-

tion. Let's just say that all of the other so-called work stations found a way to include these very same features. They'd be better, of course, but still not comparable to the re-

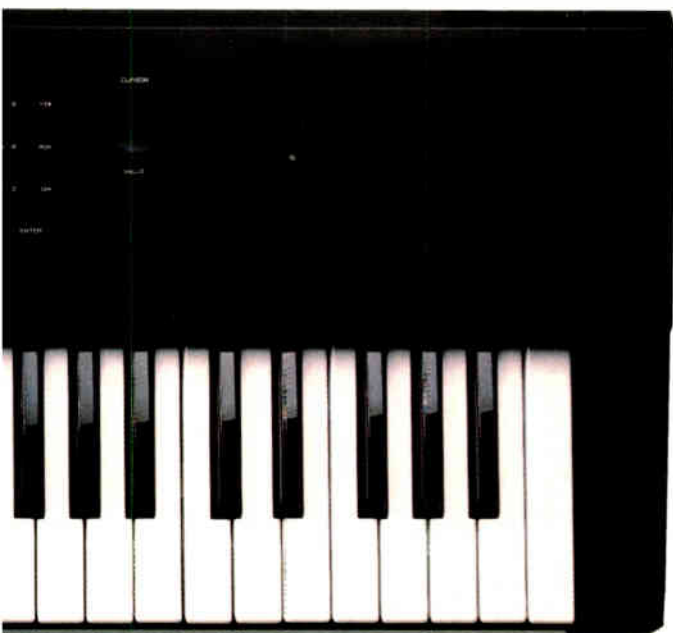
markable new W-30. Because they'd still be missing the most persuasive and motivating feature of all.

The Roland logo.

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byte, user-accessible memory (ROM).

And because it comes with the most frequently-used sounds, you won't need to load in a sound disk to begin working.

The sampler section's 512k (RAM) memory is no less impressive. It's actually equal to that of a Roland S-330, and can

be used for creating new sounds, or for playback, or for manipulating any of the S-Series disks. As a result, you'll not only be in a position to work with the sounds that are currently hot, you'll be in just as good a position to capture the sounds that will become hot.



Our state-of-the-art 240x60 dot LCD display lets you view all the parameters while editing.



While sequencing you can change the length or dynamic value of any note simply by using microscope editing.

CURRENT

RIAA REPORT

The Recording Industry Association of America released sales statistics for the first six months of 1989, and the big winner was cassette singles, as number of units shipped increased by more than 500% over the first six months of 1988. Cassettes continue as the format of choice, accounting for 56% of total shipments from January to June.

CD units shipped rose by 38%, reflecting greater availability and lower prices. And vinyl? Unit shipments of LPs decreased by nearly 60%, while disc singles dropped nearly 40%.

POLYGRAM ACQUIRES A&M

Half-a-billion dollars. That's what PolyGram reportedly paid for all of A&M Records' assets, including real estate holdings, back catalog, music videos, current repertoire and artist contracts. What they didn't get was Almo/Irving, A&M's lucrative music publishing wing. Not for sale, says A&M co-founder Jerry Moss.

Under the terms of the deal, A&M will remain autonomous from the parent company, and Moss and Herb Alpert have been signed to long-term contracts.

MACMUSICFEST 3.0

Chris Stone, founder of MacMusicFest and president of Macintosh Entertainment Guild of America (MEGA), has announced the third annual festival devoted to explorations of computer-based music technology, to be held December 2 and 3 at Paramount Pictures' Stage 5 in Los Angeles.

To request an attendee package and brochure, call MEGA at (213) 468-5496.

YAMAHA AT BERKLEE

Yamaha Corporation of America gave a special tribute to Berklee

College of Music during a ceremony held September 28 at the Berklee Performance Center in Boston. The event, jointly sponsored by Yamaha's SGD (Synthesizer, Guitar and Drum) and Pro Audio Divisions, recognized the support given to Yamaha by the school through its ongoing commitment to education excellence.

A well-attended afternoon program of Yamaha SGD and Pro Audio demonstrations, an evening performance by the Yamaha MIDI Band, featuring guest artist Eric Kloss, and a cocktail reception hosted by LaSalle Music at its new Boston location rounded out the day-long series of activities.

AFTER THE QUAKE

Blank Software, maker of the *Alchemy* program for the Macintosh, lost its home in San Francisco due to the earthquake on October 17. Fortunately no one was hurt, and the company's equipment suffered only minor damage. However, city inspectors condemned the huge, old brick building. Blank Software can be reached at (415) 863-9224; the mailing address is PO Box 6561, San Francisco, CA 94101.

Much closer to the epicenter was Summit Audio, whose marketing office in Los Gatos was destroyed. The company has since relocated a few blocks away and can be reached at (408) 395-2448. Fortunately, Summit's manufacturing facility is in Wisconsin and was unaffected by the tremors; shipments of its high-quality, tube signal processing gear continues.

Condolences to our colleagues at *MacUser* magazine, based in Foster City, Calif. Editors John Anderson and Derek Van Alstyne died when a building collapsed on them in San Francisco's South of Market

district.

DEANE JENSEN

Audio pioneer Deane Ellsworth Jensen died suddenly in his private audio engineering lab in North Hollywood, Calif., on the weekend of October 21. He was 47 years old.

In 1972, Deane founded Jensen Transformers, Inc., and the Jensen name soon became synonymous with high quality and clean sound. A friend, Gary Davis, writes, "I learned from Deane that there is a best way to do something—that 'good enough' is not really an option when perfection is the goal. His true goal was better audio, not just better transformers."

Deane is survived by his parents and sister. The family requests that in lieu of flowers, any contributions be sent to the Richard C. Heyser Memorial Scholarship Fund, c/o the Audio Engineering Society. The company will continue providing transformers for the audio industry.

CORRECTIONS

In the October *Mix* article entitled "Howard Jones in Concert," we incorrectly spelled Mark Engebretson's name. Our apologies.

In our October "New Products Directory," the listing for the Studer 48-track recorder should say it uses 1/2-inch tape.

In the November article on Henry Lee Summer, we referred to Mike Wanchic as John Cougar Mellencamp's bassist. He plays lead and lap steel.

The November "Insider Audio" said NRG Recording Services of N. Hollywood was shut down due to violation of zoning laws. In fact, NRG was cited for building code violations and is still in operation, as it has been since 1974. ■

In an age of disk and digital, why buy analog?

We know there are some applications where our 32-channel digital machine, the DTR-900, is the only answer. But if your business is such that you can do anything you want to do in the analog domain, and at the same time do less damage to your budget, then our brand new analog 24-channel MTR-100A may be the perfect machine for you.

When you consider that the MTR-100 will literally *change forever* the way engineers interface with audio machines, and



The MTR-100's auto-alignment saves you hours of time by eliminating constant tweaking and re-tweaking between sessions.

that this new way will save you hours spent in non-productive time, the analog choice begins to make even more sense. You see, the MTR-100 features full Auto-Alignment that allows total recalibration of the record and reproduce electronics. This means you can compensate for different tapes in a *fraction* of the time that it previously took, and your studio is not bogged down with constant tweaking and re-tweaking between sessions.

And if you think digital machines have a corner on high performance transports, think again! The MTR-100's new transport incorporates reel motors that approach one horsepower—you'll get fast wind speeds of up to 474 inches per second! Of course, the

transport is pinchrollerless to give you the legendary tape handling ballistics of our MTR-90.

What's more, with its optional EC-103 chase synchronizer, the MTR-100 maintains frame-lock in forward and reverse from 0.2X to 2.5X play speed, and will typically park with zero frame error.

Then, there's the sound. New cylindrical-contour heads built by Otari especially for the MTR-100 result in remarkably low crosstalk and outstanding low-frequency performance. Pre-amps are located directly beneath the heads to further improve frequency response, and HX-Pro* is built-in for enhanced high frequency headroom. (An optional internal noise reduction package houses Dolby* SR/A.) Add all these features to gapless, seamless, punch-in, punch-out, which is also built-in, and your

MTR-100's sonic performance will rival, or beat any digital machine in the world.

So there you have it. With these powerful benefits available in analog, does it make sense to go digital? Sure, for some applications. But analyze your needs carefully before you buy. For many applications, a hot

analog tape machine like the

MTR-100 is the right choice.

And because we can see both sides of the question, put us to work. We have information that can help you make the right decision. Call Otari at (415) 341-5900 for the "Technology You Can Trust".



Reel motors that approach one horsepower are driven by pulse width modulation amplifiers to tape speeds up to 474 ips.

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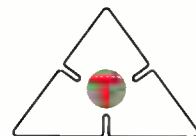
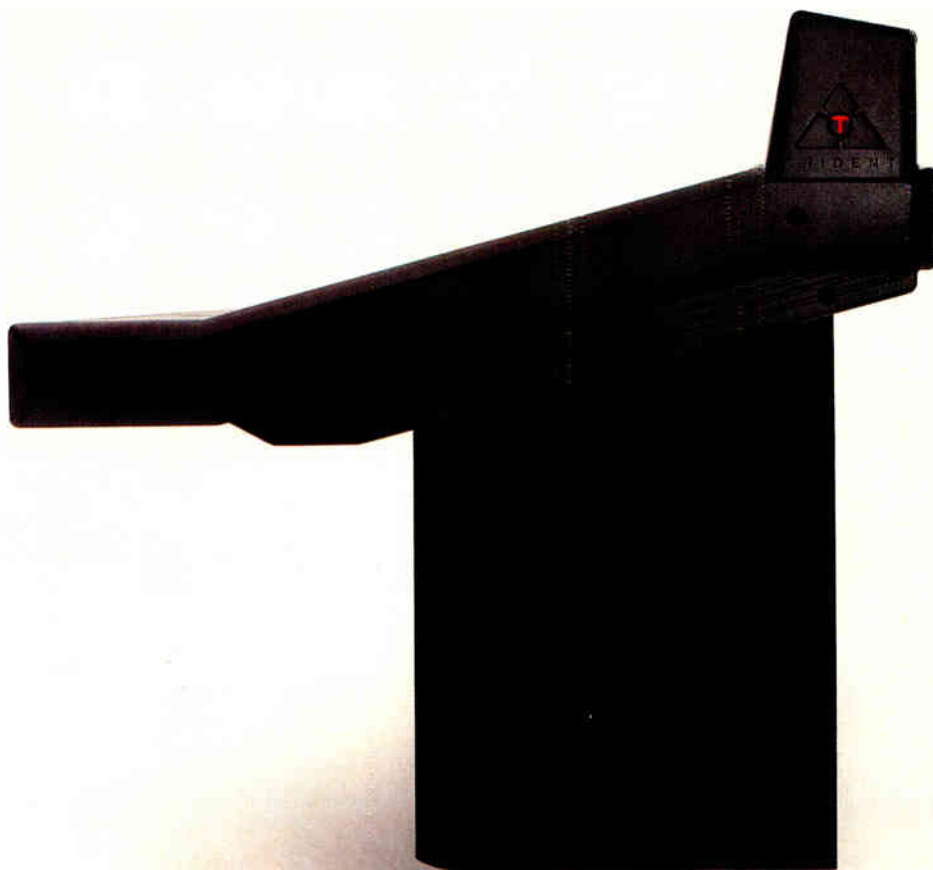
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INDUSTRY NOTES

Mark C. Gray is now president of the newly formed Sony Peripheral Systems Company, a division responsible for sales and support of Sony's optical storage products. . . Telex Communications, Inc., has acquired the assets of RTS Systems, Inc., of Burbank, CA, a former subsidiary of Compact Video Group. . . Personnel changes at Ampex, Redwood City, CA: Fred Layn, product manager, professional audio tape; Frank Foster, product manager, videotape; and Joseph Grega, product manager, digital videotape. The latter two will be based at the Ampex manufacturing facility in Opelika, AL. . . Parsons Audio, a supplier of Amek, Lexicon, Wheatstone and other lines of pro audio equipment, has opened its doors in Boston. . . New address for Ram Sound: PO Box 906, 369 West Miracle Strip Pkwy., Mary Esther, FL 32569-0906. . . Bob Carver is still chairman of the board of Carver Corporation, Lynnwood, WA, but Robert R. Dougherty has been named president and CEO to free Bob's time for developing new products. . . Alexander Publishing, Korg/USA and local retailers pooled their resources and sponsored three crash courses in MIDI this past summer. One was held at Duquesne University, another at the University of Miami, and a third at Korg West in L.A. . . The wait is over! Full Sail Center for the Recording Arts has moved into its new digs at 3300 University Blvd., Winter Park, FL 32792. . . Video Expo San Francisco will be held at the Civic Auditorium February 20 to 22. For booth reservations call Ellen Parker at (800) 248-5474. . . NARAS has created a new annual award: the NARAS Student Music Award. Educational grants of \$5,000 each will be presented in five music categories: popular/contemporary, traditional, jazz/big band, classical/new music and an open category. . . Adams-Smith recently appointed Bay Roads Marketing Group, headed by Luke Furr, as its New England rep. . .

nac Westrex Inc. has been formed from the purchase of Westrex assets from Digital Entertainment Corporation. Jack Leahy is the new president; Frank Pontius is in charge of sales and marketing. . . Digital Audio Research has appointed Bob McNabb as regional manager in the U.S. Also, John Emmas, Ian Dodd and Rupert Ford have joined the SoundStation II sales and customer support team, operating out of the Chessington, UK, headquarters. . . Studer Revox America added two full-line dealers to its network, both in California: Audio Intervisual Design in L.A. and Pro Media in El Sobrante. . . 101 West 57th Street, NYC, is the address for Digital House's new sales and service center. The company specializes in CD printing and production. . . The Streamline Scoring System from Offbeat Systems added an Emmy to its Oscar, as it walked off with the award for Outstanding Achievement in Engineering Development. . . Quest Marketing of Auburndale, MA, has been named the exclusive U.S. distributor for Genelec Active Monitors. . . Moving around at Nakamichi: Ted Nakamichi has returned to the U.S. to assume the position of vice president, marketing; and Michael W. Silber has come back to the company as director, technical support, mobile sound division. . . Gauss Loudspeakers named World Wide Electronics of Ft. Lauderdale as its manufacturer's rep in Florida. . . Brian Scott joined Altec Lansing as district sales manager for portions of NY and PN, OH, WV, KY, and IN. . . New England Digital has promoted Colin Stewart to the position of vice president, Western division. . . Peavey is sending 64 of its employees back to school twice a week as part of an innovative job skills program in association with Meridian Community College. . . Pro Piano®, the NY-based piano and MI rental company, recently purchased Krell Musical Instrument Company of Los Angeles. ■

SESSIONS AND STUDIO NEWS

NORTHEAST

After the success of their 12-inch "Yo No Se," Pajama Party went to Platinum Island Recording Studios in NYC to record their debut album for Atlantic Records. Jim Klein produced with engineering by Paul Berry and Jerry Gottus. Rob Paustian engineered the mix, assisted by Ricky Belt. . . Mark Kamins was at Prime Cuts in Manhattan overdubbing on David Byrne's *Make Believe Mambo* for Warner Bros. Tom Vercillo was at the board with Eric Kupper on keyboards. . . NYC rockers Circus of Power were at Chung King Recording Studios working on a demo for their upcoming RCA album. Daniel Rey produced the project with Greg Gordon engineering and Warren Shaw assisting. . . The Samples recently recorded and mixed their new album at Sigma Studios in Manhattan. The album, which features Branford Marsalis on a track, was produced by Kim Turner and Walt Beery and engineered by Brian Sperber. . . The Fat Boys stopped by The Magic Shop in New York City to record with Steve Lindley engineering and Fred Bobrow assisting. . . Former World Federation wrestling star-turned-actor Jesse "The Body" Ventura recorded a CD release of the '60s classic "Eve of Destruction" at Taylor-Made Productions in Caldwell, NJ. . . At Baby Monster Studios in NYC, songwriter/musician Mike Rimbaud finished up his album *Mutiny in the Subway* with engineer Sello Molekweno at the board. Rimbaud produced the album for Paris label Bondage Records. . . Virgin Records artist The Brumbys finished mixing three tracks for their upcoming album at Power Play Studios in New York City. Engineering and production chores were handled by Anton Pukshansky with Barry Sandoval assisting. . . Also in Manhattan, Lonnie Liston Smith worked with producer Terry Burus on several new songs. Phyllis Hyman pitched in to record the vocals and Robert Power handled the controls. . .

George Clinton mixed two new tunes at Island Media Services in West Babylon, NY, with Al Watts engineering. . .

NORTH CENTRAL

Toronto-based Comfort Sound's 24-track mobile has been busy with several projects including Bruce Cockburn's live LP, recorded at Ontario Place. . . Kevin McCord, formerly with One Way, was at the Disc Ltd. in East Detroit, MI, working on a mix of Virgin artist Intercity's release, "What You Gonna Do with My Lovin'". . .

NORTHWEST

Soma Sync Studios in San Francisco recently hosted producer Larry White working with Ryuichi Sakamoto and on his own project with vocalist Lenny Williams. . . Gospel artist Edwin Hawkins was at Starlight Sound in Richmond, CA, working on his PolyGram album. Engineer Bill Thompson handled the board with assistance from Lynn Levy. . . O.J. Ekemode and the Nigerian Allstars recorded their new album at Mesa Recording in Sebastopol, CA, with producer/engineer Dan Levitin. Tom Martin assisted. . . CBS Records artists Quarterflash were at Spectrum Sound Studios in Portland, OR, working with producer Charlie Midnight on their latest album. . . At Ironwood Studio in Seattle, engineer Jay Follette was busy working with Tough Mamma, Paul Allen and Memphis Movement. . . Gene Loves Jezebel stopped by Studio D in Sausalito, CA, to cut their third album for Beggars Banquet/Geffen. Jason Corsaro was at the controls, with Paul Fox producing and Jim "Watts" Vereecke assisting. . . At Dave Wellhausen Studios in San Francisco, Chris Issak was in working on the soundtrack for an ABC movie, *The Preppy Murder*. . . Veronique Beliveau was at Mushroom Studios in Vancouver working on two songs for her self-titled A & M release. Richard Carpenter produced with Robert DeLa-

Garza engineering and Tilde Fiorda assisting. . . Rex Recording Company in Portland recently completed audio post-production for *Wee Sing in Sillyville*, an hour-long children's video. Engineers Russ Gorsline, Richard Moore and Rhiner Johnson helped to create "magical" special audio effects. . . Different Fur in San Francisco completed CD pre-mastering for The Residents' latest album, entitled *The King and Eye*, for Virgin Records. . .

SOUTHEAST

At Master Sound Recording Studios in Atlanta, former Cameo artist Kevin Kendrick self-produced an upcoming release for A & M Records. Ron Cristopher engineered the project. . . Indigo Girls, Bob Margolan and Mark Weiner were at Flood Zone Studios in Richmond, VA, at various times recording performances for *The Out of the Blue Radio Review* show, with Karl Eriksson engineering. . . PolyGram artist Larry Boone stopped by Nashville's Music Mill to lay down vocals and overdubs for his latest release. Ray Baker produced the sessions, which were engineered by Jim Cotton, Pete Greene, Paul Goldberg and George Clinton. . . Also in Nashville, the Forester Sisters were at Sound Emporium with producer Wendy Waldman cutting tracks for their new Warner Bros. album. Dennis Richey engineered. . . In Atlanta, Roulette was at Musiplex working on tracks for PolyGram Records. The project was co-produced by Wynn Jackson and David Pensado. Pensado engineered with help from Dale Abbott. . . Ricky Skaggs stopped by The Bennett House Studios in Franklin, TN, to sing backups on Vern Gosdin's album project for CBS. Bob Montgomery produced the session, with Gene Eichelberger engineering and Shawn McLean assisting. . . At Criteria Recording Studios in Miami, FL, Epic Records artists Nuclear Valdez recorded basics for an upcoming promotional release. Bassist Fro

W E C A R E

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Left to right: Barry Bongiovi, Studio Manager; Bob Walters, President; Tony Bongiovi, Vice President; Studio Designer

AUDIO VIDEO PROFESSIONAL

World Radio History
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PROFESSIONAL AUDIO

World Radio History

“No one will ever buy a console with a television in it”

Visitor to AES, 1977

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

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



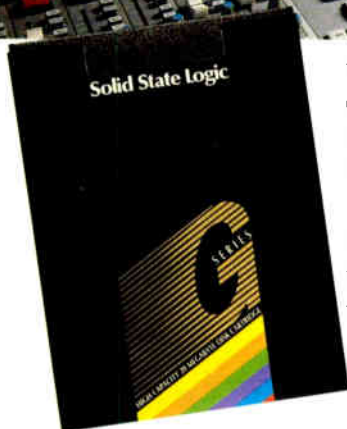
In the intervening years our designs were enhanced, incorporating the suggestions of the many leading studios who had adopted our system. Ultimately, the G Series Master Studio System evolved.

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

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recording studios in the world, it incorporates an unparalleled degree of user experience. Advanced facilities like Selective Rollback and Group Set make mixing faster. Rapid comparison can be made between mixes. Large or complex mixes can be handled effortlessly on or off-line.

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



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Sosa assisted the rest of the band with production duties. Paul Van Puffelen engineered with assistance from Kurt Berge. . . Grammy nominee Bela Fleck was at Nashville's Javelina Studios with engineer Bil VornDick recording a jazz album with the Flecktones. . . These Are Houseplants recently completed their debut CD at the Aural Canvas in Murfreesboro, TN. The disc, engineered and produced by Forrest York, was digitally mastered by John MacDonald. . . Jimi Jamison (Survivor lead vocalist) was at Ardent in Memphis working on his solo album for Scotti Bros. Jim Gaines co-produced with Kenny Mims. John Hampton engineered. . . Del McCoury was at Bias Recording Company in Springfield, VA, recording his follow-up to the Rounder Records album *McCoury Brothers*. The sessions, which feature mandolin, banjo and guitar, were engineered by Bill McElroy and produced by Ken Irwin. . .

SOUTHWEST

Singer/songwriter Lee Ann Gettinger was at Studio East in Tucson, AZ, working on her upcoming release with L.A. and the Boys. Gettinger produced with Harvey Tom and Taylor Smith at the controls. . . The Daylights were back at Planet Dallas Studio in Dallas recording their second record. Rick Rooney engineered and co-produced the project with the band. . . In Houston, Latino pop band The Choice put the finishing touches on their debut project, with Art Gottschalk and Emily Cranz producing at Sugar Hill Sound. . . Texas rock band Pariah was at Fire Station Studios in San Marcos recording and mixing tracks with producer Gary Ferguson. Gary Hickinbotham engineered the project. . . Rap duo L.O.L. and DJ. Rick G. finished recording tracks for their latest single for Taurgon Records at GK Enterprises in McAllen, TX. John J. Harper produced and engineered. . . In Austin, Reelsound Recording's 48-track remote truck finished six live broadcasts for the American Public Radio Network. The show, *Riverwalk*, features the Jim Culums Jazz Band. Margret Moos Pick produced with help from an extensive audio crew. . .

SOUTHERN CAL

Los Angeles-based producer George Daly recorded tracks at The Studio Malibu with singer/choreographer Barry Lather for Atlantic Records. Graylan King was at the board. . . At Larrabee Studios in L.A., Tom Lord-Alge mixed *Different Air* by Living in a Box for

Chrysalis with assistant Andy Batwinas. . . Also at Larrabee, Australian band Lime Spiders were working on a new album, produced by Kevin Shirley and mixed by Michael Brauer, with Sylvia Massy assisting. . . At Genetic Music in North Hollywood, Opening Line Productions completed a six song EP by singer/songwriter David Sheils, and Sensitive Heart Productions completed *Heartlife* by new age artist Doug Thomas. Richard Rosing engineered and digitally mixed both albums. . . Also in North Hollywood, David Byrne was in working on a documentary film on Australian aborigine tribal art and magic, with Mark Wolfson at the console and Keith Blake assisting at Entourage Studios. . . Mixer/engineer Jon Gass was at Elumba Recorders in L.A. engineering and mixing the Gap Band's latest for Capitol and remixing a new single by U-Crew for Enigma. Donnell Sullivan assisted on both projects. . . At Amerayan Studios in North Hollywood, the Chantoozies were in for Mushroom with producer John Van Tongren and engineer Jay Rifkin. Shawna Stobie assisted. . . Etta James stopped by Paramount Recording Studios in Hollywood to record her next record for Island Records. . . At Aire L.A. Studios in Glendale, The Calloways wrapped up their first LP for Solar/Epic with Rob Seifert and Rob Chiarelli engineering, assisted by Mike Scotella and Jackie Forsting. . . Matt Nelson and Gunnar Nelson (Ricky Nelson's twins) were at Devonshire Studios in North Hollywood overdubbing guitars and vocals for their upcoming Gefen release. John Purdell and Duane Baron produced the sessions, with Mick Guzauski engineering. Scott Gordon assisted. . . At Artisan Sound Recorders, engineer Greg Fulginiti mastered LPs for Kiss, with Gene Simmons and Paul Stanley, and for Eddie Money, with producer Chris Lord-Alge. . . At Studio 99, Ross Vannelli produced and engineered his song "Everybody Needs Someone" with Kim Carnes handling vocals. The song will be used in the Warner Bros. picture *Impulse*. . . Eric Carmen recorded overdubs for his latest Arista Records release at Lion Share Recording in L.A. Carmen co-produced with Gui Roche and Dianne Warren, with Frank Wolfe handling engineering duties and Ray Pyle assisting. . . Producer Clair Marlo worked with keyboardist Pat Coil on a recording for Sheffield Lab Records. Mick Guzauski engineered the live-to-2-track recording at Oceanway Studios in Los Angeles. . . Rick James was in at Skip Saylor Recording in L.A. producing

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Circle #076 on Reader Service Card

Jon Faddis records his new album, *Into the Faddisphere*, at The Edison in New York City.



his next album for Warner Bros. Bobby Brooks engineered with Chris Puram assisting. . . Also in L.A. at Producers Recording Studio, Bobby Womack was in producing a solo project for Sally Kellerman. Bert Battaglia engineered. . . Womack was also at Hit City West in L.A. working on an album entitled *Save the Children* for Solar/CBS. Guest artists included Carlos Santana and Jackie Johnson. Womack self-produced with Kevin "KVOG" O'Connor engineering and Karen Shellenberger and David Tobocman assisting. . . Michael Winslow was at Valley Center Studios in Van Nuys completing tracks for his new album. Gary Bell produced the project for Winslow Communications. Andre Jackson engineered with Dave Bates, Tom Twiss and Wade Norton assisting. . . Producer/engineer Max Norman selected Dodge City Sound in Glendale to record Geffen artists Death Angel. Stoll performed assistant engineer duties. . .

STUDIO NEWS

S.G. Audio of Chicago installed an Otari MTR-121 1/2-inch, 4-track recorder at Intuition Music. . . Also in Chicago, Chicago Trax Recording completed an extensive studio upgrade that features a Solid State Logic G Series console, New England Digital Synclavier and commitment to the Agfa PEM 469 tape formula. . . Airwave Production Group opened its doors in Birmingham, AL. The Steven Durr and Associates-designed facility features a 24-track studio, video post and voice-over 16-track studio and a new Synclavier/MIDI suite. . . Baker Sound Studios in Philadelphia completed a major upgrade to its Studio A. The studio includes complete 24-track capability controlled from an 84-input DDA AMR-24 mixing console and a 24-track Otari MX-80 featuring Dolby SR. . . Platinum Island in NYC opened a MIDI room with the ability to dump to tape by way of an MCI 428 console and a Sony JH-24 recorder. . . Body Electric Studios in Bolingbrook, IL, announced that it will now be open 24 hours to include more time for broadcast and audio sweetening services. The studio added an audio editing system based around the Fostex 4030 synchronizer and FAME software. . . Gnome Productions in New York City recently acquired a Clarity XIV signal processor automation interface. . . San Francisco's Different Fur became a beta site for Sonic Solutions Digital Audio System and added the company's NoNOISE computerized digital signal processing system to its digital mastering suite. . .

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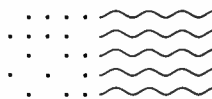
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by Ken C. Pohlmann
and Guy DeFazio

L.A. LAW & HOME STUDIOS

PART 2

It's wild, it's crazy, it's creative, it's art, it's the recording studio business. It's also hard work, competitive and financially risky. Sometimes it's even controversial, discriminatory or illegal. Is your commercial studio toeing the line in terms of zoning, permits, taxes and other realities of commercial en-

terprise? More importantly, is that console, tape machine and sequencer set-up in your garage subject to the same regulation? As we discussed last month, the home studio controversy in Los Angeles has brought these and many other issues to the fore in L.A. and other cities. In the light of this new self-examination, it is crucial for



weighed, measured, felt or touched. That obviously covers many items found in recording studios. Personal Property Rental taxes apply to equipment that is rented outside of your studio as well as within. If your rentals are limited to within your facility, Commercial Rental permits have lower tax rates and can be substituted for Personal Property Rental taxes.

The State Board of Equalization administers California's Sales and Use tax laws. Establishing a business that sells tangible personal property requires a Board of Equalization Seller's Permit, because you as the seller must collect the 6% state sales tax on all sales of tangible personal property and remit it to the state. This permit allows you to purchase your stock at cost without paying tax, then you collect the sales tax from your customers on the sales price. There is no fee for a seller's permit, but there could be a security deposit depending on the estimated sales. A 6% use tax, a companion to the sales tax, applies to the purchase of tangible personal property from out-of state for use in California. Unless specifically exempt by law, either the sales tax or the use tax will apply to the sale or use of tangible

personal property in the state. The law authorizes, but does not require, retailers to collect tax reimbursement from the purchaser.

The County Assessor's Office requires that all businesses file a Business Personal Property Tax Statement if the assessed value of their taxable

In the recording industry, where entry-level employment competition is tight, regulations sometimes get overlooked.

personal property, whether owned or leased, is equal to or exceeds \$30,000. The property tax is approximately 1% to 1.5% of the assessed value. The assessment calculation includes the purchase price, sales tax, freight charges and installation costs. Yearly purchases are listed and assessed on

March 1. Appraisers will assess directly any business personal property valued at less than \$30,000.

An important responsibility involved in any business with one or more employees is conformance to federal and state labor laws. Unfortunately, in the recording industry, where the abundance of fame-seeking labor makes entry-level employment competition tight, regulations sometimes get overlooked. Over the past several years there has been an increasing amount of employment-related litigation in this country. This increase is due to the new and ever-changing laws in our society. Employers in every industry are continuously faced with interpreting, understanding and complying with the many new laws and regulations pertaining to labor and employment.

The California State Labor Commissioner is chief of the Division of Labor Standards Enforcement (DLSE) and as such is empowered to investigate employee complaints. The DLSE will provide hearings in any action to recover wages, assess penalties and investigate other demands for compensation in issues involving: employee termination, vacation pay, independent con-



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The user interface of OPUS/e, like its larger counterpart, has been designed to give you the fastest, most intuitive control possible. The Editing Controller lets you manipulate data almost instinctively. Its jog wheel lets you locate edit points quickly and with precision. Even familiar concepts of organizing reels and tracks have been retained.

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tracting, employee inventions and many other employee rights protected by labor law and fair employment laws. Most workers in California are also covered by the wage and hour provisions of the Fair Labor Standards Act (FLSA). Although this is a federal law, it is enforceable in state courts.

The minimum wage in California is currently \$4.25 per hour. The federal minimum wage is currently \$3.35 per hour. There are exceptions to the minimum wage requirement in a few work areas that have an established work history. Minors and those learning a job may be paid 85% of the minimum wage (\$3.60 per hour), only if they have no previous similar or related job experience. The prevalence of internships and entry-level positions in the recording industry makes the "learner" exception a very relevant issue. After learners have worked 160 hours on the job, they must then be paid \$4.25 per hour. Before paying \$3.60 per hour, the employer must determine whether the learner employee has had a previous similar or related experience. Employers failing to pay the lawful minimum wage are subject to fines or imprisonment or both. Complaints received by the DLSE are investigated, and if the facts justify it, a civil action may be filed against the employer, with the consent of the employee.

Employers have the authority to set policy in certain areas that state law has historically left unregulated. Although the law burdens the employer financially and places him or her at risk for many things, the employer can still control most internal personnel policies, such as job descriptions, vacation time, amount of vacation pay, selection of paid holidays, health insurance, retirement benefits, work schedules, decisions that concern the hiring, training and promotion of personnel, and many other matters under the general heading of labor law.

Employers must maintain comprehensive records showing employee names, addresses, occupations and social security numbers. They must show hours worked, applicable rate of pay and total wages. The records must be kept on file by the employer for at least three years and must be made available to the employee upon reasonable request. This is a very important detail that should not be

overlooked by employers.

Clearly, in matters dealing with licensing, taxation and labor law, detail is the name of the game. Failure to play by any of these rules could be costly to the employer. In fact, the amount of regulation businesses are subject to is extensive; that's one reason why the rates at commercial studios are higher than at home studios. The point is that home studios, by definition, are not all run as legitimate businesses. The problem is the potential trouble that can lead to, for both the business and the client.

But there's more, much more. Next month we'll conclude this overview

of studio law with a look at payroll regulation, unemployment compensation, workmen's comp, insurance and still more zoning issues.

A final note: The authors take no responsibility for the accuracy of the information described in this article. Owners should consult professional tax advisers, local and state agencies, and other services for specific advice. ■

Ken C. Pohlmann is director of Music Engineering at the University of Miami. Guy DeFazio is a graduate of the University of Miami and a technical engineer at Lion Share Recording Studios in Los Angeles.

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The end of the shell game.

These days, purchasing tape from custom loaders is a lot like gambling. You never know what you'll find under the shell. Because chances are these tape loaders are using inferior cassettes. This can cause unnecessary damage to the tape when loaded or cause the tape to jam or fall apart during duplication. If this game seems too risky, maybe you should put your

money on a sure thing. Maxell. Our cassette shells are as dependable as the tape they house. All components are precisely designed and meticulously molded to pamper the tape over constant use and at high speeds. Every inch of tape features our exclusive Epitaxial oxide formulation to guarantee excellent reproduction. So if you're in the market for superior quality videocassettes,

backed by a full warranty, make it Maxell. Before you experience shell shock.

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by Stephen St. Croix

MIATA KEEP THE END IN SIGHT

I picked up a couple of Miatas a few months ago. If you get the six-pack you can talk the dealer out of that insane \$10,000 ADM and get moved to the top of the waiting list to boot.

Lost? Well, maybe a short glossary will help:

Miata: That little ragtop from Mazda that they say will be the world's next Mustang, costs next to nothing and was the first car ever to make *Car & Driver's* Best 10 list before it even came out.

ADM: Additional dealer markup (!). They don't even *try* to hide it anymore. If a car is hot, real hot, they blatantly add thousands onto the list price. It used to be hidden in a long list of use-

less extras like \$150 pinstripes (75 cents worth of vinyl tape put on in 35 seconds by two high school kids), but now they just tell you.

But this car is in fact magic. It is an updated re-creation of an old Lotus with a bit of generic British-of-the-time and Italian racer thrown in. It has the same kind of magic that those great '60s tunes have for me.

There is a secret on how to cover an oldie, whether it is a classic car or a classy tune. You have to *bide* the technology. You can't just re-create the original, because chances are that it actually sounded like (or ran like) trash.

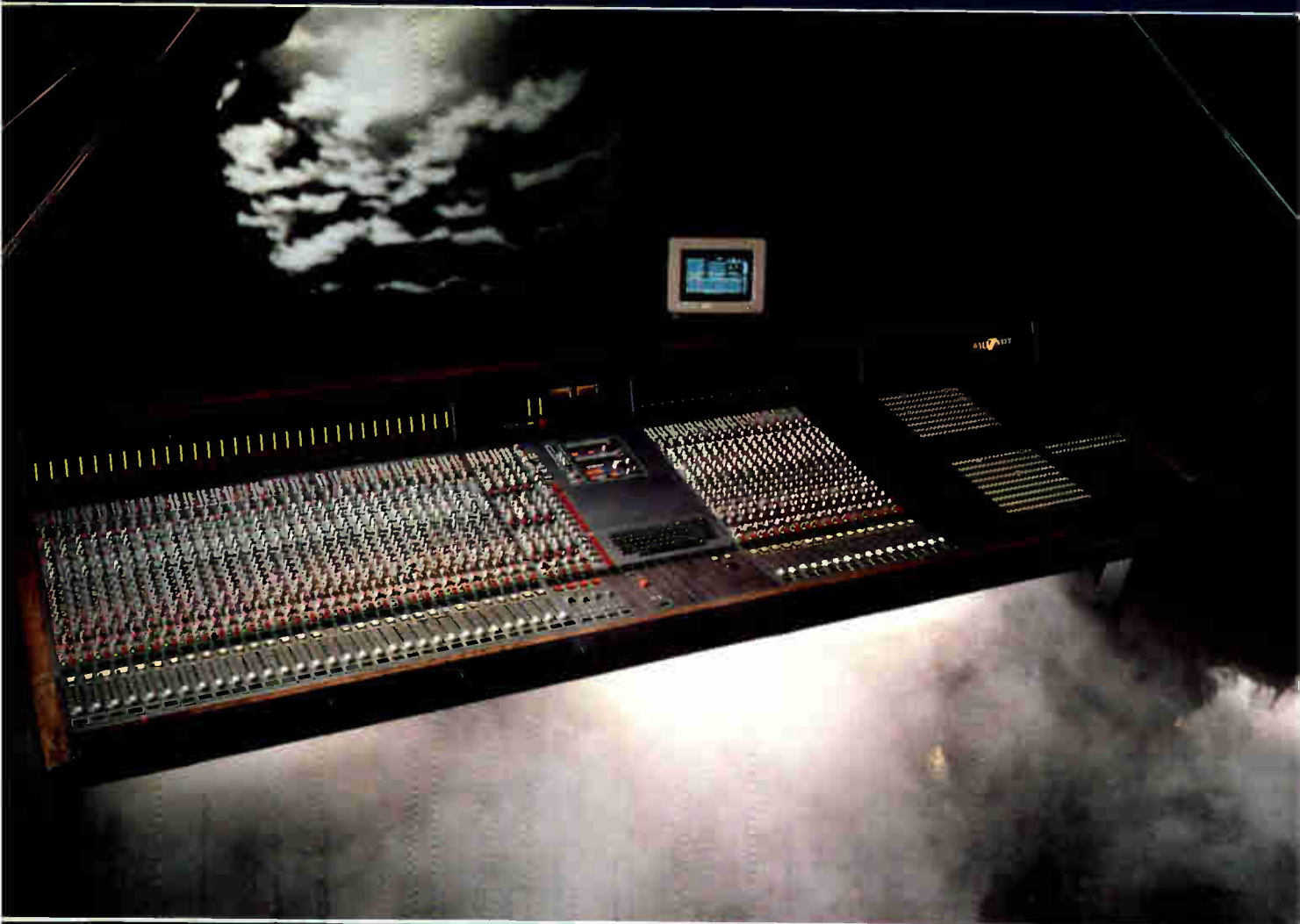
Let's take "Runaway," for example.



ILLUSTRATION: ROB BARBER

MOZART

BY AMEK



MOZART by AMEK is a significant step forward for console technology. No other combination of first-class audio signal paths and integrated computer control exists elsewhere, and in such an irresistible price category.

In the past few years the studio environment has become very complex. Not only more tracks, but the introduction of retriggered synths and the use of large amounts of effects has created a need for a console which far exceeds the capabilities of conventional mid-80's products.

MOZART's SUPERTRUE automation system allows real-time and off-line control not only of faders and mutes but of numerous switches per input module. Auxiliary sends, Eq, Insert and other functions can be switched in and out as the mix proceeds; or complex switching operations can be set up and triggered by SMPTE from

the Event Sheet. Some of the other events include a complete MIDI-triggering system and a facility for loading user-definable fades between two timecode points, however long or short. The advanced Mix Editor system includes Merge and Splice functions.

MOZART has 32 output busses and up to 16 auxiliary busses according to the choice of input module. All busses are balanced. The console has 12 stereo effects returns and frames are available for 40, 56 or 80 inputs. Equalization and sonic performance are to the standard set by AMEK.

MOZART presents a range of facilities which are unique. It opens a new range of opportunities for the modern recordist to reach the boundaries of his imagination.

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I choose this tune because it is my totally excellent favorite, dude. I remember what it sounded like, totally excellent, in fact.

If somebody were to come along and cover this tune, just re-record it, it would be a terrible disappointment, because we do not usually really remember what it sounded like technically, but what it felt like musically. We definitely remember some of the

We must be aware that it is possible—in fact probable—that many of the nuances and subtleties that we now proudly display at -60 dB in our final products are never heard by the majority of the audience we are targeting.

sounds, the voice and the music, but the *feel* is what is usually embedded in our brains.

As we all grew up, the *technical* aspect of recording improved radically, but then our standards also rose. Our audio quality references are so good now that these old tunes are shockingly lacking when it comes to what they actually sound like. So, for a successful cover or remake, we must capture the essence or feeling of the

original, while updating it to fit what our subjective memories *think* it originally sounded like.

With every year that goes by, those tunes get better in our minds, like a good wine or a good time. We must completely understand what to change or update, and what to leave alone if we wish to hit. The final product will *not* in fact be the same as the original, or even a technically improved version with less noise and distortion and better bottom, but a different product that captures the essence of the original while taking full advantage of modern technology to make the tune as good as we remember it, instead of as bad as it really was.

Bonnie Raitt understood this with her version of "Runaway." A version used as the theme song for *Crime Story* is another example showing that it *can* be done on earth as it was in the '60s. Well that's how the Miata was done. It is a simple car that succeeds in bringing back the past. It makes me feel that I'm in my old Lotus again, except I don't remember the Lotus running for any two consecutive days. It is so radically superior in the technological areas such as frame stiffness that it cannot be compared, but again, that technology is hidden. I am simply riding around in a car that is as good as I *remember* the old one being. I am intellectually aware that it is in fact radically superior (the car was designed in a computer with 80,000 inter-active body/chassis flex

points!), but my heart says time has stopped in the '60s.

Why is he still writing about that car. John? This here's *Mix*, not *Autoweek*.

We must constantly be aware of what is going on in the real world. Yes, I agree that this sounds like a pretty obvious statement, perhaps not even worthy of being committed to print. But wait. We all know that if we get too involved in the business of *mak-*

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ing music and drift too far from our target markets, we will fall over. For quite some time now, we have all been mixing on our favorite monitors, be they subwoofed kilowatt walls-'o-drivers, or the newer top-of-the-line near-fields. We have also been checking that work on "trash" speakers, to see if the mix survives. This has always made sense, as we know that the vast majority of final listening environments for our work will unfortunately be... what's the technical term? ... Garbage.

I remember working on Stevie Wonder's *Songs in the Key of Life* about two centuries ago at Crystal Studios. Now these people took this to the extreme. They actually had a little radio transmitter that they would use as soon as a mix was done to transmit to little radios in the building and to cars in the parking lot. Then everybody would run around and listen on all these radios, some with fair speakers, some with elaborate monitors and some with 5-inch car door speakers that had seen five years of harsh Los Angeles street life. If all was five by five, the mix was done. It made sense.

Personally, I am very interested in the bottom end when I produce or engineer. I like a very tight bottom, and I will quite often double bass lines an octave apart, in such a way that the lower one is dominant (most prominent on systems that are capable of reproducing them), with the higher octave all but buried in the mix, waiting there for smaller, more typical systems. As the smaller systems fail to produce the fundamental, the hidden second line emerges, creating a satisfying bottom, rather than relying on a non-ideal harmonic content in the primary bass line in order to remain audible when the fundamental is lost.

This way I allow an ideal bass sound, which may, for example, be lost in a car, while providing a second *backup* line with the proper waveforms and envelope characteristics so that it is clearly audible in that same car system.

Now we have to think a bit differently. Of course, we must still apply all that we have learned in mixing for this wide spread in final playback, but we have to go beyond the obvious.

My Miatas have CD players in them. Though I am a pretty cool guy, I do not actually feel that my few CD

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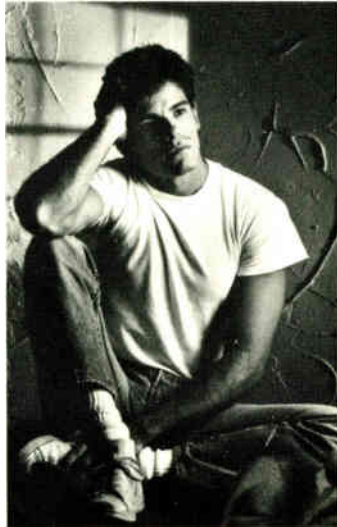
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players are a reason for the recording industry to alter long established practices. Well, maybe, though...

We as an industry have worked for decades toward today's 90-plus dB product, while in the average person's world, dynamic range has stayed the same or probably even gotten smaller. So, we now have music with a dynamic range of 95 dB in a world with a dynamic range of 60 or even 50 dB (and much less in cars).

Because of this, several manufacturers are beginning to offer CD players (for cars and "personal portables") with self-contained dynamic range modifiers. These may be simple compressors, or more elaborate digital signal processing schemes meant to intelligently *reduce* the dynamic range of today's music firmware!

Those of us who spent our youth attempting to create the perfect mix (one that a radio station's Volumax would not destroy), while still sounding good on a "real" system, are being called to arms again. We must be aware that it is possible—in fact probable—that many of the wonderful nuances and subtleties that we now proudly display at -60 dB in our final products are never heard at all by the majority of the very audience we are targeting.

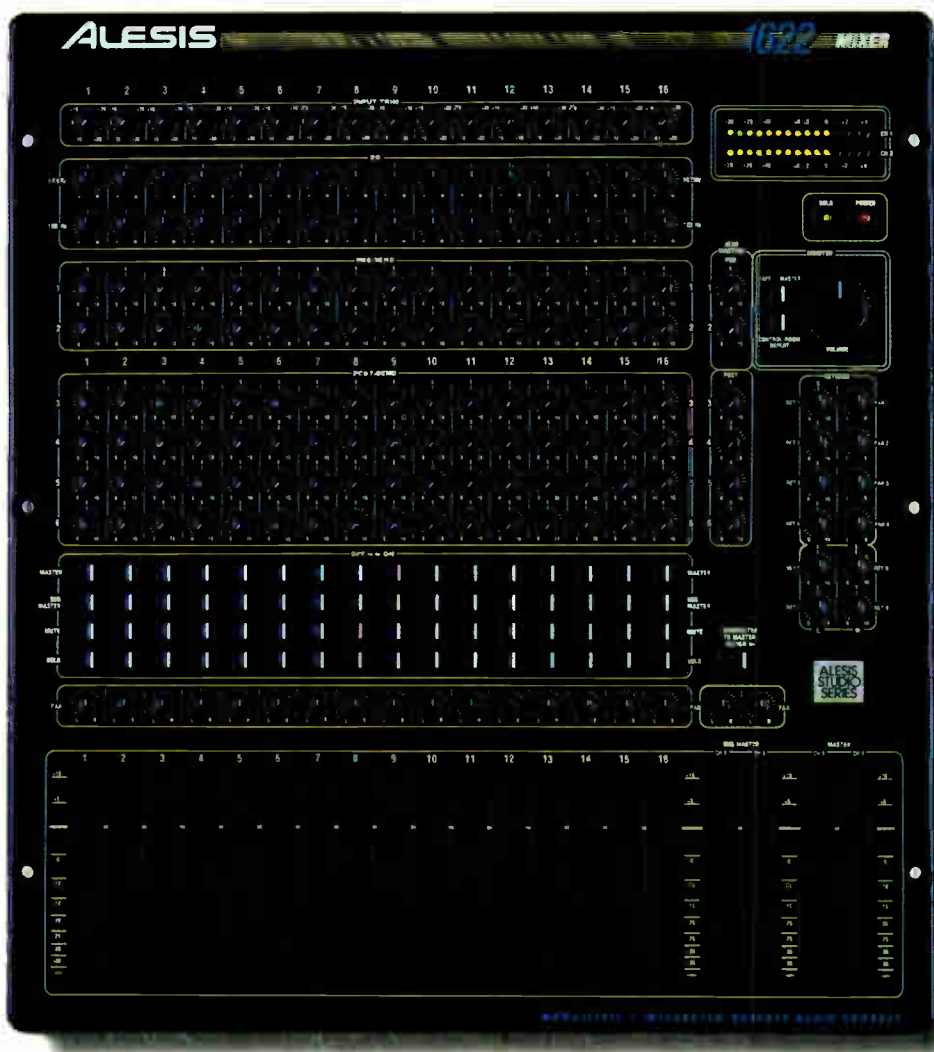
Granted, this has always been a problem, even within the window described by top-of-the-line vinyl playback systems on one end, to cheap, portable cassette players or economy ceramic cartridge vinyl lathes, oops, I mean auto-resurfacing-playback systems. With tracking weights ranging from a gram to a pound, we have always been faced with quite a performance window.

But this is different. We are not dealing with an *equipment performance window* now, but an *environmental* one.

We have been forced historically to limit the dynamic range of our product to fit the medium, but now, for the first time we are not. We must now learn to mix for the even less predictable end-listener environment. Oh, well. As translated from an ancient Mayan carving: "With dynamic range comes responsibility." ■

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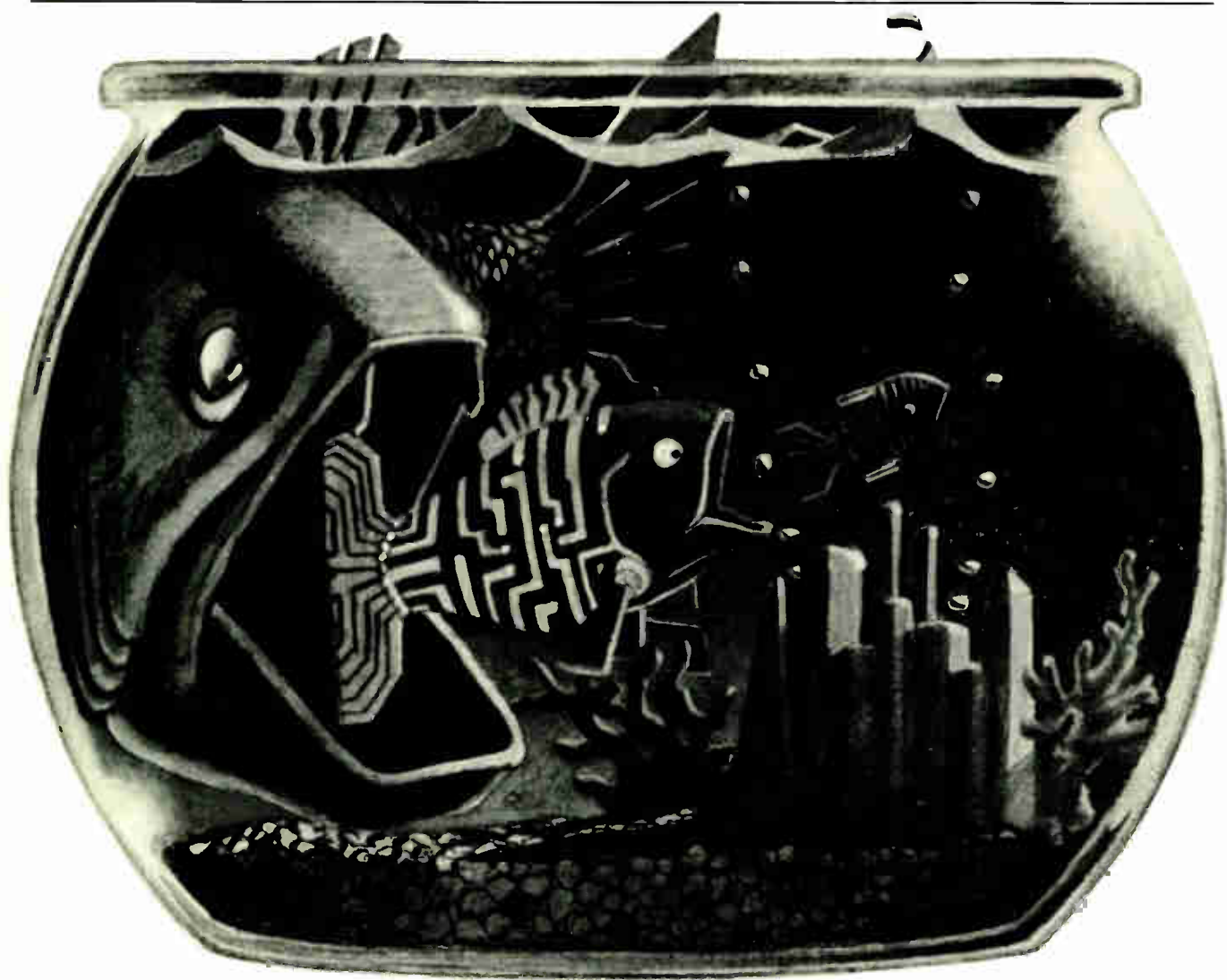
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by Mel Lambert

1989: THE YEAR OF THE AMALGAMATION



As years go, 1989 has been a rather odd end to a turbulent decade. The digital wave is now felt throughout the pro audio industry, from broadcast production to film and video post. A new generation of workstation manufacturers are, quite literally, betting the bank on formats and functions. The words on practically everybody's lips are: How fast does it run? How many tracks from to hard disk? How many real-time DSP functions? Where's the

dedicated work surface? When is it shipping?

As I mentioned in the October "Juxtapositions," the primary thrust of 1989 has been toward rationalization and harmonization. Rationalization has taken the form of a sharpening in the forward visions of marketing and R&D departments of the major movers and shakers throughout our industry; harmonization refers to the clarity of that vision. The recent New York AES

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— FROM PAGE 32

Convention opened a lot of people's eyes, not only to the stunning strides being made in digitally controlled acoustics and signal processing, but to the way the industry is gradually shrinking.

The past two years have been among the most turbulent we have seen since the late '70s and early '80s. Who can forget the record company slumps and how the blossoming audio-for-video/film markets proved a godsend for music facilities in those troubling times?

For most manufacturers, the 1987 market crash had surprisingly little impact, apart from giving them a universal (if illogical) reason for playing a more avid wait-and-see game during the past 12 months. And our neighbors on the edge of the Pacific Rim continue to develop their well-articulated, long-term market plans, with the roller-coaster ride taken by the yen and linked currencies being responsible (at least in part) for major re-examinations of long-term marketing strategies.

But 1989 will be best remembered by many as the "Year of the Takeover."

It was one in which AKG Acoustics acquired Orban Associates, Carillon sold off two dbx divisions (dbx Professional Products to AKG, and dbx OEM Products to THAT Corporation), GWL Enterprises restructured Harrison, Otari bought the assets of Sound Workshop, and Studer Revox America absorbed Integrated Media Systems, now known as Studer Editech Corp. It was also the year in which Carlton Communications merged with UEI (forming a new trading entity capitalized at just over \$2.6 billion, making it one of the largest high-tech firms in the world), Quad Eight Electronics re-established its independence, leaving the Mitsubishi Pro Audio Group, and Focusrite went away, but, with the spirited assistance of Phil Dudderidge, came back again.

To use an expression borrowed from biology, within the pro audio industry we have been witnessing a combination of culling and a diminution of the gene pool. On the positive front, we're seeing a concentration of the best technical minds in centralized, well-capitalized firms, which are better able to withstand the demands of trading in an intensely competitive, narrowly targeted industry. On a

negative front, we're seeing a reduction in the number of "expertise" centers from which spring the ideas needed for radical new products and services. When we're dealing with creative talents, organization and structure do not always make for enhanced productivity and instant financial success.

It's easy to overlook the fact that ours is a remarkably small industry. As the degree of sophistication within this ultra-high-tech focus becomes more acute—requiring progressively more capital just to pay for the creative tools that manufacturers use to create new product—we reach a state of critical mass. To develop next year's blisteringly fast hardware, we need to spend lots of dollars now. If your business plan is in the ramp-up phase, then securing funding for such adventures in "possibleland" might be difficult.

Since the market crash, we're seeing an admittedly short-lived reluctance of large entities to invest in such small ventures as pro audio, while the smaller lending institutions are likely to want so many terms and conditions (basically because they're not sure what our business does) that life is a

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shade tricky in the nearly fast lane.

As many former pro audio firms are discovering, gathering under a larger corporate umbrella makes an increasing amount of sense. It's also worth reflecting on the fact that leading industry analysts attribute more than 50 percent of the total business done within pro audio to the marketing and sales efforts of eight companies: Bose, Harman International, Mark IV, Matsushita, Philips, Siemens, Sony and Yamaha. Whither Economy of Scale when you go to market against the big eight?

In this industry's early days, the major manufacturers were confined to the broadcast and general electronics sector, and makers of consoles and tape machines quite often sprang up in the basements or maintenance departments of the larger recording and production facilities. Ma and Pa Widget found that a small but viable market existed for the Widget Soundblender Mk3 (the hand-built Mk1 and Mk2 were reserved for in-studio use), so they formed Widget, Inc. Gradually, through word of mouth, marketing and PR, plus some luck with an upwardly mobile dealer network, Widget, Inc., carved a nice niche for

itself. Along comes digital, and some problems: How many hours of labor will it take to develop algorithms that mimic the analog sounds from the Soundblender Mk20, and how much is it going to cost to add that fully implemented CAD/CAM system they now need to remain competitive in the manufacturing sector?

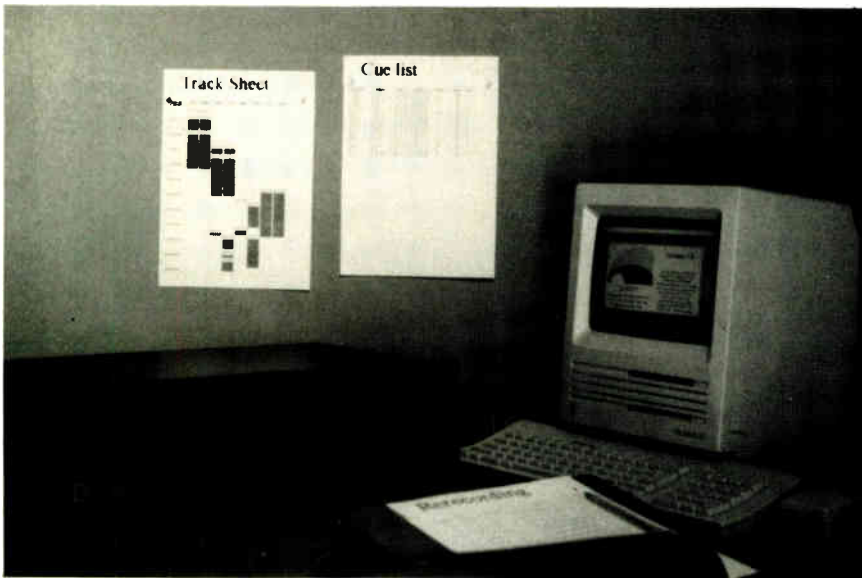
The bottom line these days—and it's a development that I predict will continue through the next couple of years—is that you need to take advantage of that good ol' economy of scale. You do that by spreading development and manufacturing costs across a broader product base. Such centralization can do more than reduce manufacturing costs, sales overhead and distribution costs. It can focus your marketing efforts by simplifying lines of communication with major dealers around the country. (Have you also noticed there are fewer and fewer dealers? And how the big companies are getting bigger, while the smaller, boutique-style companies are becoming more specialized and product-specific?) Amalgamation also brings more muscle with component suppliers, in addition to simplifying your dealings with the media.

Yes, indeed, in these turbulent times it makes increasing sense to band together to weather the storm of advancing technology. But what of the cons? Primary among them is that centralization leads to an inevitable diminution in the amount of independent, unstructured innovation that can take place. I worry when so much of the R&D effort becomes centralized into too few centers of investigation. The larger these companies become, the more remote they become from the facilities and organizations for whom they are innovating the hardware. I hope for the best of both worlds: affordable, cutting-edge hardware devised by the best minds in the industry, where contact with the industry for whom the hardware is being developed is multidimensional and enriching—in both directions.

Compliments of the season, and a prosperous 1990! ■

With over a dozen years of active involvement with professional audio on both sides of the Atlantic, Mel Lambert now heads up Media&Marketing, a high-tech consulting and marketing service for pro audio firms and facilities.

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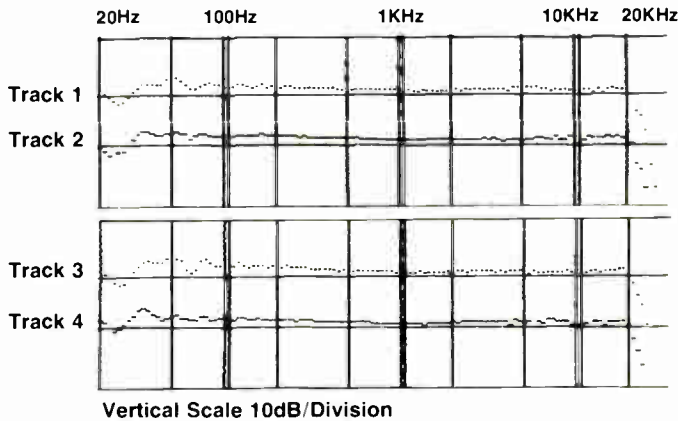
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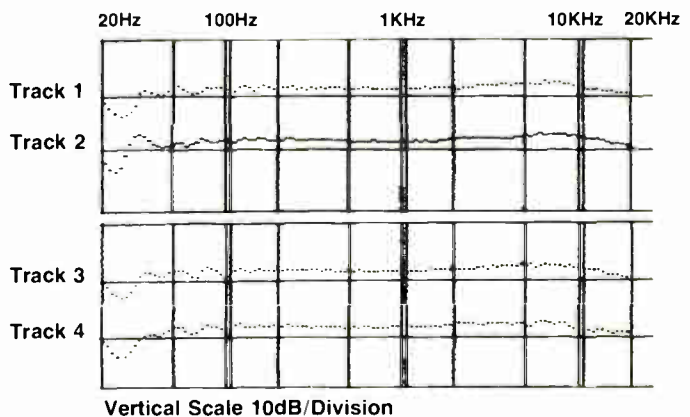


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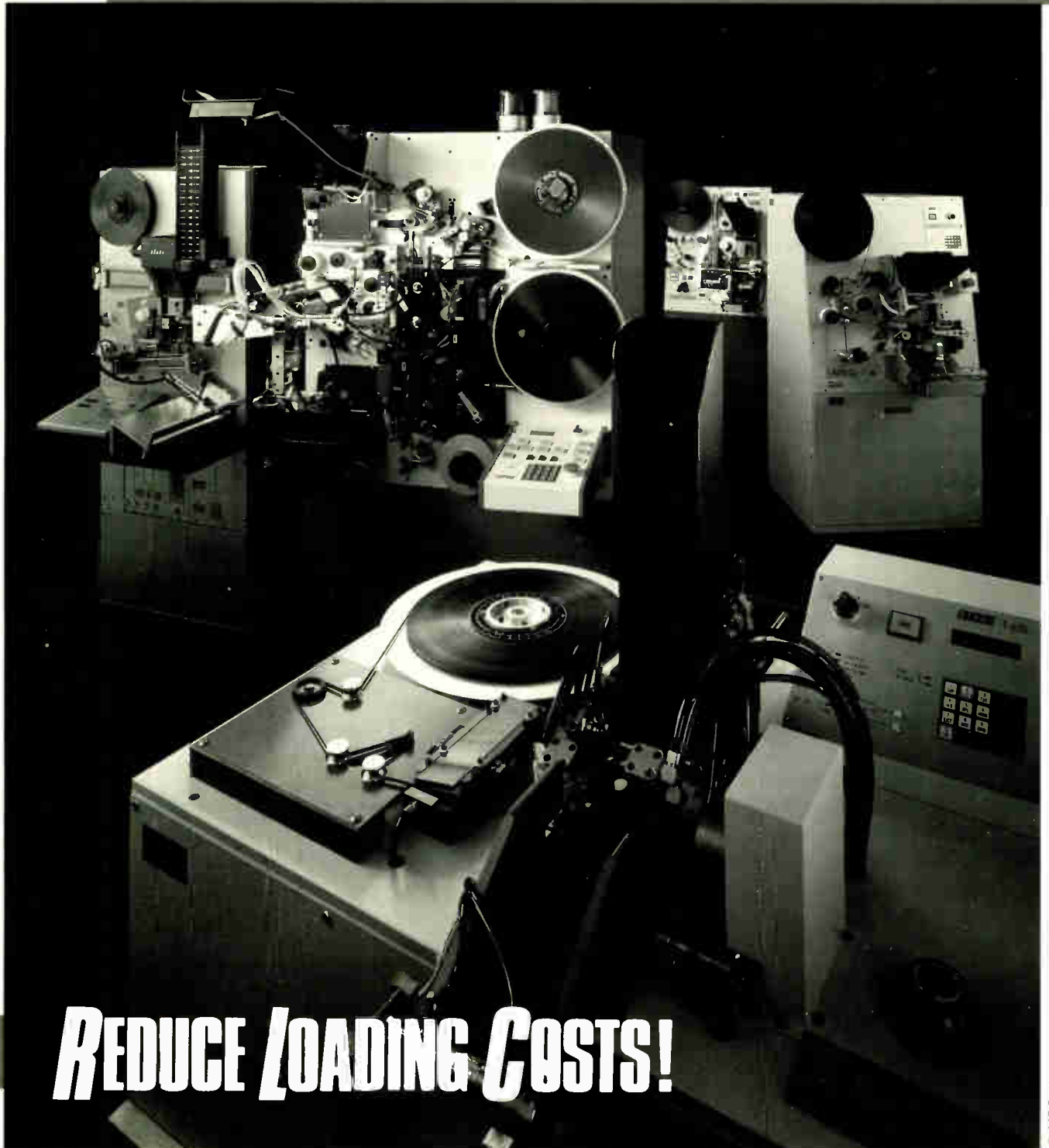
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Mastering Engineers Discuss the Past, Present & Future

Mix called the master masterers to learn what's happening in their kingdom now that vinyl is no longer the reigning music medium.

These mastering houses used to optimize the music for the medium—now they can optimize the medium for the music, and have more fun doing it, with more creative input than ever before. Other changes seen over the past year or so include the increasing popularity of digital audio tape,

BY LINDA JACOBSON

A S T E R S
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changes in client's priorities, and a growing frustration with the growing number of digital master formats.

Bernie Grundman remembers that back when the LP was the main promo format, "We spent a lot of time maximizing it to get the most level out of it, and making sure the solutions to the problems on the disc were the ones that would least affect the disc's effectiveness. Most cutting systems have no difficulty cutting the disc; it's in playback that we have the problem. We would have to make a test cut, play it back and see how clean it was tracking, because the sound quality of the disc drops off considerably from

the outer edge as it goes in toward the label.

"Now our job is a little easier, because compact discs and cassettes are much more forgiving," Grundman continues. "As long as you don't exceed its peak level limits, you can put on a CD pretty much whatever you hear off your monitors."

Mike Fuller of Fullersound (Miami) agrees, "I'm able to be more open and creative when I'm preparing a CD master. I don't have to worry about the phase relationship on the low end, as far as stereo imaging and panning are concerned. And I can get away with more top end in the sib-

ilance on vocals." Fullersound, the first on its block to get a Neve DTC digital console (one of the first in the country, for that matter), handles many Miami-based dance and rap music clients. Fuller says he can now "load up the CDs with bass and kick drum that's much closer to what my clients want, more so than what we could on vinyl. Also, dance and rap clients put so much time on a record that we were always torn between overall volume versus how much bass we can put on. With CD, we don't have to worry about that."

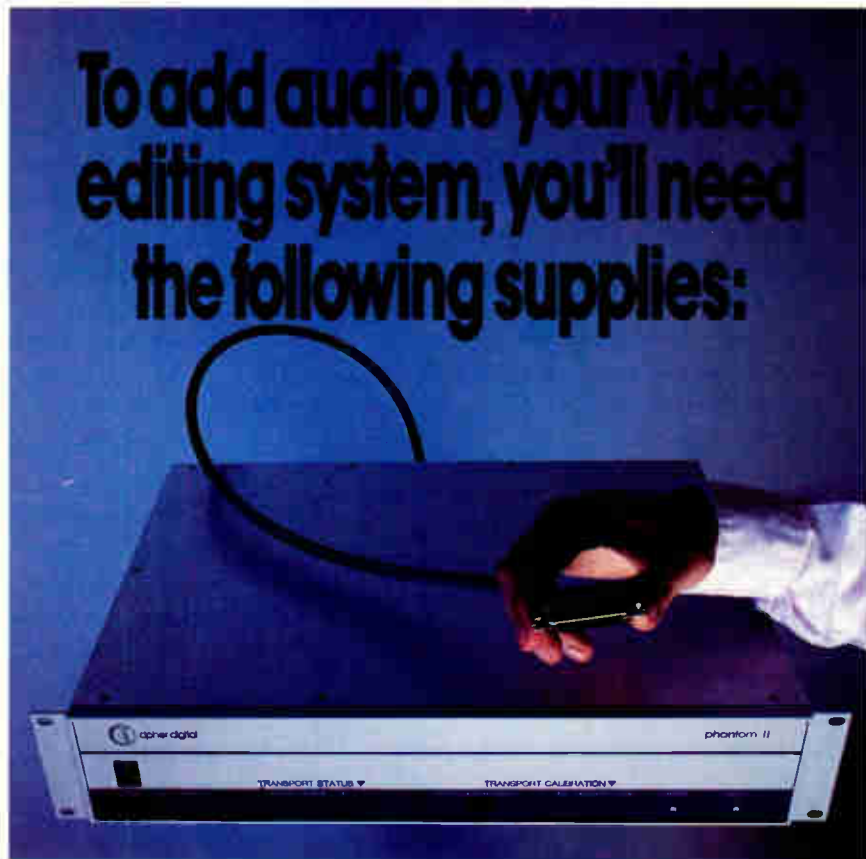
BEARING INTEREST IN CD

Then there's Northeastern Digital Recording, of Shrewsbury, Massachusetts. Toby Mountain's business "started with the CD revolution" when it was founded in 1984 and never got involved in vinyl cutting. From this perspective, Mountain sees a trend in "many people using DAT not only for reference copies but as source tape. We do a lot of work for major independents, and a lot of material comes in from smaller studios and remote recording not on 1630 but on DAT. The professional audio community has really embraced DAT as a recording format."

QCA Custom Pressing (Cincinnati) also points to "getting more and more DAT master tapes and less F1s." QCA didn't get into CD mastering until its 38th year of doing business—about nine months ago. Owner Jim Bosken had seen a "bit of demand for CDs here and there, but we don't do work for major labels. One client, who has about 40 titles in his catalog, decided to convert them all to CD at once, and that was enough motivation to buy the system, the Sony 1610 with the digital editor, and the Panasonic SV-3500 DAT machine."

THE EQUALIZER

"Years ago, there were people who didn't want you to touch their tapes," Mike Fuller recalls. "They just wanted it cut as is, or didn't know enough about mastering to realize you can make alterations. Now, if people can't be here for the session, I'm given the open hand to do whatever I feel is needed—mastering EQ and such—much more so than ever before." Fuller also points out that he used to approach the mastering session "from the viewpoint of vinyl, then make alterations for CD and cassette. Now when people come in we start EQ'ing



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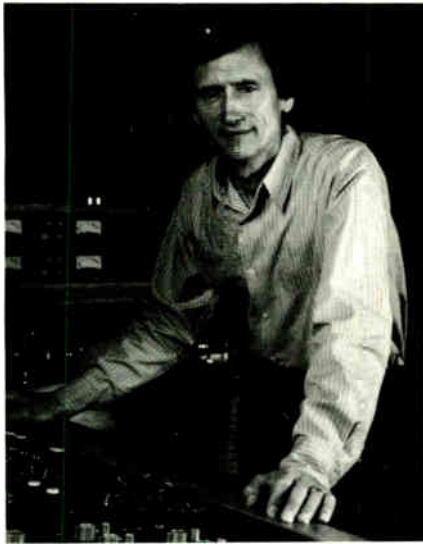
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Bernie Grundman

for the CD right off the bat, then make whatever changes we need to get it onto vinyl."

K-Disc Mastering's (Hollywood) Bill Lightner adds, "More and more, you can't make just one EQ decision—you make a master for CDs, a second EQ for cassette that takes into account some limitations of that format, such as tape saturation, and then, if necessary and on a lesser basis, a third EQ, typically an adjustment from the CD EQ for disc cutting."

"REFERENCES AVAILABLE UPON REQUEST"

"The reference system is probably the biggest problem at this point," notes Hank Williams (Master Mix, Nashville's proud new owners of a Harmonia Mundi digital compressor). "Everyone has thrown away their turntables, and cassettes are an awful reference. Most people don't want a disc anymore because it doesn't really relate to the CD. A lot of people have bought R-DAT machines, so DATs are references now in about 20 percent of the cases. The other 80 percent get cassettes more often than not, which to me is crazy, because every cassette player is different."

In Florida, Fullersound is running off a great number of DAT reference copies. Mike Fuller says, "Everybody usually walks out of here with a cassette tape, too. The vinyl reference acetate is becoming the least desired. Even if they do vinyl, they bypass the reference acetate. People are real excited about the sound they can get on the CD, and when it comes time to cut the reference acetate, they say, 'Just make whatever changes we have to do

and that'll be good enough.' It's almost like, 'Well, we're not going to sell many so we aren't worried about it.'"

Toby Mountain appreciates the ease offered by his ability to "make a digital copy of a CD master, send it to a client and have it approved on that basis. We're finding more and more people have DAT—about half our clients. Sometimes the client wants a Beta or VHS PCM tape as reference. The people who got the F1 going were the classical recording engineers, and many of them still use it. Some independent labels doing jazz and classical recordings use the F1, and we send them F1 for reference. DAT is now the most popular reference with our clients, Beta PCM is second and analog cassette is third."

Most reference tapes distributed by Bernie Grundman Mastering are DAT, although CD customers can now take refs off Grundman's new Yamaha PDS compact disc rough-cutting system (see "After-Mix"), which makes them "really happy that they can hear exactly what the final product will sound like." (The facility also opened a new room featuring a completely integrated digital/analog console, custom-made except for all-Harmonia Mundi digital circuitry.) However, Grundman feels it is "critical" for producers and artists who do go to vinyl to "take a lacquer reference because of the inherent problems discs have. The only way to find those problems is to cut

ONCE UPON A TIME . . .

"The mastering field has *really* changed since it first started. It used to be assembly line factory rooms. Or it would be like Columbia Records, which had a mastering room that was full of little booths. In every booth there was just a cutting lathe, maybe some level control, if any, no EQ, simple limiters and a couple of speakers hanging on the wall. Everybody would work 8-hour shifts, under the union, and you would just cut your discs and go home. If a mastering engineer had a great day, he could cut 10 or 12 discs a day. Other guys in adjacent booths would say, 'Hey, slow down or Columbia will expect *us* to cut that many!'"

—Ken Lee, *Sonic Arts, San Francisco*

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Randy Kling

one and play it back. It's almost a necessity when you're making a vinyl record to get an acetate reference disc first. Otherwise, there's no telling what might happen."

Since K-Disc Mastering uses the Direct Metal Mastering process, their LP refs are made of copper. "We don't do acetates," Bill Lightner says. "We're cutting copper instead of lacquer. And copper is much more of an inert medium than lacquer, so you can put the grooves closer together without running into some of lacquer's limitations."

THE COMING DECADE

December 1989 is the perfect time to ask some mastering engineers to predict the future.

QCA Custom Pressing's Jim Bosken expects to see "continued growth of the [standard analog] cassette and a lot of growth in CDs, but mostly because we're coming from such a small base. The largest percentage of our business, by far, is still cassettes. Next year we may see some growth in vinyl mastering because some of our competitors are going out of business. A lot of pressing plants who didn't go into cassettes and CDs had to close."

At Disc Mastering in Nashville, Randy Kling sees things "coming in here every way but on Band-Aids," and he hopes to see more compatibility between digital systems. "A lot of things are patched in and out and rerouted to satisfy the clients. There are so many formats, so somehow we need to get the equipment standardized more for what's out there. We all have this tremendous inertia in that we're constantly looking for the best thing for the client: If it sounds the best, that's what I go for. If [compatibility] can be channeled into things like mastering consoles containing NAB, CCIR and the Ampex mastering curve—the Neve DTC has got that pretty much taken care of—I think other pieces of the system could have that too, just like there's 45 or 33 rpm and 7/15 or 15/30 ips. I'd like to see DASH compatibility between manufacturers."

Bernie Grundman believes that the changeover to digital recording and mastering will not take place as quickly "as a lot of people in the equipment industry are predicting. In the mastering studios we still get a very high percentage of analog recording, because at the professional level, analog is still a very good medium. If it's done right, engineered well and han-

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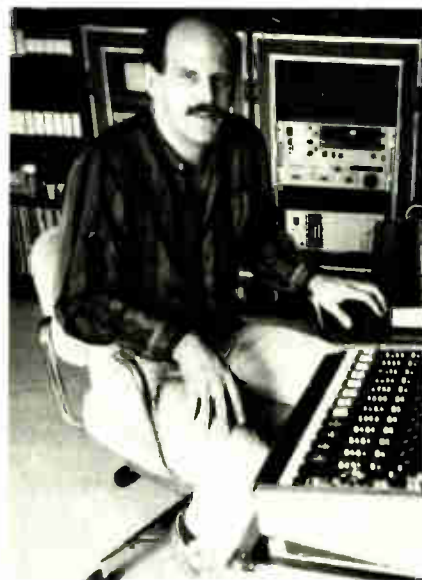
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Dr. Toby Mountain

dled properly, it can sound excellent, as good as any digital. I've heard a lot of bad digital; if it's not handled right, it can be pretty ugly. I still expect to see a lot of analog throughout the decade.

"With semiprofessional equipment we'll see more and more digital recordings on DAT," Grundman continues. "The small studios and the garage studios love those little DATs because they can get into digital and thereby get a little better sound, inexpensively.

"Finally, we have to make available to our clients a wide range of digital equipment because of all the different formats, and because they want the same convenience working in the digital domain as they always had with analog. We've put a lot of money into digital compressor/limiters, equalization and level-correction systems, and about four or five different digital formats to play back from. It costs a lot of money for mastering studios to cover all these formats, but we have to do it. Probably through the next few years we'll just be buying more and more equipment."

VINYL STILL VITAL

Those who say goodbye to vinyl say goodbye to tracking and skipping problems, intergroove distortion, high-end loss, and as Hank Williams of Master Mix points out. "We don't have to worry about overcuts anymore, pops and ticks, bad vinyl, or bad lacquer." But others are not so eager to dismiss the woes of working with vinyl!

—CONTINUED ON PAGE 103

Bernie
Grundman
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Graham Nash

Member, Rock & Roll Hall of Fame

Fostex Equipment: E-16 MTR, 4050 MIDI Remote, T-20 Headphones.

Recent Projects: Graham's recent solo album, "Innocent Eyes" (Atlantic) was recorded in Los Angeles, Hawaii and Massachusetts. Most of the compositions and arrangements were worked out at home on his E-16. The hit "Shadowland" from CSN&Y's latest album, "American Dream" (Atlantic), was recorded on the E-16.

TIMBUK3

Pat & Barbara K. MacDonald

Fostex Equipment: D-20 Digital Master Recorder, E-8 MIDI 4030/4035 Synchronizer Controller, 4010 SMPTE Time Code Generator, RM-865 and RM-900 Near-Field Reference Monitors, T-20 Headphones

Recent Projects: TIMBUK3's first album, "Greetings from TIMBUK3" (I.R.S.), was recorded on a B-1 (forerunner of the E-16). Their third and newest album, "Edge of Allegiance" (I.R.S.), is the first digital project for the group. They use a D-20

Tom Scott

Musician/Composer

Fostex Equipment: E-16 MTR (2), E-2 Master Recorder, 4030/4035 Synchronizer / Controller, 4010 SMPTE Time Code Generator, T-20 Headphones.

Recent Projects: Nationally recognized band leader of "The Pat Sajak Show", Tom's latest albums are "Streamlines" and "Flashpoint" (GRP Records). He also scored the NBC TV Movie "American River", and the film "Sea of Love" starring Al Pacino features his distinctive sax.

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Stewart Levin
Musician/Composer

Fostex Equipment: B-16 MTR, 4030/4035 Synchronizer/Controller, 4010 SMPTE Time Code Generator, T-20 Headphones.

Recent Projects: Stewart writes the music for several popular TV shows including "thirtysomething" and "The Dick Van Dyke Show '88". He also contributes music to feature film scores like "Heathers".

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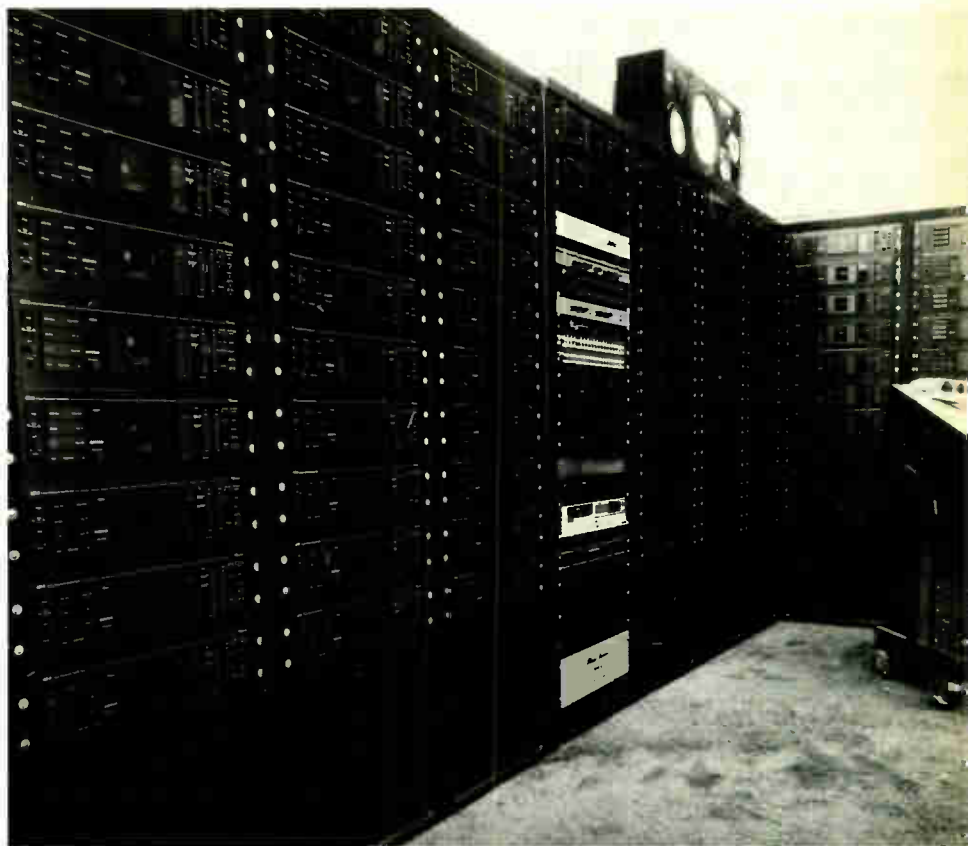
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TRENDS IN SPECIALIZED DUPLICATION

DUPLICATORS TALK ABOUT WHERE THEY FIND NEW BUSINESS



Apex Tape Duplication in Santa Rosa, California

by Lawrence Henry

Andrew DaPuzzo, who ought to know, says the cassette duplication business is getting tougher.

"The major duplicators have been growing," explains DaPuzzo, a New

Jersey-based sales representative for Agfa, a major supplier of tape to duplicators.

The major duplicators DaPuzzo refers to include WEA Manufacturing and Capitol Records. He says, "WEA has been growing, because the WEA record companies [Warner, Elektra, Atlantic] have been among the most popular groups of companies this year. And the WEA companies' demand for duplication is being satisfied through WEA Manufacturing's expansion."

DaPuzzo concludes that "the independents are fighting over less work, in effect.

"On the other hand," he adds, "since the major duplicators are getting bigger and bigger, those people who want specialized service have to go elsewhere. The big companies are just too big to deal with them. And that's led to some growth in the small-to-medium cassette duplicating market."

Sandy Sandoval, who runs Aky Recording Supplies in midtown Manhattan, has worked in the music business for more than 30 years. He says, "We've been doing duplication since before cassettes. We used to cut records. [He means 78s, folks.] We had a direct-to-disc studio. And we had a facility for people who wanted to transfer old

MUSIC ANNEX DUPLICATION, FREMONT, CA

Keith Hatschek

"A large portion of our business is coming from the independent record companies. A lot of people are now going to cassette and CD instead of vinyl and cassette, and we're acting as a broker for CDs. In particular, jazz is experiencing a bit of a resurgence. New age, which everybody said was a passing fad in '86, is bigger than ever. We're also seeing a lot of local artists releasing what I would call first efforts—EPs and things like that—for promotional purposes as well as for selling on gigs. The fact that we're now offering CD replication as well as cassettes and graphics and packaging accounts for the fact that our numbers are way up over last year. My information is that 1990 will be the year that a lot of record companies decide not to issue on vinyl."

records to new records. Sometimes we'd even get wire recordings as source material."

Today, Aky uses a bank of 20 Onkyo decks for real-time dupes, plus smaller banks of three or four decks for smaller runs. Sandoval emphasizes that the decks are always biased for the particular tape in use. Record levels on all decks are adjusted for professional use. And the studio uses test tapes to check speed.

Aky's usual source materials are analog cassettes, 1/4-inch reel-to-reel masters or DAT masters. "We're not set up for half-inch," Sandoval says. "Ever since DAT came in, a lot of pro-

ducers make their half-inch and then make a DAT for a reference recording. And that's what they bring us."

Aky's capacity defines the "small-to-medium" market, as mentioned by DaPuzzo. "We specialize in orders of 50, 100, 1,000, 2,000—anything up to maybe 5,000," Sandoval says. "We also specialize in quality. We keep the numbers low and the quality high."

Aky's customers include record companies that need promotional and prerelease cassettes. There's always a healthy chunk of business, too, from producers and artists who need demo dupes, and from individual artists and bands who need cassettes for

personal sale.

In the East, as Sandoval explains, "Some of the record companies use the college circuit as a test market." Consequently, many of Aky's prerelease dupes go out to campuses. "After we get up to 200 copies or so, we try to advise the client of the advantages of high-quality, high-speed duping. It's more cost-effective."

Aky makes high-speed copies on a system newly bought from Magnefax, which works on a common capstan for master and copies. It's a bin-loop system (more about that later), which can make three copies at a time.

"We're very confident with the system. It doesn't rely on ultra-high speed. It's kind of medium high-speed, and it retains quality. You have only one motor running this whole system, so it's almost impossible for the speed to go off. It's actually one machine making copies on itself." Sandoval estimates Aky's work capacity at 2,000 to 3,000 C45s per day.

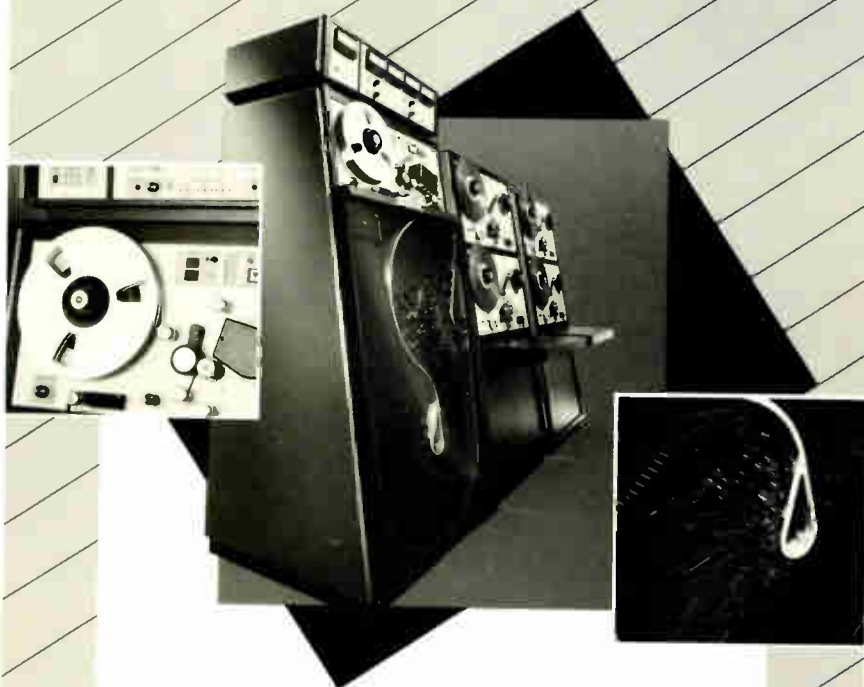
Sandoval's Aky is actually more than one business. That's characteristic, as it happens, of many successful duplicators. It works one of two ways. Either the duplicator has a supply or technical business to fall back on in slow times, or else the duplicator develops special services to even out the ups and downs in straight duplication.

The essence of a dual business is best reflected in duplication pioneer Ken Bacon, of Novato, Calif., 20 miles north of the Golden Gate Bridge. Bacon's businesses, working under the corporate umbrella of KABA Enterprises, Inc., are KABA Audio Productions (duplication) and KABA Research & Development (equipment).

"In 1974 we started out in our home," Bacon recalls. "The room we used was actually my son's bedroom. I hung his bed from the ceiling with cables, so I had a place to work underneath it. It was about eight feet by ten feet."

Bacon was working at the time as a sales manager for a film production company. That company had some old Telex cassette duplicating equipment, which the film producer eventually gave to Bacon, along with an account: Pope Productions, "a group of very dedicated Catholic ladies who were into spoken word." That was the start of Bacon's own business, which he quickly expanded into equipment sales, adding one piece of equipment at a time.

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"Probably the biggest impetus to my business," he recalls, "came when I bought a used Winnebago and converted it into a mobile showroom. So at one time we had an Accurate Sound bin-loop system, an Audico loader and a TTL loader [now made by AEG and called Kronus IV]. We had Alpha duplicators, an air compressor and a vacuum pump.

"I drove up and down the West Coast in this thing, stopping at parking lots at colleges and recording studios, and put on a demonstration of everything you needed to have to duplicate audio cassettes."

By the early '80s, cutbacks in educational funding scuttled that part of the business. "So we transferred our energies into production, and that kept us going till we were able to acquire some new equipment lines."

KABA Audio Productions is larger than most duplication facilities, including both bin-loop equipment and real-time audiophile equipment. "Bin-loop," Bacon explains, "is the way the highest volume of cassettes are produced. It's high-speed duplication out of the cassette. The master tape is stored in a bin, spliced end to end. You may have a loop of 1,000 feet or

CASSETTE PRODUCTIONS, BOUNTIFUL, UT

Mark Hanks

"We've been in business for eight years doing high-speed audio, video and computer software duplication. We have several local music clients and some from California, but most of our audio business is coming through the spoken word/seminar operations. We've been going after that marketplace because a lot of people are doing seminars and selling product at those seminars. That part of the business has taken off because we not only do the tapes but the binders and printed material—the full turnkey package. We've generated business through several speakers in Utah, such as real estate/entrepreneur business seminar speakers and a few local companies with their own seminar marketplaces that they invite speakers to. But our big focus is high-speed video duplication—we're one of few in the nation who have the Otari TMD high-speed video duplication system."

more of tape. Each time it goes around, a piece of cassette tape, which is on a pancake, is recorded. There are cue tones between each program, which the loader will recognize and then cut and load each tape into each cassette.

"Most of our bin-loop work is instructional material. For example, we're just doing 100,000 units for a bank, a tape on how to buy a house," Bacon adds. But like most other duplication facilities around the country, "we probably do more real-time and double-time audiophile duplication work in the cassette, using the equipment I developed."

As an engineer and inventor, Bacon developed the KABA 4-track real-time and double-time duplicating system. The KABA is now widely used in the recording industry and is the primary sales item on the equipment side of Bacon's business.

He developed the KABA duplication system to take advantage of the markedly increased frequency response characteristics of modern cassette tape—characteristics that could not be exploited fully by banks of consumer decks set up for real-time duplication.

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Working through a Japanese OEM, Bacon designed and manufactured "a unique cassette deck, using a master/slave concept. The master position plays only, the slave position records only. And we get considerable improvement in overall system performance by not using a combination head. The master deck also provides the distribution amplifiers, level controls and functional controls for the entire system.

"It has the specifications of the best cassette deck you can find. But it also has a transport that will last for at least 10,000 hours. Now there are probably about 250 KABA installations worldwide. We sold about \$1 million worth this past year. The White House has three of our systems. Several of the Air Force bands have purchased KABAs. National Public Radio uses it extensively. The Van Cliburn Piano Competition just bought a system."

KABA Audio Productions' primary duplication work is "high-quality audiophile, short-run jobs," and typically does not include record company work.

The company also provides extensive graphics services, including packaging, inserts and labels. A special KABA-supplied machine called a pad printer is making an impact, too. "This is a machine which will print up to a four-color process, up to a 300-line screen, and will print it on any kind of surface: uniform, flat, curved, pebbly. At last year's AES Show, we had the machine on the show floor printing four-color process work directly onto a cassette shell."

As a result, KABA has been doing a lot of custom loading and printing. "We can actually print a person's photograph on a cassette, with a precision that no other machine that prints on plastic can do. This machine will print on golf balls, key chains, anything you want. One user has copyrighted the concept of printing a four-color picture of a baseball star on a baseball."

• • •

52nd Street, in the heart of Hollywood, is a classic cassette duplicating facility. They've recently doubled their real-time duplicating capacity by adding another room of Nakamichi decks. The original dubbing room had 32 decks; the new one has 27, with rack space for five more.

The 8-year-old business devotes most of its resources to real-time duplicating, with the usual range of clients: record companies, producers

A & R RECORDS & TAPES, DALLAS, TX

Richard Sobel

"We're a pressing operation, doing records primarily. We're a vertical operation when it comes to records—we do the jackets, our own in-house mastering and plating. And we do a lot of custom cassette duplication, too. People think that the vinyl record is dead but that's just not true. I think 99 percent of that is propaganda put out by the CD manufacturers. More people are being forced to buy CDs than actually want to get into it. It's very rare to go into a store and find a CD by an unknown artist trying to retail a product at \$12 to \$15 when nobody's ever heard of him. It's ludicrous. Therefore, the type of people we cater to—the small artist—still rely on vinyl, because if they don't they'll never sell a product. Plus, the percentage of people who actually own CDs is still very small. In this area, too, a lot of the artists are people who play in rural areas where people still think a CD is a deposit you make in the bank! For these small artists it's prohibitive to make CDs, prohibitive to market them, and there aren't the customers to buy them. So we're happy working with them on vinyl or cassette."

and artists.

According to company president Neil Posner, "There's a huge demand for excellent high-speed duplication. But real-time work keeps us so busy that we haven't really had to tap the full potential of high-speed duplication."

The new room also duplicates audio sources: "There's another Otari, another DAT, another Dolby A rack, another Geary parametric equalizer," Posner says.

The increased capacity wasn't so much for running larger orders. "We were getting very, very busy. The need that kept coming up from the clients was for fast turnaround time. And as we looked at our technical capability, we decided that being able to do more cassettes at a time really wasn't a contribution to the market. But running more than one job at once was—being able to serve more clients simultaneously."

52nd Street has recently begun re-

ording audio books for New York-based book publisher Simon & Schuster. George Takei and Leonard Nimoy from the *Star Trek* cast have recorded *Star Trek: The Final Frontier* and *Star Trek: Spock's World*. Former *Hill Street Blues* cast member Joe Spano read Ed McBain's *Tricks*. And Gilda Radner recorded *It's Always Something* six weeks before her death.

The studio started recording spoken word projects in response to client demand. "The first time we did it, we recorded some radio IDs," Posner recalls. "We set this group up with a microphone in the quietest part of the room that we could find and rolled some tape. It turned out so well, we thought, 'Gee, imagine if we actually had some control over the acoustics.' So we built a booth.

"The real test is when meditation clients come in—people who do meditation tapes. They're always very mellow but very intense, very focused. If they could do a convincing recording, we felt anything could be done in there."

Musical cues and stings for the Simon & Schuster books are overdubbed in New York, after the spoken word portions are completed at 52nd

DUPLICATION SPECIALISTS, ISLAND PARK, NY

David Schwartz

"We are moving more and more into reel-to-reel duplication because the rest of the industry is moving more and more out of reel-to-reel duplication. We work with ad agencies, recording studios that specialize in spot production and radio program syndication. We do a few talk radio shows on a weekly basis, and they get sent out because it's much cheaper than satellite to the small markets that our clients serve.

"We've also found a niche for ourselves in endless-loop cassette duplication, which we stumbled upon by accident. We're a medium-to-large size, real-time house, and with that equipment we're able to do endless-loop cassettes very well—almost audiophile quality.

"We do a lot of prerelease work for some of the major labels here in New York, and they normally ask us for 1 percent of the prerelease work on DAT. One of our specialties is that we run the same Electro Sound bin-loop equipment as the major labels, except we use premium-quality tape and they don't.

Street. "A lot of the people they want, or need, to read books for Simon & Schuster aren't in New York," Posner says. "So they need a West Coast site that they can trust."

• • •

Ted Harris calls his business, *Writer's Tape Copy* of Nashville, "the short-order cooks of the duplicating business. We do a lot of the songwriters' tapes. I guess we've got the majority of the street business in town. And we also make radio broadcast-quality cassettes." A songwriter himself, Harris has worked in Nashville's music scene for 30 years.

Of cassettes, Harris says, "We make 'em the slow, sure way. We've got 60 K540 Yamahas in here that we feed off of Studer Revox playback equipment. We've invented a few things to make this thing work. We control all the Yamahas remotely, from one set of controls. We can handle eight different functions at once."

Writer's Tape Copy does virtually all real-time work. They have no bin-loop equipment. Harris estimates the 800-square-foot shop's capacity at "up to 800 a day on a short radio spot, or something like that. It depends on the length of the program."

Writer's Tape Copy does not offer labeling, fulfillment or other ancillary services, unless "we're talking to a radio syndicator and they're going to be doing a lot of business with us."

Limited high-speed work is done on Telex equipment. "We try never to forget that the little guys put us on the map," Harris says. "So if you come in here and want one tape copy, we'll still make you one tape copy."

During his interview, Harris unwittingly provides an audio portrait of his down-home business ways. A customer comes in. Never mind the hold button; Harris just puts the receiver down on the counter.

"Sure, we can do that," you hear him say, "if you don't mind waitin' a little bit. It's almost one o'clock. I can have it for you by 2:15. Will that work for you? Now that's chrome or on reg'lar? Chrome'll be a dollar-twenty, and reg'lar's a dollar-five. Fine. Still rainin' out there, or did it decide to quit?"

Small as his business is, Harris has a handle on the single most important aspect of the duplicating business—something virtually everyone in it emphasizes:

"There's one thing you'd better

have if you're going to stay in this business, and I've seen at least 20 to 25 of these services come and go in ten years right around me here. You've got to have quality. If you're dealing with a radio show, you've got to have real-time quality. If you're dealing with a professional songwriter who's fixing to pitch this tune to Kenny Rogers, and he's got two years of his life tied up in the project, you've got to have it. There's just no substitute for it. And if the customers even suspect they won't get it, they won't do business with you."

• • •

So what about starting out now? Everyone so far—Aky, KABA, 52nd Street, *Writer's Tape Copy*—has been in the business at least nine years.

In Westlake Village, Calif., Quadim Corp. started up August 14 under the direction of former Motown vice president Guy Costa. Costa acknowledges that getting started in the duplication industry is, at the very least, expensive.

According to Costa, the original investment was "in excess of \$200,000. Right now we're working with about 1,000 square feet and four people."

Costa's installation includes 110 Nakamichi MR1 decks and a KABA 10-

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position system, source equipment such as a Sony 1610 and Sony PCM-F1, a Sony PCM-F1 with Super Beta video transport, a DAT recorder, and 1/4-inch and 1/2-inch analog decks.

Quadim will concentrate "only on real time," Costa says. "I'm more interested in quality than quantity. Right now, we're marketing to the record labels for both prerelease and production, including some of the more esoteric audiophile labels. We're also targeting producers, jingle companies and other professionals who want short runs of high quality."

With a maximum-run capacity of about 1,600 tapes a day, Costa estimates he needs just over 200 copies a day to break even as far as cash flow. "Right now we're doing about 200 to 300 a day," he says, "so we've actually come online a lot faster than I thought."

Costa acknowledges that his location north of Los Angeles "creates a little bit of a problem. But we've got pickups and deliveries scheduled as needed into and out of the city. And we are doing some production by mail—some from as far away as the East Coast. So it's starting."

Costa, too, says what virtually everyone else in the business says: "Any-

EASTERN STANDARD PRODUCTIONS, BUFFALO, NY

Mark Mekker

"Our experience is that cassette duplication is making a sporadic upward climb. There's a very solid demand from the Christian music market, as well as growth in standard music-oriented cassettes— independent record companies, producers and bands that want to have product in their local area. And there's also an increase in the institutional market—spoken word cassettes for seminars. All of these areas are growing. If any area is showing more growth than any other, it's probably corporate."

body can put together a real-time duplicator. To do it right is what's important. We put in over six months in installation. We did all the work ourselves—all hand-wired, all gold connectors. We modified all the machines extensively to get them in line with the IEC-recommended responses."

One of the innovations at Quadim is computer control for the entire operation, run from an IBM PC host

and programmed in GW BASIC.

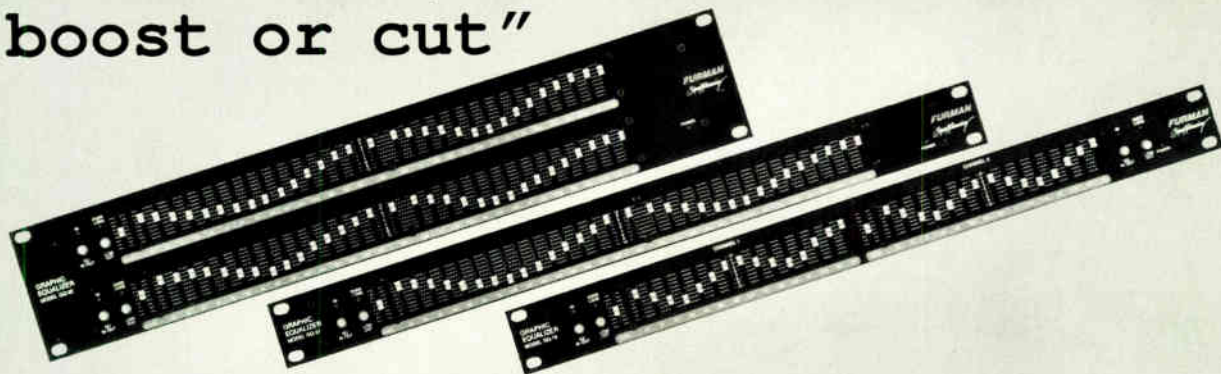
"We've had to modify the control circuitry of the Nakamichis to enable us to take out record commands and reset the counters for our automation system," Costa explains. The system will eventually "be ported to a micro-processor running with a touch panel display."

Costa expects to market the computer control system to other duplicating businesses—and not just to those working with cassette audio tape. "We designed it this way so it could be ported and used with video or other analog systems," he says. "We've manufactured our own printed circuit board, with over 1,100 connections. The idea is that we've got a universal controller box that can be used in any number of duplicating facilities, regardless of the medium."

• • •

"The cassette is really what you'd call the poor man's system," Sandy Sandoval reflects. "That's probably what's made the cassette so popular." Maybe that's why he thinks the cassette is here to stay. "Of all the media there have been—wire, records, reel-to-reel tape, cassettes, CDs—the only medium that has continually been im-

"Less noise, even with extreme boost or cut"



That was the conclusion we came to when we compared the Furman GQ-31 31-band Graphic Equalizer with several well known, comparably priced single rack space competitors.

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| FURMAN | -97 | -77 | -76 |

Unweighted noise levels in dBV, 20 Hz to 20 KHz., input shorted.

Circle #152 on Reader Service Card

proved is the cassette," Sandoval says. "Records went from mono to stereo, and that was it. Tape recorders came with more than one speed, but for years they continued to make these systems essentially the same.

"Cassettes, however, are improved every year—almost every month. We now have very good tape on cassettes. So cassettes, I believe, are going to be here for quite some time."

What about the CD?

"The CD hasn't affected my business at all. Possibly the CD has pushed up the quality of everything else," Sandoval says.

Neil Posner looks at his own record


company cassette business and says, "It's continuing to grow. Cassettes continue to be an excellent medium. CDs are stronger in the promotional field, when time permits. R-DATs are expensive, and it's not like there are a lot of R-DAT players in cars or anything. And R-DAT is still a touchy medium, technically."

Ted Harris came up with the best phrase to describe the cassette's advantages: a pitching medium. "The little audio cassette is the staple of the entire industry," he says. "CDs have made some inroads, but they're not convenient to use as a pitching medium. So I rule them out as any kind

of influence on what we're doing here."

Harris alone believes that "DAT is the key to our industry." He acknowledges the uneasiness artists feel about circulating a DAT recording, which amounts to circulating a master. "As soon as they get through arguing and fighting about it, DAT will obliterate our industry the same way the cassette obliterated 8-track," he says. "You can believe it now or believe it later. You cannot stop quality or progress, because the world will demand it. They'll come up with some means of controlling the ethics. But if quality is invented in the music business, I can guarantee you the business will use it." ■

Laurence Henry is a freelance writer based in Beverly Hills, California. He has contributed to Adweek, Investor's Daily and Psychology Today.




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"Business has been normal here—no tremendous ups or downs. We do everything from low-level voice-grade to chrome tape duplication. I'd say in general the cassette product we turn out today is superior to the one we turned out just a few years ago, in part because the CD has raised the standards of everything. It's now the CD against the cassette, instead of the cassette against vinyl. I think the public is much more educated about quality than a few years ago, and all of a sudden the standard on cassettes is much, much tighter. More and more people are going to chrome cassettes, which is a little more expensive, but people think the quality is worth it.

"We do many of our jobs these days on both CD and cassette, so clients can A-B them if they want to. We've been upgrading our equipment all along, keeping up with the ITA standards. We do our routine maintenance twice as often as we used to on the duplicator. We've had quite an increase in CD business, though we find mainly that it's the same people who were doing records; it's not new people, usually. But the CD business has become very, very competitive. You have to be good or people will go somewhere else."

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MAKING ROCK HISTORY



The world has changed quite a bit since The Who's 1969 American debut of *Tommy* at New York's Fillmore East. On that evening, the Joshua Light Show's inspired psychedelia lent a novel, extra dimension to Pete Townshend's ambitious story of the deaf, dumb and blind boy's spiritual quest. It may take more than trippy projections to turn on today's audiences, but the adventurous, mixed-media spirit that gave birth to *Tommy* was alive and kicking at The Who's historic performance of their rock opera at L.A.'s Universal Amphitheatre on August 24, 1989, near the end of their 25th anniversary tour. At the same time, though, the concert was in perfect tune with the high-tech environment of the late 1980s.

A live, pay-per-view cable transmission brought the show to home audiences across the country as The Who and their guests—Phil Collins, Billy Idol, Elton John, Patti LaBelle and Steve Winwood—entertained a celebrity-studded audience at the benefit show, where the top price for seats was \$1,500. This once-in-a-lifetime rendition of *Tommy* was recorded on twin 48-track digital audio recorders, while a 12-camera shoot captured the action on eight Sony D2 digital video machines. These audio and video masters were subsequently used to prepare an edited version of the concert, which was shown on the Fox network. There are also plans to release a live album from the audio tapes.

Audio Production and On-the-Air Mixing for "Tommy"

by Alan di Perna

Award-winning engineer/producer Bob Clearmountain was selected to mix the show for live transmission and supervise the recording. Remote mixing and tracking facilities were provided by New York's Effanel Music and its SSL-equipped mobile studio. Clearmountain and Effanel worked in close association with a team of professionals that included Clair Brothers, the tour P.A. company, and Greene, Crowe & Company, the video

Bob Clearmountain



production house, all under the aegis of DIR Broadcast Corporation, which produced the program.

BEING PREPARED

Just prior to showtime, the atmosphere was surprisingly relaxed inside the Effanel truck. Bob Clearmountain, attired in his trademark jeans and flannel shirt, settles into a chair next to a pile of DAT and analog cassette machines that will be used to record airchecks of his mix. "If it doesn't sound good tonight, I should be run out of the business," he laughs. "I've had plenty of preparation."

Indeed, planning for the audio taping and live transmission began months in advance, with Clearmountain, Effanel, Clair Brothers' Jo Ravitch and The Who's live mixer, Clive Franks, all exchanging logistical information. Clearmountain attended a few dates on The Who's tour and began faxing Effanel instructions regarding inputs and busing assignments on the truck's 40-channel SSL G Series console. An SSL devotee, Clearmountain was at home in Effanel's environment. "As long as there's an SSL and a good cup of tea (Earl Grey), I can do a mix!" As a result, all of the console patching was completed by the time Clearmountain boarded the truck in San Diego for a trial run two days before the L.A. date. The San Diego show, which was recorded to 48-track, was followed by a full dress rehearsal at L.A.'s Universal Amphitheatre just prior



PHOTO: JAY BLAKESBERG

Pete Townshend

Roger Daltrey

to the day of the *Tommy* cablecast.

Clearmountain has become expert at mixing concerts for live broadcast, having manned the console for prestigious shows such as Amnesty International, Live Aid, Freedom Fest (the Nelson Mandela birthday celebration), Prince's Trust and cable shows for David Bowie and the Rolling Stones. And in his experience, getting two dry runs before the day of the actual broadcast is a rare luxury. "In San Diego," Clearmountain says, "the band did about a third of *Tommy*, plus their regular set. We didn't have a sound-check, but we had that whole night to get everything right. And then at the dress rehearsal, they ran through *Tommy* in its entirety. They had all the guest artists come out and rehearse their songs. The whole thing was fantastic, because it let us find out what all the problems were going to be—things to watch out for. Plus, I was able to touch up the sounds while we were going. I was able to fine-tune quite a bit."

SIGNAL ROUTING

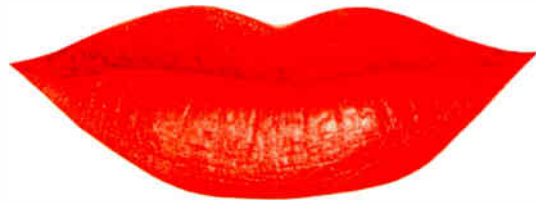
All signals from the stage were split prior to entering the Clair Brothers' twin Yamaha PM3000 P.A. consoles



PHOTO: JAY BLAKESBERG

and being sent to the Effanel truck. "Clair Brothers had one of their deluxe, Jensen transformer splitters with them," notes Effanel's Adam Pinch, who served as stage interface technician for The Who project. "We've used those splitters before, when we worked with Clair Brothers on the Amnesty Show, and on concerts with Tina Turner and Peter Gabriel. We're used to them; they're always clean."

In all, the truck received some 74 inputs from the expanded Who, which consisted of ten instrumentalists, backing tapes and a small army of vocalists. This was augmented by 10 additional inputs from audience mics, making for a total of 84 inputs. Along with the SSL, Effanel used two submixers—a custom, portable 24-channel Sound Workshop Series 34 and 20-channel Sound Workshop Logex 8—to handle this deluge of signals. The Sound Workshop boards had two roles: first, to provide submixes of multi-miked sources such as drums, percussion and horns so that the 84 inputs could be reduced to a manageable 40 channels on the SSL for the live cablecast mix; and second, to submix and bus inputs to the two Sony PCM-3348 48-track digital ma-



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In all, the truck received some 74 inputs from the expanded Who, which consisted of ten instrumentalists, backing tapes and a small army of vocalists.

chines laid on especially for the occasion.

Effanel's chief engineer, Mark Shane, explains that each 3348 was run as an independent, overlapping 48-track master. "This way, when the tape on one machine was about to run out, the second machine could be started up. The idea was to avoid a situation where you have half a song on one reel and the other half on another reel, which makes things difficult in post-production."

The input configuration used for the 40-channel live mix differed slightly from the configuration that went down to 48-track tape. "Some things, such as separate horn tracks, are not really tracks that Bob needed to hear individually in doing the live mix," Effanel owner/engineer Randy Ezratty explains. "So they came up as a stereo pair in his mix while going down to tape individually. Basically, the board was set up like this: The main VCA faders were creating the live mix, while the small faders above them were sending to tape."

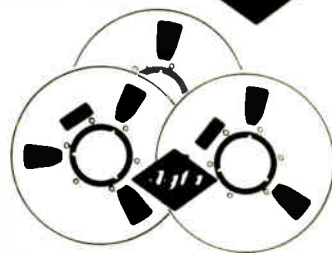
Clearmountain's live mix was also sent to two tracks of each 48-track master. "In post-production, they can use his mix and sweeten it with individual tracks, as needed," says Effanel's assistant engineer, Greg Kaplan. Along with the audio tracks, SMPTE time code was, of course, also printed on each multitrack master, to synchronize the audio with the video in post-production.

VIDEO & SATELLITE LINKS

Master time code for all audio and video machines was generated by Greene/Crowe's own mobile production facility, parked next to the Effanel truck behind the Universal Amphitheatre. "They're sending me code on two separate lines," Effanel's Shane explained just prior to showtime, "so I have a backup in case one of the time code lines goes down. Each of those lines is going to the time code input of each of the Sony 48-tracks. And the time code output of each machine is going to a TimeLine Lynx reader. On the Lynx's displays, I can visually monitor the time code coming out of each machine and make sure that it is uninterrupted. Should I see that time code has stopped, I'll know immediately which machine has the problem and I can quickly patch in a backup. In addition to time code, Greene/Crowe is also sending us blackburst, a video reference, which each of the 48-track Sonys is synched to, so that audio/video lockup in post-production will be absolute."

During the live cablecast, Clearmountain's mix was fed to the Greene/Crowe truck on a pair of cables (backed up by a second stereo feed, to be used in case of emergency). The mix came up on two channels of Greene/Crowe's Auditorix 750 console, where it was integrated with the other audio elements that made up the program—announcements, backstage interviews, historic clips—what Greene/Crowe's Kevin Hayes describes as "the pregame, halftime and postgame shows."

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pened to us, but lightning can strike.”

THE LIVE CABLE MIX

Bob Clearmountain describes his approach to the show as a combination of live and record mixing techniques: “I come from the record mixing side of things, so I tend to approach it that way. But I’ve done so many live things that I’m used to this type of work, too. In the end, it is live mixing. There’s no rewinding the tape. Fortunately, the SSL is the ultimate desk to have in a situation like this. Each channel has its own compressor and gate. You’re able to use the small faders to send to tape and then do your mix on the main faders. Also the SSL’s eight VCA groups are very important to me.”

Augmenting Effanel’s own complement of outboard gear was Clearmountain’s personal effects rack, which accompanies him wherever he works. The rack gives him access to favored vintage processors such as two UREI LA-3A limiters (modified by Ed Evans of the Power Station), which Clearmountain uses for lead vocals, and an old Ursa Major Space Station digital reverb.

As The Who and their guests hammered through the show, Randy Ezratty and DIR’s director of production, Mitch Maketansky, worked with Clearmountain behind Effanel’s console. Ezratty provided a second pair of hands, helping manage the imposing pile of submixers and effects clustered inside the truck’s control room, while Maketansky, cue sheet in hand, told Clearmountain which guitars Pete Townshend would be playing in each upcoming song, who would be singing lead and so forth. One of the trickiest parts of the mix was the guest vocal spots. All the guest vocalists shared one mic, but with singers as diverse as Steve Winwood, Billy Idol, Patti LaBelle, Elton John and Phil Collins, each voice required radically different EQ settings and processing. Luckily, there was sufficient time between guest appearances to reset the console and effects. In this area, too, the dress rehearsal paid off for Clearmountain.

“Keith Forsey, who is Billy Idol’s producer, stopped by during the rehearsal and made some really good suggestions—some harmonizer settings and things like using slap echo on Billy’s voice,” he says. “I’m very glad he came by, because his sugges-

Greene/Crowe was responsible for furnishing complete audio and video program signals to the satellite company, IDB Communications, whose dish was stationed just a few feet from the Effanel and Greene/Crowe mobiles. Inside the IDB trailer, the audio signal was digitally encrypted with the video signal and beamed up to the satellite transponder. Separate video feeds were also provided to Nocturne, the company in charge of live, large-screen projections inside the venue.

Meanwhile, Greene/Crowe also provided some vital video and audio feeds to the Effanel truck. Two video feeds came up on the twin monitors mounted just above Effanel’s SSL console. One monitor had the picture that was going out to the home audience. The second monitor had a feed from camera six—a medium-distance camera, centrally positioned in the hall, which provided Clearmountain with a fixed visual perspective of the entire stage as he was mixing.

Even more importantly, Greene/Crowe received an audio return from the satellite, which was passed along to the Effanel truck. This enabled Clearmountain to flip a switch and monitor the actual output of the satellite at any time during his mix.

“That downlink from the satellite is something I specifically asked for,” Clearmountain states. “A few years ago when I did these live broadcasts, I found that before the signal hit the satellite transmitter, they would put it through all kinds of crazy compressors and EQ, which can really turn a mix inside out. But IDB assures me that there’s now an FCC regulation that prohibits them from altering the signal in any way whatsoever. So it’s probably even pointless for me to have the satellite downlink. But I like to have it anyway, so I know exactly what’s going down—or going up, actually.”

As a fail-safe measure, the satellite transmission truck also received a stereo mix from the P.A. console. This is a practice that Effanel strongly recommends on all live broadcast dates. “If for some reason our truck should go down,” Shane explains, “the people at home would still get audio—the P.A. mix. While it certainly was never intended for live broadcast, the P.A. mix would be an acceptable alternative to having no audio at all. Something like that has never hap-

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tions really helped bring Billy's character to life."

Clearmountain monitored the mix principally on Yamaha NS-10Ms, switching occasionally to Auratones and Effanel's main monitors, a coaxial Gauss system. "I check the mix in mono quite often. Mono is quite important here. Most people aren't going to be listening in stereo. So in mixing, you don't want to pan anything hard left or hard right."

In general, the live mix required a few small concessions to the cable medium. "I tend to use a bit more compression," Clearmountain notes, "because you have to figure that most people are going to be watching at home, on television, and aren't necessarily going to be blasting it on a stereo. So if you don't keep the level of everything right up there, you're going to lose things. And not only that, the SSL compressor sounds very good, so you can compress quite a bit and it ends up sounding more powerful, rather than squashed."

In terms of EQ, Clearmountain also had to keep the proverbial 3-inch home television speaker in mind. "On the bass, I'm tending to push the mids a bit more than I would usually. On small speakers, people are probably going to get nothing under 120 or 150 Hz. And John Entwistle has a very big, round bass sound. So if I left his bass as it was, you might not even hear it in the mix. There are a few things like that which I have to consider. But not too many, really. Generally, The Who sound great just as they are. My job's pretty easy, I think."

Upon completing that job, Clearmountain eases back in his chair behind the console. Post-show elation sets in as the final credits fade from video screens overhead. Production staffers and other industry types wander into the truck to congratulate Clearmountain and the Effanel crew on a job well done. Mark Shane prepares to play back one of his 48-track reels, to make sure the show got to tape all right. A hint of tension—irrational, unspoken—always accompanies playbacks like this. But there's nothing to worry about in this case. Shane engages the play button, and rock history pounds from the monitors.

Alan di Perna is music projects editor at Musician magazine.

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Many of you are probably thinking, "Why did Clearmountain bother writing an article about digital editing when I can simply read the Sony manual and get it from the horse's mouth?" I should say, I wish many of you were thinking that. Trouble is, I've noticed that a lot of you engineers and assistants out there in Studioland just aren't thrilled about studying manuals during the few hours you might have off during the week. You have the audacity to be trying to get some *sleep!* Don't you realize you gave up that privilege along with any other normal human habits that regular people have when you agreed to be paid slave wages to cater to the whims of raving egomaniacs day in, day out?

Now, now...before you lean out the window and yell, "I'm mad as hell and I'm not going to take it anymore!" just calm down and listen to Uncle Bob. You know, in spite of your degenerating health and non-existent social life, you love your nutty job and wouldn't trade it for anything, so don't worry...I read the manual and have amassed some practical experience, so this guide could actually make your life easier. Besides, you'll never get the window of that control room open.

Now, the first thing you'll need is a pair of digital tape recorders, because we're not talking about razor blade editing here. Electronic digital editing is one of the best reasons to record digitally in the first place, so leave that box of blades on the analog machine as they roll it out of the room. Besides, you don't want to have to deal with nasty things like discontinuous control track/time code numbers, or the machine simply muting over a splice that it doesn't like. Even if you were

by Bob Clearmountain

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to try a silly thing like cutting the tape, you would need two machines anyway because the manufacturers recommend you make safeties both before and after you do your edit, so you might as well do it the proper way to begin with.

While electronic editing can be done with both DASH and PD formats, so far all PD machines require the use of an external synchronizer; therefore, editing techniques will vary with each unit. For this reason my article will deal only with DASH editing, specifically the Sony 3324/3324A and the 3348, with which I'm most familiar.

Your two machines must be complete with their remotes and all necessary cables for synchronization. These consist of three standard BNC cables and one IEEE-488 computer interface cable. You'll also need at least one digital I/O dubbing cable. Two will be handy later on for flying things like background vocals back and forth between the machines (tune in next month), but are not necessary.

For those who are accustomed to editing analog tape (which is most of us), we want to make electronic editing as familiar a process as possible, so you will record on the analog tracks to facilitate "tape scrubbing." If your console has a mono bus, patch it, or a separate subgroup of the drum tracks, into analog track 1 of the master machine. Patch whatever you're using for a click (if any) into analog track 2. Now patch the outputs of the two master analog tracks to the inputs of the *slave* analog tracks, and return their outputs back to a stereo tape monitor on the console. If one or both machines are a 3348, don't bother with this step, because, unfortunately, its PWM-format (pulse width modulation) analog tracks make tape scrubbing much more difficult than on the 3324/3324A. Next month when we get into editing, we will discuss methods of getting around this problem.

Before you start editing, it's generally a good idea to get some sound recorded on the tape first, but even before you do that you must do something we call formatting the tape. This means recording the DASH control (CTL) track and "zero audio" on the tape from beginning to end. It's extremely important this be done properly, because the integrity of the digital information you record later depends on it, *so pay attention!* Thread up a *blank* roll of tape and select the "advance record" mode on the front



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panel of the machine. If the tape's not totally blank, be sure to bulk erase it first. The machine doesn't actually have an erase head, it just overwrites whatever was there before. So if you attempt to re-record over an existing control track, you may never be able to get rid of the previous information if the new control track happens to be out of phase with the old one. (This actually happened to me once!)

Before you start formatting, you have some decisions to make. At the right side of the front of the machine there is a panel of switches under a Plexiglas door that the manual refers to as the tsw (toggle switch) block. First, make sure the master safe switch is off. Next, select the sampling frequency. I recommend 48k because it sounds best, but if you plan on doing any D-to-D transfers to or from Sony 1630, you'd better format at 44.1k. It is only necessary to use 44.056k if you're recording for television and you'll be mixing to a 1630 tape that will be laid back to an NTSC video master. If this is the case, be sure the multitrack is being resolved to composite video or "house sync" during recording. Next, you must decide if you need emphasis or not. This is an

EQ curve (sort of like the RIAA curve for records) designed to reduce high-frequency noise. Well, the machine is quiet enough for me without having to subject the signal to any extra processing, so unless you're familiar with this and actually like it (as some do), I suggest you just turn it off; you don't need it.

Unless you're using a totally digital recording console (which I doubt), for your initial recording you'll want the "input select" set to analog. This should also be set to analog for formatting, because for some strange reason, if it's set to digital, all tracks default to "emphasis on" in advance record mode even if the machine is set to "emphasis off." If you're formatting while getting drum sounds (a common occurrence), format on the second machine and disconnect it from the output of the console so you don't end up with stray tom-toms on the tape. If you're lucky enough to be using a 3348, just press "rec mute" on the remote.

The monitor switch doesn't really matter at this point, so just leave it in "auto input." Timer mode should be in "absolute." Sync clock sets itself, but it should be in "int" (internal), unless

the machine is being resolved off composite video or "house sync." System control depends on whether or not you're using the remote, but at this point you probably want it in "local." On the 3348, "local" and "remote" are the same mode.

The CTL track, as well as keeping the digital information organized, is something like time code, as it contains an absolute tape time address that is read by the machine and used by the locator/synchronizer for electronic editing as well as locating. The numbers can start anywhere you want, but to save lots of hassles later having to enter huge offset numbers, I recommend starting all reels at 00H00M00S. To do this, first select *all* tracks to "rec ready." Press "reset" on the tape counter. Press the "play" button while holding the "record" button down. If you press the "record" button while holding "play," the numbers will revert to what they were before you hit "reset."

The next few steps are not necessary, but I'm recommending them to make sure you don't have a bad batch of tape. Record for about 30 seconds, rewind to the top, put the machine in "insert" and record over the same 30

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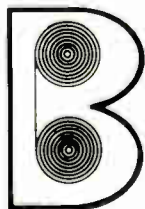
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seconds. Rewind and play what you've just recorded and watch the CRC (cyclic redundancy check) error lights (inside the doors down by your knees). If the CRC light for each track blinks less than once per second, the tape is fine. If the frequency is any more than that, try cleaning the heads (see the manual for the proper procedure). If after re-recording over that section you still see too many CRCs, try another reel of tape. If the same thing happens, try another batch. Please note that you'll probably see more CRC lights on the 3324A/3348 and 3324s with serial numbers higher than 13509 than on earlier 3324s. This is completely normal, as the later machines have a much more powerful chip in their error-correction circuits than the earlier ones. Sony is currently in the process of modifying all earlier 3324s with the identical chip free of charge.

Once you're satisfied that you have a good reel of tape, rewind to the top, put the machine back in "advance rec" and reset the counter. If you're going to need SMPTE or EBU time code for sequencers, or the SSL/Neve locator, etc., now's a good time to do it. Use a good generator like Lynx or Adams-Smith, connect it to the *time code track* input and reset it to 00H00M00S so the code matches the CTL numbers fairly closely (this is for convenience only). When using the 3348, you can use the internal TC generator, but please note that if you're generating 30 *non-drop frame*, the TC numbers will be out with the CTL track numbers by about two seconds by the end of a 10-inch reel of tape. This has something to do with the internal sync being 29.97 fps, so if you generate *drop frame* the numbers *will* match. Unless you're doing video work (in which case the machine should be locked to house sync while striping code), I suggest you either put up with the discrepancy or use an external TC generator. Also, keep in mind that because the format of the time code and analog tracks on the 3348 is different from the 3324/3324A, code recorded on a 3348 cannot be played back on a 3324. However, if code is recorded on the 3324/3324A it can be played on either machine. All 3324A/3324s are currently being modified by Sony (along with the previously mentioned mod) to eliminate this incompatibility problem.

Now, record from the top of the tape (simultaneously starting the TC

generator) to the end without stopping. I know what you're thinking: "He said 'Don't record over the CTL track.'" My, you are paying attention! Well, you're not going to start recording anything important on the first two minutes of tape anyway (except possibly a 1k ref tone, if you like), so it doesn't really matter, does it? Format at least two or three reels, because you'll need one for your master edit reel later.

Now you're ready to record some music, so put the machine in "insert," wind the tape in about two minutes, get some great songs, a band and a singer, and knock yourselves out! If you're the engineer or the assistant, you probably don't have a lot of control over this, but if the drummer can follow a click real well or has impeccable time, editing between takes will be a lot easier. Obviously, if you're using a drum machine or sequencer, you'll have no problem. Of course, in that case you probably won't be doing much editing anyway, but I think all this info will still be quite useful to you, so stay tuned.

I've found most drummers would much rather play to a drum machine they've programmed themselves than to a click track, so if you use a Linn, 808 or something like that, be sure its time base is referenced to a stable sync box like an SBX80 or an SRC, because running on their own, the tempo setting of most drum machines tends to drift quite a bit. For even greater accuracy and the ability to use a sequencer or drum machine later, you may want to run the sync box off the time code, and make a note of the offset. It's also good practice not only to record the drum box/click on one of the analog tracks for tape scrubbing, but on a digital track as well. This could come in handy during overdubs or for creating a tempo map later in an SBX80 (or similar device), in case you end up with a different time code after editing.

Well, now you've done all the necessary preparations for editing and have recorded the basic track for what we hope will be a mega hit. So please join me again next month when we get into the fun stuff. ■

Noted producer Bob Clearmountain's recent credits include mixing tracks for Paul Young, Laurie Anderson and Paul McCartney. He makes his home in Connecticut, where he started out as a bassist in the late '60s.



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by Mr. Bonzai

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cable musicianship. Herb's new single, "3 O'Clock Jump," features his enduring, storytelling trumpet surrounded by grinding synths and jumbo percussion.

A&M Records, co-owned by Herb and partner Jerry Moss [*Editor's Note:* At presstime, PolyGram Records purchased A&M Records. Please see "Current," page 6], has been home to a diversified group of chartbusters over the past three decades: Cat Stevens, The Carpenters, Peter Frampton, Supertramp, The Go-Go's, The Police, Bryan Adams, Janet Jackson, Joan Baez, Quincy Jones, Joe Cocker, Captain & Tennille, Billy Preston, Suzanne Vega, with more than enough gold records to rock a trade balance.

"I think like an artist and I try to represent the artist's point of view at A&M. I guess I had the grand awakening around 1967, and I opted to remain in touch with the music."

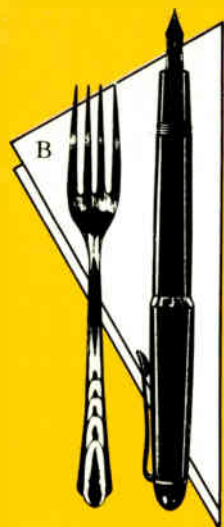
When we arrive at A&M, we pass through the gates of an old movie studio that Charlie Chaplin once called home. The guard politely directs us down a tree-lined path to a rustic bungalow. If we're lucky, the softspoken Mr. Alpert might open the door.

Bonzai: *My Abstract Heart* is your 21st album...

Alpert: Is it? I stopped counting.

Bonzai: What sets it apart from your previous work?

Alpert: I don't know what sets it apart. It's just Herb Alpert, 1989. I do one a year, and when I start out I just feel what's coming up for me musi-



In 1962 Herb Alpert emerged from his little garage studio with a moody blend of melancholy trumpet, bullfight cheers and dreamy ahh-ahh women. "The Lonely Bull" launched a career that has racked up 72 million records to date, seven Grammy Awards and five Number One albums.

If we listen back to his greatest hits, we find that sound effects and graphic instrumentation were trademarks of many tunes: from the oogah horn of "Tijuana Taxi" to the clapping, whistling and party animals of "America." "A Taste of Honey" features drummer Hal Blaine's solitary "bomp, bomp, bomp" and that brassy "boowah"—what a sample! In the summer of 1965, not everyone was acting "Like a Rolling Stone"—a lot of folks did the funky chicken and frugged carelessly to "Whipped Cream." The records are straightforward—we've got *concept* here, with sonic imagery and impec-



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cally at that time in my life. I go for it, and I don't think about whether it will be commercial or who it will appeal to. I try to make an album for me; I'm kind of a selfish artist in that regard. I go into the studio with a certain set of things I don't want to do, based on past experiences. While I'm working on an album, I'll log ideas that don't work. When it's time to do another one, I'll remember those things. I don't try to make a particular musical statement—I let whatever happens, happen.

Bonzai: What were the qualities of your breakthrough records?

Alpert: The Tijuana Brass sound essentially was me playing all the trumpet parts, so I played it from one person's point of view. The seed of the sound of the Tijuana Brass was planted when I realized I was able to play solos that sounded like Louis Armstrong, Harry James and others. I had them at my fingertips, but I started listening and decided who would want that? Carbon copies of somebody else. I was looking for my own identity as a musician, and the concept in the late '50s for pop singers was harmonizing with themselves or singing in unison. I was thinking of the Les Paul sound, with his guitar overdubs. I tried doing that in my little studio at home and came across some real interesting trumpet sounds. That was essentially the Tijuana Brass sound.

Bonzai: Were you the first to try this with the horn?

Alpert: I really don't know. I think I was the first one to use it successfully. Anyway, that was the sound, but I've always tried to do it as spontaneously as possible. All the music I played in those days—even though a lot of the tunes were written out—while I was recording them I would never look at the charts. Many times I played the song for the first time while I was recording. I would have it in my head and wouldn't rehearse, because I wanted it to sound fresh.

Bonzai: Let's talk about "The Lonely Bull." Originally it was titled "Twinkle Star." It seems there were a few key things happening—the cinematic imagery evoked by the music and sound effects of the crowd, and the perfect title.

Alpert: Yes, and the imagery that came up right at the front—we put

the hook right at the get-go, with the fanfare and the enormous crowd screaming "Ole!" I didn't wait for the bridge. Being an instrumentalist, I wanted it there before anyone had the chance to take the record off the turntable.

Bonzai: Without any one of those elements, I wonder if that song would have made it?

Alpert: I think the song itself is strong. The melody is very, very strong. The imagery definitely had an impact, because I got letters from people all over the world, and it did get me thinking about making instrumental music with a picture. That's essentially how I approached it.

Bonzai: The use of sound effects was your idea?

Alpert: Yes, and Jerry [Moss] came up with the name Tijuana Brass.

Bonzai: I guess that song got things rolling for you in a big way.

Alpert: It was a hit record for sure and one of those rare records that had a way of promoting itself. A radio station would play it and the switchboard would light up. It snowballed across the country and the world. But there was a big lull afterwards. The follow-up album did well, but after that it was slim pickin's for a while. It was a matter of me hanging in there with the sound, because I always felt it had great potential and that we hadn't really tapped it, other than with that one record.

I only bring this out because I hate to be the judge of somebody else's music or instrument. There was a moment there when people were saying, "You got lucky with this one record. Why don't you just take the money and run?" If I was only thinking about the money, or if I was an artist running scared, I might have done that. But I hung in there because I felt I had something unique, and that it was just a matter of time. I was in the mine every day trying to pull out something and find new ways to do it. It took about two years before I started to get rolling with that concept. During that period, I got a lot of negative comments.

Bonzai: Let's talk about your garage studio. Can you describe what that room was like?

Alpert: Well, my first recorder was a Webcor wire recorder.

Bonzai: Could you edit?

Alpert: I guess you could edit with a soldering iron. [Laughs] I actually had

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that machine just as an experiment. When I seriously started out, I began using two mono Ampex 601s. I would go back and forth from machine to machine. The quality was quite good—I was able to go back and forth seven or eight times before it sounded like a windstorm.

Bonzai: What year was this?

Alpert: Around 1960.

Bonzai: Did actual records come out of those machines?

Alpert: Lou Adler and I made the Jan & Dean record "Baby Talk" with one of those 601s that Jan Berry had in his garage. We recorded Jan & Dean using a metronome, then took the tape and I underdubbed, which was a really ridiculous way of doing it—adding the musicians after the vocal. It was much harder that way, rather than the usual way of laying the singers on top of the instrumental.

Bonzai: Why did you do it that way?

Alpert: They had this unusual sound in their garage, with echo that was repeating on itself. They had such a distinct quality that we were afraid we wouldn't be able to get it the other way. It worked, but there are a couple of spots in the record where Jan and Dean separate from the rhythm section.

Bonzai: How is it being a successful artist as well as a successful businessman running a record company?

Alpert: Actually, I spend very little time in the real business world running this company. I've got some incredible people involved. I think like an artist, and I try to represent the artist's point of view at A&M. I guess I had the grand awakening around 1967; we were so dependent on the Tijuana Brass records to keep it floating at A&M, and I was in the process of making an album and running back and forth to a room filled with lawyers and yellow pads. I realized I couldn't do both very effectively. It would have adversely affected my work in the studio, so I decided it had to be one or the other, and I opted to remain in touch with the music.

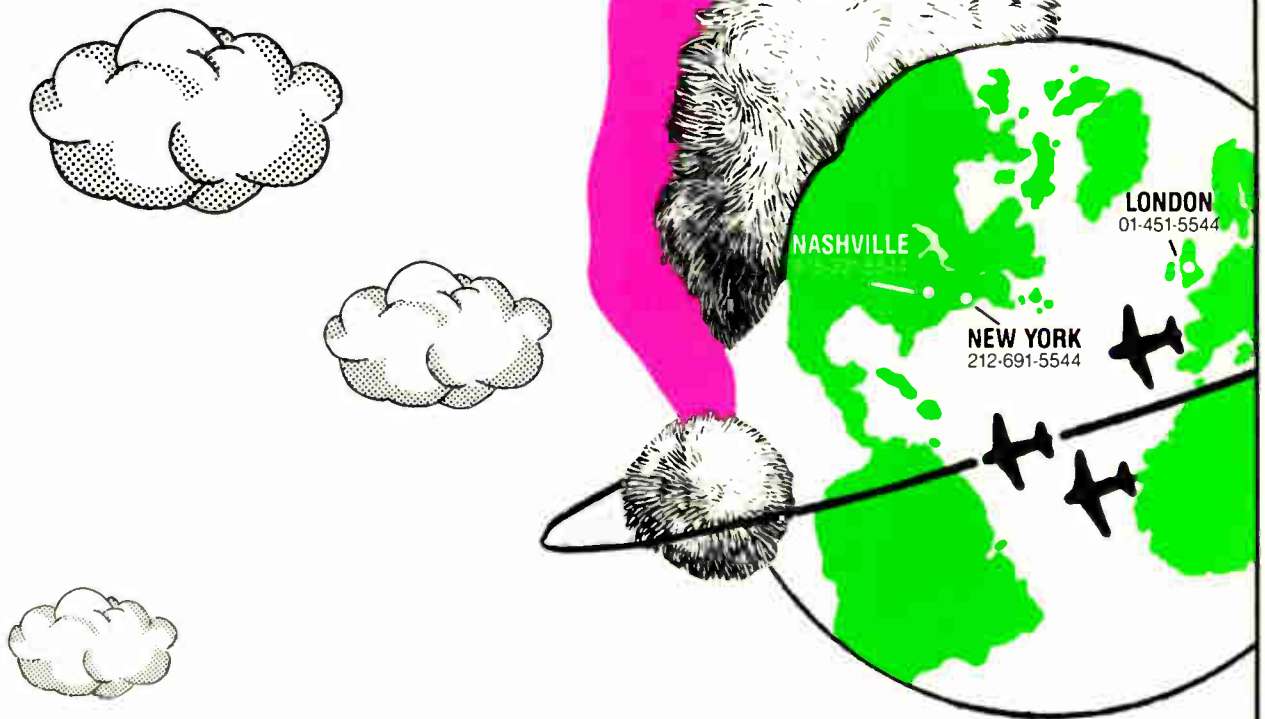
Bonzai: Have you had a close artistic interchange with A&M's many successful artists through the years?

Alpert: Yes, I have.

Bonzai: Could you give me some impressions... say, Joe Cocker?

Alpert: Joe was very instrumental in turning me on to rock'n'roll. I wasn't a stuffed-shirt, but I was a bit closed

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off. I came up as a classical musician, then turned to jazz. Rock'n'roll belonged to someone else. I didn't really understand it, never got the heat of it. I didn't see what all the to-do was about. Then Joe joined the label around 1969, around the time of the Mad Dogs & Englishmen tour. They were rehearsing on our soundstage, and one afternoon I decided to watch them work. I sat down, closed my eyes and started listening to the group, and I got goosebumps. I opened my eyes and looked up at Joe with his gyrations, and his hands making motions

like he was playing guitar, and his face contorted. He was totally into it, the drummer was churning out this unbelievable motor and I got the message. I thank him for that; it was an important experience for me.

Bonzai: Lee Michaels?

Alpert: That was an experience in another direction, 'cause Lee played so damn loud I couldn't stand it. I remember one night at the Whiskey listening to him. There were kids with their heads stuck into the speakers, and I was in the very back of the room. I had cotton stuffed in my ears and it was still unbearably loud. Just Lee and his drummer. That was an

ear-opener for me, because I found that some people needed to hear music at an incredibly loud level.

Bonzai: That seems to have changed lately.

Alpert: Whether it was a passing fancy or not, there were a lot of people who needed that kind of dB to get off. I never thought of music that way before, so it was an experience that turned my head around. There are lots of different ways to listen to music. In the old days, if you will, music was judged by whether the song was good. If the song was good, then what did the artist have to say? Can the artist interpret the song? But now, there has been a whole new set of rules added. The palette is much different.

For instance, I did a record with Jimmy Jam and Terry Lewis. What got me started doing a record with them was listening to something I didn't care for at all. I cranked up one of their records for my 14-year-old daughter and her friends. I gave it a fair shot and tried to find what they were looking for. The record ended and I asked them what they liked about it. It was not an off-the-cuff response; they thought about it for a while and told me, "It's fun to listen to."

That's an element I had never thought about, in terms of what you do when you go to make a record—to make a record that's fun to listen to.

Bonzai: Seems fair enough.

Alpert: Yes, it is. If you can combine that with a great song and a great artist, and make it fun to listen to, you've got it. Bingo. I think a lot of the big records over the years have been fun to listen to.

Bonzai: Carole King?

Alpert: Carole recorded for Ode. She brings up a couple of thoughts. I picked out all the Steinway pianos for our recording facilities, and there was one I really had a feeling for, an old, brown Steinway B, the one that Carole recorded *Tapestry* on. Joni Mitchell did many of her big albums with that piano as well. Every time I hear those records, I think about being in this little shop, plunking out sounds on this piano, thinking that it would be a fun piano to play.

Bonzai: Do you still have it?

Alpert: No, the piano is in piano heaven. It broke down finally and we gave it to a church.

Bonzai: You have quite a collection of old vintage microphones here. Some artists are a little superstitious about

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using certain microphones, maybe the ones they first cut their hits with.

Alpert: Yes, I've got a little bit of that in me. When I used to record at Gold Star, I used a Sony C-38 microphone, and I've liked that sound ever since. I've matched it against other microphones and I keep coming back to that sound. It's warm, and it does something real nice for the sound I'm looking for.

Bonzai: What about The Tubes? A couple of times I felt they were right on the verge of being gigantic.

Alpert: They were. We've had a couple of those groups, like the Flying Burrito Brothers. I thought The Tubes were going to go right through the roof, and I don't know what prevented them from doing it. The voice? The songs? They had almost the whole tool kit, but something was missing. You know, their legacy is that they painted the outside wall of our soundstage—all those flying records you see from the street.

Bonzai: It must be frustrating when you feel you have all the elements you need for success with an artist, and can't figure out why it doesn't work.

Alpert: The public tells you. A lot of artists did make it. That's how we choose our artists. We go for those who we feel will go over the center field fence, as opposed to the beat of the week.

Bonzai: It's still not a science.

Alpert: No, it isn't, and hopefully it never will be. That's the fun of it. And all your biases come out when you buzz to somebody's music, somebody's artistry. It's a product of everything you've listened to prior to that, and for whatever reason, it rings your bell.

Bonzai: You have racked up such incredible statistics—72 million records, five albums in the Top 20 at one time. . .

Alpert: We had three albums in the Top Five at one time.

Bonzai: Do you know the secret?

Alpert: Well, the timing was right. And the songs were good. The sound was good—I listen to those records, and they're still good. I made them with joy in my heart. I didn't make them because I thought I could sell a lot of records. They were done with love and care—not that that is the ingredient for selling a lot of records, but it was the way I worked. I

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didn't overthink things.

Bonzai: Has the technology of recording always been prominent in your preparation and consciousness?

Alpert: In the early days when I worked with engineers, I warned them: "Be ready to record at the drop of a hat. All I am going for is feeling. If you can capture a good sound while it feels good—bonus. Don't fool around trying to get this perfect mic on the instrument if I have something really rolling in the studio." That was always the prerequisite—the feeling.

As I progressed with that and hopefully got a little wiser, I realized I could get both. If the preparation in the studio was right, with the right engineer and the right equipment, I could set up a situation where I could get both the feeling and the sonic quality that was important. It's especially important now when you're dealing with CDs, DATs and the new, sophisticated playback gear. It's nice to have a very cleanly recorded groove, and not suffer to get it.

Bonzai: Bob Clearmountain told me that your studios were among the best—the layout, equipment, atmosphere, the feeling.

Alpert: I think he's right on target. The feeling is part of the sound, and our sound is covered totally. But you have to feel good in an environment. I've been to some studios that have the sound covered, and they have all the technical gear you need to make a great record, but for some reason I didn't feel good in the space. As an artist, I didn't feel like I could let it hang out in the space.

When we designed our studios, it was with that feeling first and foremost—that you felt good as an artist walking into the studio, and that you were the star in the studio. The studio shouldn't overshadow the artist. Some studios have so much flash that the artist becomes secondary to the space. In our studios, the artist is always first.

Bonzai: The people you have here today—Shelly Yakus, Jimmy Iovine—how did these people all come together? What chemistry was involved?

Alpert: Jimmy and Shelly are the team who presented Jerry and me with a concept for a recording facility. The more we worked with them, the more we listened to them and realized that because of the great records they had made, it was a natural to be involved

with them. They had a vision of what the studio should be like. I put my recipe in there as well, and the three of us developed the space. And they are responsible for the personnel. They have an extraordinary staff of engineers, and Mike Morongell, our head technician, is top-of-the-line.

Bonzai: I've been reading about the big business things happening here—would you care to talk about it?

Alpert: It's not official; it's in the talk stage. If something like that would happen, nothing would change here. The facilities would remain intact. If someone would want to buy A&M, and it was satisfactory to Jerry and myself, it would be with the understanding on their end that everything would remain pretty much the same.

Bonzai: So you like the way things are going. . .

Alpert: Yes, and the A&M picture is far from finished. We've got a lot more colors to fill in. I'm probably more enthused now about this business than ever before in my life. I'm involved in some great projects—like producing with Stan Getz.

Bonzai: You started playing trumpet when you were 8 years old. The only instrument I ever studied was trum-

pet, but I stopped. I used to worry about getting a big red lip, or distorted features. Did you ever worry about that?

Alpert: I did for a few brief moments, but I don't have any marks. I studied with a great teacher in New York, Carmine Caruso. He didn't play trumpet, but he taught the physics of playing the instrument. I learned how you actually make the sound. He broke it down from a totally different point of view. The conclusion is that the trumpet is a reed instrument. The lips are the reeds and they make the noise. The lips vibrate and you hold this piece of brass—he called it a piece of plumbing. It doesn't matter what you hold in front of your mouth to amplify the sound. Essentially, you are the instrument.

He broke down the process to explain how the actual vibrations work. Once I started to understand that, I stopped fighting the instrument. His thesis was that when you turn on a pipe organ, x amount of air comes out, whether you hit the lowest note or the highest note. The only difference between those two notes is that the vibrations are moving very slowly on the lower notes, and the molecules are moving rather quickly with the

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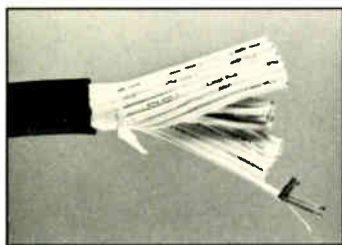
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higher notes. That's essentially what happens with the trumpet.

Bonzai: Were you a youngster when you studied with him?

Alpert: No, but this was several years back. It crystallized all the questions I had about how to play the instrument. A lot of my teachers had said if you don't play the horn for one day, you go back a week; if you stop playing for two days, you go back two months; if you stop playing for a week, forget it, you'll never play again. I heard all these ominous threats and the playing became almost a job, until I was able to understand it from this other point of view.

Bonzai: Why did you pick the trumpet?

Alpert: I liked the sound. You could probably do a psychological study on trumpet players. I don't know if it's a need to be the center of attention, but I think we need to be heard. [Laughs] The trumpet is not one of those instruments you can hide behind. You hit a couple of clams on the horn when you're playing in a section or a small group, and it's really heard. Before the electric guitar was cranked up, the trumpet player was the guitar player of yesteryear.

Bonzai: Do you like being in that position, having all that attention?

Alpert: I guess I do. It seems there is evidence that trumpet players have this running theme.

Bonzai: Tell me about your performances with symphony orchestras.

Alpert: Some orchestras are really fun to play with. I had an incredible experience playing with the Atlanta Symphony—they were hot, enthusiastic, loved the music. Chastain Park, where we played, had a wonderful sound and the audience was very responsive. It was a goosebump experience for me.

Bonzai: Goosebumps—I'm glad to hear you using terms like this. I was wondering if the thrill was still alive.

Alpert: I'm a musician right to the core. I wake up in the morning thinking about music. I usually sit down at the piano and fool around with chords and try to write a song. I'm looking for that rush, that goosebump experience that now and then comes when you hit that right sequence of chords.

Bonzai: You said the A&M story is far from over—what do you have in store?

Alpert: We have some wonderful artists who are just about on the launch-

ing pad. One is a group called Giant. I think they're just a few breaths away from hitting it big. They have all the tools necessary.

I want to produce more jazz, myself. I think jazz is really the art form that will touch people in the '90s, more than ever before. Not that jazz has ever left, but I think it's time for more people to understand and appreciate jazz. I think jazz is what we are all looking for, in terms of an integrity and an honesty that we want from our politicians, from our relationships with people, from our everyday dealings—and we want it from our artists.

Bonzai: Jazz celebrates the individual.

Alpert: There's real jazz and there's fusion jazz, which was a little more manipulated. I'm talking about the artist who doesn't care whether you dig it or not. There is a certain integrity that a lot of the great jazz musicians have. They are willing to be themselves and if you like it, great; if not, it's okay with them. They are not thinking about how they get into the Top Ten. They play on their own terms.

Bonzai: Speaking about the Top Ten, do you have any predictions for the next decade? The trend seems to be toward bigger and bigger companies, and less power spread among the smaller companies.

Alpert: It seems like it's going that way.

Bonzai: Doesn't that cut down on the creative chances?

Alpert: Unfortunately, you could be right. There are a lot of creative people out there, both young and old, who deserve to be heard. Unfortunately, they don't really get the chance, because the record companies dictate what type of music they are looking for, based on things they've already heard. Radio is dictating what type of music they are willing to play. A lot of soulful artists out there have something to say, but have no outlet because nobody is willing to give them the chance. Unfortunately, those chances may be getting slimmer and slimmer.

That creative door is still open here at A&M. I think that's what people respond to when they think of our company. I hope that we never lose that spirit. ■

Mr. Bonzai is Mix's editor-at-large, based in Los Angeles. We're still wondering what he and Mr. Alpert had for lunch.

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Nearly 700 people attended the fifth annual TEC Awards, held October 19 in New York City. The event raised a record-setting \$34,000 for deafness research and audio scholarships. The awards were highlighted by the singing debut of TEC Awards keynote speaker, Norman Lear, chairman and CEO of Act III Communications, the satirical wit of emcee Richard Belzer and the touching tribute by Howard Schwartz to Hall of Famer, the late Wally Heider. See our January issue for more details.



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Recording Engineer
George Massenburg

HALL OF FAME

*Wally Heider
George Martin
Rupert Neve*

VINTAGE MICROPHONES

PART III

Well, gang, this is it—the last in this three-part series of scientific fact and unbridled, unmitigated opinion. Of course, though opinion enters into it, it is an opinion garnered over the years through my own personal interaction with all of you crazed users out there, and, thus, it is really a synthesis of all your opinions.

Now that we've got that disclaiming cop-out out of the way, let's take a break from our friends at Neumann and go across the border to Austria, the land that brought us Mozart and Freud. Obviously, these guys know how to party.

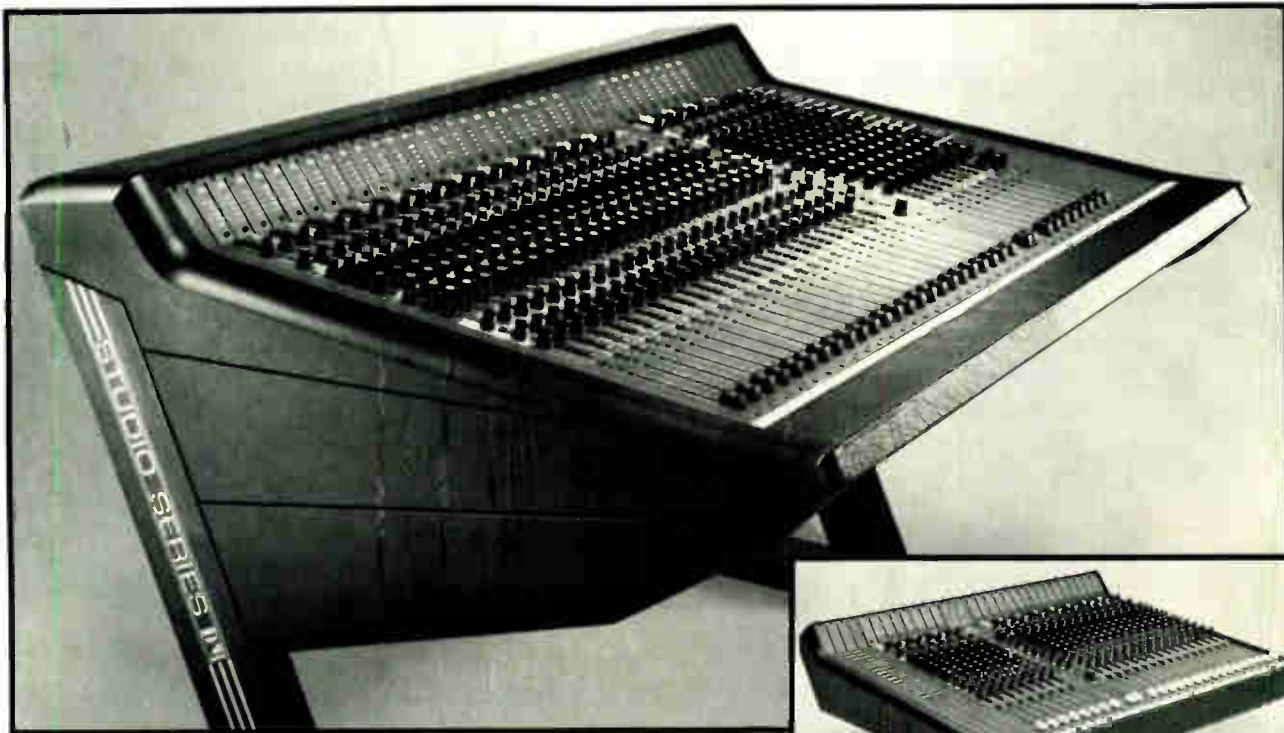
AKG is the focus of our attention here, in case you haven't guessed. AKG is fascinating because the company was ultimately responsible for introducing one of the most important innovations in capsule design, yet this is not well-known at all. AKG was noted throughout the '60s and '70s for the brightness of their microphones and their distinctly different color



AKG C-12 at left, Telefunken ELAM 251 (built by AKG)

BY STEPHEN PAUL

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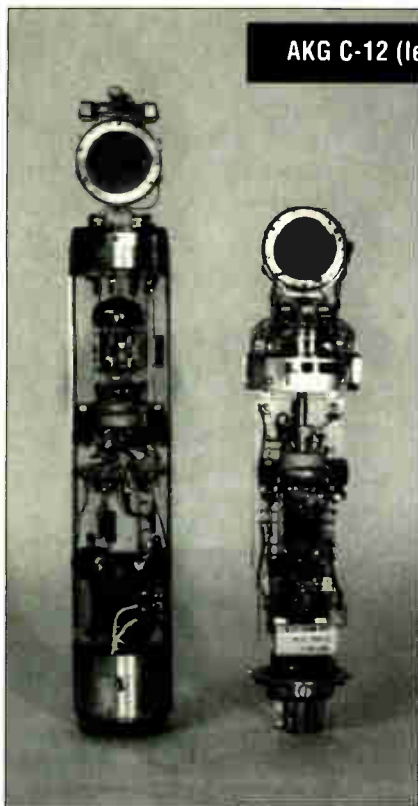
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World Radio History

AKG C-12 (left) and Telefunken 252, sans housings.



from those of Neumann. Let's have a look at some of these brilliant performers and try to discover some of the reasons they sound the way they do.

(As Richard Heyser once said, "It pains me to give away in ten minutes what took me ten years of work to discover," but what the hell, eh?)

The first of the AKG large-diaphragm, tube-equipped condenser microphones was the C-2, introduced in 1952. As with the earliest M49 mics, it was equipped with the Hiller MSC2 tube, the forerunner of the AC701. A year later, in 1953 (the glorious year in which the Corvette was introduced), AKG designed the C-12, identical to the C-2 in every way except for its 6072 industrial triode. This is an internationally available miniature twin triode tube and is still used in the currently available AKG The Tube microphone. However, when we restore or modify C-12s or 251s at Stephen Paul Audio, we equip the microphones with a 5751, a tube we have found to have preferable sonic characteristics—it is extremely quiet and consistent.

To understand the innovative AKG sound, we have to investigate the heart of the mic—the capsule. On page 94 we see a photograph of the CK-12 capsule in its original incarnation. The two

separated halves are shown next to each other. The unseen inner half has the round pattern of holes at a different location from the center, thus ensuring a minimum offset of 1.25mm between the inner sets of holes when the backplates are assembled. As in the 67 backplate discussed last month, this offset has a number of functions, one of which is to set up the delay of a wave traveling through the capsule. This delay must be tuned precisely to the same value as the diffractive delay around the capsule. In other words, when sound from the back of the microphone travels around the capsule and pressurizes the front diaphragm, the wave going through the capsule system must arrive at the back of the front membrane at precisely the same moment, in the correct phase relationship, in order to cancel sound coming from the rear. A small gap between the backplates, in conjunction with the offset of the holes, sets up this delay.

AKG was the first manufacturer to build a dual backplate design. If you recall from the 67 article, we discussed how the two electrodes also act as a lowpass filter and transform the microphone into an omni receiver above

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a certain frequency. This is so high frequencies will be picked up better when off-axis to the mic. The other advantage of the dual backplate design was that it enabled the polar pattern of the mic to be adjusted without changing its on-axis sensitivity. This backplate scheme was the invention of Mr. Kalusche and Dr. Spandock, two engineers from Siemens and Halske. It was patented in 1951, and the following year AKG modified the design and used it in the C-2. AKG's version of the device was patented in 1954. This became the basis for all subsequent CK-12 capsules until about 1981.

THE SECRET CHAMBERS OF THE KUNG-FU MASTER

If we really want to unravel one of the greatest secrets of the CK-12 capsule, we will have to travel down into the darkness of its secret chambers. Yes! Here, deep within the bowels of the electrode itself, we will find walls teeming with the hidden mysteries of Acoustical Design. These perforated sheets of brass, inscrutably performing their miracle of transformation, compress and reverberate the acoustic waves traveling through them in enigmatic and ineffable ways. And,

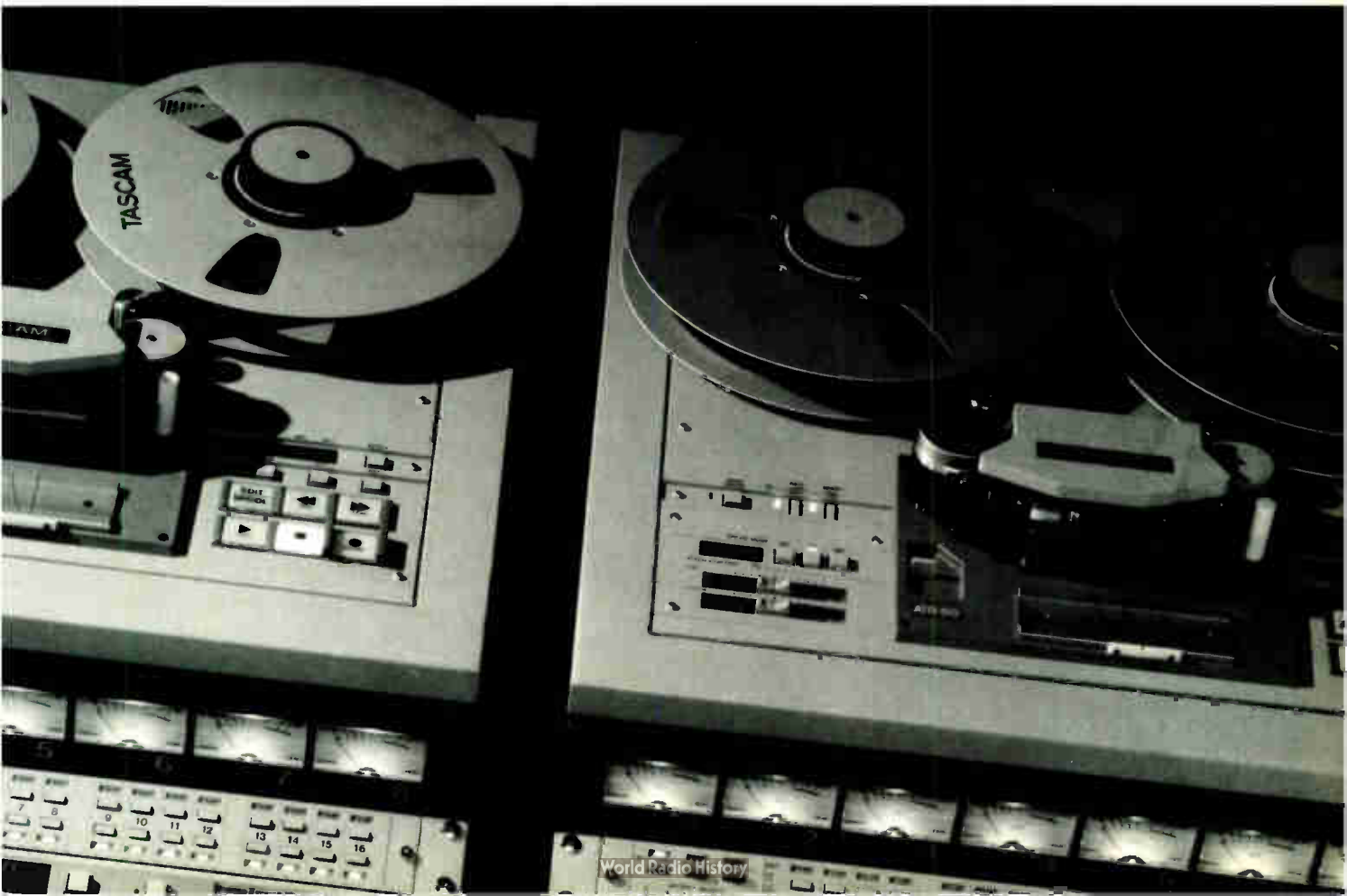
thus, we perceive the magical sound of the C-12 and 251. Actually, though it does get a little technical here and there, it is not impossible to understand some of how this capsule produces its unique sound.

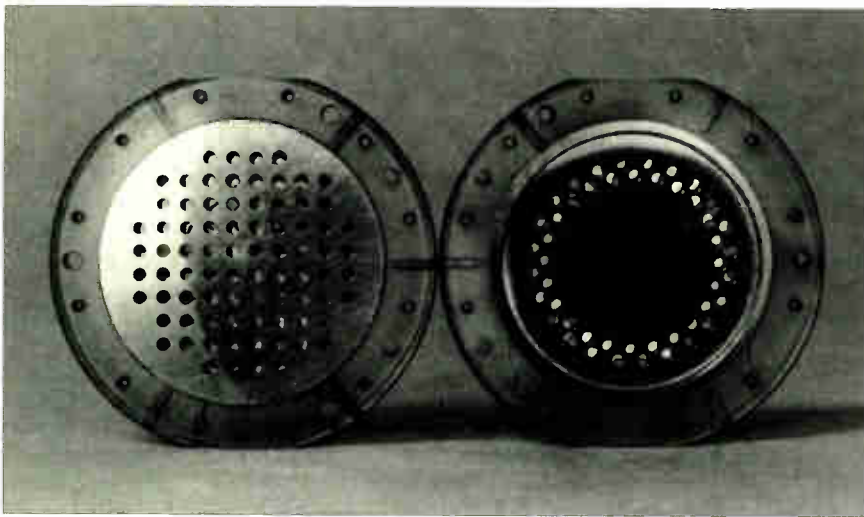
The two main schools of thought surrounding capsule systems have been called aperiodic and resonator-equipped. These are their incomprehensible names, passed down from High Priest to High Priest. Well, actually, it's almost that esoteric. I mean, just finding out about all this stuff took some serious Inspector Clouseau tactics. Let's hope they don't come after me for spilling the beans. Quick, before they realize it! Here's the story.

As we hack our way through the jungles of capsule design, keep in mind that there are many ways to skin an explorer. Without going over the high side, let's quickly review a couple of salient points about acoustical systems. When I first put on my Indiana Jones hat and sallied forth into the forest of design, I was amazed to discover that the languages of these vastly different cultures, Electronics and Acoustics, have a common ground called dynamical analogies. Very simply put, if we stick a hole in

something, its behavior in a sound field can be modeled by comparing it to various electrical elements. For example, a hole drilled through a piece of brass can be modeled as a resistance and capacitance (acoustical, in this case). Depending on the size of the tube formed by the hole's passage through the material, there's also a bit of inductance as well. (Again, this is acoustical inductance, of course.) Every hole, slot and chamber found in microphone design has its electrical equivalent circuit. If you can figure out what analogies apply to a given physical setup, you can model the capsule's behavior and get some idea of what it will do in reality.

In the case of the CK-12, there are a set of chambers behind the perforated surface that lies beneath the diaphragm. This is why in the photograph you can see that the pattern of holes on the outer surface is different from the round pattern found on the inner surface. In between these two walls is a chamber. This chamber has a resonance that falls within the audio range, thus creating a resonator-equipped design. It is interesting that Neumann built only aperiodic designs in its large-capsule format. Neumann





The AKG CK-12 capsule. AKG was the first manufacturer to incorporate a dual backplate design.

did, however, make use of the resonator design in its smaller mics, notably the nickel and aluminum diaphragm-types. Aperiodic designs feature elements (holes, slots, tubes, etc.) that are dimensioned in such a way that their individual resonances lie above the highest operational frequency of the capsule (also known as the boundary frequency).

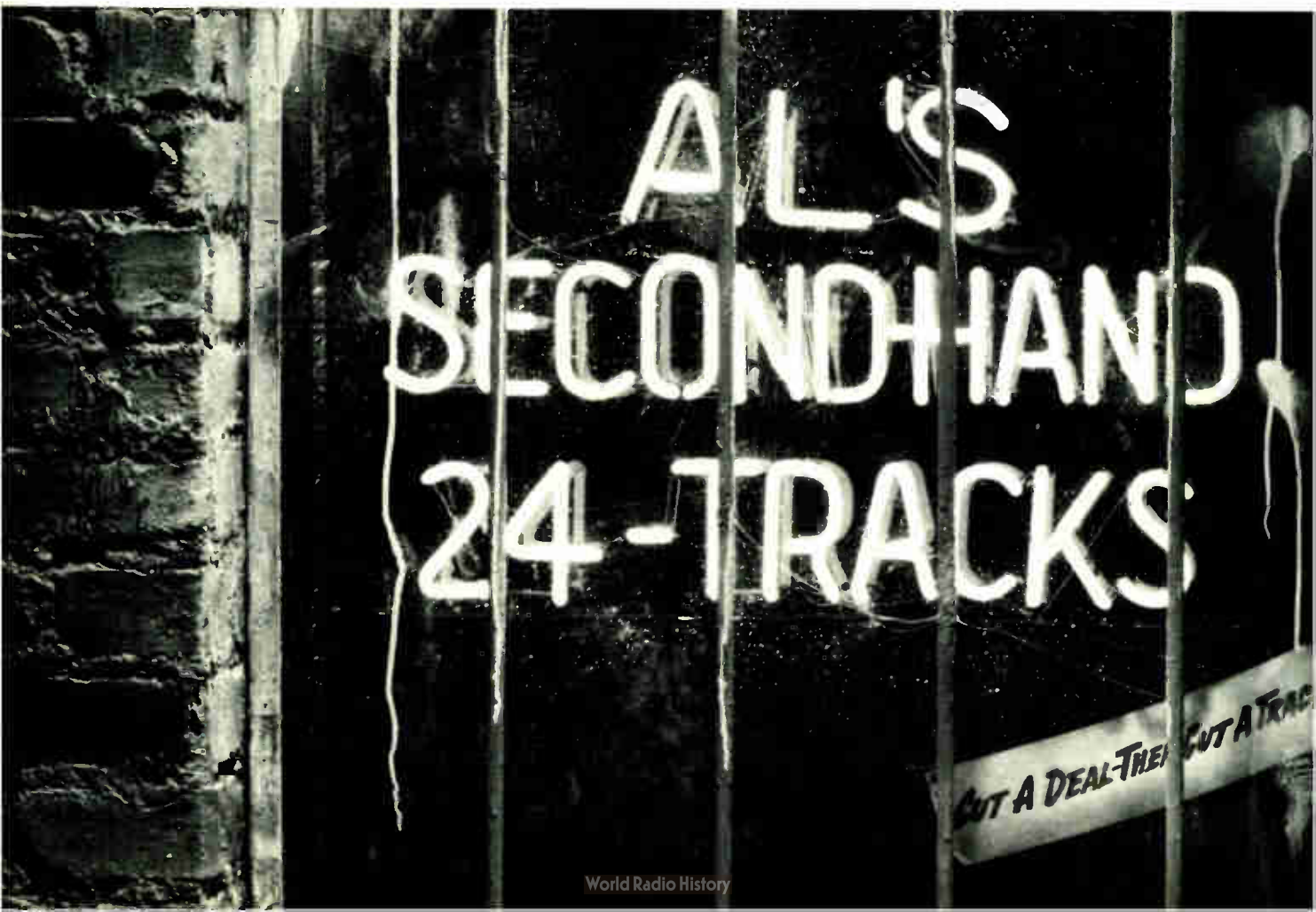
In the original AKG design, these chambers were very small, and their

resonance was fairly high. It almost qualified as an aperiodic design. A production change expanded the volume of this chamber, and this brought its resonance squarely into the high-frequency range. The fascinating thing is that the change was only made to increase the overall sensitivity of the capsule and not to adjust its frequency response. The additional rise in top end was considered a negligible side effect in those days. The engineers

wished to have a higher-sensitivity mic because FM broadcasting began, and with the improved specification for signal-to-noise, the mics were required to be quieter. To lessen the damping forces applied to the diaphragm, they increased the air gap behind it and enlarged the volume of the chambers. This bought them roughly a 3dB increase in sensitivity. In other words, the output of the mic for a given sound pressure rose by this amount.

Isn't this wonderful! For it's the sparkle and the edge that attract today's users to these products, and these characteristics were acquired quite incidentally. One of the other main differences displayed by the AKG mics that set them apart from the Neumann stuff is that Neumann put a screw in the center of their large-diaphragm capsules, and the membrane vibrates in the form of a ring. The free air resonance of the diaphragm is also set quite a bit lower than AKG's, and all of these considerations create a vastly different sound character.

AKG used a fairly tightly stretched diaphragm that was largely friction-controlled; Neumann tunes its diaphragm quite a bit lower and uses a



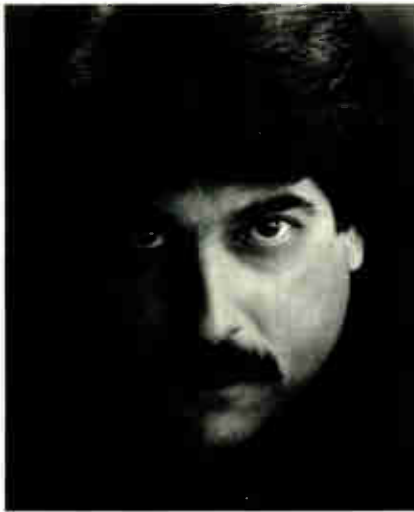
combination of friction and mass control.

WEIGHTWATCHERS STRIKES AGAIN

AKG has put its diaphragms on a diet several times over the years. The first generation of the CK-12 was made of 10-micron Styroflex plastic. The next generation was 9-micron mylar, and in the late '60s the design changed to 6-micron mylar. This was the last version available from the factory. We, of course, make this capsule available with films down to either 3- or 1.5-microns thick. As AKG found, when you lower the mass of the membrane, things really start to improve up top. Naturally, we aren't satisfied until we take things right to the edge, and when the CK-12 is equipped with these ultra-thin films, the transient response improves dramatically. Our modification also has a tendency to lower the "Q" at resonance, and this has the subjective effect of smoothing out the high-frequency range quite a bit. The thicker film has a tendency to be peaky in this area, and is a little edgier.

AND NOW, IN THIS CORNER, THE 251

The chronology of the more celebrated AKG mics might be of some interest



The author, up close and personal.

here, so let's look at the years in which our favorites debuted.

As mentioned earlier, the C-12 was introduced in 1953. It had a 10-micron capsule and a fairly flat response. The earliest versions were equipped with the original CK-12, which had the smaller chambers and therefore less sensitivity and less high-frequency rise. These first editions were also equipped with a large non-humbucking transformer that had a number of impedance options built in. The early power

supplies looked rather like large toasters, and the separate pattern control box was somewhat reminiscent of a Lionel train power transformer throttle. Ah, the good stuff, eh? The power connector also looked as though it was a refuge from a theater lighting setup, and the entire thing weighed about 25 pounds. A beige crinkle-finish paint completed the beautiful, solid look of these earliest systems.

Somewhere around 1959, Telefunken commissioned AKG to build a microphone that would be larger in diameter than the C-12 and would have the pattern control on the microphone itself rather than attached to the power supply. It has been rumored that this request was a result of Neumann's having decided to distribute its own product directly. In the past, Telefunken had distributed Neumann's microphones worldwide, and this is why some U47s say Telefunken on them. When Telefunken was left without a professional condenser microphone in its product line, the company contracted AKG to build the 251. Telefunken wanted it to be somewhat like the 47, so AKG came up with the 250. The 250 and 251 are

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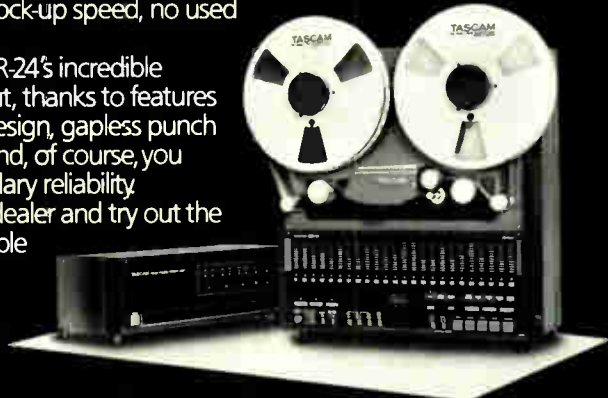
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essentially the same mic, the 251 having the addition of a figure-eight pattern.

The 251 also pioneered a pattern-switching scheme that Neumann would later use in the U87, that of insulating the two backplate halves from each other and switching them in various combinations to achieve the three major patterns.

There was a 251E in addition to the 251. The "E" stood for export, and this mic was delivered with the 6072 installed. The non-E version had the ubiquitous AC701 in it and could be used on the German airwaves. The tube in the 251 was inverted so that the pins were closer to the capsule. Unlike the C-12, which had a fairly long wire run to the tube, the 251 was set up to minimize the length of the leads to the capsule, thereby reducing the stray capacitance to the input stage and ensuring maximum output from the transducer.

In 1964 the C-12a appeared, and this was a radical redesign of the entire system. For one thing, the case was tiny compared to the C-12 or the 251, and the mic employed a 7586 nuvistator tube in a cathode follower configuration. The C-12a looked essentially like the 412 and the 414, with its angled grille and hand-sized body. The cathode follower circuit ensured very low distortion, but had the disadvantage of extremely low gain by condenser mic standards. It also had a relatively dense nylon mesh in the grille, which lent the top end a pastel character.

The C-12a was the last of the AKG vintage tube mics to be manufactured, and in 1971 the 412 was introduced, the first FET large-capsule mic from AKG. This was followed by the 414 and its subsequent additions, which have continued to this day. The construction of the CK-12 has been radically updated, and today the sound bears only a slight resemblance to the heyday of the hotsy-totsy, top-end screamers that made the tube systems so unique.

AKG has certainly "fixed" the problem of the top-end rise, but many of us feel that those problems are the essence of enjoyment for many artists. So we work hard to keep that old sound alive for the many who feel that there is no substitute for the kick-ass top end of these large-diaphragm, resonator-equipped beauties. The concession that we make to modernity is purely in the ultra-thin film of



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our version, which brings the mics into the '90s with killer risetime specs.

SO, WHAT SORT OF PICTURES DOES IT TAKE?

After all, we keep talking about this thin film we use... Sorry, couldn't resist. Actually, a little discussion of the relative merits and the subjective effect of these different models might be somewhat informative and throw some light on the more obscure aspects of these wonderful tools.

The C-12 is revered for its top end, strangely enough. It's funny—I've got a drawer full of the older type of small-chambered flat capsules, and I can't

give the damn things away! I've tried. I took one out of George Massenburg's C-12, and just for a joke, when George had me mod the mic with the 1-micron film, I stuck in one of the big chamber capsules with a 6dB rise at 12 kHz. I figured he'd hate it and ask me to make the mic more like it had been.

Well, it's a good thing that I don't speculate in the stock market! George discovered what so many others already had. The damn thing was fun! It looked like those backplates might not be coming back after all. I decided to go by the Complex and see what was up. I figured I'd better be sneaky

about it, so I pretended I was just there to visit Linda Ronstadt, who was recording the *Canciones* album with Shawn Murphy. Linda was using an early 1-micron 67 (the first ever commissioned, in fact), and I happily sat and listened to her incredible vocal work. I figured George, who was in the next room recording Toto, would eventually swoop in and hopefully tell me how awful the extra top-end on the mic was.

Well, sure enough, here comes our boy, and he be wagglin' his finger at me. The conversation went something like this:

"So, George, how's the C-12?" (Gulp!)

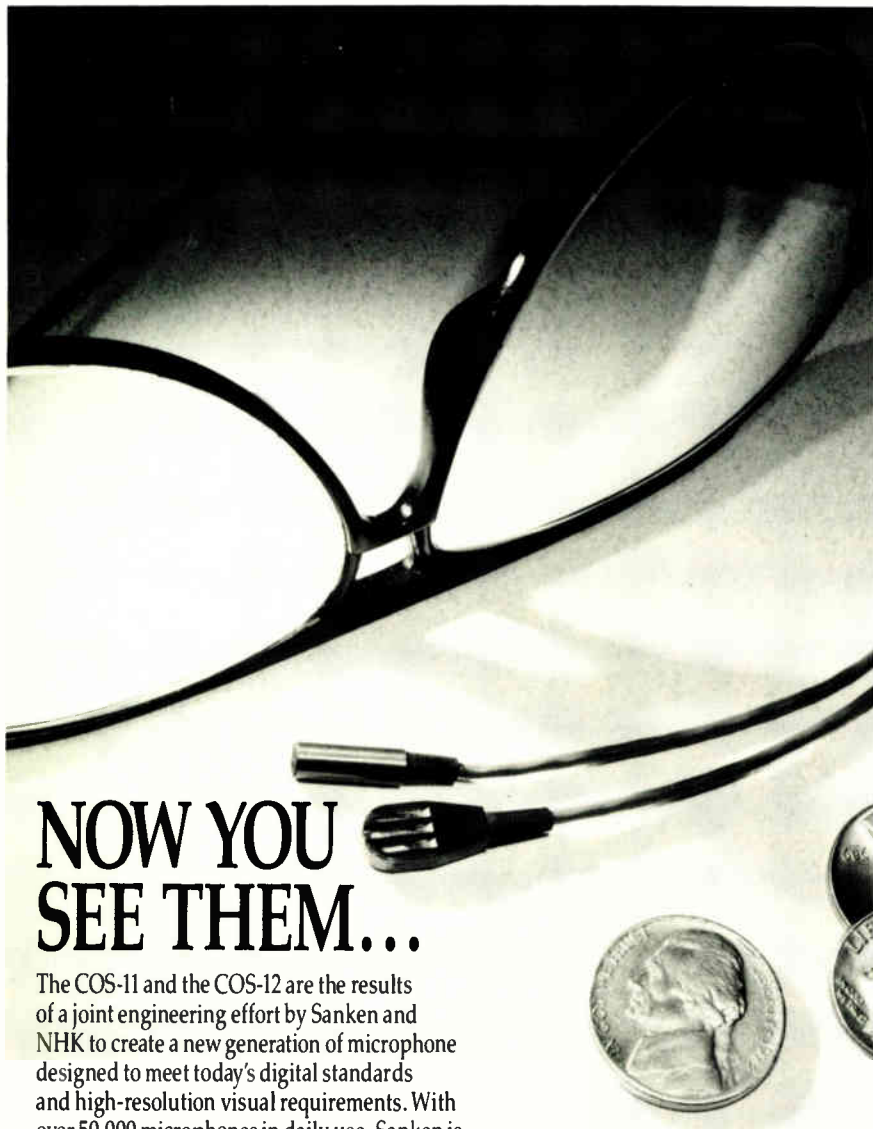
"Stephen, that thing is the best mic I ever heard in my life. I don't need any EQ on it. I just plug it in, go right to tape, and it sounds unbelievable. I don't know what you did, but whatever it is, you did it right. The mic is perfect!"

Normally, such high praise from someone like George would've warmed the cockles of my heart. In this case, my stomach sank. What was I going to say, "Sorry George, those aren't your backplates"? Yes, and another hard lesson learned in Hollywood!

Anyway, the point is, the C-12 is especially revered for its sparkle. The resonator system may not be as accurate technically (it has more overshoot and ringing than an aperiodic design), but it sure does produce the results. Use the C-12 on those vocals where you really want to capture the "air" and the silvery edge of a singer's voice. They are also wonderful overhead mics, as well as being quite killer on guitars, both electric and acoustic. Jackson Browne used a pair of 1-micron C-12s on acoustic piano on the *World in Motion* album with beautiful results.

The 251 has the same capsule with different circuitry and a very different grille and body. The grille has an additional layer of mesh internally, which tends to smooth out the high frequencies and adds a peak at 5 kHz. It also tends to make the resonance at 12 kHz a bit narrower. The 251 also was designed to have less bottom end, and rolls off starting at about 100 Hz or so, and this gives the mic a good characteristic for female vocals. Use the 251 when the C-12 sounds a little too strident but you still want that AKG sound. It's also quieter than the C-12

—CONTINUED ON PAGE 138



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NEWS

FROM AROUND THE WORLD



Studio Spotlight: Impressao Digital Studio

Brazilian producer/engineer Mazzola has completed work on his new facility, Impressao Digital Studios, in Rio de Janeiro. The 600-square-foot control room is fitted with a 48-channel SSL 4056 console with G Series Studio Computer and Total Recall, the first desk SSL has supplied to South America. The room is also fitted with Studer recorders, Westlake monitors and Dolby SR. The large, adjacent recording area has been designed to provide a variety of acoustic characteristics.

The facility is situated in a quiet, exclusive setting, while maintaining easy access to the amenities of Rio. A private suite is also available for clients.

The development of the recording industry in Sri Lanka began in the mid-'60s and fully blossomed in the early '70s. Before that people depended almost entirely on broadcast recordings by the Sri Lanka Broadcasting Corporation (then known as the Ceylon Broadcasting Corporation). In the mid-'60s a number of new Sri Lankan recording companies came into being. Prominent in this field was a company called Tharanga ("sound waves"), started by filmmaker Vijaya Ramanayake, who pioneered putting Sri Lanka's top musicians and singers on records. These artists were earlier known through the radio only among a limited group of music lovers.

Recordings on the Tharanga label brought serious Sinhala music to the masses and in the process earned money for pioneers like Ramanayake, as well as for the musicians and singers. Ramanayake helped bring the indigenous music of such artists as W. D. Amaradeva and Nanda Malani, two of Sri Lanka's foremost serious musi-

cians, to a new generation.

With the tourist invasion that followed in the '60s and '70s, there emerged a plethora of music based on Latin American rhythms. However, tourists preferred to hear local music set to faster rhythms. The result was the birth of Sinhala pop music, an entirely new market whose popularity was aided by the rapidly expanding audio cassette recording industry. In fact, "cassette fever" spread so fast that one street in central Colombo (the capital) was renamed Cassette Street. The young, high-profit cassette industry rapidly became a pirate's paradise, rife with mediocre product for an eager mass market.

One of the first Sinhala groups to develop an enthusiastic following in Sri Lanka was The Gypsies, five brothers who have been performing and recording together since 1976. The majority of their recordings are produced at their own Gypsy Recording Studio, which has been upgraded from its original single-track Revox

recording format to an 8-track Tascam system. The group is currently working on a new video release, following the enormous success of last year's cassette single "Lunu Dehi," which topped local sales charts at 140,000 units.

Among the other bright spots on the recording scene are the video and audio studios of the National Youth Centre. Considered Sri Lanka's premier recording center, the complex offers training in the music and recording field to young men and women from all over the country. All aspects of the business are addressed at this facility, including production, manufacturing and distribution of cassettes by its member artists, such as The Silveren Music Group and Selalininio.
—*Bede Perera*

SOLID STATE LOGIC OPENS LONDON OFFICE

Solid State Logic opened a London office earlier this year. Located at Paddington, London, the fully equipped service center is now providing spares and service backup to SSL product users. A demonstration facility is also being installed to provide user training close to London's studios. The office is also to be used for hosting client support functions and introductory demonstrations of SSL's product line.

NED ESTABLISHES LONDON SALES OFFICE

To better compete in the post-1992 unified European marketplace, New England Digital recently established its own sales office in London. New England Digital UK Ltd., with its staff of 12 sales, engineering and administrative personnel, now assumes direct responsibility for sales of the company's product line in the UK and management of its European distribution effort.

HNB ANNOUNCES NEW DISTRIBUTION DEALS

London-based audio equipment sales company HNB Communications recently concluded negotiations with three major players in the industry. A distribution arrangement with Solid State Logic is limited to broadcast versions of the company's SL 5000 Series consoles.

A new deal with Soundcraft involves HNB in sales of that manufacturer's full range of specialist broadcast con-

soles. With HNB's video product portfolio, based largely on an extensive range of Sony U-matic SP and Betacam SP equipment, the inclusion of the Soundcraft 200BVE is noteworthy. The latter is designed for the video post-production environment, offering serial interface capability to most video edit controllers.

Finally, U.S. signal processor manufacturer Eventide has appointed HNB as a main distributor in the UK for its product line.

AUSTRALIAN RECORD COMPANIES ORGANIZE

The seeds for a new organization, the Australian Independent Music Association, were planted earlier this year when representatives of more than 40 record labels and distributors met in Sydney and Melbourne. Formed to lobby government for more favorable indy legislation, to promote a wider awareness of the independent industry, and to obtain funding to increase the amount and quality of independent Australian recordings, the organization is intended to give a voice to local Aussie recording artists.

One of A.I.M.A.'s first projects is a poll of independent labels regarding their financial/tax/export status, which will give a more accurate picture of

INTERNATIONAL STUDIO NEWS

London's **Lansdowne Studios**, part of the Lansdowne Group of companies, has ordered a Neve VP audio mixing console, the first to be commissioned in the UK. The installation, which was scheduled to be completed in November, would enable Lansdowne to provide music recording, Dolby Stereo film mixing and audio-for-video post-production. Among the Neve VP's features are complete recall and Flying Fader automation. In other Lansdowne news, 1½ acres of prime real estate has been purchased by that company adjacent to its **CTS Studios** in Wembley. . . Digital Audio Research has sold a 4-channel SoundStation II digital audio recording and editing system to **Pelican Studios** in London. Pelican specializes in audio post-production for film, TV and corporate video work. . . In other London news, **Berwick Studios** has opened its new programming suite, which is complete with a DDA D Series desk, an Otari 24-track recorder and a plethora of MIDI instruments and outboard gear. . . **Pinewood Studios** has ordered a Solid State Logic SL 5496 M Series post production console for one of its two dubbing theaters. Located in Bucks, UK, Pinewood has hosted many major feature films, including *Hope and Glory* and *Licence to Kill*. . . Sales of Mitsubishi X-880 32-track re-



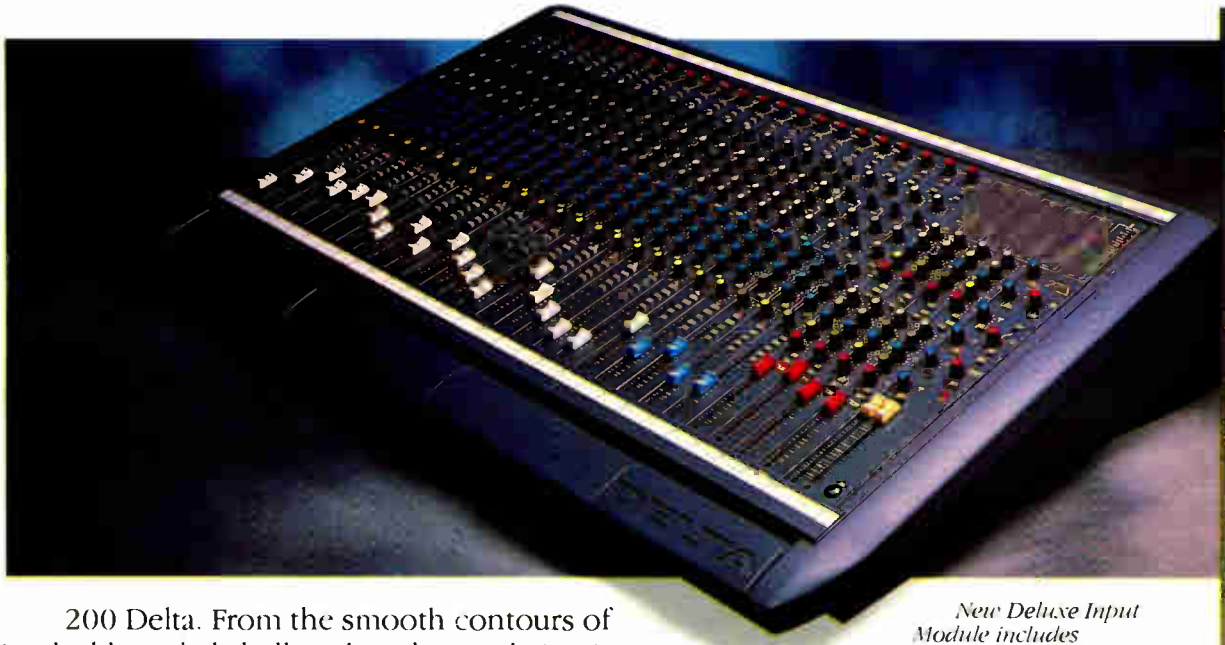
Sri Lankan Sinhala group, The Gypsies.

the magnitude of the independent side of the industry. Plans are also underway to establish a meaningful and broadly based Australian Independent Music Awards event.

orders continue at a rapid pace, including recent orders by **Morning Studio**, **Nuovo Fonit Cetra** and **Water Melon Studios**, all in Milan.

—CONTINUED ON PAGE 146

Engineered For Those With A Passion For Performance.



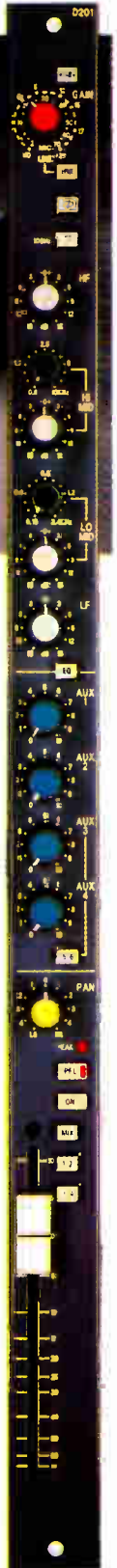
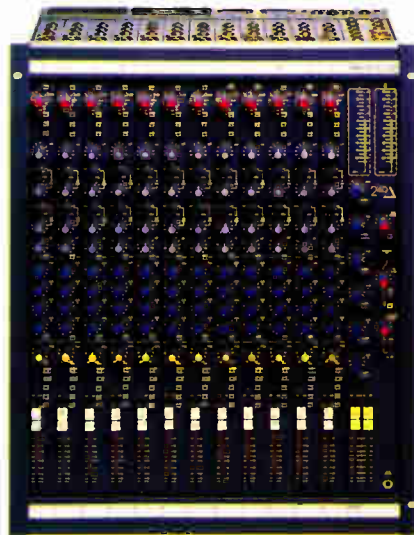
200 Delta. From the smooth contours of its sleekly styled shell to the advanced circuitry that delivers unprecedented performance, Delta is the compact console of the nineties. Expanding on the modular versatility of its 200 Series predecessors, Delta incorporates many innovations unique to Soundcraft. Advances in low profile console design that go well beyond the obvious restyling.

Delta delivers superb sonic quality, with an improved electronic design that incorporates a new microphone preamp and active panpot. And, because Delta selectively bypasses any circuitry not in operation, you can be assured of optimum transparency.

Delta delivers unmatched versatility and control. With Standard, Deluxe, Stereo and Dual-Line Input Modules, Delta can meet a wider variety of applications. By adding up to four Group Modules, configuring just the right console for your application couldn't be easier.

200 Delta. Engineered for those who hunger for perfection.

New Deluxe Input Module includes expanded 4-band EQ with two mid-sweeps, high pass filter and post-fader direct output. The rackmount Delta, shown below in a 12x2 version using Deluxe Inputs, can be expanded to 24x2 using Dual Line Inputs. Both the streamlined consoles and rackmount models are built to withstand the demands of recording and sound reinforcement.



Soundcraft



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World Radio History

—FROM PAGE 46, MASTER MINDS

Two major mastering houses in San Francisco, Sonic Arts and Fantasy, both relish cutting large amounts of high-quality LPs. Ken Lee of Sonic Arts has seen a drop-off in demand for 7-inch singles but not for the 12-inch format. "I think I saw an RIAA survey about album sales dropping off 33 percent or some outrageous figure," Lee notes, "but we still do as much LP and 12-inch single mastering as we did last year and the year before."

Ditto down in Nashville. At Disc Mastering, Randy Kling has "cut more acetates in the last eight months than in the past two years, and I attribute that to the quality that a record gives. I could see the writing on the wall when F1 and CDs started coming in and that lathe used to sit there for days at a time. Not these days. I don't know if it's territorial, having to do with being in Nashville, but there is a market for vinyl. I've cut for over 20 years, and I'm proud to be cutting analog records from digital sources. As more equipment comes in, the possibilities of what can be put into those grooves are great. We get beautiful, flawless records, and hopefully the vinyl LP will see a resurgence."

In Hollywood, 75% of Bernie Grundman Mastering's clients continue putting out vinyl, as opposed to almost 100% two years ago. Likewise, at nearby K-Disc Mastering, the percentage of clients still doing records is 75% to 80%, notes Bill Lightner, while about two years ago "it was well into the 90s." Yet, these days Lightner is noticing a trend in LPs containing "longer and longer sides. If an artist makes a 70-minute CD, they want to make a 70-minute record. We can accommodate that to some extent by cutting for vinyl production using the Direct Metal Mastering process, which lets us cut longer sides. This allows the vinyl customer to get as much of the music as possible.

"I think the folks in the record pressing business are making records with a little more care than they used to," Lightner adds, "because the pressure of quantity is off. Records today, even if they might be cut less hot, are turning out to be a better product than they were when we had to press a million." ■

Mix assistant editor Linda Jacobson also runs *Wordswork*, an audio writing/editing service based in San Francisco.

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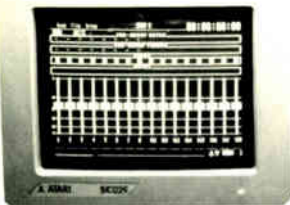
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NEW PRODUCTS

ARX MULTI-Q PARAMETRIC EQUALIZER

This new audio equalizer from ARX Systems (Silverado, CA) features a unique internal patching system that allows the user to access and series connect up to six channels of parametric EQ. The Multi-Q can be configured as six 1-channel EQs, two 3-channel EQs or as a 2-channel and a 4-channel EQ, without the need for patch leads. Features include: balanced TRS connectors; frequency variable from 40-16k Hz; bandwidth variable from three to one-twentieth octaves; ± 15 dB cut and boost; and clip LED. The Multi-Q is housed in a single-space, steel-chassis rack enclosure.

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J.L. COOPER MAGI II AUTOMATION ▲

The MAGI II system from J.L. Cooper Electronics (Marina Del Rey, Calif.) interfaces with any mixing console to provide SMPTE code-locked fader and mute automation. The disk-based system consists of rack-mount dbx VCAs, the MAGI II controller unit, MAGI remote fader unit and software (for Apple Macintosh or Atari ST computers). Available



NOVATION ALPHA CONSOLE ▲

Alpha, from Novation International (Cambridge, England), is an assignable, digitally controlled, analog mixing console featuring 999 snapshots, total dynamic automation of all console functions and complete offline mixing manipulation. The board has 32 channels, 32-track routing and 32 monitor inputs, along with eight aux sends configurable as mono or stereo. With its in-line architecture, 72 inputs on mixdown take up just 61 inches of space, and the whole desk is light enough to be moved easily

by two people. All audio electronics are contained in a remote rack unit.

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PASSAC UNITY-EIGHT MIXER

Making life easier during live performance on or off tape, Passac Corp. (Milpitas, Calif.) presents the Unity-Eight, an 8x4 line mixer with two stereo sends and returns for external effects. The rack-mount unit uses just one rack space, boasts impressive specs and channel controls include volume, pan, effects level 1 and effects level 2. Its balanced stereo output is direct; the unbalanced stereo output is intended as a monitor out and is gain-adjustable from the front panel. The two effects loops each have stereo sends (pre-fader) and stereo returns, with a fixed pan for each input channel. The mixer retails for \$524.95.

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MUSICALLY INTELLIGENT CONSOLE AUTOMATION

The MegaMix InBoard Series automation system from Musically Intelligent Devices (Bohemia, NY) incorporates software and VCA fader modules permanently installed in the console, providing typical fader and mute automa-

tion, "MegaGate" recallable, automated signal gating and a dynamics section on each channel. Channel gate modes include: Local (traditional gate, except all parameters can be automated in real time), Recorded (gate events can be edited) and Matrix (channels can be set as masters and/or slaves on a hard-wired bus with multiple masters/slaves assigned to matrices for ducking or external keying). The system runs on the Macintosh or Atari ST computer.

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SPECK SSM SYNTH MIXER ▲

Synth players and MIDI studio types are being addressed by Speck Electronics (Fallbrook, Calif.), which developed the rack-mount Model SSM Synth Supermixer. The mixer is said to be virtually transparent to the audio chain (with a stated bandwidth of 12 to 160k Hz), and each input channel offers eight stereo effects sends, parametric EQ, stereo in-place solo, mute and kill switches ("kill" disables the dry signal but doesn't affect the effects send) and signal-presence LED. The eight effects channels each have master-level send control with solo switch, stereo return level, pan, and return mute and solo switches. The output section provides two stereo



in 16, 32, 48 and 64-channel configurations, MAGI II also generates and reads time code. Features include: fader read, write and update modes; fader subgrouping; time code synchronization using one track; automatic disk archiving; start and end anywhere in mix; moving-fader computer graphics; no cumulative delays; automation memory of record and plenty more.

Circle #181 on Reader Service Card

output buses (program, monitor), effects return group master control, output for sending signal to a tuner, and headphone and transmitter outputs. An input for a stereo expression pedal allows the mixer's output level to be adjusted remotely. Model SSM is available with 12, 28 and 44 inputs; the 12-input main unit retails for \$3,925, each 16-channel expander unit is \$3,300. Options include rack-mount hardware that allows the mixer to slide in and out of the rack and tilt into various positions when in use.

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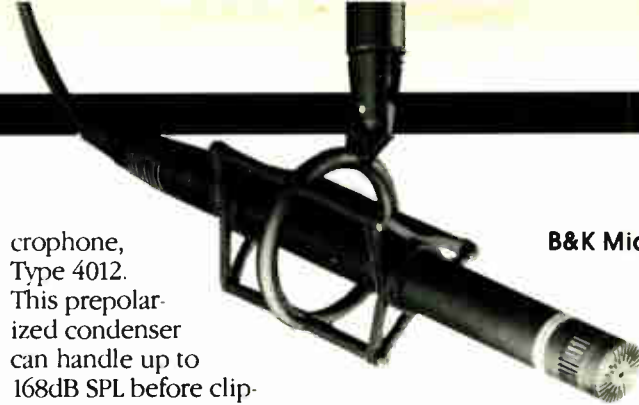
B&K CARDIoid MICROPHONE

The latest from Bruel & Kjaer (Marlborough, Mass.) is an all-new cardioid mi-

crophone, Type 4012. This prepolarized condenser can handle up to 168dB SPL before clipping. The flat, wide, on-axis response works with the smooth off-axis response to achieve ultra-high fidelity. Each mic is individually calibrated at the factory. Other features include high output level and ability to drive extremely long cables without noticeable signal loss. The 4012 is powered from the B&K dual-channel power supply, Type 2812, which supplies 130V to the 4012's preamp. Supplied with the matte black-anodized microphone is a windscreens and microphone clip.

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B&K Mic



DORSEY SONIC BOON SFX

A new approach to sound effects libraries has been taken by Dorsey Productions (Anaheim, CA). Each volume in the company's series of Sonic Boon digital sound effects libraries concentrates on a single type of effect, offering hundreds of variations. Volume 1, "Dynamic Range," provides gun shots from 22 different weapons and related effects, including gun handling, ricochets and silencers. Available in DAT format and on optical disc for use with

NED's Synclavier (CD format to be released soon), the fully documented Sonic Boon library will grow by three volumes annually. Sounds on the optical disc version are fully captioned, categorized stereo samples at 50 kHz or better, complemented by ready-to-use Synclavier keyboard patches.

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ARIEL DIGITAL MICROPHONE FOR THE NeXT

Ariel Corp. of Highland Park, N.J., has developed the world's first microphone based completely on digital electronics. It only works, however, with the NeXT computer. The DM-N digital mic captures stereo analog signals (voice, music) and uses

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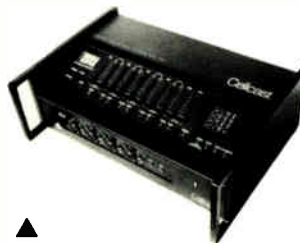
two Motorola 56ADC analog-to-digital converter chips to digitally encode the signals for the NeXT system to analyze, modify and/or store on disk. The mic also includes line input jacks for directly accessing the ADCs and an LED signal meter is built into the mic body. The DM-N is available direct from Ariel for \$595. The company is also planning to come out with a version having AES/EBU digital outputs in the near future.

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HOT OFF THE SHELF

FM Tubecraft's Home Studio Furniture Line comprises 12 different models with such options as drawers, sliding shelves,

mini-racks, etc.; call for free brochure, (516) 567-8588. . . **Pivotelli/USA's "Double Pivotelli"** wall-mounting support system for video and audio monitors provides optimum viewing/listening in L-shaped and adjoining rooms, and is available in various sizes; call (800) 548-5040 or (617) 391-4097. . . **Audio Kinetics' Motionworker Interface** allows the integration of SSL console automation, MIDI equipment and AK's machine controllers/synchronizers; call your local AK dealer. . . **Media One Productions' Basic Multitrack Recording Tips** (\$29.95), the first in a series, is a video that focuses on basic techniques, from connecting instruments to the final mix; call (404) 977-0988. . . **Tri-Tech's**

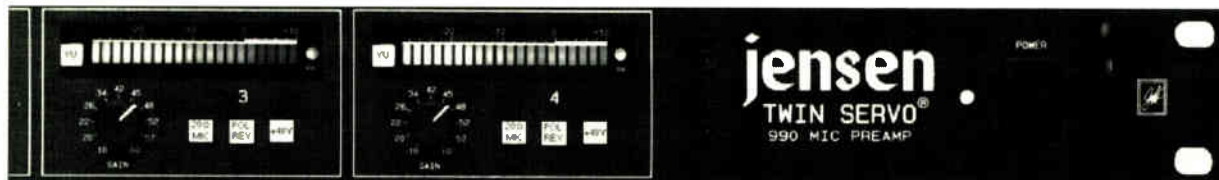


▲ **Cellcast Remote Broadcast Studio** combines the functions of an 832-channel cellular telephone with a 4-channel mic/headphone mixer, eliminating the need for telephone line access while providing remote broadcasting from any cellular service area; call (800) 852-1333 or (918) 425-5588. . . **NED's Release 2.1** is new Macintosh-based software for the PostPro and Direct-to-Disk™ systems, and provides many new audio editing features, including intuitive EditView editing;

call (802) 295-5800. . . **Twelve-Tone's Cakewalk 3.0** (\$150) and **Cakewalk Professional** (\$249, includes programming language) sequencers for IBM and compatible computers offer new features such as standard MIDI file support, enhanced track-looping, "fit improvisation" command, track view parameter and more; call (617) 273-4437. . . **Mark of the Unicorn's Performer Sequencer Ver. 3.2** (\$495) offers a graphic sequence chaining feature and remote control; call (617) 576-2760. . . **Opcode's Korg M1 Synth Editor** (\$249) for the Macintosh includes five integrated editors for different aspects of the M1; call (415) 321-8977. ■

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by George Petersen

PRODUCT CRITIQUES AND COMMENTS

BARGAINS: GREAT GIFT IDEAS FOR STUDIO DENIZENS

Well, here it is December already. The holiday season is upon us, and there never seems to be enough time to find the perfect gift for your studio-minded pals, clients, bosses and other

deserving folk. Please, no more bottles of cheap wine with a stamped label that says: "From the Personal Cellars of. . ." Let's try something different this time. With that in mind, here's my personally approved list of gift suggestions that should bring a smile



ILLUSTRATIONS: TIM GLEASON

to any audiophile. Priced from about a quarter to about a quarter-million dollars, these also neatly fit into nearly anyone's budget.

Tape editing sessions can often be a frazzled, mind-numbing experience, so Techworks' "The Hook" offers a quick solution to such nagging existential dilemmas as "Where do you put the roll of leader tape when editing?" and "How about a handy place to temporarily store flanges?" Made of sturdy, nickel-plated steel and priced at only \$12 (plus \$2 shipping), The Hook attaches to the edge of any smooth surface via Velcro-style fasteners, for easy removal or 90-degree rotation to serve as a tape reel spindle. A great stocking stuffer. Techworks, 61 Elsie Street, San Francisco, CA 94110; (415) 285-6071.

All right, let's get a little more serious. *Building a Recording Studio*, by Jeff Cooper, is just the ticket for anyone who's considering such a project. This 209-page text, written by the master acoustician/architect who has designed rooms for clients such as Lucasfilm, MCA-Universal Studios and Capitol Records, is a superb overview of the principles involved, with an emphasis on providing useful information in a highly readable, easily understandable format. Topics covered include acoustical basics, soundproofing (including ratings and comparisons of various wall constructions), basstraps, floors, and practical considerations of studio and control room design. Whether your studio budget is small or large, this book could save you thousands and is \$30 well spent. Highly recommended. Available through Mix Bookshelf, (415) 653-3307 or (800) 233-9604.

At \$69.95, the Prosonus SRD Studio Reference Disc is a gem of an audio tool, providing a wealth of studio test tones on compact disc. It's portable, a breeze to use and quite comprehensive, including 30/60-second sine waves (from 15.525 to 16k Hz), pink noise, white noise, bursts, TEF® and ETC sweeps, music pitch references, and much more. I've been using one for about six months now and don't know how I ever got along without it before. Do yourself a favor and pick one up: SRD may be your best audio investment of 1990. Prosonus, 1616 Vista Del Mar, Los Angeles, CA 90028; (213) 463-6191.

With a suggested retail price of about \$70, the Whirlwind Cable Test-

er is another winner. This battery-operated, handheld unit tests XLR, 1/4-inch and phono cables for shorts, open circuits, and phase reverses via a simple LED display. Its hands-free operation allows you to bend and manipulate cords to check for intermittent connections, which is a not-too-fun procedure with an ohm meter and a couple of test leads. Decidedly utile. Whirlwind, 100 Boxart Street, Rochester, NY 14612; (716) 663-8820.

Nothing's more expensive than that rarest of commodities: control room space. And with studio construction



costs that can easily exceed hundreds of dollars per square foot, I'm always amazed when I see valuable floor space taken up by bulky synthesizer stands in the control room. There's nothing wrong with bringing in a floor stand or two for those occasional complex MIDI sessions, but there's no excuse for having these as part of a permanent setup. Standtastic offers a sensible alternative: Its Wall Mount Kit (\$139.95) is an adjustable system containing two wall-mounted rails along with a set of 45- and 90-degree arms that accommodate standard synthesizers. I bought a system (along with an optional extra set of 45-degree arms) about a year ago and have been quite

happy with the results. I made a plywood shelf that fits on the 90-degree arms (this supports two drum machines and a half-rack synth module), with two keyboards mounted above it. Delightful. Standtastic, 1325 Meridian Street, Anderson, IN 46016; (317) 642-5205.

Here's a hot tip for those of you who have been disappointed with the tracking performance of most MIDI guitars: Check out the Suzuki XG-1M. It's not new; it's got rubber bumpers instead of strings on its one-octave fretboard; and its mostly plastic construction does not inspire confidence when operated by a heavy-handed player. But it tracks about as fast as you can play it (thanks to those rubber fret sensors) and at \$199, it's definitely priced right and is downright amazing. Suzuki Corporation, PO Box 261030, San Diego, CA 92126; (619) 566-9710.

No, it's not just for studio couch potatoes—the TB-4 Communicator is a marvelous concept, bringing wireless infrared switching to almost any console's talkback circuit. This \$395 system includes an easily installable receiver and a compact transmitter (NiCad batteries and charger included). An inset control on the transmitter allows a choice of four different switching functions: headphones, headphones & speakers, speakers, or auxiliary, which could be anything from room lights to the studio coffee pot. Clever. Brainstorm Electronics, 1515 Manning Avenue #4, Los Angeles, CA 90024; (213) 475-7570.

When you think of studio monitors, certain well-known names usually come to mind, and Toa is probably not one of them. This is unfortunate, because the Toa 280 ME monitors (\$499/pair) are nothing short of amazing. This 3-way system with 8-inch woofer, dome tweeter and supertweeter—the latter kicks in at 15 kHz!—exhibits a surprisingly flat response (perhaps a little bright on the absolute upper end, but a HF attenuation control allows you to tailor this to your ears) and superb translatability to other systems, large and small. I've had great results mixing on these over the years (I recently bought a pair of the new mag-shielded version, model 280 ME/AV), and if you're looking for an inexpensive, wonderful reference monitor, you should give these a listen. Toa Electronics, 601 Gateway, South San Francisco, CA 94080; (415)

HITMAKERS

DON HENLEY and AKAI

The Akai MPC60 was a key ingredient in the making of Don Henley's hit album, *THE END OF THE INNOCENCE*. Both the MPC60 and the Akai S1000 Digital Samplers have been crucial to reproducing that sound on stage.



The Akai S1000PB is now available. The S1000PB



is a playback-only version of the S1000. Most options for the S1000 are also available for the S1000PB.

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World Radio History

588-2538.

Its pint-sized, half-rack package may fool you, but the performance of Lexicon's LXP-5 stereo effects processing module is definitely big time. The LXP-5 offers 128 user sounds and 64 factory patches, including reverb, chorusing, flanging, delay sweeps and pitch shifting—all accessible and/or editable from the front panel or via Dynamic MIDI® using Lexicon's MRC controller (Version 3.0) or external MIDI commands. The pitch shifting covers a three-octave (+1, -2) range and is outstanding. The unit would easily be worth its \$549 price if it offered only this feature, but when you add the LXP-5's wide range of other top-notch effects, the unit is quite a bargain. Yow! Lexicon, 100 Beaver Street, Waltham, MA 02154; (617) 891-6790.

At \$699, ART's SGE Studio Super-Effector brings all the fun back to being a guitar player, offering analog distortion and a host of other programmable stereo effects in a single rack-unit box. SGE can shift you from massive crunch to mellow jazz with the touch of a button, offering 200 presets (100 factory/100 user) with up to nine simultaneous effects, including two-octave pitch shift, compression, gating, 3-band EQ, reverb, delay, panner, compressor, limiter, expander, exciter, flange, wah-wah (envelope filter) and more. It doesn't stop there, as SGE is also MIDI controllable and also works great with synths and samplers, transforming even the wimpiest patches into monster sounds. Applied Research & Technology, 215 Tremont Street, Rochester, NY 14608; (716) 436-2720.

Do your 2-track a favor and get yourself a Dolby Model 363 rack with a couple of SR/Dolby-A or SR-only cards. Priced at \$2,995 and \$2,655 (respectively), you can't lose either way, and that analog tape machine of yours will appreciate the high-performance turbo boost that Spectral Recording delivers. Since an SR-equipped system is capable of delivering typical dynamic range specs in the 95 to 104 dB range, I've heard that some studios are even using this as a cost-effective way to offer DAT editing services. Get a 363: Your analog mixes will sound better than ever, your clients will love it, and your 2-track will always be grateful. Dolby Labs, 100 Potrero Ave-

nue, San Francisco, CA 94103; (415) 558-0200.

If there's that certain someone on your gift list that you really need to impress, nothing does it quite like Sony's PCM-3348 48-track DASH digital recorder. At a list price of \$240,000, it's not exactly what you (or anyone else) would consider cheap, but just imagine the smiles on the kids' faces when they see what Santa left under the tree on Christmas morning. Thanks, Dad! Sony Professional Audio Division, 1600 Queen Anne Road, Teaneck, NJ 07666; (201) 833-5745.

Somewhere near the beginning of this essay, I promised to let you in on a great 25-cent gift item, and I won't let you down. 3M's Model 6300 are disposable foam ear protectors that provide 31 dB of broadband attenuation: enough to bring that deafening 120dB concert down to a sensible 89 dB! Available through Mix Bookshelf [call (800) 233-9604] at only \$10 for 20 pairs (only 25-cents each), these are a sensible precaution for anyone who cares about his or her ears. Better still, let's all make a resolution for 1990 to TURN IT DOWN! Take care of your hearing: As an audio pro, it's your most important asset, and once it's gone it may be lost forever.

Last but not least is an invaluable problem solver that for some time has occupied a place of honor on the table next to the producer's couch in the back of my control room. We refer to it as "The Producer," but the rest of the world knows it best as the "8-Ball Fortune Teller." A popular fad in the late-1950s and early 1960s (and still in production), this 4-inch diameter 8-ball offers predictions such as "Signs Point To Yes," "It Is Certain," "My Sources Say No" and "Reply Hazy, Try Again" that are printed on a floating dotriacontagon within the unit. Of course, nobody takes this too seriously, but it's often useful when the client/producer/artist/etc. can't make up their mind about a take. On a related note, I've recently heard rumors concerning a special studio version whose replies include "More Bass," "Try It Again, With Feeling," "Fix It in the Mix" and that classic session response: "I Don't Know. . . What Do You Think?" Stay tuned, we'll keep you posted. ■

Mix products editor George Petersen operates a Third-World class recording facility in the San Francisco Bay Area.

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- George Petersen, *Mix Magazine*
(see review in March issue)

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by Paul Potyen

DIGIDESIGN'S SOUND TOOLS

Sound Tools is a professional audio package of software and hardware components by Digidesign (Menlo Park, Calif.) that turns the Macintosh into a CD-quality, digital stereo recording and editing system. The primary software component is the popular *Sound Designer II*. On the hardware side, the Sound Accelerator digital signal processing card and the AD IN analog-to-digital converter make up the main elements of my version of Sound Tools. The company has started shipping its DAT I/O Bi-Directional

stall sound into *HyperCard*, are both included with every Sound Accelerator card. The Sound Tools package also includes a new application called *Sound Access*, a HyperCard stack that allows the user to trigger playback of stereo 16-bit sound files directly from the Mac, using simple HyperCard commands.

For this evaluation I used a Mac II equipped with 2 MB of RAM. The system works with a Mac SE, but its features are limited by a sample rate of 32 kHz, and Digidesign suggests that

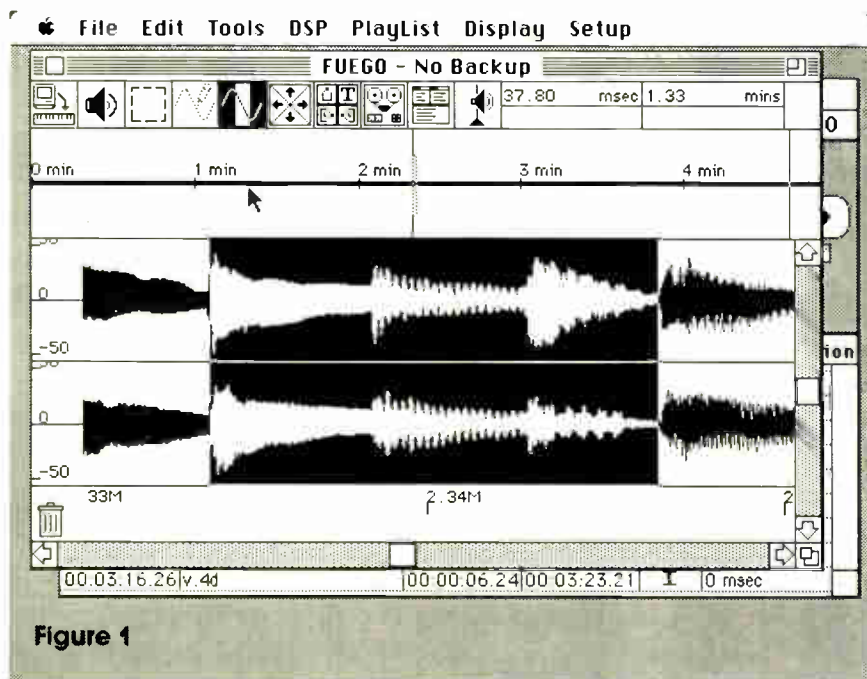


Figure 1

Digital Interface, which can be used with or instead of the AD IN unit in a possible digital configuration of Sound Tools.

Each component may be purchased separately, but together they provide a powerful and useful package. In addition, *Softsynth*, a sophisticated, digital additive synthesis program, and Sound Installer, an application to in-

pro users will want a Mac II with at least 2 megs.

I popped the top of the Mac, installed the Sound Accelerator in its proper slot (a simple job), mounted the 650MB internal hard drive and buttoned up the unit. After connecting the AD IN box to the Sound Accelerator board, I was ready to install Sound Designer II (SDII). The pro-

gram is copy-protected and allows a maximum of two installations from the original program disk.

TALK TO A NAKED SAMPLER

Before jumping into the world of hard disk recording, I decided to get my feet wet by getting SDII to talk to my Roland S-220 sampler. From the setup menu you can choose from a list of virtually all the common samplers, and can connect to many samplers at once. However, each manufacturer has its own communications protocol, and in the case of my sampler I had to change the device ID on the Mac to 2 when I wanted to transfer samples between the SDII and the S-220, then change it back to 1 when I wanted to use SDII's MIDI keyboard to play the sound loaded in the sampler. Digidesign's chief engineer and Sound Tools designer Evan Brooks explains that this is unavoidable, and he and others at Digidesign were very helpful in ironing out this and other small problems I encountered. Once this puzzle was solved, I found recording, editing and transferring sounds to be a breeze.

SDII is quite intuitive for a program this powerful. Users of earlier versions will recognize most of the icons that appear when you launch the program (see Fig. 1), with the exception of the tape deck, playlist and HD play/scrub icons (more about those later). Sound Designer is to waveform editing what *MacWrite* is to word processing. The palette of tools is substantial, including not only the normal cut, paste and copy commands, but also replace, reverse, silence, trim, invert, fade in, fade out and more.

HARD DISK RECORDING FOR THE REST OF US

Having experienced the thrill of victory after connecting SDII to my sampler, I advanced to the heady, data-intensive world of hard disk recording. A local independent record company had been asking for master-quality recordings of some of my solo piano pieces, and this field test offered an excellent opportunity.

It was obvious that the Mac II's fan noise would require locating the computer in a separate room, away from

my piano, so my bathroom became the control room. I used two Neumann KM84 mics on the piano, and plugged the preamp outputs into the two unbalanced 1/4-inch audio input jacks on the AD IN. The inputs are adjustable from approximately -10

dBu to +8 dBu, with individual LEDs that indicate -20 dB and clipping for each channel. An input-select switch provides the options of sending left mono, right mono or stereo signal to the Sound Accelerator.

When Sound Accelerator is installed

Serious Storage for Sound Surgeons

If you are a typical Mac user, you will be stunned by the size of the *Sound Designer* files you can create, without even trying very hard. At a sampling rate of 44.1 kHz, stereo audio gobbles up disk space at the rate of ten megabytes per minute. So if you expect to record even one 5-minute piece of music, your 40MB hard drive is just not going to cut it. You probably will want to shop for an alternative. Anything you consider will have to provide at least a snappy 25ms access time in order to record and play in real time.

One solution is to buy a removable hard drive. They come in sizes from 20 MB (too small for anything longer than about 60 seconds) to 200 MB. Individual cartridges cost around \$90 and up, depending on capacity, and are convenient for archival purposes.

The other solution is to get a *really big* hard drive. I was able to check out a Microtech 650MB internal drive, and it performed quietly and flawlessly throughout my evaluation. When it gets up and running, it sounds a little like popcorn popping in another room, almost unnoticeable compared to the Mac II fan noise. The SD manual says if there is a problem recording to the hard disk, the Mac will beep. That never happened. I eventually used up about 600 MB, and at one point on the last day, having recorded 60 seconds worth of acoustic guitar samples, I did get a message having something to do with recording errors due to disk fragmentation. When I played the file, however, I found nothing wrong.

The only problem I experienced with the drive had to do with the installation manual. The manual covers eight different configurations, and it took me about an hour to figure out which one to use, because the model name on the drive wasn't mentioned in the manual. Having navigated that roadblock, I then managed to plug the 50-pin SCSI connector cable in the wrong way. Failing to see the Mac screen come to life, I checked the manual again, and decided maybe they wanted me to try it the other way. The Mac fired up, and I was relieved to discover that I hadn't blown anything up by connecting it wrong. Short of clarifying the manual (at press time I was told it had been rewritten), Microtech could at least use a connector with a tab to prevent an upside-down plug connection.

Microtech also ships assorted *HyperCard* and utility software with its hard drives, and its own *Mac-Tree Plus* hard disk management system. Features include: ability to view and print the contents of many different kinds of files without having to launch their applications; ability to recognize disks and volumes on a network; flexible search and filter utility; and many other convenient organizational tools.

Microtech buys its drive from Micropolis and, together with its driver software, conservatively rates the unit's access time at 18 ms. It comes with a five-year warranty and a BBS providing technical support and various software goodies. The manufacturer's suggested retail price is \$3,430, and if you've got the bucks and the need for bytes, it could be a great investment.

—Paul Potyén

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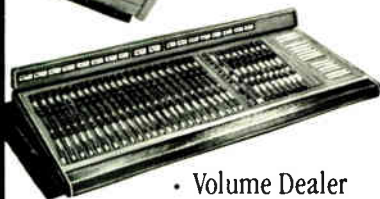
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FIELD TEST

in the Mac, the tape deck, playlist and HD play/scrub icons appear in the display's Soundfile window. Double-clicking on the tape deck icon brings up the Tape Deck window shown in Fig. 2. Clicking on the Monitor box activates the record/play VU meters and clip-hold indicators, which allow you to monitor and adjust input levels from your source and/or the AD IN box. (The Mac II I used was set up for a color monitor, although a black-and-white monitor was hooked up. The result: no VU display. Going to the Apple control panel and changing to B&W monitor solved this problem.)

Audio output is obtained from Sound Accelerator via a stereo 1/4-inch phone jack. The board is factory-calibrated for a maximum output level of 3.9 volts peak-to-peak (+4 dBm); however, a pair of trim pots on the board lets you adjust the outputs.

Once my levels were set, I activated recording by clicking on the record icon. Freed from the constraints of tape, I played until I made a mistake (fortunately for me, Sound Tools doesn't require a perfect artistic performance), and with the recorder still going, I simply continued playing to the end of a piece, making sure I repeated sections that would later need to be edited together. It's also possible to stop or start recording at any point, recording over existing data, by using the appropriate buttons in the Tape Deck window.

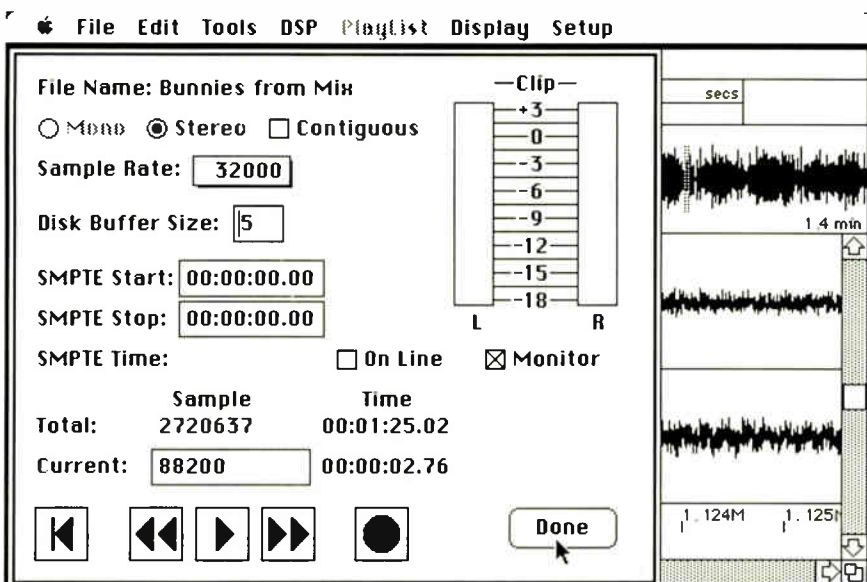
Listening to a performance from the Tape Deck window (and watching the VU meters) is done by clicking on the

play button. Clicking on the done button returns you to the Soundfile window. Playing all or any part of the performance from the Soundfile window is accomplished easily by clicking and holding at the desired point in the overview display, located just below the icons.

Here's where it really gets good. While it is possible to edit your original file, it's not necessary and in fact it may not even be a good idea. For one thing, any destructive editing of a long file takes a *long time*. The edit menu, for example, contains a handy normalize command, which optimizes the level of a selected region. I had recorded a soft piece, and although I was satisfied with the performance, the levels were generally low. It took nine minutes to normalize that 3½-minute piece. The same kind of time is required to carry out other destructive editing tasks. (Remember, 3½ minutes is equivalent to 35 megabytes.) It's far more economical (and less risky if you don't have backup files) to piece together a performance using non-destructive techniques. Here's how it works:

From the Soundfile window you can play any region by clicking on the HD play/scrub icon and clicking and holding the mouse in the overview display. When you find an edit point, release the mouse and the waveform display will scroll to that point. Clicking and holding the mouse in the waveform display lets you scrub back and forth across the waveform and listen for an edit point. You then can switch to selection mode and click at that edit point. Shift-clicking at a second

Figure 2



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FIELD TEST

edit point selects a region, which can be captured for editing together with other captured regions from the playlist window (Fig. 3), which is accessible from the playlist menu. A complete performance is assembled by dragging regions from the regions list into the playlist area in the order you want to hear them. There is no limit to the number of regions you can define.

SOUND TOOLS: A CASE STUDY

Over the last six months, I've worked with the *Sound Tools* system. I've found it to be both a powerful, stand-alone 2-channel workstation and the central hub of a sample-based MIDI system. It easily lives up to its name, as this tool can provide your system with an extra pair of synchronized digital audio tracks, hard disk edit capabilities, digital signal processing, resynthesis (when combined with Digidesign's *Turbosynth* software) and extensive sample edit/librarian

In addition to the default splice transition between regions, you can choose from four other kinds of crossfades with user-definable crossfade durations. An edit preview option quickly lets you know how well a given edit works. Clicking on the playlist button causes playback of the entire playlist. Playlists are editable, and you can create (and save) as many different versions (playlists) of your piece as you want.

capabilities.

One of my favorite aspects of this system is that its hardware structure is modular, and you can select from a wide range of hardware options. One option that makes life a lot easier is a two-page monitor. The two-pager's larger screen takes the strain off the eyes, tends to be faster in operation and lets you tile and stack application windows like crazy. Another Mac-based benefit is that the system is compatible with most memory management systems, such as internal/external/removable hard disks, WORM, CD-

—CONTINUED ON PAGE 144

WHERE THERE'S A WILL, THERE'S A WAY

I was able to create satisfactory versions of nine out of the ten piano pieces I recorded by the above method. In the one remaining case, after cutting and pasting my original file to obtain a seamless section, I found it necessary to zoom in on a sloppily pasted region and redraw the waveform with the pencil tool to eliminate a nasty glitch. Throughout the many different editing situations I encountered in the 50-odd minutes of recorded material, there was never an instance where I was unable to do what I wanted to do with a soundfile.

SDII AS DSP

Built-in programmable graphic and parametric EQs are accessible from the DSP menu. The graphic EQ offers 14 bands for mono soundfiles and seven for stereo. The frequency and bandwidth of each band are adjustable, so you can think of it as a 14-band parametric EQ. The parametric section offers highpass, low shelf and peak/notch filtering. You can save settings as files and use them on any soundfile, without changing the basic content of the file. You also can perma-

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nently change the harmonic content of the soundfile. A preview button lets you hear the effect of your settings on a section of the soundfile without leaving the Equalization window.

AN ADDED BONUS

Digidesign has just started shipping its DAT I/O digital interface, and I used a preliminary version of this new product to transfer my pieces to DAT. DAT I/O is designed to accept the digital output of Sound Accelerator and transfer to a DAT machine at a 48 or 44.1kHz sample rate using AES/EBU or SPDIF format. Dave Clementson, a design engineer at Digidesign, says they have tested the DAT I/O with all the major DAT machines, and as additional models become available, they are also checked for compatibility with DAT I/O.

For this transfer I used a Sony PCM-2500, and the operation went without a hitch. After making the jump from my piano strings to the Neumanns, my sounds never saw the light of analog day. And, if anyone wants to do additional editing or DSP on my master, it's a simple task to use DAT I/O to dump the information back into Sound Designer from the DAT and

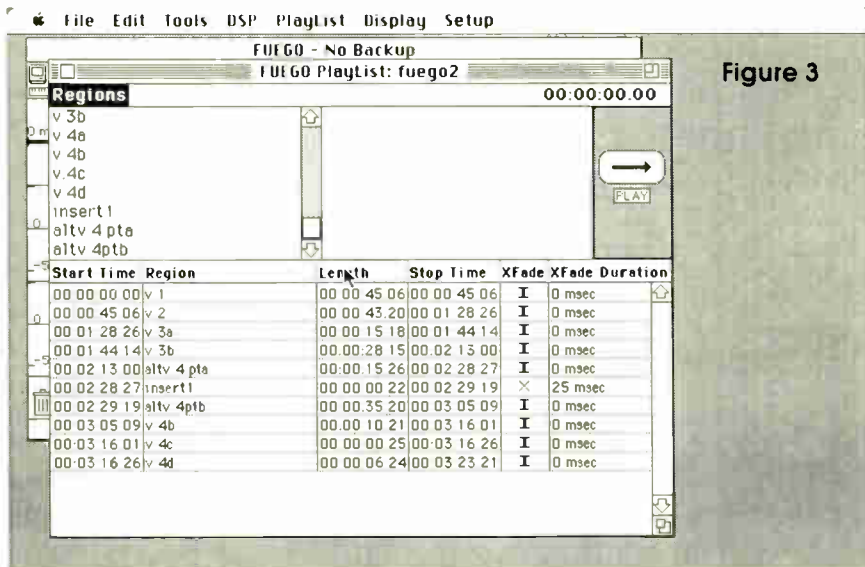


Figure 3

manipulate the files once again.

CONCLUSIONS

In all fairness, I admit I didn't thoroughly explore all the nooks and crannies of SDII, and there are many. I didn't look at the system's synching [it is fully SMPTE-compatible] features, its Fast Fourier Transform analysis tools, its time compression and expansion features, or its digital mixing and merging capabilities. But ev-

erything I did use functioned well.

The manual was one of the clearest I've come across. Eight sections were separated by index tabs, making it easy to quickly find information. I also was impressed by the system's flexibility: There were many user-selectable options throughout, allowing Sound Tools to be tailored to individual equipment and tastes.

The software is designed to take ad-

— CONTINUED ON PAGE 143

control and a new reverb algorithm that lets you design your own three-dimensional space. All controllable from its own optional dedicated remote.

Meanwhile its companion, the SPX1000, has digital inputs and outputs for direct digital access to professional quality processing.

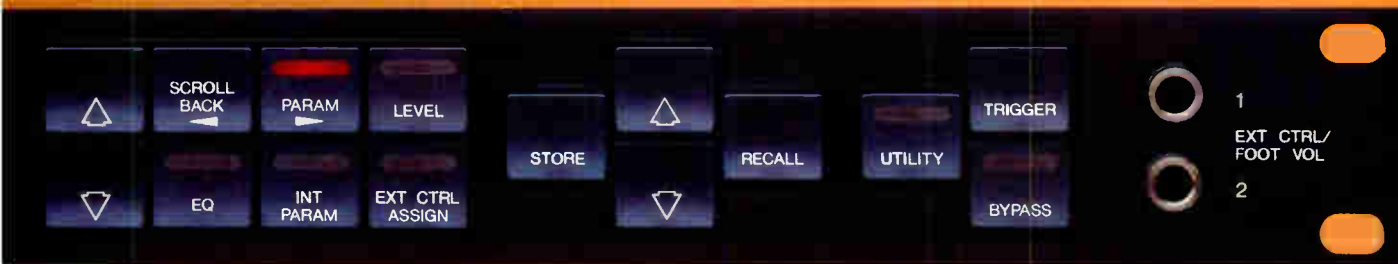
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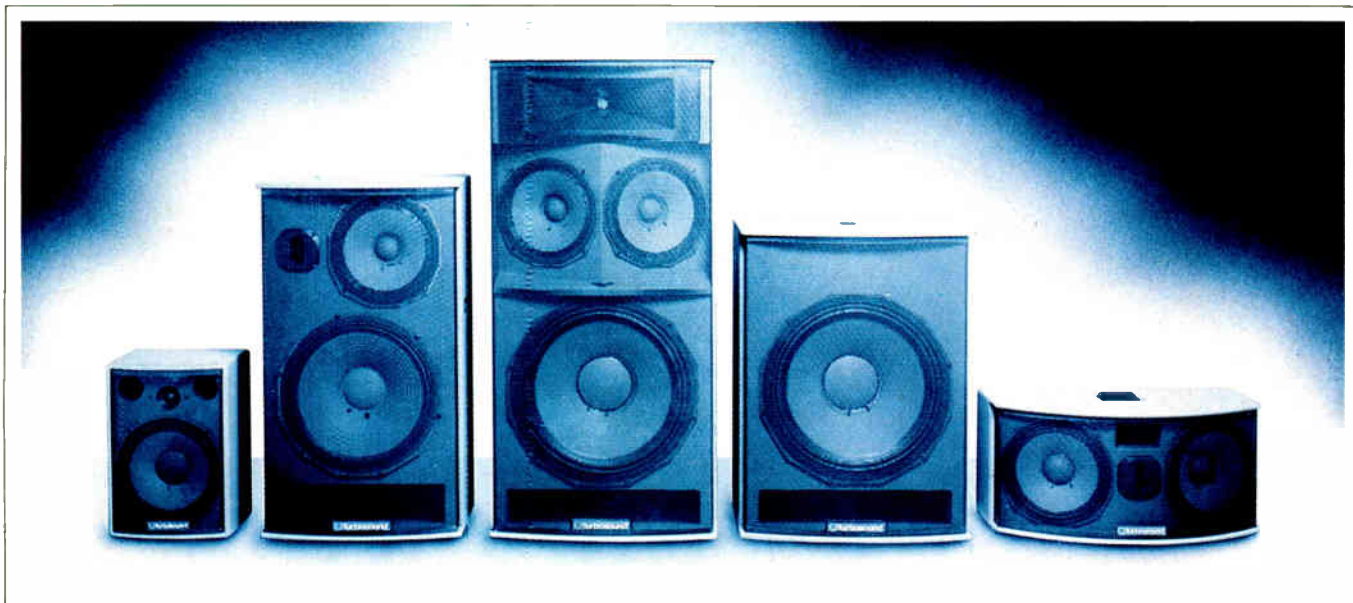
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by Mark Herman

SOUND REINFORCEMENT NEWS

P.A. speaker manufacturer **MacPherson Loudspeakers** provided 32 M1 full-range cabinets for the main P.A. system at the annual **Michigan Festival** held in Lansing, Mich. The ten-day event with main stage crowds in excess of 40,000 featured nationally known acts, including **The Bangles**, **Lee Greenwood**, **The Nylons**, **Smokey Robinson** and **Spyro Gyra**. MacPherson also provided an additional ten cabinets for a delay tower and sidefills, as well as its new LPM2 monitor wedges for the stage. A Yamaha PM-3000 console was used for the house mix and a Soundcraft Series 4 handled the stage. This was the largest array of MacPherson speakers ever used at one time in a concert setting. Festival producer **Kevin Meyer** comments that the bands were impressed with the entire system. Considering how new the company is, the relatively inexpensive MacPherson M1 main loudspeakers have reportedly been selling quite well. Several sound companies have also expressed satisfaction with the LPM2s.

The Who used giant sound reinforcement company **Clair Brothers** for their North American tour stint. The large main P.A. setup included 144 Clair S-4s and 24 subs. The band's engineers were **Clive Franks** in the house with a pair of Yamaha PM-3000s and **Bobby Pridden** on the stage with a Soundcraft Series 4. Senior engineer and crew chief **Joe Ravitch** and **Cliff Atchison** assisted in the house, with **Ed Dracoules** and **Pete Pelland** on stage... Clair Brothers has been keeping busy with

other acts as well. **Greg Hall** states, "It has been an incredibly healthy period for us. We kept all of our gear working this summer and fall, and the future looks strong as well."

A brief rundown of the coliseum-sized systems Clair put out through the late summer and fall season includes: a **Paul Simon** tour of Europe and the Soviet Union this summer; box office leader **Bon Jovi** touring North America and then Australia and Japan in October and November; a **U2** tour of Australia, New Zealand and Japan through September, October and November with a full Japanese-based Clair system; **Elton John** in North America, Japan and Australia; ex-Eagle **Don Henley** (see "On the Road") touring North America this fall with the very capable **Dave Kob** engineering the house mix; **Julio Iglesias** wrapping up large stadium shows in Europe on his way to the Soviet Union in October; the immensely popular

Fine Young Cannibals touring for the first time with Clair in September and October across the U.S.; **Stevie Nicks** working through the fall, with **Brian Rugles** mixing house; **R.E.M.** finishing their 12-week tour in late November; former members of **Yes—Anderson, Bruford, Wakeman, Howe**—finishing the U.S. before proceeding to Europe through October and November; and Christian artist **Michael W. Smith** out on a smaller, theater-sized tour. Other tours include **The Water Boys**, **The BoDeans**, **.38 Special** and the hard-working **Kenny Rogers**.

Sound reinforcement company **ZEO Brothers Pro-**

(Photo below): One of the '80s biggest concert events was the **Monsters of Rock** tour. Shown here is one of Audio Analysts' 220-box systems; utilizing over 3,000 JBL speaker components, it was the largest flying system ever assembled.



duction, located in Hatboro, Pa., just outside of Philadelphia, began in 1976 and is run by brothers **Phil, George and Dan Zeo**. Phil describes the company's client base: "We do regional one-offs from Boston to Washington, D.C., and occasional regional touring. Also, we do quite a bit of equipment sub rentals to other sound companies. Besides concert sound we also do corporate work; church, school and club installations; and quite a bit of local club work." ZEO is heavily involved in the Christian market and handles several annual festivals and artists. The brothers also operate two separate pro audio and MI stores.

The company's primary mixing consoles consist of a Ramsa WR-S840 and a 32-channel Soundtracs M Series in the house, and a TAC Scorpion

40x12 and a Soundcraft 400B for the stage. Klark-Teknik equalizers are used on the front end and White Instruments equalizers on the monitors. ZEO's main P.A. consists of two concert systems and several smaller club-sized rigs. ZEO's proprietary full-range, direct-radiating concert cabinets are tuned to 30 Hz and are augmented with a subwoofer tuned to 16 Hz. The large, custom MSE-3 (Maximum Sound Enclosures) 3/4-inch Baltic-birch boxes are loaded with two E-V X150 15-inch speakers, two E-V DL12X 12-inch speakers and a 2-inch DH1A on a HP940 horn. The companion MSE-218 sub (one is used for every two MSE-3s) is loaded with two 18-inch E-V X180 1,000-watt drivers. The crossovers are E-V XEQ-3s matched to the cabinet. Phil states, "The system is time-aligned, phase-corrected and EQ'd." He adds, "I think the E-V

X drivers are the finest ever built—they do the job extremely well and move a lot of air." McCauley 814 and 840s are used for sidefills and the club system P.A.

ZEO has two complete monitor rigs. Monitor cabinets are McCauley 6512 wedges loaded with dual 12-inch speakers and a 2-inch JBL 2445, and two-dozen custom enclosures loaded with 15-inch proprietary E-V speakers and a 1-inch driver. Power for the main P.A. and monitors consists of Crest amplifiers. The main P.A. uses 8001s on the lows, 7001s for the mids and the new 4801s for the highs. Monitors are powered by 1501s on the high end and FA1201s for the lows. "We are very pleased with the Crest amps—especially the 8001 and the 7001 models," Phil says.

New equipment purchases include almost the entire primary

ON THE ROAD

SOUND COMPANIES, EQUIPMENT, ARTISTS & PERSONNEL ON TOUR

| Artist Sound Company Tour Dates Region | House Console#1 House Console#2 Monitor Console#1 Monitor Console#2 House Crossover | Main Speakers Main Speakers Subwoofers Monitor Speakers Monitor Speakers | Main Amplifiers Main Amplifiers Sub Amplifiers Monitor Amplifiers Monitor Amplifiers | Engineers: (B) = band (H) = house (M) = monitor (T) = tech (a) = assistant (C) = crew chief |
|---|---|--|--|---|
| Aerosmith dB Sound Oct - Dec Europe Ongoing World Tour | Gamble Series EX 56x16x2 - Ramsa WR-S840 40x18 - EV MTX-4 modified | (80) EV MT-4 (8) EV DML 1152 - EV FS 212 | Crest 8001 Crown MA 2400.1200 - Crown MA1200, PSA2 | Toby Francis (B,H) Mike McNeil (M) Scott Pike (C,aH) Paul Owen Lyndon Sargent |
| Joe Cocker Sun Sound Audio September - October North America | Yamaha PM-3000 40x8x2 - Ramsa WR-S840 40x18 - EAW MX800 modified | (24) EAW KF850 - (16) EAW SB850 Sun Sound 2115, 2215 | Crest 8001 - Crest 8001 Carver 1.5 | Rod Libby (B,H) Rory Madden (B,M) Kevin Marshall (aH) Fred Mueller (aM) Michael Femino (aM) |
| Don Henley Clair Brothers August North America | Clair Custom 32x12x6 Clair Custom 32x12x6 Ramsa WR-S840 40x18 - Clair | (48) Clair S-4 Series II - - 12AM, Clair Custom | Clair/Carver 2.0 - - Clair/Carver 2.0 | Dave Kob (H) Randy Weitzel (M) Nyle Wood (aH) Scott Appleton |
| Donny Osmond Delicate Productions October 13 - December 16 North America | Yamaha PM-3000 40x8x2 - TAC Scorpion 30x12 - Martin MX-4 | (24) Martin F2 - - Martin LE400 | Crest 6001,8001 Carver 1.5 - - Carver 1.5 | Graham Thornton(H) Mike Horn (M) Kurt Wolf |
| The The Delicate Productions October 16 - December 2 North America | Yamaha PM-3000 40x8x2 - Soundcraft Series 4 40x16 - Martin MX-4 | (24) Martin F2 - (6) Delicate 218 Martin LE400 | Crest 6001,8001, Carver 1.5 - Crest 8001 Carver 1.5 | Steve Venezia (H,C) Kevin Farrant (B,M) Tracy Kunstmann |

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World Radio History

P.A. system consisting of the Ramsa console, Crest amps, Star cases and MSE loudspeakers.

Two of Canada's leading sound companies—**National Show Systems** and **Westbury Sound & Lighting Ltd.**—recently merged to become the largest staging, sound and lighting company in that country. A new 19,000-square-foot facility in Toronto will house the new company, which has yet to decide on a name. Both compa-

nies have a large stock of Adamson main P.A. speakers.

JBL has come out with several new professional speaker products. The 12-inch 2206, 15-inch 2226 and 18-inch 2241 loudspeakers incorporate JBL's new "vented gap cooling" technology in an improved "symmetrical field geometry" magnetic structure. According to JBL, the VGC process pumps air through the magnetic gap and directly over and around the voice-coil to provide instant heat transfer and

lower operating temperatures. Also new is the 2450 neodymium compression driver. Several sound companies have told me that the 2450 is definitely worth checking out. Two new Concert Series floor monitors premiered at the recent AES Convention. The 4835A is a 15-inch, two-way wedge, and the 4832A wedge features dual 12-inch drivers. Neutrik Speak-On multipin connectors are now available on JBL Concert Series line enclosures.

Earlier this year Northwestern sound reinforcement company **Proshow U.S.A.** (Redmond, Wash.) acquired the assets of **Vista Sound & Light** (Mukilteo, Wash.) audio company. Owner **Mike Fisher** spent many years mixing house for the band Heart before forming Fisher Audio in 1985. Fisher changed the name to Proshow U.S.A. at the beginning of 1989. The company's recent expansion has made it one of Seattle's foremost sound companies. Proshow is very active in the Northwest's state and county fair market, and does regional concerts and tours as well as sound for the Seattle Seahawks. The company also does corporate meetings and events, installation projects, and many shows at nearby University of Washington. Proshow just opened a pro audio store in Kirkland, Wash. Well-traveled engineer **Andy Chappel** recently joined the company as the sound reinforcement booking and rental manager.

Fisher describes the custom enclosures powered by Crown MA2400 and MA1200 amplifiers that make up Proshow's two concert main P.A. rigs: "Our two-box main P.A. cabinets are a hybrid Turbosound/Martin setup. The bass cabinets come in two versions—one with two 15s and the other with two 18s. The other cabinet is loaded with TAD 2445s for the highs and a 12-inch McCauley for the mids. Everything is horn-loaded." Additional McCauley P.A. boxes are used for smaller, club-sized projects.

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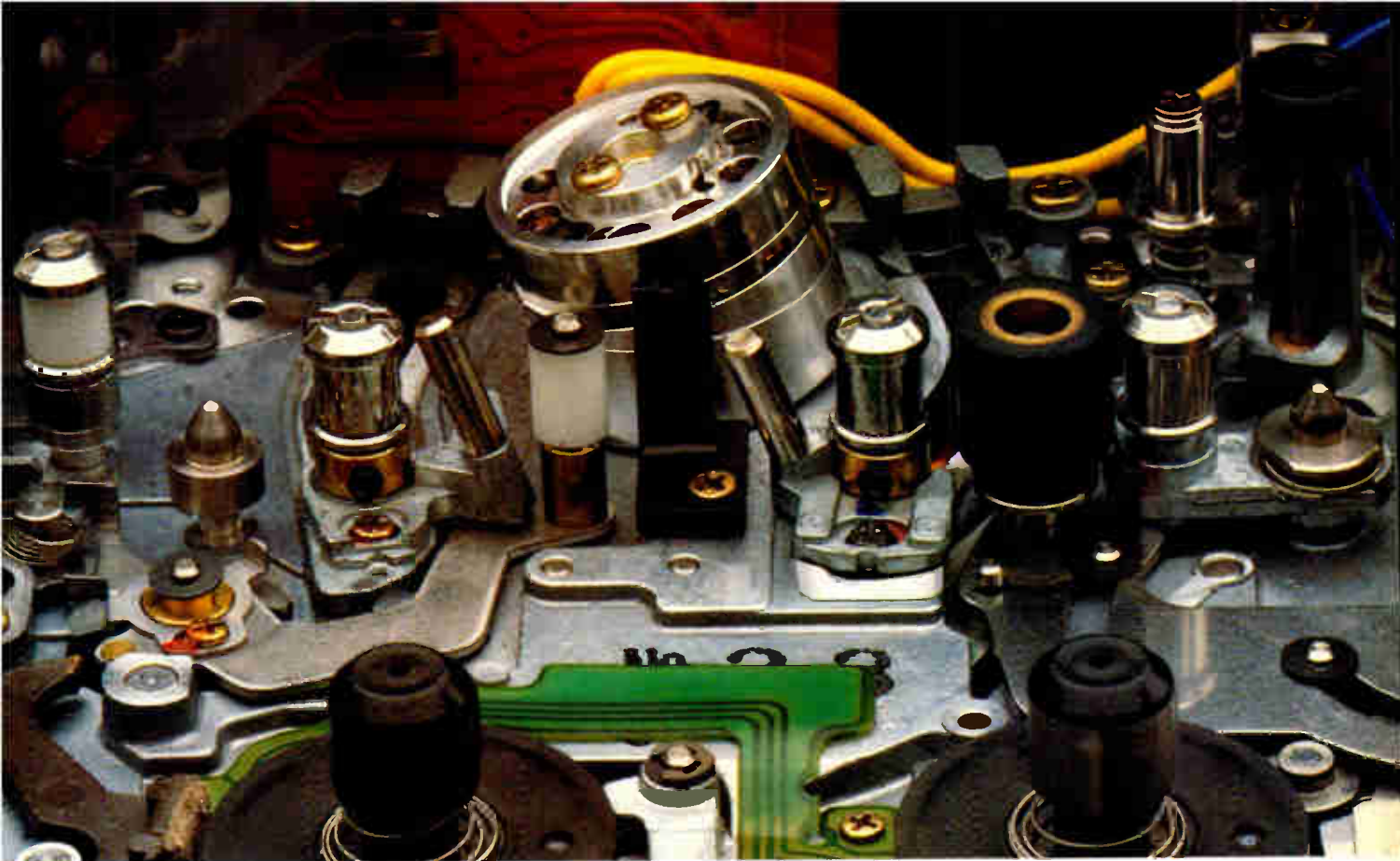
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World Radio History

with 15-inch McCauley and 2-inch Emilar compression drivers are powered by Crown MA1200 and Rane MA6 amps. Sidefills are loaded with double E-V 18-inch, double McCauley 12-inch speakers and a 2-inch 2445. The company's console inventory contains Ramsa WR-S840, Soundtracs 40x8x2 and Biamp 32x8x2 house desks; and Soundtracs M 32x12, Soundcraft 400 24x10 and Yamaha 2408 24x8 stage consoles.

The state of Montana welcomed a new sound and lighting company this summer. **Tachyon Productions** (Kalispell, Mont.) reports a busy initial season doing one-offs and festivals. Audio equipment includes Soundcraft consoles, JBL and Crest amps, and JBL Concert Series boxes.

Hollywood Sound Systems traces its beginnings back to the time when there were very few audio companies on the West Coast. Its business has evolved since 1962 from audio installations for theme parks, hotels and television, into a sound reinforcement company that provides services for the entire Southern California area. Hollywood Sound now handles concerts for up to 20,000 people, corporate, television and movie lot installations, and live remotes for television broadcast. It also serves as a rental supply house featuring a diversified selection of pro audio equipment. The company has been responsible for the audio needs at the 1982, 1984, 1986 and 1988 AES Conventions and is currently working on 1990.

Hollywood's speaker systems consist of the Renkus-Heinz Smart System with SR-1 (15-inch), SR-2 (dual 15-inch) and LR-1 (18-inch) main cabinets, with additional Electro-Voice S200 bass reflex boxes. Intersonics subwoofers are available for the extreme low end. (Company president **Les Harrison** describes an interesting use for the subs, "Once we rounded up 14 Intersonic subwoofers to simu-

—CONTINUED ON PAGE 133

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and every output on the console. It is important that the meter can be selected to read both pre- and post-fader.

Mix: What are the advantages of an output matrix on a console?

Gamble: An output matrix is like having a mini-mixer within the main console. There is a level knob for each subgroup which allows the operator to make up a separate mix of the subgroups and main outputs to feed subwoofers, center clusters, lobby, side- and rearfill stacks, TV and radio feeds, etc. Some consoles have up to eight sets of output matrices.

Mix: What can an engineer do with the matrix outputs besides just sending a signal to a specific area?

Gamble: There is a new mixing concept that addresses that very point. It is called "scene mixing," and I think it has the possibility of becoming a widely used technique for sound reinforcement and theater work. It works like this on the Gamble/Crest Series EX house console: The eight stereo matrix outputs from matrix 1 through 7 can be mixed into matrix 8. Matrix 8 then becomes the stereo feed to the main P.A. system. By pulling down one matrix fader and pushing up another, you can change the mix from one scene to the next, with the capability of handling up to seven or eight different scenes. And if you don't want to pull the faders down, the matrix mute switches could be used instead. Engineers facing radical scene changes would find this feature very useful.

Mix: What are tielines and how many does one need?

Gamble: Tielines are balanced connections between the patch bay and multipin connectors on the back of the console. They are used to connect the patch points in the console to all of the devices in the effects rack without having to patch and unpatch everything each time you set up and tear down the system. It is important to have enough tielines to connect all of

the signal processing devices you are planning to use.

Mix: Some consoles have semi- and quasi-parametric EQ, while others offer full parametric EQ. By looking at your console designs I know you prefer full parametric EQ, but is it necessary on input channels, and what does it actually consist of?

Gamble: Full parametric means full control of all EQ parameters, and is normally accomplished using three parameters: a *boost/cut* to increase or decrease the level of the frequencies that you are trying to EQ; a *frequency* control to dial in the center frequency in the area that you are trying to EQ; and a *bandwidth* control to increase or decrease the range or *width* of frequencies being affected. Consoles with less than these three controls per EQ group are a compromise at best. Complete control on the input channel is the way to tune right into what you want.

Mix: That means that you wouldn't have full control over the frequency response on consoles that have semi- and quasi-parametric equalization featuring fixed bandwidth and/or shelving on all or some of their EQ bands.

Gamble: Yes. For example, let's just say you were mixing on a house console with no adjustable high-frequency bandwidth control, and you wanted to add a little something to the cymbals. You sure don't need an entire octave's worth of high-end boost to tune it up. Think about it: To improve the sound in this situation you need to affect only a small portion of the bandwidth; and an octave's range can cover the cymbals, guitar, vocals, etc. An adjustable bandwidth equalizer that goes down to 1/10 of an octave will exhibit tremendously more control than the traditional one-octave fixed bandwidth.

Mix: Is parametric EQ necessary for monitor console equalization?

Gamble: When you use the EQ on monitors, it is very important to have an adjustable bandwidth feature so you don't have to cut

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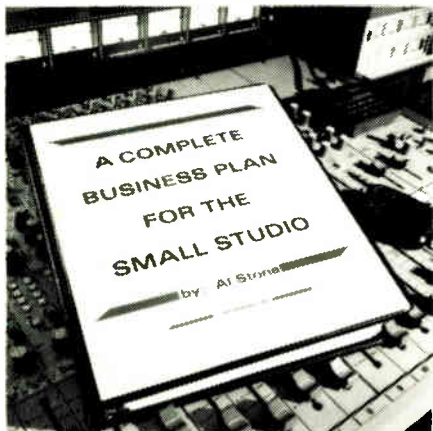
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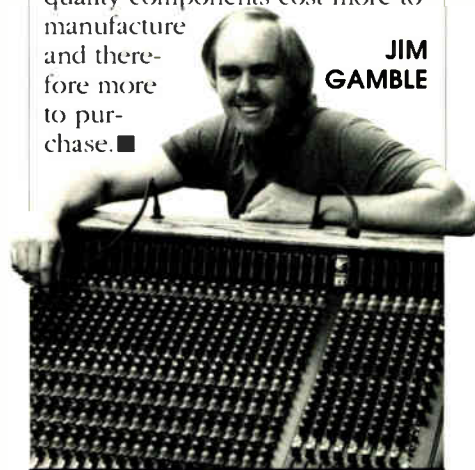
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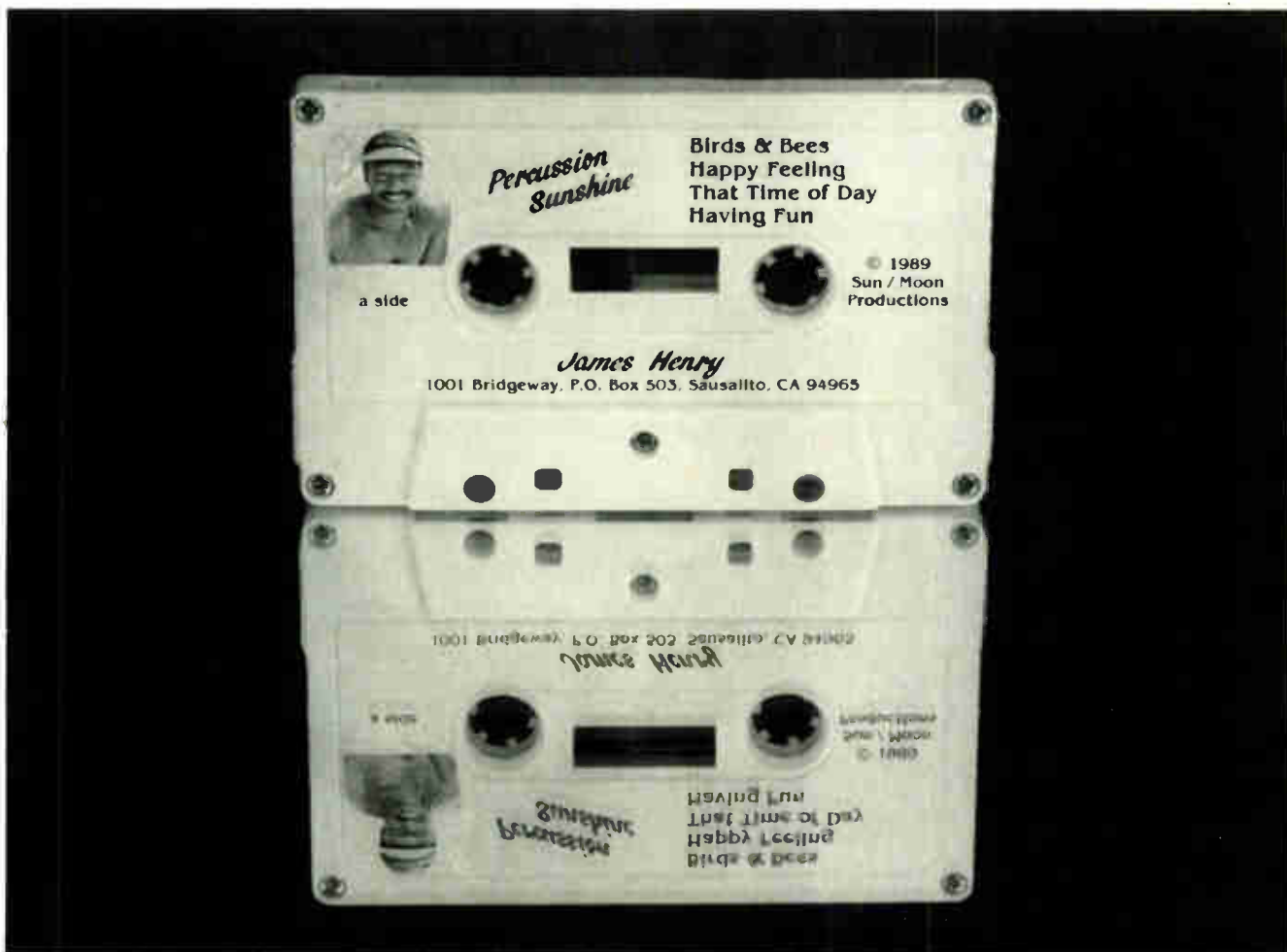
out big chunks of frequencies to fix feedback. If the fixed-frequency bandwidth is one octave wide, for example, it will definitely lessen the quality and clarity of the monitor mix by pulling down all the surrounding frequencies. A mixing console with three, four or even five bands of parametric EQ offers a much higher degree of sophisticated control than a model with semi- and quasi-parametric. It costs the manufacturers more money to produce parametric because more expensive parts are required. One of the problems with semi- and quasi-parametric is that they don't function linearly. Some models—depending on their design—often change level and/or even bandwidth when the frequency is adjusted, without the boost/cut control ever being touched. How they really function comes down to how they were designed. Did they use the more expensive state variable filter, or were they outfitted with the cheaper filter methods? And how good (read "expensive") are the individual parts?

Mix: In a nutshell, then, much of the quality of an EQ section is based on the design, which often tends to be based on the cost to the manufacturer?

Gamble: Right. A parametric state variable filter takes four op-amps, and a quasi-parametric only one. In the real world it usually comes down to money, and console manufacturing is no exception. It is a fact that mixing consoles with parametric EQ and quality components cost more to manufacture and therefore more to purchase. ■

JIM
GAMBLE





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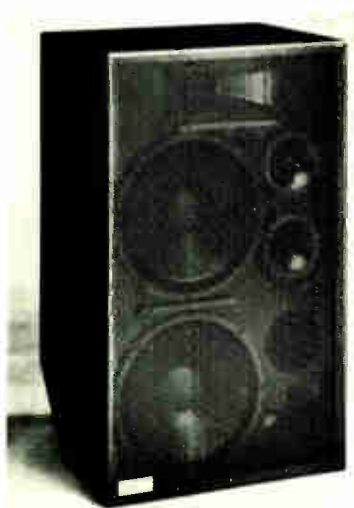
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SOUND REINFORCEMENT PRODUCT NEWS

**EAW FR253HR HIGH-DEFINITION NEARFIELD SYSTEM**

Applications that require high definition reproduction at near-concert sound pressure levels—but not necessarily high directivity—will benefit from the FR253HR speaker system from Eastern Acoustic Works of Whittinsville, Mass. The vented, 3-way system includes two 15-inch woofers, a pair of 7-inch MF drivers and a newly designed constant-coverage horn/HF compression driver combo that extends upper octave response to 17 kHz (± 3 dB). The FR253HR can deliver peak SPLs of over 130 dB, with full power output down to 45 Hz. A complex, passive crossover using an asymmetrical, equalized network reduces the need for external equalization in most situations, and a rear-panel switch allows for biamped or full-range operation.

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CARVIN MACSPEAKER

Carvin of Escondido, Calif., is distributing MacSpeaker, a Macintosh-based design program that calculates and displays the frequency response of any user-specified loudspeaker box combination, using Thiele-Small models for vented and sealed box systems. Features include a large (user-expandable) library of driver data, multiple-plot overlay capability, vent and enclosure

dimension calculations, and a bibliography of technical references. MacSpeaker is priced at \$95. Hardware requirements are a Mac with at least 512K RAM and an 800K disk drive.

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DDA ARENA SERIES TOURING CONSOLES

Distributed in the U.S. by Klark-Teknik of Farmingdale, N.Y., DDA has announced the Arena Monitor and the Arena VCA house consoles for touring and live sound applications. The Monitor board features 16 outputs (with 3-band EQ on each) and is available in configurations up to 44x16x2. The VCA board is designed for front-of-house mixing chores and offers eight groups (as well as eight VCA/mute groups), eight aux sends, eight aux returns and fully balanced in/out operation. All DDA Arena consoles employ P&G faders, recessed handles and strengthened frames with aluminum end cheeks.

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**FORMULA AUDIO 4400 SERIES**

The 4400 Series direct radiator line from Formula Audio of Zebulon, N.C., consists of three full-range and three sub enclosures suited for applications ranging from church installations to arena concert systems. All enclosures are trapezoidal and flyable—except the 4428 double-18 rectangular sub box—and are constructed of 14-ply Baltic birch

with carpet covering and reticulated foam over a metal grille. The 4403 (with a stated frequency response of 43 to 20k Hz) houses two 600-watt, 15-inch woofers, dual 2-inch compression drivers on a twin 60x40 constant directivity horn, and two slot tweeters. The 4420 sub has two 1,000-watt, 18-inch drivers and a stated frequency response of 28 to 300 Hz.

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**SPATIAL SOUND SP-1B**

Spatial Sound of Mill Valley, Calif., has unveiled a balanced version of its SP-1 Spatial Sound Processor, a MIDI-controllable panner for the simulation of sound movements on arrays of four to eight speakers. Movements can be controlled by two built-in joysticks, while two internal sequencers allow recording of spatial panning in real or step time. Intended for use in theaters, clubs, concert halls, planetariums, film post-production and multimedia shows, the SP-1B also can be controlled by a MIDI sequencer or MIDI keyboard, or from an FSK data track on audio or videotape.

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YAMAHA SOUND REINFORCEMENT HANDBOOK

This 400-page text from Hal Leonard Publishing covers every aspect of sound reinforcement, with chapters on audio basics, mics, mixers, amps, speakers, signal processing, cables, test equipment, MIDI and synchronization. Priced at \$34.95, and available at Yamaha Pro Audio dealers, technical bookstores and through Mix Bookshelf, (800) 233-9604.

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—FROM PAGE 124, SR NEWS

late an earthquake for a major client practicing a disaster preparedness drill. It was very effective.") Recently, Hollywood purchased a dozen MacPherson LPM1 pro monitor wedges loaded with a Radian 4455 compression driver. Harrison says, "We are very pleased with this very cost-effective monitor. They sound good and have the flexibility to be passively or actively crossed." Over 70 Hotspots—very popular for TV work—round out the inventory. Mixing boards consist of various small-channel models for small P.A.s and specialized uses. Carver 2.0, Carver PM100s, Yamaha PV2500, and a relatively unknown import from down under—**Australian Monitor**—power Hollywood's cabinets. Harrison states, "They are good-sounding, rugged amps that appear to be built very well."

In late August and early September, Hollywood Sound supplied 18 Renkus-Heinz SR-1 and SR-2 cabinets powered by Australian Monitor amplifiers for a movie set filming Sylvester Stallone's upcoming flick *Tango & Cash*. The set's location was in an abandoned 18-acre Irwindale gravel pit (yes, the one the L.A. Raiders were going to use for their stadium), ideal for a multitude of Rambo-style special effects. The P.A. was set up in such a way that it alerted the production crew and cast to upcoming explosions and dangerous situations, and provided a practical way of communicating on the set.

[Note: Some of the data in this column and in "On the Road" is based on information provided by the companies. Address all correspondence and photos to Mix Publications, Sound Reinforcement Editor, 6400 Hollis Street, Suite 12, Emeryville, CA 94608.]

Mix sound reinforcement editor Mark Herman also operates a company specializing in console rentals for live sound and touring applications.

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FEEDBACK

DISNEYWORLD DESIGNERS

On page 49 of the August issue of *Mix*, we noted Phil Mendelsohn of the Post Group is credited with the design of the post-production facilities at the Disney MGM Studio Tour Project in Lake Buena Vista, Florida. In fact the Post Group was primarily responsible for the electronic design and fit-up of the facility. Our office, Charles M. Salter Associates, Inc., was the acoustical consultant for this facility, as well as for the adjacent soundstages, which incorporate numerous sound isolation features to isolate theme park guests from the working facility. Backen, Arrigoni & Ross was the architect for the schematic drawings and continued as design consultant throughout the project. National Teleconsultants was broadcast consultant involved in identifying the requirements for design of these facilities. They were given the responsibility of helping design the interior, for which they hired the firm Fiori Panas. Bechtel Corporation was responsible for the working drawings and construction administration. Of course, Walt Disney Imagineering provided many of the original concepts and design goals. As you can see, there are many firms and people involved who should be credited with the design of such an interesting project.

David R. Schwind
Principal Consultant
San Francisco, CA

BALL OF CONFUSION

I have just been catching up on my backlog of reading and found some errors in the edited versions of my "Field Test" of the Dynacord DRP 20 (June '89) and the two Panasonic DAT recorders (July '89).

All the figures I submitted for the DRP 20 article were cut. This resulted in two major problems: The operational description of the DRP

20 was incomplete, since none of the front panel controls were adequately covered. Also, the list of available parameters with adjustment limits was left out, so the reader had no idea how extensive the possibilities for program manipulation are with this unit.

The Panasonic article was written to be published as two articles with the SV-250 article submitted first. All duplicate features on the SV-3500 were not described but referenced to the SV-250 article. By placing the articles in reverse order, the SV-3500 description was not adequately covered and certain referrals to the SV-250 article may have proved confusing. I intended that the manufacturer's front panel descriptions be included with the articles, yet none of the figures I submitted for either article were published. This left the descriptions of both units woefully inadequate and at times confusing.

Bob Hodas
Berkeley, CA

ASTON, FORGIVE US

I received a call from a friend who is associated with an organization called Make A Wish. They try to fulfill the last wishes of terminally ill children.

My friend described the wish of a teenager named Aston, who idolized a certain rap group whose name, for obvious reasons, will be anonymous. Aston's wish was simple—to receive an autographed 8x10 and a T shirt.

My friend was perplexed and frustrated. He explained after repeated calls to the label on all levels, no one responded. Could I help?

I contacted the group's management company, starting with the receptionist, who immediately told me they were very busy. I described the urgency of my mission and was finally connected with a decision-

maker, who responded with "I'll see what we have around the office." When I asked if there wasn't anything to send Aston in the office would she call the label, she gruffly replied they were very busy and could promise nothing. I asked why couldn't she spare a minute or two to make this unfortunate boy happy? She politely put me on hold and never returned.

I stopped for a moment and sat back in my chair, not believing what was happening. Although we've never met, I started creating Aston's face, and in my imagination I was slipping the T shirt on his frail, young body. He was beaming. There was something wrong in the values here.

I proceeded to call a friend who writes for the biggest publication in town. He knows everyone. He'll help. He made some calls and assured me that he had connected with the label. They promised that by the end of the day they would FedEx everything Aston had asked for.

I returned from my trip and called my friend at Make A Wish. He said that Aston's wish never arrived, probably was never sent. As for Aston, he asked how are those guys at Make A Wish doing. He closed his eyes and left us. Aston, forgive us.

Harry Hirsch
Digital House
Closter, NJ

Donations can be sent to Make A Wish Foundation, 37 South Moger Ave., Mt. Kisco, NY 10549.

SETTING THE RECORD STRAIGHT

In the October issue's article on the New York recording scene it is erroneously stated that Ed Germano owned the Record Plant. In fact, he was only a studio manager.

Lori Cicala
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by Craig Anderton

SEQUENCERS OF THE FUTURE

In a few short years, sequencers have reached a remarkable degree of sophistication, yet retained a great degree of ease of use. Sequencers have come so far and so fast that it's understandable if we forget occasionally that there is still much unexplored potential.

This month, let's investigate trends in sequencers—both in terms of breakthroughs that are just around the corner, as well as those that are already making their presence felt. So let's polish the old crystal ball (silicon crystals, of course) and see what lies ahead.

- The age of multiple sequencers. It used to be that you bought a sequencer, became proficient at it and upgraded to new versions as they appeared. The time invested in learning a program mitigated against becoming familiar with multiple sequencers; besides, sequencers tended to have more similarities than differences anyway.

The rapid acceptance of standard MIDI files (SMF) has changed all that. Nowadays, you can trade files between sequencers to take advantage of the strengths of different programs. For example, I've been using Pass-

port's *Master Tracks Pro* for years now and have become quite proficient with it. Then Opcode introduced *Vision*, which offered some features (such as random sequence generation and event list editing) not found in MTP. Without SMF, I would have been torn between committing to one sequencer or the other, but fortunately, that's not an issue. Generally, I do all my recording with MTP—it's great for getting ideas down fast—then while editing, bump the sequence back and forth between *Vision* and MTP to take advantage of each program's unique features. And, of course, for collaboration with other musicians, SMF is just what the doctor ordered.

Unfortunately, the cost of buying two or more sequencers can be a bit of a problem. However, if musicians start using multiple sequencers, economies of scale should come into play, and hopefully prices will come down a bit.

- Customizable sequencers. How would you like to create your own sequencer commands? It used to be that you had to be an experienced software engineer to even think of such a task, but that's starting to change. Jim Miller got the ball rolling

Quitting the sequencer and calling up another program can really put a damper on creative juices; multitasking lets you sail effortlessly from one program to another.

with *Personal Composer*, which allows you to create your own notation fonts and even offers Syntellect, a LISP dialect that can access the program's internal functions. Now Dr. T's has introduced T-BASIC, a language that lets you write your own routines for use with Dr. T's *KCS*. These could be automated editing commands, algorithmic processing or whatever. Frankly, there aren't a whole lot of things *KCS* can't do, but in case you do find something lacking, it's no harder to include that function than it is to write a moderately complex program in BASIC.

I suspect this is just the start of a new trend. For example, I mostly use three types of quantization: quantization to 16th notes, quantization to 16th notes with 95% intensity (i.e., notes are shifted 95% closer to the nearest 16th note) and quantization to eighth notes with 95% intensity. However, changing the quantization requires calling up a dialog box and spending time setting the parameters as desired. I'd much rather write a routine allowing a single function key to choose one of the three quantization options,

with another function key to call up the dialog box for those times when I need a different kind of quantization. Customizable sequencers will allow for exactly that sort of trickery, allowing the composer to create a composing environment uniquely tailored to a particular set of needs.

- Error correction. Word processors have spelling checkers to catch mistakes—why can't sequencers? For example, I'd like a function that would search for all notes with velocities lower than 10, or all notes with durations less than five clock pulses, as these characteristics are symptomatic of an accidentally hit note. The suspect notes could then be highlighted on the screen for easy editing.

Another common problem, especially with guitar and drum controllers, is the occurrence of double hits (i.e., two identical notes occur in rapid succession where only one note should be). An error correction routine could look for all notes that have the same pitch and occur less than, say, a 32nd note apart. This would make it easy to find double triggers.

For me, recording a sequence

doesn't take anywhere near as much time as going back and finding all the little glitches and errors (MIDI guitarists, does this sound familiar?). Error correction that would help find "rogue" notes would speed up matters considerably.

- Multitasking environments. All major computer brands offer some kind of program switching; the Amiga even offers true multitasking. However, this has yet to be exploited to its full potential (except, arguably, with the Amiga). Systems such as Steinberg's *M.ROS*, along with other non-compatible switching systems, such as those from Intelligent Music and Dr. T's, are bringing pseudo-multitasking to the Atari ST; and Apple's *MultiFinder* is starting to settle down into something usable.

Multitasking is important for all those times you want to take notes in a word processor while a sequence is playing, or tweak a synth patch in the context of a sequence. Quitting the sequencer and calling up another program can really put a damper on creative juices; multitasking lets you sail effortlessly from one program to

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low for much faster editing and more flexible composition.

Here's another useful algorithmic application. Drum machine rolls can often sound mechanical, but a way around that is to trigger two slightly detuned drum sounds (set to different MIDI note numbers) on alternate hits. Without using an algorithm, it's necessary to go in and change each alternate note to a new note number. However, applying an algorithm such as "increase the note value of every alternate note by one" to a snare track provides the exact same function with a couple of keystrokes.

While the above features don't tell everything about where sequencers are headed, they offer a glimpse of what may be the shape of things to come. One thing's for sure--no matter how far sequencers have evolved, they're still in their infancy. It will be interesting to see what happens when they reach adolescence. ■

Craig Anderton writes books, produces and performs music, and edits Electronic Musician, our sister publication.

another.

Standard MIDI files are important here as well, since patches can be stored as standardized data. Being able to exchange patch data between different sequencers and editor/librarians is a vast improvement over the often non-compatible sys ex librarians included with several popular sequencers.

- Improved algorithmic options. As composer/software engineer Laurie Spiegel has pointed out, many musicians mistakenly associate "algorithmic" with "random." Randomness is indeed one algorithm, but by no means the only one. More sequencers now include editing algorithms where you can set up particular parameters, such as "increase the velocity value by 25% for all bass drum notes hitting on the first beat of a measure." C-Lab's *Creator* and *Notator* offer these types of algorithmic editing options, as does (among others) Dr. T's PVG and the "Change Filter" option in Passport's new *PRO-4* sequencer. Algorithms al-

—FROM PAGE 98, VINTAGE VOCAL MICS

and can be used in situations where this is more critical.

The C-12a, while not an enormous success as a vocal mic, has been used when a soft, silky quality is desired, and has certainly been used as a wonderful string microphone.

Most of us are familiar with the 414s built before the capsule change, and many, many great vocals have been recorded with these. The only thing to really watch out for on these mics is that with solid-state electronics, the edginess of the top end can be a bit much on certain singers. A windscreen can help create a compromise that will tune in those difficult artists.

THE-A THE-A THAT'S ALL FOLKS!

So there we have it, ladies and gentlemen. The great vocal mics exposed! It should certainly be said here that many mics have been used on vocals that were not the focus of these articles, and this is not to say that they are not valid. Whatever works is valid, and we all know that.

Rather, I have tried to give some insight into the workings and history of the true classics in this field, and, of course, this precludes listing every single mic that has ever been used on

a vocal! Many companies have built some wonderful mics that were not covered in these chapters—Sony, B&K, Sanken, Milab, etc. But if we really look at the vast majority of professional vocal recordings, the truth is that the microphones we have talked about have had the most profound influence on the history of the art. It is thus fitting that we should turn our attention to these in particular.

The fact remains, however, that we should never be afraid to try anything, because, as we can see from our experience with specifications and the real world, the real world always wins. This is perhaps the great lesson to be learned from all of this.

Whether you're a tube freak or just after that perfect sound, hopefully, in these pages you have discovered some of the secrets that you've always wondered about. Put them to good use, keep recording and chasing that rainbow of perfection, and keep those classics alive!

(Special thanks to Stephan Peus at Neumann, Jerry Graham and Juergen Wahl from Gotham and Norbert Sobol of AKG.) ■

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DAVID BOWIE HELPS REV UP TIN MACHINE

If you happen to be in the company of Tin Machine, don't make the mistake of calling it David Bowie's latest backup band. What Tin Machine is, according to all four members, is a well-defined rock'n'roll democracy, born on the road, nurtured in the recording studio and transformed—out of sheer musical lust—into a killer act.

According to drummer Hunt Sales, "David's contribution is in this record and I'm not going to downplay that, but if you listen to [Iggy Pop's] *Lust For Life* and to *Tin Machine*, and in between, listen to 15 Bowie solo albums, do they sound anything alike? No, they don't. That's not taking anything away from him. I admire his talent and his conviction and that whole bit, but . . ."

The sentence doesn't need to be completed. One listen to Tin Machine's album (on EMI Records) and it is clear what Sales is talking about.

"For me it was hard to relinquish responsibility," says David Bowie, who is eager to put his place in Tin Machine into proper perspective. "We don't always get on with each

other and agree. Every moment isn't always a happy moment. We haven't got this strong thought like 'We're Tin Machine and this is our only thought.' Everyone's got a very strong personality. Tin Machine just kind of evolved as we realized we all wanted to play the same kind of music."

"It is absolutely a democracy," says bassist Tony Sales. "We all share in all of the ideas and in the production. We don't do David Bowie material live at all. David is certainly agreeable to that; he doesn't want to mix it either."

Along with Bowie, who sings, plays guitar and wrote the lyrics and much of the music, and the Sales brothers, who make up the rhythm section, the band includes Reeves Gabrels on guitar. They have built their urgent, hard-edged rock with the classic guitar-bass-drums format of a previous Bowie outing, *Spiders From Mars*.

The seeds for Tin Machine were first laid in 1977 when David Bowie produced Iggy Pop's rock opus *Lust For Life* and played keyboards in the band that toured for the record. Also in the band were the Sales brothers (sons of '60s TV star Soupy Sales),

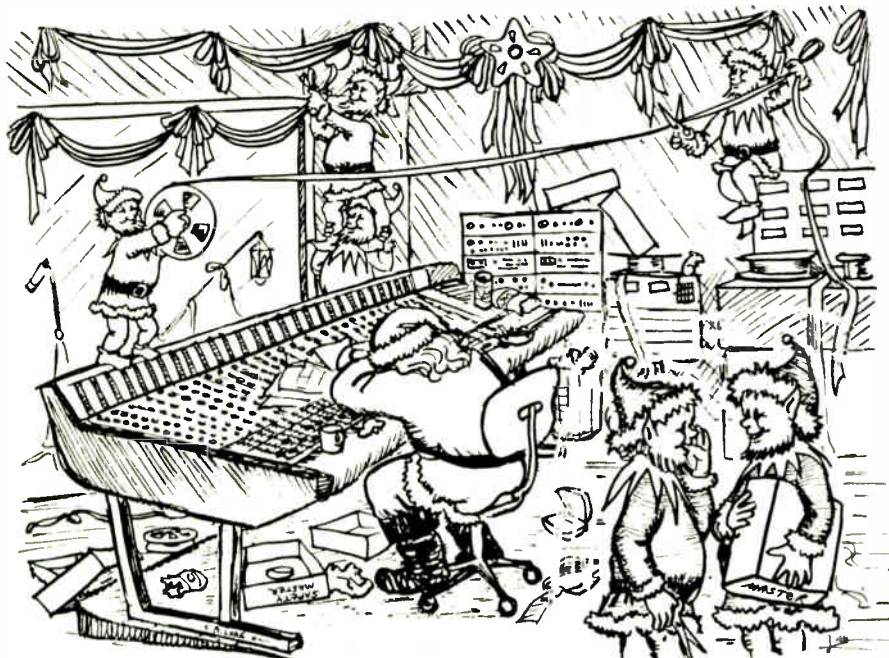
"If the music was too chordy and too arranged, it wouldn't be anything we wanted to do. We kept it as loose as possible so everyone could improvise to a certain extent."

who had spent several years as Todd Rundgren's rhythm section. While in the studio and on the road, Bowie and the Sales brothers began developing a musical cohesiveness.

"When we did the *Lust For Life* tour, David was playing piano," Tony Sales says. "At sound checks we would jam around and started developing things that we would jam around with every day. This thing could have gone on then, but it just wasn't time yet."

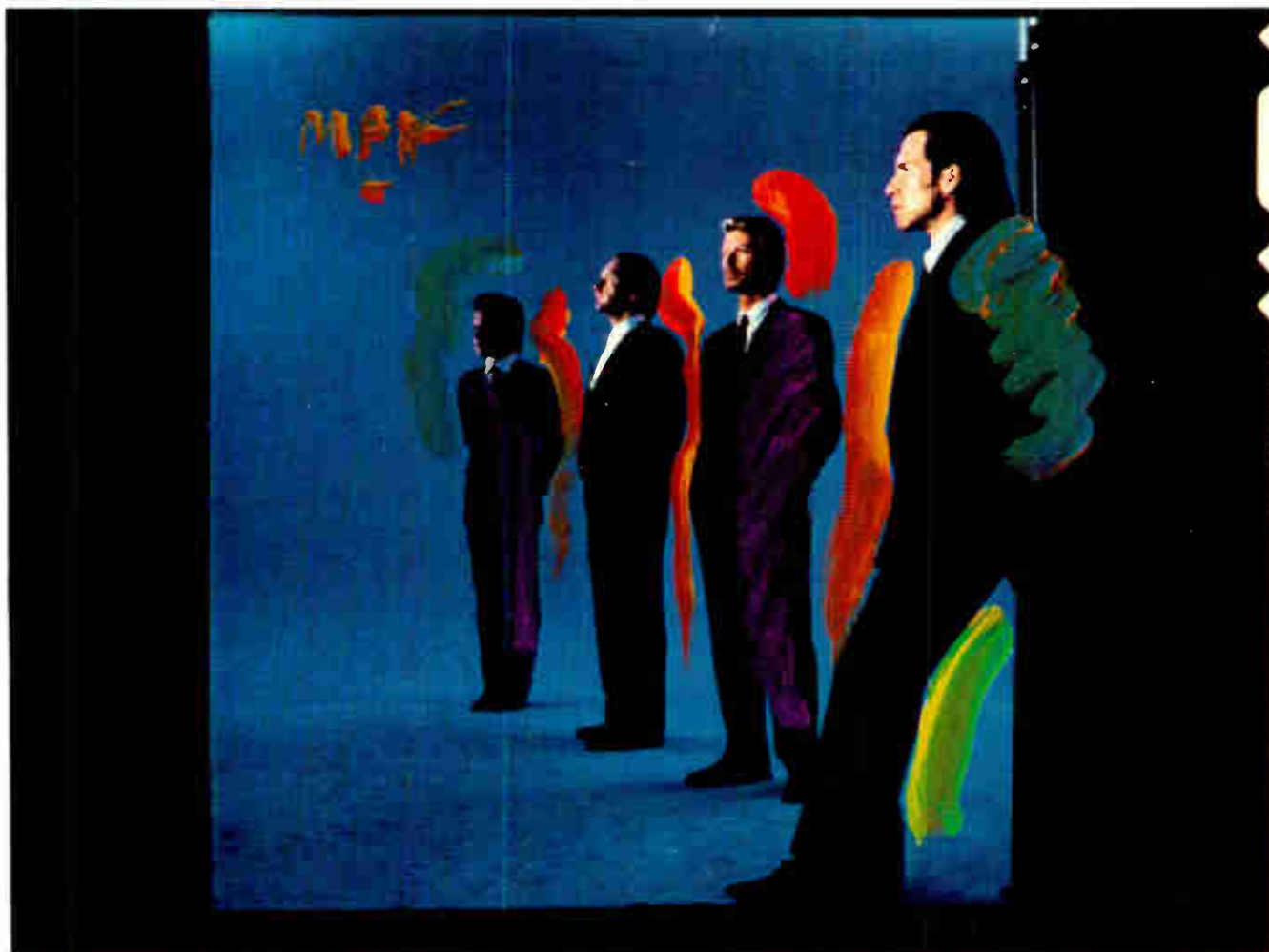
A decade passed, with little contact between Bowie and Sales. Then, at the end of Bowie's Glass Spider tour, two things happened that almost immediately flung Tin Machine together: Bowie received a tape from one of his employees featuring her husband's guitar playing; and he ran into Tony Sales at a party celebrating the end of the tour.

On the demo tape was Reeves Gabrels, a New England-based guitarist who had spent years gigging in clubs and recording. Says Bowie of



"BOY, WILL HE BE SURPRISED! TOO BAD ALL THIS RIBBON IS BROWN."

ILLUSTRATION: NEIL YOUNG



Gabrels, "He was very selective, very clever. [For his tape] he had picked out all the great bits of guitar playing he had done and therefore I didn't have to sit and listen for two hours [laughs]. That's probably why I liked him so much. He said, 'These are all my good bits, do you fancy doing something together?' And I loved the tape, so I got hold of him immediately."

When Bowie ran into Tony Sales at the Glass Spider tour party, he easily persuaded Tony to call his brother Hunt and head off to Europe to start writing and recording together. "A week later," says Tony, astonishment still in his voice, "all four of us were on a plane to Switzerland. I had not even met Reeves or heard his guitar playing."

Tim Machine, released in late spring, is hardly accessible (by Bowie standards) but seems to be a hit. It has already outsold the last few Bowie solo albums, hitting platinum in several countries. From the MTV hit "Heaven's In Here" to the relentless rock of "Under The God,"

"Crack City" and "22Video Crime," the record excels, in part due to the stark and live method by which it was created in the studio.

"It was a question of finding the right kind of music that didn't have too much orchestration," Bowie says. "The only music I know that comes that free on, and only has two or three chords, is rock'n'roll. If the music was too chordy and too arranged, it wouldn't be anything we wanted to do. We wanted to put our own personal individualities into what we were playing. We kept it as loose as possible so everyone could improvise to a certain extent."

Upon arriving in Montreaux, Switzerland (where Bowie has a home), the four musicians began writing songs together. They set up shop in Mountain Studios, the recording facility owned by members of Queen that is housed in a hotel/casino complex.

"We recorded in the casino room itself," says Tony Sales. "It wasn't the time of year for the tourist trade to be happening, so the casino was

shut down. We had this huge, airplane hangar-type room. They had sliding walls and walled off half of it. It gave us this big drum sound." The drums were placed on an elevated platform; since the control room was located on another floor in the building, the band often felt like they were simply jamming in a rehearsal hall.

The band wrote and recorded 35 songs there in six weeks, working nearly every day from 11 a.m. to 8 p.m. A few months later they regrouped at Compass Point Studios in Nassau, the Bahamas, to finish the album. The album was recorded on a Neve console built in the '70s; this particular Neve board, Hunt Sales says, "had harmonic distortion. It sounds great. After the album was recorded, we mixed on an SSL to give it some of that radio gloss."

Tony Sales says that at Mountain Studios, the album "was recorded totally live all at once, except for David's vocals. He'd go in and cut a track—he'd say, 'I want to try one,' and we'd be watching on the moni-

tors, and he'd put this incredible vocal down. It was really inspiring. Then he'd come up [to the control room] and say, 'I want to try it just one more time,' and we'd say, 'No, that's it. Once for us, once for you. You got it.' It was a performance album."

The album was produced by all four band members, along with engineer Tim Palmer, best known for his work on Robert Plant's *Now & Zen*. "We wanted to have another objective ear there for us," says Tony. "We brought Tim Palmer in, and he

gave the project some real excitement. He's young and willing to take chances. He had a lot of great ideas and sounds and techniques for mic placements and things."

Palmer, with engineers Justin Shirley-Smith and Dave Richards, captured the band's rawness while coming up with a good-sounding record. They recorded Tony Sales' bass three different ways at once: through a direct input to the board, and through two miked amps, one in the same room as Sales, the other set up two stories above the studio. Sales says, "We usually combined the three to get the best sound."

The record also features a wide-open and powerful drum sound. "I left my drums tuned real open, real loose like a jazz set," says Hunt Sales, who was responsible for most of the album's drum sounds. Hunt owns and operates a Hollywood studio called the Brotherhood Pavilion, where for six years he has concentrated on learning innovative drum miking. On the album, however, Hunt used "all the standard stuff because it works so well: Neumann U87, Shure 57s and 58s, AKG 414s, an 87 along with a Shure 57 on my kick. I used no triggering or sampling at all. There's a lot of dynamics on the record; you lose a bit of that once you start sampling and triggering, and then you're back to a drum machine. I tried to go for something kind of natural, like I did for *Lust For Life*," Hunt says.

According to Bowie, nearly all the lyrics—which deal with issues such as crack addiction, the rise of racism among young people, and TV evangelists—were written on the spot just before they were recorded. "This exercise was good form," he says. "The lyrics were impressionistically written. They were whatever came into my mind and whatever suited the music."

After leaving Switzerland and taking an extended break, Tin Machine resumed the project at Compass Point in Nassau. Equipment breakdowns kept the band idle, and they soon decided to try a live show. "The first gig we ever played was at a club in Nassau," Tony says. "We had been stuck in the studio for weeks and were going nuts, so we went down to this club and used the equipment of the band there. We just showed up and 400 tourists saw us play. When we first got up, they didn't realize it was David Bowie. Then people started going, 'My God, that's David Bowie!'"

The impromptu, hour-long show was such a success, the band decided to tour after the album was finished. They appeared at two small club shows in New York and L.A. before heading to Europe to play several small theaters. They made their U.S. debut playing for 20 million viewers last May on ABC-TV's "International Rock Awards." Critics and fans responded with raves, giving the band enough support to plan an extensive world tour, which

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Bowie has agreed to put his solo career on hold for a while in order for Tin Machine to keep recording and touring without an extended break. "It's dependent on how we all keep getting on with each other musically and personally," Bowie says. "I hate to put a limit on it. I'd like to think we've got at least two more albums in us. But you don't know, do you?"

"None of us are kids and it's infrequent that a band of people like us who've been through what we've been through would get together and still rock," he adds. "The enthusiasm you derive from that knowledge is fantastic, knowing that you still want to play this kind of music for the real reason of expressing yourself."

After pausing a moment, he adds, "It's been such a blast to work like this."
—Bruce C. Pilato

—FROM PAGE 117, FIELD TEST

vantage of available RAM whenever possible, making it quite fast for most tasks. But there are occasions when heavy (and time-consuming) number-crunching is inevitable. High on my wish list would be a cancel command that gives you the option of aborting time-consuming operations, and a "percent complete" dialog box to let you know how long it would take to finish a given operation. Finally, more than once I wanted to rename a previously captured region, but the software didn't let me edit the names. Also, when naming a captured region, I'd love to be able to see what names I had used for previously captured regions.

Those nitpicks aside, I found Sound Tools to be a remarkably powerful, flexible tool for digital audio production, and a cost-effective alternative to other hard disk recording systems, especially if you already own a Mac. The \$3,285 price tag includes Sound Designer II, Sound Accelerator, and your choice of the AD IN or the DAT I/O unit. If you want both boxes, the extra one can be purchased separately for another \$995. And while you have your checkbook out, you might want to think about getting a hard drive for all the soundfiles you'll be creating. ■

Paul Potyten is associate editor of Mix, and a recovering musician.

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—FROM PAGE 116, SOUND TOOLS

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On the DSP side, Sound Tools offers such options as FFT, EQ, pitch change and time compression/expansion. However, by using *MultiFinder* (a Mac application that lets you open and switch between multiple programs), you can open into other programs such as Turbosynth. By simultaneously opening a defined soundfile region in both *Sound Designer II* and Turbosynth, you can affect the sound in many ways. For instance, it may be modulated by various user-selected waveforms over all or any part of a soundfile to create unearthly vocoder effects. Turbosynth also can be used as a pitch envelope generator to affect the pitch of a selected area. This is a particularly powerful tool for changing the inflection of one or more words within a phrase (thus altering its meaning or giving it added emphasis).

This application also can be used to correct for individual flat or sharp notes. For instance, a seg-

ment could be pulled from a multitrack tape, pitch-corrected and flown back in sync. Ring, phase, time shift (delay) and more are also easily attainable using this powerful program, which can be easily changed, saved and reinserted back into SDII as a region.

Sound Tools has been integrated recently into Digidesign's *Q-Sheet* MIDI event sequencer program, combining music sequencing, MIDI event triggering, MIDI automation and the hard disk/DSP power of SDII in one integrated package.

Probably the greatest selling point offered by Sound Tools is the editing power it can bring to a music, dialog or broadcast production system. However, it is important to drive home the fact that Sound Tools is a 2-channel, hard disk-based workstation; it is not a multichannel system. It cannot access and output multiple soundfiles from hard disk at one time, as can an 8- or 16-channel system. Many of you will see this as an immediate limitation, but for a

wide range of production applications, it isn't. Multichannel, hard disk systems are powerful production tools and generally excel at multiple soundfile memory management, but when you get down to it, these systems are only absolutely necessary for outputting multiple soundfiles of longer duration (as with multichannel scoring/dialog or acoustic music production from hard disk).

Within a MIDI- and sample-based music production facility, most soundfiles are shorter in length and therefore can be output simultaneously through one or more samplers, while leaving the longer soundfiles (such as instrumental solos or vocals) to the 2-channel, hard disk recorder. And in the "reel" world of 1989, the vast majority of production is done using analog or digital multitrack machines. A versatile system such as Sound Tools can let you break into the world of random-access editing and transfer the final results back to multitrack.

I'd like to finish with a caveat to

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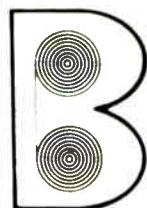


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those interested in assembling an integrated, random-access system. The first step toward knowing what system to buy is to know your present and future production needs. When checking out random-access systems, knowledge is definitely cost-effective power. For example, the pairing of Sound Tools with two E-mu E11s could provide you with 2-channel hard disk recording, editing, DSP and resynthesis capabilities, along with sampling power of up to 16 MB of RAM over a maximum of 32 voices. Such a combination would provide a great deal of audio processing power at a fraction of the cost of more expensive, multichannel, hard disk-based systems. At a cost of about \$3,285 for a Mac and related peripherals, when it comes to bang-for-your-buck, I've found Sound Tools to be pure fireworks. —David Miles Huber

—FROM PAGE 101

Italy. . . Another Milan studio, **Video-time Spa**, has ordered four identical SSL 5000 M Series Audio Production Systems for use in three of its studios and one of its remote vehicles. . . One of Brisbane, Australia's leading video production houses, **Hoyts Jumbuck**, has installed a Soundtracs IL 3632 console in its new audio post-production suite. . . Soundtracs boards have also been installed in two new Swiss facilities, **Rastral Studio** in Grenchen and **Ballhorn Studio** in Kyburg. . . Two European facilities, the UK's **Video London** and **Studio Equipe** in Brussels, have purchased Amek classic consoles for post-production work. Video London's desk is fitted with GML's moving fader automation. . . AMS Industries reports that recent orders for its AudioFile system have been placed by Puerto Rico's **Digitec**, **Novaga Films** in Portugal and **Stebbing's Recording Studios** in Auckland, New Zealand. According to AMS, 200 AudioFile systems are now in daily use in 24 countries. . . As part of a total renovation plan, **Estudio Cadena**, located in Monterrey, Mexico, is refitting its control room with a Sony MXP-3036 console. . . Also in Mexico, **Mass Cassettes** has purchased the first Sony PCM-3324A digital multitrack recorder in Latin America. ■

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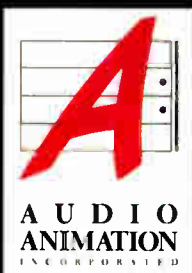
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by Mel Lambert

ARCHIVING TO DIGITAL WORM

A CASE STUDY WITH JOHN ARRIAS



“**A**ll analog tape is destined to fall apart within 15 to 20 years,” says John Arrias, seasoned producer/engineer. “If an artist spends months recording an album, we have an obligation to future generations to preserve their efforts on a medium that will be around for more than a dozen-and-a-half years!”

John Arrias knows of what he speaks. Having worked in the studio for the past 20 years with a literal Who's Who of producers and artists, he's decided to do something practical about archiving valuable master tapes.

“Analog tape just isn't designed for a long shelf life,” he says. “The latest evidence from tape manufacturers tells us that under ideal storage conditions, tape should last for 15 to 20 years. But I've come across tapes only ten years old that were in bad shape. If we go back in the vaults for material released during the '60s, the situa-

tion is even worse. My suggestion to any artist whose songs are sitting on analog tape is to transfer them to digital *right now!* Even if that means transferring them to PCM U-Matic, reel-to-reel digital or even DAT, rather than hard disk and/or WORM optical.”

At his Hollywood facility, B&J Studios, John Arrias is working on archiving the recorded work of three artists: Barbra Streisand, Quincy Jones and Neil Diamond. He also has been cataloging 30 years worth of Streisand material for a major retrospective album scheduled for release early next year.

“With access to material of that caliber,” Arrias says, “I owe it to future generations to transfer the music to a far more durable medium. The only way to go is digital optical disk, which is immune to damage from magnetic fields, has a projected lifetime of at least 100 years, and is reasonably affordable.”

WORM: AN IDEAL MEDIUM?

Late last year, Arrias recalls, Streisand started considering the logistics of her retrospective album project. "During our initial discussions, I mentioned that we should think about archiving the material—not only her records, but film/video soundtracks, interviews and other memorabilia—as we were sorting through it. I knew we'd have to edit together a great deal of material, so the only choice was a digital, random-access system. I also realized that once we digitized it, we should archive all the material to a digital medium."

Originally, Arrias considered archiving to digital reel-to-reel tape or PCM-encoded videotapes, but he soon changed his mind. "Digital tape is still magnetic *tape* and has the same physical limitations as analog. It's just as prone to damage by magnetic fields, temperature and humidity changes. The only advantage is that digital tape allows multiple generations without noise build-up and is better-sounding than analog."

In 1987 Arrias started looking for hardware that would provide random-access editing and archiving to WORM (Write Once-Read Many) optical drives. The pickings were thin, he recalls. "Only New England Digital was talking about WORM drives for their Direct-to-Disk system. I took the plunge with an 8-track system that has editing capabilities, variable crossfade times and all the rest. Having used the system for over a year, we've never had a dropout or problem with the hard disk system, and never lost a byte of data. Our WORM drive—the first in the world—was added in March.

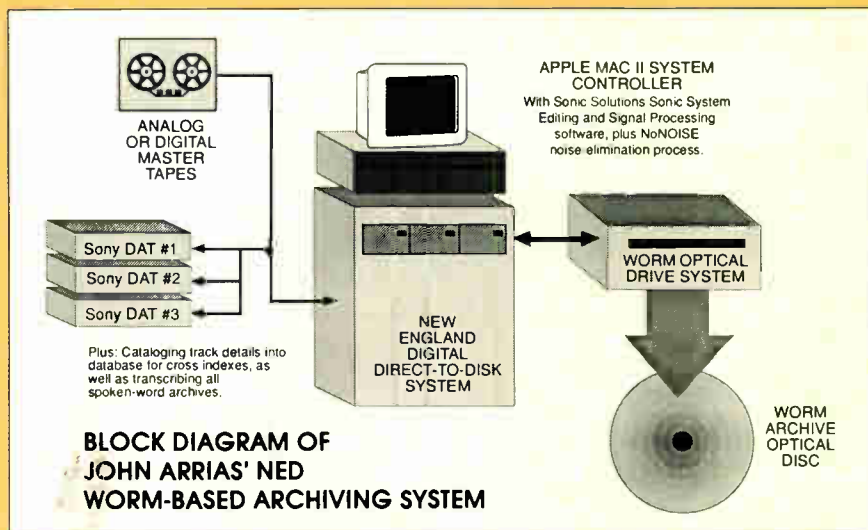
"I have much more confidence with

optical and hard disk systems than digital tape. After experimenting with DASH and PD formats, I don't feel they are sufficiently robust for long-term archiving. And for editing, nothing matches the speed of a random-access, disk-based system."

Arrias' NED Direct-to-Disk™ system features eight digital tracks of hard

the material can be archived to the WORM optical drive, which features a removable, double-sided, 12-inch WORM platter capable of recording 1.048 gigabytes (1,048 megabytes) of formatted data per side; in real-world terms, this translates to a total storage capacity of just under three hours of stereo digital audio.

The double-sided WORM optical disk, Arrias notes, "weighs roughly



disk storage, each offering up to 25 minutes of record time at a 44.1kHz sampling frequency. The system can sample at up to 100 kHz. These tracks can be reassigned freely to provide 200 track minutes of mono or 100 minutes of stereo. The system features analog and digital inputs, and stores information initially to hard disk. Then, during a second digital transfer,

three pounds and physically resembles a large floppy [disk]. It has a shutter to cover the disk when it's out of the drive, to prevent dirt from contaminating the surface."

ANALOG-TO-DIGITAL TRANSFERS

After receiving the master tapes from the record label, Arrias first establishes correct azimuth, replay and noise-reduction levels. "If there are no tones on the tapes, we'll experiment with azimuth and playback levels until it sounds best. With mono tapes we es-



establish azimuth by replaying the tape on a stereo machine, routing the outputs through two console input channels and flipping one of them out of phase with respect to the other. Then, while adjusting head azimuth, we listen for phase cancellation. We can then transfer the material off one side of the 2-track head.

"If we get a tape that's in bad shape, we adjust levels and azimuth, and get the transfer in just *one* pass to minimize tape handling. Sometimes, while replaying analog tapes that have been stored badly—or are just old—they

can stick in the guides and/or shed oxide across the heads. For these tapes we have a specially adjusted Otari MTR-12 2-track, with hand-tuned tape tension. We have that and an Ampex ATR-100; we might find the tape sticks on one, but not on the other. During the transfer process, we always have somebody with their finger over the stop button just in case the tape jams."

Analog output from the transfer console is connected to the Direct-to-Disk and three Sony DTC-1000ES DAT machines. No EQ or compression is added during the input process. "For the analog material we're using a

44.1kHz sampling frequency, because that's the standard for CD mastering," Arrias says. Digital sources in ProDigi 2-track (Mitsubishi and Otari), AES/EBU, SPDIF or SDIF-2 ("1610/1630-compatible") formats are connected to the Direct-to-Disk using the latter's interface ports and Universal Digital Input/Output (UDIO) card.

"The Sony DAT copies serve a dual purpose," Arrias explains. "For Barbara's retrospective, I'm using the tapes to select material prior to digital editing. It's a fast way of auditioning several hundred hours of material. For the Quincy Jones and Neil Diamond archiving sessions, we send a DAT copy with the final WORM optical disks, plus a cross-referenced database of the material we're entering on a per-master basis, using an Apple Macintosh and *FoxBase* software.

"Now that the material is in the digital format, there's no degradation after multiple copies. We've done A-B comparisons between the original analog sources and material that's been bounced on and off the Direct-to-



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Storage Conditions for WORM Disks

Permanent Storage

Temperature: 14 to 122 degrees F

Relative Humidity: 10% to 90%

Temperature Coefficient: Less than 27 F per hour

Atmospheric Pressure: 75 to 105 kPa

Transport

Temperature: 14 to 140 degrees F

Relative Humidity: 5% to 90%

Temperature Coefficient: Less than 36 F per hour

Atmospheric Pressure: 75 to 105 kPa

Projected Life

In excess of 100 years

Disk's hard drives, and re-recorded onto and back from the WORM, and we cannot hear the slightest sonic difference."

NO CHANGES DURING ARCHIVING

"We break up the storage space on each WORM drive into cues or categories," the producer continues, "and archive an entire album side at a time, with the same track spacing and EQ

as the master tape. We can directly audition the cues stored on the WORM or transfer them back to the hard disk. With the current software, we can only audition in real time from the beginning of a cue; if we want random-access to any section, we need to bounce the files back to the hard drives. Because the digital data trans-

Optimum Tape Storage Conditions

Like all materials, analog tape has a finite life. Stored correctly, your multitrack and stereo masters should last for up to 25 years, maybe more. But what are the best storage conditions?

The following guidelines will help ensure that your master tapes are in prime shape when you need to reissue the titles or re-edit them for subsequent release. Of course, their life can be extended pretty much indefinitely if you transfer them onto a non-perishable digital medium: magneto-optical, WORM or similar, non-tape formats. In the meantime, if you have tape libraries, read on.

Experts much agree that for tails-out, vertical storage of reel-to-reel ¼-inch, ½-inch, 1-inch and 2-inch master tapes, the following represent "optimum" conditions:

Temperature: 68 degrees F, ±3 degrees; +20 degrees C, ±1.02 degrees.

Relative Humidity: 35% to 40% (with day-to-day operational ranges of 68 to 77 degrees F, 20 to 25 degrees C).

fer from hard disk to WORM and vice versa takes twice real-time, we make sure everything is correct on the hard drive, then archive it to the WORM drive.

"These transfer processes also tie up the whole Synclavier and Macintosh controller. We expect a future software release to provide multitasking so we can archive to WORM in background mode. Alternatively, I might invest in a dedicated 'Mini Direct-to-Disk' system, equipped with a hard drive and WORM optical, to use for archive transfers."

Arrias says he prefers to build up WORM disks from complete album sides as a continuous file. "I don't want to break up the material into

smaller cues—which would also provide individual access to, let's say, each song—simply because we might add a gap or crossfade that was picked up incorrectly during the digital transfer, and would be an artifact. I might be a second or two off in the timings when we put the cuts back together. I know how much thought goes into calculating and trying out different spacings and sequencing. A second or two of timing errors can easily upset the flow of an album."

ARCHIVING SCHEDULES

With his staff, John Arrias is transferring the equivalent of two complete albums during a 12-hour session. "At this rate," he laughs, "I estimate it will take two years to archive Quincy's 2-track masters. Then we'll move onto outtakes, plus film and video soundtracks!"

It takes about two hours to transfer the analog or digital tapes to the Direct-to-Disk system, Arrias says, then another two hours to archive from hard drive to the WORM optical. "To cover all bases, I allow six hours per album. Two people work on each archiving session: One handles the audio-transfer process, and the other types labels for the DATs and tape reels, and enters data into the Macintosh FoxBase software."

Once the material has been archived to optical disk and an artist plans to re-release the material, "we can load the material back from WORM optical disk to the Direct-to-Disk, then edit the tracks and re-sequence them. We can even process the audio using our Sonic Solutions Sonic System, which offers real-time EQ and dynamics control plus full editing with variable crossfades, offline de-clicking and de-popping. The NoNOISE option is extremely useful for cleaning up noisy tracks, or when we're working with archive material that has been lifted from old acetate refs."

For the Streisand retrospective, Arrias ended up with three to five hours of edited material, which involved much time in sequencing and re-equalizing. "Working directly with the Direct-to-Disk and Sonic System lets us handle all those functions here in the studio, using our own Mac-based desktop audio production system. The two systems interconnect via their digital ports, so we can transfer files from one to the other and retain first-generation audio."

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PLAYBACK

Although both systems feature powerful digital editors, Arrias tends to use the NED system for routine editing tasks, sliding tracks and multitrack bouncing, and the Sonic System for processing functions, including cross-fades, compression, gates and automated mixing.

When working with the Direct-to-Disk, Arrias can intermix sampling frequencies on the WORM drive. "We

always use the same sampling frequency as the master digital source, either 44.1 or 48 kHz, or maybe 96 kHz from the newer Mitsubishi X-86HS decks. That capability has been useful on Barbra's album, where a lot of material came in different formats and at different sampling frequencies."

After the archiving process is completed, the WORM disks are returned to the artists. "We are also seriously looking into the possibility of using underground missile silos for long-

term storage," Arrias says. "If we made two WORM copies, we could store them in two separate locations, anywhere that's away from the earthquake belt on the West Coast!"

How much does his archiving service cost? "It works out to around \$1,500 per album, including materials: the WORM, DAT and FoxBase diskettes. We can fit three albums onto one WORM disk. Considering the cost of recording an album—upward of \$100,000—it's a small price to pay." ■

"I owe it to future generations to transfer the music to a durable medium. The only way to go is digital optical disk, which is immune to damage from magnetic fields, has a projected lifetime of at least 100 years, and is reasonably affordable."

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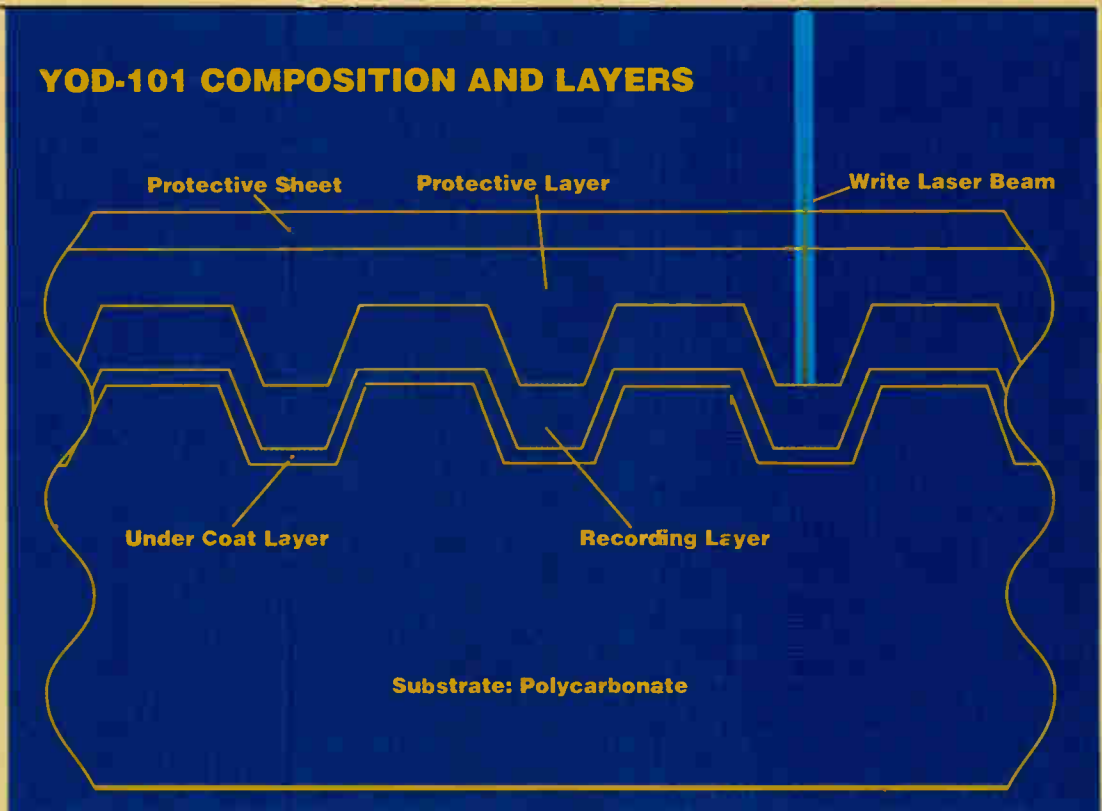
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by Phil De Lancie

PDS PUTS CD REFS WITHIN REACH

YOD-101 COMPOSITION AND LAYERS



In July's "After-Mix" I wrote that DAT, while then stalled on the consumer front by the record industry, seemed to be winning rapid acceptance in the professional recording community. More convenient than PCM-F1 and far less expensive than professional digital recorders, DAT is proving very handy for a variety of studio and mastering applications. With both F1 and DAT having demonstrated the degree to which consumer digital designs can find a home in the professional world, there is little reason to think the trend will stop now. The next crossover candidate, of course, is the recordable CD.

Development continues on various recordable CD systems targeted to consumers, but the unveiling of a truly market-ready unit still seems some way off. Professional users with a market for one-off CDs have had to wait right alongside audiophiles, because Write Once Read Many (WORM) optical recorders, although available for some time, are not designed to record discs conforming to CD-Audio standards. But the U.S. introduction of Yamaha's Programmable Disc System (PDS) finally brings recordable CDs from the laboratory to the studio.

Yamaha developed PDS for various professional uses, including the prep-

Fig. 1: Cross section of the YOD-101 recordable CD. During recording, the laser passes through the protective layer and etches a pit into the opaque recording layer, which reveals the reflective undercoat.

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AFTER MIX

ation of one-off or reference discs for both CD-ROM and CD-Interactive (CD-I). Blank discs are manufactured exclusively for Yamaha by Fuji Film. The system is distributed in the U.S. by Datalink, a Minneapolis-based company described by Craig Henson, manager of special products, as a "systems integrator." PDS fits in nicely with Datalink's presence in the CD-I field, but the company turned to New York's Gotham Audio to handle the pro audio market. According to Gotham's Joe Leon, at least three systems sold by Gotham are installed or on their way to mastering houses for making CD reference discs. A fourth system is up and running at Nashville's Georgetown Masters. In the following conversations, Datalink engineer Greg Griffin, who trained on the system with Yamaha in Japan, gives an overview of technical and operational considerations, while Georgetown co-owner Denny Purcell (who had the unit installed for just one week when we spoke) provides a mastering house's perspective on owning the system.

Mix: Let's start with a rundown of the system's various components.

Greg Griffin: In order to burn a disc, there are three items one needs to purchase from Yamaha. There is the encoder (the YPE-101) and the YPR-101 (the recorder). The third piece is a controller, which is a board that plugs into an IBM PC/AT or compatible with a color graphics monitor and at least a 20-meg hard drive. The board controls the writing of the disc. Along with the hardware, you receive software that allows you to set up the system to run a disc. The PC runs the system by sending commands to the encoder. The encoder also is set up to be connected to the output of a Sony PCM-1630 digital processor. That is where you get your word-sync and two channels of digital audio. So all the digital data passes through the encoder. The other input to the encoder is SMPTE time code, which comes from a DMR-4000 or other device.

The encoder serves two main purposes. One is to perform the EFM encoding on the data for writing out to the recorder. The other is to control the recorder, sending control signals to it. It also communicates with the PC running the software, transmit-

ting and receiving control information. The encoder's output to the recorder is via MIDI. That MIDI may be daisy-chained between recorders, so there is a MIDI in and out on each recorder for linking together up to five recorders. The last recorder has a terminator. There also is an output from the encoder for a transport remote line to the DMR-4000.

Mix: I haven't heard of MIDI being used in that particular application.

Griffin: MIDI was already designed, and they already had a chip available for the conversions and control of the MIDI handshaking. Evidently, MIDI was fast enough to pass the specifications they needed to send data out to the recorder. So that's what they decided to go with.

Mix: What goes on once the data gets to the recorder?

Griffin: Several different lasers are inside the recorder. There is one main write laser. A second tracking laser is used to follow the tracks that have been premolded into the disc. And a tilt laser is used to change the angle of the write head. If you have a warped disc, the tilt laser is used to maintain a 90-degree angle of the laser to the disc surface.

During recording the write laser goes through the protective sheet and ablates the recording layer [see Fig. 1]. The undercoat layer is metallic, and after the recording layer has been burned away, that's what reflects back when the disc is being read.

Mix: What does an operator do to produce a disc?

Griffin: The basic write procedure starts out by creating a table of contents [TOC] file on the PC. You determine how many selections and how many index points per selection. Once that information is in a file, and you are connected to the 1630 and your auxiliary equipment, you can start to write. With a blank disc in the recorder, the encoder will start to write to the lead-in area of the disc using the TOC file. Once the recorder finishes writing the lead-in area, the encoder sends a command down the remote line to the DMR-4000 and tells it to start to play. As it plays, the recorder writes to the data area on the disc, using the PQ information that you set up on the PC. As soon as it is finished, it writes the lead-out area and ejects the disc.

The system has a very good error-checking mechanism. As the discs are

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AFTER MIX

recorded, it logs any errors out to a printer or a file. There also is an on-line screen on the PC that shows errors and status information like "DMR standby" or "DMR play." It monitors the tracking servo, and if there is a bad disc, recording stops. Typically a bad disc will generate a track jump, where the write head actually jumps from one of the premolded tracks to another. The tracking laser will pick that up.

Mix: Does the disc have to be recorded from start to finish in one continuous pass?

Griffin: Yes.

Mix: Gotham Audio supplies the system with a software package of its own making. What advantages does it offer over the Yamaha software?

Griffin: Gotham has an enhancement to the software provided with the system by Yamaha. It is used in addition to the Yamaha software, not in place of it. As I understand it, their software reads PQ coding that is already written on a 1630 tape and puts it into a format the Yamaha system can understand. It creates a TOC file that looks as if it were a file created from scratch with the Yamaha software, then places it in the Yamaha directory. So when you bring up the Yamaha software, you see the TOC file created by the Gotham software, which you can use for writing a disc. The intention is to make the system adaptable to the way many tapes are prepared for the cutting of the master CD.

The Gotham software also converts the cue information that is sent in on a timing sheet, from the 1630 tape's frame rate to the frame rate of a CD. The 1630 is at 30 frames per second, CD is at 75 fps. The software helps you convert those numbers for a CD TOC file. It can be done without the software, but you have to figure it out for yourself, so it is more time-consuming.

• • •

Mix: Was your initial interest in making CD refs in response to existing client demand or in anticipation of future demand?

Denny Purcell: Both. Like anybody who runs a business, I look at a profit-and-loss statement every month and see things that are happening. A year ago, 26 percent of Georgetown Masters' overall picture was lacquer mastering. In August this year, that was

down to 8 percent. Up to now, producers have been approving their projects from an F1, DAT or reference lacquer. Approving a project from a reference lacquer, which they've been doing for over 20 years, might not be the way to do it in this day and age, because it doesn't fairly represent the end product. That is hopefully what we do with refs, take the producer as close as we can to the end product so he will see what it looks like to the consumer.

The question I hear from producers is: "What's this going to sound like on a CD?" Before, the answer always had to be they would see in three to five weeks, when the CDs came back from the plant. The only other way for somebody who absolutely had to have a ref was to have someone cut an actual glass master. Some producers have F1 at home, and more and more have been buying DAT machines. But almost everybody has a CD player. So what I did wasn't earth-shattering, but was just a matter of reading the signs.

Mix: A number of recordable CD systems are supposed to be in various stages of development. How did you settle on the Yamaha unit?

Purcell: For a year-and-a-half I was trying to find a recordable CD system. I have just about every piece of digital gear that Sony makes, but even Sony couldn't help me, because their recordable CD system wasn't in existence yet. Last January I read that Yamaha had one available. I checked my sources in Japan to see who else had a workable system at that time, and it turned out that Yamaha was really the only one.

Mix: Now that you've got the system installed, what kind of interest level is there among your clients in having CD refs?

Purcell: Almost every client who knows about it wants one.

Mix: The cost of the system has been reported at anywhere from about \$18,000 in Japan to \$60,000 in the U.S. Can you shed some light on which is closer to the truth?

Purcell: I was curious about the \$18,000 figure. That's what I initially tried to buy the system for. But that price doesn't refer to the bottom line on a complete package. Also, it depends on the yen-to-dollar exchange rate on a particular day. Gotham is selling the system they put together for \$49,500. I have a system that cost

—CONTINUED ON PAGE 178



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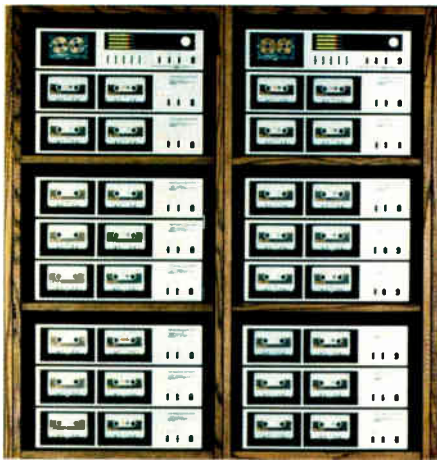
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Future Disc Systems provides full digital and analog mastering and complete digital editing for compact disc, record, R-DAT and cassette. **Facility Managers:** Gary Rice and Susan West. **Office:** Laura Gonzales, D'Ann Binkley. **Engineers:** Steve Hall, Tom Baker, Dennis Bouch, Eddie Schreyer.

Future Disc is comprised of three custom mastering suites. Analog consoles are equipped with Sontec equalizers and compressor/limiters. There are Studer and Ampex tape machines. Cutting lathes are Ortofon and Neumann. The Harmonia Mundi digital consoles contain digital

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Services & Equipment Offered:

MASTERING: Cutting Lathes: all lacquer cut at EMI Capitol. **PRESSING:** (26) automatic Lened presses. **Capacity:** 60,000 per day, 12"; 18,000 per day, 7". **Vinyl Used:** Keysor KC 588. **Other Services:** labels, sleeves, inserts, jackets, packaging. **TAPE DUPLICATION:** **Mastering:** Chrome on 1/2" Studer/DAT backup. **Duplicators:** Electro Sound 800 w/HX Pro. **Capacity:** 35,000 to 50,000 per day. **Method of Duplication:** Bin-loop. **Tape Used:** BASF. **Shell Used:** Michelex, Kyric, Lenco. **Duplicating**

Speed: 64:1. **Loading Equipment:** King 790. **Printing on Cassette:** Apex. **OTHER SERVICES:** J-card printing and design. **Compact Discs:** complete service-preparation, packaging; Blister Pak long box. Jewel boxes, shrinkwrap, layout and design. **Graphic Department:** layout and design from photos, rough copy, etc. Typesetting, inserts, booklets, etc. Special rates on combined orders. Drop-shipping, special packaging. Send for our brochure for complete information.

BUSINESS PAGES!

TAPE TO DISC

Listings of Mastering, Pressing, Tape Duplication and Compact Disc Facilities

Information in the following directory section is based on questionnaires mailed earlier this year and was supplied by those facilities listed. *Mix* claims no responsibility for the accuracy of this information. Personnel, equipment, locations and rates may change, so please verify critical information with the companies directly.



The transfer rooms at The Lacquer Channel in Toronto were designed by Terry Medweddyk of Group One Acoustics, Inc., also of Toronto, and utilize a heavily modified Neve mastering console with a transformerless transfer chain. In the background to the right of the two Studer A80 recorders is a Sony PCM 1630 system. Photo: Barbara Cromwell.

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Mix listings procedure: Every month, *Mix* mails questionnaires to recording studios and/or other vital facilities and services for the recording, sound and video production industries. There is a charge to list a Boldface Listing (name, address, contact) and an Extended Listing (equipment, credits, specialization and photo or logo). If you would like to be listed in a *Mix* Directory, write or call the *Mix* Directories Department, 6400 Hollis Street #12, Emeryville, CA 94608; toll free 800-344-LIST!

Upcoming Directory Deadlines:

Southeast Recording Studios: **December 15, 1989**
 Video Production/Post-Production Facilities: **January 15, 1990**
 Northeast Recording Studios: **February 16, 1990**



BusinessPages! Services Key

BusinessPages! half-page ads feature a box with letter abbreviations for the types of services the advertiser offers. The key to these business services is as follows:

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| ARM Audio Recording, Music | CDM Record/CD Mastering | SDS Studio Design/Supply |
| APPV Audio Post-Production for Video | SR Sound Reinforcement | CDP Record/CD Pressing |
| VP Video Production | MMD MMD Production | RLR Remote/Location Recording |
| TD Tape Duplicating | APPF Audio Post-Production for Film | |

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All pro audio publications run press releases on new products. But NO other magazine goes beyond the press release like *Mix*, to bring you comprehensive coverage and practical information on new products. And no other magazine has editors with more hands-on experience in using the products they write about. In fact, *Mix* is the only pro audio magazine with a full-time products editor.



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Preview—Up to 15 new products debut each month. Reader service numbers make contacting the manufacturer simple and direct.

Hot Off the Shelf—“HOTS” presents those products coming to market as *Mix* goes to press; including list price and manufacturer's phone number.

Sound Reinforcement Product News—A booming live sound industry means more new products; basic specs, photo and list price. Includes reader service number.

Auditions—George Petersen evaluates equipment, software, books and videos in his own production studio. Three capsule reviews every month!

Field Test—Leading industry pros provide the most thorough product reviews in the industry—



with an emphasis on practical applications and techniques.

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MIX THE RECORDING
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TAPE TO DISC

DIRECTORY

Listings of Mastering, Pressing, Tape Duplication and Compact Disc Facilities



CASSETTE EXPRESS
(DIV. OF AL JOLSON ENTERPRISES, INC.)
Nashville, TN

tion: In-cassette. Mastering Equipment: Dolby A/SR, dbx Type I, Nagra IV-S, R-DAT, Super Beta, VHS, Nakamichi DMP-100, Studer A810. Tape Used: Agfa 649, BASF Chrome II, Ampex 456 Shell Used: Lenco, Michelex. Duplicating Speed: 1:1, 2:1, 8:1. Rates: Competitive rates, please inquire. Other Services: Printed labels.

AGFA CORPORATION
Ridgefield Park, NJ

AGFA CORPORATION; Mastering, Tape Duplication; 100 Challenger Rd., Ridgefield Park, NJ 07660; (201) 440-2500. Contact: Andrew Da Puzzo, national sales manager. **MASTERING.** Other Services: Studio mastering tape products: PEM469, PEM468, PEM369, PEM526 bin-loop tape and R-DAT cassettes—R:60, R:90, F:120. **TAPE DUPLICATION.** Other Services: Bulk audio cassette tapes: PE619/919, PE649/949/1249, PE647/947 (Chrome); R-DAT duplicator cassettes.

AIR CRAFT RECORDING AND REAL TIME DUPLICATIONS SERVICE; Tape Duplication; Dormont Square, Pittsburgh, PA 15216; (412) 343-5222. Contact: Barney Lee. **TAPE DUPLICATION.** Duplicator: Nakamichi MR-2 professional cassette decks. Capacity: 750 album-length tapes per day. **Method of Duplication:** In-cassette. **Mastering Equipment:** Otari MTR-10 (15 and 30 ips), Sony 3402 digital reel-to-reel, Beta/Sony PCM 1/2" digital processor, Fostex 20. **Tape Used:** BASF CrO, Agfa CrO, Shape, Lenco 5-screw housing. **Duplicating Speed:** Real-time cassette duplication at 1 1/4 ips. **Loading Equipment:** Custom loading to length. **Packaging Equipment/Fulfillment Services:** Complete custom printing/art/application and insertion/shrinkwrap/packaging. Apex printing. Rates: Call for rates. Other Services: 1/4" reel-to-reel copies.

ALIGNED AUDIO INCORPORATED; Pressing, Tape Duplication, CD Services; 151 22nd St., Brooklyn, NY 11235; (718) 788-6969; FAX: (718) 499-0421. Contact: Inquiries **MASTERING.** Cutting Lathes: Neumann. Console: Custom-built. **Tape Machines:** Studer. Monitor Speakers: MDM-4, Infinity Kappa 6. Quad ESL. Signal Processing: Dolby, Orban EQ, Aphex, dbx. **Burwen PRESSING.** Presses: Hamilton special, fully automatic. Capacity: 12,000 per 24 hours. Vinyl Used: Super quiet, dye-colored, audiophile quality. Rates: Competitive. Other Services: Plating, insert and label printing, special packaging, fulfillment, drop shipping, DMM. **TAPE DUPLICATION.** Duplicator: Otari, real-time. Capacity: Bin-loop: 5,000 per day; real-time: 1,000 per day. **Method of Duplication:** In-cassette, bin-loop. **Mastering Equipment:** Studer, Otari, MDM-4 near-field monitors, Sony, Fostex. **Tape Used:** BASF Shell Used: Shape, Michelex, Swire. **Duplicating Speed:** 32:1, 16:1, 2:1, 1:1. **Loading Equipment:** Otari, AVA. **Packaging Equipment/Fulfillment Services:** Drop shipping, mailings. Rates: Competitive. Other Services: Special packaging, open-reel duplication, DAT copies, quality control. **COMPACT DISC.** Preparation/Manufacturing: PCM-1610 or -1630 to PCM-1630 CD master, coded and analyzed. Reduction of artwork and layout for CD graphics.

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AMERICAN MULTIMEDIA, INC.; Tape Duplication; Route 8 Box 215-A, Burlington, NC 27215; (919) 229-5554; FAX: (919) 228-1409. Contact: Tim Mallard. **MASTERING.** Console: Neve 8108. **Tape Machines:** Otari, Studer. **Monitor Speakers:** UREI, JBL. **Signal Processing:** dbx, Dolby A, B, C and SR capabilities, Aphex, Lexicon. **Engineers:** Richard Clark, Howard Hoyt. Other Services: Digital processing: Sony 1610 and 1630, JVC BP-90 and Nakamichi DMP-100, Sony 1630. **TAPE DUPLICATION.** Duplicator: Concept Design, Electro Sound, Gauss. Capacity: 100 million annually. **Method of Duplication:** DAAD and bin-loop. **Mastering Equipment:** Studer A80. **Tape Used:** By customer request. **Shell Used:** By customer request. **Duplicating Speed:** 64:1, 80:1. **Loading Equipment:** 36 Concept Design modifications. **Packaging Equipment/Fulfillment Services:** Apex printing, Ilseman labelers, Scandia wrappers, Sentinel blistering, F-20, HS-3 and A-22 Shanklin. **COMPACT DISC.** Preparation/Manufacturing: 4-color process and 5-color booklet and inlay card printing.

APEX MACHINE COMPANY; Tape Duplication; 3000 NE 12th Terr., Ft. Lauderdale, FL 33334; (305) 566-1572. Contact: Bob Coningsby.

AUDIO ANTICS WEST; Tape Duplication; 156 W. 94th St., New York, NY 10025; (212) 662-8685. Contact: Susan Winthrop.

AUDIO CRAFT CO.; Mastering, Tape Duplication; 2701 E. Sunrise Blvd., Ste. 406, Ft. Lauderdale, FL 33304; (305) 563-0553 (Florida); (800) 432-0405. Contact: Lonny Kelem. **MASTERING.** **Tape Machines:** Sony, Sony DAT, Sony 601, MCI, Studer Revox, Nakamichi, Otari. **Monitor Speakers:** E-V. **Signal Processing:** Lexicon, dbx, EXR, Dolby, UREI, Symetrix. Rates: Upon request. **TAPE DUPLICATION.** Duplicator: Studer Revox and Sony, Sony DAT, Sony 601, Telex, Nakamichi F-1. Capacity: 1,000 real-time per day, 2,000 high-speed per day. **Method of Duplication:** Real-time, high speed; in-cassette. **Mastering Equipment:** Sony DAT, Sony 601, Nakamichi F-2, MCI/Sony reel-to-reel. **Tape Used:** Agfa, BASF, TDK. **Shell Used:** Shape, ICM, Magnamedia. **Duplicating Speed:** 16:1 and real-time. **Loading Equipment:** King, TTL. **Packaging Equipment/Fulfillment Services:** Full packaging as required. Rates: Upon request. Other Services: Voice-overs, mastering, editing.

CASSETTE EXPRESS (DIV. OF AL JOLSON ENTERPRISES, INC.); Tape Duplication; 114 17th Ave. S., Nashville, TN 37203; (615) 244-5667. Contact: Mark Capps. **TAPE DUPLICATION.** Duplicator: KABA real-time system w/(86) decks, (42) dual. Capacity: 970 C-45s per shift. **Method of Duplication:**

CLARITY REAL-TIME CASSETTES
Waterville, ME

CLARITY REAL-TIME CASSETTES; Tape Duplication; Main Street, 1 Post Office Sq., Waterville, ME 04901; (207) 873-3911 (Maine); (800) 458-6405. Contact: Michael Pepin, Bill Wheeler. **MASTERING.** Console: Custom-designed, semi-automated with exclusive computer loopback. **Tape Machines:** Custom-modified, computer-assisted Studer Revox B-215. **Monitor Speakers:** Custom-designed digital loopback monitor system. **Signal Processing:** dbx computer analyzer, various Tektronix components, all necessary processing available on request. **Engineers:** William Wheeler, Matthew York. Credits: Pope John Paul, Arlo Guthrie, Yale Glee Club, hundreds more. Rates: Studio production editing \$45 per hour, duplication rates available upon request. Other Services: Clarity cassette duplication offers a full range of services including typesetting, label printing, insert (J-card) printing, direct stamp print, custom packaging, fulfillment, blank cassettes custom-loaded. Clarity offers a free, highly detailed educational brochure to better understand the process of real-time. **TAPE DUPLICATION.** Duplicator: (60) Custom-modified Studer Revox. Capacity: 12,960/week, 660,960/year. **Method of Duplication:** In-cassette. **Mastering Equipment:** MCI, Panasonic DAT, Sony PCM F1 501/601/701, all digital. **Tape Used:** Ampex pure Chrome, BASF pure Chrome. **Shell Used:** All shells are deluxe precision 5-screw; ICM, Michelex, Shape, Lenco. **Duplicating Speed:** Only quality real-time 1:1. **Loading Equipment:** Exclusively King loaders. **Packaging Equipment/Fulfillment Services:** Custom packaging available. Rates: Available upon request, special contract pricing for large accounts. Other Services: Full range of services including typesetting, label and insert printing, direct stamp printing, full 6-color printing, blank cassettes.

CLASSIC SOUND, INC.; CD Services; 129 West 67th St., New York, NY 10023; (212) 496-7100; FAX: (212) 721-2229. Contact: Tim Martyn. **COMPACT DISC.** Preparation/Manufacturing: Compact disc premastering from DAT, F1, analog. Sony DAE-3000/PCM-1630 editing, Harmonia Mundi bw102, Neotek Series 1E. Fast turnaround, low rates as low as \$88/hr. Credits: EMI, Angel Records, RCA Red Seal, CBS, Smithsonian Collection, EMC, Boston Symphony Orchestra.

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DIRECTORY

—CONTINUED FROM PREVIOUS PAGE

state-of-the-art digital editing suite (both digital tape and hard disk), format conversion; automated digital level control and equalization; PQ editing and logging. (See our complete equipment listings under "Mastering.")



FULLERSOUND, INC.

FULLERSOUND, INC.
Miami, FL

FULLERSOUND, INC.; Mastering, CD Services; 1755 NE 149th St.; Miami, FL 33181; (305) 945-6697. Contact: Michael Fuller. **MASTERING.** Cutting Lathes: Scully LS-76 w/Ortoton DSS-821 cutter heads. Console: Neve DTC-1 digital, custom Cyberonics automated MC2003E analog. Tape Machines: Analog: Sony 1/2" and 1/4"; digital: Sony PCM-1630/DMR-4000, Sony PCM-3202, Sony PCM-601, Sony DAT 2500, Mitsubishi X-80. Monitor Speakers: UREI 813A, Yamaha NS-1000, Auratone. Signal Processing: Neve DTC-1 digital, Sontec MES-430B EQ, Sontec DRC-400, Ortofon STL-852. Engineers: Michael Fuller, Rod Fuller. Credits: *Dirty Dancing* soundtrack, *Expose*, *Will to Power*, Barry Manilow, Eric Clapton, Eric Carmen, Billy Vera & the Beaters, Rod Stewart, Company B, Julio Iglesias, Kenny Rogers, Judas Priest, Romantics, Eddie Money, Dionne Warwick, 2-Live Crew, Betty Wright, Kenny Loggins, George Clinton, Bee Gees, Kashif, Russel Hitchcock. Rates: Upon request. Other Services: Premastering for compact disc and cassettes. **COMPACT DISC.** Preparation/Manufacturing: Complete digital domain processing with the Neve DTC-1 digital console to Sony 1630/DMR-4000/DTA-2000. Digital-to-digital transfers to and from Sony 1630, Sony 3402, Sony DAT 2500, Sony 601 and Mitsubishi X-80.

GEORGIA RECORD PRESSING; Mastering, Pressing, Tape Duplication, CD Services; 262 Rio Circle; Decatur, GA 30030; (404) 373-2673; (800) 327-9212; FAX: (404) 373-0950.

GRENADIER; Tape Duplication; 10 Parkwood Ave.; Rochester, NY 14620; (716) 442-6209; (716) 275-2942. Contact: Tom Greene. **TAPE DUPLICATION.** Duplicator: Nakamichi real-time and Telex high-speed. Capacity: 800 per day. Method of Duplication: In-cassette. Mastering Equipment: Full 24- and 16-track studio and mastering facilities available, to 2-track digital or analog with Dolby A, B, SR or dbx Type I noise reduction. Tape Used: Agfa. Shell Used: Lenco, Michelex. Duplicating Speed: Real-time 1:1 and 8:1 high-speed. Loading Equipment: Loading to custom length. Packaging Equipment/Fulfillment Services: We have special packaging options that make smaller quantities of even 100 album-length, real-time duplicated cassettes with 4-color inserts, labels and shrinkwrap affordable. Please inquire. Rates: Small orders welcome. Superb quality at affordable pricing. 100 real-time demo cassettes with printed labels for less than \$1 each. Other Services: Full-service 24-track recording studio.

THE HIT FACTORY—DMS, INC.; Mastering, CD Services; 130 W. 42nd St., 10th Fl.; New York, NY 10036; (212) 768-4141; FAX: (212) 768-9818. Contact: Danielle Germano.

HTM, LTD.; Tape Duplication; 15 Gilpin Avenue; Hauppauge, NY 11778; (516) 234-0200. Contact: Mr. Brian Wilson, vice president, sales and marketing.

IAN COMMUNICATIONS GROUP, INC.; Tape Duplication, CD Services; 10 Upton Dr.; Wilmington, MA 01887; (508) 658-3700; (800) 433-DUPE. Contact: Richard Berberian. **TAPE DUPLICATION.** Duplicator: Otari DP-7000, Otari DP-80. Capacity: 10,000 per shift. Method of Duplication: Bin-loop. Mastering Equipment: Otari MTR-10 IIX. Tape Used:

Keysor. Rates: Call for catalog. Other Services: Complete art design, printing. **TAPE DUPLICATION.** Duplicator: Lyrec. Capacity: 100,000 weekly. Method of Duplication: Bin-loop. Mastering Equipment: Ampex. Tape Used: BASF. Shell Used:



IAN COMMUNICATIONS GROUP, INC.
Wilmington, MA

Agfa, BASF. Shell Used: Michelex. Duplicating Speed: 64:1 or 32:1. Loading Equipment: AVA 2001. Packaging Equipment/Fulfillment Services: Tapematic labelers and boxers. Rates: Rate card for up to 2,000 units. Larger orders on quotation basis. Other Services: Complete in-house facilities for graphics, typesetting, printing and wrapping. Climate-controlled warehouse and order fulfillment. **COMPACT DISC.** Preparation/Manufacturing: Editing, mastering and pressing services, printing and packaging.

ICCA; Tape Duplication; 429 Briabend Dr.; Charlotte, NC 28209; (704) 523-7219. Contact: John Firestone, Harrell Canning. **TAPE DUPLICATION.** Duplicator: Electro Sound 8000. 4 Lines. Capacity: 50,000/day. Method of Duplication: Bin-loop. Mastering Equipment: Studer A80, Dolby F1 digital, 30-ips playback, R-DAT. Tape Used: Agfa, Ampex. Shell Used: Lenco, ICM. Duplicating Speed: 64:1. Loading Equipment: King 790. Packaging Equipment/Fulfillment Services: Singles and rack packages. Rates: Call for prices. Other Services: Graphic arts design, typesetting, desktop publishing, label and insert layout.



CASSETTES AND AUDIO PRODUCTS

LORAN CASSETTES AND AUDIO PRODUCTS
Warren, PA

LORAN CASSETTES AND AUDIO PRODUCTS; Mastering, Tape Duplication; 10-48 Clark St.; Warren, PA 16365; (800) 633-0455. Contact: Earl J. Keeney Jr., Randy Britton. **MASTERING.** Engineers: Danny Imel, Brian Karda, Darryl Bergstrom. Credits: Ford Motor Co., Volvo Cars of No. America, Fujitsu Ten, Alpine, GRP, Rykodisc, Narada, Sheffield Lab, JCI, Classical Music, Sea Breeze, River Music. Rates: Call for quotes. Other Services: Professional DAT duplication using Sony DRD-100 units with complete table of contents encoding, custom loading and on-cassette multicolor printing. **TAPE DUPLICATION.** Duplicator: Electro Sound high-speed and real-time, Harman Kardon. Capacity: 7 million/year. Call for current available capacity. Method of Duplication: In-cassette and bin-loop. Mastering Equipment: Sony. Otari. Tape Used: Agfa, BASF, Loran or equivalent. Shell Used: Loran and other azimuth-correct shells. Duplicating Speed: Real-time and 64:1. Loading Equipment: King, Otari. Packaging Equipment/Fulfillment Services: Insert cards, direct print on shell, labeling, assembly, shrinkwrap, packaging and fulfillment. Rates: Call for quotes. Other Services: Full-service analog and digital duplicator including licensing services to handle concept through fulfillment.

MAGNETIC TECHNOLOGY; Tape Duplication; 816 18th Ave. S.; Nashville, TN 37203; (615) 254-7001. Contact: Mack Evans.

TAPE TO DISC

DIRECTORY

Listings of Mastering, Pressing, Tape Duplication
and Compact Disc Facilities



CASSETTE EXPRESS
(DIV. OF AL JOLSON ENTERPRISES, INC.)
Nashville, TN

tion: In-cassette. Mastering Equipment: Dolby A/SR, dbx Type I, Nagra IV-S, R-DAT, Super Beta, V-S, Nakamichi DMP-100, Studer A810. Tape Used: Agfa 649, BASF Chrome II, Ampex 456. Shell Used: Lenco, Michelex. Duplicating Speed: 1:1, 2:1, 8:1. Rates: Competitive rates, please inquire. Other Services: Printed labels.

AGFA 

AGFA CORPORATION
Ridgefield Park, NJ

AGFA CORPORATION; Mastering, Tape Duplication; 100 Challenger Rd.; Ridgefield Park, NJ 07660; (201) 440-2500. Contact: Andrew Da Puzzo, national sales manager. MASTERING. Other Services: Studio mastering tape products: PEM469, PEM468, PEM369, PEM526 bin-loop tape and R-DAT cassettes—R:60, R:90, R:120. TAPE DUPLICATION. Other Services: Bulk audio cassette tapes: PE619/9191, PE649/949/1249, PE647/947 (Chrome); R-DAT duplicator cassettes.

AIR CRAFT RECORDING AND REAL TIME DUPLICATIONS SERVICE; Tape Duplication; Dormont Square, Pittsburgh, PA 15216; (412) 343-5222. Contact: Barney Lee. TAPE DUPLICATION. Duplicator: Nakamichi MR-2 professional cassette decks. Capacity: 750 album-length tapes per day. Method of Duplication: In-cassette. Mastering Equipment: Otari MTR-10 (15 and 30 ips), Sony 3402 digital reel-to-reel, Beta/Sony PCM 1/2" digital processor, Fostex 20. Tape Used: BASF CrO₂, Agfa CrO₂, Shape, Lenco, 5-screw housing. Duplicating Speed: Real-time cassette duplication at 1 1/2 ips. Loading Equipment: Custom loading to length. Packaging Equipment/Fulfillment Services: Complete custom printing/art/application and insertion/shrinkwrap/packaging. Apex printing. Rates: Call for rates. Other Services: 1/4" reel-to-reel copies.

ALIGNED AUDIO INCORPORATED; Pressing, Tape Duplication, CD Services; 151 22nd St.; Brooklyn, NY 11235; (718) 788-6969; FAX: (718) 499-0421. Contact: Inquiries: MASTERING. Cutting Lathes: Neumann Console. Custom-built Tape Machines: Studer. Monitor Speakers: MDM-4, Infinity Kappa 6, Quad ESL. Signal Processing: Dolby, Orban EQ, Aphex, dbx, Burwen. PRESSING. Presses: Hamilton special, fully automatic. Capacity: 12,000 per 24 hours. Vinyl Used: Super quiet, dye-colored, audiophile quality. Rates: Competitive. Other Services: Plating, insert and label printing, special packaging, fulfillment, drop shipping, DMM. TAPE DUPLICATION. Duplicator: Otari, real-time. Capacity: Bin-loop: 5,000 per day; real-time: 1,000 per day. Method of Duplication: In-cassette, bin-loop. Mastering Equipment: Studer, Otari. MDM-4 near-field monitors, Sony, Fostex. Tape Used: BASF. Shell Used: Shape, Michelex, Swire. Duplicating Speed: 32:1, 16:1, 2:1, 1:1. Loading Equipment: Otari, AVA. Packaging Equipment/Fulfillment Services: Drop shipping, mailings. Rates: Competitive. Other Services: Special packaging, open-reel duplication, DAT copies, quality control. COMPACT DISC. Preparation/Manufacturing: PCM-1610 or -1630 to PCM-1630 CD master, coded and analyzed. Reduction of artwork and layout for CD graphics.

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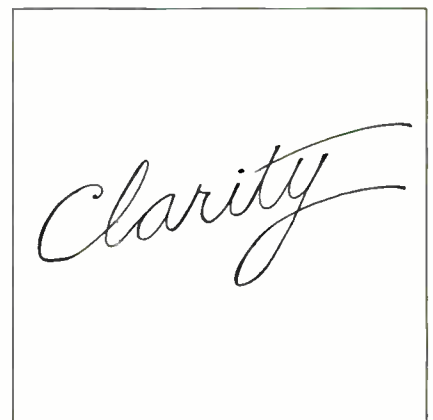
AMERICAN MULTIMEDIA, INC.; Tape Duplication; Route 8 Box 215-A; Burlington, NC 27215; (919) 229-5554; FAX: (919) 228-1409. Contact: Tim Mallard. MASTERING. Console: Neve 8108. Tape Machines: Otari, Studer. Monitor Speakers: UREI, JBL. Signal Processing: dbx, Dolby A, B, C and SR capabilities, Aphex, Lexicon. Engineers: Richard Clark, Howard Hoyt. Other Services: Digital processing: Sony 1610 and 1630, JVC BP-90 and Nakamichi DMP-100, Sony 1630. TAPE DUPLICATION. Duplicator: Concept Design, Electro Sound, Gauss. Capacity: 100 million annually. Method of Duplication: DAAD and bin-loop. Mastering Equipment: Studer A80. Tape Used: By customer request. Shell Used: By customer request. Duplicating Speed: 64:1, 80:1. Loading Equipment: 36 Concept Design modifications. Packaging Equipment/Fulfillment Services: Apex printing, Ilseman labelers, Scandia wrappers, Sentinel blistering, F-20, HS-3 and A-22 Shanklin. COMPACT DISC. Preparation/Manufacturing: 4-color process and 5-color booklet and inlay card printing.

APEX MACHINE COMPANY; Tape Duplication; 3000 NE 12th Terr.; Ft. Lauderdale, FL 33334; (305) 566-1572. Contact: Bob Coningsby.

AUDIO ANTICS WEST; Tape Duplication; 156 W. 94th St.; New York, NY 10025; (212) 662-8685. Contact: Susan Winthrop.

AUDIO CRAFT CO.; Mastering, Tape Duplication; 2701 E. Sunrise Blvd., Ste. 406; Ft. Lauderdale, FL 33304; (305) 563-0553 (Florida); (800) 432-0405. Contact: Lonny Kelem. MASTERING. Tape Machines: Scny, Sony DAT, Sony 601, MCI, Studer Revox, Nakamichi, Otari. Monitor Speakers: E-V. Signal Processing: Lexicon, dbx, EXR, Dolby, UREI, Symetrix. Rates: Upon request. TAPE DUPLICATION. Duplicator: Studer Revox and Sony, Sony DAT, Sony 601, Telex, Nakamichi F-1. Capacity: 1,000 real-time per day, 2,000 high-speed per day. Method of Duplication: Real-time, high speed, in-cassette. Mastering Equipment: Sony DAT, Sony 601, Nakamichi F-2, MCI/Sony reel-to-reel. Tape Used: Agfa, BASF, TDK. Shell Used: Shape, ICM, Magnamedia. Duplicating Speed: 16:1 and real-time. Loading Equipment: King, TTL. Packaging Equipment/Fulfillment Services: Full packaging as required. Rates: Upon request. Other Services: Voice-overs, mastering, editing.

CASSETTE EXPRESS (DIV. OF AL JOLSON ENTERPRISES, INC.); Tape Duplication; 114 17th Ave. S; Nashville, TN 37203; (615) 244-5667. Contact: Mark Capps. TAPE DUPLICATION. Duplicator: KABA real-time system w/(86) decks, (42) dual. Capacity: 970 C-45s per shift. Method of Duplication:



CLARITY REAL-TIME CASSETTES
Waterville, ME

CLARITY REAL-TIME CASSETTES; Tape Duplication; Main Street, 1 Post Office Sq.; Waterville, ME 04901; (207) 873-3911 (Maine); (800) 458-6405. Contact: Michael Pepin, Bill Wheeler. MASTERING. Console: Custom-designed, semi-automated with exclusive computer loopback. Tape Machines: Custom-modified, computer-assisted Studer Revox B-215. Monitor Speakers: Custom-designed digital loopback monitor system. Signal Processing: dbx computer analyzer, various Tektronix components, all necessary processing available on request. Engineers: William Wheeler, Matthew York. Credits: Pope John Paul, Arlo Guthrie, Yale Glee Club, hundreds more. Rates: Studio production editing \$45 per hour, duplication rates available upon request. Other Services: Clarity cassette duplication offers a full range of services including typesetting, label printing, insert (J-card) printing, direct stamp print, custom packaging, fulfillment, blank cassettes custom-loaded. Clarity offers a free, highly detailed educational brochure to better understand the process of real-time. TAPE DUPLICATION. Duplicator: (60) Custom-modified Studer Revox. Capacity: 1,296/week, 660,960/year. Method of Duplication: In-cassette. Mastering Equipment: MCI, Panasonic DAT, Sony PCM F1 501/601/701, all digital. Tape Used: Ampex pure Chrome, BASF pure Chrome. Shell Used: All shells are deluxe precision 5-screw; ICM Michelex, Shape, Lenco. Duplicating Speed: Only quality real-time 1:1. Loading Equipment: Exclusively King loaders. Packaging Equipment/Fulfillment Services: Custom packaging available. Rates: Available upon request, special contract pricing for large accounts. Other Services: Full range of services including typesetting, label and insert printing, direct stamp printing, full 6-color printing, blank cassettes.

CLASSIC SOUND, INC.; CD Services; 129 West 67th St.; New York, NY 10023; (212) 496-7100; FAX: (212) 721-2229. Contact: Tim Martyn. COMPACT DISC. Preparation/Manufacturing: Compact disc premastering from DAT, F1, analog. Sony DAE-3000/PCM-1630 editing, Harmonia Mundi bwl/12, Neotek Series 1E. Fast turnaround, low rates as low as \$88/hr. Credits: EMI, Angel Records, RCA Red Seal, CBS, Smithsonian Collection, EMC, Boston Symphony Orchestra.

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E A S T E R N

TAPE TO DISC

DIRECTORY

CRYSTAL CITY TAPE DUPLICATORS, INC.; *Tape Duplication*; 48 Stewart Ave.; Huntington, NY 11743; (516) 421-0222. Contact: Frank Russo TAPE DUPLICATION Duplicator: Otari bin-loop Capacity: 12,000 per day Method of Duplication: In-cassette, bin-loop Mastering Equipment: Otari MTR-10; Otari MTR-12 Tape Used: BASF, Magnetic Media, Agfa Shell Used: Magnetic Media Duplicating Speed: 64 1 Loading Equipment: Electro Sound, AEG Kronos 4 Packaging Equipment/Fulfillment Services: Apex on-cassette print, Scandia wrapper Rates: On request Other Services: Video duplication ¾", ½" Panasonic 6810 Hi-fi stereo

THE CUTTING EDGE; *Mastering, Pressing, Tape Duplication, CD Services*; PO Box 217; Ferndale, NY 12734; (914) 292-5965. Contact: Paul Gerry

D&G MASTERING; *Mastering*; PO Box 370; Englishtown, NJ 07726; (201) 446-2411. Contact: Don Van Gorden

DB PLUS DIGITAL SERVICES; *CD Services*; PO Box 694; Lynbrook, NY 11563; (516) 872-2325. Contact: Kathy Kerr

DEMO-VOX SOUND STUDIO, INC.; *Mastering, Pressing, Tape Duplication*; 1038 Bay Ridge Ave.; Brooklyn, NY 11219; (718) 680-7234. Contact: Laura B. Grassi

BARRY DIAMENT AUDIO; *CD Services*; 2728 Henry Hudson Pkwy. #C-73; Riverdale, NY 10463; (212) 543-2079. Contact: Barry Diament, Mary Antonelli COMPACT DISC Preparation/Manufacturing: Full CD master preparation, optimized analog-to-digital transfers, digital editing Machines Sony 1630/1100A/DMR-4000/DTA-2000, Dahlquist DQ-20/MIT and Monster cables Call for rates Credits include AC/DC, Anita Baker, Edie Brickell and New Bohemians, The Cars, The Coasters, Phil Collins, Jim Croce, Crosby, Stills and Nash, The Cult, Divinyls, The Eagles, Enya, Kevin Eubanks, Genesis, Guns N' Roses, Hanson, Kitaro, Eartha Kitt, Led Zeppelin, Julian Lennon, Glenn Miller, Steve Nicks, Robert Palmer, Robert Plant, Questionaires, The Rascals, Otis Redding, Rolling Stones, Linda Ronstadt, Simply Red, Slayer, Steps Ahead, Tesla, Pete Townshend, U2, Joseph Villa, Yes, Warren Zevon

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DIGITAL HOUSE LTD.; *Mastering, Tape Duplication, CD Services*; 101 West 57th St.; New York, NY 10019; (212) 333-5950; FAX: (212) 262-5631. Contact: Jerome Bunke, Harry Hirsch

DIGITAL 1 DUPLICATORS; *Tape Duplication*; 658 Douglas Ave., Altamonte Springs, FL 32714; (407) 682-7790. Contact: Batt Donovan TAPE DUPLICATION Duplicator: KABA decks—50 positions. Capacity: 20,000 per month. Method of Duplication: In-cassette Mastering Equipment: SSL, Neve, full complement signal processing Tape Used: TDK SA, Agfa 649 Shell Used: Shape Mark 10, ICM Duplicating Speed: 1.1, 2:1, real-time, 2x1 Loading Equipment: Electro Sound Packaging Equipment/Fulfillment Services: On-cassette printing, shrinkwrap, inserts Rates: Call Other Services: Digital transfers, editing, mastering

DISC MAKERS; *Mastering, Pressing, Tape Duplication, CD Services*; 1328 N. 4th St.; Philadelphia, PA 19122; (215) 232-4140 (in PA); (800) 468-9353. Contact: Sales department MASTERING Cutting Lathes: Scully Tape Machines: Ampex Monitor Speakers: JBL Rates: Call for catalog PRESSING Presses: SMT II Capacity: 100,000 weekly Vinyl Used:

Keycor Rates: Call for catalog Other Services: Complete art design, printing TAPE DUPLICATION Duplicator: Lyrec Capacity: 100,000 weekly Method of Duplication: Bin-loop Mastering Equipment: Ampex Tape Used: BASF Shell Used: Shape Duplicating Speed: 32 1, 64 1 Loading Equipment: King Packaging Equipment/Fulfillment Services: Scandia Rates: Call for catalog Other Services: All art and design services along with printing COMPACT DISC Preparation/Manufacturing: Premastering, all art, design, printing, replication, blistering services available

DISC TRONICS, INC.; *CD Services*; 405 Lexington Ave., 47th Fl.; New York, NY 10017; (212) 599-5300; FAX: (212) 599-3227. Contact: Michael Rosenbaum

THE DUPE COOP; *Tape Duplication*; 268 West 23rd St.; New York, NY 10011; (212) 633-6287. Contact: Tom Sleeva

DUPLICATION SPECIALISTS, INC.; *Tape Duplication*; 4584 Austin Blvd.; Island Park, NY 11558; (516) 432-7107. Contact: David Schwartz, James Voigt

EASTERN STANDARD PRODUCTIONS, INC.; *Mastering, Tape Duplication*; 26 Baxter St.; Buffalo, NY 14207; (716) 876-1454; (800) 527-9225. Contact: Deborah Mekker

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EUROPADISK, LTD.; *Mastering, Pressing, Tape Duplication, CD Services*; 75 Varick St.; New York, NY 10013; (212) 226-4401. Contact: Bill Irvine MASTERING Cutting Lathes: Neumann VMS-82 DMM Console: Neve DTC, Neumann SP79B Tape Machines: Sony DMR-4000, Sony PCM-2500, Mitsubishi X-80, MCI JH-110M, Studer A80 Monitor Speakers: JBL 250T1 Signal Processing: Neumann, Neve DTC Engineers: Jim Shelton, Jack Skinner, Jim Brick, Tom Spalone Credits: Capitol, CBS, RCA, Warner Bros., EMI, Telarc, Motown, Island Rates: Call for brochure Other Services: In-house LP plating and audiophile pressing and cassette, R-DAT and CD manufacturing Complete graphics services PRESSING Presses: Toolex-Alpha, Hamilton, all automatic Capacity: 3 million per year Vinyl Used: Teldec Rates: Call for brochure Other Services: Complete graphics, printing, packaging and shipping services COMPACT DISC Preparation/Manufacturing: CD replication, CD mastering Call for brochure

EVA-TONE

EVA-TONE INCORPORATED
Clearwater, FL

EVA-TONE INCORPORATED; *Mastering, Pressing, Tape Duplication*; 4801 Ulmerton Rd.; Clearwater, FL 34622; (800) EVA-TONE; (813) 572-7000. Contact: Norm Welch MAS-


TERING. Cutting Lathes: Scully automated and manual. Console: Sony and Eva-Tone customized. Tape Machines: Studer Revox, Otari, MCI, Nakamichi. Monitor Speakers: Tannoy, Altec. Signal Processing: UREI, AMS, Sontec, Aphex, Orban. Engineers: Michael Newsome, Wayne McElhose, Alan LaVerso, Jacques Woodin, Jerry DeClercq, Jeff Jones. Rates: On request. PRESSING Presses: Eva-Tone custom-design flexible disc (Soundsheets). Capacity: 200 million. Rates: On request. Other Services: Printing, packaging, mailing services. TAPE DUPLICATION. Duplicator: Cetec Gauss 4800 and 2400. Capacity: 15 million C-40 per year. Method of Duplication: Bin-loop. Mastering Equipment: MCI, Studer Revox, Otari. Tape Used: Various high-quality sources. Shell Used: Various high-quality sources. Duplicating Speed: 32:1, 64:1, 128:1. Loading Equipment: King 790 Packaging Equipment/Fulfillment Services: Labeling is Apex and Stoddard, packaging is Iseman and custom-designed. Rates: On request. Other Services: Printing, packaging, mailing services.



FORGE RECORDING STUDIOS, INC.
Valley Forge, PA

FORGE RECORDING STUDIOS, INC.; Mastering, Tape Duplication; PO Box 861, Valley Forge, PA 19481; 119 Great Valley Pkwy., Malvern, PA 19355; (800) 331-0405; (215) 935-1422; FAX: (215) 993-9954. Contact: Warren Wilson. MAS-

TERING. Console: Neotek Elite. Tape Machines: Sony system. Monitor Speakers: JBL, UREI 813. Signal Processing: Whatever is needed. Rates: \$75 per hour plus materials. TAPE DUPLICATION. Duplicator: MTI and Versadyne 2 x 6 slaves. Capacity: 20,000/day. Method of Duplication: Bin-loop. Mastering Equipment: Ampex, Sony. Tape Used: Agfa, BASF, Mag Media. Shell Used: Mag Media, ICM, Elmar, Swire. Duplicating Speed: 32:1, 64:1. Loading Equipment: King 790s. Packaging Equipment/Fulfillment Services: Boxing, shrinkwrapping and album setup. Rates: Call for rate card and samples. Other Services: Drop shipping and radio syndication services. COMPACT DISC. Preparation/Manufacturing: Complete Sony 3000 editing.



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FRANKFORD/WAYNE MASTERING LABS, INC.; Mastering, CD Services; 1697 Broadway, 14th Fl., New York, NY 10019; (212) 582-5473. Contact: Carol or Tom Steele. MASTERING. Cutting Lathes: (2) Neumann lathes with Technics quartz drive and Neumann SX-74/SAL-74B driver rack and Sontec Compudisk control computers, (4) Scully/Ranstelee automated quartz-locked drive lathes with Sontec Compudisk computer and Neumann SX-74/Ranstelee cutter driver system. Console: (5) Ranstelee Audio custom/proprietary DC-

coupled console w/full equalization and processing facilities, analog and digital capable, transformerless. (2) Ranstelee/Harmonia Mundi full digital transfer console w/digital level, equalization, compressor/limiter and sample rate conversion to/from any format, Sony/Harmonia Mundi/Ranstelee custom automated CD master preparation console. Tape Machines: AMS AudioFile hard disk recorder/editor, (3) Sony PCM-2500 Pro R-DAT recorder, (5) Sony PCM-1630 digital processor with Apogee filters, Sony PCM-601 processor. (5) Sony/MCI JH-110MB 1/4" and 1/2" play, (3) Sony/MCI JH-110C 1/2" and 1/4" recorder, (5) Technics RS1520 pro 2-track, Scully LJ-12 stereo recorder. (6) Technics cassette recorder, Sony PCM-3402 DASH reel-to-reel, (3) Sony PCM-10/100 digital F1-compatible processor, (3) Sony DMR-2000 digital U-matic recorder, (10) Sony DMR-4000 digital U-matic recorder, Sony VO-5800, (2) Sony BVU-800DB U-matic recorder, (2) Sony SL-2700 Beta recorder, (3) Sony SL-2300 Beta recorder, (5) Sony DTA-2000 digital tape analyzer, Panasonic Super-VHS recorder. Monitor Speakers: (6) JBL 4350B bi-amped, (2) JBL 4343B bi-amped, (2) JBL 4330, (2) JBL 4311, (2) B&W 701, (6) ADS 300, (4) Auratone 5C, (2) Technics 6060, (2) JBL custom subwoofer system, (2) Yamaha NS-10M, (2) E-V Sentry 100. Signal Processing: Equalizers: Sontec, UREI, ITI, Pultec, Ranstelee Audio, Orban, Technics. Limiters/Compressors: Sontec, Sony, Aphex. Noise reduction Dolby, dbx and Dolby SR. Proprietary audio processing equipment. Ranstelee Audio Digital processing. AMS DDLs and effects, (2) Sony DAE-3000 digital editor, Lexicon, Sony PQ subcode editor, Sony DAE-1100A digital editor, AMS AudioFile, audio-for-video. Engineers: Tom Steele, Carlton Batts, Michael Sarfield, Tom Brick, plus freelancers when applicable. Credits: Rolling Stones Singles Collection, Heavy D & the Boyz, Kid N' Play, Guy, Al B. Shure, Al Green, Billy Ocean, Damien, UTFO, Eric B., Jaya, Stevie B., Chubb Rock, Michael Brecker, Whistle, 24-7 Spyz, Ziggy Marley, LaRue, Nenah Cherry, Bunny Wailer, Today, Public Image Limited, Marly Marl, Les Miserables Soundtrack, Manzanera & McKay, Yo! MTV Raps!, KRS-One, Boogie Down Productions, Jocelyn Brown to name just a few. Rates: Client attendance, \$220/hr., LP masters, \$155/side, 45 masters, \$55/side, 12" single masters, \$125/side; LP S/F refs, \$90/side, 12" single D/F refs, \$110, 45 D/F refs, \$75. Other rates, including custom pressing packages and digital CD prepared tapes, available upon request. COMPACT DISC. Rates: CD Prep LP under 50 minutes, \$360, LP over 50 minutes, \$425, singles, \$225, prices include tape and SMPTE and DTA analyzer logs. Other digital services and digital equipment rental rates upon request. Preparation/Manufacturing: Preparation. Complete facilities for analog-to-digital and digital-to-digital transfers from any format to any format. Full

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TAPE TO DISC

DIRECTORY

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FULLERSOUND, INC.

FULLERSOUND, INC.
Miami, FL

FULLERSOUND, INC.: *Mastering, CD Services:* 1755 NE 149th St.; Miami, FL 33181; (305) 945-6697. Contact: Michael Fuller. *MASTERING* Cutting Lathes: Scully LS-76 w/Oroton DSS-821 cutter heads. Console: Neve DTC-1 digital, custom Cybersonics automated MC2003E analog. *Tape Machines:* Analog: Sony 1/2" and 1/4"; digital: Sony PCM-1630/DMR-4000, Sony PCM-3202, Sony PCM-601, Sony DAT 2500, Mitsubishi X-80. *Monitor Speakers:* UREI 813A, Yamaha NS-1000, Auratone. *Signal Processing:* Neve DTC-1 digital, Sontec MES-430B EQ, Sontec DRC-400, Oroton STL-852. *Engineers:* Michael Fuller, Rod Fuller. *Credits:* *Dirty Dancing* soundtrack, *Expose*, *Will to Power*, *Barry Manilow*, *Eric Clapton*, *Eric Carmen*, *Billy Vera & the Beaters*, *Rod Stewart*, *Company B*, *Julio Iglesias*, *Kenny Rogers*, *Judas Priest*, *Romantics*, *Eddie Money*, *Dionne Warwick*, *2-Live Crew*, *Betty Wright*, *Kenny Loggins*, *George Clinton*, *Bee Gees*, *Kashif*, *Russel Hitchcock*. *Rates:* Upon request. *Other Services:* Premastering for compact disc and cassettes. *COMPACT DISC. Preparation/Manufacturing:* Complete digital domain processing with the Neve DTC-1 digital console to Sony 1630/DMR-4000/DTA-2000. Digital-to-digital transfers to and from Sony 1630, Sony 3402, Sony DAT 2500, Sony 601 and Mitsubishi X-80.

GEORGIA RECORD PRESSING; *Mastering, Pressing, Tape Duplication, CD Services:* 262 Rio Circle; Decatur, GA 30030; (404) 373-2673; (800) 327-9212; FAX: (404) 373-0950.

GRENADIER; *Tape Duplication:* 10 Parkwood Ave.; Rochester, NY 14620; (716) 442-6209; (716) 275-2942. Contact: Tom Greene. *TAPE DUPLICATION.* Duplicator: Nakamichi real-time and Telex high-speed. Capacity: 800 per day. *Method of Duplication:* In-cassette. *Mastering Equipment:* Full 24- and 16-track studio and mastering facilities available, to 2-track digital or analog with Dolby A, B, SR or dbx Type I noise reduction. *Tape Used:* Agfa. *Shell Used:* Lenco, Mixel. *Duplicating Speed:* Real-time 1:1 and 8:1 high-speed. *Loading Equipment:* Loading to custom length. *Packaging Equipment/Fulfillment Services:* We have special packaging options that make smaller quantities of even 100 album-length, real-time duplicated cassettes with 4-color inserts, labels and shrinkwrap affordable. Please inquire. *Rates:* Small orders welcome. Superb quality at affordable pricing. 100 real-time demo cassettes with printed labels for less than \$1 each. *Other Services:* Full-service 24-track recording studio.

THE HIT FACTORY—DMS, INC.; *Mastering, CD Services:* 130 W. 42nd St., 10th Fl.; New York, NY 10036; (212) 768-4141; FAX: (212) 768-9818. Contact: Danielle Germano.

HTM, LTD.; *Tape Duplication:* 15 Gilpin Avenue; Hauppauge, NY 11778; (516) 234-0200. Contact: Mr. Brian Wilson, vice president, sales and marketing.

IAN COMMUNICATIONS GROUP, INC.; *Tape Duplication, CD Services:* 10 Upton Dr.; Wilmington, MA 01887; (508) 658-3700; (800) 433-DUPE. Contact: Richard Berberian. *TAPE DUPLICATION.* Duplicator: Otari DP-7000, Otari DP-80. Capacity: 10,000 per shift. *Method of Duplication:* Bin-loop. *Mastering Equipment:* Otari MTR-10 ILX. *Tape Used:*



IAN COMMUNICATIONS GROUP, INC.
Wilmington, MA

Agfa, BASF. *Shell Used:* Mixel. *Duplicating Speed:* 64:1 or 32:1. *Loading Equipment:* AVA 2001. *Packaging Equipment/Fulfillment Services:* Tapematic labelers and boxers. *Rates:* Rate card for up to 2,000 units. Larger orders on quotation basis. *Other Services:* Complete in-house facilities for graphics, typesetting, printing and wrapping. Climate-controlled warehouse and order fulfillment. *COMPACT DISC. Preparation/Manufacturing:* Editing, mastering and pressing services, printing and packaging.

ICCA; *Tape Duplication:* 429 Briabend Dr.; Charlotte, NC 28209; (704) 523-7219. Contact: John Firestone, Harrell Canning. *TAPE DUPLICATION.* Duplicator: Electro Sound 8000. 4 lines. Capacity: 50,000/day. *Method of Duplication:* Bin-loop. *Mastering Equipment:* Studer A80, Dolby, F1 digital, 30-ips playback, R-DAT. *Tape Used:* Agfa, Ampex. *Shell Used:* Lenco, ICM. *Duplicating Speed:* 64:1. *Loading Equipment:* King 790. *Packaging Equipment/Fulfillment Services:* Singles and rack packages. *Rates:* Call for prices. *Other Services:* Graphic arts design, typesetting, desktop publishing, label and insert layout.



LORAN CASSETTES AND AUDIO PRODUCTS
Warren, PA

LORAN CASSETTES AND AUDIO PRODUCTS; *Mastering, Tape Duplication:* 10-48 Clark St.; Warren, PA 16365; (800) 633-0455. Contact: Earl J. Keeney Jr., Randy Britton. *MASTERING.* *Engineers:* Danny Imel, Brian Karda, Darryl Bergstrom. *Credits:* Ford Motor Co., Volvo Cars of No. America, Fujitsu Ten, Alpine, GRP, Rykodisc, Narada, Sheffield Lab, JCI, Classical Music, Sea Breeze, River Music. *Rates:* Call for quotes. *Other Services:* Professional DAT duplication using Sony DRD-100 units with complete table of contents encoding, custom loading and on-cassette multicolor printing. *TAPE DUPLICATION.* Duplicator: Electro Sound high-speed and real-time, Harman Kardon. Capacity: 7 million/year. Call for current available capacity. *Method of Duplication:* In-cassette and bin-loop. *Mastering Equipment:* Sony, Otari. *Tape Used:* Agfa, BASF, Loran or equivalent. *Shell Used:* Loran and other azimuth-correct shells. *Duplicating Speed:* Real-time and 64:1. *Loading Equipment:* King, Otari. *Packaging Equipment/Fulfillment Services:* Insert cards, direct print on shell, labeling, assembly, shrinkwrap, packaging and fulfillment. *Rates:* Call for quotes. *Other Services:* Full-service analog and digital duplicator including licensing services to handle concept through fulfillment.

MAGNETIC TECHNOLOGY; *Tape Duplication:* 816 18th Ave. S.; Nashville, TN 37203; (615) 254-7001. Contact: Mack Evans.

MARK CUSTOM RECORDING SERVICE; Mastering, Pressing, Tape Duplication, CD Services; 10815 Bodine Rd.; Clarence, NY 14031; (716) 759-2600. Contact: Mark J. Morette. **MASTERING.** Cutting Lathes: Neumann VMS-70 (modified). Console: Neumann SP-272. Tape Machines: Studer A80 all digital formats (rotating head) except JVC. Monitor Speakers: UREI 809, JBL, Yamaha. Signal Processing: Anything is available. Engineers: Bruce Leek, George Graves. Credits: 10,000 Maniacs *Secrets of I-Ching*, Jeff Tyzik *Prophecy Original*, Peterson Field *Guide to Bird Songs*. Bruce Leek has mastered over 25 gold LPs. Rates: Call for costs. **PRESSING.** Presses: Subcontracting. Vinyl Used: Teldec, Europa, Kaiser. Rates: Call for quotes. **Other Services:** Complete record production packages, from art layout, 4-color printing, collation, shrinkwrap. **TAPE DUPLICATION.** Duplicator: (50) Nakamichi MR-1, (50) Nakamichi LX-5. Capacity: 2,400 C-50s per day. **Method of Duplication:** In-cassette. **Mastering Equipment:** PCM 1630, DAT, PCM-F1, dbx 700, analog 30 ips, 15 ips, 7 1/2 ips. **Tape Used:** TDK SA, BASF CrO₂. **Shell Used:** Shape Mark 10. **Duplicating Speed:** 1:1 (real-time). **Loading Equipment:** (2) King 760 cassette loader. **Packaging Equipment/Fulfillment Services:** Full-time art dept. Rates: Varies on quantity and length. **Other Services:** Bulk mailing facilities, 24-track recording studio, post-production room. **COMPACT DISC.** Preparation/Manufacturing: CD pre-preparation, PCM-1630 plus DMR 2000 in cooperation with our 24-track studio.

MASTER CUTTING ROOM, INC.; Mastering, CD Services; 321 W. 44th St.; New York, NY 10036; (212) 581-6505; FAX: (212) 582-1496. Contact: Joseph Brescio.

MASTERDISK CORP.; Mastering, CD Services; 545 W. 45th St.; New York, NY 10036; (212) 541-5022; FAX: (212) 265-5645. Contact: Linda Duffany. **MASTERING.** Cutting Lathes: Neumann DMM, (4) Neumann VMS70. Console: Neve digital transfer, (4) Neumann Tape Machines: Sony DMR-4000, Studer, Mitsubishi X-80, Sony Beta, JVC VHS, Sony DAE-3000, Mitsubishi X-86, Sony ProDAT recorder. **Monitor Speakers:** Sovereign 2001, Altec, Hartley subwoofers, UREI 813, Fourier 8, Yamaha, JBL. **Signal Processing:** Sony 1610, Sony 1630, Cello, Sontec EQ, NTP limiter, Lexicon reverb, Aphex, Pultec, Sony 501, Sony 701. **Engineers:** Bob Ludwig, Howie Weinberg, Andy Van Dette, Tony Dawsey, Scott Hull, Don Grossinger. **Credits:** Bruce Springsteen, David Bowie, Sting, U2, Run-D.M.C., Beastie Boys, Def Leppard, Robbie Robertson, Tracy Chapman. Rates: Call for brochure. **COMPACT DISC.** Preparation/Manufacturing: DAT and optical disk references. CD tape masters.



MASTERFONICS
Nashville, TN

MASTERFONICS, INC.; Mastering, Tape Duplication, CD Services; 28 Music Square E.; Nashville, TN 37203; (615) 327-4533; FAX: (615) 242-0101. Contact: Lois Walker. **MASTERING.** Cutting Lathes: Neumann VMS-70, Neumann SAL-74B, Zamaudio, JVC CD-90, Ampex ADD-1. Console: Neumann SP-75 custom, JVC DS-DM900 automated digital. **Tape Machines:** JVC VP-900, Sony 3402, Mitsubishi X-86C, Sony 1630, Sony 2500 DAT, Panasonic SV3500 DAT, Studer A80, B67, Sony F1, JVC FC901. Sony PCM-601. **Monitor Speakers:** Kinoshita/Hidley, Yamaha NS-10M, Genelec Triamp S30, Fostex RM780, Auratone 5C, B&W. All power amps by FM Acoustics. **Signal Processing:** JVC DS-DM900 digital mixing/EQ, Sony DFX-2400 sample frequency/format converter, Wadia Digital 2000 digital decoding computer, Sony DAL-1000 digital limiter, Sontec EQ and DRC, Quantec QRS/XL, Barth Dynaset, Outer Ear image recovery, Dolby A and SR, BASE and custom spatial enhancement, Yamaha reference CD system. **Engineers:** Glenn Meadows, Benny Quinn, Jim Loyd, Milan Bogdan. Rates: On request. **Other Services:** Tom Hidley-designed, 20Hz monitoring environment mix room that must be experienced to be fully appreciated. Includes SSL 4000E (with TR) 48 x 32 console, Otari DTR-900 digital 32-track, JVC VP-900 digital 2-track and a generous complement of outboard equipment. Hidley-designed tracking

and overdub studio with Trident TSM40 in/24 bus/32 monitor console, Otari DTR-900B digital 32-track, more. **TAPE DUPLICATION.** Duplicator: Tascam 122 MkII cassette deck. Capacity: 15. **Method of Duplication:** In-cassette. **Mastering Equipment:** JVC VP-900. **Tape Used:** Ampex 472. **Shell Used:** Ampex. **Duplicating Speed:** 1:1. Rates: On request, per size of run. **Other Services:** Full coordination of custom cassette production from mastering to artwork and display packaging. Submaster preparation for high-speed duplication. Editing compilation services for sampler cassettes. **COMPACT DISC.** Preparation/Manufacturing: Complete CD master tape preparation from any 2-track source. Eight years experience with products from all major labels. Fully digital processing including compression, EQ, sample frequency conversion, format conversion, pre-emphasis removal, crossfades. JVC AE-90 digital editor. Sample accurate in-song editing. Custom CD duplication available, small or large quantity, any or all duplication services from mastering and artwork to packaging. Reference CDs available with Yamaha optical CD recorder.



MASTERMIX
Nashville, TN

MASTERMIX; Mastering, CD Services; 1808 Division St.; Nashville, TN 37203; (615) 321-5970. Contact: Chris Sullivant. **MASTERING.** Cutting Lathes: Neumann VMS70 w/Tech-

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DAT

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TAPE TO DISC

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nics quartz direct-drive and Zuma audio preview computer, Neumann SAL-74B cutter rack, Neumann SX-74 cutter head Console: Neumann SP77, Harmonia Mundi. Tape Machines: Studer preview machine 1/2" and 1/4". Studer copy machine Monitor Speakers: Meyer 833 studio and Rogers powered by Times One and Lenco amplifiers. Signal Processing: Digital using Harmonia Mundi bw102/D6 equalizer w/custom Eproms and Harmonia Mundi bw102/34 dynamics processor, Sony DAL-1000 available; analog EQ Sontec, API, Summit, Neumann; compressors: Sontec, N.T.P. Engineers: Hank Williams and Ken Love Credits: RCA, Warner Bros., Capitol, Atlantic, IRS, Rough Trade, Metal Blade, Twin Tone and Word Records Rates: Available upon request. Other Services: CD and cassette master preparation using AMS AudioFile or Sony DAE-1100.



MASTERWORK RECORDING, INC.
Philadelphia, PA

MASTERWORK RECORDING, INC., *Mastering, Pressing, Tape Duplication, CD Services*; 1020 N. Delaware Ave.; Philadelphia, PA 19125; (215) 423-1022; FAX: (215) 423-6020. Contact: Albert Oon, Peter Humphreys. **MASTERING** Cutting Lathes: Scully with Sontec "CompuDisk" system, Westrex-Ranstele driver systems. Console: Custom/proprietary by Masterwork. Tape Machines: MCI/Sony digital (1630 and R-DAT) Monitor Speakers: JBL, Yamaha, JVC, Sony Signal Processing: Equalizers/filters by Sontec, UREI, Soundcraftsmen Ampex digital delay, Sontec/Valley People limiters/compressors. Engineers: Nimitr "Nim" Sarikananda, Peter Humphreys Credits: Grover Washington Jr., Chuck Mangione, Levert, The O'Jays, E.U., Lou Rawls, Phyllis Hyman, Miles Jaye, Third World, Wolvz, Michael Fath, Carl Filipiak and many others Rates: Available upon request. Other Services: Compact disc premastering and preparation, submastering for cassette duplication Custom CD and record pressing, real-time and high-speed cassette duplication.

MASTERWORKS STUDIOS, *Tape Duplication*; 4024 Williamsburg Ct., Fairfax, VA 22032; (703) 385-1780. Contact: Lois Fritz, Mike Zook

MIRROR IMAGE AUDIO DUPLICATORS, *Tape Duplication*; 619 S. Main St., Gainesville, FL 32601; (904) 376-8742. Contact: Ray Valla.

THE MIXING BOARD, *Mastering*; Rte. 6, Box 543, Toccoa, GA 30577; (404) 886-9179. Contact: Steve Hartley.

MULTITAPE, *Tape Duplication*; 2112 18th St. NW; Washington, DC 20009; (202) 332-1522. Contact: Bruce Moyser

THE MUSIC CONNECTION INC., *Mastering, Pressing, Tape Duplication, CD Services*; 166 Madison Ave., New York, NY 10016; (212) 686-9595. Contact: Ira Cohen. **MASTERING** Other Services: Complete analog and digital mastering services. **PRESSING** Presses: 12", 7" Other Services: Film separations and board jacket printing. **COMPACT DISC** Preparation/Manufacturing: All services from glass master to replication/packaging

NASHVILLE RECORD PRODUCTIONS, INC., *Mastering, CD Services*; 469 Chestnut St.; Nashville, TN 37203; (615) 259-4200. Contact: George Ingram. **MASTERING** Cutting



NASHVILLE RECORD PRODUCTIONS, INC.
Nashville, TN

Lathes: Neumann, Zuma and Capps II computer. Console: Sphere and Neve Tape Machines: Studer and MCI Monitor Speakers: Electro-Voice Sentry 3 Yamaha NS-10 Signal Processing: Parametric and graphic EQ, reverb, compressor/limiter Engineers: Glen Bullard, chief engineer, John Eberle, studio manager. Credits: Ronnie Milsap, Amy Grant, Rick & Janice Carnes, Sha-Na-Na, Tupperware, American Airlines, Drifters, Bill Anderson, Dan Seals, Ray Price, Sammi Smith, Pat Boone, Alabama Rates: \$90/side, 12"; \$35/side, 7" Other Services: Digital mastering: 1/2" Sony F1, 501, 701, 74" Sony 1610 CD preparation, complete record and cassette packaging, LP and 45 pressing, tape duplication, editing, reference acetates

L. NIX & CO. INC., *Mastering, Tape Duplication*; 2000 Madison Ave.; Memphis, TN 38104; (901) 725-0855. Contact: Larry Nix

NORTHEASTERN DIGITAL RECORDING, INC., *Mastering, CD Services*; 12 Sadler Ave.; Shrewsbury, MA 01545; (508) 753-1192. Contact: Toby Mountain.

PHILIPS AND DUPONT OPTICAL COMPANY, *Mastering, CD Services*; 1251 Avenue of the Americas; New York, NY 10020; (212) 512-9350. Contact: Bob Wray, senior VP marketing

PRODIGAL, INC., *Mastering, Tape Duplication, CD Services*; 3400 Pendleton Dr.; Wheaton, MD 20902; (202) 635-5588; FAX: (202) 635-4490. Contact: Alan Wonneberger, Bill Burns. **MASTERING** Tape Machines: JVC VP-900 mastering system Monitor Speakers: B&W 801F Signal Processing: Lexicon 480, (2) Lexicon LXP w/MRC controller, (2) UREI 1176 Engineers: Alan Wonneberger, Bill Burns. Credits: *Body-music* Nicholas, Nuage Records; *Bach to Sousa* Pines Records, *Seven Valleys* Sam Ruzetta, *Flying Fish* Records, *Free Flight* Craig Fraederich, *Creative Digital* Products Rates: \$80 per hour for analog-to-digital and digital-to-digital transfers \$100 per hour for digital editing, digital equalization and digital compression. Other Services: Digital audio mastering services including: digital editing, digital EQ, digital reverb and digital compression direct to CD master tape from DAT, F1, JVC and analog formats. Complete services from conception through talent, scripting, composition, production, mastering, packaging, mailing and fulfillment. Digital and analog soundtrack production for release on audio and videotape or discs. **TAPE DUPLICATION** Duplicator: (110) Aiwa ADS-15 and ADS-37 Capacity: 1,000 C-46 per 8-hour shift. Method of Duplication: In-cassette. **Mastering Equipment**: JVC VP900, JVC AE900, DAT, F1 and analog 1/4" with or without NR. Tape Used: BASF Chrome, Agfa 649 normal Shell Used: Shape Mk10, ICM, Swire. **Duplicating Speed**: Real-time. **Packaging Equipment/Fulfillment Services**: Apex printing, complete packaging Rates: Please call. Other Services: Bulk mailing services, bulk mailing packaging. **COMPACT DISC** Preparation/Manufacturing: Mastering, production, printing and packaging. Please call for rates.

PROGRESSIVE TAPE CORPORATION, *Tape Duplication*; 40-H Corbin Ave., Bay Shore, NY 11706; (516) 242-4646. Contact: Paul Giantzman

PROJECT 70 AUDIO SERVICES, INC., *Tape Duplication*; 777 Lambert Dr. NE, Atlanta, GA 30324; (404) 875-7000. Contact: Jerry L. Connell. **TAPE DUPLICATION** Duplicator: Ampex BLM 200 (new electronics 1987); Electro Sound 6000 Capacity: Ampex, 10 slaves; Electro Sound, 6 slaves. Method of Duplication: Bin-loop. **Mastering Equipment**: Otari MTR-10 1/4", Ampex AG-440 1", dbx, Dolby A and Dolby B. **Tape Used**: Agfa, BASF and Sunkyong. **Shell Used**: Mag Media, Shape Mark 10. **Duplicating Speed**: 32.1. **Loading Equipment**: King 790 w/AMI splicers and software. **Packaging Equipment/Ful-**

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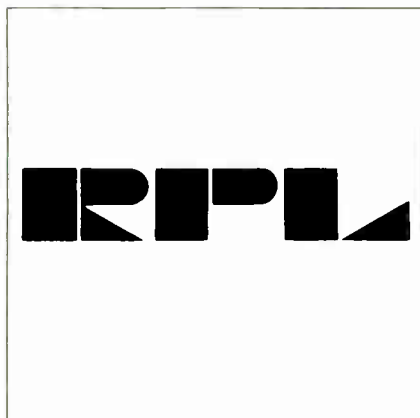
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RECORDAMATT; Mastering, Pressing, Tape Duplication, CD Services; 506 Kime Ave., West Islip, NY 11795; (516) 242-1729; (212) 674-6697. Contact: Joe Jed.



RPL, INC.
Camden, NJ

RPL, INC.; Mastering, Tape Duplication; 1100 State St., Camden, NJ 08105; (800) 235-2679 (outside NJ); (609) 963-3000. Contact: Lisa Ollano, sales manager

SELGER SOUND; Tape Duplication; 6 Sparhawk St., Brighton, MA 02135; (617) 782-3384. Contact: Ken Selger

SOUND TECHNIQUE MASTERING LAB; Mastering, CD Services; 130 W. 42nd St., 5th Fl., New York, NY 10036; (212) 869-1323. Contact: Danielle Germano

STERLING SOUND, INC.; Mastering, CD Services; 1790 Broadway, New York, NY 10019; (212) 757-8519; FAX: (212) 757-4607. Contact: Studio Manager

STUDIO MAGNETICS CO., INC.; Tape Duplication; 12 Long Island Ave., Holtsville, NY 11742; (516) 289-3400; (800) 874-2202 (outside NY). FAX: (212) 797-1660 (in NY). Contact: Craig Balaban, Jim Makowski

THE TAPE COMPLEX; Tape Duplication; 4 Haviland St., Boston, MA 02115; 1606 N. Highland Ave., Hollywood, CA 90028; (617) 437-9449 (MA); (213) 465-2466 (CA). Contact: Kathryn Torda, exec vice pres (in MA), Ray Dileo (in CA). **MASTERING Engineers:** James McCaffrey, James Grant, Miguel Sa Pessoa, David Schmidt. **Other Services:** Real-time duplication using the TDO's computerized quality control system enables us to ensure that every deck is running at maximum efficiency. And a sampling system (both computerized and human) that checks each tape being duplicated. **TAPE DUPLICATION Duplicator:** (250) Awa customized. Capacity: 5,000 album length per day. **Method of Duplication:** In-cassette. **Mastering Equipment:** PCM 2500 DAT w/digital capability. Otari 505CB 1/4" mastering deck for analog. Sony PCM-553 assembly edit system 1/2" or 3/4" w/electric valve (crossfading). Full complement of studio outboard gear. **Tape Used:**

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TAPE TO DISC

DIRECTORY

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THE TAPE COMPLEX
Boston, MA

Ampex, Agfa Shell Used: Michelex (German). Duplicating Speed: Real-time. Loading Equipment: King, TTL. Rates: Call or write for price list. Other Services: On-cassette hot stamp printing, custom labels, shrinkwrap

TAPESOUTH, INC.; *Tape Duplication;* 1801 1st Ave. S. Ste. 333; Birmingham, AL 35233; (800) 248-2730. Contact: Jeiro or Kerri Bennati. TAPE DUPLICATION. Duplicator: KABA 2-track system. Method of Duplication: In-cassette. Tape Used: BASF and Agfa Chrome, Agfa normal bias. Shell Used: Shape Mark 10. Duplicating Speed: 1½ and 3¼. Loading Equipment: King 790. Packaging Equipment/Fulfillment Services:

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TRUTONE RECORDS; *Mastering, Pressing, Tape Duplication, CD Services;* 163 Terrace St.; Haworth, NJ 07641; (201) 385-0940. Contact: Adrienne Rowatt. MASTERING. Cutting Lathes: Neumann VMS-70 w/Zuma computer, Scully lathe w/Capps Varipitch II computers. Console: Neumann, Studer, custom. Tape Machines: Studer A80 MkIII, Studer AB10, Studer B67, Ampex ATR-102, MCI JH-110B, Sony PCM-1630, PCM-2500, PCM-701. Monitor Speakers: UREI 813, B&W 801, B&W DM-220, JBL, Yamaha, Auratone. Signal Processing: Neumann, Pultec, UREI, Sontec, Harmonia Mundi. Engineers: Carl Rowatt, Phil Austin, Ray Janos, Steve Robb. Credits: Upon request. Rates: Upon request. Other Services: Digital editing, digital EQ, Sony PCM-1630, R-DAT and F1 masters. High-quality, short-run cassette duplication and LP pressing. TAPE DUPLICATION. Duplicator: (30) KABA real- and double-time. Method of Duplication: In-cassette. Tape Used: Agfa 662. Duplicating Speed: Real-time and double-time. Rates: Upon request. Other Services: Duplication available

TRUTONE RECORDS

TRUTONE RECORDS
Haworth, NJ

directly from digital or analog source without running master. COMPACT DISC. Preparation/Manufacturing: Preparation/assembly of Sony PCM-1630 masters for CD.

U.S. OPTICAL DISC, INC.; *Mastering, CD Services;* Rte. 109 and Eagle Dr.; Sanford, ME 04073; (207) 324-1124. Contact: Debra J. L'Heureux. COMPACT DISC Preparation/Manufacturing: U.S. Optical Disc, Inc., is a complete compact disc manufacturer committed to delivering quality on time at competitive pricing in one complete package. We use a Philips mastering system to transfer your tape, and have qualified personnel onboard to ensure the customers' satisfaction to their fullest expectancy. We also will use the Philips mastering system in assisting customers in their mastering needs.

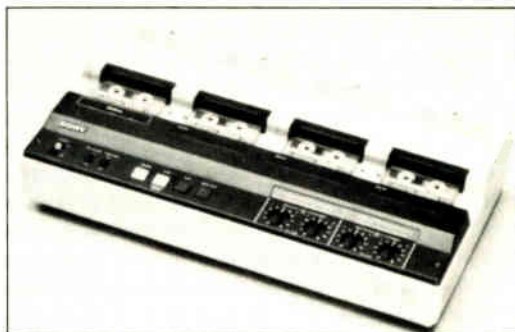
WHITE CROW AUDIO; *Tape Duplication;* 19 Marble Ave.; Burlington, VT 05401; (802) 658-6475. Contact: Douglas Jaffe. TAPE DUPLICATION. Duplicator: (50) Nakamichi CR-1A deck. Capacity: 500 C-60/day. Method of Duplication: In-cassette. Mastering Equipment: Studer A80, Studer AB10, Studer AB20, Dolby A and SR, Sony PCM-2500 R-DAT, Sony VO-5800 ¾" VCR with Sony PCM-601ESD, Neve/GML console. Tape Used: BASF Pro-II Chrome, TDK SA Chrome, TDK AD normal. Shell Used: Shape, Magnetic Media, TDK (stand-

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ard preloaded) Duplicating Speed: Real-time, 1 1 Packaging Equipment/Fulfillment Services: Shrinkwrap Rates: Call or write for rate card and demo Other Services: In-house computer-generated labels, J-card insertion Can assist with complete design and printing services, Apex on-shell printing.

WK STUDIO; Tape Duplication: 611 Broadway, Ste. 529; New York, NY 10012; (212) 473-1203. Contact: Phyllis Whitehouse. Konstantine Sareyani. **TAPE DUPLICATION** Duplicator: (40) Tascam 122 real-time, (2) Telex 6120 high-speed 16 1 (1 master, 7 slaves each), Olari DP4050 (1 master, 5 slaves) 8 1 Method of Duplication: In-cassette Mastering Equipment: We can duplicate from 1/2-track (1/4" and 1/2") (3/4, 7/8, 15, 30 ips), 1/4-track, PCM, DAT, LP, Beta and VHS Tape Used: BASF Chrome, Ampex, Magnetic Media Shell Used: Magnetic Media, Sunkyong Duplicating Speed: Real-time, 8 1, 16 1 Loading Equipment: TTL automatic Packaging Equipment/Fulfillment Services: Custom labeling, shrink-wrap Rates: Upon request, very reasonable! Other Services: 16-track recording facility, editing, mixing, custom equalization, blank tapes of any length! Satisfaction guaranteed!

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A&F MUSIC SERVICES; Mastering, Tape Duplication; 2834 Otsego, Pontiac, MI 48054; (313) 682-9025; (313) 669-3100. Contact: Frank Merwin

A + R RECORD & TAPE MFG. CO.; Mastering, Pressing, Tape Duplication, CD Services; 920 N. Industrial Blvd., Dallas, TX 75207; (214) 741-2027; (800) 527-3472 outside TX. Contact: Richard Sobel, Stanley Getz II

A TO Z AUDIO SERVICES, INC.; Tape Duplication; 21929 Lorain Rd., PO Box 26087, Fairview Park, OH 44126; (216) 333-0040. Contact: Duane Abarca, Greg Zarnoski

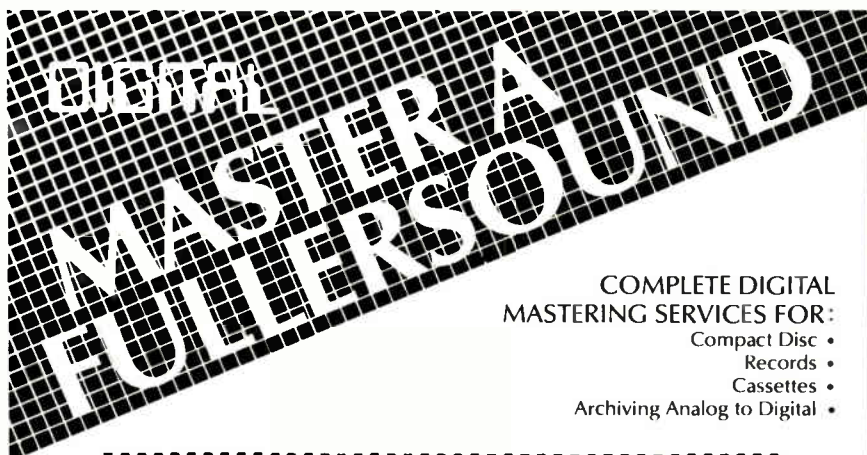
ACME AUDIO & RECORDING CORP.; Mastering, Tape Duplication, CD Services; 3821 N. Southport, Chicago, IL 60613; (312) 477-7333; (800) 826-2263. Contact: Jim Rasfeld **MASTERING Console:** Neotek Series One Tape Machines: Ampex ATR-102 1/2" and 1/4", Technics 1520, Technics 1500, Technics 1506, Sony PCM-501ES, Sony PCM-1630, DMR-4000, PCM-2500 R-DAT, Nakamichi BX-300 Monitor Speakers: E-V Sentry 100A, E-V Sentry 500 Signal Processing: Brooke-Siren dynamics processor, Phase Linear auto-correlator, Orban 422B, Technics SH-9010 EQ, Teletronix and dbx compressors, PCM-60, REV7, Melcor program EQ, Dolby A and SR, dbx Type I and II. Engineers: Paul Smith, Blaise Barton, Al Wittek. Credits: Flying Fish, Blind Pig, Red Beans, Blues R&B, Global Village, Earwig, Atlantic, Nessa and Wolf record companies Rates: \$45/hr for PCM-501 digital copy-masters, \$35/hr editing and copying, \$125/hr CD preparation Other Services: Compilations from any format for CD release, we specialize in digital remastering. **TAPE DUPLICATION** Duplicator: (35) Nakamichi BX-300 customized Capacity: 1,000 C-45s a day Method of Duplication: In-cassette Mastering Equipment: Beta, VHS, Sony PCM-501ES, Technics 1500 Tape Used: BASF Chrome, Ampex 615 Shell Used: Shape Mark 10, ICM clear normal Duplicating Speed: Real-time Loading Equipment: King Packaging Equipment/Fulfillment Services: Insertion and shrinkwrap

ANVID RECORDING COMPANY; Mastering, Tape Duplication, CD Services; PO Box 8130; Bartlett, IL 60103; (708) 837-9840. Contact: David Schuler

ARS RECORDING STUDIO & TAPE DUPLICATION; Mastering, Tape Duplication; 11626 S. Pulaski, Alsip, IL 60658; (312) 371-8424; FAX: (312) 371-9403. Contact: Allen Keilman, Gary Cobb

AUDIO-VIDEOGRAPHICS; Mastering, Tape Duplication; 13801 E. 35 St., Independence, MO 64055; (816) 254-0400; (800) 322-2832. Contact: Jerry Riegler **MASTERING Console:** TAC Scorpion 16x8 Tape Machines: (3) Sony APR-5000 2-track mastering machine, Sony 2500A DAT machine, Sony PCM-F1 and PCM-501 with JVC 1/2" and 3/4" video-cassette recorders Monitor Speakers: Norberg BCS-16 2-way near-field, Andante 3As Signal Processing: UREI 1176LN, UREI 1178, Aphex Compellor, UREI 546 parametric EQ, Dolby A, B and SR noise reduction, dbx noise reduction, Barcus-Berry model 802 signal processor, Dorrrough loudness meters Engineers: Eric Etwell, Russ Wojtkiewicz, Vaughn Weddle **TAPE DUPLICATION Duplicator:** KABA real-time duplicators, (3) bin-loop system (modified Liberties), Magnefax low-speed bin-loop system. Method of Duplication: In-cassette bin-loop Mastering Equipment: (3) Sony APR-5000 2-track, Technics 1506 1/4-track, Sony 2500A R-DAT Tape Used: BASF Chrome, Agfa 649/949 ferric cassette tapes, Ampex 456 and Agfa 526 1/4" mastering tape Shell Used: Shape Mark 10, Lenco, Magtek Duplicating Speed: Real-time, 2x, 16x, 32x Loading Equipment: (2) King 790 loader

—CONTINUED ON NEXT PAGE



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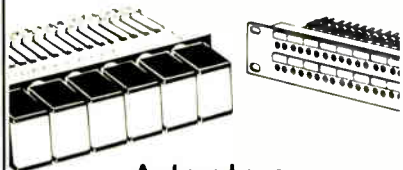


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CASSETTE SERVICES INC.; *Tape Duplication*; 100 N. Hickory Ave.; Arlington Heights, IL 60004; (708) 398-8403. Contact: Michael Connor.

C.D.S. CASSETTE DUPLICATING SERVICE; *Tape Duplication*; 444 Dimmick Ave.; Cincinnati, OH 45246; (513) 851-1956. Contact: Carl J. Burkhardt.

century21 PROGRAMMING, INC.

CENTURY 21 PROGRAMMING, INC.
Dallas, TX

CENTURY 21 PROGRAMMING, INC.; *Mastering, CD Services*; 14444 Beltwood Pkwy.; Dallas, TX 75244-3228; (800) 937-2100; (214) 934-2121. Contact: Gary Hollis, Chris Green. **MASTERING**. Console: Sony 2016, Sony/MCI 636. **Tape Machines**: Sony DASH 2-track, Sony/MCI 2-track analog w/Dolby SR and A. **Monitor Speakers**: TAD, JBL 4430 studio. **Signal Processing**: Sonic Solutions NoNoise CD mastering, reverb, Dynafex, EQ, etc. **Engineers**: Gary Hollis, Chris Green, John Parthun, Craig Turner, Tom Cusic. **Credits**: Century 21 Programming GoldDiscs, HitDiscs, CD Production Libraries, Bullet Productions* in the Studio, ABC/Watermark American Top 40, Memory-Tech A to D. **Rates**: CD mastering \$125/hour, NoNoise processing \$100 per finished minute. **Other Services**: In-house 24-track studio, (2) in-house MIDI studios. **COMPACT DISC**. Preparation/Manufacturing: (2) complete CD prep suites with Sony DMR-4000, DTA-2000, PCM-2500 DAT.

COACHHOUSE MUSIC; *Mastering, Pressing, Tape Duplication, CD Services*; PO Box 1308; Barrington, IL 60011-1308; (312) 382-5295; FAX: (312) 381-1022. Contact: Michael Freeman, Theodora Vosnos.

CREATIVE SOUND

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CREATIVE SOUND PRODUCTIONS, INC.
Houston, TX

CREATIVE SOUND PRODUCTIONS, INC.; *Tape Duplication*; 8383 Commerce Park Dr. #604; Houston, TX 77036; (713) 777-9975; (800) 451-7034; FAX: (713) 774-3419. Contact: Edward B. Smith, president; Michele Crosby, dir. of duplication. **TAPE DUPLICATION**. Duplicator: Otari DP-80 w/HX Pro 64:1 bin-loop, 2 slaves; Otari DP-1010 master/bin loop, 5 slaves; Infonics open-reel master, 3 slaves. Capacity: 10,000 per 8-hour shift. Method of Duplication: Bin-loop, in-cassette. **Mastering Equipment**: Otari MTR-10-4 w/HX Pro; Otari 5050 Mark III-4; Ampex ATR 700; Tascam M32; Sony PCM-501 2-track digital, Ramsa SV-3500 R-DAT. **Tape Used**: Agfa 649/949, Agfa 619/B19, Agfa 647 Chrome, Ampex 615/616. **Shell Used**: Swire Premium, ICM Premium, Shape Mark 10. **Duplicating Speed**: 16:1, 32:1, 64:1. **Loading Equipment**: Tape-matic 2000, King automatics. **Packaging Equipment/Fulfillment Services**: Compugraphic typesetting, shrinkwrap, custom labels and full-color caseliners, printing, custom vinyl albums, full graphic design, Macintosh II DTP and graphics system. **Rates**: Catalog available upon request. **Other Services**: Video duplication and packaging, all formats; custom-loaded blank cassettes; studio production and post-production facilities.

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CRYSTAL CLEAR SOUND
Dallas, TX

CRYSTAL CLEAR SOUND; *Tape Duplication*; 4902 Don Dr.; Dallas, TX 75247; (214) 630-2957. Contact: Keith Rust. **TAPE DUPLICATION**. Duplicator: KABA 26 position. Method of Duplication: In-cassette. **Mastering Equipment**: Sony 5002 ½" and ¼", Panasonic SV3500 R-DAT. **Tape Used**: BASF Chrome. **Shell Used**: Shape. **Duplicating Speed**: Real-time. **Other Services**: 24-track studio, color insert printing, Apex printing, shrinkwrap.

DOMAIN COMMUNICATIONS, INC.; *Tape Duplication*; 289 Main Place; Carol Stream, IL 60188; (312) 668-5300. Contact: Jim Draper.

EMC PRODUCTIONS; *Tape Duplication*; 300 York Ave.; Saint Paul, MN 55101; (612) 771-1555. Contact: Dick Stevens, Jane Tweet, Paula Jeske.

BOB GREEN PRODUCTIONS, INC.; *Mastering, Tape Duplication*; 7950 Westglen; Houston, TX 77063; (713) 977-1334. Contact: Bob Green, Jim Spurlock, Don Fisher.

INTERNATIONAL AUDIO, INC.; *Tape Duplication*; 2934 Malmö Rd.; Arlington Heights, IL 60005; (312) 956-6030. Contact: Paul Mally. **TAPE DUPLICATION**. Duplicator: Liberty (modified 1989), Awa F770, Alpha 4000M. Capacity: 3,000 per day. Method of Duplication: In-cassette, bin-loop.

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INTERNATIONAL AUDIO, INC.
Arlington Heights, IL

Mastering Equipment: Studer Revox, Nakamichi, Panasonic. Tape Used: Agfa, BASF, TDK. Shell Used: Elmar, Shape Mark 10. Duplicating Speed: Real-time, 16:1. Loading Equipment: Concept design modified King 770s. Packaging Equipment/Fulfillment Services: Shrinkwrap, on-cassette printing. Rates: Upon request. Other Services: Diskette duplication for most formats.

INTERNATIONAL CASSETTE CORP.; Tape Duplication; PO Box 1928; Greenville, TX 75401; (214) 454-9164. Contact: Ron Moyer

JOR-DAN RECORDING, INC.; Mastering, Tape Duplication; 1100 Wheaton Oaks Ct.; Wheaton, IL 60187; (312) 653-1919. Contact: Lynn Wallace.

THE LITTLE WAREHOUSE, INC.; Tape Duplication; 5505 Valley Belt Rd., Ste. E; Independence, OH 44131; (216) 398-0022. Contact: Joe Kauffman. TAPE DUPLICATION. Duplicator: Magnefax LBC 82-QT, Telex 6120 XLP, CD Series, Magnefax LBC-88TT. Method of Duplication: In-cassette, bin-loop. Mastering Equipment: Studer Revox PR99, Otari MX-5050B, Ampex ATR-200, Tascam 35-2 and 3440. Tape Used: Agfa 619, 649, BASF Chrome, Ampex 615. Shell Used: Magnetic Media 5-screw. Duplicating Speed: 8:1, 16:1, 24:1. Loading Equipment: King 790, King 2500. Packaging Equipment/Fulfillment Services: Inserts and shrinkwrap. Rates: Quote on request. Other Services: In-house printing of labels and inserts. Full-color foto-ert inserts. Video loading and duplication: 3/4" and 1/2" VHS and Beta w/digital time base correction

MUSICOL, INC.; Mastering, Pressing, Tape Duplication, CD Services; 780 Oakland Park Ave.; Columbus, OH 43224; (614) 267-3133. Contact: Boyd Niederlander, John Hull.

THE PRESSING PLANT; Pressing, Tape Duplication, CD Services; 111 Oak Lawn; Dallas, TX 75207; (214) 748-6622. Contact: Dewayne Eley. PRESSING. Presses: S.M.T. fully automatic. Capacity: 7,200 albums daily, 8,400 singles daily. Vinyl Used: Keycor audiophile virgin (colors in stock). Other Services: Direct-to-board jackets, laser color seps., posters, shrinkwrap, mailouts, etc. TAPE DUPLICATION. Duplicator: Min. order 500. Capacity: 75-90 thousand per day (3 shifts). Method of Duplication: Bin-loop. Mastering Equipment: Sony PCM-1610, Sony 701-ES, Otari MTR-10, Electro Sound 8000 Series. Tape Used: Ampex, BASF, Capitol. Duplicating Speed: 64:1. Loading Equipment: King 760. Packaging Equipment/Fulfillment Services: Ampex printing, COMPACT DISC. Preparation/Manufacturing: Analog-to-digital transfers, mastering, packaging, disc. CD booklets, inlay cards, blister packs, jewel boxes, many other options.

PRO DUPE; Tape Duplication; 1155 Rosewood, Suite A; Ann Arbor, MI 48104; (313) 994-1210. Contact: David Lau. TAPE DUPLICATION. Duplicator: KABA real-time, 20 slaves. Capacity: 100 C-45s per hour. Method of Duplication: In-cassette. Mastering Equipment: Nakamichi, Crown, dbx, Otari. Tape Used: BASF Chrome, Sunkyong Chrome. Shell Used: Various. Duplicating Speed: Real-time and 2x. Rates: Vary with length and quantity. Other Services: Mastering or duplication from R-DAT, F1 digital, open-reel or cassette masters.

QCA CUSTOM PRESSING, INC.; Mastering, Pressing, Tape Duplication, CD Services; 2832 Spring Grove Ave.; Cincinnati, OH 45225; (513) 681-8400. Contact: Amber Hines. MASTERING. Cutting Lathes: Neumann VMS66 w/Zuma disc computer. Console: Neumann. Tape Machines: MCI JH-110M, Otari MTR-10. Monitor Speakers: UREI 811, Eastern Acoustics. Yamaha NS-10M. Signal Processing: Sontec parametric EQ, Aphex Compellor, Aphex Dominator. Engineers: Don Kraft. Rates: Call sales department. PRESSING. Presses: (5) S.M.T. automatic 12" press, (2) S.M.T. automatic dual 7" press. Capacity: 15,000 LPs per day, 15,000 7" per day. Vinyl Used: Keycor E 588. Rates: Call sales department. Other Services: Plating, typesetting, color separation, jacket and sleeve printing, packaging, shrinkwrap. TAPE DUPLICATION. Duplica-



QCA CUSTOM PRESSING, INC.
Cincinnati, OH

tor: Catec Gauss 2400 w/Dolby HX Pro. Capacity: 9,000 per day. Method of Duplication: Bin-loop. Mastering Equipment: MCI JH-110, Neumann console, Otari MTR-10 4LX. Tape Used: Agfa Chrome. Shell Used: Michelex, Shape Mark 10. Duplicating Speed: 32:1, 64:1, 128:1. Loading Equipment: King 790, 770. Packaging Equipment/Fulfillment Services: Apex printing, 4-color insert printing, packaging and wrap. Rates: Call sales department. COMPACT DISC. Preparation/Manufacturing: Q.C.A. handles complete manufacturing of CD from premastering to final packaging.

RICHARDSON TAPE; Tape Duplication; HC 71, Box 231; Mountain View, AR 72560; (501) 269-3908. Contact: Aubrey Richardson. TAPE DUPLICATION. Duplicator: Nakamichi MR-2 (77 decks). Capacity: 1,000 C-30s per shift. Method of Duplication: In-cassette. Mastering Equipment: Otari, Crown, Technics digital, DOD, UREI, dbx, Aphex, R-DAT, B.B.E. Tape Used: BASF Chrome, Ampex, Mag Media. Agfa. Shell Used: Mag Media, Shape Mark 10, Filam. Duplicating Speed: 1 1/2 ips, real-time. Loading Equipment: King. Packaging Equipment/Fulfillment Services: Complete labeling and shrinkwrap 1- to 4-color, direct-to-cassette imprinting with true metal colors using the Print Rite 314 hot-foil stamper. Rates: On request. We do small orders (under 1,000). Other Services: Each cassette is checked for QC before packaging. Demo copies: with letter-quality computer labels in small quantities. Call for prices.



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Kansas City, KS

R.S.R.T. (ROYAL SCANLON'S REAL TIME); Mastering, Tape Duplication; 4020 Stateline; Kansas City, KS 66103; (913) 262-5335. Contact: Royal Scanlon, Lois Geffert. MASTERING. Tape Machines: Otari MTR-12 with Dolby SR, Sony 2500 R-DAT. Monitor Speakers: Yamaha NS-10M, EAW NS-50, Minimus 7. Signal Processing: Aphex Compellor, Aphex Dominator, Aphex Exciter. Engineers: Royal Scanlon, Larry Johnson (El Jay). Rates: Mastering, editing, sweetening—\$45 per hour. Straight transfer time—\$35 per hour. Other Services: Decoding of Dolby A and SR as well as dbx Type I, encoding of Dolby B or C or dbx Type II. Multiple format compatibility: 1/4" half-track or quarter-track, Sony F-1 PCM on Beta, VHS or U-matic, R-DAT, cassette, Beta Hi-Fi or VHS Hi-Fi. TAPE DUPLICATION. Duplicator: Modified KABA real-time system (50), Nakamichi MR-1. Capacity: 4,800 double-time C-40s per day, 2,400 real-time C-40s per day. Mastering Equipment: Otari MTR-12, Sony 2500 R-DAT. F1 format on Beta, VHS, U-matic. Tape Used: BASF Chrome, others available. Shell Used: Shape Mark 10, others available but not recommended. Duplicating Speed: Real-time and double-

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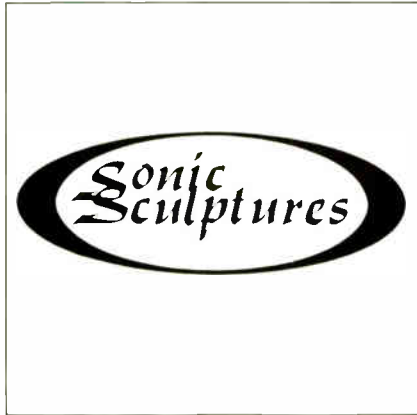
TAPE TO DISC

DIRECTORY

—CONTINUED FROM PREVIOUS PAGE

time. Loading Equipment: King 790 Packaging Equipment/Fulfillment Services: Yes. Other Services: On-cassette printing or labels, labeling complete packaging, shrinkwrap services

SESSION MASTERS; *Mastering;* 25 W. 360 Geneva Rd.; Wheaton, IL 60188; (312) 653-1516. Contact: Mark Richardson



SONIC SCULPTURES
Cincinnati, OH

SONIC SCULPTURES; *Mastering, Pressing, Tape Duplication, CD Services;* 636 Northland Blvd.; Cincinnati, OH 45240; (513) 851-0055. Contact: Lan A. Ackley

SOUND RECORDERS, INC.; *Tape Duplication;* 4031 Guadalupe; Austin, TX 78751; (512) 454-8324; FAX: (512) 454-5594. Contact: Miles Muller, Tim Doot. TAPE DUPLICATION

Duplicator: Electro Sound 8000, Magnelax. Capacity: Thousands per day. Method of Duplication: Bin-loop. Mastering Equipment: Studer. Tape Used: Agfa and others. Shell Used: ICM, Mag Media. Duplicating Speed: 64:1, 32:1. Loading Equipment: King and Tapematic. All fully automatic. Packaging Equipment/Fulfillment Services: In-house printing, packaging and cello wrapping. Rates: Nationally competitive. Other Services: A lot of extra quality and care.

SUMA RECORDING STUDIO; *Mastering, Pressing, Tape Duplication, CD Services;* 5706 Vrooman Rd.; Painesville, OH 44077; (216) 951-3955; (216) 352-9802. Contact: Paul Hamann

WORLD CLASS TAPES; *Tape Duplication;* 670 Airport Blvd., Ste. 1; PO Box 7611; Ann Arbor, MI 48108; (313) 662-0669; (800) 365-0669. Contact: Sherry Prindle, Kevin Ellis.

WESTERN



AAPEX TAPE DUPLICATION
San Rafael, CA

AAPEX TAPE DUPLICATION; *Tape Duplication;* 28 Paul Dr., Ste. E; San Rafael, CA 94903; (415) 492-1300; (800) 323-AAPX. Contact: Devon Hulett. TAPE DUPLICATION Du-

plicator: (103) Nakamichi MR-2B (real-time). Capacity: 1,000-1,500 per day. Method of Duplication: In-cassette. Mastering Equipment: Otari MTR-12 2-track (7½, 15 or 30 ips), Sony PCM-501ES digital processor, Sony Super Beta VCR and Quazar VHS, Sony DAT. Tape Used: Mastering: Agfa 469; duplication: BASF Chrome, Agfa 649, BASF normal. Shell Used: Quality 5-screw shell, Shape upon request. Duplicating Speed: 1:1 (real-time only). Packaging Equipment/Fulfillment Services: X-Rite shrinkwrap machine and Auto-Labe automatic labeler. Rates: Rates upon request, please call. Other Services: Sonic enhancement, analog-to-digital mastering, full graphic design and printing services offered. Full mixing, mastering and recording at our 24-track recording studio, Banquet Sound Studios.



AAZTEC RECORDING & TAPE DUPLICATING, INC.
Phoenix, AZ

AAZTEC RECORDING & TAPE DUPLICATING, INC.; *Tape Duplication;* 1110 E. Missouri, Ste. 400; Phoenix, AZ 85014; (602) 279-0808. Contact: Ron Briskman. TAPE DUPLICATION Duplicator: KABA, Trac Systems. Capacity: 3,000 cassettes per day. Method of Duplication: In-cassette. Mastering Equipment: Otari. Tape Used: All. Shell Used: 5-screw. Duplicating Speed: Real-time, double-time, 16:1. Loading Equipment: King Packaging Equipment/Fulfillment Services: MLater shrinkwrap. Rates: Call for rates. Other Services: Recording 2- to 16-track

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ABACAB AUDIO; Tape Duplication; PO Box 3376; Costa Mesa, CA 92628; (714) 432-1745. Contact: Marc.



ABBEY TAPE DUPLICATORS, INC.
Chatsworth, CA

ABBEY TAPE DUPLICATORS, INC.; Tape Duplication; 9525 Vassar Ave.; Chatsworth, CA 91311; (818) 882-5210 (in CA); (800) 346-3827. Contact: Bill Snow, Norman Cooke **TAPE DUPLICATION** Duplicator: Dubbings 24-slave (bin-loop) KABA 50-slave (real-time) Capacity: 5,000/day Method of Duplication: In-cassette, bin-loop Mastering Equipment: MCI, Ampex, Technics, Sony, Nakamichi digital F1, R-DAT. Tape Used: BASF LHD BASF Chrome Shell Used: 5-screw white, black or clear Duplicating Speed: 36 ips and real-time Loading Equipment: King 790s Packaging Equipment/Fulfillment Services: ITI labeling, Roll-dex imprinting, shrinkwrap ping albums, individual mailings Other Services: Complete narration studio and audio production facilities Editing, sequencing, equalizing, mixing Video duplication Reliable, personal service for over 20 years

ADVANCE RECORDING PRODUCTS; Tape Duplication; 7190 Clairemont Mesa Blvd.; San Diego, CA 92111; (619) 277-2540; (800) 854-1061; (800) 858-1061 (in CA).

AMERICAN PRODUCTION SERVICES; Tape Duplication; 2247 15th Ave. W; Seattle, WA 98119; (206) 282-1776; FAX: (206) 282-3535. Contact: Ella Bachmann, Nicholas Denke.

ARTISAN SOUND RECORDERS; Mastering, CD Services; 1600 N. Wilcox Ave.; Hollywood, CA 90028; (213) 461-2751. Contact: Greg Fulginiti

ARTIST SOUND; Tape Duplication; 10011 SE Division #306, Portland, OR 97266; (800) 628-5782. Contact: Sue, Dennis or Gloria **TAPE DUPLICATION** Duplicator: (50) Nakamichi real-time Capacity: 500 C-45/shift Method of Duplication: In-cassette Mastering Equipment: Sony F1 (Beta), Sony DAT, Philips CD, Fostex analog. Tape Used: BASF pure Chrome, TDK by request Shell Used: Shape Mark 10 Duplicating Speed: 1:1 Packaging Equipment/Fulfillment Services: Type setting, labels, J-cards, shrinkwrap, shipping. Rates: Extremely competitive, \$99 specials! Other Services: Digital and analog editing, digital and analog remastering; fast turnaround, no tax!

ASR RECORDING SERVICES; Tape Duplication; 8960 Etor Ave.; Canoga Park, CA 91304; (818) 341-1124. Contact: Kathleen Anthony.



AT&T RECORDING
Los Angeles, CA

AT&T RECORDING; Tape Duplication; 501 N. Larchmont Blvd.; Los Angeles, CA 90004-1305; (213) 466-9000; FAX: (213) 467-6615. Contact: Kathy VanBooven **TAPE DUPLI-**

CATION Duplicator; (88) KABA real-time in-cassette system, (10) Nakamichi real-time in-cassette system Method of Duplication: In-cassette and bin-loop Mastering Equipment: Sony 2500 DAT, Panasonic DAT 3500, Studer 1/4", Otari 8-track 1/2", Scully 4-track 1/2", Sony PCM-501, Sony SLO-1800 Beta Hi-fi, JVC BR-7000 UR VHS deck. Tape Used: Agfa 649/949, Agfa 468 1/4", Shell Used: Shape Mk-10, Magnetic Media Duplicating Speed: Real-time, 2:1, 16:1. Loading Equipment: King. Packaging Equipment/Fulfillment Services: Custom labels, insertion, shrinkwrap Rates: Competitive rates Call for quotation

AUDIO CASSETTE DUPLICATOR CO.; Tape Duplication; 12426 1/2 Ventura Blvd.; Studio City, CA 91604; (818) 762-2232. Contact: Steven Katz, Steve Mitchell **TAPE DUPLICATION** Duplicator: Yamaha K-2000 cassette machines Capacity: 1-1,000. Method of Duplication: In-cassette Mastering Equipment: Sony 1630, Sony PCM-2500 DAT, Sony F1, Ampex ATR-100 Tape Used: TDK SA Shell Used: Shape, Solcoor Duplicating Speed: Real-time 1:1 Packaging Equipment/Fulfillment Services: Labeling, shrinkwrap Rates: Call for prices Other Services: Appointments, credit cards accepted.



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BAUER AUDIO
Sepulveda, CA

BAUER AUDIO; Tape Duplication; 8840 Valjean Ave.; Sepulveda, CA 91343; (800) 627-7277. **TAPE DUPLICATION** Other Services: Remastering, radio syndication, Short runs (12 to 5,000 cassettes) requiring fast turnaround and audiophile quality are our specialty, utilizing state-of-the-art mastering equipment and real-time duplication (KABA 84 slaves). Personalized service is emphasized to match your requirements to our variety of tapes, C-zeroes, labels, inserts and shrinkwrap We offer complete project management including location recording 24-hour service available



CAPITOL RECORDS STUDIOS
Hollywood, CA

CAPITOL RECORDS STUDIOS; Mastering, CD Services; 1750 N. Vine St.; Hollywood, CA 90028; (213) 462-6252. Contact: Tammy Kizer, Docken Polk **MASTERING** Cutting Lathes: (2) Neumann SAL 74B w/Zuma computer Console: Neve console w/Sontec, Neve and NTP computerized equalization. Tape Machines: Studer A80 2-track (1/4" and 1/2"), Sony and JVC digital mastering. Monitor Speakers: JBL custom, Yamaha and Auratone Signal Processing: (8) live chambers, digital echo. Engineers: Ron McMaster, Wally Traugott Credits: The Beatles, Richard Marx, Lee Ritenour, Julio Iglesias, The Whispers, Diane Schurr, Kenny Rogers, Juice Newton, Shalamar, The Bangles, Bob Seger, Steve Miller, Crowded —CONTINUED ON NEXT PAGE

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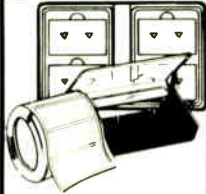
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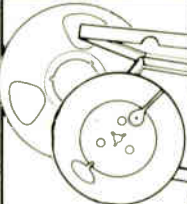


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W E S T E R N

TAPE TO DISC

DIRECTORY

—CONTINUED FROM PREVIOUS PAGE

House, Dwight Yoakam, Poison, Stryper, David Bowie, Pet Shop Boys, Buck Owens, Peter Cetera, John Lennon and many more. Rates: Call for rates. **TAPE DUPLICATION** Other Services: Call for tape duplication info. **COMPACT DISC** Preparation/Manufacturing: CD preparation analog-to-digital mastering. Format conversion of all types. JVC to Sony mastering. Digital mastering engineers Tom Ketterer, Odeia Murphy, Bob Norberg and Larry Walsh. Call for prices for preparation and manufacturing.

CASSETTE PRODUCTIONS UNLIMITED; Tape Duplication; 5796 Martin Rd.; Irwindale, CA 91706; (800) 345-0145. Contact: W. Weston Jolly

CHRISTIAN CASSETTE; Tape Duplication; 2650 W. Glen Rosa #5, Phoenix, AZ 85017; (602) 246-4976. Contact: Ed Richards. **TAPE DUPLICATION** Duplicator: Magnelax 6 Capacity: 50,000 Method of Duplication: In-cassette, bin-loop. Mastering Equipment: Otari, Tascam. Tape Used: BASF, Agfa. Shell Used: Shape, I.T.L. Duplicating Speed: Real-time, 2x, 6x. Loading Equipment: King. Packaging Equipment/Fulfillment Services: Complete packaging and fulfillment services. Rates: Varies. Other Services: In-house graphics, design, printing.

COMMAND PRODUCTIONS; Tape Duplication; 107 Industrial Center, Harbor Drive; Sausalito, CA 94965; (415) 332-3161. Contact: Warren Weagant

CUSTOM DUPLICATION, INC.; Tape Duplication; 3404 Century Blvd.; Inglewood, CA 90303; (213) 670-5575. Contact: Rick Hively. vp sales. **TAPE DUPLICATION** Duplicator: Gauss, Otari. Capacity: 85,000 per day. Method of Duplication: Bin-loop. Mastering Equipment: Studer. Tape Used: Agfa. Duplicating Speed: 64 1. Loading Equipment: King. Packaging Equipment/Fulfillment Services: Total packaging. Other Services: Video duplication, computer software duplication, total turnkey operation, drop shipping, warehousing, computerized inventory reporting.

FANTASY STUDIOS MASTERING; Mastering, CD Services; 10th & Parker Streets; Berkeley, CA 94710; (415) 549-2500. Contact: George Horn. **MASTERING** Cutting Lathes: Neumann mastering system utilizing the Zuma Audio computer Console: Sphere console. Tape Machines: Studer ¼" and ½" tape machines, Mitsubishi X-80 2-track recorder, Sony 1630 R-DAT. Signal Processing: Sontec. Engineers: George Horn, Phil De Lancie. Rates: Call for rates. Other Services: Mastering from Mitsubishi X-80 digital and from Sony 1630 digital. Preparation of digital masters for compact disc manufacturing. Editing and equalization mastering from F1 and R-DAT format.

FDS Labs, Inc.

Full Dimensional Sound



FDS LABS, INC.
Los Angeles, CA

FDS LABS, INC.; Mastering, CD Services; 4007 W. 6th St.; Los Angeles, CA 90020; (213) 383-2155; (213) 383-2156; FAX: (213) 383-2158. Contact: Hank Waring, Joe Steiner. **MASTERING** Cutting Lathes: Neumann VMS-66, SX-74 (cutting head) Console: Sony K-1105 digital. Tape Machines: (3) Sony ¼" DMR-4000, (5) Sony ¼" DMR-2000, (2) Sony ¾" BVU-800, Sony ¾" VO-5800, (3) Sony DAT PCM-2500, (5) Sony DAT DTC-1000ES, Mitsubishi X-80, Mitsubishi X-86, (2) JVC ½" BR-6400U VHS, Sony ½" SL-130ME Beta, Denon DCD-3300 CD player, (5) Analog MCI-JH110 ¼" and ½" Monitor Speakers: (6) Yamaha NS-10M, (4) Electro-Voice Sentry 100A, (2) JBL 4332, (2) JBL 4311B, assorted Auratones. Signal Processing: Sony DAE-1100A digital audio editor, (3) Sony PCM-1630, (3) Sony PMC-1610, Sony DFX-2400 format converter, (2) Sony PCM-701ES, (3) Sony DAL-1000 digital audio limiter, (4) Sony DTA-2000 digital tape analyzer, (2) Orban 674A parametric EQ, (2) Orban 622B parametric EQ, Aphex Compellor, (2) Orban 526A de-esser, Dolby 361 (Dolby A, Dolby SR, DBX K9-22), (2) Yamaha REV5. Engineers: Hank Waring (president), Joseph L. Steiner III (mastering supervisor), Patrick Burnette (engineer), Michael Dwyer (engineer). Credits: WEA (Europe, Capitol, Warner Bros., Chrysalis, BMG (Europe), Arista, I.R.S. Records, PolyGram, RCA Records, R.J. Reynolds, Universal Pictures. Rates: Transfer \$100/hr., digital editing \$125/hr., digital equalization \$125/hr., call for further rates. Other Services: Our facility offers specialized services in all areas of the entertainment industry. We also feature the full-dimensional sound computers and mainframe that will eliminate noise, provide sound restoration and correct phase problems. We also offer full CD-video preparation. This is our third mastering suite, and our most advanced **COMPACT DISC Preparation/Manufacturing**: We offer complete CD prepping from transfer to digital tape analysis. We also have full digital equalization as well as full digital editing. Please call for current price quotes.

52ND STREET AUDIO; Tape Duplication; 1741 N. Ivar Ave., Ste. 204; Hollywood, CA 90028; (213) 463-5252. Contact: Stu Yahm

FUTURE DISC SYSTEMS; Mastering, CD Services; 3475 Cahuenga Blvd. W.; Hollywood, CA 90068; (213) 876-8733. *See Our Ad in the Business Pages! Contact: Gary Rice, Susan West

GOOD VIBRATIONS RECORDING AND PRODUCTION CO.; Tape Duplication, CD Services; PO Box 764; Bonita (San Diego County), CA 92002; (619) 267-0307. Contact: Don Marshall. Karl Fitch. **TAPE DUPLICATION** Duplicator: KABA, Otari. Capacity: (24) slaves. Method of Duplication: In-cassette. Mastering Equipment: (4) Sony R-DAT modified, Revox A-700, TEAC 3440, Technics 1506, Onkyo TA-2090. Tape Used: BASF normal bias, BASF Chrome and Super Chrome, Agfa, AmpeX, Sunkyo Shell Used: Magnetic Media, Shape. Duplicating Speed: Real-time, double-time, high-speed (8 1). Packaging Equipment/Fulfillment Services: Fabrication includes labeling and shrinkwrap. Rates: Various rates for cassette duplication. Call or write. Other Services: Location digital recording, typesetting, 4-color J-cards, voice-over studio, subliminal and motivational tape production including original music. **COMPACT DISC Preparation/Manufacturing**: Preparation of analog or R-DAT master for CD replication.

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DIFFERENT FUR DIGITAL; 3470 19th St.; San Francisco, CA 94110; (415) 864-1967. Contact: Susan Skaggs. **MASTERING** Console: Sonic Solutions NoNoise system. Tape Machines: Sony 1630, DMR-4000, Sony DAT, Panasonic SV3500 DAT. Credits: Dancing Cat Productions, The Residents. Rates: Telephone for quote. Other Services: CD pre-mastering, digital EQ and dynamics, digital editing, frequency rate conversion, session automation and project management. **COMPACT DISC Preparation/Manufacturing**: Sonic Solutions NoNoise digital audio system. Also featuring CD pre-mastering, digital EQ and dynamics, digital editing, frequency rate conversion, session automation and project management.

DIGIPREP; Mastering, CD Services; 1425 N. Cole Pl.; Hollywood, CA 90028; (213) 461-1709. Contact: Warren Sailer

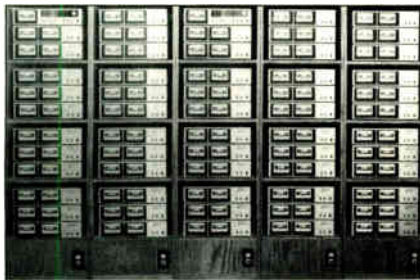
DIGITAL BROTHERS; Mastering, Tape Duplication; 1731 Bonaire Way; Newport Beach, CA 92660; (714) 645-9702; (714) 646-4244. Contact: Ben Shaw, Bryan Shaw

DISCTRONICS, INC.; CD Services; 3500 W. Olive Ave. #1020; Burbank, CA 91505; (818) 953-7790; FAX: (818) 953-7791. Contact: Sue Simone, Cal Roberts, Rick Goldman

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BERNIE GRUNDMAN MASTERING; Mastering; 6054 Sunset Blvd., Hollywood, CA 90028; (213) 465-6264; FAX: (213) 465-8367. Contact: Nickie Walters. **MASTERING.** Cutting Lathes: Scully Compudisc, CD Reference Disc cutting system. Console: Custom designed. **Tape Machines:** Studer A80 mastering decks with custom electronics, ATR-102, Yamaha K2000, Mitsubishi X-80, X-86, X-86HS, Sony 1630, DAT, F1 Monitor. **Speakers:** Tannoy custom. **Signal Processing:** EMT plate, dbx de-essers, Aphex limiters, Harmonia Mundi digital EQ and limiting. **Engineers:** Bernie Grundman, Brian Gardner, Chris Bellman, Mark Keller, Erik Wolf. **Credits:** Michael Jackson, Lionel Richie, Herb Alpert, Janet Jackson, Prince, George Harrison, Anita Baker, George Michael, David Lee Roth, Barbra Streisand. **Rates:** On request. **Other Services:** Complete preparation services for compact disc, from any digital source.

JACKSON SOUND PRODUCTIONS LTD.; Tape Duplication; 3897 S. Jason St., Englewood, CO 80110; (303) 761-7940. Contact: Linda Loughman



**AUDIOPHILE QUALITY CASSETTES
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KABA AUDIO PRODUCTIONS
Novato, CA

KABA AUDIO PRODUCTIONS; Tape Duplication; 24 Commercial Blvd.; Novato, CA 94949; (415) 883-5041 (in CA); (800) 231-TAPE. **★See Our Ad in the BusinessPages!★** Contact: Toni Lynn. **MASTERING.** Engineers: Gordon Elliott, Ted Straton, Margaret Olney. **Rates:** Phone. **TAPE DUPLICATION.** Duplicator: KABA 4-track real-time and 2x system, 100 positions, Accurate Sound 16x and 32x bin-loop system, 5 slaves. **Capacity:** 3,500 C-45 on RT/2x; 4,500 C-45/day on bin-loop. **Method of Duplication:** In-cassette, bin-loop. **Mastering Equipment:** Otari MTR-12-I w/Hx Pro, Otari MX-5050 1/4" 2-track, 1/2" 4-track, Nakamichi and Technics PCM, Dolby B330, Dynalox noise reduction, Aphex Aural Exciter, Compellor, Dominator, ADA digital delay, Yamaha R-1000 digital reverb, Tascam parametric EQ, (2) Sony DTC-1000ES DAT machine, Orban Co-operator. **Tape Used:** BASF, Sunkyong, Agla. **Shell Used:** Shape, Michelelex, El Mar, EMC, ICM. **Duplicating Speed:** 1, 1, 2, 1, 8, 16, 1, 32. **Loading Equipment:** TTL Model 515, Kronos-4. **Packaging Equipment/Fulfillment Services:** ITI L-1B labeler, Pack-all, shrinkwrap, Kent 4-color print-on-cassette, Norelco box or other products. **Rates:** Phone. **Other Services:** In-house graphics department, full packaging with paper labels or on-cassette printing, 1-4 colors, up to 300-line screen. **Equipment for turnkey cassette duplication systems available from sister company, KABA Research and Development.**

KDISC MASTERING STUDIOS; Mastering, Pressing, CD Services; 6550 Sunset Blvd., Hollywood, CA 90028; (213) 466-1323. Contact: Julie Gach. **MASTERING.** Cutting Lathes: Neumann, Lacquer, DMM Console; Neve DTC, Harmonia Mundi, custom analog. **Tape Machines:** Studer, Ampex, Sony Monitor. **Speakers:** JBL custom, Cetec Gauss, Yamaha NS-10M. **Signal Processing:** Sontec, API, Neve, Dolby, dbx. **Rates:** Call for rates. **COMPACT DISC Preparation/Manufacturing:** Complete digital preparation services. Sony PCM-1610 and PCM-1630 mastering, editing, digital copies, digital consoles, compact disc prep.

KM RECORDS, INC.; Mastering, Pressing, Tape Duplication, CD Services; 2980 N. Ontario St.; Burbank, CA 91504; (818) 841-3400; FAX: (818) 845-6478. Contact: Jim Auchterlone, Bill Riley. **MASTERING.** Cutting Lathes: (2) VMS-70, (2) SX74, (2) SAL 74B, with Zuma computer. **Console:** Neumann SP78, Neumann SP272. **Tape Machines:** (2) MCI JH-110 modified, Otari Monitor. **Speakers:** Yamaha NS-10, JBL 4425. **Signal Processing:** EMT 140, API and other EQs, Sontec parametric. **Engineers:** Michael DeCuir, Dave Travis, Keith Kearns. **Rates:** Upon request. **PRESSING.** Presses: Toolex-Alpha. **Capacity:** 15,000 per day. **Vinyl Used:** KC-569 Rates: Upon request. **Other Services:** In-house metal processing, printing of labels, jacket covers and liners, jacket fabrication.

TERRY LESSIG SOUND; Tape Duplication; 1626 N. 7th St.; Phoenix, AZ 85006; (602) 255-0155. Contact: Terry W. Lessig. **TAPE DUPLICATION.** Duplicator: Magnefax LB-72 bin-loop mono, (25) Nakamichi MR-2 stereo. **Capacity:** 4,000/day high-speed mono, 500/day real-time. **Method of Duplication:** In-cassette, bin-loop. **Mastering Equipment:** Otari MTR-10 w/Hx Pro, Sony F1, Panasonic SV-3500 R-DAT. **Tape Used:** BASF Chrome, LHD, LNS, DIC/DAT. **Shell Used:** ICM, Lenco. **Duplicating Speed:** 24.1 mono, real-time stereo. **Loading Equipment:** (2) Concept Design modified King 760. **Packaging Equipment/Fulfillment Services:** On-cassette printing, shrinkwrap, J-cards and O-cards printed from fully composed negatives. **Rates:** Call for quote. **Other Services:** Real-time 1/4" tape duplication (2-track stereo) for broadcast syndication of spots or programs, R-DAT duplication.

LOCATION RECORDING SERVICE, INC.; Mastering, CD Services; 2201 W. Burbank Blvd.; Burbank, CA 91506; (213) 849-1321. Contact: Shari Fraiberg. **MASTERING.** Cutting Lathes: (3) Neumann VMS-70, Neumann VG66, Neumann SX74. **Console:** (2) Neumann SP79, Neumann MT66. **Tape Machines:** (4) Studer A80 MkII 1/2" and 1/4", (4) Nakamichi MR-1 cassette deck, (3) Studer B67, Sony PCM-1630, (2) Sony DMR-4000, Sony 2500 DAT. **Monitor Speakers:** UREI 811-A, Studer A68 amps. **Signal Processing:** Sontec MES430 EQ, EMT 240 plate reverb, Yamaha REV5 digital reverb. **Engineers:** Bruce Kennedy, David Ellsworth, Slew Hillner, Kevin Gray. **Credits:** ABC Watermark, United Stations, MCA Radio, Rick Dees Productions, DIR, MJ Broadcasting, Premiere Radio. **Rates:** LP \$105/side, single \$40/side, rundown \$95/hr. **CD submaster \$400, CD clone \$180, DAT clones \$135, simul. DAT copy \$95.** Call for package prices. **Other Services:** Complete printing services: labels, jackets, cue sheets, etc. **Complete record productions:** Commercial printing, CD insert and tray cards, cassette J-cards.

KABA REALTIME **AUDIOPHILE QUALITY CASSETTES
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MARTIN PRODUCTIONS, INC.
DBA MARTIN AUDIO GROUP
Seattle, WA

MARTIN PRODUCTIONS, INC., DBA MARTIN AUDIO GROUP; Tape Duplication, CD Services; 1200 Westlake Ave. N., Ste. 414; Seattle, WA 98109; (206) 784-0139. Contact: Scott Olsen, Roxanne Robertson. **TAPE DUPLICATION.** Duplicator: KABA real-time 50 positions. **Method of Duplication:** In-cassette. **Mastering Equipment:** 1/4" analog, DAT, F1 16-bit VHS. **Tape Used:** BASF Chrome. **Shell Used:** Shape Mark 10. **Duplicating Speed:** Real-time. **Rates:** Quoted to quantity and length. **Other Services:** Cassette shell pad imprinting, J-card printing, shrinkwrap. **COMPACT DISC Preparation/Manufacturing:** Exclusive dealer for American Helix in Washington state. **Premastering, pressing, up to 5-color screen printing, packaging.**

MASTER TRACK PRODUCTIONS; Tape Duplication; 1524 W. Winton Ave.; Hayward, CA 94545; (415) 782-0877. Contact: Cynthia Ramirez. **TAPE DUPLICATION.** **Capacity:** 100,000 units/month. **Method of Duplication:** Bin-loop. **Mastering Equipment:** Studer A80 MR. **Tape Used:** Sunkyong. **Shell Used:** ICM, Michelelex, Magnetic Media. **Duplicating Speed:** 16.1, 32.1. **Packaging Equipment/Fulfillment Services:** On-shell printing, overwrap, paper labels, full-color inserts. **Rates:** Call for detailed price lists. **Other Services:** Complete 24-track recording studio.

MELODY PRODUCTIONS; Mastering, Tape Duplication; 7712 23rd Ave. NW; Seattle, WA 98117; (206) 783-8694. Contact: James A. Bostad, Sr. **MASTERING.** **Engineers:** James A. Bostad, Sr. **Rates:** Call for quote. **Other Services:** Custom loading of cassettes and quick turnaround a specialty. **Complete 8-track studio with digital effects.** **TAPE DUPLICATION.** Duplicator: Otari 4050 (high-speed), Nakamichi MR-1 and MR-2B. **Capacity:** 8 per pass on Otari, 6 per pass on Nakamichi. **Method of Duplication:** In-cassette. **Tape Used:** BASF LNS, LH-D, Chrome and new Super Chrome. **Shell Used:** Magnetic Media, Kyrac, Michelelex, Shape Mk10. **Duplicating Speed:** High-speed 8.1, real-time 1:1 (Nakamichi). **Loading Equipment:** King 790. **Rates:** Call for quote. **Other Services:** 8-track studio, video editing, duplication with effects.

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TAPE TO DISC

DIRECTORY

MOON VALLEY CASSETTE (WINTER SUN, INC.): Tape Duplication; 10802 N. 23rd Ave.; Phoenix, AZ 85029; (602) 870-3987. Contact: Mark Bruno



MUSIC ANNEX, INC.
Fremont, CA

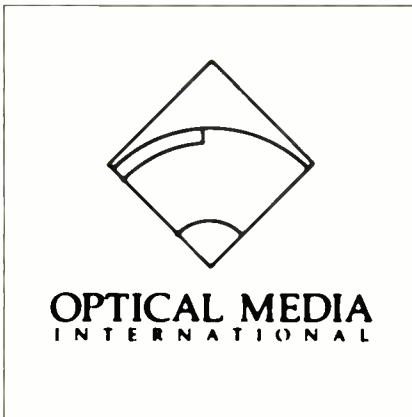
MUSIC ANNEX, INC.: Tape Duplication, CD Services; 42650 Christy St., Fremont, CA 94538; (415) 226-0800. Contact: Cathy Furness TAPE DUPLICATION Duplicator: Electro Sound 4800 system/3 slaves, Otari DP-80/6 slaves, Versadyne 1500/4 slaves Capacity: 300,000 per month Method of Duplication: Bin-loop Mastering Equipment: Otari MTR-12 Tape Used: Agfa, BASF, Sunkyoung Shell Used: ICM Almag, Michelex, Lenco Duplicating Speed: 64:1 (240/480 ips bins) Loading Equipment: King 790 and Tapematic 2002 Packaging Equipment/Fulfillment Services: Scandia Wrapper. Complete drop ship service available Other Services: In-house graphics department to assist you with your project. COMPACT DISC Preparation/Manufacturing: Complete CD mastering, replication and packaging available. Call for prices.



MUSICON
Wilsonville, OR

MUSICON: Tape Duplication; 27501 S.W. 95th Ave., Wilsonville, OR 97070; (503) 682-8668. Contact: Bill Berry TAPE DUPLICATION Duplicator: Versadyne (8 slave), Magnefax Capacity: 25,000 C-60/day Method of Duplication: Bin-loop Mastering Equipment: Complete recording studio. Tape Used: Sunkyoung Shell Used: Various Duplicating Speed: 32:1, 64:1 Loading Equipment: All King 790 Packaging Equipment/Fulfillment Services: On-cassette printing, labeling machines, boxing machines. Rates: Please call. Other Services: International distribution

OPTICAL MEDIA INTERNATIONAL: Mastering, Pressing, CD Services; 485 Alberto Way, Ste. 115; Los Gatos, CA 95032; (408) 395-4332; FAX: (408) 395-6544. Contact: Sylvester Pesek COMPACT DISC Preparation/Manufacturing: CD audio tape master preparation, CD audio tape premaster/encoding CD audio disc mastering services. CD audio disc

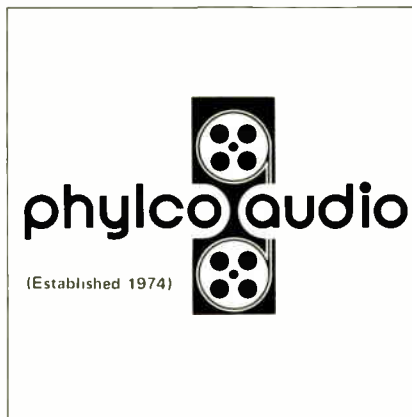


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PENGUIN DIGITAL RECORDING COMPANY: Tape Duplication; 10650 East Bethany Dr., Ste. B; Denver, CO 80014; (303) 755-9978. Contact: Robert Berglund TAPE DUPLICATION Duplicator: (56) Nakamichi MR-2B (real-time) Capacity: 780 C-30s per shift Method of Duplication: In-cassette. Mastering Equipment: Sony PCM-2500 R-DAT, Sony TCD-D10 Pro R-DAT (portable), Sony PCM-F1 Beta/VHS, MCI JH-110C 2-track 1/4" and 1/2" (7 1/2, 15 or 30 ips). Tape Used: BASF LHD, BASF Chrome. Shell Used: ICM, Michelex. Duplicating Speed: Real-time 1:1 Loading Equipment: King. Packaging Equipment/Fulfillment Services: Complete graphic service with custom J-cards/inserts, labels and shrinkwrap Rates: Please call for quote. We do small orders (under 1,000) Other Services: Short runs demanding fast turnaround and the highest of quality, utilizing state-of-the-art duplication and mastering equipment. We can do your complete project including on-location, digital recording. We also do DAT-to-DAT digital transfers



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PHYLCO AUDIO: Tape Duplication; 4697 Brooks St., Montclair, CA 91763; (714) 621-9561; (800) 525-0100; FAX: (714) 626-8183. Contact: Robert E. Deates, Gail Husa TAPE DUPLICATION Duplicator: Audio/Tek, GRT. Capacity: 10,000 per day Method of Duplication: Bin-loop Mastering Equipment: Tascam, TEAC, Dolby B, dbx I. Tape Used: BASF, Sunkyoung Shell Used: Elmar, Swire, Kyrac. Duplicating Speed: 30 and 60 ips. Loading Equipment: King 790 Packaging Equipment/Fulfillment Services: Direct-to-cassette imprinting, labeling, shrinkwrap and drop shipping Rates: Call for quote. Other Services: Label and J-card typeset and printing. Packaging individual cassettes and vinyl albums. Custom-loaded blanks

QUADIM CORPORATION: Mastering, Tape Duplication; 31542 Rustic Oak Dr., Westlake Village, CA 91361; (818) 706-8843; FAX: (818) 706-8426. Contact: Guy Costa MASTERING Console: Custom-designed w/computer control system Tape Masters: Sony 1610 w/Apogee, Sony 601 w/SLO-1800 Super Beta, Panasonic 3500 DAT, MCI analog 1/2" and 1/4", Otari 4-track. Signal Processing: PCM70, Aphex Dominator, Aphex expander/gate, Aphex Aural Exciter. Engineers: Guy Costa Credits: Pre-release and audiophile production for major labels. Rates: Call or write for rates and specifications. Other Services: Proprietary computer control system monitors and tests all cassettes and machines by processing



QUADIM CORPORATION
Westlake Village, CA

them through the Audio Precision System One. Quality certification available on all cassettes TAPE DUPLICATION Duplicator: (110) Nakamichi MR-1 Pro deck, KABA 10-position system. Capacity: 1,600+ per day. Method of Duplication: In-cassette Mastering Equipment: Custom console, Sony 1610, F1, analog 1/2" and 1/4", DAT Tape Used: Agfa 649, TDK SA, TDK metal, BASF Chrome Shell Used: Shape Film, Magnetic Media Duplicating Speed: Real-time (Nakamichi), 2x (KABA) Loading Equipment: King, Audicc Packaging Equipment/Fulfillment Services: Shrinkwrap, fulfillment services Rates: Call or write for rates and specifications



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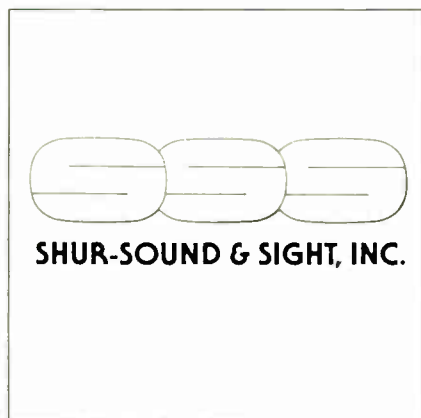
RAINBO RECORDS AND CASSETTES: Mastering, Pressing, Tape Duplication; 1738 Berkeley St., Santa Monica, CA 90404; (213) 829-3476. *See Our Ad in the Business-Pages* Contact: Jack G. Brown, Steven E. Sheldon MASTERING Cutting Lathes: All lacquer's cut at Capitol PRESSING Presses: (26) Lened automatic Capacity: 60,000 12" per 24-hour day, 18,000 7" Vinyl Used: Keycor KC 588 Rates: Call for current rates Other Services: Labels, jackets, sleeves, packaging and drop shipping TAPE DUPLICATION Duplicator: Electro Sound #000 w/HX Pro Capacity: 50,000/24-hour day Method of Duplication: Bin-loop Tape Used: BASF Shell Used: Michelex, Lenco Duplicating Speed: 64:1 Loading Equipment: King 790 Other Services: Apex printing, insert card and drop shipping, COMPACT DISC Preparation/Manufacturing: Packaging

RAINBOW CASSETTE STUDIO: Tape Duplication; PO Box 472, Taos, NM 87571; (505) 776-2953. Contact: Judy Lujan

REELTIME TAPE DUPLICATION: Tape Duplication; 125 Alتنا St., San Rafael, CA 94901; (415) 459-7180. Contact: Tony Johnson TAPE DUPLICATION Duplicator: (20) Nakamichi MR-2B. Capacity: 320 C-30/day Method of Duplication: In-cassette Mastering Equipment: Scully 280, Technics 1500, Sony DTC-1000 ES DAT, Orban parametric equalizer Tape Used: BASF, TDK Shell Used: 5-screw, precision molding, large pad, lubricated stainless steel pins, Shape available Duplicating Speed: Real-time Packaging Equipment/Fulfillment Services: Printing, assembly, shrinkwrap Rates: Low Other Services: Same-day computer-generated labels and inserts

SAN DIEGO'S AUDIO DUPLICATOR: Tape Duplication; 10536 Pine Grove St.; Rancho San Diego, CA 92078; (619) 670-9598; FAX: (619) 660-9083. Contact: Jim Norr TAPE DUPLICATION Duplicator (12) Ampex 440-B. Tape Used:

3M 226 Duplicating Speed: 15 ips or 7.5 ips reel-to-reel duplication Rates: Negotiable Other Services: National distribution for radio syndicators



SHUR-SOUND & SIGHT, INC.
Santa Clara, CA

SHUR-SOUND & SIGHT, INC.: *Tape Duplication*; 3350 Scott Blvd. #5, Santa Clara, CA 95054; (408) 727-7620. Contact: Lonnie Cory, Glenn Cardon **TAPE DUPLICATION** Duplicator: Electro Sound, Infonics, Versadyne 1/2" Capacity: 10,000 per shift Method of Duplication: In-cassette, bin-loop **Mastering Equipment**: Technics 1506, Ampex AG-440, Electro Sound 505 **Tape Used**: Ampex, BASF **Shell Used**: Shape, ICM **Duplicating Speed**: 16 1, 32 1, real-time **Loading Equipment**: (4) King 790, Electro Sound **Packaging Equipment/Fulfillment Services**: Tuck labeler, shrinkwrap, direct shell imprinting on cassette **Rates**: Call **Other Services**: Real-time duplication, location recording for conferences, seminars, etc.

SONIC ARTS CORP./THE MASTERING ROOM: *Mastering, CD Services*; 665 Harrison St., San Francisco, CA 94107; (415) 957-9470; (415) 957-9471. Contact: Kenneth Lee Jr, Leo Kulka **MASTERING** Cutting Lathes: Neumann mastering system **Console**: Custom mastering console **Tape Machines**: Scully Ampex, Inovonics, 1/2" and 3/4" **mastering**, PCM digital **Monitor Speakers**: Altec 604 w/E M Long Assoc. **time-aligned crossovers**, Yamaha NS-10 **Signal Processing**: Sontec Master EQ, Inovonics compressor/limiter, Dolby A and SR, dbx noise reduction, UREI **Engineers**: Kenneth Lee, Leo Kulka **Credits**: Philips, Warner Bros., Concord Jazz, Quartet Records, Ralph Records **Rates**: Available upon request **COMPACT DISC Preparation/Manufacturing**: 1630 CD preparation, Colossus digital mastering system



SOUNDWORKS WEST LTD.
W. Hollywood, CA

SOUNDWORKS WEST LTD.: *Mastering, CD Services*; 7317 Romaine St., W. Hollywood, CA 90046; (213) 850-1510; FAX: (213) 874-1420. Contact: Ron S. Lagerlof, Candice Moore-Dooley

SUPER DUPER: *Tape Duplication*; 3235 SE 39th, Portland, OR 97202; (503) 239-6070. Contact: Rick McMillen **TAPE DUPLICATION** Duplicator: (52) Nakamichi MR-2B w/Real-world EQ, Sony high-speed in-cassette **Capacity**: 1,000 C-45/day real-time, 4,000 C-45/day high-speed **Method of Duplication**: In-cassette **Mastering Equipment**: Otari MTR-12C, Otari 5050, Panasonic SV-3500 DAT, Panasonic SV-250 DAT, Nakamichi MR-1 cassette, Sony F1 **Tape Used**: BASF Super Chrome, BASF Pure Chrome, BASF LHD, BASF LNS, Agfa **Shell Used**: Shape Mk 10, Michelex, Systems Inc **Duplicating Speed**: Real-time (Nakamichi), 16 1 (Sony). **Load-**

ing Equipment: Custom lengths via King 790 **Packaging Equipment** **Fulfillment Services**: One-stop service—labels, J-cards, shrink and specialized packaging **Rates**: Less than L.A. **Other Services**: DAT clones, broadcast dubs, safety copies, restoration and tape cleanup, DAT location recording, event recording, consulting **Signal Processing**: Dolby SR, Dolby A, dbx, Aphex Dominator, Compellor, BBE 822, UREI/JBL 1/2-octave EQ, Aphex 10-4, Aphex D As, dbx noise filters, Scamp rack **You name it, we'll get it** **Engineers**: Rick McMillen, Todd Chatalas

TAPE ONE HAWAII, INC.: *Mastering, Tape Duplication, CD Services*; 1520 Liona St., Honolulu, HI 96814; (808) 947-8802. Contact: Dwain H. Hansen **MASTERING Console**: Harrison **Tape Machines**: Otari DAT, Otari MTR-10, MCI JH-110B, Sony 2500 **Monitor Speakers**: Tannoy **Signal Processing**: Orban, Symetrix Aphex **TAPE DUPLICATION** Duplicator: Versadyne (4 slaves), KABA (18 slaves) **Method of Duplication**: In-cassette, bin-loop **Mastering Equipment**: Otari MTR-10, Sony/MCI 2500 DAT **Tape Used**: Agfa, TDK, Ampex, GC **Shell Used**: Almag, Lenco, Shape **Duplicating Speed**: 32:1, 64:1, real-time, 2:1 **Loading Equipment**: (2) Concept Design **Packaging Equipment/Fulfillment Services**: Insert printing, on-shell imprinting, shrinkwrap, any packaging **Rates**: Competitive **Other Services**: Vinyl albums and other specialty packaging (custom) **COMPACT DISC Preparation/Manufacturing**: Preparation only

UNIMAGNETICS USA: *Tape Duplication*; 1513 6th St. #204, Santa Monica, CA 90401; (213) 393-1572; (800) 366-1176. Contact: Thomas Pereira

WEA MANUFACTURING, INC.: *Mastering, Pressing, Tape Duplication, CD Services*; 3601 W. Olive Ave., Ste. 420, Burbank, CA 91505; (818) 953-2941. Contact: David L. Brown, sr vp marketing

OUTSIDE U.S.

LES INDUSTRIES MAGRA LTEE: *Mastering, Tape Duplication*; 5722 Rue St-Andre, Montreal, Quebec, H2S 2K1 Canada; (514) 272-8224; FAX: (514) 272-9785. Contact: Mario Paquet, Francois Godard **MASTERING Console**: Chilton QM5 **Tape Machines**: Studer B67, Otari MTR-12 II, (2) Revox **Monitor Speakers**: JBL 4312 **Signal Processing**: Klark-Teknik EQ, Symetrix NR **Engineers**: Francois Godard **TAPE DUPLICATION** Duplicator: 102 KABA slaves, bin-loop AEG Lyrec **Capacity**: 1,200,000 a year **Method of Duplication**: In-cassette, bin-loop **Mastering Equipment**: Otari MTR-12 II **Tape Used**: Ampex, Magnetic Media, BASF **Shell Used**: Magnetic Media, Michelex, Shape Mark IV **Duplicating Speed**: 1:1 or 1:2 KABA | 15 Telex | 80 Lyrec **Loading Equipment**: (3) AEG Konos 4, (2) Electro Sound **Packaging Equipment/Fulfillment Services**: Shrink and print on cassette **Rates**: On request **Other Services**: R-DAT to R-DAT copy available **Distributor of Ampex, 3M products, studio accessories**

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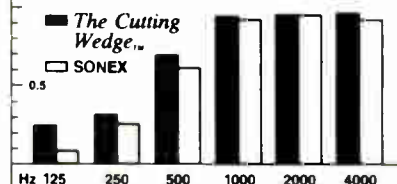
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AFTER MIX

—FROM PAGE 156, *AFTERMIX*

substantially less than that, but substantially more than \$18,000.

Mix: What does it cost your clients to get one ref?

Purcell: I've talked to several people across the country about that, and we all seem to be pretty close. The blank discs cost mastering houses \$80 to \$90. I believe it will take us about two hours to make each disc, including the PQ coding and the actual real-time transfer. Right now, I only have one recording unit, though I could get up to four more. On a one-at-a-time basis, the refs will be in the \$350 neighborhood. I talked to some people last week who are buying units, and they had "guestimated" that \$375 would be their charge. That seems expensive until you compare it to a glass master as a ref, which runs between \$600 and \$1,200.

The price I'm quoting does not include any stage before actually working on the ref. In other words, EQ and editing time and the running of the 1630 from which the ref is cut are not included. If people working at other mastering houses want to have a CD ref, we simply tell them to bring over a 1630 with a frame-accurate timing sheet, and that's how much it will be.

Mix: Lacquer refs generally are cut before the masters, which are then cut after the client has approved the ref. It sounds as though you plan to cut refs mostly from EQ'd 1630s, which means the client will have already paid for making a master before having a chance to approve a ref.

Purcell: You could do it either way, but mainly the refs will be cut from EQ'd 1630s. But that is something that certainly could be discussed with the client. You could cut the ref directly from the client's original master, using a digital output from your console or going from analog through the 1630, and wait to make the EQ'd master until the client approves the ref. But this way when the client approves the ref you've already got the 1630.

I have not experimented much with other ways of doing this. We're going through a learning curve and expect to learn how to best serve our clients as we use it. There are certainly all kinds of ways to configure the system.

Mix: Now that the way is supposedly being cleared for consumer DAT in the U.S., it may become much more

common to find DAT machines in people's homes and cars. If so, wouldn't a 44.1kHz DAT be just as useful and a lot less expensive than an actual CD ref?

Purcell: In theory it would. However, several factors go into this. If a producer leaves here with a DAT copy and, like most of the engineers and producers I work with, plays the competitors' CDs against his own product, then a DAT is not necessarily as good, because when he plays a CD he's listening to his CD player, and when he plays a DAT, he's listening to the digital-to-analog converters of the DAT machine. So the DAT wouldn't sound the same as the CD. Now if he had a common set of converters, then it might not matter.

Mix: Wouldn't the same thing apply if the producer compared from two different CD players?

Purcell: That surely would be true, depending on the models, how expensive they are and whether one has a separate D/A network, which some people do have. But if the question is "How do I get the producer closer to the end result?" the answer right now is not DAT, because it isn't yet commercially available on a big scale for doing A/B comparisons.

I don't think it is as simple as "every producer is going to want the same thing." Now that I can offer another alternative, producers can have whatever they want. We've had DAT for two years, and the people who have DAT players get DATs, just as the people who have F1s still get F1s. And some people still take an analog cassette along with DAT. So now there is just another question to ask: "Do you want a CD or DAT or both?"

Mix: PDS discs reportedly will play on most CD players, but not all. How will you handle the problem of clients whose players don't play the discs?

Purcell: The figures I'm getting now say the discs will play on 90 percent of the players. I think there will be a learning process in which we find which players they won't play on, then tell the producers. The producers who want a CD won't play it on those players. We won't be making any guarantees, because we will say up front that it plays on 90 percent of the players. I know it has worked with every player I've tried. ■

Phil De Lancie is a mastering engineer at Fantasy Studios in Berkeley, Calif.

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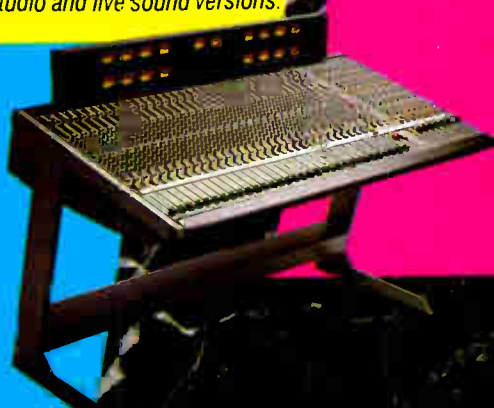
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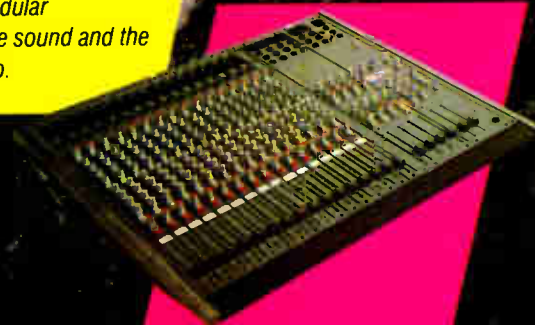
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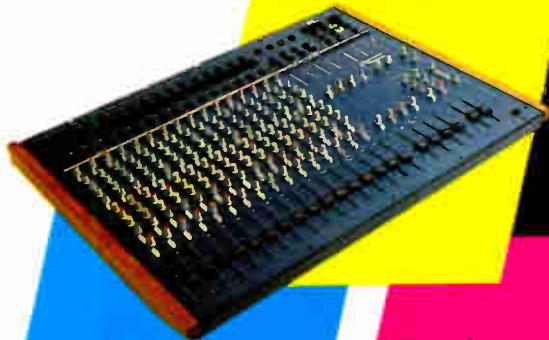
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