In the Studio with Peter Gabriel · MIDI Machine Control · HDTV Update

MARCH 1992

MIX

A Closer Look at CD and CD-ROM Recorders

Searching for the Perfect Reference Monitors

PROFESSIONAL RECORDING · SOUND AND MUSIC PRODUCTION

Directory: Northwest Recording Studios

Special Venue Audio Sound Design & Playback

INTERVIEW: PRODUCER PETER ASHER

World Radio History

**********5-DIGIT 91329
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The Alesis 3630...

a compressor that sounds great, does everything and is affordable

When we blueprinted the new **Alesis 3630 Compressor Limiter** we had a hard time cutting out features. So we left them all in.

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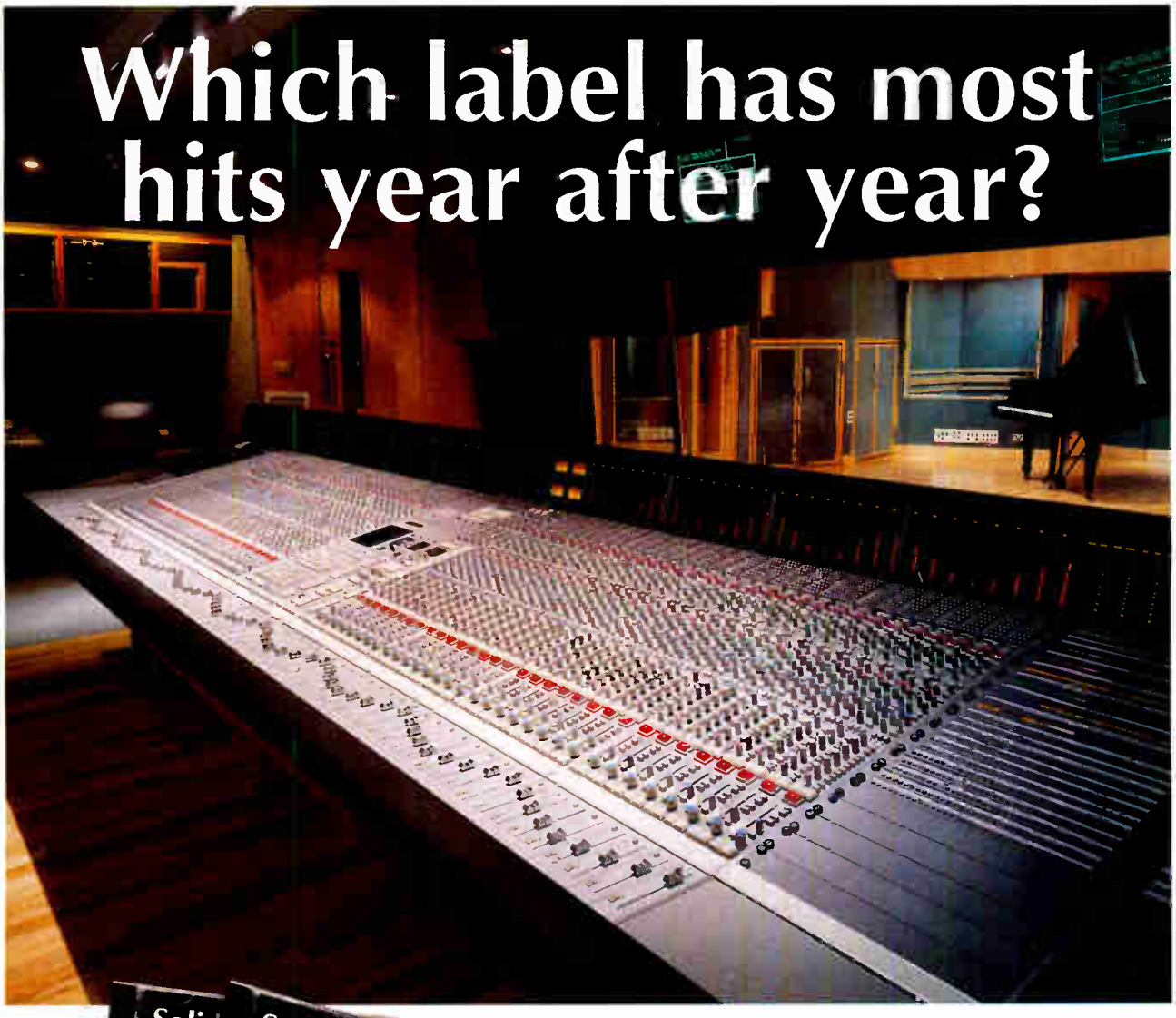
Which label has most hits year after year?



Photographed at Abbey Road Studios, London

Billboard

1992 STUDIO ACTION

PRODUCTION CREDITS FOR BILLBOARD'S No. 1 SINGLES

CATEGORY	Produced on SSL consoles*	Produced on ALL other consoles
DANCE	94%	6%
R&B	79%	21%
MODERN ROCK	79%	21%
ADULT CONTEMPORARY	77%	23%
HOT 100	71%	29%
RAP	59%	41%
ALBUM ROCK	59%	41%
COUNTRY	56%	44%

*Recorded and/or mixed on SSL consoles

Solid State Logic

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We built our woofer and tweeter a better home.

TEC 1991 WINNER

DMT AND TRANSDUCER HOUSINGS —

All Cabinets used in the new Tannoy Monitor Series represent considerably more thought and design than the average 'chipboard cabinet of the correct volume'.

Cabinets are constructed from a high density space-frame with rounded corners and edges, supporting MDF/high pressure twin laminated walls

Rounded corners and edges greatly inhibit sound reflections and diffractions from cabinet boundaries. These can be major sources of irregularities in the reproduced sound, particularly in terms of the perceived placement of instruments within the sound stage. For the high frequency unit to make an effective job of launching all the detail that it can generate into the listening space, it must be held rigidly in the cabinet throughout its operational frequencies.

This is the key to the Tannoy cabinets. If a 'rigid' cabinet is used, the redundant energy from the rear of the bass unit and frame cause endless resonance problems within the cabinet. Differential Material Technology provides the answers by using a variety of different adhesives between the rear of the drive unit and brace, the cabinet walls and the brace and within the layers of the MDF laminate.

TANNOY

HEAR BELIEVE

The lossy couplings effectively transmit and absorb energy in a frequency selective way. Put more simply, at low frequencies the drive unit sees the cabinet as a rigid structure and at higher frequencies as a resonance absorbing/damping structure.

DMT provides an ideal cabinet solution for the complete frequency range, eliminating unwanted loudspeaker biases.

The overall result is a true representation of the mix, unequaled referencing capability, guaranteeing what you hear is what you get — *every time.*

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disk & dat

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MIX

PROFESSIONAL RECORDING • SOUND AND MUSIC PRODUCTION

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Cover: Bad Animals/Seattle (formerly Lawson Productions) is a six-studio music recording and digital audio post-production complex. Architectural award-winning Studio X was designed by studio bau ton and features a 64-input SSL console with Ultimation and Total Recall, Sony 3324s, Studer and Otari multitracks, Dolby SR and custom TAD monitors. X also features a private lounge with full kitchen, sunken living room and private baths.
Photo: Grant Ramaley.

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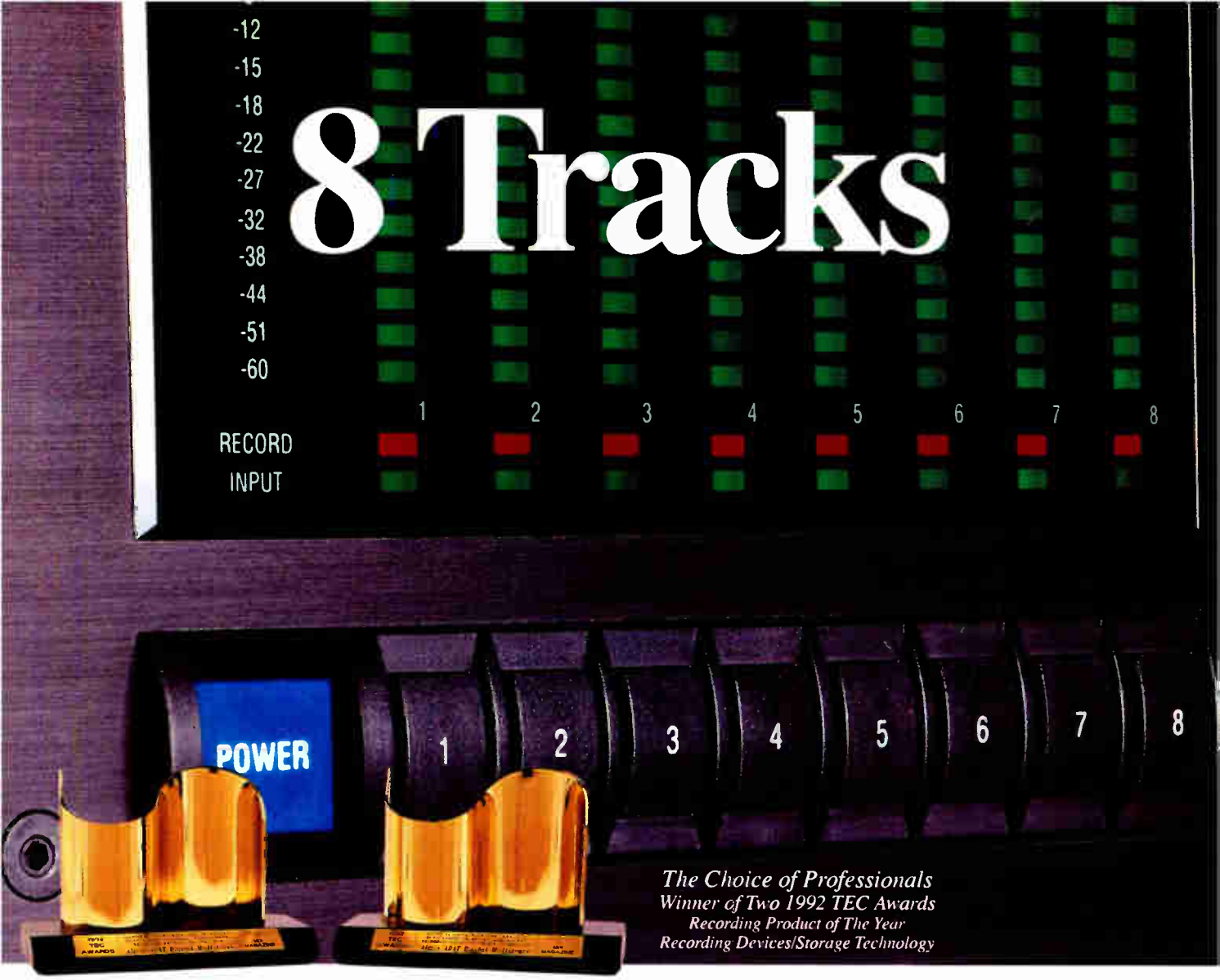

8 Tracks

The Choice of Professionals
Winner of Two 1992 TEC Awards
Recording Product of The Year
Recording Devices/Storage Technology

Demos to masters. Creativity to tape. Dreams to reality. Magic phrases for those who want to make music that sounds as good as it feels.

The inspiration for these thoughts is the **Alesis ADAT Professional Digital Audio Recorder**, a technological revolution that tears down the walls to your creativity while delivering world class master recordings. Too good to be true?

Here's the concept. ADAT fuses a supersonic Alesis-designed very large scale integrated chip set with the proven reliability of an industrial grade S-VHS* tape transport and a logical, sensible user interface. The result is a digital tape recording system that exceeds the most demanding requirements of professional audio and that can be used by literally anybody. Hard to believe?

Here's some specs. Bandwidth 20Hz to 20kHz ±0.5dB. Total Harmonic Distortion plus Noise 0.009%. Wow and flutter unmeasurable. ADAT uses the professional standard 48kHz sample rate and delivers better than 92dB dynamic range.

Here's some features. ADAT uses the familiar tape recorder controls that you already know how to use so recording is fast, intuitive, effortless. Connections are provided for balanced +4dBu levels on a single 56 pin ELCO** connector and unbalanced -10dBV signals on 1/4" jacks. And ADAT uses S-VHS tape because it's a proven, robust recording medium with wide 1/2" tape to solidly support ADAT's 8 recording tracks while delivering 40 minutes of recording time.

The best part. ADAT's Proprietary Synchronization Interface (Patent Pending) locks multiple ADATs, independent of the audio tracks, to single sample accuracy ±5% of 1/48,000th of a second! In other sciences this is referred to as 'air tight'. So multiple ADATs function in perfect mechanical and electronic unison: up to 16 ADATs without an external controller. That's 128 tracks!

More best part. ADAT's Proprietary MultiChannel Optical Digital Interface (Patent Pending) simultaneously sends all 8 tracks of recorded information out the Digital I/O for perfect safety tapes and perfect track bounces.

Even more best part. The optional BRC Master Remote Control opens a whole other door to the ADAT miracle. With it you can control up to 16 ADATs (128 simultaneous tracks) with full transport functions, track offsets, machine offsets,

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Also available: The AI-1 ADAT to AES/EBU and S/PDIF Digital Interface with sample rate converter.
RMB 32 Channel Remote Meter Bridge.
Call 1-800-5-ALESIS for information about the ADAT Worldwide Network.

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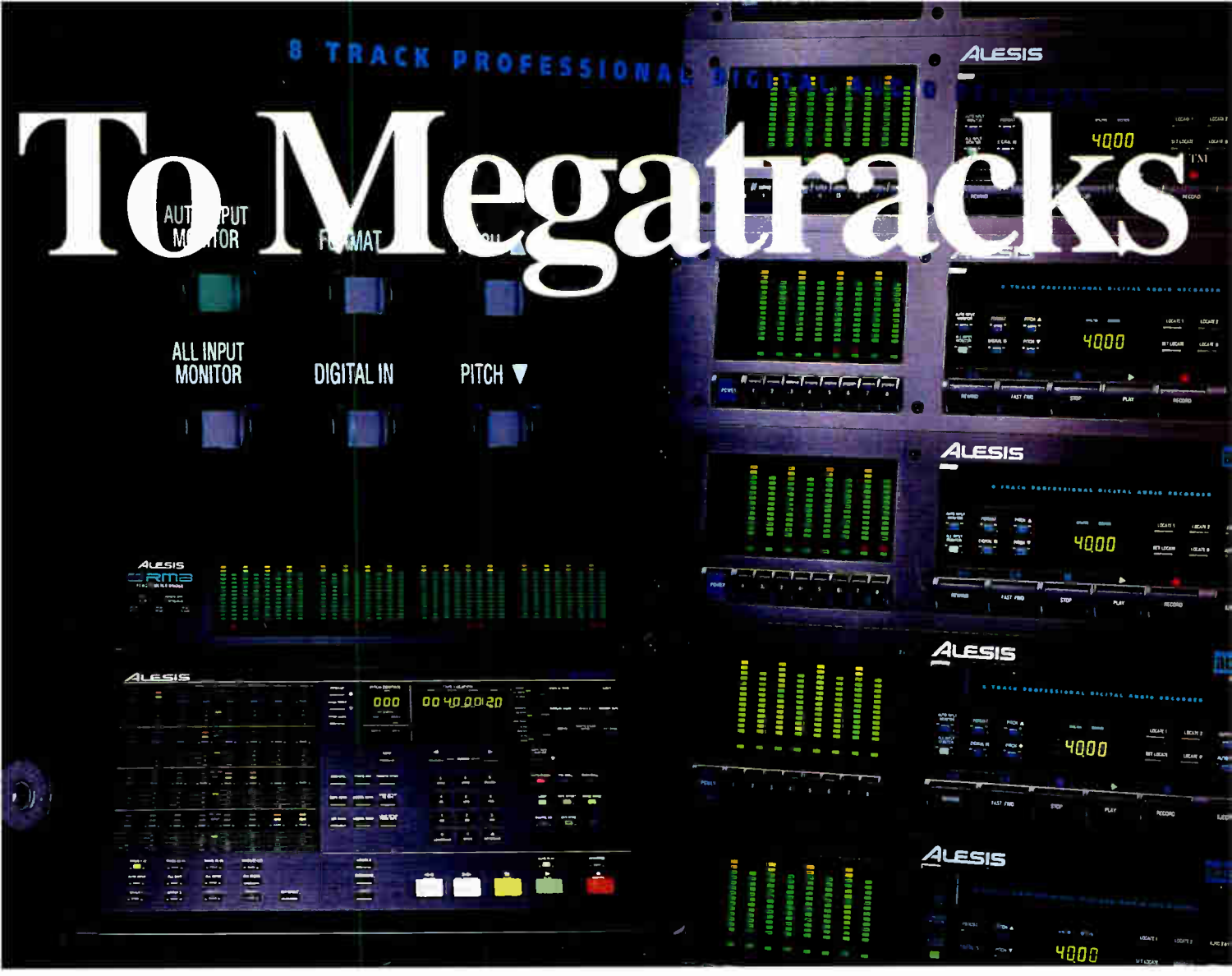
To Megatracks



digital assembly editing via the Digital I/O, SMPTE and MIDI Time Code, Video Sync and more.

What does all this mean? Here's just a few benefits.

It's commonly known that many hours are wasted during expensive album projects while the artist, producer and engineer work in vain to reproduce the rhythmic feel and tonal nuance of demos. Demos that couldn't be used because they suffered from noise, limited bandwidth and overall sonic feebleness. Those days are over forever. ADAT's Sync and Digital I/O perpetually link your demos to your masters making them all part of the same creative process. Every track you record on ADAT is a master track that can be flown into any other ADAT recording, at any time. The best part is that ADAT can be there at any time to catch you at your best, flawlessly stored in the digital domain...forever.

Need more tracks? ADAT studios can be expanded at any time. The cost of a single ADAT is remarkably inexpensive and new ADATs can be added as budgets permit. Add the BRC at any time for more control and advanced editing. Producers please note: with ADAT, Megatrack™ recording is a reality.

Your favorite sax player lives in Idaho? No problem. Send 'Supersax' a formatted tape with a guide track of your song. You'll get back 7 tracks of burning solos you can fly back into your production. All in perfect sync, all in the digital domain. All dripping with soul. Want more tracks? Just send more tapes.

ADAT is not only a new recording medium, it is the new recording standard. Imagine a network of ADAT users from bands, composers and project studios to professional studios, video editing suites and broadcast production studios. All recording master quality tracks with full compatibility and no barriers between their creative disciplines. In fact, we're launching the ADAT Worldwide Network™ multitrack recording group to facilitate communication between ADAT studios.

In time we'll all start taking these little miracles for granted. Before that inevitable event, unpack your first ADAT and track a minute of single notes and chords on your favorite instrument. Play loud, play soft. Play it back and listen really close. It's always a good feeling to have your mind completely blown.

See your Alesis ADAT Dealer today and start Megatracking on ADAT.

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Alesis Corporation 3630 Holdrege Avenue Los Angeles CA 90016

World Radio History

FROM THE EDITOR

Cutting your own CDs has become a viable alternative for many studios in the past couple of years. As Phil De Lancie explains in this issue, CD recorders that sold in the $50,000 range as recently as 1989 are now available for less than one-tenth of that price! This affordability, coupled with the increased sophistication of options and formats, deserves a new look from both large and small recording operations that find the need for short runs of CDs.

Go one step further and you'll also find an increasing availability of CD-ROM makers. While it may not be obvious why you need to budget for a CD-ROM maker this year, associate editor Paul Potyen builds quite a case for bringing this service in-house. For example, CD-ROM recording capability would allow you "to back up and archive the entire contents of a hard drive related to a given project, including audio files and documentation, giving the user instant access to any session file at a later date." It would also allow a project to be downloaded and sent to other facilities that have standard CD-ROM drives hooked up to their systems. Or perhaps it could be used by your facility to organize and quickly gain access to sound libraries for your samplers. As we are still in the dawn of the CD-ROM revolution, we can expect to see these applications moving up as the prices continue to come down. When to invest is your decision.

• • •

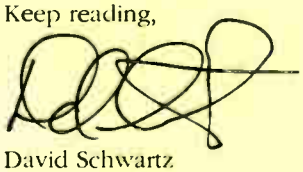
What else is new in pro audio? While we generally accept as a given the six or eight weeks lead time it takes for a monthly magazine to respond to news, this delay has always been a source of some consternation for us. We know that many pieces of news require quick dissemination. Likewise, certain people have jobs that demand they stay on top of late-breaking developments in pro audio.

That's why we've created MixLine. For anyone who needs fast news, we are now able to gather news items on Friday and literally have them in our readers' hands first thing Monday morning. You might think of MixLine as a Monday morning pro audio tip sheet, delivered by fax.

We're very excited about our new ability to get the word out on major developments in the industry, important new products, studio updates, juicy gossip and pretty solid rumors. Give us a call at (800) 233-9604 or drop us a fax at (510) 653-5142, and we'll send you a free sample of MixLine.

And finally, it's a great pleasure for us to welcome the highly acclaimed engineer/producer Fred Jones as our Southern California editorial bureau chief. Check him out in the L.A. Grapevine, in our Coast-to-Coast section.

Keep reading,



David Schwartz
Editor-in-Chief

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David Schwartz

NATIONAL EDITORIAL, ADVERTISING and **BUSINESS OFFICES**, 6400 Hollis St. #12, Emeryville, CA 94608. (510) 653-3307. IMC 736. FAX: (510) 653-5142. **SOUTHERN CALIFORNIA ADVERTISING OFFICES**, 1999 Avenue of the Stars, Suite 500, Los Angeles, CA 90067. (310) 551-4035. FAX: (310) 556-3855. **EAST COAST ADVERTISING OFFICES**, 110 East 59th St., 6th Floor, New York, NY 10022. (212) 909-0430. **DIRECTORIES ADVERTISING**, (800) 344-LIST. **CLASSIFIEDS ADVERTISING**, (800) 544-5530. **MIX BOOKSHELF**, (800) 233-9604. **CIRCULATION INQUIRIES**, PO Box 41525, Nashville, TN 37204. (800) 888-5139. (615) 370-5643.

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David Schwartz and Penny Riker Jacob

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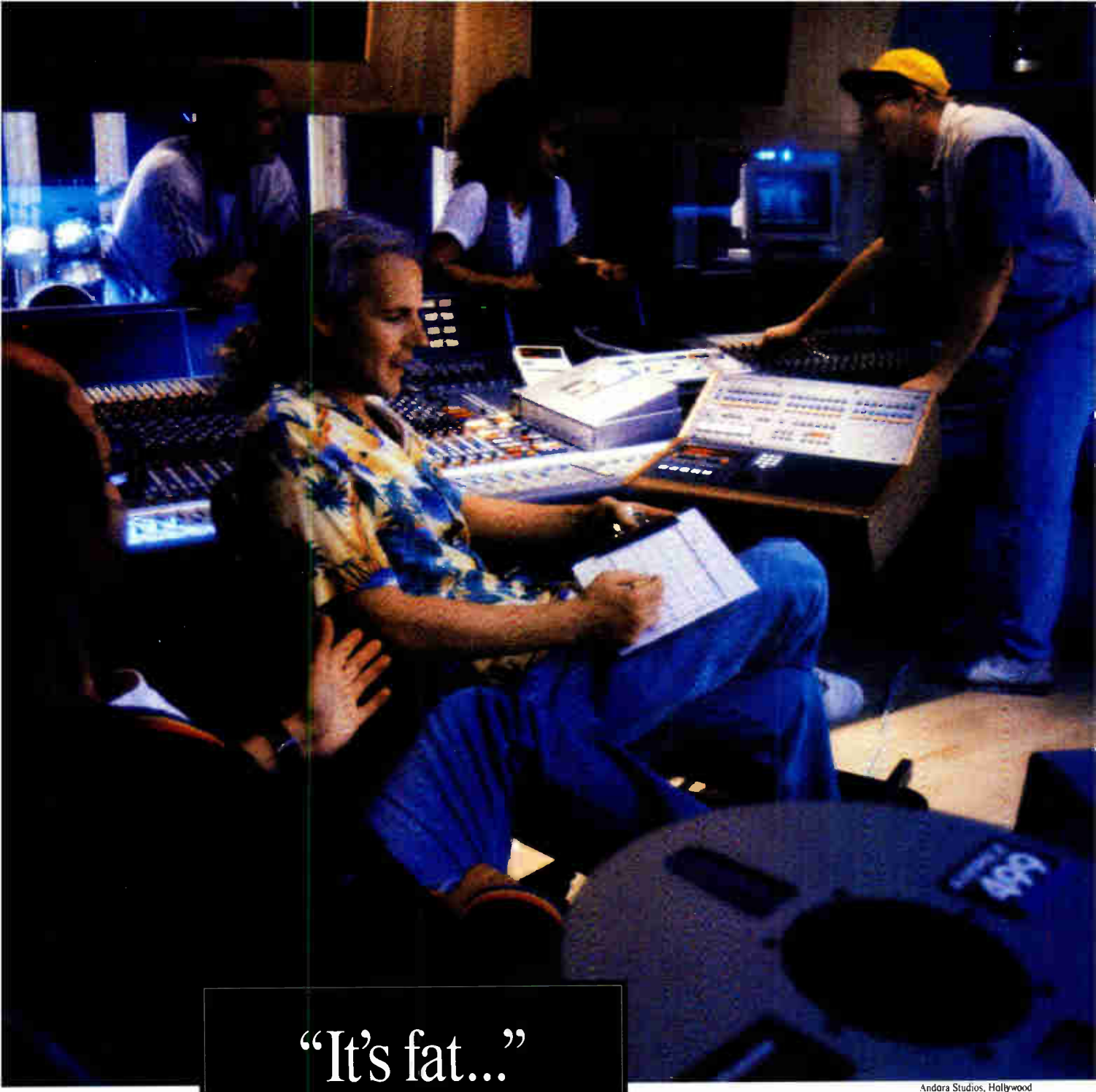

"It's fat..."

Andora Studios, Hollywood

We're printing at 9 over 250 and it still doesn't sog up.
I know, the harder you hit it, the better it gets.
Listen to that high hat.
It's stiff.
Yeah, and it's not squashed.
No, it's not compressing at all.
That's pretty amazing.

What's amazing is the noise floor.
What noise floor? I don't hear any noise.
Right!
Hey, this sound's got everything I need.
It's got depth all right. You can hear everything—way back in there.
Clarity, punch, depth—that's it.

You heard it. Ampex 499.
I'd say it was audibly superior.
I'd say it just *sounds* better.

Ampex 499.
It just *sounds* better.

AMPEX

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The CSII Digitally Controlled Analog Audio Mixing System provides facilities beyond the constraints of conventional designs but with the familiarity of a traditional in-line work surface. Add to this features such as the SnapShot Recall™ system, for instantly recalling all console settings, & Total Automation™ control and you have unequalled mixing power at your fingertips.

The new System Expansion Options™ and the CSII's modularity allow for up to 104 Totally Automated mono/stereo signal paths, each with Digitally Controlled Eq and Dynamics, 24/48 multitrack buses and up to 96 aux sends and mix buses. You can start with a 32 fader system and expand as your requirements change to end up with the largest audio mixing system in existence.

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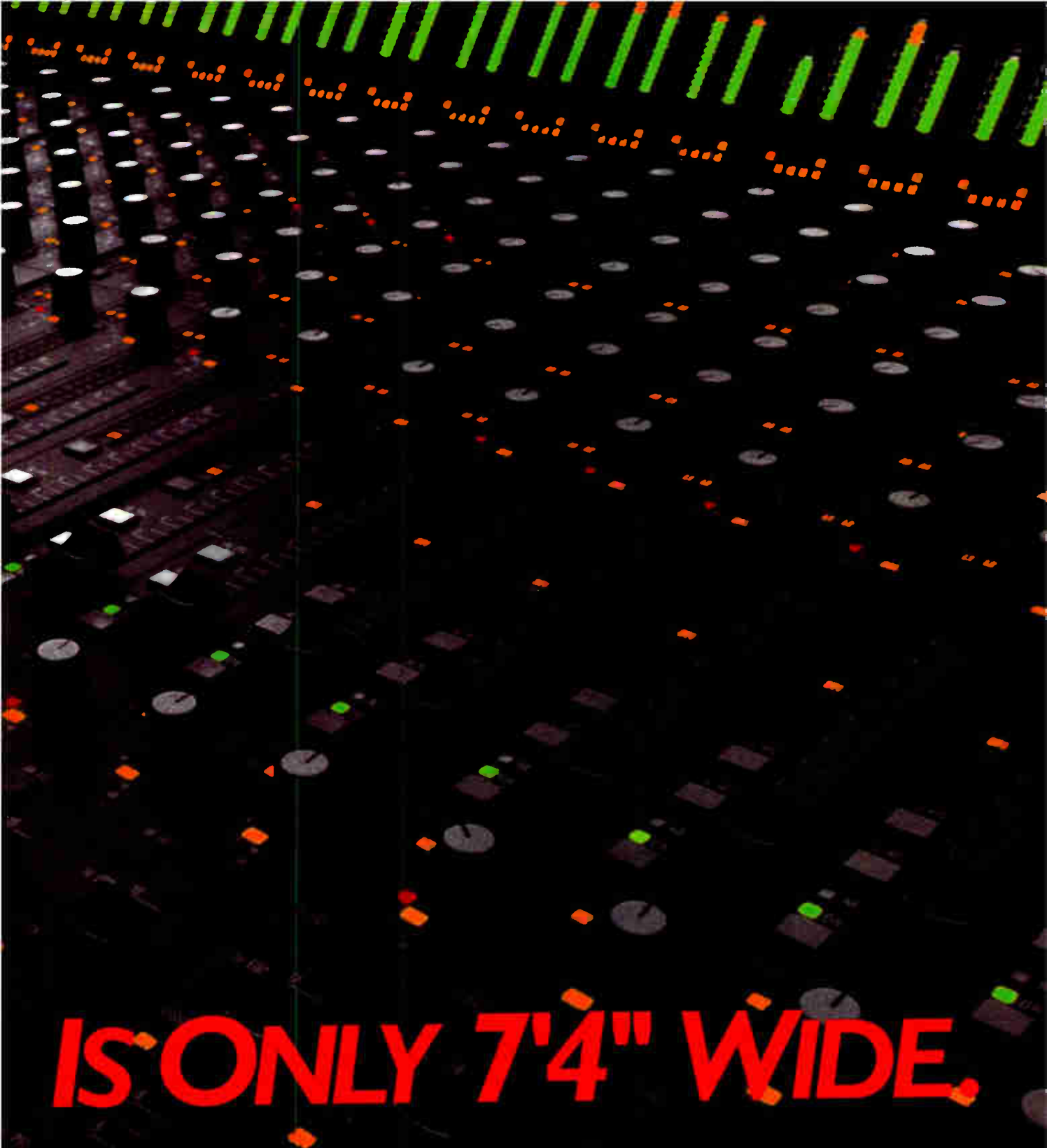

IS ONLY 7'4" WIDE.

The sleek, Digitally Controlled work surface, even for a 104 fader system, is only 7'4" wide. This allows you to sit at the center of the image while you adjust controls, so you can hear the changes.

The CSII represents a new generation of audio mixing system where you get much more, in a smaller space, for a lot less.

System configurations are available for Music, Film & TV Post, Broadcast, and Sound Reinforcement applications.

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North Hollywood, CA 91602
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Euphonix

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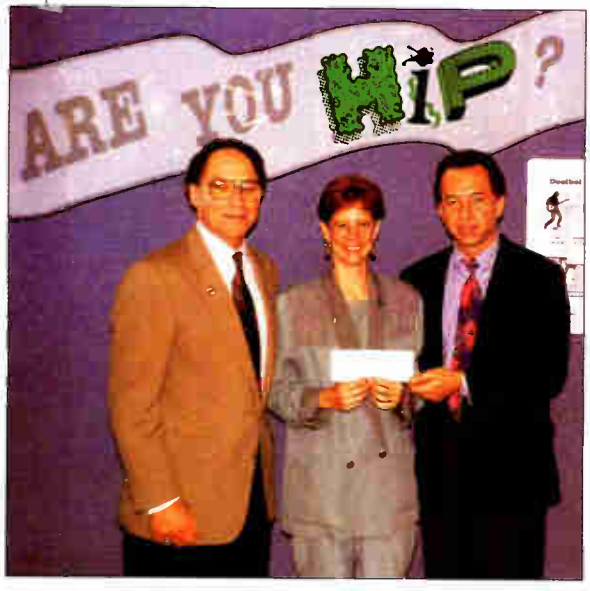
CURRENT

WINTER NAMM 1993: BIGGER, BETTER...WETTER

After nearly seven years of bone-dry drought conditions in California, the state was suddenly hit with a record 18 days of continuous heavy rainfall, causing massive flooding, damage and mudslides. Coincidentally, the National Association of Music Merchants met January 15-18 in the (usually) sunny city of Anaheim, bringing 30,000 attendees intent on previewing over 800,000 square feet of the latest in music and sound technologies.



At NAMM, Mix publisher and TEC Awards executive producer Hillel Resner (left) and Mix editor-in-chief David Schwartz present Charlie Lahaie of the House Ear Institute with a check for $11,000, earmarked for the Los Angeles research institute's work with the Hearing Is Priceless campaign. The Technical Excellence & Creativity Awards, presented by the Mix Foundation for Excellence in Audio, were held in San Francisco on October 2, and raised a total of $23,000 for various educational and hearing-related causes.

Despite the deluge outside, the mood within the convention center was anything but damp. Most importantly, there were plenty of new techno-goodies to drool over. Perhaps most significant were disk-based recording and editing systems, with at least a dozen companies (Anatek, ART, Akai, Digidesign, Digital Audio Labs, Digital FX, Roland, Singular Solutions, Spectral Synthesis, Tascam, Turtle Beach and Yamaha) showing product, most of it aimed at the burgeoning home studio market. And on the DAT front, both Sony and Panasonic debuted new under-$1,000 decks for the home musician.

The modular digital multitrack wars are heating up, as barrages of "my format can beat your format" lit up the Anaheim sky with a brightness equaling the summer fireworks over Disneyland. The Tascam booth featured a working DA88, so attendees could listen to and check out this 8mm-based deck firsthand; initial deliveries are expected to begin next month. And with a one-year head-start in this genre, Alesis focused on the announcement of strategic third-party alliances. JL Cooper, MIDIman and TimeLine all announced ADAT-friendly synchronization products; Steinberg/Jones will offer a computer interface for direct MIDI machine control of ADATs via software-based sequencers; and Digidesign will provide both the ADAT 8-channel optical and sync/control protocols for integration into its ProTools and new DOS-based Session 8 products.

Retro. It's big. It's here. It's now. It's ironic, but with all this talk of the "latest sounds," E-mu drew crowds with its showing of Vintage Keys, a $995 MIDI module loaded with the hip keyboard sounds from the '60s, '70s and '80s. Imagine hundreds of B3, ARP, Moog, Rhodes, Wurlitzer, Oberheim and even Farfisa sounds with 32-voice polyphony, 32 "analog-sounding" filters and a disk drive for loading new variations, and you get the idea. The winner in the slick-but-probably-unnoticed category is Peavey's VMP 2, a 2-channel tube mic preamp with defeatable 2-band EQ, high/lowpass filters, phantom power and line inputs for warming up synth tracks. But by far the coolest product at the NAMM show was the reissue of the Vox AC30 guitar amp from Vox (Westbury, N.Y.), an exact reproduction of the 1963 model.

Look for our expanded coverage of NAMM's product highlights next month. And in other news, Summer NAMM will be back this year, meeting July 17 and 18 in Nashville. Mark your calendars now.

—George Petersen

NEW DATES, VENUE FOR FALL AES, CALL FOR PAPERS

The 95th AES Convention is now slated for October 7-10, 1993, at the Jacob Javits Convention Center in New York City. The convention committee announced a call for technical papers to be presented in New York. Convention chair Leonard Feldman named Ken Pohlmann (University of Miami, *Mix* magazine) and Robert Finger (Matsushita Electric Corp.) technical papers chairmen. Call the AES for more information at (212) 661-8528.

CREATIVE TECHNOLOGY PURCHASES E-MU

Singapore-based Creative Technology Ltd. has signed an agree-

—CONTINUED ON PAGE 16

PHOTO: CHRIS PATTON

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PEAVEY MAKES HISTORY...

The Original Peavey DPK® 3, 1989

World Radio History

AND HISTORY REPEATS ITSELF

DPM®C8
MIDI MASTER CONTROLLER

DPM® 2
61-NOTE PERFORMANCE KEYBOARD

DPM® 4
61-NOTE KEYBOARD COMPOSITION CENTER

DPM® 488
88-NOTE KEYBOARD COMPOSITION CENTER

DPM®SI
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INDUSTRY NOTES

Robert S. Blumberg, founder of R.S.B. Marketing & Sales Inc., was recently hired as senior vice president, sales and marketing, at **Nakamichi America Corporation** in Torrance, CA...**Milo Kosich** was named president of CTI Audio (Conneaut, OH). Kosich has held marketing positions at Audio-Technica and EV. CTI also announced the promotion of **Bruce Forbes** to vice president, pro products...Sales reps for **Ramsa/Panasonic** (Los Angeles, CA) **Carla Campbell**, formerly Eastern regional manager, and **James Murray**, formerly Western regional manager, have exchanged territories...**Garry Templin** was promoted to vice president of sales for **Electro-Voice Inc.** of Buchanan, MI. Templin will be responsible for OEM and U.S.-based export sales, as well as the company's telemarketing effort...**Steve Grom** joined **C.M.I.**'s (Nashville, TN) marketing staff. In his new position, Grom is responsible for all pro audio and sound reinforcement marketing, which now includes DAWN speaker systems and mixers, as C.M.I. was appointed the new distributor for DAWN in the U.S. and Canada...**Sennheiser**, headquartered in Wedemark, Germany, opened a new branch office at 4116 W. Magnolia Blvd., Burbank, CA 91505. Phone (818) 845-7366, fax (818) 845-7140. **Matt Robertson** will serve as vice president and head of the regional office, supported by sales and marketing staffers **Shelly Harrison**, **Steve Goldner** and **Jürgen Wahl**...**Fostex** (Norwalk, CA) appointed **Reflex Marketing** to be its representative in New York City and northern New Jersey...**DOD Electronics**, manufacturers of the DigiTech line, will move a few miles at the end of March to new headquarters in a suburb of Salt Lake City. The new 100,000-square-foot space is double the size of DOD's two existing facilities and will double the company's production capacity. The new address is 8760 S. Sandy Park Way, Sandy, UT 84070...**TGI North America** (Kitchener, ON), distributor of all Brüel & Kjaer products for North America, recently appointed **Rob Hofkamp** as the new B&K sales manager. Hofkamp's duties will include sales administration, sales training and promotion...**Audio-Technica** U.S. of Stow, OH, appointed **Jesse Walsh Communications** as the PR representative for its pro products division. A-T also announced new Canadian sales reps: **Only Audio** will service Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland. **A&K Marketing** will handle A-T in British Columbia and Alberta...**Starin Marketing Inc.** is the new sales rep for **Crown International** (Elkhart, IN) in the northern Illinois and eastern Wisconsin territories...**Yorkville Sound** (Niagara Falls, NY) named two new representatives: **Luis Rodriguez**, West Coast Marketing, and **Greg Miller**, Meyer & Ross Inc., will represent the company in Southern and Northern California, respectively...Two hires at **Scharff Weisberg Inc.** (New York City): **Barry Grossman** is a new on-site technical manager, and **Michael Halper** is the director of staging productions...**Thorson West Co.** is **Spectrum's** (Mountain View, CA) new Northern California representative...**TC Marketing** welcomed **Sue Jones** and **Tim Campbell** as new sales reps...**Martin Audio** (London, UK) appointed **Martin Kelly** as sales and marketing manager...**Berklee College of Music** (Boston) promoted **Robin Coxe-Yeldham** to associate professor in the music production and engineering department...**Circuits Maximus Co.** has moved to 9017-B Mendenhall Ct., Columbia, MD 21045. ■

—FROM PAGE 12, CURRENT

ment to purchase E-mu Systems (Scotts Valley, Calif.) in a stock swap worth about $32 million. The agreement is subject to shareholder and regulatory approval, and the transaction should be finalized by the end of this quarter.

CARVER AQUIRES U.S. SOUND

Carver Corporation (Lynnwood, Wash.) acquired the assets of U.S. Sound Inc. of Maple Shade, N.J., manufacturer of sound reinforcement speakers and custom sound reinforcement systems.

The new business is not expected to have a positive effect on Carver's net income until at least the third quarter of 1993. Tom Graham, Carver president and CEO, will serve in the same capacities at the new USS Corporation, headquartered in Lynnwood, Wash.

CONFERENCE NEWS

The SPARS 1993 Digital Audio Workstation conference will take place May 15-16 at the Hudson Theatre in New York City. Contact SPARS at (800) 771-7727.

The National Sound & Communication Association's contractors' conference and expo is scheduled for April 2-4 in Orlando, Fla. Call (800) 446-6722 for more information.

CORRECTIONS

The January Sound Reinforcement Directory contained an error. RTM Audio is a sound reinforcment company, not an equipment rental company. In addition to a Yamaha PM3000, its house consoles include a Soundcraft 800 and 600, both 32x8, an Audioarts 32x4 and a Yamaha PM1000 16x4.

A clarification: We reported in the January "Industry Notes" that Ensoniq had formed the new company Emagic. In fact, Emagic was formed by the principal developers and support staff from C-Lab, manufacturers of Notator SL and other sequencing and notation programs. As exclusive U.S. distributor for all Emagic products, Ensoniq provides product support. ■

World Radio History

You're looking at the future of affordable digital multitrack.

Today it seems that everyone's jumping on the digital bandwagon. And for good reason. It sounds great, there's no generation loss, and it's state-of-the-art. But until now it's been very expensive—or even inferior.

So when we set out to design the future—we refused to accept anything but the best. And considering that our parent company, TEAC, is the largest manufacturer of professional audio recording and data storage equipment in the world, and was the first company to make multitrack recording affordable, we've got a lot at stake.

That's why TASCAM chose the newer 8mm tape format for digital multitrack recording. It's simply better than anything else. Why? The 8mm transport is the most compact and is designed to take the beatings of the start-stop-start-stop operations that characterize studio and post production environments. And we should know, because TEAC makes transports for both VHS and 8mm. We tried them both. In fact, tests show 8mm to be superior for digital audio multitrack recording. That's just the start. The 8mm format is superior in many ways. Like "Auto Track Finding" (ATF)—an innovative technology that ensures consistent, error-free operation by imbedding important control information during the helical scan. This maintains a perfect relationship between the tracking and program signals on your tape. What does that mean? Precise editing for punching in and out as well as the ability to exchange tapes between musicians and studios without synchronization concerns.

There's more. The Hi-8mm metal particle tape cassette is sturdier and protects the tape against dust and environmental hazards. The 8mm format takes advantage of technologically superior tape that characteristically has a higher coercivity and therefore higher retention than S-VHS tapes. That's why Hi-8 is a preferred format for backup of critical digital data by computer users worldwide. And that's why your recordings will last longer on Hi-8. Even more, with up to 100 minutes of recording time, Hi-8 offers longer recording length than any other format.

We could go on. But the point is that with over 20 years experience, TASCAM has quite an investment in multitrack recording. An investment that has paid off for musicians, recording studios and post production houses worldwide. We've put this experience to work in defining the future of affordable studio quality digital multitrack recording. And you can take advantage of it now.

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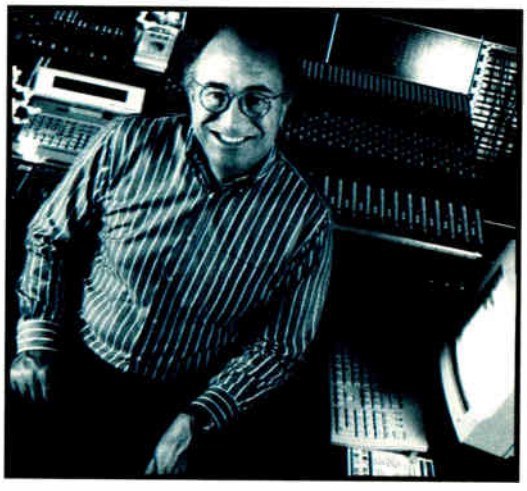


Randy Thom

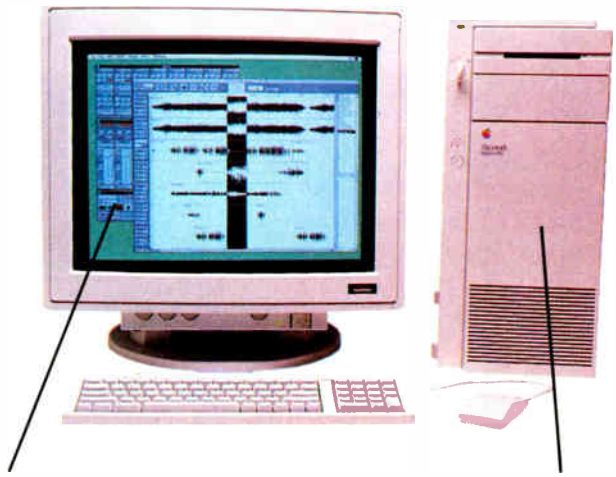
Film Sound Designer —
Backdraft, Wild at Heart, Start Trek III, Raiders of the Lost Ark

"I've used some of the most sophisticated digital audio workstations in the business. Pro Tools is the system I chose to buy."

IN THE INCREASINGLY COMPETITIVE audio post market, putting your money on the right sound editing system is more than a tough decision: It's probably critical to your success.

So why are more pros putting their money on Pro Tools™ than all other multichannel digital audio workstations combined? Simple: Price and performance. At Digidesign, we believe that extraordinary power shouldn't come with an extraordinary price tag. Fact: With 4-channel systems starting at under $6000,* Pro Tools will practically pay for itself with your first project—and will continue to be profitable from that point on. Pro Tools just makes good business sense.

As for performance, Pro Tools is fast, friendly, and sounds great. Among its many features, Pro Tools has a unique



Pro Tools software provides a simple yet powerful interface for multitrack digital audio recording, one-step spotting, trimming, crossfades, and more.

Pro Tools is based on the Apple Macintosh® which means it's easy to set up, and extraordinarily easy to learn and use.

Post *magazine's readers voted Pro Tools the best digital audio workstation of the year over some of the biggest names (and the biggest price tags) in the business.*

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We're one of the fastest growing companies in America and the leader in digital audio recording and editing systems for one reason—you. We listen to your needs and those of the rest of the industry. Our business is making products that help build your business.

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Geoffrey Rubay

Sound Editor — Basic Instinct, Reservoir Dogs

"Of all the systems I've encountered, I must say I prefer Pro Tools. I try to avoid buying equipment, but I feel that Pro Tools is just too cool not to have whenever I want it, no matter where I'm working. Some people bring their own pen to work; I'll bring my own digital editing system."

mode devoted to post: *Spot* mode. With it, spotting and trimming is as easy as *one keystroke*. Best of all, Pro Tools is a joy to use—a fact you'll appreciate even more during lengthy spotting sessions (just ask Randy Thom or Geoffrey Rubay).

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by Ken C. Pohlmann

ATRAC

PART 5, MINIDISC TECHNOLOGY

To achieve small disc diameter, the MiniDisc system employs data reduction. Prior to storage, the data rate of 1.41 megabits per second (16-bit stereo samples at 44.1 kHz) is compressed using a perceptual coder to a rate of 128 kilobits per second—approximately one-fifth that of the original. Following retrieval from disc storage, the data rate is again restored to its original value. The proprietary Adaptive TRansform Acoustic Coding (ATRAC) algorithm developed by Sony is used to perform the encoding and decoding operations.

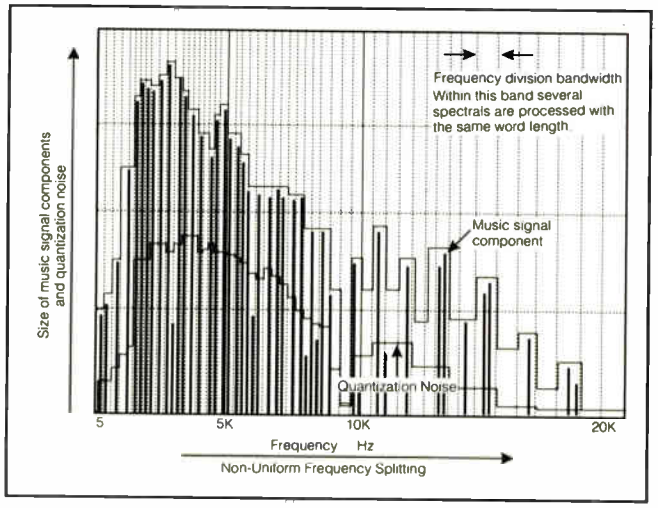

Figure 1

The aim of an audio data reduction system is to reduce the volume of data required to code a signal. In the case of MD, the sampling rate remains unchanged, so the word length must be decreased. As word length is reduced, however, quantization noise increases. A data reduction system must conceal the increased noise floor, using psychoacoustic principles. For that reason, such systems are often called perceptual coders. Human hearing is very nonlinear; for example, tones of equal power but different frequency will not sound equally loud. The human hearing model shows that the ear is most sensitive to frequencies around 4 kHz; it is less sensitive to lower and higher frequencies, and very insensitive to very high frequencies. Extensive audibility testing has produced a threshold of hearing curve that plots the sensitivity of the most acute listeners. Tones that fall below the curve are not audible; for example, a soft 4kHz tone may be audible if

Figure 2

Critical Band Number	Center Frequency [Hz]	Bandwidth [Hz]
1	50	80
2	150	100
3	250	100
4	350	100
5	450	110
6	570	120
7	700	140
8	840	150
9	1000	160
10	1170	190
11	1370	210
12	1600	240
13	1850	280
14	2150	320
15	2500	380
16	2900	450
17	3400	550
18	4000	700
19	4800	900
20	5800	1100
21	7000	1300
22	8500	1800
23	10500	2500
24	13500	3500
25		

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Power Users Prefer Sonic

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Gateway Mastering Studios, Portland, ME

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"At present, the Sonic system is the only means available to edit 20 bit recordings without being forced to redither those recordings to 16 bit precision while editing. The Sonic systems play a major role in Sony Classical's 20 bit front line and archival reissue programs."

"Whether I'm editing new material or using NoNOISE to rescue a track, our clients are always impressed. The Sonic system incorporates the best features of the other systems along with the most complex and versatile editing tools."

Magno Sound, New York

PAUL MICHAEL

"The SonicStation is completely expandable and offers an extremely wide range of functions. Our system has been booked to 100 percent capacity since the day it arrived; we use it for soundtrack and radio production, album mastering, and audio for video."

Soundstage I Recording, Kalamazoo, MI

JIM CUMMINGS

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it is above the curve, but a soft 10kHz tone will not be audible if it is below the curve. Hence, a perceptual coder will not code these inaudible tones. Similarly, tones that are perceived as soft will offer relatively softer quantization noise, hence fewer bits may be used to code them.

The human hearing mechanism is also greatly affected by simultaneous amplitude masking in which a soft but otherwise audible tone is rendered inaudible when a louder tone is simultaneously produced. In other words, the softer tone is masked. Masking is more pronounced for tones that are close in frequency. A perceptual coder will not code tones that are masked and will contribute fewer bits to audible tones near loud tones because quantization noise will be effectively masked as well.

ATRAC is quite unlike linear PCM coding because it is a perceptual coding system based on nonuniform frequency- and time-splitting concepts, and assigns bits according to rules fixed by a bit-allocation algorithm. The algorithm both observes the fixed threshold of the hearing curve and dynamically adapts to the audio program to take advantage of psychoacoustic effects such as masking. In other words, ATRAC changes the recorded signal according to the ear's relatively changing sensitivity. ATRAC can perform crude quantizing in areas where quantization noise is inaudible, that is, where there is strong musical activity. Looked at another way, this method is more efficient than linear coding because less data is required to code high-fidelity signals.

> ATRAC changes the recorded signal according to the ear's relatively changing sensitivities.

ATRAC accepts a standard digital audio input and divides it into blocks of time. It analyzes the signal in each block to determine the content in different frequency bands. Exposed regions are given long word lengths, yielding low quantization noise. Masked regions are quantized with shorter words, with the expectation that the quantization noise also will be masked. Through this processing, the data rate is reduced by 80%.

ATRAC uses frequency division, as shown in Fig. 1, to divide the signal into 25 nonlinear bands. These nonlinear bands are based on the concept of critical bands and mirror the way the human ear analyzes sound. Lower-frequency bands are relatively narrow, while high-frequency bands are wider. For example, in the ATRAC model, the band centered at 150 Hz is 100 Hz wide, the band at 1 kHz is 160 Hz wide, and the band at 10.5 kHz is 2,500 Hz wide. These widths reflect the ear's decreasing sensitivity to high frequencies.

ATRAC also performs nonuniform time splitting, with blocks that vary according to the audio program content. A rapidly changing program will prompt a decrease in block duration (to perhaps 1.45 or 2.9 mil-

—CONTINUED ON PAGE 148

Introducing the Affordable PDR-10 CD-R Recorder from Carver Professional

Why wait for days or weeks to hear how your project sounds on CD? With the Carver PDR-10, you can record your own CDs right in your studio.

The PDR-10 CD-R provides total I/O format flexibility, with AES/EBU and SPDIF (electrical and optical) digital inputs and outputs, along with balanced XLR and unbalanced RCA analog connections. The PDR-10 generates a temporary Table of Contents (TOC), so you can start and stop while recording, as well as delete any false starts or unwanted tracks. After finalizing the TOC, your CD-R is playable on any CD player.

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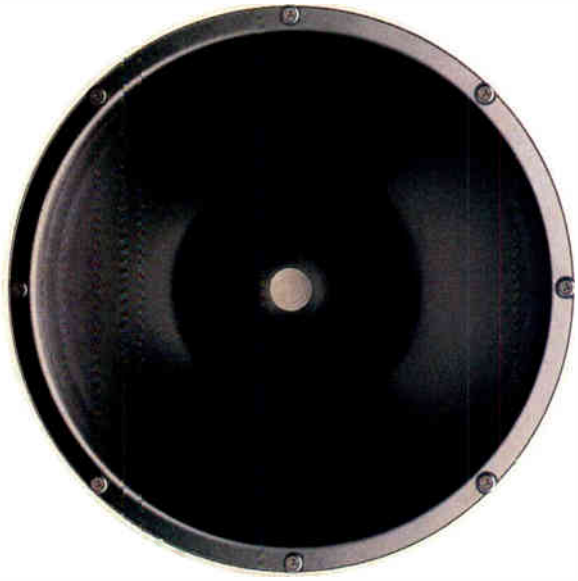
Distortion Free.

It's funny, but sometimes the worst things in life are free! Take distortion for example. For too many years, if you wanted the high sound pressure levels that horn/driver combinations deliver, they were the only game in town. Period. There were trade offs of course. Inferior coverage that was never the same at any two frequencies and with this, poor power response that made for inconsistent performance from room to room. And worst of all, poor sound quality and very high levels of distortion. All of this Free!

Distortion Free.



But Ramsa has an alternative to those old compromising horns. Our engineers have come up with a technology they call the Spherical Waveguide and it's in our new T-Series trapezoidal speakers. With these wide-range, compact speaker systems, you get all of the good stuff of horns and none of the compromises.

Good stuff like the power handling and efficiency needed for the tough demands of professional sound reinforcement, but with the sound quality of audiophile and high-end studio monitors.

Those Spherical Waveguides are the reason. Alone or in arrays, the T-Series deliver superior sound quality, with extremely low distortion, consistently in all applications. Whether rock & roll or in a house of worship and all points in between.

We haven't got space here to tell you all of the exciting performance gains in the new T- Series systems and particularly the Spherical Waveguide, so if you would like to know more, please contact us here at Ramsa at (714) 373-7278 and we'll send you more information. But be warned! You're going to rethink all you have come to accept about horns!

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RAMSA

Panasonic

Broadcast & Television Systems Company

World Radio History

by Stephen St. Croix

INDUSTRY TAKES WRONG TURN

WORLD COMES TO END

This month's column is really a test, and here are the instructions. Please read normally, but keep a little highlighter marker with you. When you get to the point in the column where you figure out what it's about, mark it with the highlighter. Keep this issue forever. Sometime in the future, I will ask you to send in your copy. The person with the earliest mark wins the contest. First prize winner gets me writing a column about them personally, or *not* writing a column about them personally, whichever they would prefer. Let us begin.

Let me ask you something. Well, since I am not actually sitting next to you as you read this, I guess I will have to ask you to ask yourself. (Sorry, this type of thinking is one of the lasting effects of having lived through the '60s.)

Have you noticed a strange new trend toward *lower*-quality audio? Now I'm not talking about some tiny esoterica like 20th-bit settling or third-order, noise-shaping modulation artifacts (I made that up—I wonder if there *are* any third-order, noise-shaping modulation artifacts; there certainly are some very strange "noise-gating" type effects with the newest 20- to 16-bit translation schemes). And I don't mean some obscure, non-linear response in sample and hold capacitors that makes oak wood blocks sound like teak when recorded at -50.

Ashes to ashes, dust to dust, 8-bit to 8-bit. Maybe it's not my place to be alarmed—maybe this is just the natural order of the universe.

I'm talking about the new gear that is about to become part of our lives, that is *purposely designed to have inferior audio quality.*

I guess it was inevitable. The potential developed as the public became more and more accustomed to the insanely impressive rate at which new and improved technologies appeared, as people developed the attitude, "If you don't see what you want today, you only have to wait until next month and you will." Basically, as the end user begins to believe that *anything* is possible, a sort of "situation" emerges. By the way, why shouldn't he think that? Look at some of our recent magic: from plates and springs to digital reverb; from scraping rocks over the surface of vinyl to reading CDs with lasers; from storing data on rust to storing it optically; and, well, from analog to digital.

Pressure to compete forces manufacturers to come up with radical new ideas and improvements on the radical ideas that their competitors came up with the week before. Pressure to try to grab and reserve market share as soon as possible so that the end-user won't go out and buy the competing product from company B while company A is still getting their product finished forces them to *show* all their radical new cool stuff way too soon, at whichever trade show happens to be

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next. Pressure to stay in business then forces them to actually figure out how to manufacture this amazing device, hopefully within three years of the latest extended promised ship date.

So its a bit hard to say if this is all your fault (the end-user), or the manufacturers' fault, for being bad parents and letting the end-users push them around and for letting them talk them into stuff that they really can't do.

Well, anyway, I have always been fascinated with the fact that for all these years this stupid system of incredible pressure has actually worked so well. It has brought us decades of advancement in only a couple of years. We play with toys today that we wouldn't have seen for years if that good old capitalist pressure system hadn't worked. But...

I fear that for the first time it is failing us. I feel that there has always been a possible alternative path that this self-energized evolution could take and that we have been incredibly lucky that it has not... until now.

Certain Japanese manufacturers have been doing something interesting for several years now: delivering more features per buck with less audio quality. More effects in a box at the expense of what they *sound* like. I have no problem with this. There definitely *is* a market for this approach, especially when you consider how dramatic this trade-off is. Today this is generally applied to digital signal processors, little renaissance rack-mount wonders that sound pretty terrible, but do four or even eight effects for the same price as a machine that sounds good but does only one thing at a time. A realistic trade-off for many people.

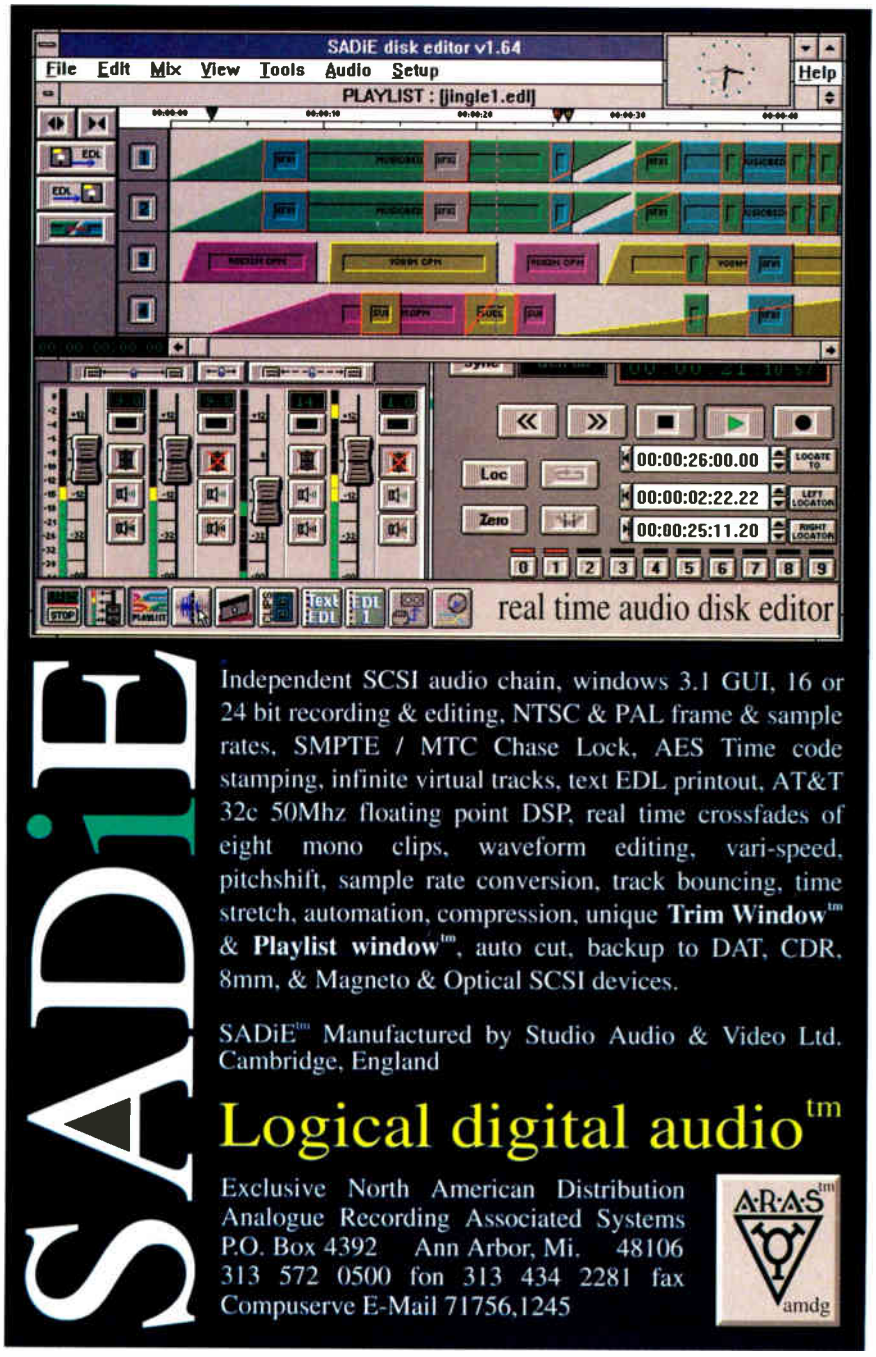
But this is *not* what I am talking about. This has been going on for some time now, and garages all over America are better for it. What *has* happened that worries me a lot *looks* similar, but has some very important and very scary differences.

Here it is: There is a horrifying new trend, brought on by this audio techno-race. We have finally arrived at the dreaded theoretical point of *no longer being able to keep up with the expectations of the consumer*! Yes, folks, we have reached a point that was always looming just beyond the event horizon: It is no longer possible to deliver techno-growth at the rate that the end-user expects it.

We have outdone ourselves. Whether it is the manufacturers' fault for propagating this insane race or the consumer's fault for responding to dramatic advances with that charmingly naive familiarity that breeds the contempt of the state of the art, that makes them only expect *more*, is irrelevant; here we are.

CDs weren't *good enough*, were they? We need mini CDs, don't we? But there is a little problem with these little diskettes; *current technology doesn't support the format.* Let me put it in plain terms: It can't be done. At least not today, not this year, not with what we as a planet are capable of technically. Way too much data in way too little space with a way too slow read-write technology, and another five years to go before compression can come to the rescue.

So there we are. The time has come when manufacturers are forced to design a product that exceeds the abilities offered by the current state of the art. How can this be done? It can't. But it has to, because the race must go on, the consumer has been



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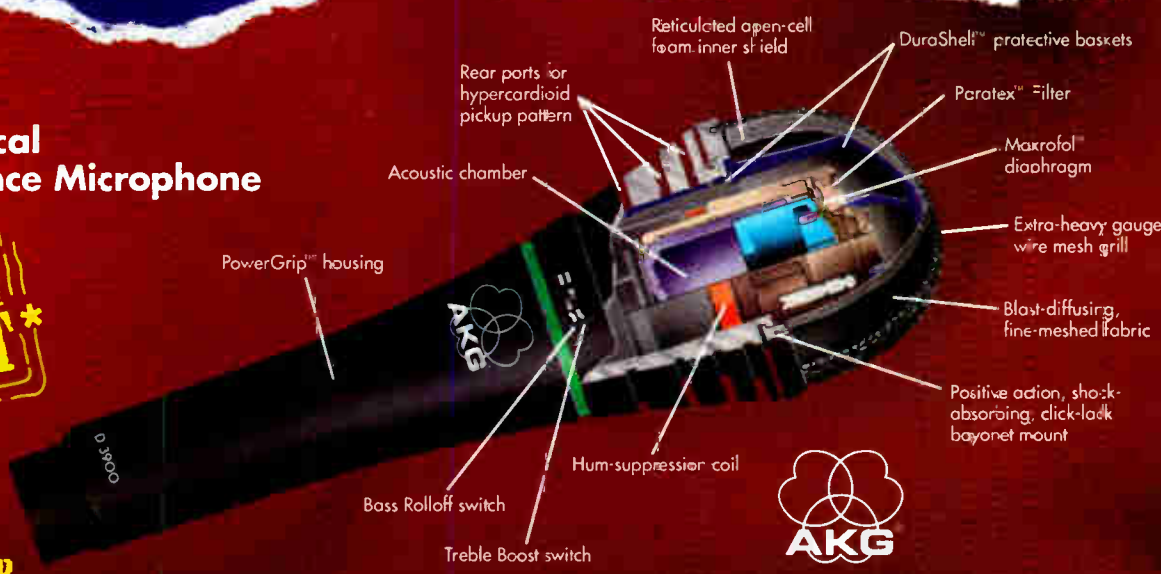

*CRANK IT UP

and compare the 3900's handling noise, feedback rejection and sonic performance against **any** other microphone.

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taught to expect it. So what to do? The answer is obvious; *you cheat.*

Remove something that we have all come to expect as baseline, as standard. Back down on some aspect of the machine that would normally be assumed to be intact. Lower some spec, pick some attribute that uses too much of the device's power or time, and simply define a new, lower (read "inferior") spec to replace it with, one that is so relaxed that it actually appears that you *can* deliver the impossible technological advancement that the boys on the street expect this season.

Now let's see, which spec should we throw out to get this done? It can't be features or convenience; that certainly is not the trend. What can we throw out so we can get MiniDiscs and Digital Compact Cassettes on the street now? Wait! I know: *audio quality*!

There you have it. That is the alternate path that we have avoided until now. Basically, the only way to get these two products to work is to seriously compromise the audio quality, to take a giant step *backward* for mankind, thereby completely negating the first step man made on the moon.

The type of irreversible, lousy compression used on these devices is the beginning of a new, dangerous trend—lowering the actual quality of the *audio* in order to get all the features on the street before the next guy.

Remember those Japanese DSP rack toys that I mentioned earlier? They don't bother me because they do not represent a new format standard. They screw up any audio that goes through them, but the user gets to decide if the damage inflicted is acceptable considering the demands of the track that was processed. I mean, they're special effects, not a new storage standard.

But these two non-linear, low-bit formats *are* being put upon us as new standards. Oooohh. Scaaary, boys and girls; really scary.

EPILOGUE

They say all things come full circle. Maybe this is so. Ashes to ashes, dust to dust, 8-bit to 8-bit. Maybe it's not my place to be alarmed—maybe this is just the natural order of the universe. I mean, we lost the technology of building pyramids, and we seem okay, so I guess we will be okay in 100 years when we look back and sort of remember when digital audio end-products were more than 8-bits.

Or maybe we should wait until a *legitimate, non-damaging*, high-density encoding technology is ready before we ship new music standards...Maybe we should.

EPILINEAR

By the way: Sony, Phillips and anyone else who might be thinking about showing up at my door and offering these formats for pro use had better be wearing a steel cup.

EPILADY

I *would*, however, be happy to see a second, pro standard for MiniDisc that offers 15 minutes with *no* compression. A couple of singles or a reel of film on that cute format? Sure! I would like that. ■

Stephen St. Croix will buy a consumer MiniDisc anyway, but promises to only listen to it in his convertible, at speeds over 55, with the top down. That way only the top four bits should be audible, and he thinks that might be okay.

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HARDWARE

By Soundcraft

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SOFTWARE

By JLCooper and Steinberg

Mixing with Spirit Auto becomes even more powerful and intuitive when you team it up with high quality custom software, taking it beyond the range of many big studio systems. Both J.L.Cooper and Steinberg have developed software specifically designed for the Spirit Auto. First and foremost is the increased fader resolution that comes with using either package. A full 256 steps are available on each fader. This doubles the resolution of standard MIDI automation systems. In addition, VCA virtual groups can be assigned for more effective mixing control. Softmix by J. L. Cooper offers a graphical fader interface with an Edit Decision List detailing all the automation events for off-line editing and a host of other features for the Apple Macintosh. Read, Write and Update modes can be selected from the console without relying upon a mouse. The Spirit Automation Software package from Steinberg provides graphical on-screen editing with cut and paste of mix data - just like using your sequencer package. The automation software runs concurrently with Cubase, too, allowing you to mix "live" sequenced data.

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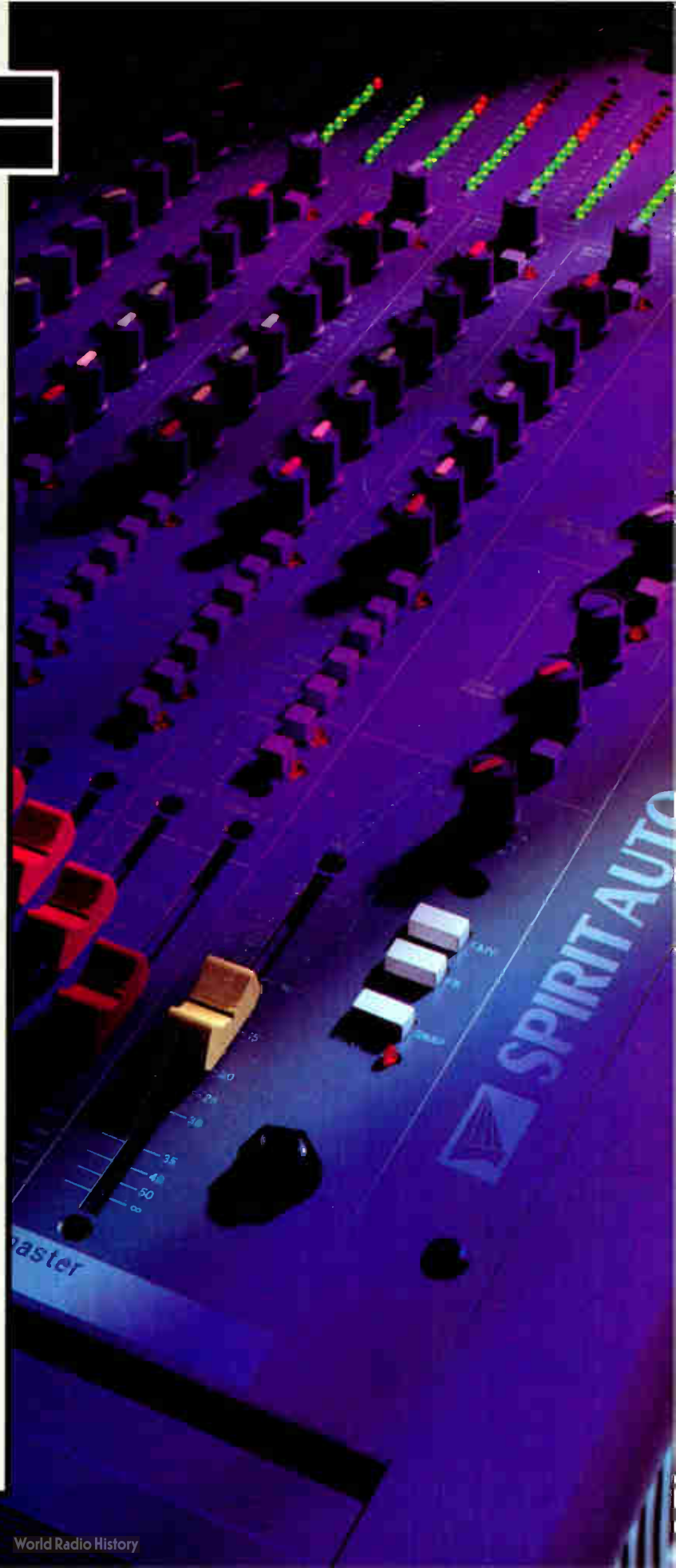
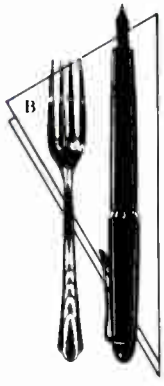


World Radio History

by Mr. Bonzai

PETER ASHER
STAR POWERS



What lucky star was shining over war-torn London in 1944 during the birth of Peter Asher? Twenty years later, as a member of the duo Peter & Gordon, he would record "World Without Love" (the duo's first record), which would become an international Number One hit. Over the next four years came nine Top 20 records, three of which went Gold.

Asher then gave up his charmed role as an artist, and from 1968 to 1970 he was head of A&R at the newly formed Apple Records, where he signed and produced James Taylor. The next step was to move to America and found with Taylor a management company, which took on Linda Ronstadt as a client in 1973. Today, Peter Asher Management represents such distinctive clients as Randy Newman, Carole King, Ivan Lins, Little Feat, Joni Mitchell and Mary's Danish.

As a producer, Asher has worked with Taylor, Ronstadt, and a strong group of artists including Bonnie Raitt, Cher, Diana Ross, Peter Blakely, 10,000 Maniacs (*Blind Man's Zoo* is a beauty), Neil Diamond and Ringo Starr. He's been awarded 28 Gold albums, 18 Platinum albums and the Grammy for Producer of the Year in 1978 and 1989.

Julie Ritter of Mary's Danish commented on her experience with Asher: "He pushes to get the best take from an artist. With many producers, when pushed, the artist leaves at the end of the day never wanting to speak to the producer again. With Peter, we looked forward to coming back the next day and working with him."

PHOTO: PAMELA SPRINGSTEEN

We met at Asher's offices, a homey, one-story bungalow filled with framed records, awards and magazine covers and charged with the energy that drives the careers of world-class artists. The lively Mr. Asher, who appears rather elfin with his shock of red hair and twinkling eyes, spoke at a fast clip and welcomed all questions with animated candor.

Bonzai: How did the duo of Peter & Gordon materialize?

Asher: We started singing together when we were at Westminster School in London and then continued when I entered University. After playing for two or three years at parties and clubs we got offered a record contract. We were playing at a place called the Pickwick Club and were approached by this A&R guy, your traditional guy in a shiny suit. It turned out to be Norman Newell, a very nice man whom I haven't seen

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for many years. He bought us a drink and asked if we would be interested in making a record, if we'd like to come and do an audition at EMI. We said, fine, love to. So we went over there and recorded three or four of the songs we did in our show and he said, "Yes, we'd like to give you a recording contract. Let's choose some songs for the first session." He asked us to sign on the dotted line, and that was it.

Bonzai: Since then you've gained such recognition as a producer—I was wondering, who produced you?

Asher: Well, Norman Newell produced the first record, "World Without Love," but he didn't really do very much. He let us do it pretty much the way we wanted to. With the arrogance of those who had never done it before, we thought we knew exactly how to do it. Norman was helpful, but he didn't really direct anything particularly. Afterward, some of our records were made by John Burgess, who was more actively involved as a producer. He chose some of the songs later on, as well.

Bonzai: George Martin's partner—interesting. You did some Lennon-McCartney tunes didn't you?

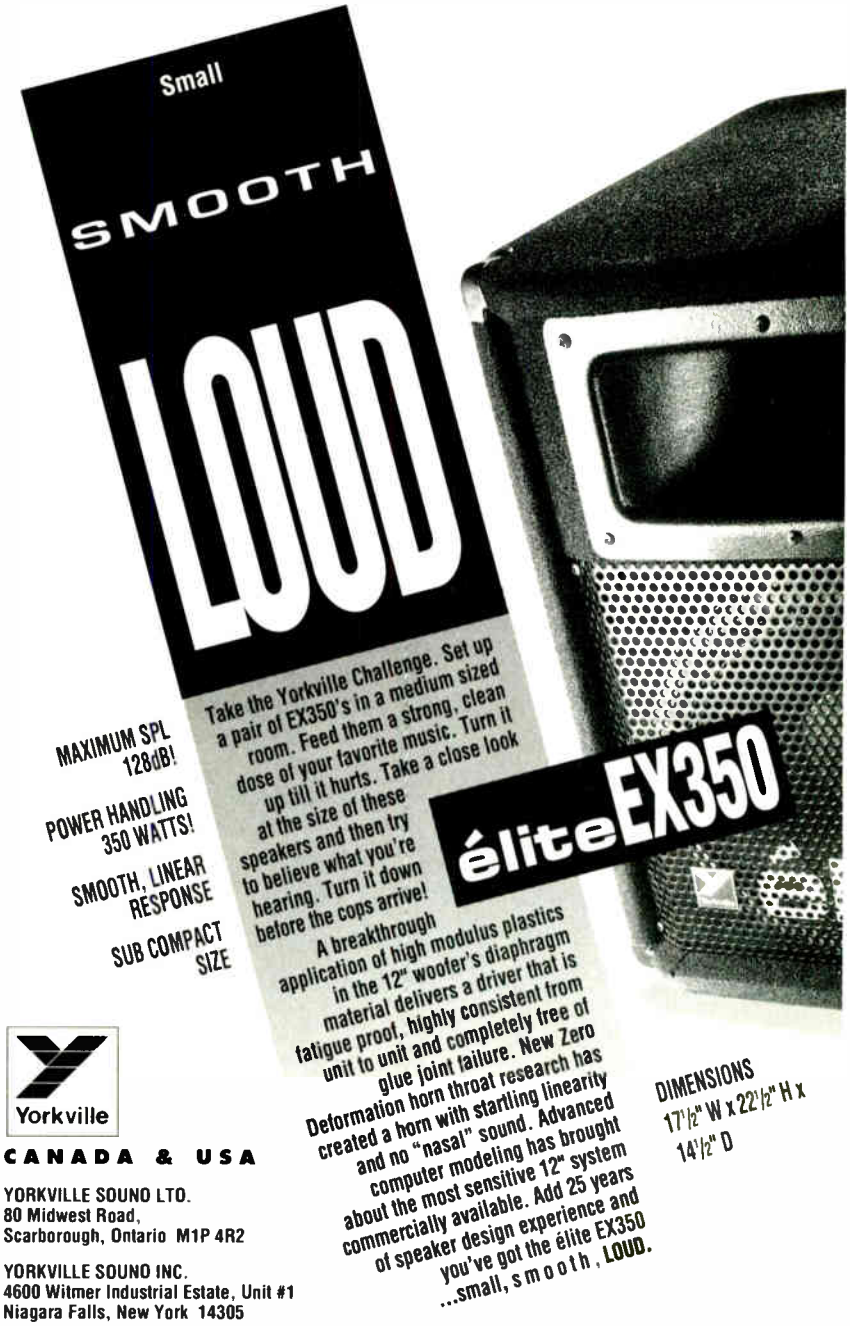
Asher: Yes, quite a number of them. Nominally they were Lennon-McCartney, but they were actually Paul's songs. At that point in time, even if they wrote separately, they were construed as written together. Paul had written "World Without Love," but the Beatles didn't want to do it. I had heard him sing it in passing, because we were friends and spent time together, even before we had passed our audition with EMI. I liked it a lot, but it was unfinished—didn't have a bridge. When we were picking songs for the first session, I said to Paul if he could finish it, we'd like to do it. He wrote the bridge, and it was one of the three or four songs we cut on our first recording session. That was the first single, and it went Number One all over the world. We got off to a very rapid and fortunate start.

Bonzai: Let's jump to 1968 and your new job as head of A&R at Apple Records—how did this transition happen?

Asher: I had remained friends with Paul throughout that period, and he told me a lot about his plans for Apple, what the company was supposed to be and what they were trying to accomplish. He was aware that I was interested in producing records—indeed I had produced a couple after I stopped recording.

The first record I produced was with Paul Jones, who used to be the lead singer with Manfred Mann—"Do-Wah-Diddy" and all those great tracks. Paul left that group, and I produced some tracks. I owe him a lot because he was the first person who said he liked my ideas and asked if I would produce his record. A bold step on his part, for which I am grateful. Actually, the first track I produced was a Bee Gees song called "And the Sun Will Shine." It's interesting in retrospect because the rhythm section was Paul Samwell-Smith from The Yardbirds playing bass, Jeff Beck playing guitar, Nicky Hopkins playing piano and Paul McCartney playing drums. It was a good record, actually—minor hit in England, but didn't do anything in America.

Based on that experience, and from working with me on various things, Paul initially asked if I would produce some records for Apple. He



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also asked if I would like to be the head of A&R to run that aspect of the label. They also hired a man named Ron Kass, who was a real record company executive—an American who used to run Liberty Records. Good man; now, sadly, dead. Ron was the boss, and I was second in command to him, running the artistic aspect of the label, in conjunction with whatever quorum of Beatles was in the building at the time.

Bonzai: So you had given up the idea of being a recording artist yourself?

Asher: I never had any interest in being a solo singer. I'd always liked singing, whether it was singing in the choir at school, or doing four-part madrigals—I was more interested in harmony singing and never saw myself as a lead singer. I don't think I have the kind of voice or the style for that, but I still like singing harmonies. On some of the records I produce, I end up singing some of the parts.

Bonzai: And I notice that you have credits for playing percussion with Mary's Danish on "American Standard."

Asher: Yes, I play quite a lot of percussion, but I am not a skilled percussionist. If I want some complicated part, there are people I will hire who are a hundred times better than me. But just in terms of a simple part, with good time, which I have, I play quite a lot of that sort of stuff.

Bonzai: And what happened to Gordon? And what was his last name?

Asher: Waller. He pursued a solo career for a while, and then he got out of the music business altogether, went to Australia. He's back in England now and runs a gift shop in a seaside town, last I heard.

Bonzai: You are associated with James Taylor, of course, in the early Apple days. Did you discover him? Was he an American hanging out in London?

Asher: Well, going back to the Peter & Gordon days, one of the bands we had backing us was called The Kingbees. The lead guitar of that band was Danny Kortchmar, and we became great friends. Even when our tour was over, we remained in touch. I used to visit him when I was in L.A. He's a wonderful guitar player and since then, as I'm sure you're aware, has become a very skilled record producer and made tons of hits of his own with Don Henley and others. Anyway, "Kootch" was later in a band called the Flying Machine with James Taylor. He and James had known each other since they were about 12 years old and had a duo when they were kids.

When the Flying Machine broke up, James decided to go to London and seek his fortune. I had apparently met him at a Flying Machine rehearsal in New York, which I don't remember. Kootch gave him my number, and he called and asked if he could play me a tape of his. He came by my house that evening with a tape of "Something in the Way She Moves," "Something's Wrong," "Knocking Around the Zoo" and all sorts of fantastic songs. I was knocked out and said, "Listen, it so happens I've just started working for this new label—I'd like to sign you to the label and produce your record." It all fell into place very easily.

James has since mentioned that it was all rather odd that within a cou-

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ple of weeks of landing in London, he was in the studio with Paul McCartney and hanging out with the Beatles. Fairly startling, but I didn't realize it at the time because I was there anyway, and they were my friends.

Bonzai: Proceeding from that tape of his, what did you do musically for James?

Asher: Too much, probably. [Laughs] When we made that first album, I was very anxious that it really stand out, and that each song stand out. I tried to make every song different and, with that aim, we did a lot of arranging. One song has a string quartet, one song has horns; I think it may have been a little overdone. Some of the songs sound a bit better now when James does them with a lot less stuff. But on the other hand, the album did get people's attention, and it's become some sort of a classic.

James is singing a helluva lot better now than he was then. If you listen to that record, it's surprising—his voice has gained so much strength and maturity, and his phrasing is more interesting since that time. For what it was then, the record is absolutely fine, but listening to it with today's ears, there are things that clearly we could have done better.

What I brought to it, I suppose, was a determination to get people to listen to him and take him seriously at a time when the singer/songwriter era had not yet dawned. Joni Mitchell, Eric Anderson and people like that were just starting to make waves in America, but they were still pretty much folksingers in a sea of rock 'n' roll. My intention was to get people to pay attention to James and realize how good he was—as it has remained to this day.

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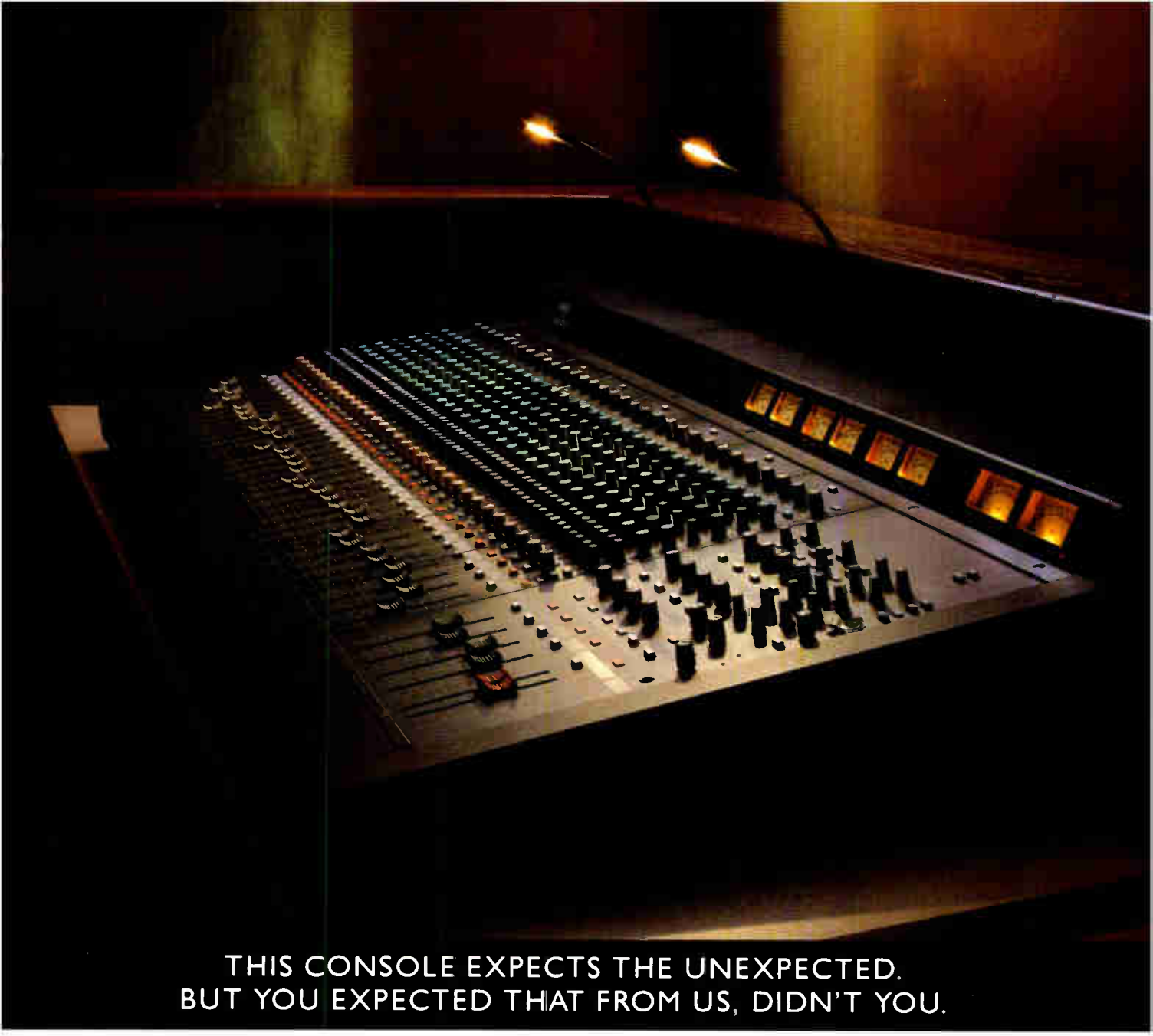

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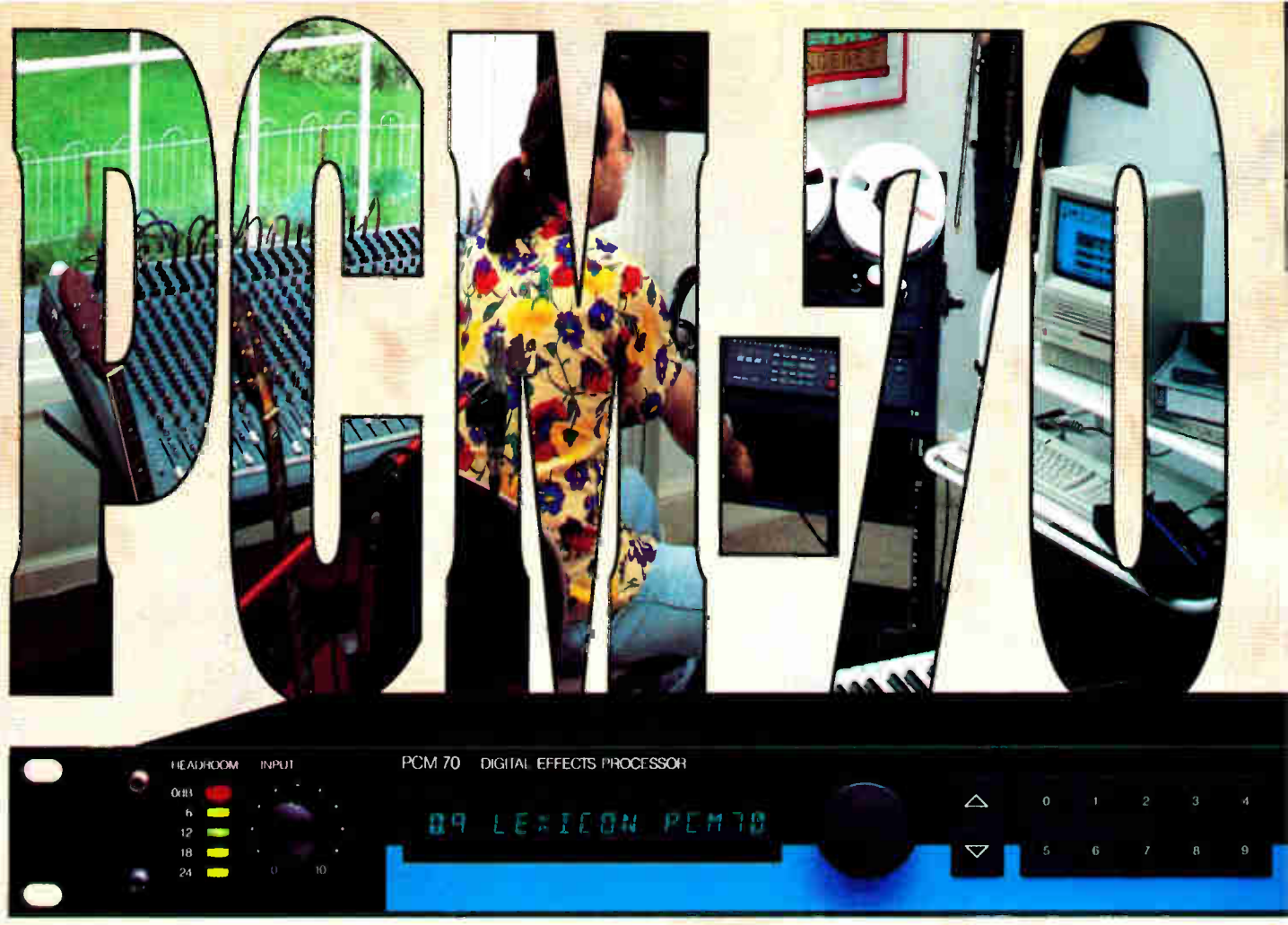

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in 1970 to start your management firm?

Asher: Apple had started to get pretty weird. It was crumbling, and there was a lot of dissension among the Beatles. Allen Klein had come in and was changing the character of Apple, John was all for him, and Paul was against him. All this weird stuff was going on, and it became clear that Apple was on its last legs. James wanted to go back to America anyway, and I followed shortly after and became his manager. We agreed that we didn't know who else should undertake this task, so it made sense for me to try. Based on advice from people I knew, I started managing James and set out to get him a record deal in America.

Bonzai: How do you manage the tough activity of being a manager with what seems to be such a gentle nature?

Asher: I think you can be tough without screaming and yelling. When I know I am right and I know what I want, I can be fairly firm. I'm sure there are occasions where someone who is prepared to jump up and down and yell could elicit a few more cents out of the deal than perhaps I could. On the other hand, I prefer things to remain on a congenial basis whenever possible.

Bonzai: Let's move ahead to 1973—how did you begin working with Linda Ronstadt?

Asher: Well, I had met Linda a few times and seen her at the Bitter End in New York, and I was incredibly impressed. She had the most amazing voice I had ever heard—still does. She looked great and was everyone's dream of the California Girl, singing country music in bare feet and shorts. She talked to me about management, but I didn't do it right away because I had started managing Kate Taylor, James' sister, who is also an amazing singer. I didn't think that I could work with both of them at the same time, but Kate made one record and decided to stop, and I spoke again with Linda. I signed her to management and worked to finish her current project, which was the *Don't Cry Now* album, and I became one of the producers. When the next album rolled around, she asked me if I would like to produce the whole

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thing, which I was happy to do. That was *Heart Like a Wheel.*

Bonzai: And you've been working with her for quite a while now...

Asher: Must be 17 or 18 years with Linda and about 23 with James.

Bonzai: Has Linda changed over the years?

Asher: I think we all have, but everyone's basic character stays the same. Linda has always been a very determined person who knew what she wanted to do. I think the times have changed to the extent that back then when she was a determined woman who knew what she wanted, it was regarded as being a real pain in the ass. It was a combination of the fact that she was young, and that sexism was much more okay then. Any pushy woman was considered a pain. That has changed, but I don't think Linda has changed much. She knows just what she wants and is just as determined to get it, but she doesn't have nearly as much trouble getting it now. [Laughs]

Bonzai: It seems to me that you really showcase the character, the individuality of the artist. Do you step out of the way, do you nurture the kernel of character you imagine?

Asher: It varies from one project to another. With Linda, she knows very much what kind of record she wants to make. Once we've discussed all that, my role is helping her get what she wants. When we did the *Cry Like a Rainstorm* album, she had this idea of a record that had a big rock 'n' roll rhythm section and a huge orchestra. She knew the kinds of songs she wanted to do. It was mostly a question of making sure we had the right musicians and did things in the right order. Some of it was organizational, some of it was musical, some of it was just sifting through the various musical ideas to make sure we had the right ones.

In other projects—say with a Cher record, she doesn't initially contribute musical ideas, other than agreeing on a song. Then it is a question of me imagining her voice and assembling the right kind of backdrop to show it off to best advantage. I try to think of an arrangement of the song that emphasizes the strengths of the song.

In James' case, although I haven't produced him for a while, a lot of it springs from the song he has written, and a great deal of the arrangement comes from his guitar part. He is an amazing guitar player and still to this day underrated as a player. The part he writes for the guitar to accompany himself is very often the basis of the arrangement of the song. One of the mistakes you can make is putting too much on top of that and losing the guitar and the chord changes that he puts underneath the melody. It varies from one artist to another.

Bonzai: Let's talk about the big splash this year with Mary's Danish and the writers, Julie Ritter and Gretchen Seager.

Asher: They all write, actually, in various combinations. Gretchen and Julie write the lyrics, but musically they all contribute.

Bonzai: What did you bring to this project?

Asher: I helped them organize it a bit musically. I loved the band when I first heard them, but it's sometimes hard to separate what is the correct and appealing rawness of that kind of rock 'n' roll. And then sometimes there are things that seem like sort of wrong notes. Sometimes it would just be a question of sitting around the piano and organizing the harmony parts so that the actual wrong notes were gone, but the strength and the insistent quality of the music remained. I just tried to get it all down on tape as live as possible. We cut the album in a week up at Skywalker Ranch. We just set up in a live room and did it. It was really fun, had a terrific time doing it—it was funny because I was doing that and the Neil Diamond Christmas album at the same time. A week of Mary's Danish and then we'd cut some tracks with Neil and then some overdubs on the Danish. It was exciting, and on one track of Neil's album, Louis Gutierrez from the Danish plays the guitar solo—an unlikely kind of blend. The Danish album is getting a great deal of airplay on alternative stations, and Neil's album, I'm glad to say, sold like there was no tomorrow.

Bonzai: In preparation for this conversation, I picked up the albums you produced for 10,000 Maniacs. I had never listened before, because I already have enough maniacs in my life, but I was totally knocked out.

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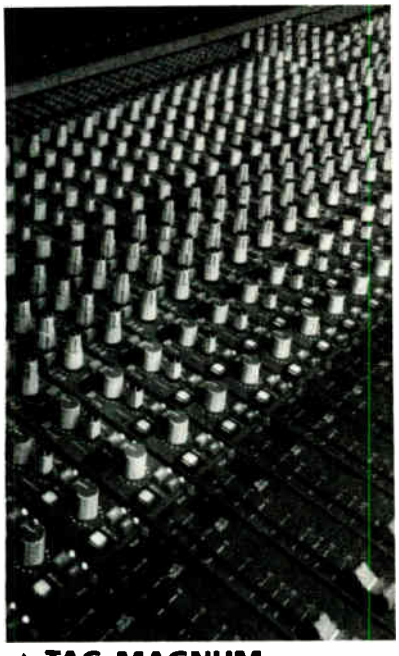

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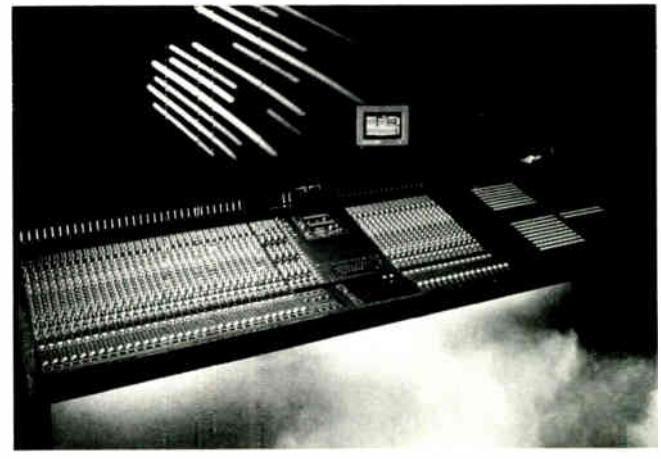

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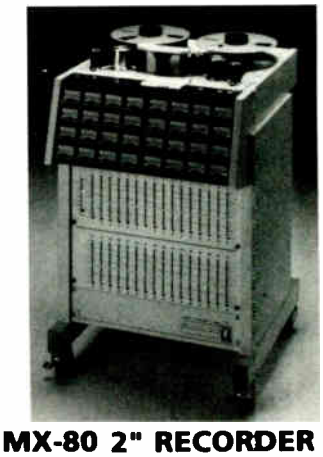

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Asher: They are terrific, and Natalie Merchant is a wonderful singer and songwriter. She writes all the lyrics and cowrites all of the melodies. With them, a lot of the work, as with Mary's Danish, is in the pre-production, going over the songs one at a time, and just trying to rearrange when necessary and emphasize the strengths of the song. Then it's a matter of getting it on tape as efficiently as possible and keeping as much of the original energy as you can on a record. I enjoyed doing those records, and they did very well, so it was a pleasure.

They took a hiatus, and when they got back together decided to make a fresh start. I was busy with the Danish and Neil anyway, and some Diana Ross projects. Their new record is very good, produced by Paul Fox, who does XTC, whose records I love.

Bonzai: What have you got cooking with Randy Newman?

Asher: We're starting the Faust project in January. It will be a Broadway musical in '94, but we are going to do an album of songs from the musical before that. Randy will be the Devil, James Taylor will be God, Don Henley is Faust, Linda Ronstadt is the Good Girl and Bonnie Raitt is the Bad Girl. That's a quick summary of the characters. [Laughs] Oh, and Elton John is an English Angel singing one very beautiful song. I have a meeting tomorrow with Don Was, who will be producing half of it, and I will produce half.

Bonzai: Sounds great, and intelligent, too.

Asher: Hope so—but that could doom the sales right there, just like Randy's records that should sell ten times what they do. People don't get it, or something. Randy's records and concerts are among my favorite events in life, but the sales don't reflect that unfortunately.

Bonzai: How do you get along with such a wide assortment of people?

Asher: I don't know. I tend to like working with people who have a fairly special kind of voice—one hesitates to use the word unique, but in fact, when I think of Cher, Diana Ross, Linda, James, Natalie Merchant, Mary's Danish—the thing they all have in common is they are very distinctive vocally and musically and have a definite style of their own. I like that, and I find it easy to work with. When I get asked to work with somebody, and they say, "I can sing anything," that puts me right off. It's like saying, "I can sound like anybody."

I really like people who have a sound of their own and a clear idea of how they sing and what they want to sing. And I really enjoy helping them to get it the way they want it and the way that I think will sound the best. I don't mean to imply that I don't contribute musically myself, because I do—but I do so with the aim of putting the voice and the song in the best possible setting, rather than creating something independent of that. Yes, I do seem to get along well with the people I work with. ■

Roving editor Mr. Bonzai was one half of the obscure '60s folk duo Bonzai and Shemp.

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DIGGING DEEP WITH PETER GABRIEL

BY RICHARD BUSKIN

Peter Gabriel is legendary for taking his time in the studio and not releasing records until he's completely satisfied with them. That explains, in part, why it was five years between the release of his mega-seller *So*, and his latest, *Us*, released last fall. To get some insight into the way this meticulous and remarkable artist works, we interviewed engineer David Bottrill in depth and completely dissected the making of just one song on the *Us* album: the lead-off single "Digging in the Dirt," which was cut over a two-year period at Gabriel's Real World studios and co-producer Daniel Lanois' Kingsway Studio in New Orleans.

Bottrill's career began in Hamilton, Ontario, under the tutelage of Daniel Lanois, and later included stints with Gabriel on the *So* album, concert performances and various Real World recordings. He traces the beginning of the *Us* project back to his first DAT reference. "We have about a thousand DATs," he says. "We run DATs all the time as we're recording just for a reference, so that if a great performance happened about 15 minutes ago, we'll just spin the DAT back." The first DAT dates back to November 1989.

For Gabriel, the "writing process" continued right through until the end of the recording process. Ideas would formulate, structural sections would start to materialize, and then, as if trying to match together the parts of a jigsaw puzzle, a section from one day's work would perhaps be linked to another from a few days earlier.

As a general rule, Gabriel began with a groove consisting of a percussion loop, drum machine program or a combination of the two, and would then add experimental chords on his keyboard rig while singing melodic vowel sounds. The setup consisted of a Yamaha CP80, Akai S1100, Prophet V and Roland D50 for left-handed bass parts, as well as the composite output from a piano and a Korg WaveStation pro-

ENGINEER DAVID BOTTRILL TALKS ABOUT THE MAKING OF "DIGGING IN THE DIRT."

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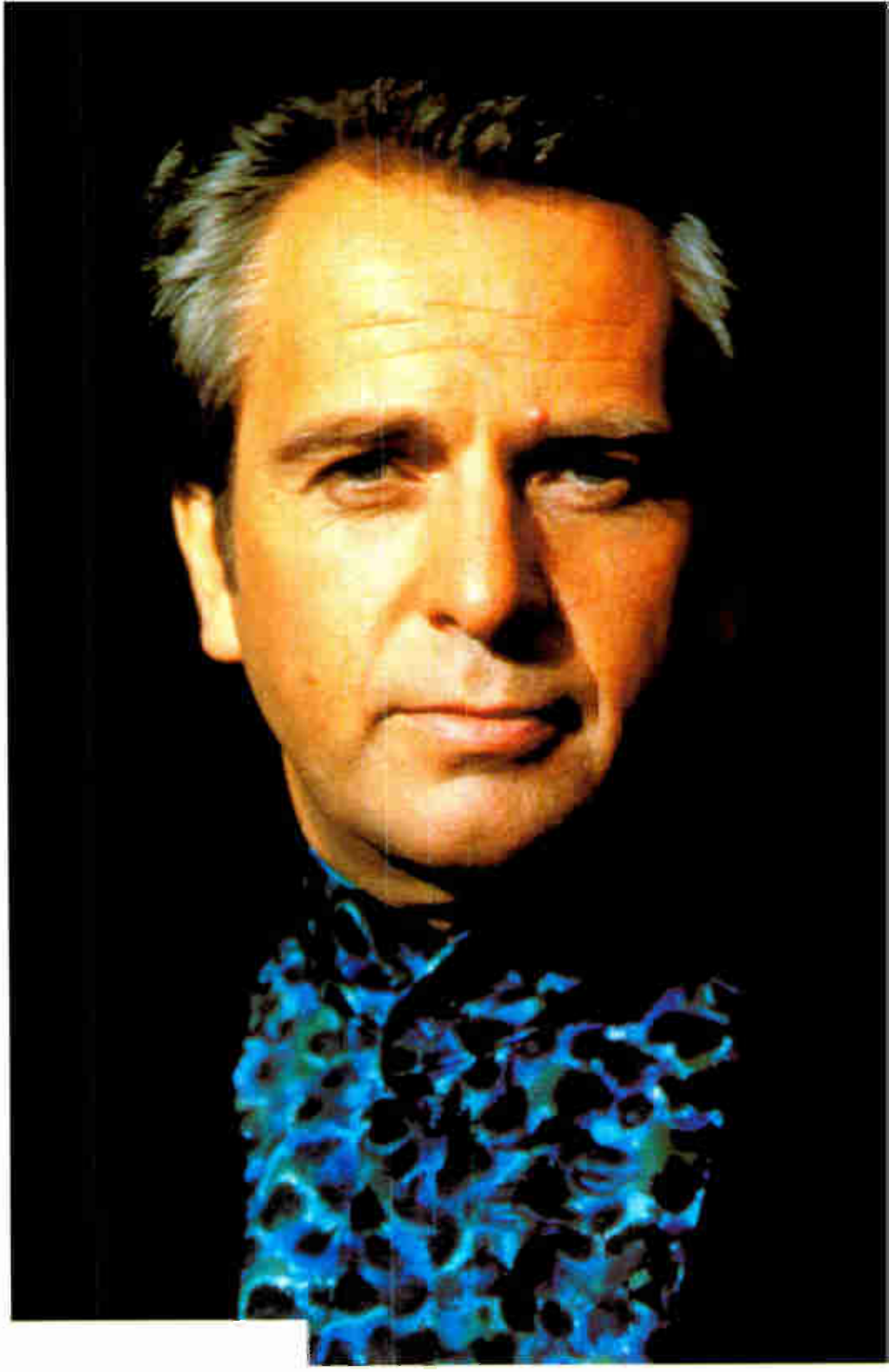
ducing Leslie and D70 organ sounds. Going through a custom matrix into a DDA console and then into the main board as two channels, this enabled Gabriel to create his own sound for recording.

"Peter would basically be building up sections until he'd have a tentative structure of a song," explains Bottrill, "and his keyboards would be coming up through the console all the time so that he could always play along. Even when we would be listening back to a DAT, it would be coming up through the console so that he could play along. And he records everything on a blaster that sits in front of him and acts as his own personal monitor. As a result, he has thousands of cassettes on which he can be heard play-



Far left: David Bottrill at work in Peter Gabriel's Real World loft studio where 80% of the new album, Us, was recorded

Left: Bottrill outside Real World Studios in Bath, England

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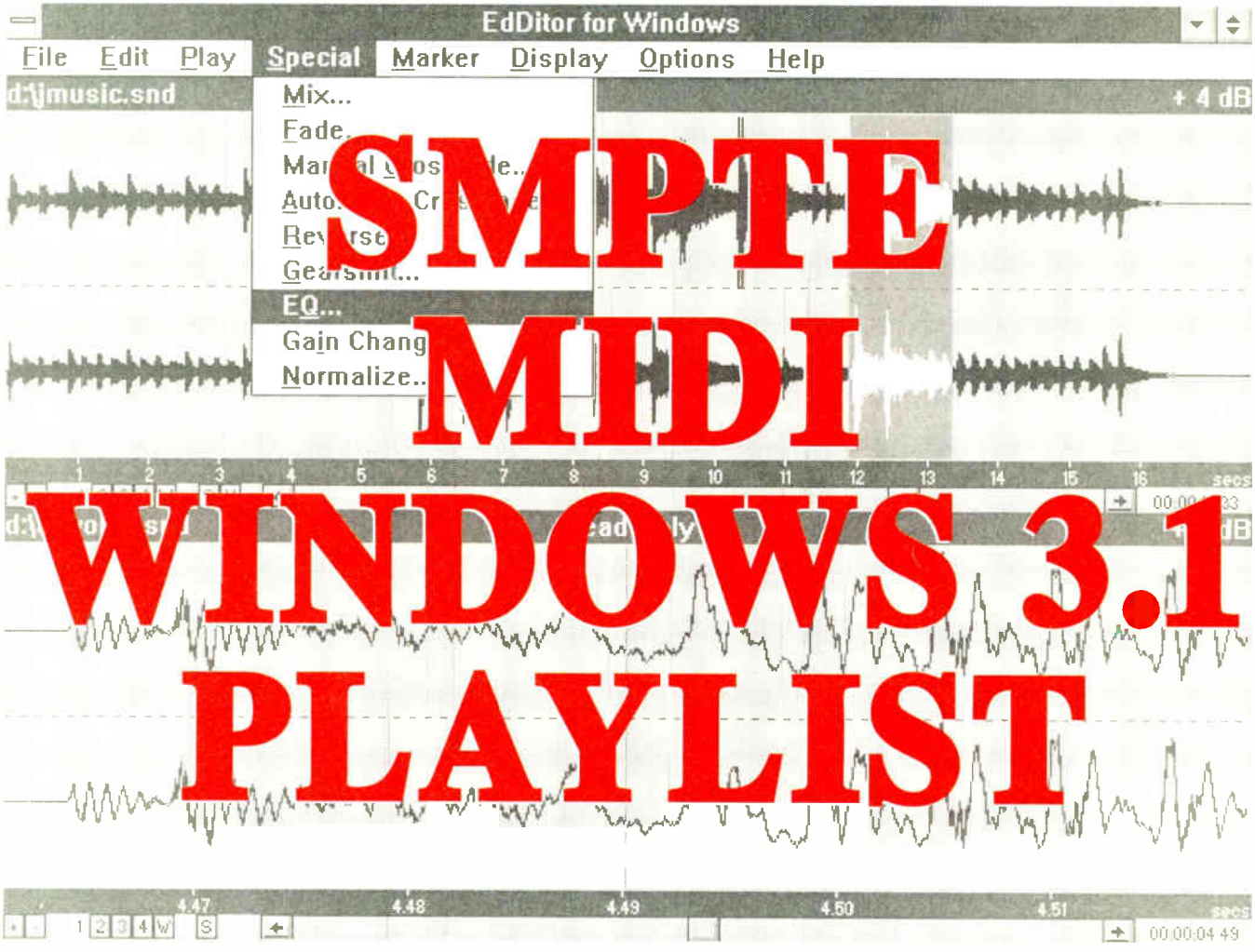

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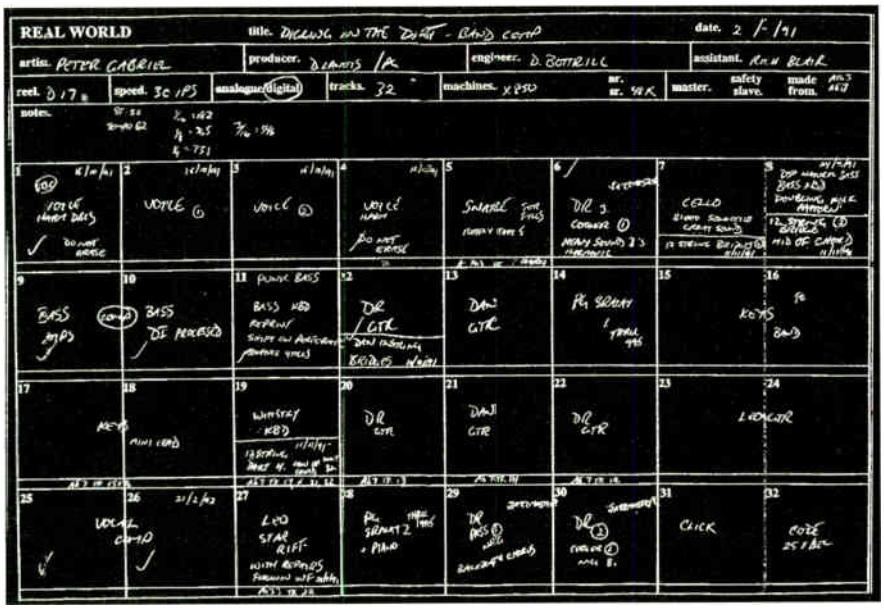
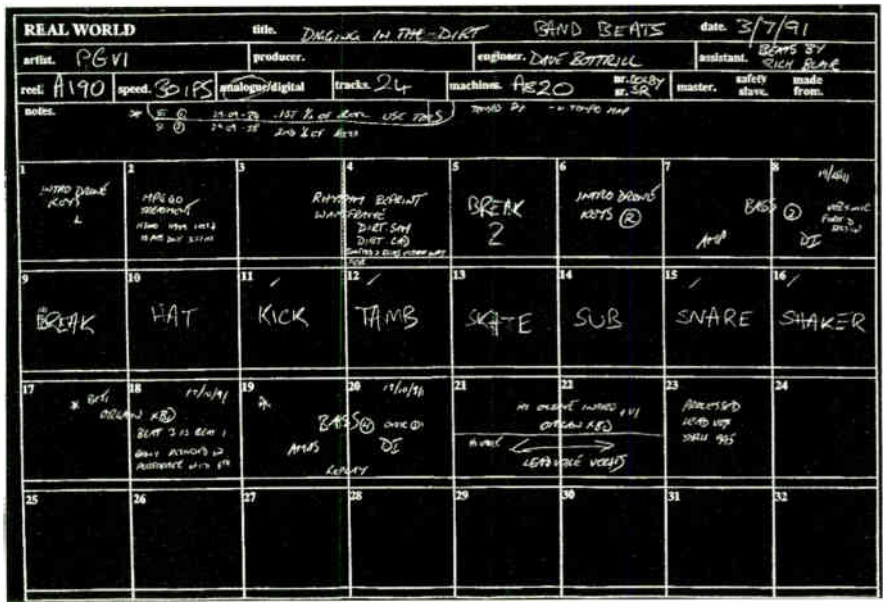


Charts for Peter Gabriel's song, "Digging in the Dirt", with Dave Bottrill as engineer, Rich Blair assistant engineer and Daniel Lanois as producer.



ing along, and this way he'd be able to recall, 'Oh yeah, that was a nice idea, let's try that later.'"

MIX 'N' MATCH

Having pieced together a structural framework within which musicians could innovate and develop their own parts, Gabriel requisitioned the services of his studio band, comprising Manu Katche on various types of drums, Tony Levin on Status bass (instead of his usual Music Man) and David Rhodes on Steinberger guitar, with producer Daniel Lanois also contributing Fender Telecaster guitar parts. Gabriel then worked on a stronger melody via his keyboards and fit proper words. Structure, melody and lyrics would all be changed and exchanged until everything fit together to the composer's liking—a case of mix 'n' match until he got it right.

"The structures were constantly changing, so I was never able to edit on the multitrack," recalls Bottrill. "By the time we'd get around to a structure, we'd likely have three tapes going already, so I would end up compiling from the various tapes using offsets and building a structure from that. Then Peter might come up with another idea, and we'd have to restructure the whole thing again. In effect, the song was constantly being molded and built up over the two-and-a-half-year period, going

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through maybe three or four different structures until finally becoming what it is today."

About 80% of *Us* was recorded in Real World's loft studio, known as the Work Room and equipped with a 48-channel SSL E Series console; 40-channel and 72-channel G Series desks were used in the Production Room and main studio, respectively. Analog tape machines were Studer A820s, running at 30 ips with Dolby SR, while digital recordings were made with a Mitsubishi X-850. In all, ten tapes were used for "Digging in the Dirt," these being compiled down to one 32-track and two 24-tracks.

"Broadly speaking, the 32-track machine was used when we would compile down in order to restructure or just to create space so that we could put up another slave," Bottrill says. "If I could, I would record the vocal and keyboard parts on digital, but it got to the point where we would use whatever was available. What I campaigned for and usually got were drums and bass on analog, and then, if possible, the voices would go onto digital for ease of punching in and lack of generation loss when comping. 'Digging in the Dirt,' in fact, didn't go through too many generations of the vocal, but 'Love to be Loved,' for example, was sung by Peter about 40 times, and we probably used bits from each performance."

INTO THE GROOVE

"Digging in the Dirt" kicked off with the obligatory groove—initially culled from a track entitled "Zaar" on Gabriel's *Passion* album (recorded for Martin Scorsese's film *The Last Temptation of Christ*)—consisting of an Egyptian rhythm played in stereo by Hossan Ramzy on a large, metal Brazilian drum called a surdu and a deep tambourine-type instrument known as a duf. This was combined with another rhythm pattern out of an Akai MPC 60. Gabriel then wrote a bass sequence using Mark of the Unicorn's Performer and a D50 natural bass sound, before a seemingly endless amount of keyboard takes followed.

"Peter played along to the rhythm, came up with a structure, and the first thing that he got vocally while ad-libbing on the mic was the 'shut your mouth' part," Bottrill recalls, referring to the section on the record that begins with the lines, "Don't talk back/Just drive the car/Shut your mouth/I know what you are." Consequently, for a long time the track was known as "Shut Your Mouth" within the confines of Real World.

Meanwhile, with a rough structure having been hewn out of some David Rhodes and Daniel Lanois guitar parts (in addition to the rhythm and keyboard passes), there was a week-long relocation to the French Quarter in New Orleans for overdubbing sessions at Lanois' API-equipped Kingsway Studio. While a horn section that was taped in New Orleans never made it onto the finished recording, Leo Nocentelli's Epiphone funk guitar riff did, and then it was time to return to Real World for band track session one.

MICS AND THE MECHANIC

"We had everyone in the Work Room," explains Bottrill. "Tony [Levin] over in one corner, Manu [Katche] in the other with Peter's African drums in a sort of drum kit setup, David Rhodes playing guitar by the edge of the console, Dan [Lanois] even closer to the console, and Peter inside the 'keyboard castle.'

"Tony basically had a Trace Elliot amp and speaker setup in the room," he continues, "and we'd send the signal downstairs into Studio 1, as well as have an isolated speaker. Across the way, there's a little overdub room into which we also sent the signals from Dan and David's guitars, with speakers set up in two separate corners. That way we'd have isolated guitars and isolated bass. Peter's keyboards, on the other hand, went direct.

"For all of the speakers I would normally use a Shure SM57 and an AKG D-12 jammed right up close and heavily compressed. We have some wonderful old valve compressors here belonging to an old Decca desk that Peter bought years ago from Decca Studios; they're unlike anything that I've seen anywhere else."

The percussion consisted of an assortment of drums from places as far afield as the Ivory Coast and Guinea, including a Burundi drum and a *d'jembé*. "Basically I had B&K cardioid mics on whatever I could, even though I only had a few of them," says Bottrill. "The Burundi drum was used like a snare, and when on occasion we actually put a

World Radio History

snare in the middle, I would mike the top and bottom with SM57s. For the double-headed kick drum—a tiny jazz kick from way back in Peter's Genesis days—I put an [EV] RE20 right near the outside skin so that we didn't actually get any pedal, just a chesty 'oomph' coming out of the back. Both heads were muted, and the result was a rather small kick with a big sound. Then we had tiny little tambourines together with a very big mazhar, which is like a deep Egyptian tambourine. The mazhar was on Manu's left foot so that he could do a sock-cymbal action, and there was a mic way down on that.

"There were no overheads," Bottrill explains. "The whole kit was close-miked, and we would generally record everything with all the speakers on. I would try to keep as much isolation as possible by putting blankets up around Manu. Only his head was uncovered in order for him to see what everyone else was doing while avoiding spill into the drum mics.

"There were wedge monitors for the guitarists and for Tony [Levin], and the whole band had blasters in front of them so that they could each record what was going on," he continues. "They were each getting a mix in a wedge or in their own blaster, so it was quite good for timing and pitch. It's a great way to record. The sound is swirling around the room, but it's kind of exciting that way, and even though it's not too convenient in terms of isolation, it usually turns out okay. Everybody's a part of what is going on, and I really like that a lot."

For all the effort, however, most of the first session was deemed unsuitable and discarded. A second session then took place in the large downstairs control room with a similar setup, except for Katche, who was positioned in the adjacent wooden recording area. The drummer played a regular Yamaha kit this time around, although instead of regular hi-hat cymbals he used a pair of small splash cymbals to produce a less expansive sound.

END PIECES

Once the band track had been re-recorded, Bottrill and his assistant, Richard Blair, looped up sections of Katche's performance, ran them along with the track, and re-record-

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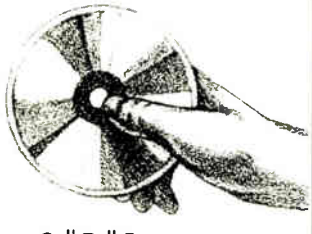

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Peter Gabriel's latest album, Us, which Bottrill and Lanois engineered

ed it in order to tighten up the timing within the song's complex, varying structure. "We got the kick by itself and the other drums and redid the pattern on its own," says Bottrill, "so it was the same as what Manu had been playing but more solidly in time. We also got some break beats to go along with that, as well as some additional rhythm programming, using Manu's parts sampled into an Akai S1000 and Performer. Then, once we had the rhythm locked solidly, we got Tony Levin back one more time to play his Status bass and replace what he had done before on the Music Man."

With most of the song's parts recorded, Gabriel then performed his vocal section by section in just over an hour. While this went onto tape dry, for monitoring purposes his familiar studio voice was produced using slap echo courtesy of a Korg SDD3000 with a Quantec reverb. Later on, one part was re-recorded using the Neumann U47 tube mic, which was always open while he was playing keyboards.

This same U47 also came in handy when recording the backing vocals—fondly referred to as "the Everlys" because of the harmonies—which were performed several times in the control room by Peters Hammill and Gabriel, Richard MacPhail and Ayyub Ogada. Two weeks were then dedicated to polishing up "Digging in the Dirt."

"After [the background vocals] it was basically a case of adding or changing little bits and pieces, trying different things," Bottrill says. "Peter wanted to redo some keyboard parts, so he set up his organ sound and his piano sound and we put that out through a Vox AC30. As we'd go along in the recording process, we'd always be mixing, so there was no clear cutoff point for one and start-off point for the other. By the end of the record, we'd probably been running in mix mode for about six months—doing a mix, documenting the setup, doing something else and then returning to work on it, chipping away until we'd end up with the finished product—a real molding process, like a sculpture.

"By the end we were editing different mixes from different eras," Bottrill concludes. "I cut them all together in the AudioFrame [WaveFrame 1000] so that I could crossfade sections. The finished song is a composite of three mixes, whereas some of the other tracks on the album are composites of four or five mixes. Peter always has a picture or an idea of where he wants to go. And even though it may take a long time to get there, he does know when this has happened. It's not a case of being self-indulgent: He just wants to make it right, and he'll know when it is right." ■

Richard Buskin is a London-based writer who frequently contributes to various European audio magazines

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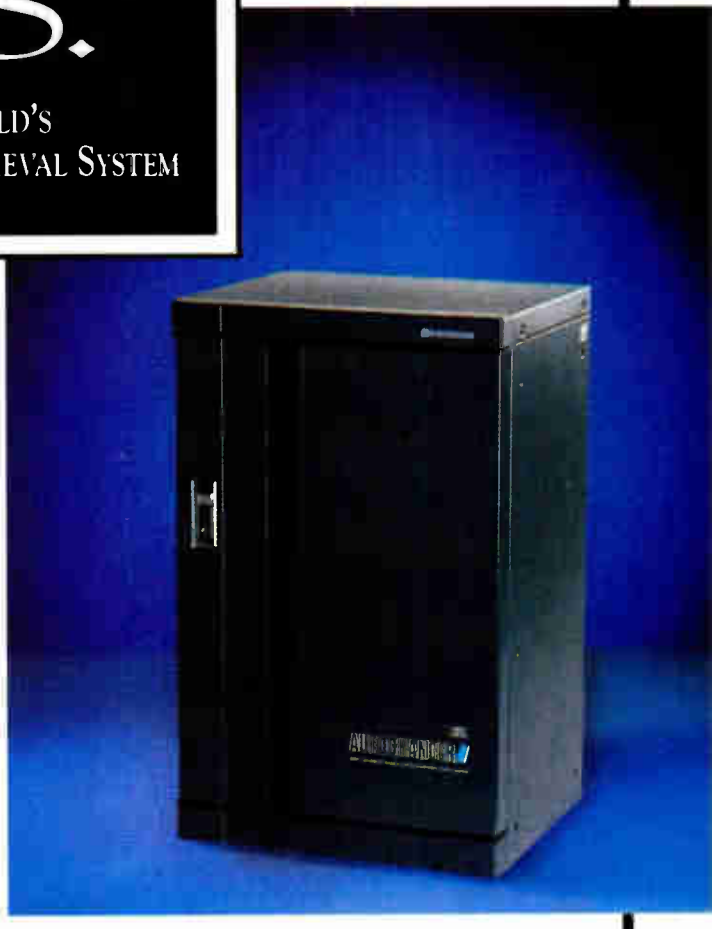
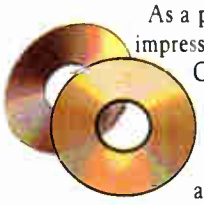


No matter how technologically advanced an industry may become, it's always a good idea to keep things simple. Well, what could be simpler than programming audio by hand? The Pioneer CAC-V3200 Compact Disc Autochanger.



As a professional audio user, you'll be impressed that it provides access to 300 CD's with uninterrupted playback thanks to dual CD players. And they can be connected together to program thousands of CD's. You'll also appreciate that its built-in interface makes it pre-programmable for error-free playback by almost any computer. And its fade-in and fade-out capabilities, pitch control, and analog and digital outputs make it a remarkably ingenious piece of equipment.

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CD Recorders

Matching Features to Applications

by Philip De Lancie

When CD recorders first reached the U.S. in 1989, the recording drives were packaged as peripheral devices to be controlled by computers. Initial systems from Yamaha (marketed by Gotham Audio) and Kenwood were based on three main components: computer (running control software), signal encoder and recording drive. Sonic Solutions followed a similar pattern in marketing the Sony/START Lab CD Maker, but the drive-control software was offered as just one module of a digital audio workstation (DAW) package. The Gotham and Sonic systems were sold in the $50,000 range, limiting their attraction for all but the most affluent.

By December of 1991, when products editor George Petersen surveyed the field for *Mix*, a whole new breed of recorder had surfaced: stand-alone units that operate much like a tape recorder. Enough vendors were getting into the market that the choice of available features and options was starting to expand. And prices had fallen to the point where systems were coming within range of recording studios, spot production houses, mastering facilities and other potential users.

A year later, the market has changed again,

World Radio History

though the basic DAW-based vs. stand-alone distinction remains. As happened with DAT, the professional audio community is now the unintended beneficiary of miscalculation by a hardware manufacturer about the demand for a new audiophile technology. In this case, Philips apparently overestimated the number of consumers who would shell out $7,000 to $8,000 for the capability of recording their own CDs. The resultant glut has driven down prices for stand-alone recorders.

"I think that Philips is going to dump them any way they can get rid of them," says Gotham Audio's Russ Hamm. "The good news is that you can have these things now for $4,000, almost half the price they were introduced at. But we're not going to sell them anymore. I can't make any money at it, so it doesn't make any sense."

The glut affects not only Philips' own Marantz brand, but machines built by Philips and marketed by others. "Whether it's Micromega, Marantz, Studer or Apex," says Hamm, "they are all the same machines, with only minor variations. They are all made in the same factory in Belgium, with slight variations in features." While the Marantz and Meridian machines are pretty much stock, and the Apex brand has bigger buttons, the most unique is the Studer D740, which has a parallel port allowing external control of recorder functions. Marantz Professional Products is adding a parallel port to its forthcoming CDR-610, which will replace their current model, the CDR-600. (An upgrade will be available to CDR-600 owners.)

The PDR-10 from Carver Professional

OMI's TOPiX system with the Philips CDD-521 CD Recorder

Studers D740 CD Recorder

With the Philips-built stand-alones available so inexpensively, it's tempting to think that this is the time to rush out and buy. As with any piece of pro gear, however, the prospective buyer needs to carefully compare basic features—such as the types of analog and digital input and output formats a machine supports—before writing a check. Beyond that, there are differences in functionality between the basic stand-alone units and their DAW-based counterparts that could be crucial, depending on the intended application.

The main distinction between the two types is the way in which the systems are designed to be used. The stand-alone systems record directly from an external analog or digital source. In contrast, the DAW-based systems are generally set up to record a program that has been loaded onto the system's hard drive or, in the case of the Sonic System, from a PCM-1630 CD master. The strengths and weaknesses of each flow mainly from this difference in recording approach.

The one area in which everyone seems to agree is that stand-alones have an advantage is in ease of use. David Schwartz of Dynascan, which markets Marantz professional products in the U.S., points to "the cost and simplicity of the whole system. It's easier to learn, and it just couldn't be any easier to use. It works like a cassette recorder."

Schwartz's sentiments are echoed by Peter Chaiken of Yamaha: "We offered a computer-controlled unit prior to the YPDR601, the 201/301 Series. But it was felt that for the second-generation unit, operation could be simplified by making it a stand-alone unit with a dedicated remote control. It is so simple to operate that anybody can be trained to do it."

START/STOP RECORDING

Convenience alone, however, isn't the crucial difference. "The key factor," Schwartz says, "is the ability of the stand-alone machines to do start/stop recording. You can record some tracks, then take your disc to another studio and record more tracks. Or you can take dailies home to compare mixes."

Even if a system supports start/stop recording, Schwartz notes, "it's important that it be Orange Book-compatible. Otherwise you have to use it only in that system, and you can't take that disc to another studio that has a different Orange Book recorder and record on it there."

The start/stop capability, says Schwartz, opens up quite a few other applications where a computer-based system wouldn't fit. Denon, he says, makes several special Orange Book players that can read CD-Rs that have not yet been finalized with a table of contents. "Radio stations can use these things by putting a few commercials on a disc and playing it over the air on an Orange Book player," Schwartz says. "The next day, they can go back into their pro-

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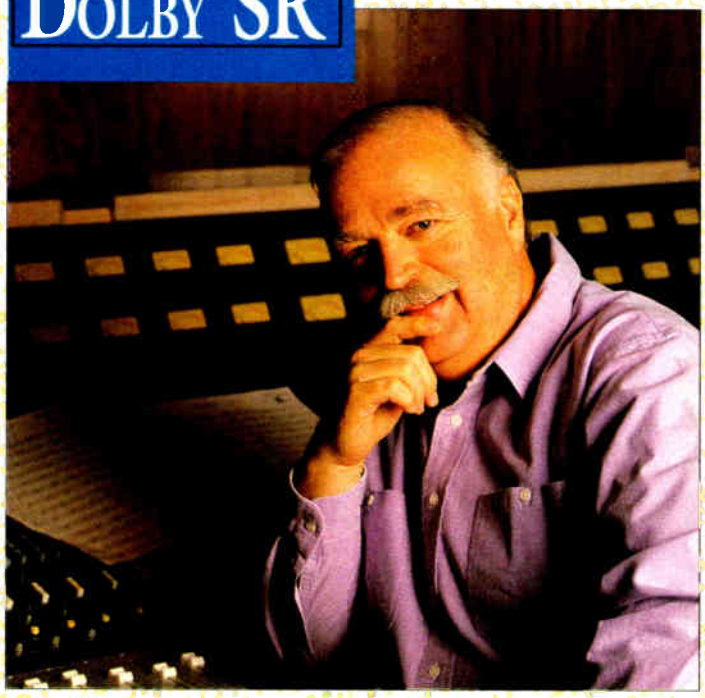
Bruce Swedien DEMANDS DOLBY SR



Alan Silfen

"A little voice inside tells me not to give up my analog machines. There is a refinement and character with analog not available with other mediums."

Occupation

Producer, engineer, songwriter.

Recent credits

Co-produced 5 and engineered 11 songs on Michael Jackson's "Dangerous." Currently working with Michael Jackson, Sergio Mendes and Rene Moore.

Career credits

At age 19 recorded Tommy Dorsey, and hasn't stopped yet: Quincy Jones, The Chicago Symphony, Duke Ellington, Count Basie, Stan Kenton, Oscar Peterson, Sarah Vaughn, Natalie Cole, Barbra Streisand, Dizzy Gillespie, Diana Ross, Nat 'King' Cole. Awards: 3 Grammy's (8 nominations); TEC Hall of Fame.

Career direction

"I want to do more co-producing and song writing along with engineering."

On his technique

"Lately I have returned to recording directly to analog recorders, later transferring the final elements to digital for editing and storage."

On Dolby SR

"Dolby SR allows the inherent beauty of analog recording to come through without annoying hiss, hum, or print-through. I use Dolby SR on all my projects."

Michael Jackson's "Dangerous" (Epic)
5 songs co-produced, 11 engineered
by Bruce Swedien

duction facility and add commercials, or new station IDs."

Yamaha's YDPR601 takes the start/stop capability one step further. "The most immediately evident difference between our unit and the others," Chaiken says, "is the fact that we offer two methods of writing the TOC. You cannot play a disc in a regular CD player until there is a TOC on the disc. Generally the TOC is written after the audio has been recorded, and once it is written, you can't change the disc.

"In our unit, you are offered the option of being able to record a TOC prior to recording the audio, which allows you to take the disc out of the machine, play it in any standard CD player and later bring it back for additional material to be added to it." What is unique about this pre-TOC mode is that a disc that is not yet completed can play on any CD player, not just a special Orange Book player.

This feature, Chaiken says, is designed for "anybody who has use for a CD-R who is compiling information over time, for instance sound effects libraries in post-production applications. You could compile a separate disc for each type of sound effect and add to it over time as more material becomes available, while still being able to use the disc at any time."

In the pre-TOC mode, Chaiken explains, "a track grid is specified with 99 tracks of equal lengths. When you record material on the disc, you use so many of those tracks per program," depending on the length of the selection. The leftover capacity in the last segment of each selection is not used, so the next selection begins at the start point of the next empty track. (The user has to keep a log to know which track numbers correspond to the start of selections.) The unit currently comes with 10-second and 30-second track length options, but Yamaha is introducing a new software option for 30/60 second segments.

Chaiken says the pre-TOC mode reduces overall media cost, because the user doesn't have to write a new disc every time there is a change of data. In addition to post-production, he sees applications in broadcast (for spots, IDs, etc.), and reference discs of mixes for groups recording in studios.

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WRITING TRACK STARTS

Beyond start/stop recording, another major difference between DAW-based and stand-alone CD recorders has to do with specifying track start points. Like many DAT machines, basic stand-alones offer a Manual mode, allowing operator insertion of track start codes during recording, and a dynamics-dependent Auto mode that senses the start of music. "Stand-alone units are not as good for premastering and reference mastering," says Schwartz, "because it is difficult for them to be accurate in placing track points. There may be errors (in Auto mode) of 45 to 200 milliseconds. That's under one-fourth of a second, but in those applications, that is quite a bit of time."

If the main use of the CD recorder is to transfer from DATs that already have accurately placed start IDs, there are ways around this particular problem. Yamaha's YPDR601 will generate track points directly from DAT start IDs if the source is played on one of the Sony 7000 Series DAT machines. Users of other CD recorders can buy a device like the Smart Box, available from Gotham for about $1,500, that will turn DAT start IDs into CD subcode for track changes.

Yamaha offers an alternative approach that is not start ID-dependent. "To place track numbers," Chaiken says, "the YPDR601 looks for a General Purpose Interface (GPI) voltage closure. We offer a device (TC601) that reads SMPTE time code and can put out a GPI signal. At a certain time code frame, the CD recorder can be started. At another frame, track 1 can be indexed. Once you determine where you want your track numbers and indices to go, you can make a frame-accurate duplicate of the disc every time, automated." Because GPI is a common means of machine command, Chaiken says, "You could use any number of interfaces to control the device. There are even MIDI-to-GPI interfaces."

While the YPDR601 does address some of the limitations found in the basic stand-alones, it has one unique limitation of its own: Yamaha does not recommend the use of 74-minute discs. According to Chaiken, the company has not found a manufacturer that can make the longer discs "up to our standards." Another important consideration is the system's list price of $13,980. (Up to seven record units—$11,200 each—may be controlled from one $2,780 remote.) This brings it into the range of some DAW-based systems, largely because downward price pressure on the stand-alone side of the CD recorder market has been evident on the workstation side as well.

DAW-BASED RECORDING

One indicator of how quickly prices have fallen over the last three years is the fact that Sonic Solutions now sells its recording drive and control software package for a fraction of the price of its earlier-generation systems: $9,750 for the CD Printer from Sony/START Lab, plus $850 for Sonic's own Trackmaker software module, which writes the TOC and includes sampling rate conversion.

The CD Printer is a SCSI drive that allows the Sonic System to write CDs off of its hard drive at two

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times real time. According to sales VP Kirk Paulsen, it is also the only system to support the use of 80-minute discs. Because the system is not set up for recording from any source other than the hard drive or a prepared PCM-1630 CD master, it is only suited for applications like premastering where the exact locations of track starts and indices can be specified in advance of recording.

This premastering orientation is reflected in Sonic's client base, and explains why start/stop recording is not supported. The company has been in the forefront of an effort to get CD replication plants to cut glass masters directly from CD-Rs rather than from PCM-1630 tapes (see "Tape & Disc," February 1992). According to Paulsen, start/stop recording creates "corrupt sectors" on disc, so the plants are only interested in cutting from CDs that have been recorded in one uninterrupted pass.

Among Sonic Solutions' competitors in the Mac-based DAW market, Digidesign has been less focused on high-end premastering applications. With its products traditionally oriented toward the affordable end of the price spectrum, the company's CD-R program has been vulnerable to price pressure from the stand-alone side. Digidesign had been integrating the earlier Yamaha PDS systems into its Macintosh-based workstation, but is not actively selling that system any more. According to "chief scientist" Evan Brooks, the company decided it didn't make sense to be selling a $25,000 system in today's market.

Digidesign is now in the process of coming out with a new system, which Brooks hopes will be available by March. "I can't tell you anything about who makes our new drive," he says, "because we are still under non-disclosure for it. But this will be something very new. We have basically skipped a generation, because the price curve has been coming down so fast. The price will probably be well under $6,000, including our software."

DOUBLE-SPEED WRITE AND CD-ROM

While the control software created by a DAW vendor influences factors like ease of disc writing, Brooks sees price, reliability and the length of media accepted as important differences between the writing drives

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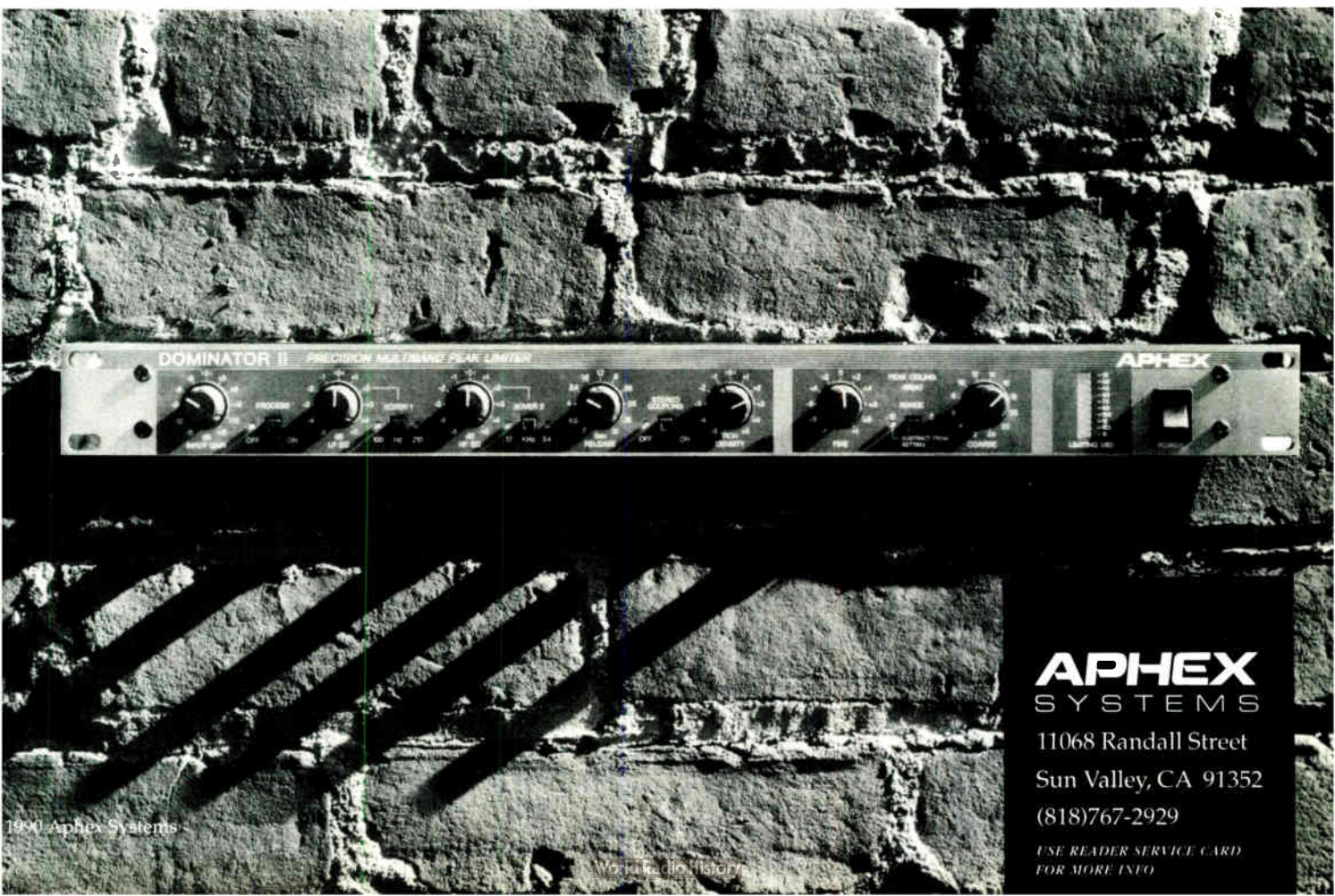

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themselves. Other features, such as the ability to write CD-ROM and to write at double speed, may be valuable to some users, he says, but not to all.

Despite its use as a selling point by some DAW makers, Brooks says double-speed writing is really most important in CD-ROM applications, where data is present on the workstation hard disk in its final form, and transfer to CD is just a data dump. He doesn't see it as a very important factor for most audio users. "There are only a couple of instances," he says, "where double speed is useful: When you already have all the audio data on your hard drive, you need to make a bunch of copies, and the data doesn't need any further modification."

Brooks explains that when using the double-speed recording mode available on some workstations, "you can't do any DSP except for level adjustment." This limitation is inherent in the nature of non-destructive editing, in which the program loaded onto the hard drive remains intact, while editing and DSP are performed on the output as it is loaded off onto the final storage format, be it DAT, 1630 or CD-R. "You can't just tell your DSPs to do everything twice as fast," Brooks says. "So if you want to do any EQ, you have to either put the EQ on the program as it goes onto the hard drive, or write the modified data back to a new file (if your hard drive has enough space). Otherwise, you have to record your CDs in real time."

Another little-discussed fact about double-speed recording, says Brooks, relates to the peripheral recording drive introduced by Philips in 1992 and available with some of the audio workstations. "It's a great CD-ROM drive, but it works only at double speed. That means you can't listen to an audio CD on that drive, and you can't record one in real time."

As for recording from DAT, Brooks says, "The only way you can write a CD at double speed from a DAT is by first dumping the whole DAT onto the hard disk in real time," which wouldn't save any time over writing in real time from DAT to CD-R. Given these limitations on the usefulness of double speed to Digidesign's target market, Brooks doesn't expect the feature to be available on the company's new system.

On the other hand, double speed could be of real value to users with an interest in writing CD-ROMs. CD-ROM is usually associated with publishing applications outside the audio industry, but companies like Optical Media International, which sells the TOPiX line of CD-writing systems, are coming up with innovative uses for ROM writing capability in workstation-based studio environments. (See "CD-ROM Recorders," page 63.) Sufficient flexibility to take advantage of some of these new applications could be an important consideration for some buyers.

For the moment, price is the main factor that is sparking interest in CD recorders. But unless a system is well-suited for its intended application, price is irrelevant. Picking a good buy over the long haul depends largely on matching a system's strengths to the needs of one's clients, and asking how successfully the design can adapt as those needs evolve. ■

Philip De Lancie is a mastering engineer at Fantasy Studios in Berkeley, Calif.

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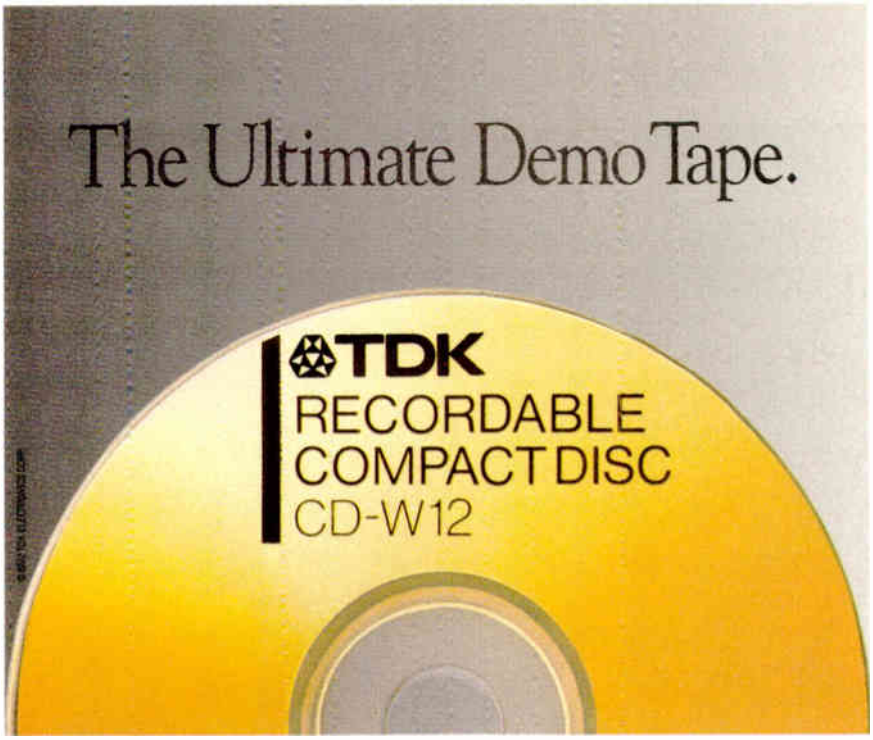

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About CD-R

A CD-R is a type of optical disc on which data is recorded by the user rather than prerecorded (replicated) at a CD plant. CD-R systems may be used for recording CD-Audio and/or CD-ROM. The discs are playback-compatible with conventional CDs, meaning they play in standard CD players or ROM drives—a significant advantage over alternative disc-recording methods such as magneto-optical. Unlike MO and DAT, however, CD-Rs are not erasable or rewritable, which limits their appeal for some applications. A rewritable CD-compatible recording system (CD-E) is not expected to be widely available until the middle of the decade.

Blank CD-Rs, made by Taiyo Yuden, TDK and others, sell for $20 to $50 each, depending on supplier, disc capacity and quantity. The discs are commonly available with either 63- or 74-minute recording time on the standard 12cm size. There are also 80-minute discs newly available for use on the Sonic Solutions system, and 8cm (3-inch) CDs with an 18-minute capacity. Record times are fixed by the length of a track that is "pre-grooved" (molded) into the polycarbonate substrate. The substrate is spin-coated with a recording layer of organic dye, then overlayed with reflective and protective layers of gold and UV resin, respectively.

During recording, the record drive's write laser, following the premolded track, focuses on the recording layer and heats the dye above its decomposition point of 250°C. The immediately adjacent polycarbonate absorbs the heat and expands into the decomposed dye materials. That creates—looking from the read side of the disc—a pit that has a lower reflectivity than the surrounding "land" area, and is thus readable by a CD optical pickup. The pit is permanent, which makes CD-R a WORM (write-once, read-many) medium. Once the disc is finalized with the writing of a table of contents, it is playable in any standard (Red Book) CD player.■

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Tom Lord-Alge (seated), Chris Lord-Alge (standing)

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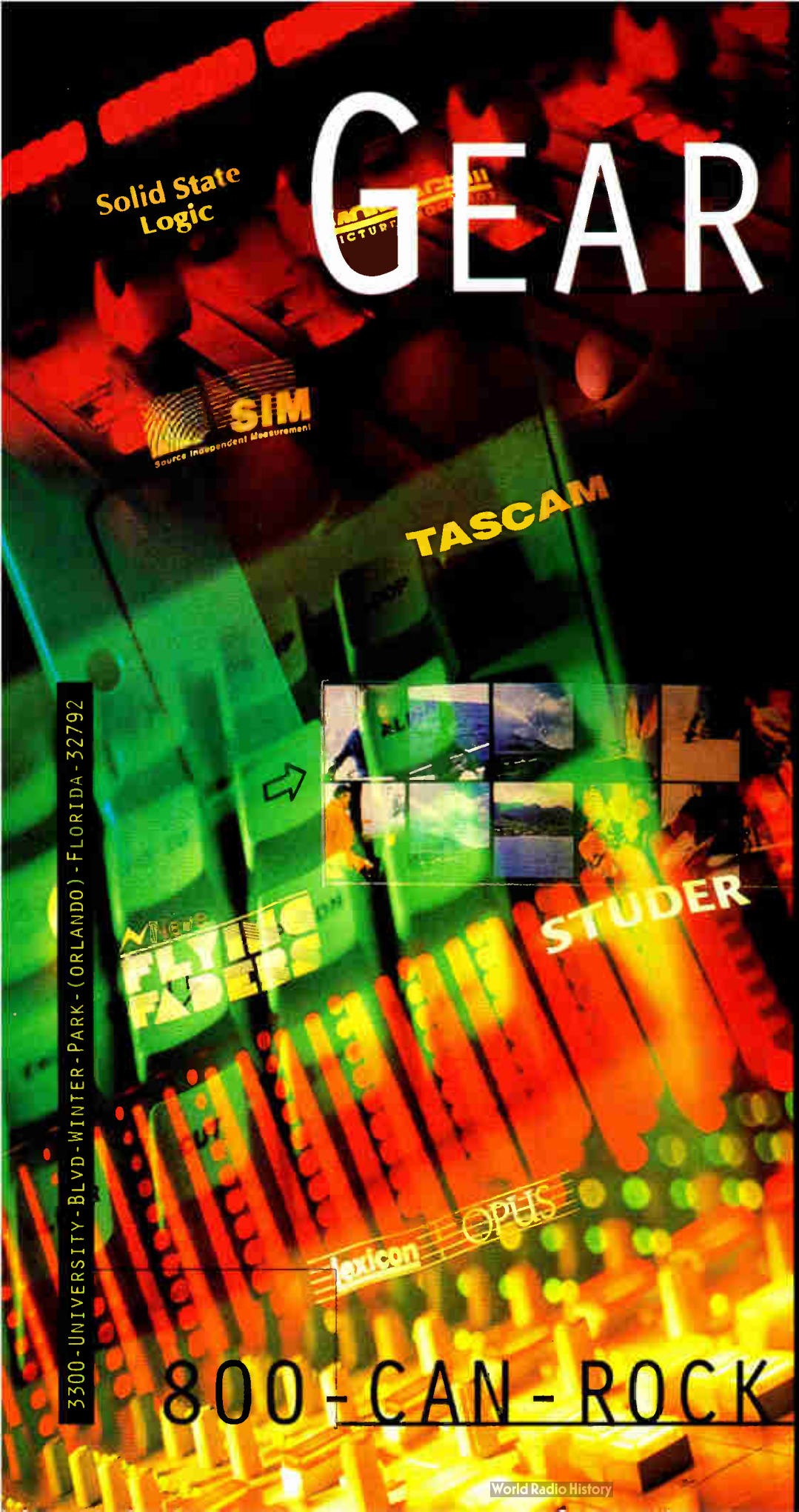

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World Radio History

CD-ROM *Recorders*

While the advantages of having an audio CD recorder at your own facility are obvious, the reasons you might want to take the extra step to CD-ROM recording are perhaps not as obvious.

CD-ROMs, as you probably know by now, look just like audio CDs, but they may contain text, graphics, photos, animation and video as well as audio in digital form. CD-ROM drives are generally connected to some kind of PC or sampler, rather than a stereo system. While the market for CD-ROM is nowhere near that of audio CD, it's one of the fastest growing markets in the media industry.

As for reasons you might want a CD-ROM recorder, there are several. According to Reid Ridgway of Los Gatos, Calif.-based Optical Media International, one use for recordable ROMs is to back up and archive the entire contents of a hard drive related to a given project, including both audio files and associated documentation. This approach gives the user instant access to any session file at a later date. It also allows a project, completed or in progress, to be sent to and re-created at other facilities that have standard CD-ROM drives hooked up to their systems. "It's a way to send your hard drive across the U.S.," Ridgway says.

Another application is found in studios with large amounts of audio data and sound sample libraries formated for specific samplers. "Samplers," Ridgway says, "take so much information. If, for instance, you have an Emulator III, you might have a 650MB hard drive dedicated for use on that particular machine. And since there are already drivers written in the operating system of the Emulator III to handle CD-ROM, and the hard drive is a SCSI device, you can hook it up and make a CD out of it. You flush the drive and back it up on CD. What you get is a CD that is in the native format of the Emulator III, so when you load your keyboard from that CD, your sounds have all the parameters of the original files saved on the hard drive." The advantage of CD-ROM archiving over DAT archiving is its random access, a fact that becomes increasingly important as you accumulate gigabytes of data.

JVC's Personal ROM Maker includes software for recording CD-ROMs and audio CDs.

Yet another possibility is to make CD-ROM reference disc recording services available to others. Expanding your business in this way makes sense because there are still relatively few places you can go to make your own CD-ROM reference disc. And you need only to pick up your newspaper to see that this part of the industry is gathering considerable steam, with CD-ROM titles and multimedia developers cropping up like SimAnts.

So if you wanted to buy a CD-ROM recording system, where would you look? As of December '92, CD-ROM recorders were available from Sony (CDW-900), Philips (CDD-521), JVC (XR-W1001 Personal ROM Maker) and Yamaha (301 Series PDS CD Recorder). But a system is more than the recording hardware. What about recordable media and software? Blank discs are easily available from several sources, some of which are listed at the end of this article. But software is another matter.

The Sony CD-ROM unit, priced at about $10,000, does not include software. At a suggested retail price of about $12,000, the Yamaha 301 also comes exclusive of software. The Philips system includes software for making CD-ROMs in all

—CONTINUED ON PAGE 176

The following companies provide software and/or blank media for recording CD-ROM discs:

DataDisc
Route 3, Box 1108
Gainesville, VA 22065
(800) 328-2347

DataWare Technologies
500 Ignacio Valley Rd. #250
Walnut Creek, CA 94596
(510) 942-3111

DIC Digital Supply
222 Bridge Plaza South
Ft. Lee, NJ 07024
(201) 224-9344

Optical Media International
180 Knowles Drive
Los Gatos, CA 95030
(408) 376-3511

Meridian Data Inc.
5615 Scotts Valley Drive
Scotts Valley, CA 95066
(408) 438-3100

TDK Electronics Corporation
12 Harbor Park Drive
Port Washington, NY 11050
(800) TDK-TAPE

Young Minds Inc.
1910 Orange Tree Lane #300
Redlands, CA 92374
(714) 335-1350

Here are some phone numbers you can call for more information on CD-ROM recorders:

JVC Product Information:
(714) 965-2610

Philips Consumer Electronics:
(615) 475-8869

Sony Computer Peripheral Products:
(800) 352-7669

Yamaha Multimedia:
(612) 448-9800

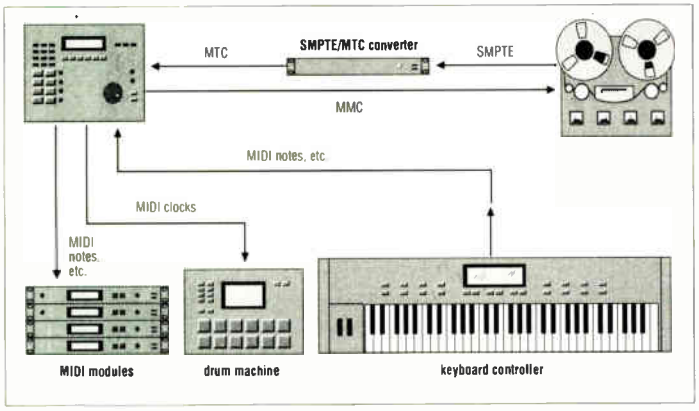
World Radio History

by Paul Potyen

MIDI MACHINE CONTROL

A CLOSER LOOK

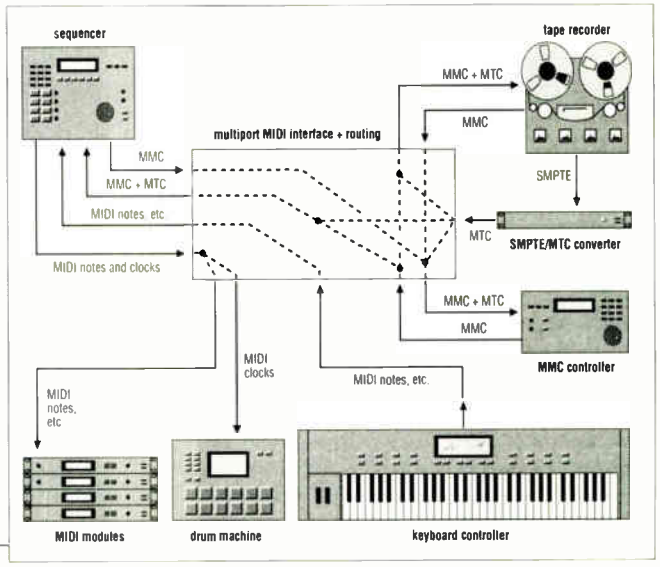
The specification for MIDI Machine Control was finalized by the International MIDI Association in January '92, and today we are getting the first glimpses of what audio manufacturers are doing with it. Just as the significance of the MIDI standard was unclear to those who read about it in 1984, the lack of first-generation MMC products has only allowed recording industry sages to conjecture about the future of MMC. But the consensus is that its first applications will be to allow external tape decks to synchronize to MIDI sequencers.



Lachlan Westfall, president of the National MIDI Association and managing director of the MIDI Manufacturers Association, explains it this way: "MMC is intended to allow MIDI sequencers or any other MIDI control device to send messages to time-based devices such as audio or video tape recorders—anything that's SMPTE-based. Previously when you connected a MIDI system to a SMPTE-based system, you needed to have the tape recorder be the master, controlling the sequencer. With MMC you can go the other way. So you can put all your transport controls in one spot on a sequencer. It offers an immense degree of integration previously unavailable."

Actually, the idea of controlling an external deck from a MIDI sequencer has been around for a while. Prior to the publication of the MMC specification, Fostex developed a proprietary protocol that allowed control of its MTC-1 and G8330 decks via MIDI, and several software-based MIDI sequencer manufacturers, including Steinberg, Emagic (formerly C-Lab), Oktal and Dr. T's, incorporated that protocol. Fostex has since developed upgrades to those decks that allow transport control via MMC as well.

And several pre-MMC Tascam recorders were designed with a serial control port, which, theoretically, allowed software transport control. With the publication of MMC, Tascam announced its MMC-100 interface, which provides



Left: Basic MMC set-up. Below: Typical MMC pro studio set-up.

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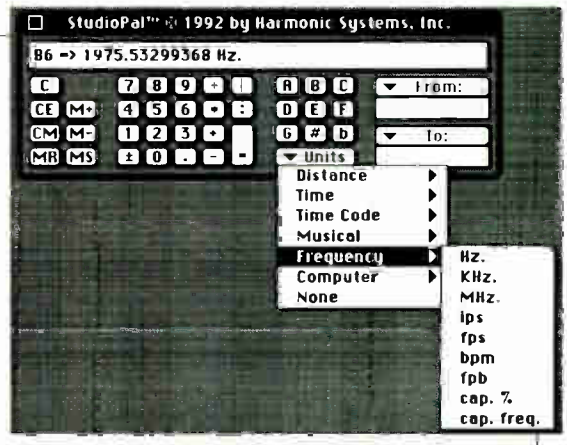
MMC control of its TSR 8, MSR 16, MSR 24, 644, 688 and 238 machines. (The new DA 60 and DA 88 allow direct MIDI connections.)

At its simplest level, MMC allows synchronization of external transports by a one-way MIDI connection from a MIDI sequencer to an MMC-capable deck. Once it receives an MMC command from a sequencer, the deck can use its SMPTE track to synchronize the sequencer via a SMPTE-to-MIDI converter.

A more sophisticated version of the above scenario would be to have a closed-loop MIDI system where the sequencer is connected to an MMC-capable synchronizer, such as a future version of TimeLine's MicroLynx. The synchronizer would then control one or more transports in a typical post environment via SMPTE, and the sequencer via MTC. According to TimeLine's Gerry Lester, former chief engineer at Adams-Smith and author of the MMC proposal, "The idea was to provide a path to allow people to use MMC as their systems become

Harmonic Systems StudioPal



StudioPal is a Macintosh program from Harmonic Systems (Fairfax, Calif.) that performs conversions and calculations. What makes this program unique is that it's intended for recording studios. It's a free-standing application, rather than a desk accessory or HyperCard stack, and is able to convert parameters such as distance, time, time code, musical intervals and rhythms, frequencies and computer capacity.

Here are some examples: the number of megabytes of disk space taken up by a four-minute stereo digital audio track sample at 44.1 kHz; the length in SMPTE drop-frame of a given number of bars/beats/ticks at a specific tempo; and the percent change of tape capstan frequency required to detune a track by a half step. And there's much more. It's a well-designed package, with many shortcuts and customizable features for often-repeated conversions and calculations. Of course it can also be used as a standard software-based calculator.

The manual is brief and well-written, with helpful examples. Priced at $69.95, StudioPal is a good value for any Macintosh-based recording facility.

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more complex and sophisticated. The path is there to go all the way to the professional production and post-production level.

"SMPTE time code is still by far the best way to lock tape decks," Lester adds. "There was no intention in MMC to use MTC to control decks. The intention is to have the MTC interface to go back to the sequencer and whatever else you are using."

MMC also supports external transport track record/enable control from the sequencer software. Theoretically it would be possible to represent these external tracks along with MIDI and digital audio tracks in programs such as StudioVision. The resulting integration offers unparalleled advantages over existing systems.

When can we expect products to be available? Quite possibly by the time you read this. Opcode Systems is one software company that appears to be nearing the finish line with its first generation of MMC-compatible software. According to communications director Paul DiBenedictus, "The way Opcode is integrating MMC into its software is through new driver software that goes into the OMS System folder. It's called the AV OMS driver. Essentially, through OMS we allow applications to control MMC decks like those made by Fostex and Tascam. Along with this driver is another piece of software, tentatively called AV Controls, which is both a setup program that you use to configure to your particular deck, and a set of transport controls for 'record,' 'play,' 'stop,' 'continue,' 'pause,' 'fast forward,' 'rewind' and 'shuttle.' The 'shuttle' is mainly for future video decks that support MIDI Machine Control.

"This software is a long-range solution to controlling external devices," DiBenedictus continues. "It's not just for MMC; it's also built around our Studio A/V hardware synchronizer, and it allows you to set up all your device definitions and control those devices as well.

"Once an MMC device is set up in the AV Controls you don't have to use the AV Controls to control that device. You can also control the device from the new MMC-compatible versions of Vision and StudioVision via a new synchronization type called Time Control.

"However, if you want to *record* an audio track on the tape machine," DiBenedictus continues, "you *do* need to have the AV Controls window open. That's where you select and record/enable the tracks you want to record to. It's a safety feature to prevent you from accidentally recording over previously recorded tracks.

"Another difference between using AV Controls with the Studio A/V and using it with MMC protocol is that the former method allows you to control multiple decks in a chase-lock format. This is something that MMC can't do. In addition, if you have a Studio A/V with a video deck and you also have an MMC deck that doesn't work with the Studio A/V for any reason, you can't achieve synchronization by using the MMC on one and the Studio A/V on the other.

"The long-range plan for this software is that we'll be able to integrate other kinds of timing or control protocols—such as QuickTime—into the system, too. It's part of the OMS system and, as such, will be available to third parties who want

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to program their software to be OMS-compatible."

Denis LeBreque, vice president of Passport Designs, expects that MMC will be introduced in its Producer software package some time later this year. "We're very customer-driven," LeBreque says, "and we're getting more calls each day asking about MMC. So we're working on the software as we speak."

Mark of the Unicorn's Daniel Rose feels that MMC will be a standard feature in the industry in the next two years. Although the company demonstrated a version of its Performer software that could control an external deck at last year's NAMM show, the company has since been concentrating on adding other features to its portfolio of products. "We hope to implement MIDI Machine Control in Performer later this year," Rose says.

"We wanted to make the Roland DM80 [see this month's "Field Test"] MMC-compatible," says Chris Meyer of Roland, "but the MMC specs were finalized in January 1992, a month or two after the DM80 was released, so we developed a proprietary method of machine control. We're now trying to prioritize that with other feature requests for future upgrades." Meyer was also one of those who planted the seeds of MMC. "My main role was wishing very loudly to Gerry Lester and David Oren," he says. "I really wanted it."

But MMC doesn't assume that MIDI sequencers must be at the center of a complex control system. There is nothing to prevent a console maker or a workstation manufacturer from implementing MMC transport controls and track selection on a mixing board or a master keyboard. Alternatively, dedicated controllers could implement MMC, such as JL Cooper's Media Control Station or CS-Edit. According to JL Cooper's Chuck Thompson, "We are waiting for a reason to implement it. It wouldn't be that difficult. For example, if a sequencer allows us to use MMC to implement jog/shuttle functions, we'll do it." One Cooper product that does use MMC is the data-SYNC, which converts the Alesis ADAT Digital Audio Recorder's transport functions into MMC messages. Another significant example is the Alesis BRC (Big Remote Controller), which uses MMC to communicate

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with the ADAT. The BRC is designed to control 128 tracks, and they don't all necessarily need to be ADAT tracks.

So the relatively few chickens are beginning to hatch many new eggs, and the audio community could well find many tasty items on the dinner menu very soon. ■

Paul Potyen is a Mix *associate editor and prefers his eggs poached.*

CHIP SHOTS

DIGIDESIGN SESSION 8

Session 8 is a low-cost 8-track hard disk recording system for the DOS/Windows platform from Digidesign. It integrates random-access digital audio, MIDI and analog mixing and patching under computer control. The Session 8 Audio Interface offers 8 line ins/outs, 4 front-panel mic ins, 4 front-panel line ins, a 10x2 analog submixer that can be routed to a pair of A/D converters for digitization, S/PDIF digital I/O and more. It runs on a 386 SX/25 MHz; a 486 is recommended. It was expected to be available in February at a price of $3,995.

Session 8XL, priced at $5,995 with a January availability, is a configuration with two 4x4 Pro Tools Audio Interfaces for those who need a high-quality random-access digital system without all the integrated mixing features and routing that the Session 8 audio interface offers.

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ALTEC LANSING COMPUTER SPEAKER SYSTEMS

The Altec Lansing Multimedia ACS100 Computer Speaker System includes two self-powered satellite speakers that are electronically controlled and magnetically shielded to prevent interference with visual transmission to computer monitors. The ACS100 accepts inputs from two audio sources, with mixing capabilities. Controls on the left satellite allow easy adjustment of volume, DSP and treble of the entire system. Each satellite includes a 3-inch mid/bass driver and an 11mm tweeter.

The ACS150 self-powered subwoofer can be added to any computer speaker system for full low-band response. The ACS100 is priced at $180; the ACS150 retails for $150.

Circle #202 on Reader Service Card

SOUND IDEAS SFX ON CD-ROM

SFX on CD-ROM Volume #1 contains 300 digitally recorded sound effects for multimedia PC applications. It operates on Windows 3.0 with Multimedia Extension or Windows 3.1. Sounds are provided in WAV format at 22.05 kHz 8-bit mono, 8-bit stereo, 16-bit mono, and 16-bit stereo. A built-in search program allows for efficient access to sounds. SFX on CD-ROM Volume #1 is available for $69.95.

Circle #203 on Reader Service Card

DESKTOP VIDEO PRODUCTS 1GB OPTICAL DISK DRIVE

New from Desktop Video Products is a 1GB optical disk drive designed specifically for audio and video digitization speeds. The drive, based on a Panasonic mechanism, includes a custom driver for the Macintosh. It has been tested extensively with the Video F/X system from Digital F/X Inc. and with Digidesign Sound Tools, and has been proven to operate with at least five simultaneous audio channels in both Record and Playback modes.

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From a sonic and audio engineering point of view, the single greatest factor dealt with in special venues is spatiality, achieved through the use of multichannel audio systems.

To some it seems that frontiers are getting harder to find, but to others it's simply a matter of following the technological Yellow Brick Road. In the audio world, this road led through the '80s to the new and exotic lands of MIDI, sampling, personal computers, digital recording and editing, and the burgeoning field of sound-for-picture. In the '90s, the recent international surge in construction of theme parks and other special venues has presented another expanse of new territory to pioneer.

Special venue audio bears some resemblance to audio-for-video but offers even greater challenges. The uniqueness of each attraction and the nature of special venues, as an environment experienced by the audience rather than a presentation shown to them, makes the difference between conventional post-production and special venue audio like the difference between regular chess and 3-D chess. From a sonic and audio engineering point of view, the single greatest factor dealt with in special venues is spatiality, achieved through the use of multichannel audio systems.

"Audio has to be a companion to something," observes Wylie Stateman of Soundelux, a sound design firm with roots in film, offices in Los Angeles and Orlando, Fla., and credits that include the Backdraft and E.T.'s Adventure attractions at Universal Studios, Fla., and Batman—The Ride and the Batman Stunt Show at Six Flags in Gurney, Ill.

"In the case of film, it's visual, but in the case of a theme park or architectural audio, it's really a space or environment," Stateman adds. "Film and architectural audio design are two very different ways of working. With film, you're dealing with three fixed speakers that are set left, center and right behind a perforated screen—and possibly a pair of speakers out in the auditorium. In architectural design you can place speakers wherever you deem appropriate and use the source points to your advantage."

A special venue may be a single space, such as a theater, in which the audience remains relatively stationary, or it may be a ride or walk-through environment; each poses different demands. Bob Zalk, director of post-production for Theme Park Productions, the subsidiary of Disney responsible for generating media for their theme park attractions, feels that designing sound for a theme park ride is intensely multidimensional and interdisciplinary.

"We try to treat everything by scenes," Zalk says, "so, if you have a vehicle that's moving through an area, the show designer looks at a blueprint and decides when he wants certain sound effects to come up and where he wants them to emanate from—the set, inside the vehicle—it depends on what he wants to do creatively. In this environment, sounds can come from anywhere: above, below, beside or under you. A lot of the design is obviously timing-intensive, because you need to know how quickly a vehicle is moving through a certain area and how many sounds are coming from where, so that

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you don't have this big mush of sound hitting the guests.

"With a ride-through attraction like the dark rides at Disneyland—Haunted House, Pirates of the Caribbean, Mr. Toad's Wild Ride—you figure out how long the guest is going to be in the space, and then you know you have a certain number of seconds in which to get a story point across," Zalk continues. "We'll ask, 'Okay, where is a sound supposed to come from? Is there dialog? How much music? Are there effects?' All that information has to be deciphered in terms of the space, and a lot of people have to sit down and figure out who can do what: 'Can you get an extra speaker run over to here? Can you hide that someplace?' A lot of what we do here is very team-oriented because there are a lot of different disciplines that need each other in order to produce the Creative Vision in the Rye."

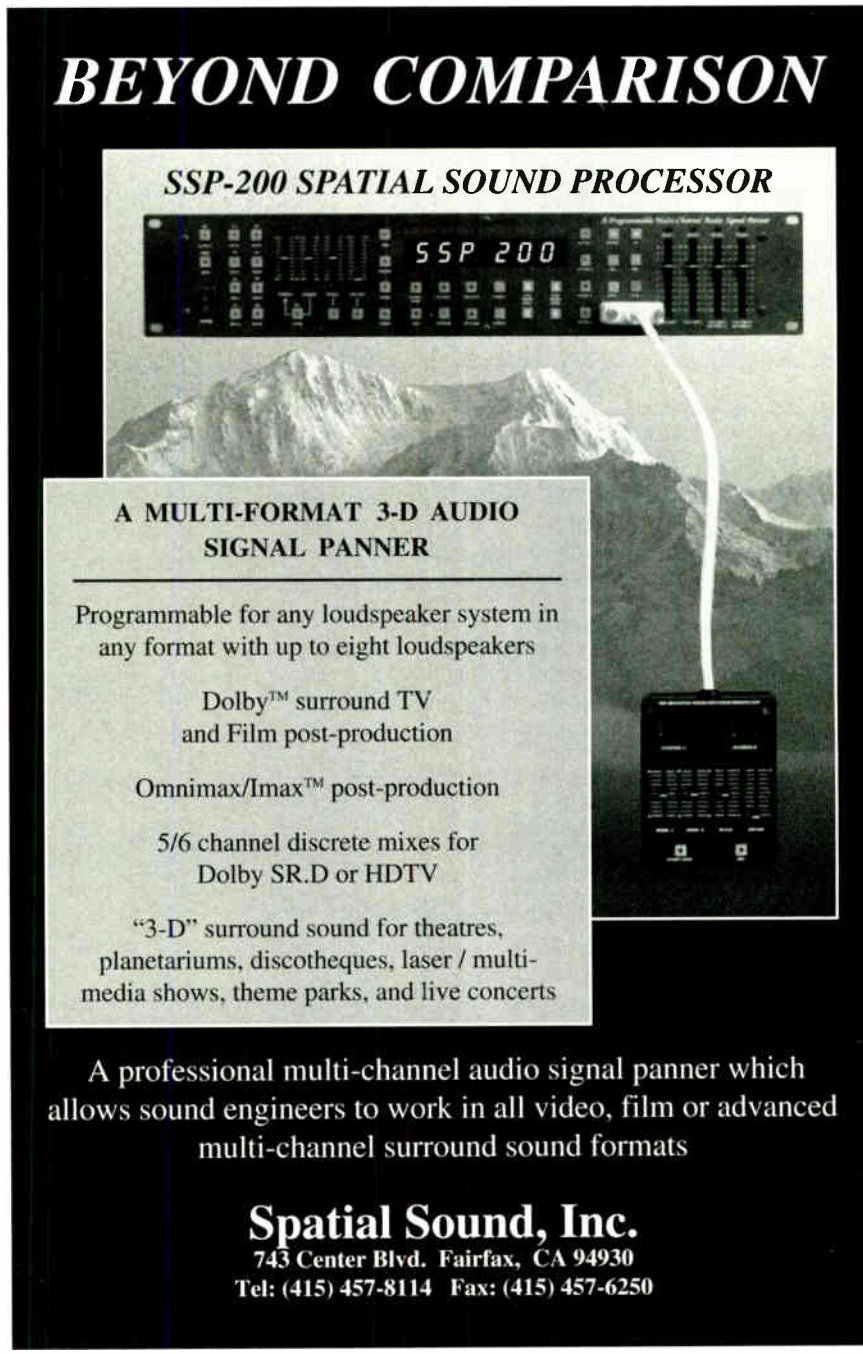
A special venue theater, likely to be a non-traditional film environment such as a multiscreen, 360° projection or a large-screen format like IMAX, will usually have a unique sound system, custom-designed for the attraction. The Disney Circlevision theaters were perhaps the first and best known examples. Circlevision is typically nine 35mm screens in the round, making a full 360° environment. Behind each screen is a speaker, supplemented by more speakers overhead.

Unlike any previous Circlevision project, the new installation at EuroDisney outside of Paris had characters and a story line, and incorporated audio animatronic figures in the theater. To meet the needs of this new approach, sound designers were brought in on the project nearly a year before it opened to begin developing specific effects. Narration recording was done traditionally, except that multipanel videotapes were made for work prints to allow all the material that would be shown on the nine screens to be viewed within a traditional studio environment.

Needless to say, mixing for a multichannel environment is impossible to achieve in a traditional environment. "Optimally, you would like to be able to mix in the actual space itself," says Zalk, "but given the construction schedules and everything else that's going on, and the time it takes to do a polished, professional mix, you want to give the mixers the best environment to work in, so sometimes you have to simulate the final environment somewhere else."

In 1982, Disney built a custom mixing facility with a console on an elevated platform, surrounded by nine screens and speakers on Stage One of the Disney lot in Los Angeles to mix Circlevision films for EPCOT Center in Orlando, Fla. That facility, torn down after the films were mixed, was recently resurrected to create the audio for the EuroDisney Circlevision theater. A custom panner was constructed to allow sound effects to be panned from screen to screen.

Less known, yet perhaps more interesting, is the 360° theater known as Hexaplex 6.60 Cinema and designed by Mike Browning, constructed for the Australian pavilion at Expo '92 in Spain. This theater had six screens with a speaker placed above each one. As sound designer Brian Laurence details, "It's a total surround vision using six film projectors, like Disney Circlevision, only several steps beyond that, in that this provides a seamless full-surround picture on a giant screen. It was a



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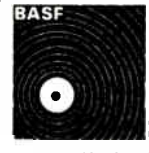

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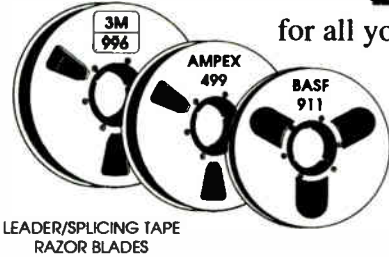

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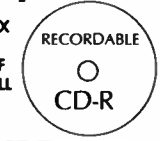

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tourist film, which used some 32 locations from around Australia. A further complication of this cinema was that the camera rig was rotating slowly at one revolution per minute while it was shooting. And added to that was the fact that the cinema itself—the entire seating area for 600—was also rotating slowly in the opposite direction at the same rate, giving the audience an effective rate of one rev every 30 seconds. This was because, with a surround image, it's important that people miss as little as possible."

After considerable experimentation, Laurence decided that location ambiences should be recorded in six channels. "The main thing that we found," he relates, "was that a phase-coherent 6-channel sound field was most important, rather than re-creating a sound field from conventional stereo or mono recordings by panning them. We did some experimentation with that, but it was a very poor effect compared with the effect of a phase-coherent 6-channel sound field, which is like an extension of a phase-coherent stereo pair but multiplied all the way around, so every channel is in-phase with every other channel of the six."

Laurence built a custom microphone mount that held six Sennheiser 416s in an array such that each microphone covered 60° of the horizontal plane, with the capsules aligned to the edge of a circle to ensure phase coherence. The six channels were recorded to three Sony TCD-10 DAT recorders, with time code striped at the head of the tapes. The sound field proved to have startling accuracy and evenness throughout the seating area.

Mixing was done in a conventional studio with a 6-channel surround monitoring environment, using a split-screen video, as at Disney, to allow viewing of all the visual material on a single screen. Mixes were then checked in a scale model of the theater, which seated 12 and used six video screens to simulate the final projection environment. This model was also used for the extensive psychoacoustics research conducted for the project.

To faciliate the 6-channel mixing, Metropolis Audio, the production company used for the project, constructed a custom panning system that exceeded Disney's. In the Metropolis system, a joystick output six

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control voltages, which then were fed through A/D converters into a PC running custom automation software that not only allowed memorization of panning moves, but also enabled a library of moves to be built up, including both "hard" pans that moved directly from channel and "soft" pans that "floated" from several channels to several channels. D/A converters from the computer were interfaced to control six groups of the SSL console used for the mix.

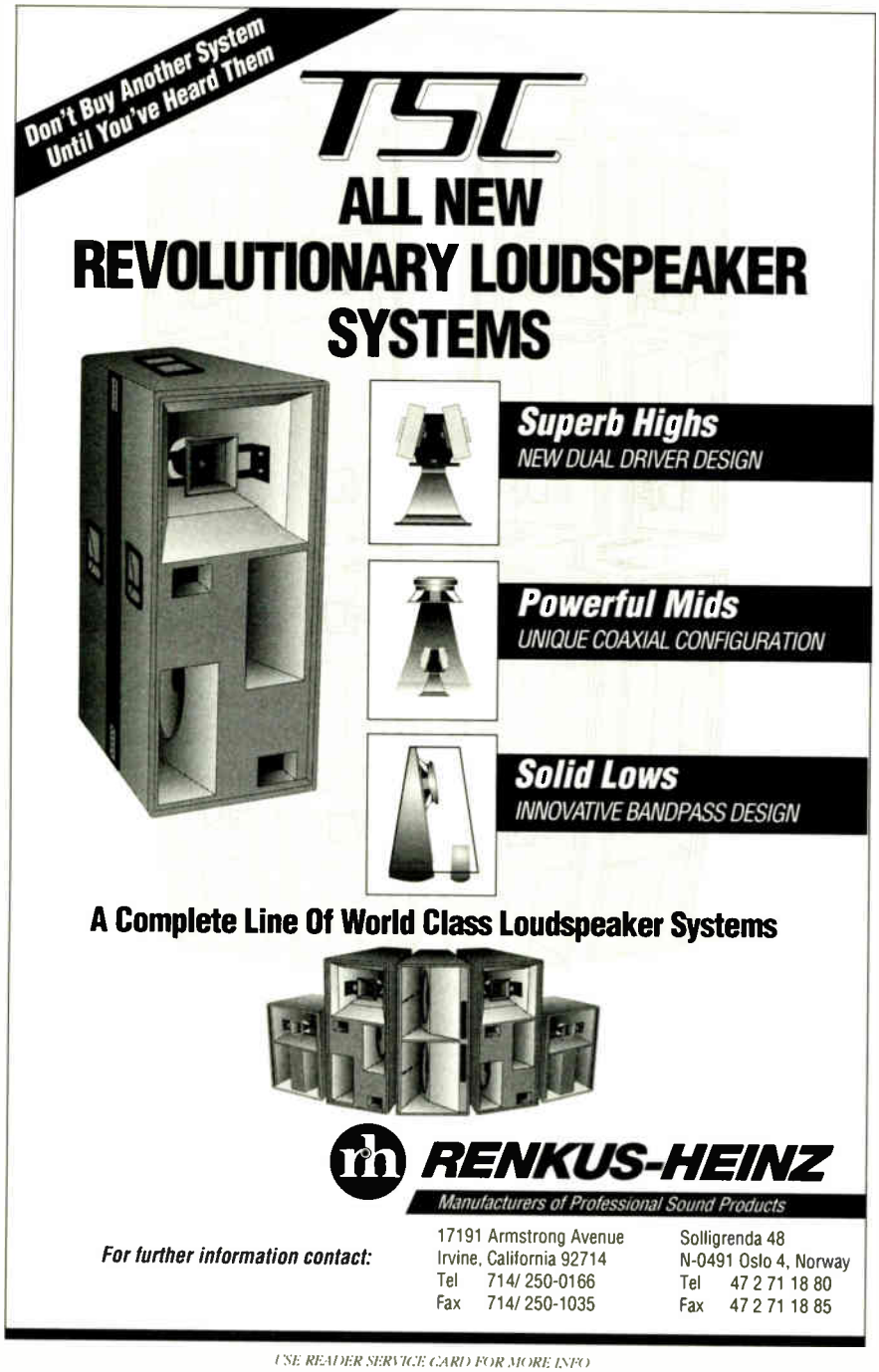
One use for this setup was in a skiing scene where the sounds of skiers moving across five screens were superimposed over the basic ambience of the scene. Perhaps the most dramatic use was in a scene where Laurence wanted the ambience to revolve with the cameras. Feeding the six channels of ambience to 36 channels of the SSL, then mixing them down to the six automated groups, the entire 6-channel sound field was rotated.

Although audio for the Paris Circlevision was produced entirely in California, and audio for the Australian pavilion in Spain was done in Australia, not everyone finds the idea of final mixing outside of the venue itself acceptable. "The sound designer has to be part of the onsite final preparation of his or her material," Stateman says. "He has to be both married to a concept of sound design that enhances or somehow exploits the space, and married to that space. *And* he must be able to bring his work and his mixing tools there to do the final refinement so he can allow for the various idiosyncracies of the environment."

Soundelux has built their own systems to enable them to implement this approach. As Soundelux Florida's John Miceli describes, "We've designed what we call the IDAP (Integrated Digital Audio Processing) system, which is pretty much a high-powered workstation with multichannel hard disk editing and multichannel RAM, as well as the means to master for Flash PROM, EPROM, laserdisc and D2. The IDAP has harnesses for proper interfacing to different types of show control systems and the like, as well as connecting into patch bays or Elco connections, etc. If we know, for example, that we're working with the 360 Systems EPROM playback devices, we can emulate that unit until our work is finalized.

"The Backdraft attraction at Universal Studios was the first time I used the Anatek MediaPro Flash PROM system," he explains. "When we were doing our final tweaking, time was really a consideration. At the point of 'soft' opening (a sort of preview to allow final adjustments that occurs when the ride is finished and 100% safe) was when we were able to really see how the sound reacted to the bodies. I listened to the soundtrack while people were in there, watched their reactions to the experience, and then, where I felt we might have been short on something or where something that was supposed to attract their attention didn't, I ran back into the control room, sat down at the IDAP system, made my changes, quickly mastered into the Flash PROM computer system, reburned it down to the card and got it into the next show, when the shows are about three-and-a-half minutes apart." Miceli and Stateman feel that advances in media, especially CD-ROMs coupled with sophisticated switching systems, are going to bring about great advances in special venue audio.

—CONTINUED ON PAGE 88



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BY DAVID SCHEIRMAN

Sound reinforcement for theme parks is one of the most challenging areas of sound system design. Today's youngsters, having grown up with television cartoons, in-home video games and MTV, have very high expectations when it comes to animation, sound and lighting, and other production aspects of the theme park environment. In fact, it could be argued that the dynamic theme park industry is one of the strongest driving forces influencing the integration of sound reinforcement systems with computers and digital audio.

Disneyland, Anaheim, Calif., the world's best loved and most recognizable theme park, has pioneered many different production technologies in past years. Children and adults the world over have marveled at such wonders as walking, talking cartoon characters, carnival rides turned into educational experiences, and

Left:
The "FANTASMIC!" show control room.

ALL PHOTOS OF AUDIO EQUIPMENT BY DAVID SCHEIRMAN

FANTASMIC! LOGO AND SHOW PHOTO COURTESY OF THE WALT DISNEY CO.

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entire landscapes and environments that support fantasy concepts. But today even Disneyland executives and technical personnel are enthralled by the success of the park's most recent attraction, "FANTASMIC!"

FANTASMIC! is the largest, most elaborate live presentation ever produced at any Disney theme park. Highlights include a 100-foot-long Kaa (the snake from *The Jungle Book*); Monstro the Whale; a 25-foot crocodile from *Peter Pan*; a 45-foot-tall, fire-breathing dragon monster; three strategically placed 30x50-foot "waterwall" mist screens that enable a widely spaced audience to see the projected effects from any angle; and, of course, Mickey Mouse as the Sorcerer's Apprentice, magically appearing at the tip of Tom Sawyer Island, using his imagination to make comets shoot across the sky and restore magic and happiness in the Disney wonderworld, fighting off threats from a pantheon of villains like Captain Hook and Ursula the Sea Witch of *The Little Mermaid*.

This new combination of music, live performers, imaginative concepts and spectacular special effects that integrate mechanized stage props, 70mm film projection, fog, lasers, pyrotechnics, puppetry, inflatables, water fountains and an exciting full-bandwidth audio soundtrack, takes place on Tom Sawyer Island. The stage area must be open to the public during the day, with all production technologies invisible to parkgoers... and then must be transformed so that up to 6,400 viewers can wit-

FANTASMIC! Rockustics hidden subwoofer below left and the subwoofer revealed to the right of it

Small photos above show the EAW speaker array both hidden and then in operating position during the show. At left, is another hidden speaker behind the wooden window grille. Also shown is the custom EAW lamppost speaker.

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ness the 22-minute spectular presentation after dark. The creative team responsible for this attraction includes executive producer Bob McTyre, producer Mike Davis and writer/director Barnette Ricci.

While the multimedia special effects are both innovative and stunning, the sound reinforcement for FANTASMIC! is the focus here. The audio design and installation for the project were conceived and managed by Disneyland's own Entertainment Division, through the Technical Services Department team managed by Mark Hollingworth.

A DESIGN-BUILD SYSTEMS APPROACH

From the beginning, the Entertainment Division made a concerted effort to take the artistic conceptions of the attraction's creative designers and achieve an integrated approach to audio system design. It was designed to allow absolute consistency and repeatability, with rock concert excitement, while incorporating the very latest in hardware and operating techniques.

The completed system ties together digital input sources, including Pioneer LD-V8000 Laservision players and 360 Systems DigiCarts, with sophisticated front-end control devices from Oxmoor, Ramco, MicroAudio and Marshall Long Acoustics. Signal processing from White, Drawmer, Symetrix and BSS is included in the audio signal path (powered by Crest amplifiers, computer-linked with NexSys software).

Sound is presented to the audience through surround-environment KF300s, arrayed KF850s with SB850 subwoofers, and custom low-profile, broad-dispersion LP-642 lamppost loudspeaker systems, all from Eastern Acoustic Works. Each lamppost system includes components on three sides of a four-way 7x7x20-inch enclosure housing 5-inch cones and dome tweeters, and serves up high-fidelity (100Hz to 20kHz) audio from a tiny package (see photo).

Unique ground-level subwoofers from Rockustics (each weighing 250 lbs., with decorative rock) are strategically placed throughout the audience listening area, providing low-frequency enhancement for the audio track's dragon growls, thunder and lightning, and pirate ship guns (see photo).

"A number of different firms were invited to view the initial show concept presentation, and then to submit design/build proposals," recalls Curtis Anderson, chief audio engineer for Disneyland's Technical Services Department. "After our review, Maryland Sound Industries was selected to work on the project.

"We needed a sound contractor with a high degree of awareness about live show production techniques that could also supply a high level of permanent systems installation talent," Anderson continues. "Since we had only about a one-and-a-half-month window projected for the actual onsite installation phase before the show had to open, the advance planning and detailed design work were critical to the success of the sound system."

Phil DiPaulo served as MSI's senior design engineer on the project. "Unlike a static sound system that just sits and waits for different types of programs to come through, a dedicated theme park attraction system like this one has to meet the defined

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criteria that the artistic director is trying to create," states DiPaulo (now senior design engineer with Signal Perfection Ltd. of Columbia, Md.).

"There are typically multiple-input sources that have to be shifted around in real time, giving the audience an image of apparent movement that follows the production," he adds. "When a show is not just automated but has live performers onstage, you have to design for that as well. You create a fantasy for the audience, but you also have to address the needs of dancers and technicians in the stage area.

"The hallmark of a good theme park attraction sound system is that when the audience walks away, they don't even know what technology was used, or that it was in use at all. Rather, they have been drawn into the fantasy world of illusion that was created by the artistic concepts and the production technology. That's what Disneyland's Entertainment Department was striving for on FANTASMIC!"

For months during the fall and winter of 1991-92, prior to the production's opening in the spring of 1992, MSI's crew worked in conjunction with Disneyland Technical Services to install racks, terminate cabling and place loudspeaker units in the attraction area. The firm's Los Angeles facility, under the direction of Mike Stahl, provided major support. The Rivers of America around Tom Sawyer Island were drained while major construction was underway. The concert-tour-experienced sound company found it to be "not just another install."

"Our crew had high standards of personal appearance and etiquette to adhere to in the Disney environment," says Bill Bittel, senior installation project manager for MSI. Bittel (like DiPaulo, also now with Signal Perfection Ltd.) explained that putting a high-tech sound system in a working theme park was a challenging job.

"We did a lot of night work, and we had swing shifts due to the large crowds in the public areas for more than 12 hours every day of the week," Bittel recalls. "We probably had a maximum of eight technicians working during the peak install period for nearly two months. A premier theme park job like this one brings with it a high degree of safety and quality-control awareness. And logistically, you just can't have access

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to some locations during the park's public hours."

SOUND SYSTEM DESIGN AND CONTROL CONCEPTS

The sound system for FANTASMIC! is unique in that there is no dedicated "sound mixer," no multi-input traditional mixing console and no sound equipment in public view. In brief, a soundtrack on a digital audio storage medium is cued and enabled by a master show computer, which also is linked to cues for water effects, lighting, hydraulic lifts, lasers, film and such. Thus, automated switcher-routing units, linked to hidden and disguised speaker systems, take over many audio functions that would normally be handled by a sound technician.

"There are two people in the control booth during the show," Anderson says. "That includes the show computer control operator and a lighting person. The show control operator is responsible for setting up the system, enabling background walk-in music, and doing a site walk to check local speaker zones. The audio must be a fail-safe function during the show, because this same individual is doing real-time-triggered enables of pyrotechnic and flame-burst cues."

Triad's Synthesis computer program, running on Compaq computers using the OS/2 operating system, is used to sequence the show's audio input and "scene changes." It is linked directly to the Pioneer Laservision disc players, the paging logic system, and audio components such as White's Series 4700 digital equalizers. It enables signal routing via distribution amplifiers, VCAs and mix cards on Marshall Long Acoustics' Series 1000 modular electronics package.

"The operators who use this system are basically familiar with its parameters because it's somewhat similar to our parade system onsite," notes Anderson. "But this is the largest and most complex dedicated audio system on-property. The computer control gives us consistency that couples the sound reinforcement system's input signals to time code, and it frees up our in-park qualified audio operators to work on other projects that require 'live' production expertise.

"If this show used live microphones for the performers, you'd be back to a human sound operator," Anderson explains. "You can do

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special effects, you can do preset cues, but you couldn't really entrust open wireless mics and the subsequent feedback potential, along with the actors' and singers' varying techniques, to a computerized system."

SPEAKER SYSTEM FORMAT

As the orchestral score and sound effects for FANTASMIC! run to time code, audio imaging enhances the production. As the dragon rises, the crocodile surfaces and the colorful Disney characters move across the stage area, gain levels change and the apparent image shifts to accommodate the production's needs. Loudspeaker zones are energized by Crest 4801, 7001, 8001 and dual-channel amplifiers. Crest's PFA-600 24V-powered amplifier runs hidden systems on the show's two theme boats, the pirate ship Columbia and the Mark Twain, a stern-wheeler paddle boat.

A total of 13 thematically decorated lamppost speakers circle the riverbank at the forward part of the audience viewing area; 18 cleverly hidden EAW KF300 compact two-way loudspeaker enclosures behind the audience handle surround-sound effects and provide a sound source onboard the boats.

Near the stage area, hidden among scenically painted boulders and wharf pilings, are a total of 20 large-format EAW KF850 and SB850 enclosures. The arrays are fixed to lifting platforms that enable technicians to bring them into play during the preshow procedures, after Tom Sawyer Island is cleared of the public.

Each EAW speaker enclosure has been ruggedized for outdoor use, and the arrays are additionally protected from water splashes by special scrim "raincoats."

PRODUCTION SUMMARY

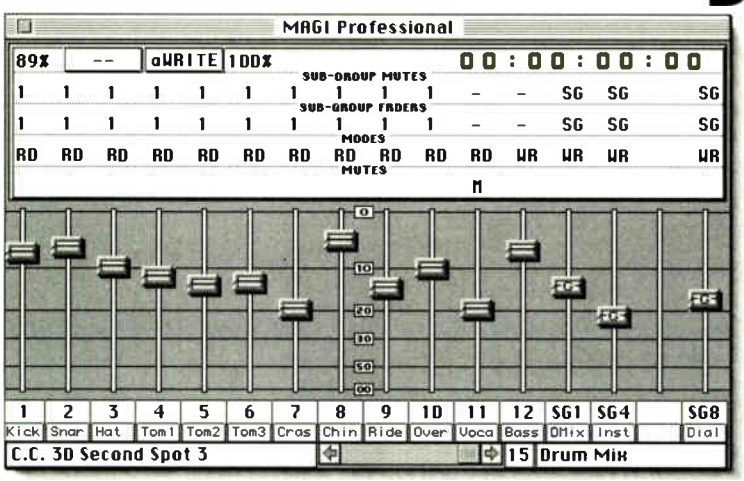
"The Entertainment Department would like to have handled this design-build sound project entirely in-house, but the realities of having to run a working theme park that's open every day, and manage a tightly scheduled staff of production specialists, precluded that," Anderson explains. "We had complete faith in the audio design and installation plan that was set forth, and the MSI crew faced some real logistical challenges, like what you see in any fast-track construction project. What we're seeing in audience reaction, with the crowds larger than were expected and the favorable reviews, let us know that things have worked out well."

The Disneyland Entertainment Technical Division has taken to the new audio system for FANTASMIC! like a veteran race-car driver slides into the seat of a state-of-the-art racing automobile. "There is great flexibility here, and we're able to satisfy the desires of the music composer and recordist, the show producer, the on-stage performers and the audience," Anderson says. "We have a consistent audio system for this attraction that works as we intended and that offers flexibility for the future."

FANTASMIC! is a one-of-a-kind experience that no Disneyland guest will soon forget, and one that no production professional, audio engineer, digital music specialist—or anyone else who works with sound, lighting and special effects systems—will want to miss. You may think that theme parks are just for kids. Think again. This is *show business*—high-tech, computer-linked stage craft for the future. ■

David Scheirman is a sound reinforcement specialist who owns Concert Sound Consultants

Virtual Reality



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—FROM PAGE 78, SPECIAL VENUE

But the technology they embrace is always in the service of the show. "When you're dealing with an environment, you can be a great asset to the architect by presenting something to the senses [of the audience members] that clues them in to being within a certain environment, oftentimes one that is very different from where that venue actually exists," Stateman philosophizes. "Architects think in terms of space—how you would enter a space, where your eyes would be focused while entering or exiting—and comfort within that space, while a sound designer may focus on somewhat the same issues but is not confined by walls. He's able to deliver his contribution through a network of speakers and/or triggers for those speakers, which can mean that somebody entering a space triggers something to occur at the far end of the space, thus drawing the eye to that area. Or it can trigger an event to happen right at the person's feet to alert them to something that they need to do—step up or down, into or to one side in that space. We become a non-visual support to the architect and the space."

Miceli provides a perfect illustration to his partner's musings. "Let's look at Batman—The Ride. That is mainly an interactive queue line section that leads you to a roller coaster ride," he explains. "It goes through three different sections: the first is Gotham City Park. The designers wanted you to feel real pleasant as you're walking through there, like it's a normal park, an everyday sort of situation. In the second section, which is your first sign of problems in Gotham City, you see a cop car on its side and you're hearing all these sounds from things that you're not actually seeing happen. You hear a cop car and a thug car pull in, they have a gunfight, the thugs blow the cops away and tear off laughing. These scenarios are heard acting out all around you. The third place you go into is the entrance and caves leading up to the Batcave, and through that you're hearing dripping water and rats and all these criminals planning the way that they're going to get Batman and take over Gotham City.

"The way we designed it," he adds, "if you go through there twice, you're probably not going to hear the same show. We put more material on the EPROM cards than we needed, so it will never line up the same way unless it's reset. Say we needed ten items to make the cycle; well, we put 15 in. The second time through you'd start at number 11. The only thing that remains continuous through the whole thing is the background music."

"Architectural audio is a budding young industry whose parameters have not yet been defined," concludes Stateman. "Those are the parameters of the sound designer and the sound designer/hardware systems designer. This kind of design requires a certain willingness to go into an architectural space and embrace the idiosyncracies of that space—and work around them or with them." ■

Larry Oppenheimer is an active performer as well as an engineer/producer and consultant in audio/music technologies.

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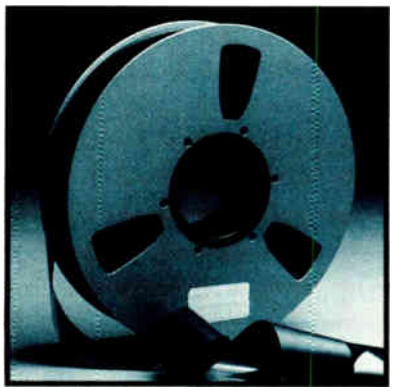

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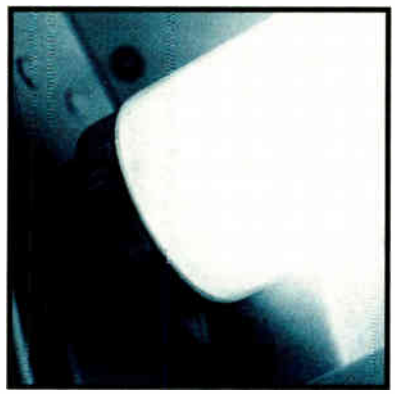
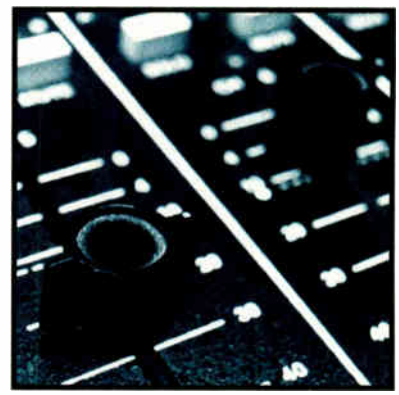


Buzz.



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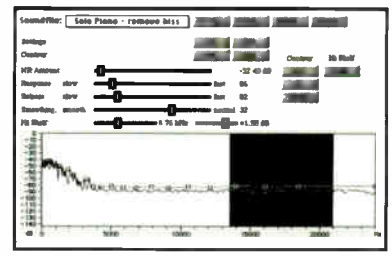

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SPARS

by Dan Daley

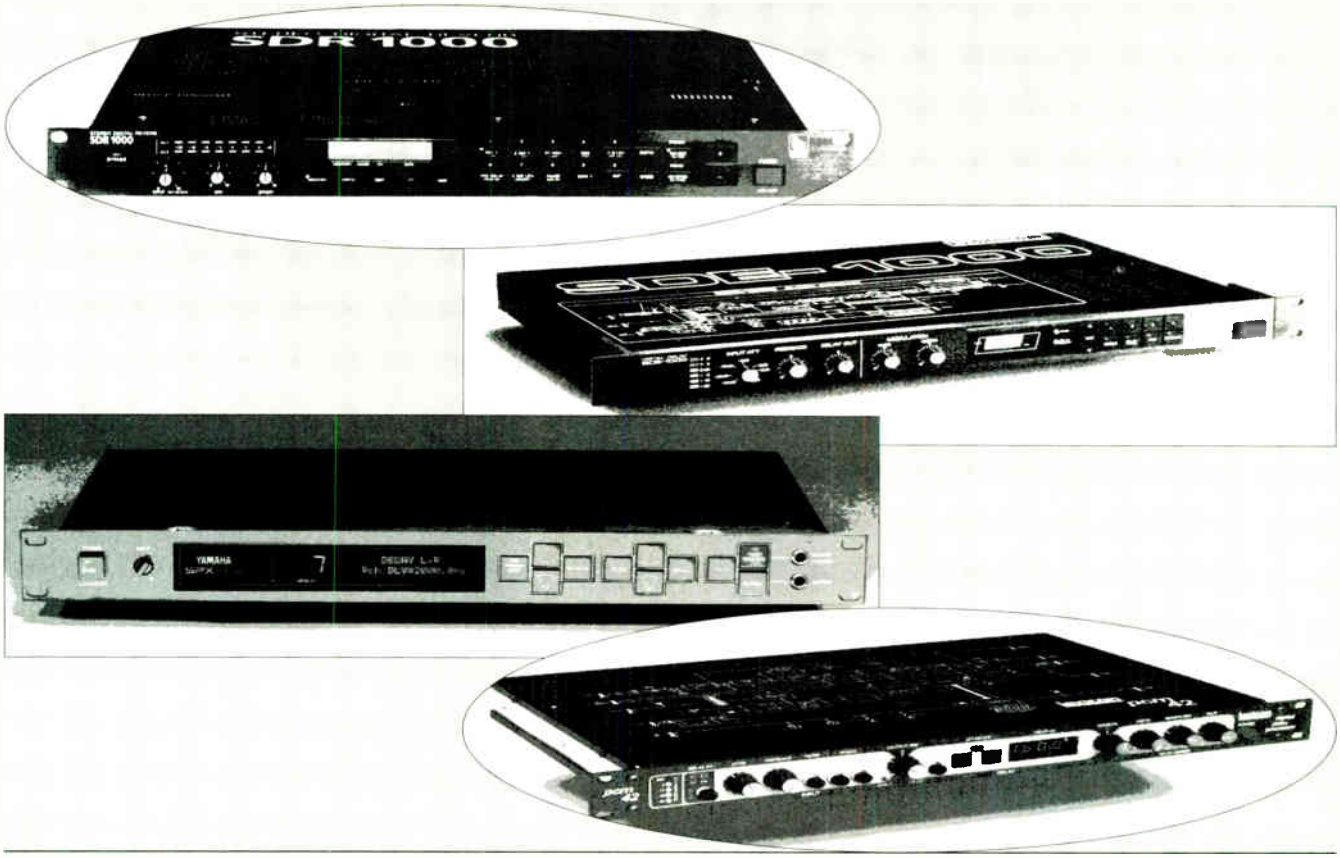
NEO VINTAGES

There are no rules for pro audio equipment, as there are for automobiles, that tell when something officially becomes a classic or antique. With audio gear, it's more of a general consensus that develops around certain pieces.

We all know the cachet associated with certain pieces of gear—the LA-2A, the Pultec, the Neumann tube 87 (and 47)—the equipment that falls under the heady rubric of "vintage." However, with the rapid pace of development (and oblivion) of gear in the last digital decade, a new generation of vintage gear has emerged.

The big difference is that this second generation is digital, as opposed to the tube technology that characterized its predecessor. Like the preceding generation, however, it's discontinued but not obsolete, as evidenced by the fact that some of it has gained some rather rabid fans.

The project studio is particularly responsible for the accelerated status of the new vintage equipment. The personal recording phenomenon caused home and project studios to proliferate very quickly, and in doing so it consumed scads of newly minted gear throughout the 1980s. Here's a look at what's about to be-



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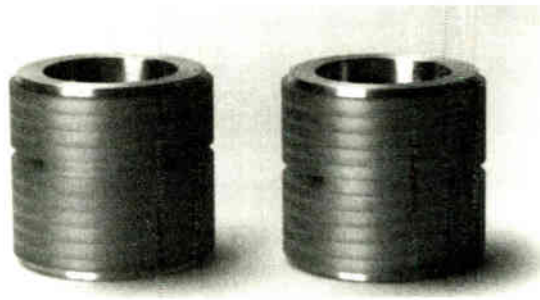

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The first item is one I own and have used continuously since I got it in the mid-'80s: the Ibanez SDR-1000 with the Plus software upgrade. The SDR-1000 is remembered fondly for its relatively comprehensive (for the time) tuning parameters and smooth response, much silkier than its contemporary, the Yamaha REV7, a unit with its own small but loyal following. The only real bug the SDR-1000 had was its truncated input sensitivity.

"There's something about the way it sounds; it's grainier than the newer reverbs," explains engineer Brett Rader at Ruggieri Music in Manhattan, which has two SDR-1000s as well as an old Roland SRV-2000. "It's got some character to it that seems to be missing from newer units. And it came along before there were tons of pages and parameters to deal with, so it's easier to get the sounds you want."

The most interesting thing about the SDR-1000 is that it was developed by a company known primarily for manufacturing guitars and pedal-type effects. The unit's history is interesting. According to Bill Cummiskey, Ibanez's guitar department manager, the software for the SDR-1000 was developed by engineers at parent company Hoshino in 1985. The manufacturing was contracted out to Sony, since Ibanez didn't have that sort of manufacturing capability at the time. The unit had total sales of about 10,000 pieces worldwide before it was discontinued in 1988, by which time multi-effects units like the SPX90 had come to dominate the market. "The SDR-1000's architecture simply couldn't accommodate an upgrade to multi-effects," says Cummiskey.

The unit has maintained an intense following, however, thanks to its true stereo and two-channel independent operation capability. Steve Vai still has one in his rack, says Cummiskey. Me too.

CHEESY IS STILL GOOD

Though drum machines are all digital now, the early ones were analog and cheesy as hell. But that hasn't stopped the Roland TR-808 from becoming a classic. The TR-808's kick

World Radio History

drum is almost certainly the most sampled drum in history and continues to be heard on scores of rap and dance records, enough so that Roland has issued a RAM card with 808 sounds for its current R-8 series of machines. The TR-808 debuted in 1978, which in digital or dog years is a lifetime ago, and production was halted four years later. But sales didn't really take off on that unit until after it was discontinued, says Roland product manager Paul Youngblood. "It wasn't until five or six years later that the sounds became the rage for dance and rap," he says. "Early rap records had lower budgets for which the 808 was suited, and the successful ones made people want to get those sounds and continue to use them."

Another Roland oldie, the SDE series of digital delays—the 1000 and the 3000—continues to endure in studios, particularly on the East Coast, and in racks with players like Larry Carlton. Musicians liked the SDE's "Playmate" function, which allowed users to tap in the tempo via a momentary footswitch as it was being counted by the drummer. Studios liked it for its straightforward programmability.

Soundwise, the SDE digital delays had the same advantage as the Ibanez SDR—they predated the rise of multiple effects units whose chips are asked to do multiple processing tasks simultaneously. A chip with only a single dedicated function could simply perform that function better. They also permitted full bandwidth, which is often another casualty to price competition and smaller sizes. Both units were discontinued in 1985; neither ever had a MIDI feature, and both continue to retain a high level of demand among producers and engineers.

The SPX90 and its variant, the II, are probably the most ubiquitous of the neo vintages, if only because they were made in greater numbers—over 35,000 sold in the U.S. alone, according to Mike MacDonald at Yamaha. Freelance engineer Mark Mandelbaum, who uses a variety of older digital gear in his personal recording setup, says the venerable SPX90s rent inexpensively as a result, and that provides his clients with many more spatial options for mixes. "I can get true left-right by using two of them panned in stereo, and why not? They cost next to nothing to rent and sound great," he says. "In fact, you can get truckloads of a lot of this sort of gear for next to nothing, and often the places I rent from will throw in an old Eventide 949 for nothing."

The SPX90 was introduced in 1985, and the last new II version was sold in 1988. Mike MacDonald attributes its huge success less to its sonic characteristics than to the fact that it was the first reasonably priced sophisticated multi-effects unit, and that its soft-key graphic interface was user friendly. What's kept it in demand, besides low-cost rental charges, is a huge distribution base, and a similarity in interface, operation and designation that MacDonald says makes it appear current next to a new SPX900.

Considering that so many are around, the SPX90 has kept much of its value, selling for as much as $450 on the street, vs. its original $745 list price eight years ago.

(An interesting aside, deserving of another article sometime in the future: The SPX90's lithium battery

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World Radio History

was designed for five years of operation before needing replacement, with the expectation that the unit's programmability and storage would burn up the battery in about that time. MacDonald says that SPX units are only now beginning to come in for battery replacement, an indication that most of the programmability was never utilized, with users preferring to modify only slightly the factory-loaded programs as needed. This underscores the oft-heard complaint that you can aurally spot different brands of effects on records because few people bother to significantly customize programs.)

SALES & RENTALS

Many of the rental and used equipment sales companies are also seeing these units resurface. Prices can vary. Chris Paul at Mercenary Audio says, "There's a definite demand out there for them, especially the SDE 3000 delay unit," which he says is selling for upward of $800. In some cases Mercenary is selling some of the new vintage gear for more than they cost when they were new, a definite reflection of street demand. SPX90s are going for less—between $350 and $450. "The Lexicon PCM42 was recently discontinued; you can expect the demand for them to go way up, and I expect used ones to be selling for more than new ones did within a very short period of time," says Paul. "Probably about $1,000." The reason? "You just can't go out and buy a dedicated delay line anymore," he says. "That's a valuable commodity to a lot of people, apparently."

Rogue Music, whose business is split between studios and individual musicians, is trading a significant number of these items, particularly SPX90s. "They're like NS-10M speakers," says sales manager Mark Venezia. "Not everyone likes them, but the demand is such that studios need to have a couple on hand." Venezia says that the SPX90II units resell for around $450 in the New York area; the Roland SDE-3000 delay goes for about $395 and the Ibanez unit with the Plus upgrade for around $495.

Underground Sound recently bought two more Roland SDE-3000 delays (updated models, for which manager Mike Simmons paid $1,500) for a total of three, and they and the SPX90 units are always out, Simmons says. "It was a good deal since there's plenty of demand for them," he adds.

The one difference between this generation of classic equipment and the previous one is that there is so much more of the newer stuff. As a result, there is not nearly as much consensus as to what's eternal and what's fleeting. It's hard to find someone who doesn't like a Pultec. But the SDR-1000, for instance, is characterized by at least one sales house as, "Either you love it or you don't. If you do, you'll pay almost anything to get it."

That assessment will likely change with time, but as the narrowing gap between generations in the digital age indicates, not all that much time. ■

Dan Daley is Mix*'s East Coast editor. His personal favorite vintages are the 1984-86 (predrought) Napa Cabernets, although a younger Chilean Merlot will do in a pinch.*

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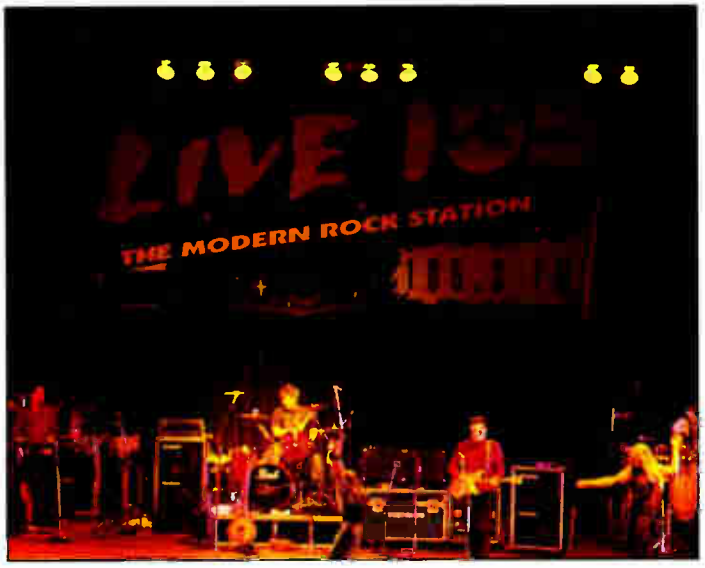
by David (Rudy) Trubitt

SOUNDCHECK



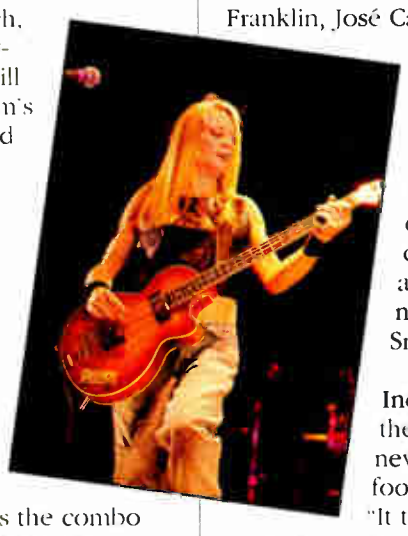
Tom Tom Club with Tina Weymouth at the Live 105 Listener Appreciation Party in San Francisco

PHOTOS: JAY BLAKESBERG

REGIONAL NOTES

Third Ear Sound and Scorpio Sound provided gear for San Francisco FM station Live 105's Listener Appreciation Party at the recently renamed Bill Graham Civic Auditorium. Acts included the Tom Tom Club, The Cult, Soup Dragons, the Wailing Souls, Gene Loves Jezebel, The Rembrandts and James. Scorpio (which was already out with James and the Soup Dragons) provided a Soundcraft Series 4.

Rat Sound Systems (Sun Valley, CA) finished their busy 1992 touring with the Red Hot Chili Peppers, Pearl Jam, the Rollins Band, Lynch Mob and Sonic Youth (who will be back out this spring). The company has been adding custom monitor wedges to their inventory. Five of the tri-amp double-15-inch, 10-inch 2-inch low-profile monitors will end up in Pearl Jam's rehearsal space and another two travel with the Peppers when they aren't carrying full production. Rat also added a Sound Technology Analyzer, which they've been using with their TC Electronic 1128 digital EQ. Rat's Karrie Keys reports the combo has helped provide excellent consistency from venue to venue. Finally, Tom Dubielak, one of the company's three partners, has moved east with a system and five staffers to open a Rat Sound office in Charlotte, NC.



RCI Sound Systems (Rockville, MD) continued to grow through a strong fall season, providing touring sound, special event, meetings/convention and media and rental services. In the media services area, RCI provided equipment and engineers for a live television broadcast from the Kennedy Center. Produced by Univision, "Premio Encuentro 1992" featured Linda Ronstadt, Celia Cruz, Tito Puente, José José and Emmanuel. On the special events front, the company provided sound for a candlelight vigil held at the Lincoln Memorial. The vigil was organized in conjunction with the AIDS Memorial Quilt Project for a crowd of 125,000. RCI used radio transmitters to control four sets of delay speakers that were assembled with video projection systems along the length of the Reflecting Pool. RCI's systems have been on one-offs with Aretha Franklin, José Carreras, Branford Marsalis and Matthew Sweet. The company has been adding gear, including a Yamaha PM4000 console, D-2040 digital crossover and a BEC Technologies Digital Snake.

Bernhard Brown Inc. recently moved their operation to a new 50,000-square-foot, six-acre facility. "It took 24 truckloads to move all this gear," claims BBI shop manager John Powell, "and we're still trying to find all the stuff we packed away!" In addition to relocating the company's sound, lighting

World Radio History

and rigging gear, a wood and metal shop, C&M chain motor service department and paint booth were also moved. According to the company, 1992 was their best year yet, and with major new equipment purchases scheduled for '93, president Danny Brown feels the move came not a moment too soon. "We had really outgrown our old warehouse over two years ago," says Brown. "We're very excited about the future, and the new facility will give us the space we need to continue to grow and service new clients and new markets."

EAW USERS ONLINE SERVICE ESTABLISHED

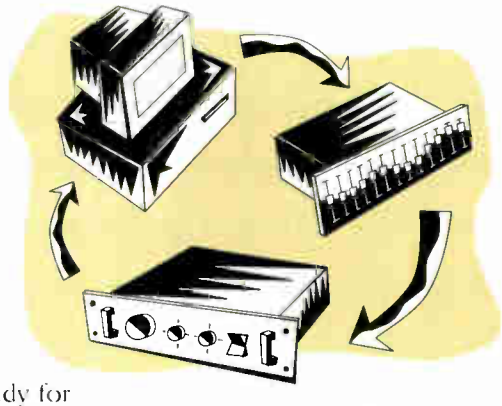
Mark Frink, the point-man in EAW's Virtual Array Technology Association, has opened an electronic bulletin board service for KF850 suppliers and clients. Tour production managers will be able to dial into the system and download equipment lists, personnel information, and client lists from participating sound reinforcement companies. The BBS should allow prospective clients to obtain information from a number of EAW-based companies without having to make a lot of phone calls. Other online information includes public and private message systems, a users' forum and classified ads. To access the system, set your modem to 2400 baud, eight data bits, one stop bit, no parity and call (207) 871-0762. See you online!

CROWN AND MEYER ADDED TO BOSTON SYMPHONY HALL

Andrews Audio (NYC) recently installed a new audio system in the 2,631-seat Boston Symphony Hall, home of the Boston Pops. The installation was performed

—CONTINUED ON PAGE 98

COMPUTER CONTROL CONCEPTS



by Bob Moses

PART 1

The year is 2013. Briana is a house engineer at a club that showcases live music nightly. Briana is getting ready for tonight's show; the band is scheduled to arrive in an hour. Before load-in, she is tweaking the house acoustics.

This club has a small central loudspeaker cluster that creates six acoustic zones in the room. Briana's challenge is to ring out the system, sweeten the sound and blend the acoustics between zones. This requires time and frequency domain measurements in each zone and corrections using EQs and delays. In the old days this process was performed by two people. One person moved around the room with a microphone, while the second person watched an RTA and adjusted individual EQs assigned to each zone. Everything was done manually, and the two sound people found it especially hard to communicate because the pink noise was so loud. Today the entire process is almost trivial, thanks to DSP automation. But Briana is old-fashioned—when she has time she prefers to do it herself just for fun.

Briana is wearing a pair of special glasses and a funky-looking glove. She's also wearing a hat with a small microphone and position tracker sticking out the top. The glasses project two images in front of her, which show the readout of an RTA and the response curve of an equalizer. As she reaches out her gloved hand, a small point on the EQ curve's image is highlighted. She moves her hand sideways, and the highlighted point moves across the curve. She moves her hand up and down, and the curve flexes with it. She pulls her hand toward her, and the highlight goes away. As she walks around the room, the RTA image shows the response at her location, and the equalizer image shows the EQ curve in this zone. Briana roams the room, watching the RTA and adjusting the EQs with her glove.

Once the EQs are properly adjusted, Briana turns her attention to the loudspeaker delays. She pushes a virtual button in front of her, and music starts to play through the P.A. system. The image of a giant lobe appears in front of her. The lobe is tilting downward slightly, which explains the mediocre sound she hears. She reaches out her gloved hand, grasps the "virtual" lobe and pushes it upward. The delays in the system are all automatically adjusted, and the system sounds much better.

BLIP—WE'RE BACK IN 1993

Believe it or not, much of the technology required to implement the above system is available today. Whether we'll be walking around a club and adjusting acoustics in virtual reality remains to be seen, but the process of transforming from all-analog systems to all-digital systems has been happening, somewhat subtly, for a number of years. Indeed, digital technology was first applied to audio signal processing back in the '60s. That's 30 years ago! It's been ten years since MIDI ushered in the age of interdevice communications and moved the industry from expensive proprietary systems to one slick integrated en-

—CONTINUED ON PAGE 101

ILLUSTRATION: ANDREW FALKINER

World Radio History

—FROM PAGE 97, SOUNDCHECK

by David Andrews, in consultation with several sources, including Steve Colby of Evening Audio Consultants (Kensington, NH). Twelve Crown Macro-Tech 1200 amps power a variety of Meyer Sound Labs speakers, including a movable central cluster consisting of seven UPA-1Bs. Three UPA-1Bs are installed on each side of the proscenium, and six UPA-1As are used in two delayed under-balcony systems.

NEWS FLASHES

Electrotec's current North American leg of the Seven Day Weekend tour for Def Leppard has added Behringer signal processing to both FOH and monitor setups. House engineer Robert Scovill is using a studio de-noiser 2-channel unit on the main bus outputs and a parametric equalizer on the subs. A professional compressor and multiband expander/gate are being used for bassist Rick Savage's house console inputs. Monitor engineer Phil Wilke is using a Behringer Autocom on lead singer Joe Elliot's in-the-ear monitoring system...**Sound Image** (San Marcos, CA) reports continued growth from its Nashville office. General manager Rick Stanley has been busy with the Barbara Mandrell tour and local events including the Vince Gill Third Annual Basketball Concert. The event was broadcast by TNN. Sound Image marketing director Greg McVeigh notes the company was already providing equipment to country artists touring California and says that now "production managers as well as the artists themselves have requested our Phase Loc system in the Nashville area." According to Sound Image president Dave Shadoan, "The growth in the Nashville office we have experienced in just six months is staggering. I expect that soon we will be placing additional systems into the Nashville facility to keep pace with demand."
...**Sound on Stage** (Brisbane, CA) provided sound for an unusual gig in San Francisco's Warfield Theater—*Guitar Player* magazine's 25th Anniversary show. The bill included Adrian Belew, Steve Morse, Dick Dale, Elliot Easton, Rik Emmett, John Lee Hooker and many more. SOS supplied a Gamble console, and the venue's Soundcraft 500B was used for drums and effects. Crest amps, Meyer MSL-3s and SOS's three-way Cutlass cabinets were used. Chris Kathman mixed the house, and Francis Truett covered monitors...Chicago's Columbia College has installed Bag End loudspeakers in its 250-seat Columbia Dance Center...Randee's Music (Rockford, IL) entered the sound-rental business as an extension of its successful music store operation. The company chose a system based around 12 EV MT-2 loudspeakers and six Crown amps, including 3600VZ, Macro-Tech 2400 and Power Tech 2 models...Roadworx Audio (Greensboro, NC) recently installed three Symetrix 564 Quad Expander Gates and a 425 dual compressor/limiter

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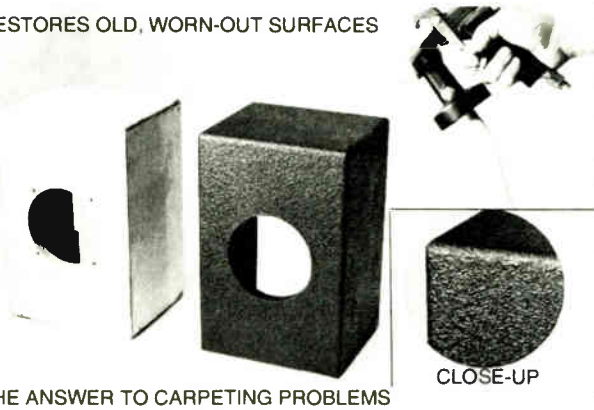

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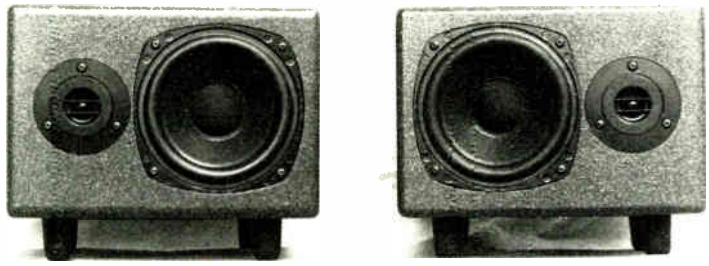

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at The Silver Spoon Saloon (Charlotte, NC). The 2,000-seat venue showcases country acts. Symetrix gear was also used by **United Sound Associates** (Yakima, WA), which added two 524E multimode crossovers and two 564 quad gates to its system, which was then used at the New Mexico State Fair in Albuquerque. That 15-day event, which drew 1.4 million, featured Larry Gatlin, Gary Morris, Seals and Croft, Mark Chesnut and the Texas Tornados...Theatrical design group **William F. White Ltd.** designed and supervised the installation of the new multi-million-dollar Chinese Cultural Center in Calgary, Canada. The venue has dimensions similar to a basketball arena, according to Mike MacLeod, who designed the facility in conjunction with Mike MacPhee. "We mounted three Tannoy CPA-15s arrayed in a center cluster, and two more in a left-right proscenium pair," MacLeod says of the $100k install. "It was the easiest installation we have ever done, both sonically and in terms of rigging. And that was important, since the Cultural Center's grand opening was literally hours after we finished. The mounting, arraying and aligning of the speakers were done in record time." The venue is used for cultural, dance and music performance events ...**Soundshine Inc.** (Miami, FL) provided 30 Vega R-42A wireless microphone systems to several new ships in the Royal Caribbean Cruise Line. The systems were installed in the vessels' main show lounges. All R-42A systems feature T-77B/DIII body pack transmitters equipped with LM-201 lavalier mics. The receivers are rack-mounted backstage and connected to two Vega dipole antennas positioned optimally above the main stage. ■

David (Rudy) Trubitt is looking forward to a calming spring.

World Radio History

—FROM PAGE 97, COMPUTER CONTROL CONCEPTS

vironment. PA-422 followed a few years ago and gave fixed sound systems a control network.

Behind the scenes today, the MIDI Manufacturer's Association (MMA) and the Audio Engineering Society (AES) are standardizing Local Area Networking (LAN) technologies to control, monitor and distribute audio. Meanwhile, researchers at institutions such as the Human Interface Technology (HIT) Lab at the University of Washington are playing MIDI synthesizers from virtual controllers in virtual worlds. Signal processing manufacturers are introducing digital audio processors that talk on LANs, blow your mind with new processing capabilities and promise all kinds of exotic new human interfaces. This stuff is real, and it's coming at us like a speeding train.

Though it's fun to fantasize about the systems of the future, it is time to roll up our sleeves and get down to the business of actually creating and using them. Of course, we must not be seduced by hype. It will be years before Briana is working in her virtual reality P.A. system (in fact, Briana is in diapers right now). Our challenge today is to visualize the future and work toward making it reality. In the coming months, this series of articles will observe the stages the audio industry is traversing as it transforms from "old-fashioned" analog systems to the digital promised land. We'll look at where we've come from, where we might be going, and what new tools we'll be playing with. We'll look at today's cutting-edge technologies and at the visions their inventors have for them. And we'll explore the amazing new creative opportunities for artists. There's so much to talk about. Join me on a very exciting voyage into the future. ■

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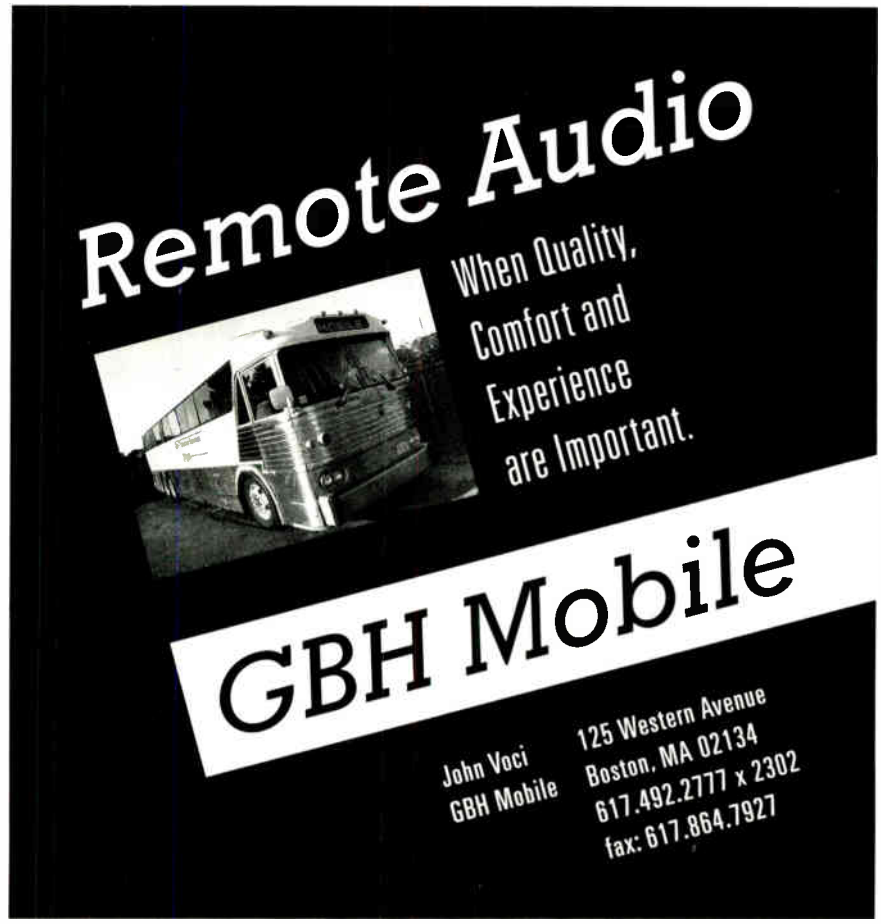

World Radio History

SOUND REINFORCEMENT NEW PRODUCTS

ETYMOTIC RESEARCH ER-4 CANAL PHONE

Etymotic Research (Elk Grove Village, IL), a company known for its professional audiology earphones, has introduced the ER-4 Canal Phone™. Designed for professional listening/monitoring applications, the ER-4 combines 20-25 dB of external noise exclusion and high-quality, in-the-ear transducers with a frequency response of 20-16k Hz, ±4 dB (or 50-10k Hz, ±2 dB). Priced at $330, the ER-4 Canal Phones weigh less than one ounce and include soft flange eartips; custom-fitted ear molds are optional.

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GOLD LINE APT-2

The APT-2 Polarity/Phase Analyzer from Gold Line (West Redding, CT) is a simple-to-use system that employs state-of-the-art signal processing to accurately determine absolute polarity, with the ability to check either. The $249 system is made up of two handheld modules—a pulse generator and an analyzer—and works on any main or monitor loudspeaker, subwoofer, equalizer, amplifier or crossover.

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TECHRON SOUND LAB-PC 1.3

The latest enhancement to the TEF System 20 from Techron (Elkhart, IN) is Version 1.3, which incorporates 3-D waterfall displays and improved Noise Level Analysis. The NLA upgrade is designed specifically for monitoring concert sound levels; the 3-D log or linear waterfall displays provide two to 36 curves, which can be viewed from a left or right perspective, as well as from the front or back. Also new are an AutoRepeat mode, a Combine Files feature and muting for excluding unwanted noise without having to stop a measurement. Version 1.3 is available to all Sound Lab PC owners for $50.

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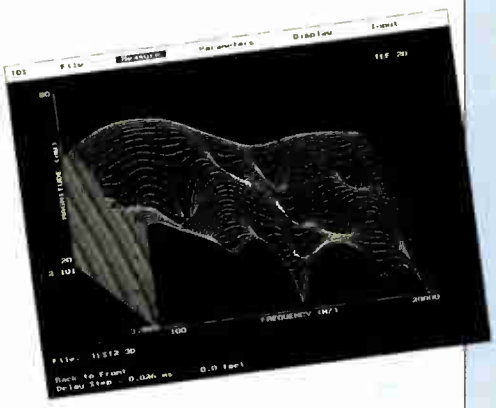
TOA F-505 LOUDSPEAKER

New from TOA (South San Francisco, CA) is the F-505, a compact loudspeaker with a stated frequency response of 70-20k Hz, power handling of 240 watts (continuous program) or 80 watts RMS (band-limited pink-noise), and a high sensitivity of 93 dB (1W/1m). The F-505 is a two-way design with an 8-inch woofer and compression driver mounted on a constant-directivity horn, in a rugged, 11x18x9-inch polypropylene enclosure weighing just 16.5 pounds. The input panel has two ¼-inch jacks and push-in terminals; an internal protection circuit safeguards against overload conditions. The F-505 is available in ivory or gray finishes and retails at $558; the F-605 system with 12-inch woofer is $958.

Circle #215 on Reader Service Card



BEC 16-CHANNEL MIC PREAMP/SPLITTER

New from BEC Technologies (sales offices are in Seattle) is the MP16 mic preamplifier and MX16 remote gain controller. The MP16 functions both as an active two-way analog splitter and premium-quality mic preamplifier with two discrete gain stages. The first stage, affecting both the A and B outputs, is a fixed +30dB boost that can be switched in or out for each channel; separate for the A and B outputs, the second stage offers ±30 dB of continuously variable gain, controllable in 0.1dB steps via the MX16 remote gain controller. The A and B outputs of one MP16 can be separately controlled by two MX16 remote units to allow for varying requirements of monitor, FOH or broadcast consoles. Control commands are sent via a 16-pin digital communications port, and, when used with BEC's AudioPlex fiber-optic system, gain changes can be made from miles away.

Circle #216 on Reader Service Card

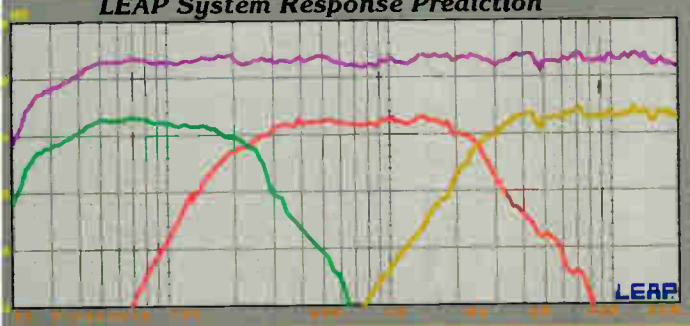
World Radio History

New! LEAP Version 4.5

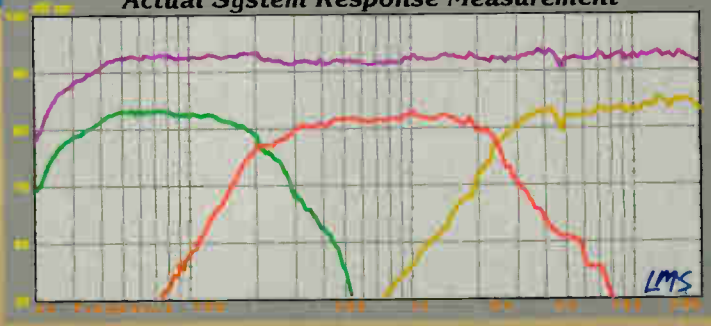
LEAP

Precision Development Tools for Precision Loudspeaker Designs

LEAP System Response Prediction



Actual System Response Measurement



The Art and Science... of loudspeaker system development today has become more complex than ever before. Competition is tough, and to compete each design must perform to the best of its ability, and make the most out of every dollar's worth of transducer cost. The simple approach of choosing a combination of seemingly appropriate transducers coupled with ordinary networks and filters, has given way to a painstaking process of meticulously blending selected transducers in combination with carefully devised and matched crossover designs.

Extensive Documentation

The two volume manual set comprises almost 1,000 pages of documentation which thoroughly covers the operation of the program and provides numerous examples of how to maximize your use and understanding of the program's many features. The Reference Manual describes all graphs, menus, commands, and their operation. This manual explains the unique and special non-linear speaker and port models, as well as proper use of the optimizers, importing data, and the many other utilities. The Application Manual provides many exciting examples showing how to use the powerful features of the system in a combined manner to perform both simple and complex design tasks. Both novice and experienced users alike will find this information invaluable for exploiting the full power of the system. Additional information is also provided on loudspeaker measurements, design tips, filter calculations, and complete crossover system development for both passive and active based systems.

✔ 502 Page Reference Manual ✔ 436 Page Application Manual

LEAP (Loudspeaker Enclosure Analysis Program) is a complete full range analysis package which provides virtually *all* of the tools necessary to develop precision loudspeaker systems, for today's demanding audio markets. Whether your applications are consumer audio, car stereo, professional audio, or custom esoteric marvels, LEAP provides the power, flexibility, and accuracy to investigate every possible design permutation. The open architecture and broad spectrum of features provided will dramatically reduce your development time, while improving the quality of the final result... and demonstrates why LEAP has become the #1 choice of professional loudspeaker designers world-wide!

Advanced System Analysis Features

- ✔ Use simulation or imported actual measured SPL/Z data.
- ✔ 5-Way crossover system modeling, and more.
- ✔ Time offset between transducers.
- ✔ Active or Passive based crossovers.
- ✔ Hilbert-Bode transform for deriving phase.
- ✔ 22 Passive components per xover section.
- ✔ 16 Active filter blocks per xover section.
- ✔ Passive Network Optimizer for single/system response.
- ✔ Active Filter Optimizer for single/system response.
- ✔ Frequency ranges from 1Hz to 100kHz.

Development Utilities

- ✔ Quick Cabinet Box Designer
- ✔ Conjugate Network Designer
- ✔ Wire Table Calculator
- ✔ Multi-Curve Averager
- ✔ Import Data from ASCII Files
- ✔ Crossover Network Designer
- ✔ Spkr Parameter Measurement
- ✔ Voltage/Current/Imp Calculator
- ✔ Motor Constants Calculator
- ✔ Export Data to ASCII Files

Advanced Transducer/Enclosure Simulations

- ✔ Sealed,Vented, Bandpass, PR Simulations with multiple speaker/ port capability.
- ✔ Large signal analysis of TempVC, and Non-Linear BL/ Ports/ Compliance.
- ✔ Acoustic Parallel or Acoustic Series (Isobaric) Driver Mounting.
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- ✔ Frequency Dependent Revc and Levc modeling.
- ✔ Library storage of 36 transducer parameters, and over 24 enclosure parameters.
- ✔ Generic transducer modeling of electro-dynamic, ribbon, and piezo devices.

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When you wish to produce a hardcopy output of your finished designs and graphical data, LEAP supports a large number of printer standards, and even supports numerous desktop publishing graphic formats in both black & white and color! Portrait/Landscape orientations in any custom size and aspect ratio are user controllable.

- ✔ IBM/Epson 8 Pin Dot Matrix
- ✔ TOSHIBA 24 Pin Dot Matrix
- ✔ HPGL-Compatible Plotters
- ✔ DXF AutoCAD Vector Plots
- ✔ NEC 24 Pin Dot Matrix
- ✔ HP LaserJet Series Printers
- ✔ PostScript Printers- B&W,Color
- ✔ AI-Adobe Illustrator B&W,Color
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World Radio History

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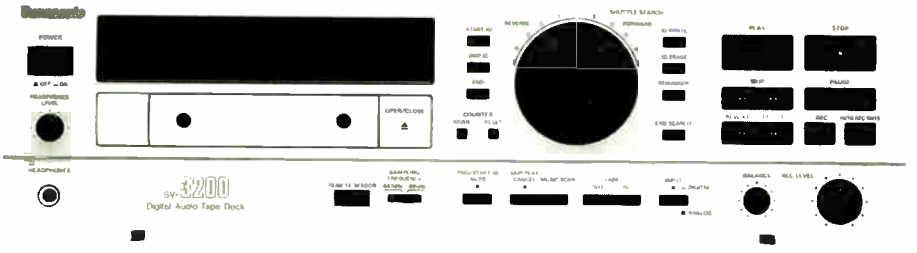
NEW PRODUCTS



AKAI DR4D HARD DISK RECORDER

Housed in a three-rack-space package is the DR4d, from Akai of Fort Worth, TX, offering four tracks of disk-based recording (expandable up to 16 tracks by connecting multiple units) and priced at $1,995. A SCSI port connects to any external hard disk. The unit is designed to operate like a standard tape recorder, with familiar tape transport-style controls and analog balanced inputs and outputs on the back panel. A/D and D/A converters are 18-bit; also featured is a jog/shuttle wheel, 108 memory locations, AES/EBU and consumer digital I/O, MIDI sync, and extensive editing functions. An SMPTE time code interface board is optional.

Circle #226 on Reader Service Card

MEYER HD-2 MONITORS

Based on the acclaimed Meyer HD-1 studio monitor is the HD-2 from Meyer Sound Labs (Berkeley, CA). Designed for mid-field listening applications, the powered HD-2 monitor combines a 1-inch, titanium-dome HF driver mounted on a symmetrical 60° horn and 10-inch, long-excursion woofer in a vented enclosure. Also within the cabinet are dual Class-AB1 power amplifiers, active crossover, optimized zero-pole response correction filters and speaker component protection circuitry. Each speaker is factory-aligned under high-resolution FFT analysis in an anechoic chamber to exacting phase and frequency-response specs.

Circle #227 on Reader Service Card

MIDDLE ATLANTIC SRS RACK SYSTEM

New from Middle Atlantic Products (Riverdale, NJ) is the SRS Sliding Rail System, an ingenious solution to providing rear access to rack gear in problem installations, such as under consoles, custom cabinets, in-wall mounting, etc. SRS consists of four industrial, full-extension ball-bearing slides, rack rail, and mounting base. The system slides out 19 inches for easy access to connections and is custom-designed to handle from eight to 20 rackspaces, supporting 300 pounds. Optional articulated cable carriers (with two separate cable ducts) protect audio and/or AC lines during the slide-in/out process.

Circle #228 on Reader Service Card

PANASONIC SV-3200 DAT

Fashioned after the TEC Award-winning SV-3700 studio DAT recorder is the SV-3200 from Panasonic Pro Audio (Cypress, CA). The SV-3200—designed as a primary recorder for the project studio or as an additional machine in a larger facility—features 44.1/48kHz recording from analog inputs (32/44.1/48kHz from digital sources), forward/reverse shuttle wheel with three- to 15-times operation in play mode, high-speed (up to 400x) search, wireless remote control and IEC 958 (consumer-type) digital I/O, with optical and RCA coaxial ports for connecting to workstations and other digital components. A/D converters are 1-bit with 64x oversampling; D/A converters use a high-resolution, single-chip, 4-DAC LSI. Retail is $950.

Circle #229 on Reader Service Card

AUDIO LOGIC 266 GATE/COMPRESSOR/LIMITER

Audio Logic (Salt Lake City) offers the model 266, a dual-channel (stereo-linkable) unit that combines natural-sounding gating with soft-knee compression and automatic, variable-knee soft limiting. Features include XLR and ¼-inch TRS inputs/outputs, ten-segment LED gain reduction bar graphs, ¼-inch side-chain inputs/outputs and gating/compression action with a dynamic range exceeding 112 dB.

Circle #230 on Reader Service Card

World Radio History

CM INTELLIGENT AUTOMATION

CM Automation (Los Angeles) has launched its MX-816 automation and FX-100 automation control console, a turn-key interactive automation system. The FX-100 has eight 100mm faders and intelligent mute/solo buttons, with a tri-color LED on each channel to indicate operational status. Global record in/out and update/rehearse modes are controlled by panel switches, and automation data can be stored into any MIDI sequencer. The MX-816 is available in 8-channel ($489.95) and 16-channel ($779.95) versions; the FX-100 retails for $449.95.

Circle #231 on Reader Service Card

SONY DPS-F7

From Sony Pro Audio (Montvale, NJ) comes the DPS-F7 Digital Dynamic Filter Plus, a single-rackspace device designed to provide a wide range of natural, warm-sounding filter effects. The 2-channel unit offers ten filter effects algorithms—such as parametric equalization, exciter, dynamic filtering and subharmonics generation—along with 100 factory programs and 256 memory slots for user-created effects.

Circle #233 on Reader Service Card

MADI FOR OTARI DTR-900

Responding to the needs of customers who plan to install digital consoles, Otari (Foster City, CA) has announced a Multichannel Audio Digital Interface (MADI) option for its DTR-900II 32-channel digital multitrack recorder. Shipments were slated to begin during the first quarter of 1993.

Circle #235 on Reader Service Card

DDA FORUM CONSOLES

Announced at AES, the Forum consoles from DDA (distributed by the Mark IV Pro Audio Group, Buchanan, MI) are available in three configurations, each with 24, 32 or 40 inputs. The Forum PA ($11,995 for 24 inputs) is a sound reinforcement console with eight group outputs; the Forum Matrix ($12,995 for 24 inputs) is similar, but adds an 8x8 output matrix; and the Forum Composer ($14,500 for 24 inputs) is a recording version with 24-track monitoring and meter bridge. All Forum consoles share the same input module, which features 4-band EQ with sweepable midbands, switchable 80Hz highpass filter, balanced group and aux outputs, six aux sends, and a direct out (with level control) on each module. Optional modules include stereo inputs, digital inputs and a 6-into-1 mic input.

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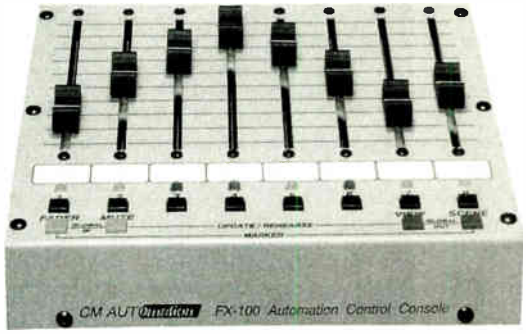

REAL TUBE DIRECT BOXES

Tube Works (Denver, CO) has released The Real Tube Direct Series, a line of mono portable ($250) and stereo rack-mount ($500) vacuum tube-based direct boxes. Instrument, line and amplifier-level inputs are standard; outputs include line and balanced XLR, with or without speaker emulation. The stereo version has two discrete direct boxes in a single rackspace.

Circle #232 on Reader Service Card

EQUITEK CAD E-100 MICROPHONE

CTI Audio (Conneaut, OH) has expanded its line of studio microphones with the Equitek E-100, an affordable studio-grade condenser microphone. The E-100 uses high-speed, low-noise electronics, offering a wide frequency response (said to be usable down to 3 Hz) and a dynamic range of 132 dB. Retail is $449.

Circle #234 on Reader Service Card

TASCAM 134-B A/V SYNCASET

The 134-B from Tascam (Montebello, CA) is a 4-channel cassette recorder designed for multi-image and A/V production/presentation. The deck features balanced inputs and outputs, a 25Hz cue tone, five repeat modes, three memory-locate points, 4x2 mixing capability, shuttle control, Dolby B and C noise reduction, and 4-track record/playback capability. Retail is $1,349.

Circle #236 on Reader Service Card

World Radio History

DIGIDESIGN SESSION 8

Targeted at the home/project studio recording market and unveiled at NAMM by Digidesign (Menlo Park, CA), Session 8 is a new line of low-cost, disk-based multitrack recording systems for the PC-Windows platform. Used with your PC 386SX/25MHz (or better) and hard disk, Session 8 provides a complete self-contained digital studio with random-access digital recording/editing, analog mixing/patching and MIDI integration. The Session 8 Audio Interface is a rack-mount box with eight analog line inputs and outputs (when using the system's onboard mixing, these can be reconfigured as effects sends/returns), four mic inputs, 10x2 analog mixer, headphone outputs, S/PDIF digital I/O, monitor outputs, tape inputs/outputs and switchable 44.1/48kHz operation. The software offers waveform editing, playlisting, digital EQ, disk-based track bouncing, and simultaneous MIDI file playback. System prices begin at $3,995; options include a hardware controller with eight faders, mute/solo buttons, autolocator and "transport" controls.

Circle #238 on Reader Service Card

SOUNDTECH MIXER LINE

At the recent NAMM show, Soundtech (Vernon Hills, IL) debuted a new line of dual-purpose sound reinforcement/recording mixers, created by former Trident design engineer John Oram. The series consists of 11 consoles in 4-, 8- and 24-bus versions with 16 to 40 input channels. According to Soundtech, Oram's emphasis on the design stresses musical EQ and sonic integrity. The boards are priced from under $2,000 to $12,999.

Circle #239 on Reader Service Card

API LEGACY CONSOLES

From API (sales offices in Wheaton, IL) comes Legacy, a console series that combines the sonic purity of an all-discrete design with features found on modern consoles. Legacy uses a modular frame that accommodates expansion in 16-channel groups. Each input channel has the legendary API 2520 discrete mic preamp and 550S 4-band EQ modules, and where separate monitor facilities are required, an optional 24-, 32- or 48-track monitor section is available. Complete console systems start at $125,000.

Circle #240 on Reader Service Card

ADA MICROCAB

The Microcab guitar cabinet emulator from ADA Signal Processors (Oakland, CA) is designed to produce the resonance, depth and sound quality of any type of guitar cabinet when recording directly from a preamp or effects box. Controls allow the user to select open/sealed-back cabinets, vintage or standard speaker types, LF resonance, high balance (brightness) and 1x12, 2x12 or 4x12 arrays. Inputs are stereo; both mic-level XLR and line level ¼-inch stereo outputs are standard.

Circle #241 on Reader Service Card

HOT OFF THE SHELF

"How to Make and Sell Your Own Recording: A Guide for the 1990s," ($29.95) by Diane Sward Rapaport, is the revised edition of this classic text, with 250 pages of solid, down-to-earth advice for the independent label/musician. Available at bookstores or through Mix Bookshelf, (510) 653-3307 or (800) 233-9604...**This does it all: The Toolbox DI** ($599) is a single-rackspace box with six filtered AC outlets (two with delayed turn-on to prevent power-up "thumps"); two pull-out, front-panel rack lights; BNC lamp socket on the rear panel; a chromatic tuner with paralleled inputs/outputs and built-in mic; metronome with visual indicator and mutable audio click; and two active direct boxes. Call (615) 228-3765...**Terk's Leapfrog** ($59.95) is an accessory that extends the range of any infrared remote control up to 150 feet—even in full sunlight outdoors. Call (516) 756-6000...**Support Systems Technology** (SST) is now an Eastern U.S. dealer for the Verity line of degaussing products, with units priced from $1,200 to $40,000. Call (304) 876-3904...**File Effects** is a new sound effects library with ten CDs of digitally recorded ambient sounds, priced at $600/set or individually at $79. Call ProMusic at (305) 776-2070 for a free CD demo...**DATRAX** is a full line of DAT storage racks and carrying cases, priced from $6.99 to $349. Call Bryco at (310) 305-0317...**The Winter/Spring 1993 Mix Bookshelf Catalog** (52 pages) lists hundreds of technical books, videos, cassette courses and useful accessories for audio and music professionals. Call (800) 233-9604 or (510) 653-3307 for your free copy. ■

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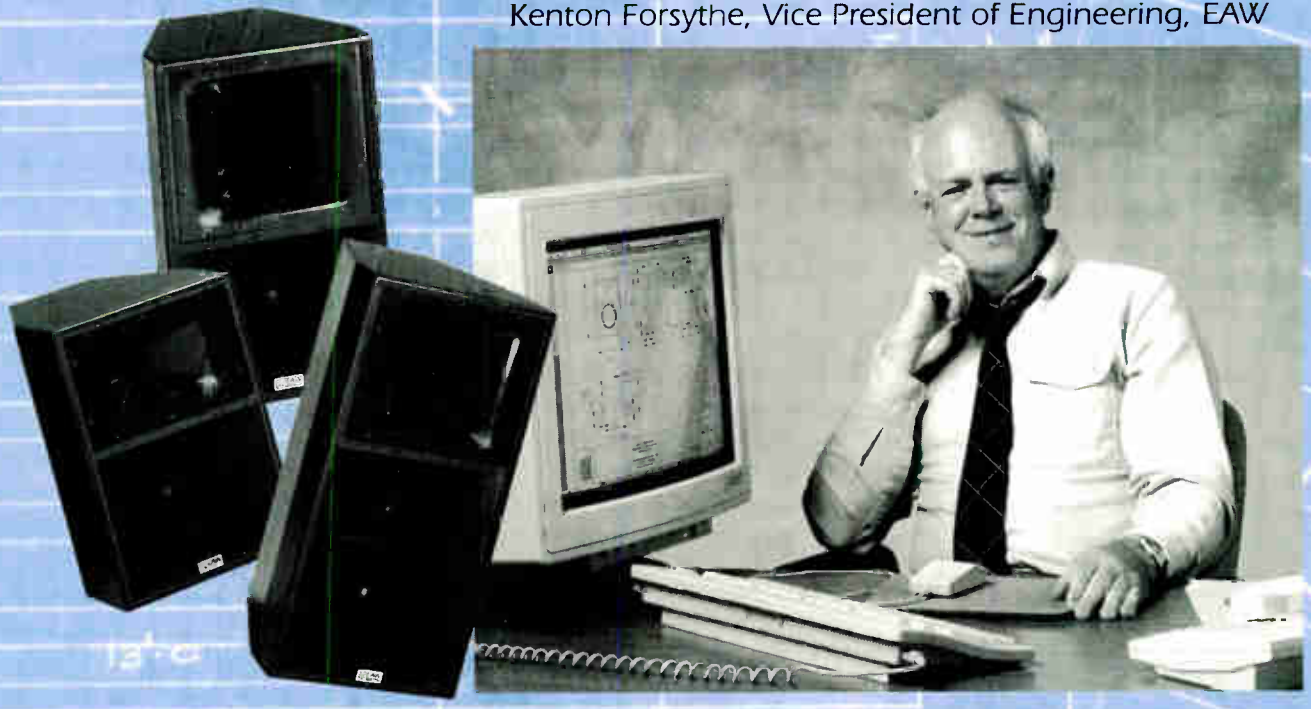
"It's no longer necessary to sacrifice musical fidelity for vocal intelligibility."

Kenton Forsythe, Vice President of Engineering, EAW



MH Series Engineered Sound Systems—part of a new series of tools for acoustical designers from the engineers of Eastern Acoustic Works.

Effective pattern control: .....60° or 90° horizontal by 40° vertical.
Consistent power response: .....±3 dB from 160 Hz to 19 kHz.
High peak output:.....140 dB peak SPL—extremely low distortion.
Predictable arrayability:.....Trapezoidal cabinets match horn coverage angles.

On world tours and in permanent installations, for chart-topping rock bands and renowned symphonies, Virtual Array™ Technology has set new standards of musical fidelity from New York to Tokyo. Now Kenton Forsythe has used VA™ design principles to develop a new set of high-performance tools for engineered sound systems. This new approach merges the predictability and intelligibility of constant directivity horns with the superior definition and output of VA™ touring systems. It's a combination that has already turned several acoustical nightmares into dream projects.

Consistent pattern control is central to VA™ design. The horn-loaded MH Series controls dispersion precisely in both horizontal and vertical dimensions, over a much wider frequency range than previous devices. Acoustic energy goes where you aim it, not onto reflective surfaces. Minimal cabinet interaction allows accurate, predictable arrayability.

MH Series horn-loaded midbass cone drivers are the centerpiece of a true three-way design. Add EAW low-frequency systems to build a high output, low distortion system that handles everything from lectures to a full spectrum of music.

Standard MH Series configurations solve the problems of typical engineered sound systems. For unusual applications, you can call on EAW's advanced engineering and manufacturing capabilities to ensure success.

If you're always looking for better ways to solve difficult sound engineering problems, we invite you to apply for membership in the EAW Acoustical Performance Partnership program. Or contact us for full information and specifications on the new MH Series. Either way, you sacrifice nothing—except, perhaps, a few preconceptions.

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USE READER SERVICE CARD FOR MORE INFO

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SEARCHING FOR THE PERFECT REFERENCE MONITOR

STOP, LOOK AND LISTEN

Studio monitor designers are a lot like portrait photographers. The ones who portray their subjects most accurately are often the least successful in the field. What we need and what we want may represent two entirely different concepts. Let's face it, your driver's license and passport photos are probably accurate renditions of how you really look. Given a choice, most people would undoubtedly prefer seeing photographic images of themselves a couple pounds lighter, with a few less wrinkles.

However, when you work on hyped studio monitors that give a little zing on top and a nice bass boost, you've merely fooled yourself into thinking that everyone else who hears your product thinks it sounds as good as you do. As a simple test, try listening to some of your recent mixes on a variety of different systems—auto sound, boom boxes, home systems, TV speakers and, of course, portable cassette (headphone) players.

And while comparing your mixes to those of other products in a similar genre, pay particular attention to the balance of different elements in the mix. Are the vocals too hot, just right or unintelligibly soft? Does reverb jump out excessively on

BY GEORGE PETERSEN

If you're stuck working in an unfamiliar room or in a too-familiar room that you can't tolerate, you need some reliable reference speakers that you can trust.

ILLUSTRATION BY STEWART STANYARD

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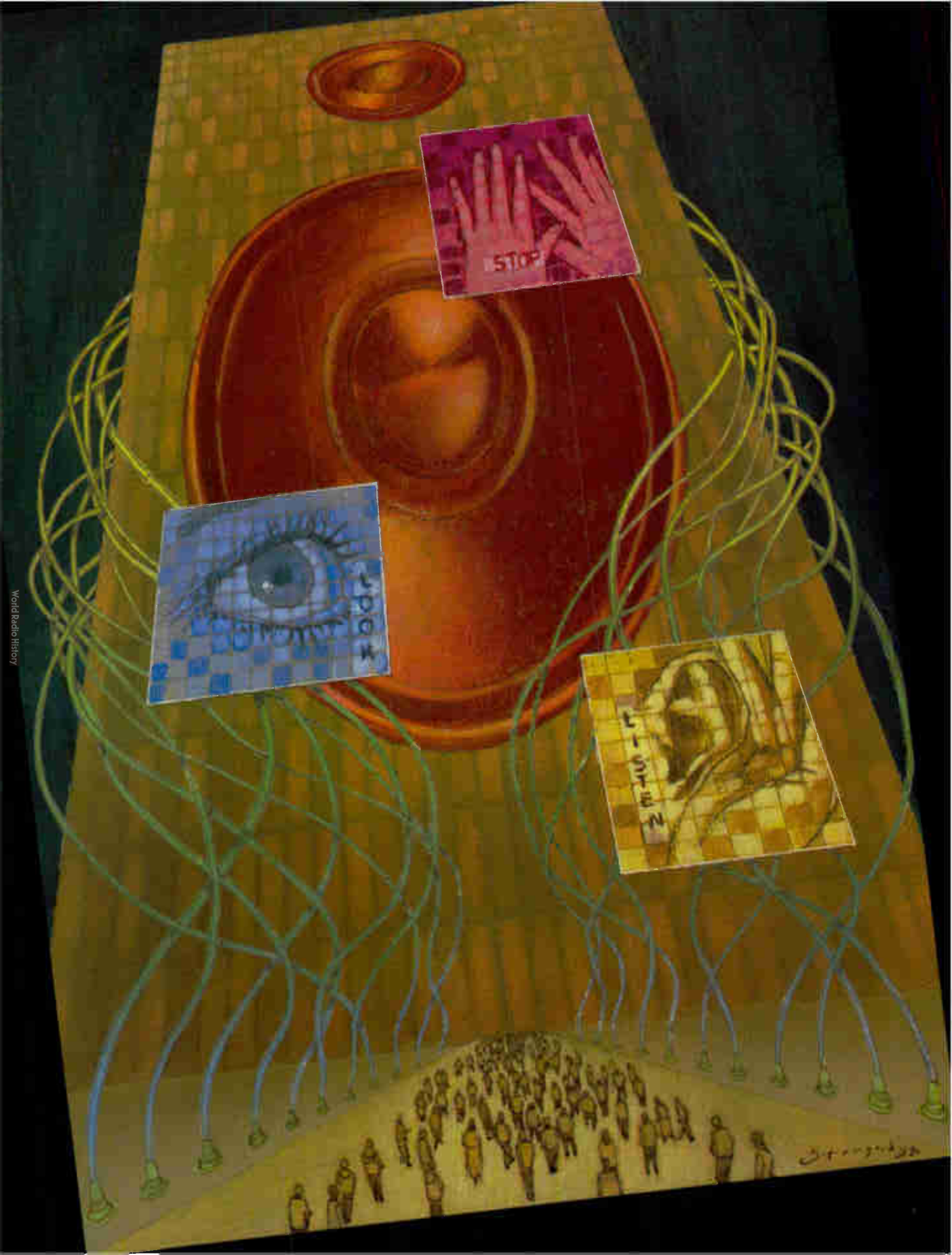

World Radio History

CLOSE-FIELD STUDIO REFERENCE MONITORS

Note: "Type" refers to whether the enclosure is sealed or vented; "Sensitivity" indicates an SPL output measured at one meter from a 1-watt input; weight is the actual weight of a single speaker in pounds; size is rounded off to the nearest inch; and the price listed is the retail for a pair, in U.S. dollars. Specs and prices may vary, so contact the manufacturer or a local dealer for more information.

MANUFACTURER/MODEL	TELEPHONE	TYPE	LF	MF	HF	CROSSOVER	FREQ. RESPONSE	SENSITIVITY	SIZE	WEIGHT	PRICE	NOTES
Acoustech 8025	313/663-7013	V	8"	—	1"	1750 Hz	35-20k ±3dB	90dB	10x17x17	32	$1190	DT
Alesis Monitor One	310/558-4530	S	6.5"	—	1"	2200 Hz	55-25k	90dB	15x8x8	n/a	$395	DT
A.T.C. SCM-20	207/774-3874	S	6.5"	—	1"	2800 Hz	80-15k ±2dB	83dB	18x10x12	50	$2795	
A.T.C. SCM-10	207/774-3874	S	5"	—	1"	2800 Hz	100-15k ±2dB	80dB	15x8x10	23	$1995	
Audio Factor MX-860	817/656-0730	V	6.5"	—	1"	2500 Hz	40-22k ±3dB	90dB	14x8x10	15	$489	DT
Audio Factor MX-1080	817/656-0730	V	8"	—	1"	2500 Hz	40-22k ±3dB	92dB	11x15x13	20	$669	DT
Audio Factor MX-460	817/656-0730	V	6.5"	—	1"	2600 Hz	40-22k ±3dB	90dB	8x12x7	10	$489	DT
Audix HRM-1	503/692-4426	V	6.5"	—	1"	3000 Hz	50-18k ±3dB	88dB	16x10x7	15	$499	DT
Audix HRM-2	503/692-4426	V	2-6.5"	—	1"	3000 Hz	47-18k ±3dB	92dB	19x12x10	26	$649	DT
Audix HRM-3	503/692-4426	V	2-6.5"	—	1"	3000 Hz	47-19k ±3dB	92dB	19x12x10	26	$799	DT
Avatar 6.5 D	415/459-3767	V	6.5"	—	1"	3200 Hz	48-21k +1,-3	88dB	14x10x12	20	$449	DT, OS, OM
Bag End TA12 Jr.	708/382-4550	V	12"	—	1"	3300 Hz	75-19k ±3dB	101dB	21x14x12	40	$1176	HCD, OS
B&W Matrix 805	416/771-6611	V	6.5"	—	1"	3000 Hz	45-20k ±2dB	87dB	16x10x9	19	$1600	DT
Celestion Studio 3	508/429-6706	S	5"	—	1"	5000 Hz	75-20k -3dB	86dB	12x7x8	8	$350	DT
Celestion Studio 5	508/429-6706	S	6"	—	1"	4000 Hz	70-20k -3dB	88dB	14x8x10	10	$420	DT
C.S.I. MDM-4	510/531-8725	V	2-6.5"	—	3.5"	1500 Hz	60-17k ±3dB	89dB	19x13x10	25	$1490	CT, OS
C.S.I. MDM-TA2	510/531-8725	V	6.5"	—	.75"	2500 Hz	60-20k ±3dB	87dB	16x12x9	20	$1490	DT, OS
C.S.I. MDM-TA3	510/531-8725	V	2-6.5"	3.5"	.75"	1.8k/7k	45-20k ±3dB	91dB	19x16x12	35	$1990	DT, OS
Digital Designs M6	405/946-4500	V	6.5"	—	.75"	3700 Hz	45-20k ±3dB	91dB	9x13x11	17	$199	DT, OS
Digital Designs M26	405/946-4500	V	2-6.5"	—	.75"	3700 Hz	40-20k ±3dB	91dB	10x18x15	30	$299	DT, OS
Digital Designs DD161	405/946-4500	V	6.5"	—	1"	4000 Hz	52-20k ±2dB	88dB	14x9x10	16	$602	DT, OS, MS
Digital Designs DD261	405/946-4500	V	2-6.5"	—	1"	4000 Hz	48-20k ±2dB	88dB	19x10x14	29	$830	DT, OS, MS
DynaudioAcoustics M1	516/249-1399	V	6"	—	1"	n/a	50-40k ±2dB	88dB	8x18x12	31	$2650	DT
DynaudioAcoustics C2	516/249-1399	S	6"	—	1"	n/a	40-20k ±2dB	83dB	16x9x11	25	$2750	DT
DynaudioAcou. PPM-1	516/249-1399	V	6"	—	1"	n/a	50-18k ±2dB	88dB	11x7x9	13	$1850	DT
E.A.W. MS-63	508/234-6158	V	12"	6"	1.25"	350/2.2k	50-18k ±2dB	95dB	16x24x13	87	$2190	DT
Electro-Voice MS-802	616/695-6831	V	8"	—	1.5"	2000 Hz	45-18k ±3dB	91dB	17x12x11	27	$690	DT
Electro-Voice S-40	616/695-6831	V	5.25"	—	1"	3500 Hz	85-20k ±3dB	85dB	10x7x6	6	$336	DT, MS
E-V Sentry 100A	616/695-6831	V	8"	—	1.5"	2000 Hz	45-18k ±3dB	91dB	17x12x11	28	$824	DT
E-V Sentry 100EL	616/695-6831	V	8"	—	1.5"	2000 Hz	45-18k ±3dB	—-	17x12x12	33	$1744	DT, P
Fostex RM800	310/921-1112	V	6.5"	—	RP Horn	5000 Hz	55-25k ±3dB	89dB	9x15x9	15	$500	CX
Fostex RM900	310/921-1112	V	8"	—	RP Horn	5000 Hz	50-25k ±3dB	92dB	10x18x11	19	$798	CX
Genelec 1031A	508/650-9444	V	8"	—	1"	2200 Hz	42-21k ±2.5	—-	10x15x11	26	$2998	DT, P, OM
Genelec 1032A	508/650-9444	V	10"	—	1"	1800 Hz	42-21k ±2.5	—-	19x13x11	44	$3998	DT, P, OM
Genelec S30C	508/650-9444	V	8"	3.5"	Ribbon	420/4k	43-25k ±2.5	—-	19x13x11	44	$4498	P

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MANUFACTURER/MODEL	TELEPHONE	TYPE	LF	MF	HF	CROSSOVER	FREQ. RESPONSE	SENSITIVITY	SIZE	WEIGHT	PRICE	NOTES
JBL 4206	818/893-8411	V	6.5"	—	1"	2800 Hz	42-21k ±3dB	87dB	15x9x10	15	$395	DT
JBL 4208	818/893-8411	V	8"	—	1"	2600 Hz	38-21k ±3dB	89dB	18x11x9	20	$525	DT
JBL 4408A	818/893-8411	V	8"	—	1"	2500 Hz	50-20k ±2dB	89dB	17x12x13	26	$650	DT
JBL 4412A	818/893-8411	V	12"	5"	1"	850/4k	45-20k ±2dB	89dB	14x23x11	47	$1350	DT
JBL 4425	818/893-8411	V	12"	—	1.75"	1200 Hz	40-16k ±3dB	91dB	16x25x15	57	$2190	HCD
JBL Control 1	818/893-8411	V	5.25"	—	.75"	6000 Hz	70-20k ±3dB	87dB	9x6x6	4	$260	DT, OS
JBL Control 1+	818/893-8411	V	5.25"	—	1"	6000 Hz	60-20k ±3dB	88dB	9x6x6	5	$310	DT, OS
JBL Control 5	818/893-8411	V	6.5"	—	1"	3000 Hz	50-20k ±3dB	89dB	15x10x9	10	$420	DT, OS
JBL Control 10	818/893-8411	V	12"	5"	1"	1.1k/4.6k	35-27k ±3dB	94dB	24x17x12	32	$1190	DT, OS
KRK Model 7000	714/841-1600	V	7"	—	1.5"	3000 Hz	50-15k ±3dB	91dB	12x11x10	30	$989	DT
KRK Model 9000	714/841-1600	V	9"	—	1.5"	2900 Hz	45-19k ±3dB	92dB	16x14x13	45	$1750	DT
Lost Chord "Inca"	415/661-2757	V	5"	—	1"	2500 Hz	60-20k ±3dB	87dB	14x10x12	37	$1600	DT, OS
Meyer HD-1	510/486-1166	V	8"	—	1"	1600 Hz	40-20k ±1dB	—	12x16x16	51	$4550	DT, P
Paradigm Titan	416/850-2889	V	6.5"	—	.75"	3000 Hz	75-20k ±2dB	88dB	13x8x10	13	$200	DT
Paradigm Compact	416/850-2889	V	6.5"	—	1"	2000 Hz	55-20k ±2dB	88dB	16x9x12	22	$600	DT
Peavey PRM-205A	601/483-5365	S	5"	—	1"	2500 Hz	79-18k ±3dB	85dB	8x11x7	7	$300	DT
Peavey PRM-308S	601/483-5365	V	8"	5"	1"	300/3k	45-18k ±3dB	88dB	17x12x11	26	$640	DT
Peavey PRM-308SV	601/483-5365	V	8"	5"	1"	300/3k	45-18k ±3dB	88dB	17x12x11	28	$760	DT, MS
Quested Q108	510/351-3500	V	8"	—	1"	1200Hz	40-18k ±6dB	—	13x17x12	51	$4995	DT, P
Radian MM-8	714/693-9277	V	8"	—	1.75"	1800 Hz	40-22k ±3dB	90dB	10x16x8	24	$429	CX, HCD
Radian MM-8L	714/693-9277	V	8"	—	1.75"	1800 Hz	40-25k ±3dB	90dB	17x11x8	25	$498	CX, HCD
Radian MS-8	714/693-9277	V	8"	—	1.75"	1800 Hz	35-22k ±3dB	90dB	12x19x11	32	$729	CX, HCD
Radian MS-8L	714/693-9277	V	8"	—	1.75"	1800 Hz	35-25k ±3dB	90dB	12x19x11	33	$798	CX, HCD
Radian MS-10	714/693-9277	V	10"	—	1.75"	1800 Hz	40-22k ±3dB	92dB	15x25x12	42	$1196	CX, HCD
Smithline 2x4S	818/786-7324	V	2-4"	—	.75"	3600 Hz	70-20k ±3dB	87dB	14x10x6	13	$700	DT, MS, OS
Smithline MM1	818/786-7324	V	8"	2-4"	.75"	100/3.6k	60-20k ±3dB	90dB	16x14x14	38	$1600	DT, MS, OS
Tannoy PBM-6.5	519/745-1158	V	6.5"	—	.75"	2600 Hz	57-20k ±3dB	90dB	13x9x8	5	$395	DT
Tannoy PBM-8	519/745-1158	V	8"	—	.75"	2400 Hz	47-20k ±3dB	92dB	16x11x11	19	$575	DT
Tannoy System6 NFM	519/745-1158	V	6.5"	—	.75"	2300 Hz	52-25k ±3dB	91dB	16x9x9	20	$795	CX, HCD
Tannoy System8 NFMII	519/745-1158	V	8"	—	.75"	2300 Hz	48-25k ±3dB	93dB	18x12x9	26	$1295	CX, HCD
Tannoy System10 NFMII	519/745-1158	V	10"	—	.75"	2300 Hz	46-25k ±3dB	94dB	22x14x11	42	$1895	CX, HCD
TOA 265-ME AV	415/588-2538	V	6.3"	—	1.2"	3000 Hz	60-20k ±3dB	88dB	14x8x10	12	$432	DT, MS
TOA 280-ME AV	415/588-2538	S	8"	1.2"	.75"	1.5/14k	60-20k ±3dB	89dB	16x10x10	15	$562	DT, MS
TOA 312-ME AV	415/588-2538	V	11"	5"	1.2"	500/5k	40-20k ±3dB	91dB	23x13x12	36	$1042	DT, MS
UREI 809A	818/893-8411	V	12"	—	1.75"	1500 Hz	50-18k ±3dB	93dB	23x17x14	60	$1790	CX, HCD
USCO DFW-3	213/465-4370	S	6.5"	5.25"	1"	280/4.7k	60-15k ±3dB	91dB	10x10x8	17	$600	DT, MS, OS
USCO SP-2	213/465-4370	V	5.25"	—	1"	4700 Hz	70-15k ±3dB	89dB	7x8x10	10	$310	DT, MS, OS
Westlake BBSM-4	805/499-3686	V	2-4"	—	.75"	1500 Hz	65-20k ±3dB	89dB	8x15x10	25	$1498	DT
Westlake BBSM-5	805/499-3686	V	2-5"	—	1.25"	1200 Hz	63-18k ±3dB	90dB	11x18x10	35	$1698	DT
Westlake BBSM-6	805/499-3686	V	2-6"	3.5"	1"	600/6k	60-20k ±3dB	91dB	11x22x13	60	$2500	DT
Westlake BBSM-8	805/499-3686	V	2-8"	3.5"	1"	600/5k	65-18k ±3dB	93dB	13x26x17	90	$3048	DT
Yamaha S8M	714/522-9011	V	8"	5"	3"	2.3/13.4k	50-20k ±3dB	90dB	19x11x9	17	$180	CT
Yamaha NS-10M S	714/522-9011	S	7"	—	1.5"	2000 Hz	60-20k ±2dB	90dB	15x9x8	13	$430	DT
Yamaha NS-40M S	714/522-9011	S	2-7"	2.5"	1.25"	1.3/5.5k	50-20k ±3dB	90dB	12x24x12	38	$850	DT
Yorkville YSM-2	716/297-2920	V	5.25"	—	.75"	2200 Hz	80-20k ±3dB	90dB	7x13x8	9	$200	DT
Yorkville YSM-1	716/297-2920	V	6.5"	—	1"	2500 Hz	40-20k ±3dB	90dB	10x16x9	18	$280	DT

Key to Notes: DT = Dome Tweeter; CT = Cone Tweeter; HCD = High Frequency Compression Driver; CX = Coaxial Design; P = Powered Speaker; MS = Magnetic Shielding; OM = Magnetic Shielding Optional; OS = Optional Subwoofer.

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headphones? And in addition to the midrange instruments (synth, organ, guitars, piano), also check the balance of elements at the extreme ends of the audio spectrum, such as bass, kick drum or cymbals and percussion.

If you detect balance problems from this test, your monitoring system may be at fault. For those who mix on large main studio monitors, the dilemma is a bit more complex, involving the quality of the control room acoustics and the delicate interplay of the room/monitor combination. This could be traced to any number of factors: lousy room design, poor wall construction techniques, bad monitors, the right monitors in the wrong room (or vice versa), or even something as simple as a couple of blown tweeters. Don't laugh; the latter happened to me once when I started a mixing session and about 10 minutes later wondered why the tracks sounded so bad!

If you're stuck working in an unfamiliar room or in a too-familiar room that you can't tolerate, you need some reliable reference speakers that you can trust. If you typically mix in the near-field (with the speakers placed from three to five feet away) and have problems with your mixes, then what you need is better reference monitors.

Finding the right reference monitors is no easy task. First of all, each of us perceives sounds differently, and what works for me may be entirely wrong for you. So recommendations—whether they be from famous producers, magazine writers or audio salespeople—should only be treated as starting points in your search for the perfect monitor.

The first step comes in defining your needs. For example, if you're an independent engineer who works in different studios from day to day, you may require a set of easily portable monitors that you can tote from gig to gig. And as power amps play a major role in how a monitor sounds, you may also want to consider buying a power amp to bring with you, unless you really trust the power amps in all those rooms. Interestingly, a lot of state-of-the-art studios provide less-than-wonderful amplification systems for the console-top speakers.

Another possibility is to investigate a powered monitor system, which offers the greatest degree of consistency for the traveling engineer. Over the past five years, powered monitors

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have evolved from a mere matter of convenience into some very serious listening devices. The price for a powered system may seem higher than conventional monitors, but when you add in the costs of the active crossovers and internal amplification, things begin to even out.

One of the most important considerations in selecting any monitor system is the speaker-to-ear distance. Many systems, particularly larger reference monitors, do not produce a coherent image at close listening distances. Coherency is a sense that you are hearing a single source, rather than distinct sounds coming from individual components (tweeter/woofer or tweeter/woofer/mid). Monitors designed for near-field listening achieve coherency by locating the drivers as closely as possible, or by using some sort of coaxial approach where the low- and high-frequency drivers are aligned along the same axis. Near-field speakers also typically employ wide-dispersion elements for high-frequency reproduction, which may be less desirable when listening at greater distances.

I am always surprised to observe customers auditioning near-field speakers in pro audio showrooms by listening to the monitors from a standing position halfway across the room. As these speakers were never intended to be used in the far-field, how can anyone make an informed purchase under such conditions?

When testing any monitors, make sure you listen to the speakers at the proper distance, with your ears at the same level as the drivers. This allows you to get a good idea of both the width of their "sweet spot" and lets you check out the off-axis response. Many monitors sound great, but only when you're sitting exactly between them. Reach to adjust the EQ on channel one (at the far left of the console) to tweak the hi-hat that is probably panned hard right, and you may get an idea of how important off-axis response is to monitor performance.

In the store, compare a monitor's sound when facing the speaker directly with the sound you hear when you move one or two feet to the side. Depending on the directivity of the HF element, there will probably be some perceived attenuation of the overall sound. Beware if you note any major changes in the tim-

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bre or character of the sound when listening in the off-axis position. Console reflections have a major influence on the sound of close-field speakers, so if you really want to drive an audio salesperson crazy, insist on listening to the speakers while seated at a console, which is exactly the way you'll be using the monitors.

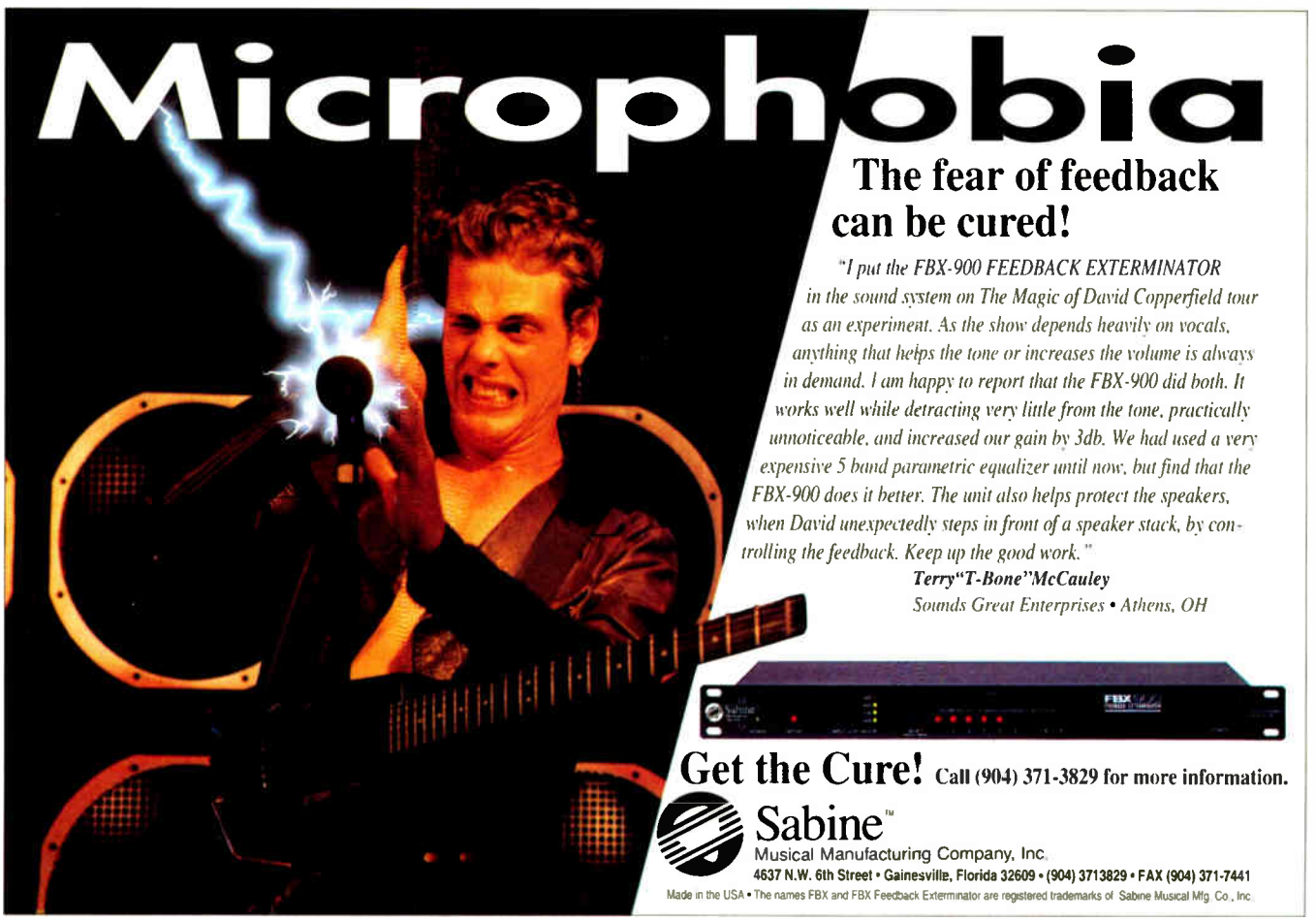
You may be surprised to discover that the monitors of the '90s have plenty to offer.

One thing to watch out for is A/B comparisons of monitors with different sensitivities. A monitor's sensitivity rating is a measure of a speaker's overall efficiency, typically defined in terms of the number of decibels a speaker will put out, given a standard input (usually 1 watt), measured at a distance of 1 meter. Speaker sensitivities can range from approximately 80 dB (1W/1m) to well over 100 dB, and this information is extremely useful in predicting the maximum sound pressure levels a speaker can reproduce. For example, a monitor with a sensitivity of 91 dB (1W/1m) will put out 101 dB from a 10-watt input, or 111 dB from a 100-watt input. The pattern is simple: Each additional 10dB SPL requires a ten-fold increase in amplifier power.

We humans instinctively seem to be drawn to whatever is louder, brighter or bigger, so it's easy to think that the louder of the two is necessarily the best. Unfortunately, by itself, sensitivity has very little to do with a monitor's sound quality, so don't fall into the trap that louder is better, especially in the typical A/B comparisons on the showroom floor.

And while in the store, hopefully you remembered to bring some familiar CDs or DATs for auditioning your potential purchase. It's virtually impossible to gauge the quality of any monitoring system when listening to unfamiliar material. For such occasions, I have a small collection of CDs I consistently use, including *a capella* vocals (solo and group), solo piano, orchestra and chamber ensembles, jazz and rock groups, and albums I've produced and heard at least 2 million times. Hearing a simple piano etude can reveal a lot more about speaker quality than listening to the latest chartbuster.

If you can manage to get beyond the hype and the hustle, you will discover that today's close-field monitors provide greater power handling, smoother frequency response and tighter imaging than similar models of just a few years back. It's no secret that everybody's looking for classic mics and vintage signal processing, but the market for 20-, 15- or even 10-year-old monitors is pretty slow by comparison. So whether you're a veteran engineer or studio novice, you may be surprised to discover that the monitors of the 1990s have plenty to offer—if you've got the time to stop, look and *listen*. ■



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Okay, that may sound like fanatical ad jive. But after you've seen a MicroSeries 1202 12x2 stereo mixer being used on a scoring stage at a world-famous film company...or talked to one of the many engineers who uses an MS 1202 to record direct to digital...or heard a power drummer thrash the heads off a kit that's submixed through a 1202...you'll know this is no ordinary $399 mixer. Small wonder. We packed it with features no one has ever had the fanaticism to pack into a mixer that takes up less than a square foot of space.

THE $399 "SWISS ARMY KNIFE." We designed the MicroSeries 1202 to be the absolutely best "starter" mixer in existence for home MIDI studios, individual musicians and small club acts. What we frankly didn't count on was its fanatical popularity with seasoned audio pros who are accustomed to far larger boards. They've discovered that the 1202 has the headroom, ultra-low noise and no-compromise mic preamps to qualify as an essential part of their audio tool kit. For instance:

- Outboard 4-ch microphone preamplifier
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When a mixer sounds as good as the MicroSeries 1202 – yet costs less than $400 – the possibilities are limited only by your creativity. Hear the product of our fanatical engineering at your Mackie dealer soon.

STUDIO-GRADE MIC PREAMPS. The MS 1202 is the only mini-mixer that incorporates discrete, large-emitter-geometry transistor preamplifiers instead of simple ICs. Which is why the 1202's four balanced mic preamps deliver an honest –129dBm E.I.N., 0.005% THD, yet can handle +14dBu inputs without a pad. And they even have +48V phantom power for condenser microphones!

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2 AUX SENDS with plenty of gain for special effects.

MAIN OUTS. Balanced (max +28dB) or unbalanced (max +22dB) output.

"Phono-style" TAPE INPUT/OUTPUT for recording & playback.

STEREO AUX RETURNS have separate left-right inputs with 20dB gain.

AUX OUTPUTS for stage monitoring, effects recording.

INSTRUMENTATION-GRADE, BUILT-IN POWER SUPPLY not only eliminates inconvenient "wall warts & line lumps" but also their hum-inducing magnetic fields. These result when a skimpy transformer is driven into non-linearity at 15 kiloGauss, causing stray 25-35µ magnetic fields that are easily picked up by shielded audio cables. The MS 1202's large transformer loafs at just 10 kiloGauss, reducing stray fields to under 1µ, and has juice to spare for +48V phantom power and a beefy headphone amplifier.

DOUBLE-SIDED FIBERGLASS CIRCUIT BOARDS. Our exclusive, patent-pending isolated mounting method provides rigid, multi-point suspension, isolating controls from the mixer's mechanics. All other mixers use their controls as part of the mechanical structure, leading to potential damage from physical impact.

SEALED ROTARY POTENTIOMETERS prevent contamination and are co-molded without use of easily-shattered phenolic. No wonder we can offer an un-precedented 3-YEAR warranty.

MIX AMPS WITH DOUBLE THE HEADROOM. Conventional mix amps can overload and distort when you start pouring on the channels. Our gain structure lets you cram the MS 1202 with up to 20 hot signals and still have more headroom than other mixers running half as many inputs.

HI-OUTPUT HEADPHONE AMP drives headphones to max level.

THE MS 1202 MEASURES 12.35" x 11.47" x 2.64" and rack mounts in 6 spaces with optional brackets.

TWO-BAND EQ at 80Hz (more thump than 100Hz) & 12.5kHz (more sizzle than 10k).

UNITY PLUS CHANNEL GAIN CONTROLS minimize noise and maximize headroom. 20dB gain above unity center detent reduces the need to constantly adjust trims during recording or performance.

BETTER-THAN-DIGITAL. –90dB S/N ratio with 108dB dynamic range (vs. digital with –90dB S/N and 90dB dynamic range) so you're ready for that A-DAT, DAT, or hard-disk recording system in your future. Other equally un-$399-esque specs include 0.025% THD 20-20kHz, and 20-40kHz ±1dB frequency response. On top of all this, the MicroSeries 1202 just plain sounds good and is made right here in Washington State.

3-WAY, 12-LED VU METERS. Via Ch. Metering button, the display can read 1) main stereo output levels; 2) mic input levels or 3) line input levels for more accuracy than mere overload LEDs.

RUGGED, COLD-ROLLED STEEL CASE No wonder the MS 1202 weighs 7 lbs!

LURKING ON THE BACK: CHANNNEL INSERTS provide both uninterrupted and interrupted direct outs as well as pre-fader and post-fader effect loop channel patching for equalizers, compressors, limiters, etc.

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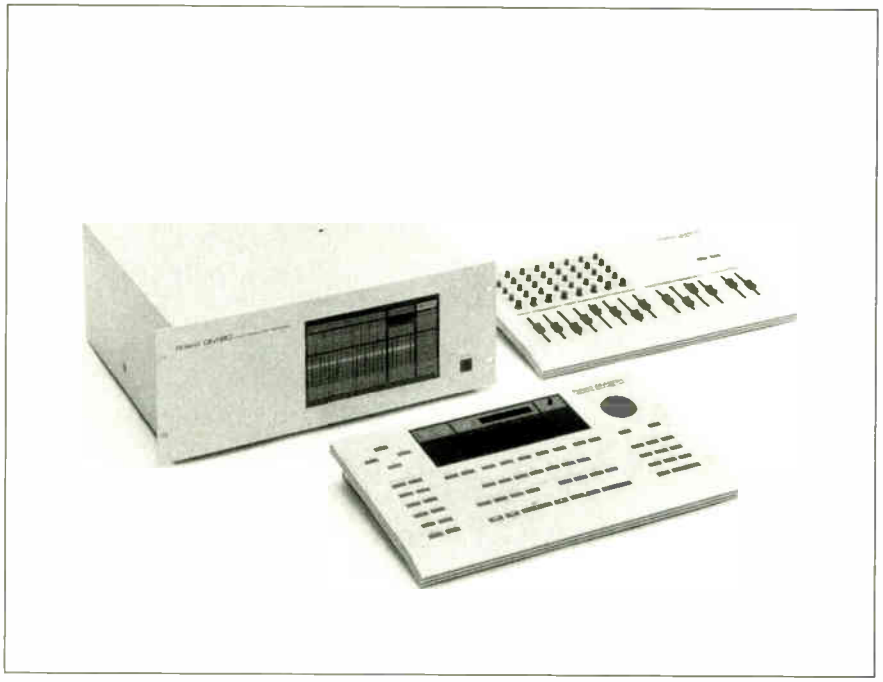
World Radio History

by Mel Lambert

ROLAND DM-80 DIGITAL AUDIO WORKSTATION

Anyone who has been following my comments in the various "Juxtaposition" columns and feature articles I've written over the past several years knows my predilection for dedicated work surfaces. The more facilities I see struggling to introduce VDU-based editors and workstations—for which the user is forced to remember complex point-and-click sequences to control every system function via the "Glass Console"—the more I remain convinced that the majority of us like to press buttons, push faders, and use both eyes and hands simultaneously.



To this end, the new DM-80 represents an excellent example of a design approach that doesn't involve a steep learning curve. Anyone familiar with basic audio record/replay and editing functions could be up and running, and cutting audio, with the DM-80 within a couple of hours. Having said that, however, I did find the system's operations to be somewhat slow (a problem that can be attributed to an overstressed 8-bit microprocessor used to control the host CPU) and to involve some silly operational functions. On the plus side, the user manual is almost unnecessary. And the system is almost bulletproof; DM-80 did not crash, hang up or otherwise misbehave once during my evaluations.

All in all, I would mark the DM-80 as scoring 95% in terms of value

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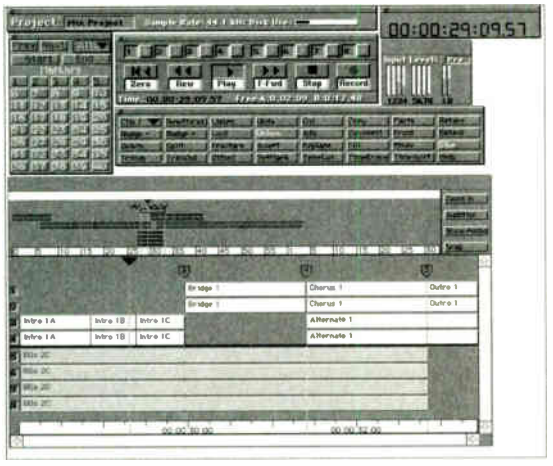


DM-80 running

for money and its ability to allow unskilled operators to quickly master the system. It scores 80% in terms of user features and functions; the system's lack of speed and other basics, such as undo, scrub editing, segment labeling, proved a slight letdown in this department.

The DM-80 provides simultaneous recording and playback from up to eight hard disk tracks; accommodates both analog and digital sources; offers real-time, non-destructive editing and sound cue assembly; provides mixing, pan and equalization; and enables synchronization to SMPTE time code, MIDI Time Code and digital clock sources.

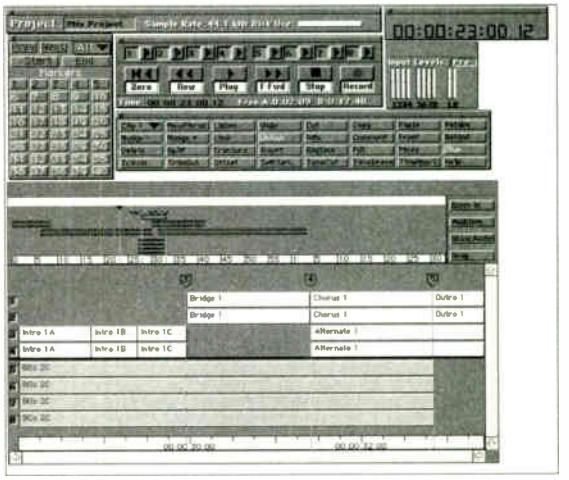
SYSTEM COMPONENTS

The main DM-80 rack-mount chassis houses the various internal hard drives, DSP subsystems, analog and digital I/Os, sample rate converter, main record/replay level displays, and other essential systems. Given the current speed of commercially available SCSI hard drives, Roland has elected to offer track-record functionality in blocks of four. In other words, a single SCSI drive in the DM-80 offers 4-track record/replay; each additional drive adds another four tracks.

In this way, the user can incorporate external or internal drives, to both extend the record time, and/or the number of simultaneous audio tracks. The SCSI buses are arranged within the DM-80 to allow a combination of fixed and removable drives to be added as necessary. The distinction needs to be made between "Internal" and "External," even though the actual drive might not physically reside within the main chassis. Internal drives are collected together by the system on a specific SCSI-A or SCSI-B bus, and treated as contiguous storage capacity. External drives, on the other hand, define another, separate segment of storage. Projects cannot use both internal and external drives for storage.

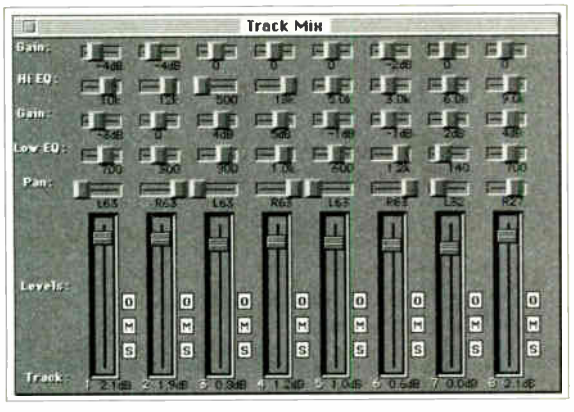
The bottom line is simple: If you want to remove a hard drive from the system, and connect it to another DM-80, you are advised to format and configure the drive as External. Otherwise, the DM-80 will get very upset when it tries to boot up with a missing drive.

Removable drives, including SyQuest drives, Bernoullis, Exabyte, Data DAT and (more useful) erasable optical systems, can be added for extended storage and/or for archiving projects via a copy function. During tests of the DM-80, I made extensive use of a Panasonic LF-7010 Phase-Change drive, which offers a capacity of between 650 megabytes and 1 gigabyte per cartridge. (Since it does not require a separate erase cycle, Panasonic's PC technology is around 50% faster during Record mode than competitive magneto-optical drives, and allows multitrack recording/playback.)



DM-80 Static

Inputs and outputs to the DM-80 comprise eight analog, line-level inputs; eight analog track outputs; stereo analog monitor outputs; a choice of AES/EBU or IEC-958/consumer digital outputs; and switchable "A" or "B" digital inputs, again via AES/EBU or IEC-958 connectors. Unfortunately, the AES/EBU output does not follow the AES3 standard with regard to several important Channel Status flags (specifically byte #0; bit #0, the consumer/professional ID flag), which caused problems with dubbing onto a certain brand of DAT re-



DM-80 Mixer

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corder. Reverting to the IEC-958 connection cured the problem, however.

The DM-80 can be slaved to various rates of SMPTE time code, video sync, or clocked to an incoming digital bitstream. The "B" digital input also connects to the unit's internal sample rate converter, thereby allowing a CD project to be mastered at 44.1 kHz, yet accept digital source material recorded at 48 kHz (maybe some sound samples recorded on a portable DAT recorder). Other inputs/outputs comprise MIDI In, Out and Thru, SCSI connectors, plus a bus connector for additional DM-80 system components.

The DM-80's 16-bit sigma-delta A-to-D converters feature 64-times oversampling, while 20-bit DACs with 8-times oversampling handle interface with the analog world. All I/O converters sounded exceptionally clean, with no level-dependent anomalies nor distortion products. The DM-80's built-in sample rate converter (based on the same circuitry used in the firm's new SRC-2 unit) also does an outstanding job of 48 to 44.1 and similar number-crunching translations.

CHOICE OF EXTERNAL CONTROLLERS

The DM-80 is designed primarily to function with the DM-80-F Fader Board and DM-80-R Remote Controller. The DM-80-F comprises eight channel faders, plus four auxiliaries and a stereo master. It functions strictly as a virtual console, however; no audio passes through the unit: only control signals. The channel faders normally control off-disk playback levels, while the aux inputs control analog source levels (via inputs 1 through 4). Each channel also features a high-frequency EQ section (+/-12 dB centered at 500 Hz to 18 kHz), an LF section (+/-12 dB; 40 Hz to 1.5 kHz), plus pan. Alternatively, the DM-80's eight off-tape outputs can be output directly to an existing audio console.

While the DM-80-F handles record and replay levels, EQ and panning, the DM-80-R Remote Controller is where system commands are implemented. A familiar transport-control section is provided, along with marker buttons, basic la-

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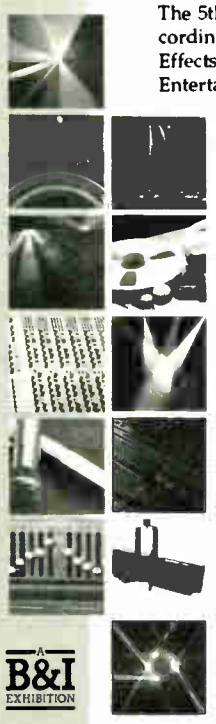

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beling keys, safe/ready and replay on/off keys, time code display, jog-edit wheel plus a central 240x64 pixel, backlit LCD window. The latter provides a graphic display of system options, as well a simple 4-track display of audio segments, with a central "Now line." For an 8-track system, access to tracks 5 through 8 is via scroll buttons.

The DM-80-R controller measures just 11 inches x 17 inches, and connects to the main chassis via a single cable. The controls are well laid out and labeled. A larger window would have been nice, but does not slow you down too much. The buttons could also be larger, and quicker to respond to user requests, but once again these are minor gripes.

THE SYSTEM IN OPERATION

To use Roland's vernacular, each audio project contains up to 128 takes per four data tracks, with takes being organized as individual phrases that tag each start/stop time. Overlapping phrases can also replay on the same track for up to one second and/or crossfade within that interval. In addition, audio events can be triggered directly via MIDI note information or from the keypad. Tempo maps can also be used to generate MIDI clocks, or for translating SMPTE h:m:s:f into bars and beats. All digital mix data can be memorized and stored for later use. Finally, each take and phrase can be labeled automatically, and then later renamed from the keypad or an external keyboard that plugs into the DM-80-R.

Once audio material has been recorded to hard disk in either single or multiple passes, it can be edited and moved freely among the available tracks. There is one limitation, however. Because two separate SCSI buses are used to handle storage in pairs of four data tracks, you cannot directly move audio data recorded on, say, tracks 1 to 6, only between adjacent tracks 1 through 4, or 5 through 8. It is possible, however, to copy files between projects—a more complex albeit practical workaround.

Eight dedicated Marker keys are also provided to tag locations for quick, single-button search-to-cue routines. All Marker locations are stored with a particular project, allowing an editing session to be con-

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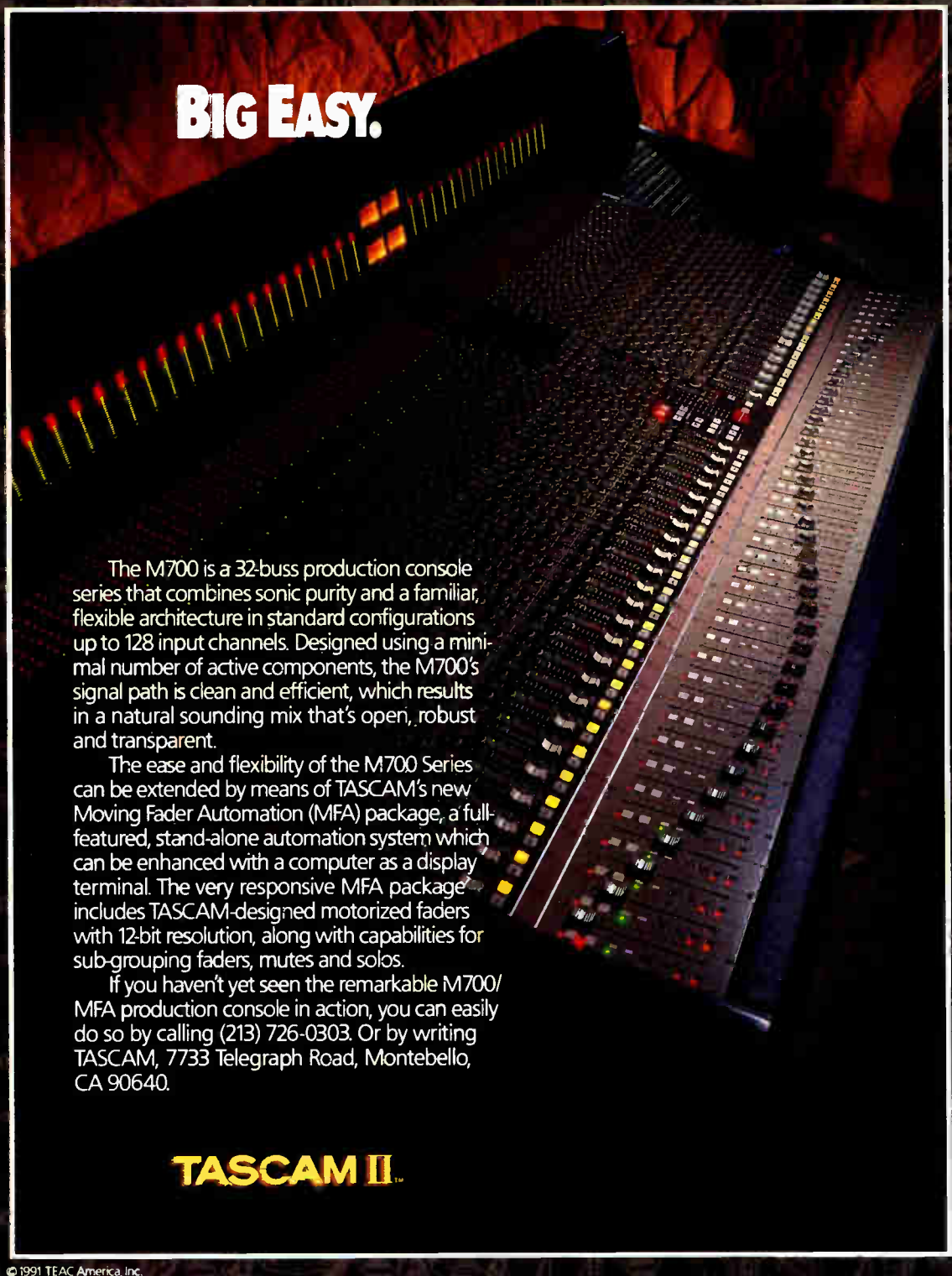

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tinued at a later date, with important cue points intact.

Having tagged, for example, several cue points on the fly with the Marker keys, these points can then be used to refine edit locations. Instead of a scrub wheel, the DM-80 features a pair of buttons and a continuous shuttle control. You can listen up to the Edit Point, away from the Edit Point, or through the Edit Point for the duration of a preset audition time (adjustable up to two seconds). Although this may sound restrictive, with a little practice—and setting the audition time to around 0.5 seconds—I found it easy to master. However, the DM-80's lack of DSP horsepower means that you have to wait awhile each time the audition window is shifted forward or backward—as audio data is transferred temporarily from hard disk to a RAM buffer.

Having identified the start or end of an audio segment at which the user wishes to perform an edit, that location can be assigned a crossfade time and then either moved to join another segment—as in an assembly-edit sequence—or used as a tag point to which another cue will be butted. Alternatively, the tagged phrase can be deleted, moved or

Roland DM-80-S Multitrack Manager Software

Despite the ease and convenience of the DM-80's single window display, there is no denying that for more complex operations, power users are soon going to wish for more space in which to interrogate system information. As the fates would have it, just as I was about to complete this evaluation, I received an advance copy of Roland's new DM-80-S Multitrack Manager Software for the Macintosh.

Designed to run on a Classic II or faster machine, Multitrack Manager features color-coded windows that allow a great deal of data to be displayed simultaneously (dependent, of course, on the size of monitor being used). Each phrase and track can now be labeled on-screen, and an Expand window can be called up that provides a graphical display of a waveform. Although editing is still performed using the Play From/To/Through and Trim keys, use of the Mac keyboard does speed up the process. Connecting the Mac to a DM-80 is simply a matter of plugging in a suitable Serial-to-MIDI box (I was using a Mac IIfx and an Opcode Professional Plus converter); loading Apple's MIDI Manager 2.0 (or higher) and PatchBay; and hooking up a Roland IB-1 MIDI Interface, which connects to the DM-80 in place of the normal DM-80-R controller. (The Mac IIfx also requires a Serial Switch control panel.) The DM-80-F can still be used with the DM-80, allowing all channel-level, EQ and pan controls to be displayed in real time on the Macintosh monitor.

Each of the display windows can be moved around the screen according to the user's preferences and, in the case of the Edit window, resized. Although I was more than happy to operate the DM-80 from its companion DM-80-R Controller, for complex projects involving multiple libraries of Phrases, the optional DM-80-S software certainly does make operation a whole lot less cramped. All system functions have keyboard equivalents so that, after just a couple of minutes, I was driving the DM-80 system via simple combinations of point-and-click commands plus key strokes. Alternatively, you can hook up a JL Cooper CS-1 or similar ADB-based controller to provide dedicated, remappable system controls and jog wheel.

The DM-80-S user manual is very well-written and covers a great deal of ground in a clear, concise manner. Given its speed and power, I predict that the majority of DM-80 users will provide themselves with a Mac-based control environment, simply to take full advantage of the system's multiple operational functions.

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copied freely to another time code location. In addition, short phrases can be duplicated along a track at a preset offset interval, to create a repeating pattern of sounds—a regular drum pattern, for example.

A number of sound layers can also be created, one on top of another. As front-layer sounds are deleted or moved to other locations—creating "holes" in a dialog track for example—the material in rear layers "plays through" the gaps.

All editing operations, including Trim In/Out, Cut, Erase and Insert, are very easy to master, and function very much like a computer-based word processor. However, one significant lacking feature is Undo; if you are unsure about whether an edit will work or not, you need to save the project before pressing the Execute key. Otherwise, it is impossible to retrace your steps. But with a little care and attention, you soon learn to work from Marker points, so that if a phrase needs to be recovered, you have ready access to timing locations and track positions to reassemble audio cue sequences.

On the same tack, if a multichannel cue is recorded into the DM-80, and the track elements then split into individual tracks for separate editing, it is impossible to rejoin them again as a composite. This can be useful, for example, if several tracks need to be individually edited and slipped relative to one another, but then treated as a locked group for the remainder of the project. The workaround is either to perform each subsequent edit separately to each element (slow), or to re-record the data as a group to other tracks (fast, assuming you have sufficient track capacity).

THE BOTTOM LINE

All in all, the Roland DM-80 Digital Audio Workstation behaved faultlessly during my extended evaluations. Despite one or two reservations I might have about its speed of operation and lack of an Undo function during editing, the system represents a very powerful, easy-to-use, crash-proof system for a wide variety of recording and editing functions. ■

Mel Lambert is a Mix *senior editor.*

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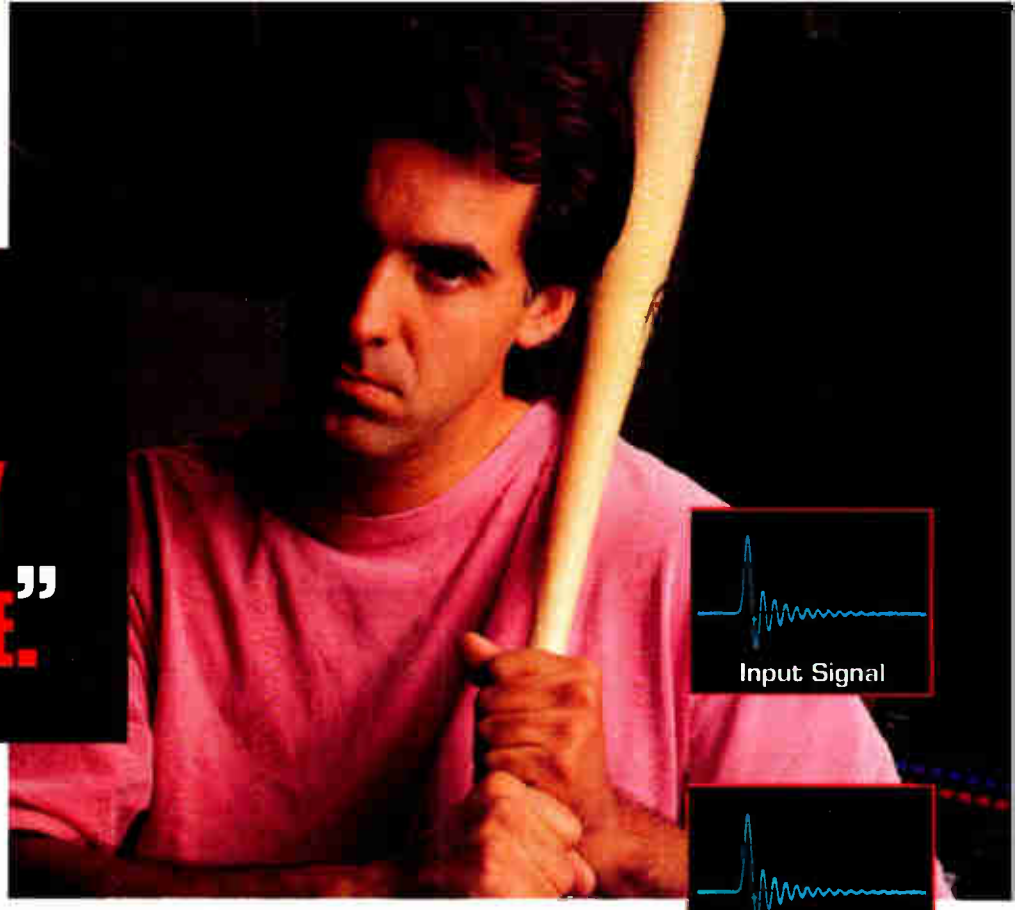

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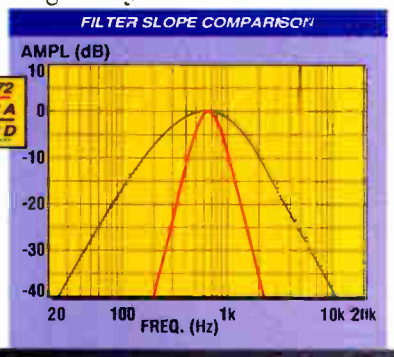

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Russian Hill Recording

PHOTO COURTESY OF RUSSIAN HILL RECORDING

Sound mixer Sam Lehmer at the SSL console in Russian Hill Recording's Studio A.

Russian Hill Recording does a little bit of everything: regional and national advertising spots; independent film work and documentaries; scores for television; books on tape; and music dates. In a second-tier market like San Francisco, the luxury of niche recording simply doesn't exist, and those facilities that survive beyond a decade are generally those that have found the proper and varied balance of work from a number of audio angles.

Russian Hill Recording opened at 1520 Pacific Avenue, San Francisco, in November 1980 as a two-room

—CONTINUED ON PAGE 127

SOUND AT SEA

Production Recording for *Wind*

by Nicholas Pasquariello

By far the most adventurous scenes in Carroll Ballard's $30 million America's Cup theatrical feature *Wind* are the racing sequences: about one-third of the picture. Like all good things in life, they came at a price, which included the accidental loss of a leg of one of the stuntmen. (Ballard is best known for two ground-backbreaking location pictures, *Never Cry Wolf* [1983] and *The Black Stallion* [1979].)

The racing boats used for location shooting off the coast of Fremantle, Australia, and later Hawaii and Newport, Rhode Island, were eminently well-suited for sailing and almost completely inappropriate for filming purposes. "With no hand holds or lifelines, [the boats] were not designed for any kind of comfort," remarks a member of the crew. The most difficult part of filming was staying onboard the 13x60-foot racers in 25-knot winds.

PHOTO COURTESY OF TRI STAR PICTURES

As Ballard so succinctly put it, "These are dangerous, mean boats, where the crew has to be filming without being killed or decapitated. They can't move around freely because there's half-inch steel cable whipping across decks with 50,000 pounds of pressure on it. It's murder."

Production recordist Drew Kunin (*Tough Guys Don't Dance*, *Eat a Bowl of Tea*, *The Comfort of Strangers*) spent nearly all of his three months on deck...underwater. "I expected that we would shoot more [theatrical-type] setups

—CONTINUED ON PAGE 128

World Radio History

A Different Look at *Bram Stoker's Dracula*

PHOTO: RALPH NELSON

***Professor Anthony Hopkins examines the first of Count Dracula's London victims in a scene from* Bram Stoker's Dracula.**

The following is excerpted from a technical paper entitled "Sprockets, Pulses and Bits: Or, How We Merge Film, Television and Computer Technology in Pursuit of the Electronic Cinema," delivered at the 134th SMPTE Conference in Toronto, November 12, 1992, by Kim Aubry, VP of engineering and technical director at American Zoetrope, San Francisco. For a complete copy of the transcript, which deals more heavily with the video side, contact Digital F/X at (415) 961-2800.

The art of television post-production has been creatively advanced through the use of computers and electronics: Machine-readable address codes on the source and master media make possible automatic and repeatable previews and assemble editing of work tapes, and then actual conforming of these "offline" decisions onto the edited master using original source media.

All source frames of material are cataloged by virtue of their unique SMPTE or EBU time code address. There is a limitation, though: TV-style video editing systems are inherently linear; that is, as you assemble a sequence of clips onto a master recording, it is not practical to make changes to the sequence you have already recorded without re-recording the entire sequence of clips.

On the other hand, the traditional film-based editing process is inherently a nonlinear, random-access system. Bits of film are assembled into cut sequences using manual means: a splicing block and sticky tape. Changes and adjustments can be made at any point by simply lifting or adding the desired section of picture and/or sound. All source material is manually cataloged by various criteria, including camera roll number, latent edge number (placed on the camera's original negative stock when the film is manufactured), arbitrary "code numbers" such as ACMADE numbers, which are heat-

—CONTINUED ON PAGE 130

HDTV Update

by Jeff Forlenza

Brilliant, robust colors bursting from your wide, movie-style screen; pristine, CD-quality sound coming at you from three dimensions; interactive capabilities allowing you to become part of the show—this home entertainment extravaganza is closer than most of us think.

Hailed as the biggest advance in broadcasting since color TV, High Definition Television is the way of the future. And this piece of broadcasting history will go down in the 20th century, maybe as soon as 1995.

A private sector advisory committee was assigned by the Federal Communications Commission to evaluate proposed HDTV systems and recommend a broadcast standard by June 1993. The Advanced Television Test Center, a broadcast industry-sponsored lab in Alexandria, Va., and two other laboratories were formed to perform testing for the committee.

A Zenith/AT&T high-definition image on the left, NTSC on the right; an HDTV camera on location.

Subsequently, experts forecast that the market for HDTV will start about two years after the adoption of the broadcast standard. So Americans could have HDTV sets in their homes as soon as 1995. In fact, speculation calls for high-definition sets to hit the market in 1995 at a price point of around $3,500, but should drop (like most new technologies) to near $2,000 by the end of the decade.

Richard E. Wiley, chairman of the FCC Advisory Committee on Advanced Television Service, explains what they appraise in the testing process: "There are ten criteria [for judging the HDTV proponent systems]. They break down into three groups: cost—cost to

—CONTINUED ON PAGE 133

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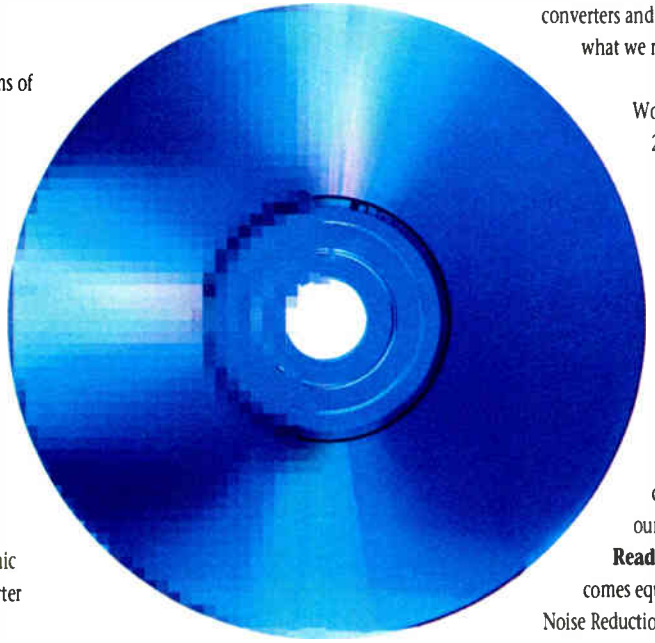

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—FROM PAGE 124, RUSSIAN HILL RECORDING

music facility, under the guidance of owners Jack Leahy and Bob Shotland. The construction story—including the raising of the "Great Wall of Chinatown"—is documented in the January 1981 *Mix* and makes for fascinating reading. Architect Jeff Cooper and building guru Dennis Stearns certainly made the most of 2,500 square feet. Space is at a premium, but it's also premium space.

Today, Russian Hill handles everything from a 15-second television spot to major label album production to feature film scoring, sound design and post. "Jack Leahy and Bob Shotland decided early on, 'Okay, we don't have any kind of record company backing or an independently wealthy financier, so we aren't going to be able to go after the record production market exclusively. The capital requirements would be too great,'" says engineer/mixer Sam Lehmer. "So they decided to go after a post-production and independent filmmaker base. Actually, Russian Hill was one of the first facilities in San Francisco to do electronic post-production, beginning with the score for *Never Cry Wolf* with Mark Isham and Todd Boekelheide.

"Along the way," he continues, "the amount of independent film work in this area—and nationwide—has dropped off considerably since the early '80s, which I attribute to a lack of funding. But the same techniques apply to advertising work."

To satisfy the ad community, Russian Hill has concentrated on video capability, recently installing Sony BVH-1100A 1-inch and DVR-20 D2 video decks. According to Lehmer, 98% of the commercials in San Francisco are being finished on D2, so the facility had to have a machine for audio post and laybacks directly to client masters.

And because the high-end ad community expects random-access and non-destructive editing, RHR decided to purchase the new Studer Dyaxis II system, in an 8-channel/16-track configuration, to supplement its Dyaxis I system. "On a cost vs. features basis, I'm really impressed with the Dyaxis II system," Lehmer says. "It's geared toward the post-production market. It has EDL implementation, auto-conforming—all the features required for post, especially for projects that are edited on video.

"On voice-overs, for example, I

—CONTINUED ON PAGE 128

Audio Technologies for Film

DISK-BASED RECORDING/EDITING SYSTEMS

In this month's installment of an ongoing series on audio technologies for film, *Mix* looks at digital audio workstations. Four out of the 18 manufacturers are featured here, with more to come. The purpose here is to talk to real-world users of systems in the field, asking them what they find to be the particular strengths of a system, followed by a concrete example of the unit in operation. The only taboo words were "speed" and "flexibility"; by now we all know that DAWs cut down on time while increasing available options. Next month we'll profile four more.

DIGITAL AUDIO RESEARCH *SIGMA SOUNDSTATION*

Bob Liebert, owner/engineer, Liebert Recording, NYC

Strengths: Transparent expansion/compression capability; segment-based EQ templates; EQ, pan and levels stored for revise from opticals; Wordfit dialog replacement feature; one control opens audio and video simultaneously, "like a Scenaria without the board"; don't need to read the manual.

"I can totally mix within the system, EQ as well as levels," Liebert explains. "In fact, when I do a mix, I set all the faders to zero-gain and use the board only for outboard. And when DAR comes out with the insert sends and returns, I'll use the board even less. The crossfades are clean, and EQ-wise the Sigma is unbelievable—4-band, variable Q to infinite. If a vocal has a 'popped P,' I've created a 'disP' template so that with two keystrokes I pop it in and copy EQ to it instantly. Everything about it is dedicated to post-production, and it's so damn versatile. We used the Wordfit function for episodes of *The Babysitter's Club*, where we played back the production lines, had the kids then mimick the lines and read wild—not to picture—punched a button and had Wordfit do the rest. If you've

—CONTINUED ON PAGE 136

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MIX

—FROM PAGE 127, RUSSIAN HILL

record every take into the Dyaxis and to some sort of linear backup medium, either ¼-inch or DAT," he continues. "Generally, the tape never gets used. And I've done a lot of sessions where the visual time has been compressed to make the most information available in 30 seconds. It's certainly possible to do the audio with a ¼-inch tape deck and a Harmonizer, but it's a lot easier to do it with time compression, and the Dyaxis has a very good time compression routine."

Russian Hill now has three studios, plus a film/tape room. Studio A houses a 36x32 SSL 4048 E with Total Recall, special film mods to quad bus and a custom 24x6 monitoring matrix, along with Otari MTR-100A and MCI JH-24 24-tracks. Studio B holds a 28x24 Neotek Series III and Otari MTR-90II 24-track. Both rooms have UREI 813 Time Align monitors, as well as Yamaha NS-10 and Auratone near-fields; both rooms employ Q-Lock 3.10 synchronization, and both offer 24 tracks of Dolby SR noise reduction. Studio C contains a 24x16 Soundcraft 600 console and two Fostex E-16 ½-inch 16-tracks, with a Kelly Quan/Cypher Shadow synchronizer system.

Recent music work includes the last three John Lee Hooker projects, Linda Ronstadt and Aaron Neville, Dave Brubeck, John Hammond and Charlie Musselwhite. Recent film work includes choral recordings for an HBO Productions release called *Earth and the American Dream*, and sound design and post for a Nickelodeon pilot called *Rocco's Modern Life*, which is very much in the Warner Bros. crazy cartoon tradition. Advertising work ranges from some of the wild Sega spots for Goodby, Berlin & Silverstein to the recent series of dalmation spots for Hewlett-Packard laser printers, courtesy of Saatchi & Saatchi.

"People who are strictly based in New York, Los Angeles or Chicago—especially in the advertising world—are going to still see San Francisco as an outpost," Lehmer concludes. "I don't think that is ever going to change. But there is a certain appeal for people to come here and work, not only because it's a nice place to come and spend some time, but the quality of work is very high. And with picture places like Colossal and Industrial Light & Magic, there are certain things that you can get here that you can't get anywhere else." ■

—FROM PAGE 124, RECORDING FOR "WIND"

than we ended up shooting," he says. "We did a lot of stuff from the hip. It was just the sailors and the four of us on the boat. We went through endless maneuvers. Largely in an improvisational fashion, Ballard would set up a task such as a spinnaker set or a tacking operation.

"And then Carroll and John [Toll, director of photography] would find new camera positions," Kunin continues. "Carroll would be shooting close-ups on Matthew [Modine] at the wheel, while John was shooting the grinders. So I was all over the place. In the end, I simplified everything and the challenges were less technical than they were physical.

"I wired the boat much the same way one would wire a studio," he adds. "Since most cable is waterproof, the problem comes with the connectors. I ended up using condoms to seal them. [Non-lubricated ones were very difficult to find in Fremantle.] By the time the shoot was over, I changed the connectors several times because of corrosion and rust; I had to keep cutting them and soldering new ones on."

As would be expected at sea, miking was at best difficult. So what worked the best? "Schoeps CMC4U [preamp] in a Rycote Zeppelin with the foam baseball windscreen inside the Zeppelin, which is not normally done," Kunin says. "And then I had the Windjammer outside the Zeppelin. Then I had a waterproof cover over them, which I would remove before the takes. I had about four Windjammers with me, which I would constantly change to shake the water out.

"I had waterproof pouches made for the radio mics and waterproof covers made for the Nagras," he continues. "Everyone who's seen the waterproof Nagra and DAT covers has coveted them desperately. You can't get one because no commercial manufacturer makes them. The cover I made looks like a waterproof Nylon shirt with no neck hole. And where the neck hole would be there's a flexible plastic window. On the ends of the arms, there are neoprene cuffs so you can stick your hands through the arms and they seal, like the way a darkroom changing bag works. At the bottom where the arms go, there's Velcro where you rolled it up three times, flipped it back over and clipped it, like what

World Radio History

you do in a dry sack that goes in a kayak, which is where I stole the closure idea from.

"Then I had two clips: one on the inside that I hung the Nagra from, then a clip on the outside that I attached to, so there was no actual sewn-through place. That way I could record standing in the rain," he explains. "You just can't do that with any commercially available Nagra cover. I got hundreds and hundreds of gallons of saltwater poured all over me. The Nagra never went down, though I lost a couple of Schoeps when Matthew went overboard a couple of times.

"I strapped myself to my equipment by way of a quick release, because if I went overboard attached to this anchor [his sound gear], there would have been no way to stay afloat, even with my life preserver," Kunin notes. "I wired all three boats so I could put two time code Nagras in a box down below [deck] to remote-roll them. It involved an immense amount of wires all over the boats. It was very difficult to remote-roll the Nagras properly because they needed this big 10-second run-in [the time code that the EditDroid required in post-production, which Kunin finally got reduced to 5 seconds], which was the longest time on Earth."

As one of the assistant directors pointed out, there was no way any conventional Hollywood production recordist—with chest-high metal-cart-on-wheels—could have handled this assignment.

"The funny thing was that I thought I would end up with a much slicker, high-tech setup, and I ended up reverting to documentary style," Kunin laughs. "Carrying everything on me gave me more flexibility. Since the guys tended to project their voices well, I discovered that my best bet was with the boom. I originally had this idea of planting microphones—Carroll really wanted microphones planted all over the boat—so that I would not be intrusive and he could run around shooting anything. I tried to comply with this but it didn't work.

"I could get good camera perspective by booming from underneath," he continues. "And an open mic sounded much better on the boats than radio mics or plant mics. This was because the boat was a rather quiet sound space; you don't hear the wind so much [using a windscreen], although there is a great wind. When

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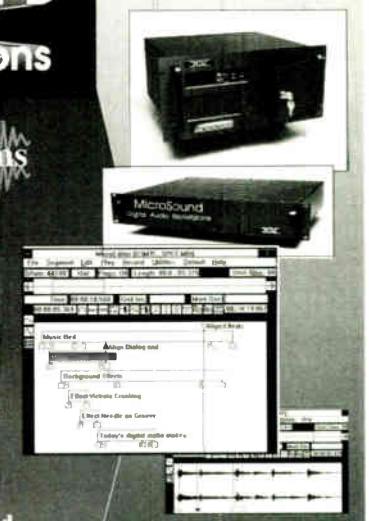

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you get anyone speaking loudly—really projecting or yelling—a radio mic (lavalier) tends to overmodulate, and the compressor clamps it down, and it sounds very flat.

"You don't get any perspective," Kunin concludes. "I would end up lying on the deck underneath the actors, lying in water over my head because the cockpit would fill up with huge waves." ■

—FROM PAGE 125, "BRAM STOKER'S DRACULA"

transferred onto the manually synched workprint by the editorial crew as part of the preparation of film dailies for editing, etc.

The film editorial process has evolved over the past 80 years, and certain industrywide protocols developed that make it possible for any film editor to walk into virtually any editing room on the continent and begin work. The technology is mature, and the system of apprenticeship ensures that an experienced crew will be able to arrive at a finished cut workprint that can be conformed by the negative matcher.

TELECINE PROCESS

Every night after the [*Dracula*] shoot would wrap, exposed film and ¼-inch sound rolls were taken to the lab for processing. A small percentage of selected takes were printed for checking by the director of photography the next morning, but on *Dracula* there were no traditional "rushes" in a screening room. Rather, the negative was handed off immediately to the Telecine suite for transfer.

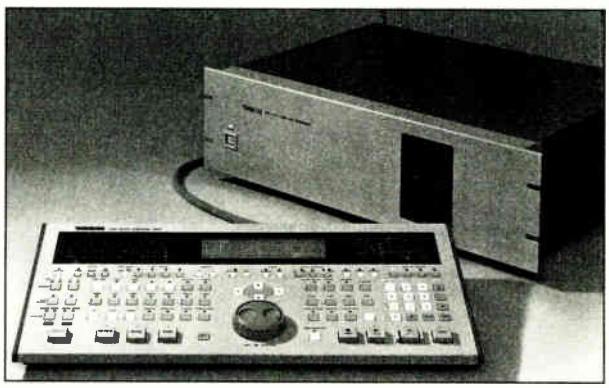
The first assistant editor would supervise the transfer and synching of camera negative with ¼-inch sound rolls. The dailies/Telecine process is like the return of a NASA space probe after it rounds the dark side of a planet: Suddenly, there is an opportunity for receiving, interpreting and storing a great deal of relevant information that will become an essential part of the film's post-production database.

Every individual frame of picture will have unique data attached to it, including its Keycode number, its film time code, its scene and take numbers, camera roll number, related sound roll number and sound time code. Also emerging at this point are the videotape's corresponding roll number and time code.

Post Product Spotlight

TASCAM DIGITAL EDITING WORKSTATION

From Tascam (Montebello, CA) comes the RA-4000, a stand-alone—no computer required—random-access digital recording/editing system, designed specifically for the audio-for-video post-production market. The unit's easy-to-use interface focuses on editing by replacing the usual keyboard/mouse operations with dedicated buttons for all edit functions, familiar-looking transport controls and a large LCD screen. Standard features include a 200MB internal drive, two input channels, four analog outputs (both XLR +4 and -10 dB are provided), AES/EBU and S/PDIF digital out-



puts, a 9-pin serial port for video editor control, and connections for word sync, video sync, SMPTE time code and MIDI time code. External hard disks, magneto-optical drives and tape backup systems can be connected via SCSI. The system consists of the RC-4000 remote controller and up to four RA-4000 hard disk recorders, which can be combined to create a 4/8/12/16-track system. The RA-4000 retails at $5,499; the RC-4000 controller is $1,499. Circle #190 on Reader Service Card

RIVER CITY SPECIALTY SERIES

Memphis-based River City Sound Productions has released the first two CDs in its Specialty Series of production music. "Weddings" has 29 cuts of traditional and contemporary wedding themes; "Nature" has 12 full-length themes for documentary needs. Each CD is buyout-priced at $59, and a Broadcast Series is also available. Circle #191 on Reader Service Card

TIMEWAVE SOUNDGRAPHIX

Timewave Corp. (Westlake Village, CA) has introduced soundGRAPHIX, a new software upgrade package for Soundmaster and Timewave synchronization products. According to the manufacturer, the new software simplifies system operation while adding features such as improved shuttle response, high-resolution graphics, individual SMPTE time code display and calculator for each machine, and rapid varispeed synchronization. The package retails at $750 and includes software, replacement shuttle controller card, updated synchronizer EPROMS, manual and replacement keycaps. Circle #192 on Reader Service Card

FULTEK UNIVERSAL RESOLVER-CONTROLLER

The Universal Resolver-Controller from Fultek (Toluca Lake, CA) is compatible with sprocketed film drives from Magna-Tech, MTM and stepper motor/servo units from RCA. The two-rackspace unit can be driven from 50/60Hz line frequencies, crystal sync, composite video, Nagra stereo FM sync, neo-pilot tone, SMPTE time code, ranger sync and external sources. Varispeed can be adjusted from three to ten times normal speed, and front panel indicators include a lock LED, loss-of-lock alarm (defeatable) and an LED display of frame rate as a percent of speed. Available outputs include machine drive, sine/square wave, head preamp, reshaped/buffered time code and oscilloscope outputs. Circle #193 on Reader Service Card ■

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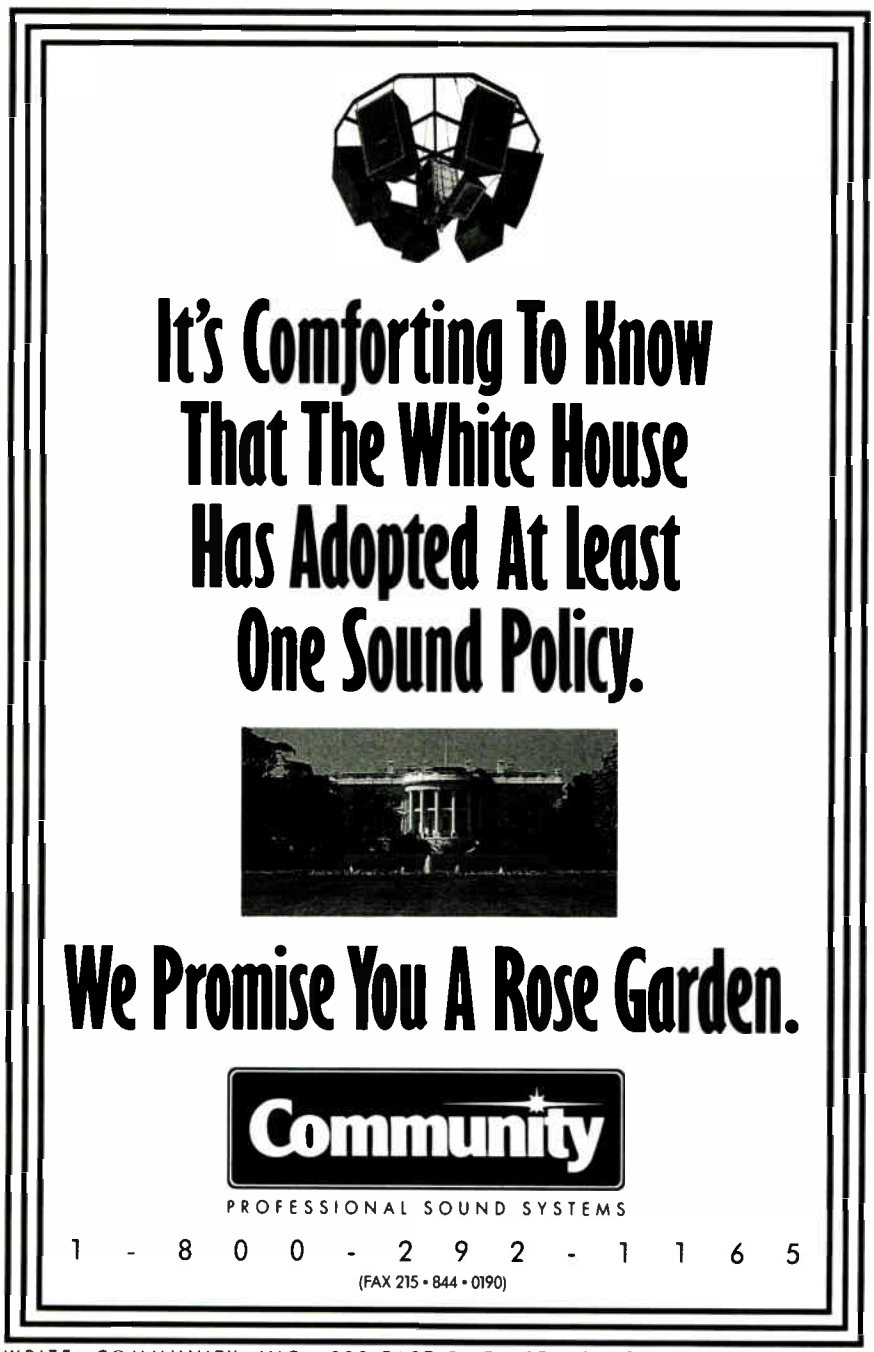
—FROM PAGE 130, "BRAM STOKER'S DRACULA"

Evertz Microsystems and Zoetrope jointly developed what later became known as Key Log, a simple-to-operate PC application that when connected to the Keycode reading and film time code reading hardware in the Telecine suite, could automatically capture and log data on a take-by-take basis while running the session.

The database files of the Telecine session could be uploaded via modem to our editorial office in San Francisco so the editors would have a jump on what new material was coming in the pouch. These database files also played an integral part in the bureaucracy of the editorial system; a *Dracula* log book (a.k.a., "Dracu-log") was the hard copy printout of all footage, and lab print orders were generated from the concatenated database files.

Most significantly, these database files could be uploaded into the nonlinear offline editing system to "auto-reference" the source material. In other words, the Montage, Avid or other offline system would understand the relationships between actual film frames and video frames so that accurate negative or workprint cutting lists calibrated in Keycode latent edge codes could be generated.



SOUND FOR THE PREVIEW

A small crew was hired to prepare tracks for a temp mix. We used the cut audio right off the Montage Work [Video] Tape and added minimal sound effects and temporary music. As picture editorial decisions became finalized, we brought on a sound crew at Sony Studios. Dialog, ADR and Foley were all edited using digital audio workstations that used edit decision lists provided by the Montage picture editors in San Francisco.

Sound editors began by loading all relevant source material from original ¼-inch sound rolls onto removable magneto-optical discs. Floppy disk sound EDLs were loaded, and the workstations would auto-conform the source audio based on the Montage picture editors' work. The sound editor would then make necessary adjustments and fine-edits to make a smooth-sounding track filled with the necessary air and ambience.

The editors would then spot the film for technically necessary ADR. Eventually the cut and split dialog and ADR tracks were laid back onto multitrack tape for premixing to mag film. We were fortunate in that Columbia-Sony had equipped themselves with over ten CyberFrame workstation rooms.

Regarding futuristic high-tech digital picture- and sound-editing machines in the real world of post-production, these are capital-intensive systems. Sony Studios had been using CyberFrame digital audio workstations primarily on made-for-television movies and low-budget features; large features had shied away from these systems. A consideration for any large-scale project on a tight schedule would be access to enough systems. The tendency in both electronic picture and sound-editing systems is to double-shift around the clock to improve throughput. In conventional film editing, it had always been simple to add one or more conventional edit benches along with additional crew when speed had to be increased.

A culture gap exists between traditional film crews and television or video post-production people. From the film editor's point of view, the typical TV-trained videotape editor is a "...glorified computer operator... video editors spend more time looking at lists of numbers than at the image they are cutting...they are always in a hurry and settle for the

World Radio History

quick editorial fix rather than trying multiple options."

From the TV producer's point of view, feature film directors and editors are slow, arrogant prima donnas who adhere stubbornly to outmoded manual technologies that require far too many human, payrolled assistants. But I believe that a new generation of talented professionals and artists is emerging that will make use of whatever equipment or technology, new or old, that best suits the project at hand. ■

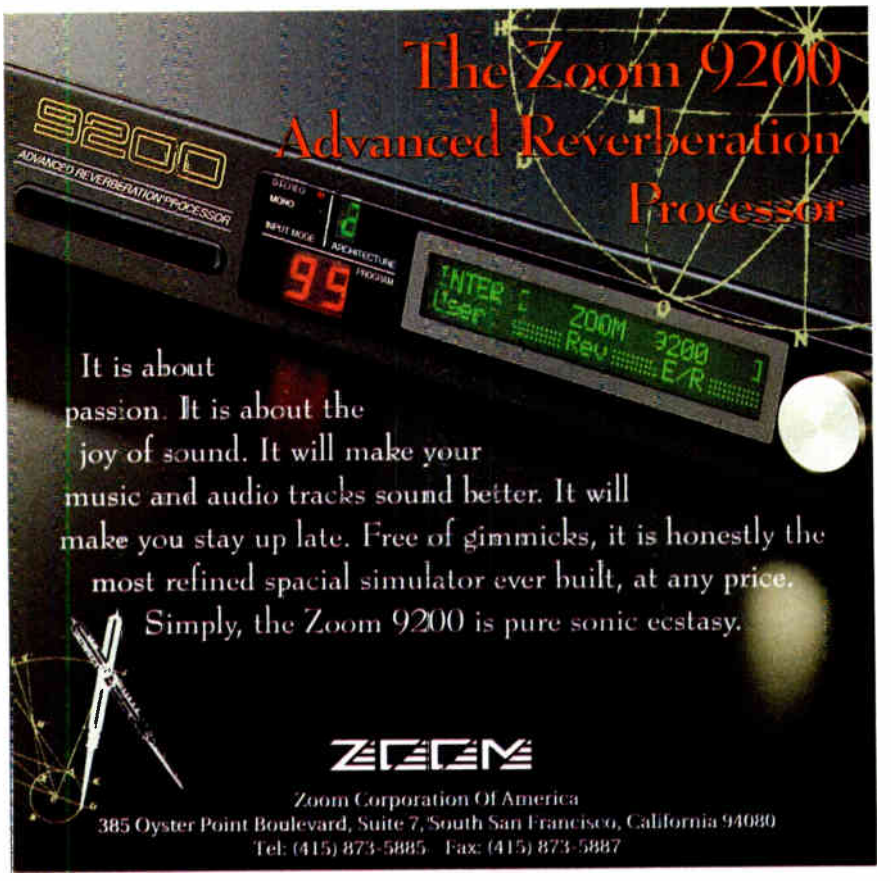
—FROM PAGE 125, HDTV UPDATE

the consumer and cost to the manufacturer; signal quality—the robustness of the signal and interference potential; and interoperability and extensibility—the winning system must be compatible with other imaging formats like computers and also be able to have headroom, to improve as we go down the line just as NTSC has done over the last 50 years."

Testing started in July 1991, and as of October 20, 1992, the ATTC had tested five proponent systems and prepared to send their results to the Advisory Committee by January 1993. A special panel from the Advisory Committee then met on February 8-12, 1993, in order to retest any product advances by the proponents.

The five high-definition television proposals before the Advisory Committee are (in testing order): the Narrow-MUSE system from NHK, Japan's public broadcasting corporation; the DigiCipher™ system from General Instrument Corporation; the Digital Spectrum Compatible HDTV system from Zenith Electronics Corporation and AT&T; the Advanced Digital HDTV system from the Advanced Television Research Consortium (ATRC); and the Channel Compatible DigiCipher™ system from General Instrument and the Massachusetts Institute of Technology. There was a sixth proposed system, known as Advanced Compatible Television, also from the ATRC, but the consortium withdrew it from consideration in March 1992.

The David Sarnoff Research Center is part of the ATRC alliance, which also includes NBC, Philips, Thomson Consumer Electronics and Compression Labs Inc. General Instrument Corporation and M.I.T. are part of the American Television Alliance (ATVA).



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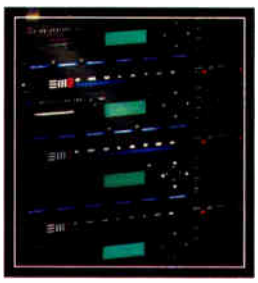

But incredible sound is only half of the story. The EIIIx series offers an impressive complement of features beginning with 32-voice polyphony, 32 digital resonant lowpass filters and 8 MB of RAM standard (expandable to 32 MB). And with AES/EBU digital I/O and eight balanced polyphonic outputs, the EIIIx series is ready for any mix environment. Dual SCSI connectors make it easy to link multiple EIIIx modules and to access a variety of mass storage devices. Add a long list of sample processing functions and you've got both power and versatility at your fingertips—all accessible through the industry's clearest user interface.

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But with all these features, the most impressive one may be price. EIIIx models start at $3,995. Visit your nearest E-mu dealer for a demo and consider your search for the perfect audio tool over.

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World Radio History

The ATRC is the only faction with a broadcaster, NBC, among its ranks.

Yet to be determined by the HDTV testing committees are standards for data compression and signal transmission. Today's radio and TV stations send their analog signals over narrow frequency bands, also known as channels. The FCC plans to use similar channels with a simulcast system when it selects the U.S. standard for HDTV broadcasting. However, in order to transmit on these channels, proponents must squeeze an HDTV signal into a 6MHz TV channel. Currently, HDTV information can be compressed by a ratio of almost 50:1 so that it can fit onto existing TV channels.

In the FCC-proposed simulcast approach, existing NTSC television stations would continue to broadcast as they do now, and HDTV would be broadcast simultaneously on currently unusable or "taboo" channels. These unusable channels are left vacant in today's TV system to avoid interference between television stations. When HDTV becomes reality, the total number of television broadcast channels will double.

Technically, HDTV systems will transmit and receive five times more information than ordinary TV, and HDTV sets will deliver higher-resolution images with 787 to 1,050 horizontal scanning lines (as compared to existing sets that render 525 lines) in a wider-screen monitor—the 16:9 ratio of width to height approximates that of a theater screen.

The audio for HDTV has to be stunning to match the graphics being presented onscreen, and HDTV proponents promise sparkling, 5-channel digital sound. Many attribute the adoption of world-standard Motion Picture Experts Group (MPEG) video compression and MUSICAM audio compression systems, in combination with a high sampling rate, for the quality sights and sounds. One system even claims it can produce 6-channel digital audio, since only a small proportion of the data being compressed is audio as opposed to video.

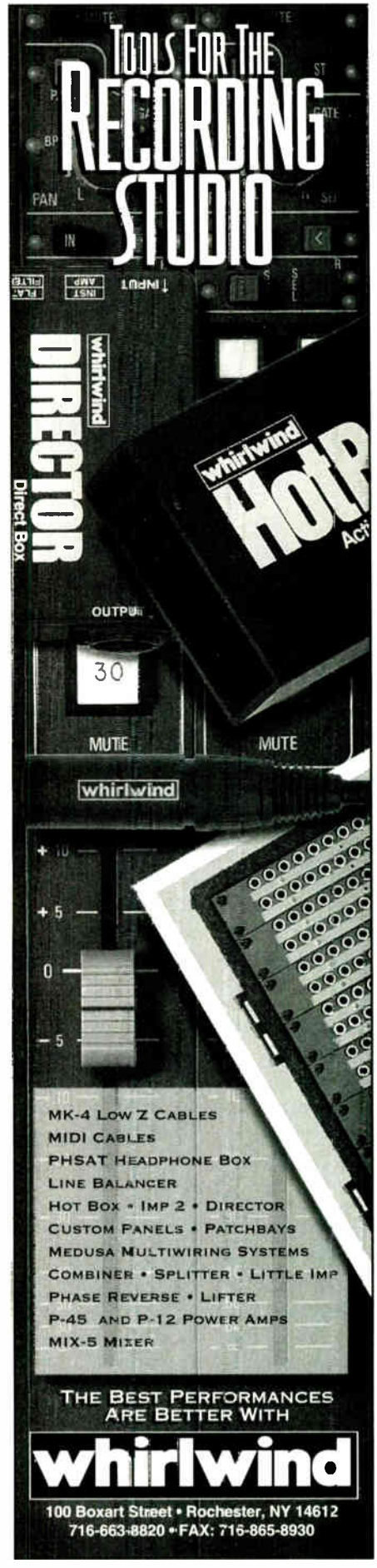
In addition, the MPEG compression system is designed for prerecorded digital media, such as future CD-I systems, and can be adapted to magnetic recording systems—like computer disks and drives. And the digital dialog between PCs and HDTV holds promise for plenty of interactive multimedia.

Altough an HDTV standard has not been adopted, many HDTV projects are already in the can, especially in Japan, where NHK would seem to have a huge head start in HDTV production. Since 1991, NHK has been broadcasting HDTV programming via MUSE (Multiple Sub-Nyquist-sampling Encoding), a bandwidth-compression, satellite-delivered transmission system. In order to be considered for U.S. adoption, NHK developed their Narrow-MUSE system to conform with the American broadcasting infrastructure—terrestrially transmitted programming via VHF and UHF frequencies.

In the U.S., completed HDTV projects include an HDTV take on basketball with a high-definition videotaping of a Chicago Bulls/New York Knicks basketball game by the Zenith/AT&T Digital Spectrum Compatible system; a live HDTV simulcast of "News4 at 5" on NBC affiliate WRC-TV in Washington, D.C., which used the Advanced Digital HDTV system from Philips and the Advanced Television Research Consortium; and one company, Rebo Studios in New York, has been shooting HDTV since 1986 when they received one of the prototype NHK systems from Japan.

The only thing obstructing HDTV's U.S. acceptance is protocol—FCC-approved methods of data compression and signal transmission, and standardized parameters for manufacturing video recorders and home monitors. The recommendation from the Advisory Committee and subsequent decision of the FCC on the winning system likely will affect the next 50 years of television broadcasting. Consequently, the developer of the winning proposal should reap HDTV's lucrative bounty since the digital compatibility—and, thus, interactive possibilities—and dramatically improved sights and sounds of HDTV systems will make them quite desirable. So it's important that all proponents—and their upgrades—be tested thoroughly.

"It's been a long [testing] process," Advisory Committee chairman Wiley concludes. "But given the complexities we've faced I think we're well on track. If we lose a few months, it's not going to be the end of the world because the main goal is to come back to the FCC with a very good recommendation." ■



World Radio History

—FROM PAGE 127, TECHNOLOGIES FOR FILM

ever tried to loop kids..."

EDIFLEX SYSTEMS *AUDIFLEX*
Catherine Speakman, supervising dialog editor, EFX Systems, Burbank, Calif.

Strengths: Made for dialog editing; "looping" function for clean backgrounds, with the potential for eliminating some ADR; "back and forward" function; capable of more than 100 channels, 8-channel playback; user-friendly, one-screen operation; "just like working with film."

"*Weekend at Bernie's II* was shot in the Virgin Islands, where the backgrounds were very loud and diverse—bugs, wind, beach, waves—and the mics were set in certain fixed positions," Speakman notes. "The Audiflex allows you to take a very small segment of sound, as small as one second, and build a continuous, steady background through the scene. I was once told by Lon and Wylie [Bender and Stateman, of Soundelux] that detail in backgrounds makes or breaks the dialog. This system is intricate, and it re-creates the traditional film editorial process better than any system I've seen. Source material comes in on DAT, ¼-inch, M-S stereo, and they're all adaptable to this machine."

KORG *SOUNDLINK*
Bob Bragg, engineer, Producers Video Service, Baltimore

Strengths: Interface!; MIDI interface with internal sequencer; machine control (¾-inch, 1-inch, D-2, whatever); real faders; mix automation of EQ, levels, panning, fades; digital aux sends.

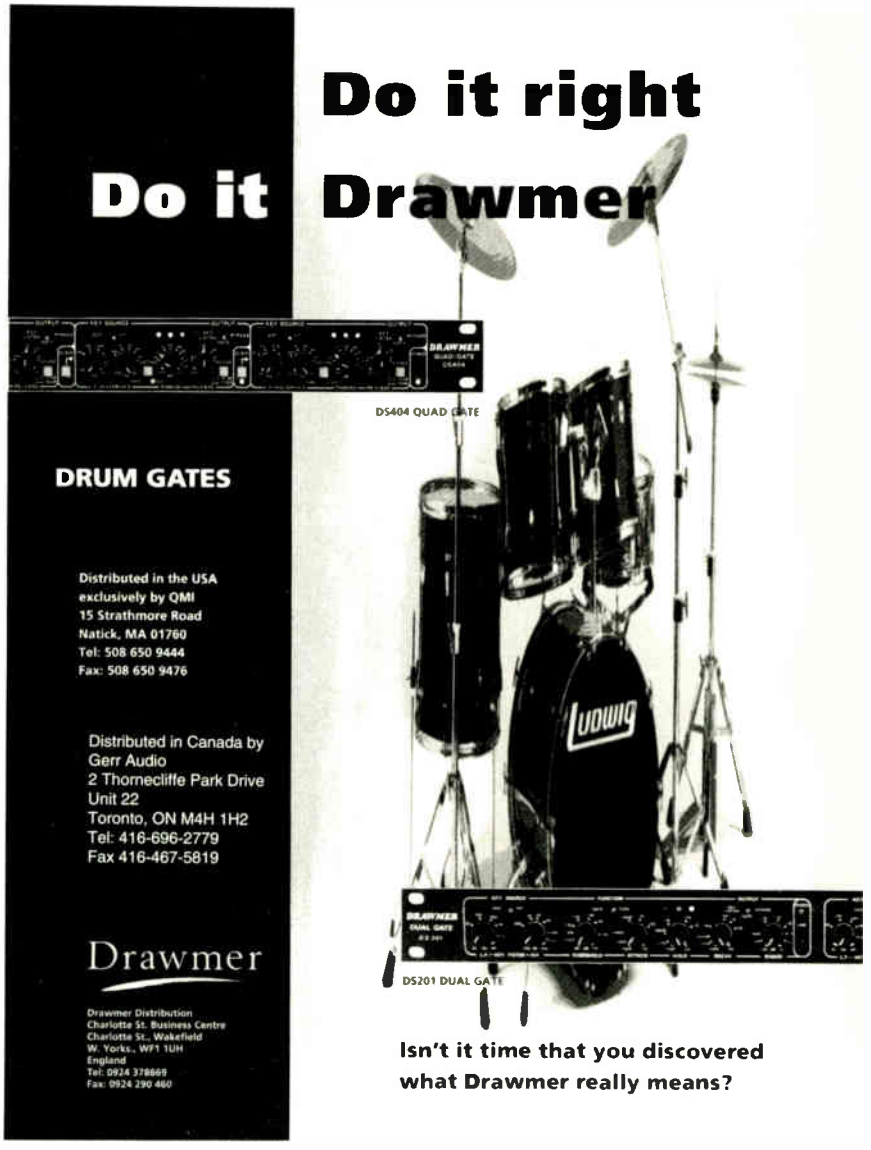
"I cut dialog on it every day," Bragg says. "The ad agencies are interested in taking the best of what the talent reads—three words from this take, three from another—whether in the sync or non-sync world. So you load the voice-overs in, copy them and paste them. The Undo button is right there waiting for you. We were doing a session for a health care provider, and 45 minutes after the talent left, the client called and wanted to change a word. Well, the spot had to be shipped FedEx that night. Luckily, the word was used somewhere else in the spot, and the inflection was close enough so that we moved it around and it fit. You just can't do that with a razor blade and the generation loss."

NEW ENGLAND DIGITAL *SYNCLAVIER*
Harry Cohen, SFX editor, EFX Systems, Burbank, Calif.

Strengths: Effects, effects, effects!; hardware panel with buttons and knobs for quick sound manipulation; 200-track internal sequencer; simple slip and slide; nooks and crannies in the old software pages for unusual effects; solo at the touch of a button.

Weakness: Company no longer exists, though users' consortiums have formeed in New York, L.A. and Chicago.

"Right now I'm working on *Surf Ninjas* for New Line Cinema, and there are a lot of fight scenes," Cohen reports. "So I've designed a set of punches and kicks—sometimes as many as ten to 20 elements per punch. The sounds are easy to collect by auditioning from the library, then you just put the sequencer in record and the sound is there behind the button. Add one, then another, change the tuning, and just arrange the elements in time. After creating an element, I just store it as a single sound, then build keyboard setups for the punches. I'm using upward of 130 to 140 sequencer tracks for some of the fight scenes." ■



World Radio History

by Philip De Lancie

TAPE & DISC NEWS

SONY REPORTS STRONG MD INTEREST

Sony's Audio Development Group reports from Japan that fellow electronics manufacturers are displaying strong interest in supporting MiniDisc with consumer products and key components. The group noted that 11 companies besides Sony showed MD-related wares at the country's two major consumer audio exhibitions, Tokyo's Audio Fair and Osaka's Electronics Show. While Sony's initial MD models had been announced some time ago and are now on sale, the prototypes from other companies provide a glimpse of what the future may hold for the format.

Aiwa showed its AMD-100 recording MD portable, which went on sale in November. The company also displayed some interesting future product concepts, including a wrist-mounted player. Four other prototypes for play-only portables, said by Sony to be remarkable for their small size, were shown by Sanyo, Sharp, Denon and Mitsubishi. Kenwood, Alpine and Fujitsu Ten showed prototype automotive players, while Aiwa, Sanyo, Pioneer, Sharp, JVC, Denon and Kenwood all showed prototype recorder/players in a mini-component configuration.

In the area of key components, Sanyo showed laser pickups, an ultra-compact transport and LSI chips for the format's ATRAC data compression scheme and shock-resistant memory. Sharp displayed new pick-up technology that greatly reduces space requirements compared with conventional CD-type pickups. And Mitsubishi showed a thin, light transport for portables. Stay tuned to see if these components and prototypes translate into actual products exhibited at the Winter Consumer Electronics Show.

TDK DEBUTS RECORDABLE MD

TDK announced the sale of 60-minute MD-XG recordable MiniDiscs at a suggested list price of $13.99. A 74-minute version will be available in early 1993, as will the company's line of DCC-XG blank Digital Compact Cassettes. The MD-XG features a TbFeCo recording layer sandwiched between dielectric layers composed of a silicon compound. These layers are protected from humidity and physical damage by a protective layer of ultraviolet curing resin. Each disc is housed in a see-through protective caddy designed for heat and shock resistance. The caddy is stored in a locking carrying case with a transparent label cover.

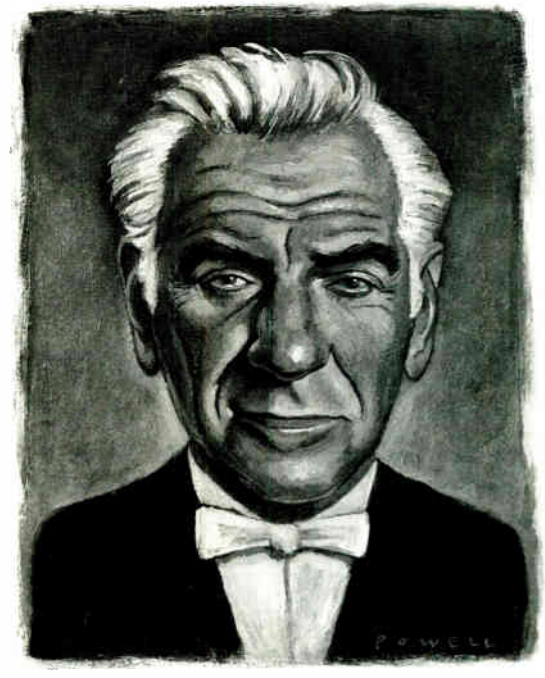


ILLUSTRATION CHARLIE POWELL

SONY DOES BERNSTEIN BIG TIME

Sony Classical is in the initial stages of one of the largest ever single-artist reissue projects. "The Bernstein Royal Edition" is a collection of recordings

World Radio History

USE READER SERVICE CARD FOR MORE INFO

made by conductor Leonard Bernstein, primarily with the New York Philharmonic Orchestra, during the 1960s and 1970s. Sony expects to release a total of 199 CDs in the series over a two-year period. Producers Dennis Rooney, Andrew Kazdin and others will select the best available source tapes, ideally the original unedited session masters for each recording. The program will be A/D-converted at 20 bits for digital editing, then converted to 16-bit for CD using Sony's Super Bit Mapping processor.

UNI GOES COBALT

Uni Distributing, the distribution arm of MCA, has decided to release all new and front-line cassette product on cobalt-ferric tape. The new formulation will be used for some catalog product as well. Quoted in *Billboard*, Uni's Paul West says the cobalt stock allows the company to "increase its cassette mastering levels over 3 dB. We also find there is no difference in physical characteristics between ferric and cobalt."

According to the *Billboard* report, the move to cobalt is part of an ongoing revision of the company's cassette manufacturing facilities and procedures, intended to keep MCA product in line with quality improvements at other major labels. Other upgrades include the installation of three Duplitronics digital bins and equipment for computerized analysis of duplication performance.

ITA BOARD ELECTS NEW MEMBERS

Don Patrican of Polaroid has been elected a vice president of the ITA, while ten new members have been elected to the ITA board. They are: Joseph Colosi (Du Pont), Frank Goodchild (Swire), Mark Mitravich (Hoechst), Ram Reddy Nomula (Disc Manufacturing Inc.), Terry O'Kelly (BASF), Isidore Philosophe (Cinram), William Robson (Kodak), Scott Sanderude (Dow Plastics), Ken Wiedeman (Sony) and Roy Zemanovich (ICI Films). The new members will serve for one year, at which time the entire ITA board will be up for re-election.

EMERALD AND PAKTEC JOIN FORCES

Emerald Technology and Paktec Automation have entered into a joint licensing and technology development venture to develop, manufacture and market high-speed production automation. The agreement calls for transferring the manufacture of Paktec's JC7000, a 100-part-per-minute Norelco box inserter, to Emerald in Nebraska, while continuing research and development at Paktec in Washington under Darrell Zielke.

"COMPTON'S ENCYCLOPEDIA" ON CD-I

Philips Interactive Media of America announced the release of a CD-I version of Compton's Interactive Encyclopedia. The title includes 5,000 still images, 18 minutes of video, and 20 minutes of high-fidelity sound. The disc ("a $299 value") will be bundled with Philips' $699 CDI910 player.

SPLICES

Electro Sound (Sun Valley, CA) has sold Series 9000 dual-slave high-speed duplication systems to four facilities in Asia: Sinhung Jen Heng in Beijing, China, and Top Line, Onpa and Krung Thai in Bangkok, Thailand...**Versadyne** (Campbell, CA) sold its new 1000 Series bin loop master with 600 Series slave to duplicator Lauro & Cia in Cochabamba, Bolivia. The company also sold an additional four slaves to Recortec of Buenos Aires, Argentina, for its 1500 Series system. Versadyne also supplied Recortec with two CD-9000 loaders from **Concept Design**...**Saki Magnetics** (Calabasas, CA) announced the signing of a long-term agreement with Specialty Records to supply ferrite heads for Specialty's 155 Electro Sound duplicating slaves. According to Specialty's Pat Shevlin, appropriate preventive maintenance allows the heads to go 3,000 hours between relapping, with three or four relaps possible before replacement...Mel Torme's first-ever Christmas album, *Mel Torme: Christmas Songs*, was mastered by Hoyt Dooley III at **Disc Mastering Inc.** in Nashville...**Digital House** (New York City) prepared the CD and cassette release of *Bayard Rustin: The Singer*, a benefit project commemorating Rustin's contributions as a singer and civil rights activist...**Parallax Audio Productions** (Jackson, MS) has opened a mastering facility based around the Sound Designer II system from Digidesign. The facility also does real-time duplication of cassettes, DATs and video. ■

World Radio History

by Chris Stone

REAL-WORLD MARKETING

HOW YOUR PEERS DO IT

Now that you have your studio together, how do you tell your potential clients about it? How do you appeal to those studio time users who fit your niche, and how do you keep them? What is important to offer, and what isn't necessary? We talked to four studios in the Northwest that have survived in today's tough market because they have found a unique way to promote their facilities. They all have diversified their original services to meet the forces of competition, while not forsaking their commitment to do what they do best. No matter what you read or hear, that philosophy is what makes the winners.

We talked to two small markets: Chris Middaugh at Triad Studios in Redmond, Wash., who has been there for 13 years and does music and advertising; and John Sundberg, owner of FTM studios in Denver, Colo., who learned early in his 25 years of experience that diversification is the key to success. His business has grown from simple 2-track recording of lectures "to a well-outfitted 24-track studio with two months of advance bookings."

Then we moved down to San Francisco and spoke to Susan Skaggs, owner of Different Fur, which has been one of the area's leading music studios for at least 20 years; and Phil Schroeder of Green Street Music, a project studio specializing in advertising and related industries, who apologized for being so busy that he almost could not participate in this discussion.

What they all have in common is a consuming desire to service their clients. Some use advertising to spread the word about their services. Others "hang out" and promote their facilities verbally to their clients. All agreed that once they had captured clients, they wanted to provide them with everything necessary to keep them—from digital editing to duplication—and to subcontract those services they were not prepared to provide. Different Fur's Skaggs says, "Our goal is to create and keep customers by doing things that will make them want to come back and refer others to us." FTM's Sundberg says, "From the beginning we

—CONTINUED ON PAGE 148

Operator Tip of the Month:

The music industry trade magazines are hungry for news. Regularly send them anything exciting about what is going on at your studio. Marketing makes the difference.

World Radio History

COAST

L.A. GRAPEVINE

by Fred Jones

The Record Plant guys just don't stop. Last month I told you all about the new SSL room, and now they have completed the new Neve room. Appropriately called "Neve 1," it includes a 96-input VRP Legend console with GML moving fader automation.

As with "SSL 1," the acoustic design is by studio bauston, under the direction of Peter Grueneisen. George Augspurger designed the main control room monitors. These rooms also offer

—CONTINUED ON PAGE 143

Margarita Mix (a Los Angeles post-production house) recently installed a Euphonix CSII 8056 console into its Studio C.

SESSION SPOTLIGHT: *SHADOWFAX*

by Jeff Forlenza

Chuck Greenberg's lyricon has become the signature of a grooving band that melds ambient synth textures with visceral organic rhythms to make soulful ethnic music. That band is Shadowfax, and their new album, *Esperanto*, was nominated for a Grammy in the world music category this year.

Shadowfax first came to prominence under the auspices of Will Ackerman's Windham Hill label in the early '80s. Today Shadowfax are EarthBeat! artists—distributed by Warner Bros. Records—and the feel of their latest release reflects the down-home nature of the almost-indie label.

As chief architect of the Shadowfax sound, Greenberg explains how this album differs from their previous efforts: "After Capitol and Private Music and the big labels, we wanted a small label and the attention [that comes with a small label]. There's a lot of enthusiasm at EarthBeat!, like the early Windham Hill."

Greenberg, who co-produced *Esperanto* with engineer Harry Andronis, also sought a new sound that was a change from the earlier electronic albums. "[We wanted] a lot of natural percussion, and we tried to play everything live," Greenberg explains.

When it came time to record, Greenberg chose Group IV Recording in Hollywood. "The thing that's great about Group IV is the size of the room," Greenberg raves about the 45x48-foot room that can fit a 40-piece orchestra. "[Before tracking] we rehearsed for a month at Group IV. We tried to get the songs so that people knew the tunes but they were still fresh." Tracking and mixing were

—CONTINUED ON PAGE 146

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COAST

SESSIONS & STUDIO NEWS

by Jeff Forlenza

NORTHWEST

San Francisco's Razor's Edge Recording Studio had Kurt Cobain in producing The Melvins' heavy, dirge-like Atlantic release with engineers Billy Anderson and Jonathan Burnside. The Melvins were originally from Cobain's hometown of Aberdeen, WA, before migrating to the Bay Area. Razor's Edge also had The Red House Painters in tracking for the exclusive British label 4AD Records...Sound Sound is a 24-track studio in Seattle with location recording capabilities via its portable Mackie

Right: At Razor's Edge Studio in San Francisco (standing l-r) are guitarist/singer Buzz, engineer/co-producer Jonathan Burnside, drummer Dale and producer Kurt Cobain. Seated is bassist Lori. Below: Up in Seattle, Tom Fallat (left) and Steven M. Miller run Sound Sound Recording.

mixer, B&K mics and DAT recorder. Manager Steven M. Miller and owner Tom Fallat engineer the 2-track digital location recordings. Recent Sound Sound gigs included capturing North Indian sitarist Sharmisha Sen from the Seattle Museum of History and Industry; and jazz pianist Larry Karush from the Cornish College of Arts in Seattle...Up in Fairbanks, AK, brothers Jerry and Rif Rafson own and operate Dome Studios, a 16-track recording and digital mixdown facility. Recent Dome sessions include an album-length demo by Kelly Moneymaker, now a vocalist with the currently charting group Expose; and a cassette release entitled *Do Me Right* from Dawn Holmes...All tracks and overdubs for the latest Faith No More Slash/Reprise release, *Angel Dust*, were laid down at San Francisco's Coast Recorders with producer Matt Wallace.

Also at Coast, former-Replacement Paul Westerberg was tracking and overdubbing his next Warner Bros. album...Producer Al Eaton was working with Oakland rapper Too Short at Eaton's project studio, One Little Indian Productions, in El Cerrito, CA. Eaton and "The Short Dog" worked on his latest for Jive/RCA Records...

NORTHEAST

Donald Fagen returned to Clinton Recording Studios in Manhattan to finish up vocals for his upcoming solo album on Warner Bros. Wayne Yurgelum engineered the sessions on a vintage Neve 8078, while Troy Halderson assisted on the 48-track digital project... Acme Recording of Mamaroneck, NY,

—CONTINUED ON PAGE 143

N.Y. METRO REPORT

by Dan Daley

You heard it here first. Rumors of Ed Evans leaving Power Station are true. Evans, who was the chief tech at Power Station since the beginning, left at the end of January to take up the position of technical director for the rapidly expanding Touchdown Studios in Munich, Germany. As part of Evans' new responsibilities, he'll be overseeing the construction of a large new recording facility in Portugal, which is expected to be completed late this year. That studio will be designed by Neil Grant of Harris Grant Associates.

Evans will maintain an informal relationship with Power Station, and he stressed that the parting of ways was quite amicable. "I had simply reached a point where I wanted to do more consulting and design work," explained Evans, who designed the D room at Power Station and consulted on other area studios, including JSM, Manhattan Center and Snowbound. "Also Tony [Bongiovi] is doing more in-house productions at Power Station. While they still do a lot of outside clients, it would cut down somewhat on the level of intensity for me here. I needed another challenge." Power Station will continue to have in-house maintenance in the future, Evans said.

Electric Lady has put off its planned new console acquisi-

—CONTINUED ON PAGE 146

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World Radio History

—FROM PAGE 140, L.A. GRAPEVINE

an impressive array of new and vintage outboard gear, as well as one of the best microphone collections in the world.

What I can't wait for is the completion of the new pool and Jacuzzi. Hey Rick, give me a call when it's all finished so I can check it out—I mean "book some time"—yeah, that's it. Call Rick Stevens at (213) 993-9300.

The big news this month in the post world is that Hollywood Digital is open. If you haven't heard about it yet, you will very soon. To start with, the facility is 33,000 square feet of every digital toy you could ever want, and it cost well over $12 million to build from the ground up.

The place has been designed to accommodate a broad clintele base. Services include all that is necessary and more for film- and tape-based television production, commercials, promos, music videos, feature films and corporate productions.

CEO Bill Burnsed says, "Great care has been taken in matching construction and engineering techniques. It's a wonderful opportunity to build a facility for the truly digital generation. I see Hollywood Digital as the television post-production facility of the 21st century."

HD contains four composite digital edit bays (there will be ten edit bays when the facility is completed), all with Grass Valley Group 3000 switchers, Kaleidoscopes, GVG Sabre editors and GVG and Accom digital disc recorders. There are graphics compositing rooms and two Rank URSA digital telecine rooms, with color correction using the da Vinci Renaissance 8:8:8 for use on either film or tape.

More importantly, there is no slacking on the audio side: two Solid State Logic Scenaria digital audio mixing rooms and two SSL ScreenSound digital audio workstation rooms. All four will be tied together with SoundNet, and all rooms will have surround sound capability. A large, multiperson ADR/Foley room is part of the audio section, and the machine room houses more than 50 digital tape machines of all formats—in a 1,600-square-foot room! Call them at (213) 465-0101.

Speaking of studios with "Hollywood" in their name, Kelly Nichols of Hollywood Recording called to say that they have expanded their in-house duplication facility with the purchase of a KABA real-time cassette duplication system. This is in addition to the DAT and reel-to-reel dupe systems already in place. Call them at (213) 957-8400.

P.S. Kelly gets my award for the best quote of the new year: "Because of this new system, I'm actually able to get out of the facility before dark and have a personal life again!" We will see how long that lasts.

Sadly, due to the rains this month, the "overheard at the hamburger stand" portion of this column will not appear.

If you have anything to contribute, please give a call or fax at (818) 506-1071. You can also write to me, Fred Jones, at 859 Hollywood Way #128, Burbank, CA 91505. ■

—FROM PAGE 141, SESSIONS & STUDIO NEWS

had the Spin Doctors in mixing and editing their live disc, *Homebelly Groove*, with producer/engineer Peter Denenberg. The Doctors are riding a wave of hype (cover of the *Rolling Stone*) and heavy airplay of their *Pocketful of Kryptonite* album, but their strength has always been their live jams. Thom Leinbach was second engineer, and Frankie Larocka was co-producer on the seamless 77-minute CD, which made use of Acme's Akai DD-1000 digital workstation...Eclectic/psychedelic New England rockers Phish locked out White Crow Audio in

USE READER SERVICE CARD FOR MORE INFO

World Radio History

Burlington, VT, for five weeks with producer **Barry Beckett**. **Kevin Halpin** engineered the sessions for Elektra Records, with assistance from **Tom Walters** and John **Altshiller**...At **Shelter Island Sound** in Manhattan, renowned producer **Gus Dudgeon** was working on **Ellen Cargan**'s debut album for Atco/EastWest Records with engineer Ray Martin...At **Third Story Recording** in Philadelphia, alternative acts **Zen Guerrilla** and **Mondo Topless** were working with producer Scott Herzog... Producer/manager Thomas "Doc" Cavalier was at **Trod Nossel Recording** (Wallingford, CT) with engineer Rob Cavalier working on tracks by **Christine Ohlman**. Ohlman is a member of the *Saturday Night Live* band and leader of **Rebel Montez**. She checked in to TNR to track her own material after supplying background vocals at the Bob Dylan tribute concert at Madison Square Garden...Veteran producer **Tom Dube** (Tin Machine, 'Til Tuesday) was at **Q-Division Studios** in Boston working on a project for **Charlie Dog**, with guitar and arrangements handled by Tin Machine guitarist **Reeves Gabrels**...

SOUTHERN CALIFORNIA

Former Monkee **Michael Nesmith** completed his latest self-produced release, *Tropical Campfire's* at **Trax Recording** in Hollywood with engineer **Mike McDonald**. The new Pacific Arts Audio release is country-rock with flamenco flairs and Nesmith's languid, soft-spoken/sung lyrics recorded and mixed in Dolby Surround...**Screamin' Jay Hawkins** was at **For The Record Studios** (Orange, CA) mixing tracks for his Bizarre/Straight release...**Keith Richards** was at **Cornerstone Recorders** in Chatsworth, CA, producing/mixing a live recording for Virgin Records with engineers Don Smith and **Richrad Hasal**...Bassist **Rob Wasserman** continued work on his *Trios* album at **Ocean Way Studios**, where he teamed up with **Brian Wilson** and Sam **Phillips**. The threesome combined to create "Bells of Madness," produced by Don **Was**...Strings whiz **David Lindley** was at **Brooklyn Recording** (Hollywood) doing the soundtrack for the children's video *Sacajawea* with engineer **Micajah Ryan**. Lindley's work will be combined with Laura Dern's narration for the Rabbit Ears release...

SOUTHEAST

Mark O'Connor was working on a self-produced project for Warner Bros. at **Sound Emporium** (Nashville) with engineer **Bill Vorndick**...The **Rollins Band** stopped in at **Cue Recording** in Falls Church, VA, to touch up some guitar tracks with engineer **Jim Ebert** for their Imago Records release...**Serious Pilgrim** were at **Telstar Studios** in Sarasota, FL, working with engineer/producer **Rob Stevens** and engineer **Bud Snider** on a new release for MayKing Records...

SOUTHWEST

The **Galactic Cowboys** were at **Rivendell Recorders** (Houston) working on their new release, *Space in Your Face*, for DGC/Geffen with producer **Sam Taylor** and engineer Brian Garcia...Starshine recording artist **Didier** was at **Goldust Studios** in Las Cruces, NM, where he tracked and produced a 14-song project titled *N Full Fx*...

NORTH CENTRAL

Creative Life Entertainment producer **Juan "Jas" Shannon** recently completed tracks for **EZ Bang**'s debut LP at **Sound Suite Studios** in Detroit with engineers **James Reed** and **Steve Capp**...Producers **Jeff Murphy** (of Shoes fame) and **Leroy Bocchieri** recorded the debut release by Chicago-based artist **Day One** at **Short Order Recorder** in Zion, IL.

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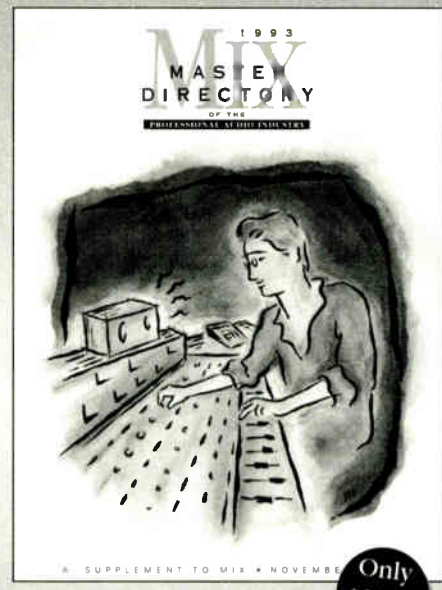

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World Radio History

Rocking rap group Proper Grounds completed its debut for Madonna's Maverick Records at Brooklyn Recording in Hollywood. Pictured (l-r) are Bill Dooley (chief engineer), Scott Stillman (assistant engineer), Danny Saber (guitarist/ producer), Guy Oseary (A & R) and Sandman (vocalist/ songwriter/ producer).

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World Radio History

Bocchieri wrote, played on and sang all the catchy tunes for the album *Hallowed Ground*, while Murphy engineered...

STUDIO NEWS

West Hempstead, Long Island, has a new room: The Music Palace sports a 64-input SSL G Series desk in a Tom Hidley-designed 20Hz control room, supposedly identical to the Hidley room at Capri Studios in Italy. The Music Palace installation also features the first U.S. implementation of FM-801A power amps...Mary-Anne Turner-Sparks purchased the former Alpha Audio complex in Richmond, VA, and turned it into Blondies Recording. The former Alpha studio manager and sales director Sparks wasted no time in her new position and added an SSL ScreenSound digital audio editing system to the post-production and music recording facility...Located just outside of Dallas, Inside Track Studios opened a new room. Outfitted with a Trident console and Studer recorders, the room was designed primarily as a pre-production and artist development facility. Clients in the new room included Brave Combo and Trout Fishing in America...Crescent Moon Studios of Miami recently added two Allen & Heath Spectrum consoles, which will be used for pre-production work with Miami Sound Machine and other acts...

Send nationwide sessions and studio news to Jeff Forlenza, c/o *Mix*, 6400 Hollis St. #12, Emeryville, CA 94608. ■

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—*FROM PAGE 140, SESSION SPOTLIGHT*

handled on Group IV's Neve V Series console with Flying Faders.

Joining Shadowfax co-founders Greenberg, Phil Maggini (bass) and Stu Nevitt (drums) on this their ninth studio effort is Armen Chakmakian—a classically trained keyboardist, computer whiz, drummer and generally adventurous musician who brings an Armenian/Arabic bent to the melting pot. Guest musicians on *Esperanto* include renowned percussionist Emil Philips and noted violinist/vocalist L. Shankar.

Whether or not Shadowfax takes home a Grammy this year—and it would be their second—they can be satisfied in knowing that they created their own genre of music. It's not jazz, not rock, not electronic music, not acoustic music, not new age, not classical. It's not any of these categories, but all of them. ■

—*FROM PAGE 141, N.Y. METRO*

tion, at least for the time being. Of three consoles in use—two SSLs and a five-year-old original Rupert Neve Focusrite—the smallest, a 56-input SSL E Series, was slated for replacement with an 80-input SSL late last year. But slower-than-anticipated fall bookings short-circuited that, according to studio manager Mary Campbell. However, she said, December's bookings were way up, and a new console, as well as a possible expansion into the now closed 8th Street Playhouse movie theater next door, are likely for some time in 1993. In January, George Massenburg was working there with James Taylor, using the Focusrite room.

Music industry legends Les Paul, Tom Dowd and Eddie Kramer all received Platinum Music Awards for Lifetime Achievement on December 6. The ceremony, held at the Lone Star Roadhouse, included presentations from Ace Frehley and Jerry Wexler. Platinum Music Networks, the organizer of the awards, operates music seminars along the East Coast. ■

World Radio History

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Algorithms include reverb as only TC Electronic could do it, pitch/harmony effects, and unmatchable chorus/flange/delay effects. Other algorithms are already under development by TC Electronic and third party programmers. Since the M5000 is software based, updating or adding new algorithms is as simple as loading in a RAM card or floppy disk.

Thanks to its open architecture, software-based design, and over-the-top specification, the M5000 will never be obsolete. A dream machine today, the M5000 has many futures—this is just the beginning!

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—FROM PAGE 139, REAL-WORLD MARKETING

learned that word-of-mouth would be the backbone of the studio's growth." Sound familiar?

Green Street's Schroeder went to the marketing text books and reports that "marketing is really a collective understanding of the 'four p's': product, price, positioning and promotion. Most people confuse marketing with advertising, but you'll notice that in the 'p' series, promotion is only part of it, and even then it comes last. Marketing is the understanding of how the four work in concert to create greater possibilities. We are not in the business of selling studio time; we create original music to fit our clients' specific needs and use the studio as a means to accomplish that end." I really like that! Schroeder goes on to say that he uses project-based rather than hourly pricing: "The burden is on us to analyze the project correctly and to charge a price that adequately covers our efforts. When we discuss our position in the market, we consider the image that we send out to our clients: Are we professional? Do clients have fun when they work with us? We try very hard to give our clients and prospective clients the sense that we are competent, creative, daring if necessary, and, most of all, accessible."

Skaggs takes it a step further: "Every time a potential client calls us and asks for information, I consider it a gift. We differentiate ourselves from other studios in San Francisco by emphasizing how we can solve the customer's problem and fulfill our promises. Our goal is to give them more than they expect. That is how we keep them. I do not try to get the buyer to want what I sell, but to sell what the buyer wants." Go for it Susan!

Triad's Middaugh feels that marketing his studio primarily means "relying heavily on our reputation and our strong belief in customer service. We work our contacts, and we distribute a color brochure and advertise in the local monthly music paper as well as the Yellow Pages." All of this seems to work for his music and advertising clients.

FTM's Sundberg considers himself "to be equal to or most of the time better than the area studios." He has accomplished that feat for more than 25 years "by providing a big, lush studio and a budget studio, plus a production studio to offer a wide appeal." To spread the word, he decided that diversification was the key to marketing success. "We considered the sound of our studio to be our edge in marketing because of its effect on the quality of our product." I agree with this guy. To tell his story, he uses large Yellow Page ads, trade magazine ads, free studio time for winners of composition and band contests, and sponsorships of local artist radio shows.

All of these owners are promoters. They are out there all the time hanging out and talking about why their studio is the best. Yes! Nothing beats personal contact. So, get out of your chair in your comfortable office and talk to the clients. You are probably the biggest reason they could be at your studio instead of the one down the street. ■

Chris Stone, a former studio owner, is a pro audio consultant and heads the World Studio Group.

—FROM PAGE 22, INSIDER AUDIO

liseconds), while a more slowly changing program will promote an increase in block duration (up to 11.6 milliseconds). This time splitting is based on the effect of temporal (backward) masking, in which tones sounding nearly simultaneously exhibit masking properties. Block duration is interactive with frequency bandwidth; longer block durations permit selection of narrower frequency bands and greater resolution.

Nonuniform time and frequency splitting is accomplished with a combination of filters and transforms. Two splitting filters divide the input signal into three sub-bands: low (0 Hz to 5.5125 kHz), medium (5.5125 kHz to 11.025 kHz) and high (11.025 kHz to 22.05 kHz). Following splitting, contents are examined to determine length of block durations. Signals in each of these bands are then placed in the frequency domain with the Modified Discrete Cosine Transform (MDCT) algorithm. The frequency-domain signals are formed into 512 nonuniform frequency groups, with 128 spectra in the low band, 128 spectra in the mid-band and 256 spectra in the high band, as shown in Fig. 2. Each of these groups is requantized according to the threshold curve and masking conditions in the block, resulting in a reduced data rate. An algorithm is employed to examine the requantized word length of each requantized signal, thus using available bits optimally. Following ATRAC coding, CIRC and EFM operations are performed, and compressed audio data (along with overhead data) is stored to disc at a 44.1kHz sampling rate.

Data played from a disc undergoes EFM demodulation, CIRC error correction and ATRAC decoding. The ATRAC decoder essentially reverses the encoding process. The frequency-domain values are placed back in the time domain through an inverse MDCT operation. The three sub-bands are combined to obtain a full-spectrum, 16-bit digital audio signal. In addition to smaller disc size, ATRAC also permits use of a shock memory, an important feature in the portable medium. The ATRAC encoder is placed prior to the input buffer memory and after the output buffer memory so that only reduced data flows through the buffer, minimizing the required memory length. In a complete MD signal path, the ATRAC encoder is placed just after the A/D converter (or digital input) and just before the D/A converter (or digital output). Digital inputs and outputs on MD recorders adhere to the standard S/PDIF interface.

ATRAC provides a high-fidelity signal and permits 74 minutes of recording and playing time on MiniDiscs. Without ATRAC, an MD would hold only 15 minutes of audio program.

The explanations of MiniDisc technology presented in this series of articles have been based on preliminary information. Final versions of production recorders may differ. ■

Ken Pohlmann is author of Principles of Digital Audio, The Compact Disc Handbook, *and co-author of* Advanced Digital Audio, *all available from the Mix Bookshelf.*

World Radio History

NORTHWEST STUDIOS

Information in the following directory section is based on listing applications 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.

Studio Z Recording Inc. (Sacramento, CA) was founded as a commercial production facility. In 1991, equipment was upgraded to facilitate album projects and audio-for-video work. A vintage Trident TSM 40-input, automated console was acquired from The Plant (Sausalito, CA) and paired with a new Sony APR-24. Jay Lemmons handled studio design and technical direction, while Dr. Richie Moore installed and modified the console. **Photo:** Chris Witzke.

150	ALASKA, CALIFORNIA
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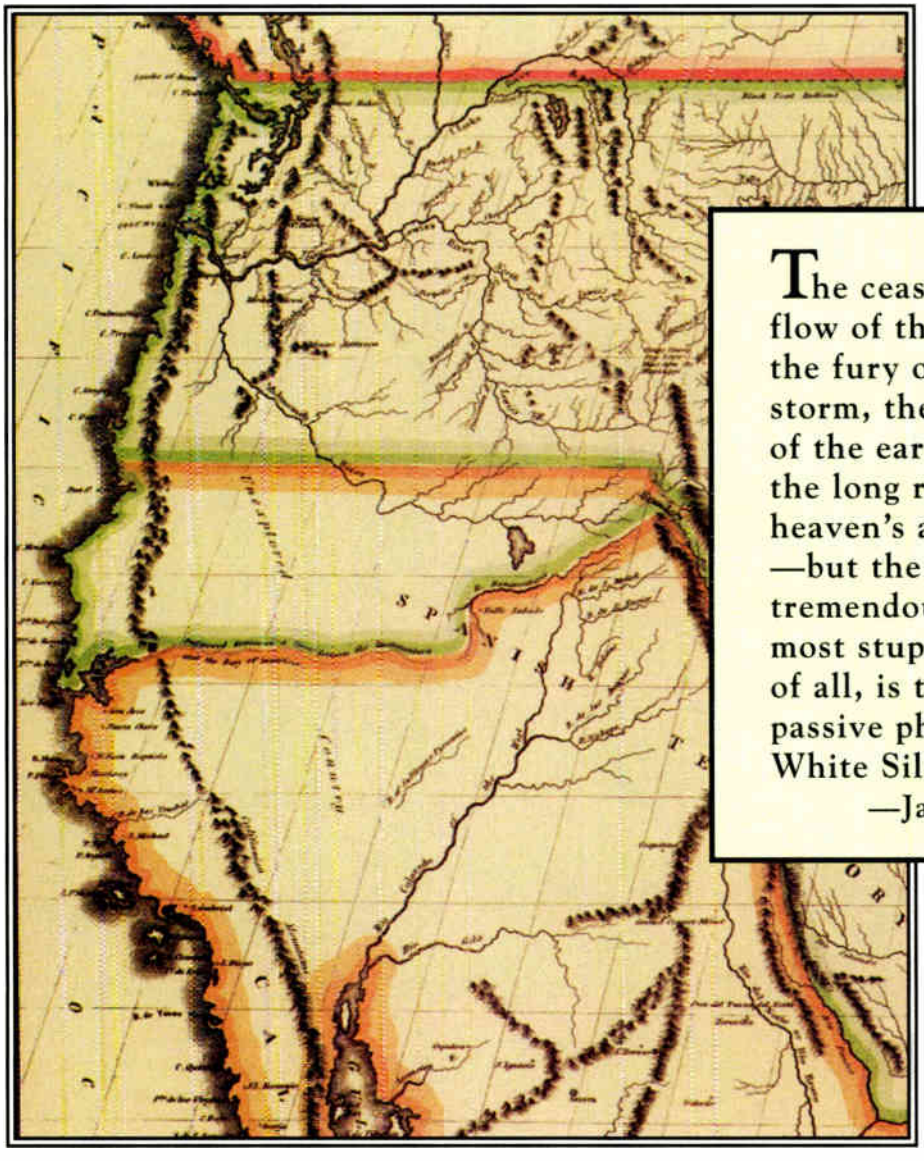
162	IDAHO, MONTANA, NEVADA, OREGON
164	UTAH, WASHINGTON
167	WYOMING

Upcoming Directory Deadlines:
Southeast Recording Studios: **March 8, 1993**
Independent Engineers and Producers: **April 8, 1993**
Facility Designers and Suppliers: **May 7, 1993**

Mix listings procedure: Every month, *Mix* mails listing applications to recording studios and/or other vital facilities and services for the recording, sound and video production industries. There is a nominal 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 (5478).

World Radio History



The ceaseless flow of the tides, the fury of the storm, the shock of the earthquake, the long roll of heaven's artillery —but the most tremendous, the most stupefying of all, is the passive phase of White Silence.

—Jack London

Northwest

RECORDING STUDIOS

Alaska

DOME STUDIOS

A16 D2

1912 Gilmore Trail; Fairbanks, AK 99712; (907) 457-1993. Owner: Jerry Rafson. **Manager:** Rif Rafson.

SURREAL STUDIOS

A24 D2

355 W. Potter Dr.; Anchorage, AK 99502; (907) 562-3754; FAX: (907) 561-4367. Owner: Kurt Riemann. **Manager:** Kristi Olson.

California

ALPHA & OMEGA RECORDING

A48

150 Bellam Blvd., Ste. 255; San Rafael, CA 94901; (415) 485-5675. Owner: Sandy Pearlman. **Manager:** Gregg Schnitzer. **Engineers:** Mark Needham, Mark Hutchins, Terry Weeks, Marc Senesac, Gregg Schnitzer. **Dimensions:** Studio 22x30, control room 22x28. **Mixing Consoles:** API Automated 48+ W/560/550B. **Audio Recorders:** (2) Ampex ATR-124, Ampex ATR-116, Studer A820 24-track, (4) Tascam 122 MkII cassette decks, (2) Ampex ATR-102 1/2" and 1/4", Panasonic 3500 R-DAT. **Monitors:** Yamaha NS-10M, TAD Huge. **Other Major Equipment:** Sontec stereo parametric EQ, (2) Teletronix LA-2A compressors, (4) EAR 660/Fairchild type compressors, Drawmer 1960, (3) Sontec DRC-202 compressors, (6) Aphex 612 gates, (6) Drawmer DS-201 gates, Trident stereo limiter, NTP 179-170 stereo limiter, Franz/PDM EMT-156 compressor, Valley People 415 de-esser, Massenburg 8200 EQ, Lexicon 480L, Pultec EQP-1A, (2) Pultec MEQ, BBE 202R Exciter, Publison DHM-89 2B, (2) Aphex II, EXR EX IV, (4) dbx 160, TC Electronic TC 2290, Eventide H3000 Ultra-Harmonizer, Eventide H969, Eventide Phaser, Eventide SP2016, AMS RMX-16, AMS 15-80S, (2) Lexicon PCM42, Lexicon Prime Time, Loft delay, TC Electronic TC 1210, (10) Kepex II, ADR Compex, (6) GML mic preamps, (2) EAR mic preamps, (4) Lynx SMPTE synchronizers, Quantec room simulator, EMT 140 stereo plate, EAR 822-Q EQ, Vocoder SVC-350, ADR Panscan, large and unusual mic assortment.

World Radio History

THE ART OF EARS

A24 D2

21087 Cabot Blvd., Ste. 6; Hayward, CA 94545; (510) 887-4612. Owner: Andre Ernst. **Manager:** Nancy Urquidez.

ASTHMATIC CAT PRODUCTIONS

A16 D2

Redwood City, CA; (415) 367-8479. Owner: Steele A. Harris. **Manager:** Steele A. Harris.

AUDIO PRODUCTION GROUP

AUDIO PRODUCTION GROUP
Sacramento, CA

AUDIO PRODUCTION GROUP

A8 D32

3100 Fite Circle, Ste. 105; Sacramento, CA 95827; (916) 362-2540; FAX: (916) 368-4133. Owner: Ralph Stover and Diane Davidson. **Manager:** Diane Davidson. **Engineers:** Ralph Stover, David Houston, Cecil Ramirez. **Dimensions:** Room 1: studio 10x9, control room 18x19. Room 2: studio 31x18. **Mixing Consoles:** Neotek Elite 64-input, Studiomaster 16x8x2, Studiomaster 8x4, Mackie 16, Alesis 1622. **Audio Recorders:** AMS Audiofile 8-track, (3) Alesis ADAT 24-track digital, Studer A812 2-track, Panasonic SV-3500 DAT, Otari MX-5050 2-track, Panasonic SV-250 portable DAT, Panasonic SV-3700 DAT, Akai GX-912 cassette recorder, Pioneer D-900 DAT, Fostex 80 8-track. **Digital Audio Workstations:** Sound Designer Sound Tools. **Monitors:** (2) Westlake BBSM-8, (4) Yamaha NS-10M. **Other Major Equipment:** (2) Dolby SR-361, (2) Lynx SAL Time Code modules, Lexicon 480L w/sampling option, Lexicon PCM70, TC Electronic TC 2290, (4) dbx 903 compressor, (4) dbx Kepex, dbx deesser, Eventide Harmonizer, Drawmer dual gate, Symetrix quad expander, (2) Simon active direct box, Yamaha REV7, Yamaha SPX90, BBE Sonic Maximizer, AKG tube mic, Neumann U89, Neumann U87, (2) Neumann KM84, AKG C-414, Beyer M-380, Sennheiser 409, QSC amplifier, Perreaux amplifier, (2) Rane headphone amps, E-mu Emulator III, (2) E-mu Emulator II w/CD ROM, (2) E-mu SP-1200, Roland R-8M drum machine, Roland MKS-80 Super Jupiter, Roland MKS-20 digital piano, Roland D-50, Oberheim DPX-1, Yamaha TX-802, Ensoniq ESQ-1, Steinway 1903 grand piano, Yamaha KX88, (2) Macintosh Performer 3.61, Digidesign Sampling & Q-Sheet, Mass Micro 45 meg removable hard drive. **Specialization & Credits:** Audio Production Group is a full-service facility specializing in all aspects of recording, from artist pre-production to the final mix. With rooms that feature excellent acoustics, great gear and a comfortable working environment, APG has built a solid reputation among artists and producers who want the very best for their projects. We also handle audio post-production for motion pictures and video productions, with complete Foley, ADR, SFX and mix facilities. Our experienced staff of engineers, composers, arrangers and technicians will help you complete your project on time and within your budget in a relaxed and creative atmosphere. For any question regarding our services, please call Diane.

AVID PRODUCTIONS

A8 D48

235 E. Third Ave.; San Mateo, CA 94401; (415) 347-3417; FAX: (415) 344-2878. Owner: Henry Bilbao. **Manager:** Chris Craig.

LEGEND

- D48 Maximum digital tracks
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BANQUET SOUND STUDIOS

A24 D2

5408 E. Todd Rd.; Santa Rosa, CA 95407; (707) 585-1325; FAX: (707) 585-1330. Owner: Warren Dennis. **Manager:** Warren Dennis.

BAY RECORDS

A24 D2

1741 Alcatraz Ave.; Berkeley, CA 94703; (510) 428-2002; FAX: (510) 428-1196. Owner: Michael Cogan. **Manager:** Michael Cogan. **Engineers:** Michael Cogan, Robert Shumaker. **Dimensions:** Studio 30x34. control room 15x20. **Mixing Consoles:** Bimix 2016, Mackie CR-1604. **Audio Recorders:** Otari MX-80 24-track, 3M M79-16, 3M M79-8, Ampex ATR800-2, Sony 854-4S, (3) Panasonic SV-3700 DAT, Sony & Onkyo cassettes. **Digital Audio Workstations:** Digidesign Sound Tools II. **Monitors:** (2) JBL 4311, (2) MDM TA-2, (2) Yamaha NS-10M. **Other Major Equipment:** (12) Neumann condensor mics, Telefunken U47, RCA 77-DX, (4) AKG C-452.

BAYVIEW STUDIO
Richmond, CA

BAYVIEW STUDIO

A24 D2

1368 S. 49th St.; Richmond, CA 94804; (415) 237-4066. Owner: Robert Hall, Stephen Suda. **Engineers:** Tom Anderson, Jack Crymes, Robert Beaton, Pete Carlson. **Dimensions:** Studio A: 45x20x17. Studio B: 19x16x17, control room 14x18x8. **Mixing Consoles:** Soundcraft TS24 40x24. **Audio Recorders:** Studer A800 MkIII 24-track, Ampex ATR-102 2-track, Studer A80 MkIV RC 1/2" 2-track, Panasonic SV-3500 R-DAT. **Monitors:** Meyer Sound Labs 833, Yamaha NS-10, JBL 4311, Auratone 5C, Ed Long MDM-4, Meyer HD-1. **Other Major Equipment:** (2) EMT 140 stereo plate, Yamaha REV7, Roland SRV-2000, Yamaha SPX1000, Yamaha SPX90II, Roland SDE-1000, Eventide 949 Harmonizer, Lexicon Prime Time II, UREI 1176, (2) UREI LA-4A, Teletronix LA-2A, dbx 160, Valley People Dyna-Mites, Pultec MEQ-5, Dolby 361, TC Electronic sampler, Dolby SR, Aphex 612 expander/gate, Symetrix 544 gates, AKG 414EB, AKG 414EB-P48, AKG C-451E, 452EB, AKG C-422 stereo. C-460B, Telefunken Elam 251, Sony C-37A, Neumann U87, Neumann KM84, Neumann U47 FET, Neumann M49B, Crown PZM, EV RE20, Shure SM57, Shure SM7. Sennheiser 421, Sennheiser PML DC-73, Countryman Isomax, Countryman direct boxes, Sony ECM-50, Hafler. **Rates:** Please call for rates.

ROBERT BERKE SOUND

A16 D8

50 Mendell St. #11; San Francisco, CA 94124; (415) 285-8800; FAX: (415) 285-8847. Owner: Robert Berke. **Manager:** Mark Escott.

KEN CARLTON RECORDING

A24 D48

11240 Hwy. 41; Madera, CA 93638; (209) 431-5275; FAX: (209) 431-9145. Owner: Ken and Marilyn Carlton. **Manager:** Ken Carlton.

CLOUD NINE STUDIOS

A24 D2

275 Fairchild Ave., Ste. 101A; Chico, CA 95926; (916) 342-7794. Owner: Rich Cavanaugh. **Manager:** Rich Cavanaugh. **Engineers:** Rich Cavanaugh, Bruce Coykendall, Kent Hooper. **Dimensions:** Room 1: studio 30x18, control room 20x18. Room 2: studio 15x13. **Mixing Consoles:** Amek/TAC Matchless, Allen and Heath System 8. **Audio Recorders:** Fostex G-24S, Fostex B-16D, Ampex 440, Fostex Model 20, Tascam DA-30 DAT, Akai GX-912 cassette, Nakamichi MR-1 cassette. **Monitors:** (2) JBL 4430 bi-amped, (2) Yamaha NS-10, (2) JBL 4411. **Other Major Equipment:** Sony R-7, Eventide H3000, Lexicon PCM60, Lexicon PCM42, (2) Roland SRV-2000, Yamaha SPX90II, Roland DEP-5, (2) UREI 1176, (2) dbx 160XT, dbx 166, dbx 263X de-esser, Symetrix 511, BBE 822, Korg 01W, Aphex 612 gate, Neumann U87, (2) AKG 414, Macintosh w/Mark of the Unicorn Performer, many mics and MIDI equipment.

COAST RECORDERS

A48 D2

1340 Mission St.; San Francisco, CA 94103; (415) 864-5200; FAX: (415) 864-7541. Owner: Dan and Ketty Alexander. **Manager:** Dan Alexander. **Engineers:** Independent engineers available by request. Staff technical support includes Peter Steinman, Gibbs Chapman, Mark Wallener, James Gangwer, Jeff Kamalia, Matthias Mederer. **Dimensions:** Room 1: studio 40x25, control room 20x25. Room 2: studio 20x16, control room 20x18. Room 3: studio 8x10, control room 12x10. **Mixing Consoles:** Neve 8026 52-input w/GML automation: Studio A; Neve custom discreet 40-input: Studio B; Neve custom production desk: Studio D. **Audio Recorders:** Studer A820-24, Sony APR-24, (4) Otari MTR-10 2/4, (4) MCI JH-110, (2) Ampex ATR-102, (4) Panasonic DAT. **Monitors:** (6) UREI 813/811, (2) Genelec S-30, (4) Yamaha NS-10, (2) Genelec 1022. **Other Major Equipment:** Dolby SR-24 24-channel, Dolby SR 2-track, EMT 250, Lexicon 480L, (2) Eventide H3000, (6) Pultec EQs, (6) ITI parametrics, (30) Neumann and AKG tube mics, (8) UREI limiters, (2) Fairchild tube limiters, (2) TC Electronic TC 2290, Akai S1000 sampler, (2) EMT 140 plates, (100) miscellaneous microphones, (6) Neve 2254/3314 limiters, (2) TimeLine Lynx synchronized modules, (4) Telefunken V72 tube mic preamps, (4) API B-12 mic preamps, (2) Teletronix LA-2 limiters, over 100 miscellaneous pieces of outboard equipment. **Specialization & Credits:** Coast offers a very well equipped recording environment. Recent credits include: Faith No More (all tracks and ods); Chuck Prophet; Paul Westerberg; Joe Satriani; Maria Muldar; Chris Isaak; Red House Painters; Arkane; Primus; Potato Eaters; Ritchie Kotzen; Baku; etc. Projects for Warner Bros., MCA, 4 AD, China, Disney, Rough Trade, Nirvana, Slash, Sire, etc. We have just added an additional 3400 sq. feet to our facilities, and we welcome anyone interested in viewing the studios. Our rates are competitive and we would like to discuss your project, whatever your budget.

COMMAND PRODUCTIONS

A8 D2

107 Industrial Center Building; Harbor Drive; Sausalito, CA 94965-1412; (415) 332-3161. Owner: Warren Weagant.

DANCE HOME SOUND

A16 D2

1321 61st St.; Emeryville, CA 94608; (510) 652-7511. Owner: Lisa Richmond. **Manager:** Lisa Richmond.

DIFFERENT FUR RECORDING
415-864-1967
3470 Nineteenth Street
San Francisco, California 94110

DIFFERENT FUR RECORDING
San Francisco, CA

DIFFERENT FUR RECORDING

A24 D24

3470 19th St.; San Francisco, CA 94110; (415) 864-1967; FAX: (415) 864-1966. Owner: Susan Skaggs, Howard Johnston. **Manager:** Susan Skaggs. **Engineers:** Howard Johnston, Ron Rigler, Mark Slagle, Matt Murman, Mack Clark, Nancy Scharlau, Adam Munoz. **Dimensions:** Studio 25x35, control room 17x21. **Mixing Consoles:** SSL 4056E/G Series 48x48 w/Total Recall. **Audio Recorders:** Studer A800 MkIII 24-track, Studer A80 vu MkIII 24-track, Sony 3324 24-track digital, Studer A80 vu MkIII 2-track 1/2" & 1/4", MCI JH-110A 2-track and/or 4-track, Panasonic SV-3700 R-DAT, Panasonic SV-3500 R-DAT, Sony 1000ES R-DAT, Sony PCM-F1, (5) Onkyo Integra TA-2700 cassette decks. **Digital Audio Workstations:** Sonic Solutions Digital Mastering Systems 2.0. **Monitors:** Westlake TM-1, Tannoy NFM-8, Yamaha NS-10, Auratones, JBL 4310, JBL 4311. **Other Major Equipment:** Dolby XP-24 SR 26-channel, Dolby 361 A & SR 2-channel, (3) TimeLine Lynx synchronization systems, Lexicon 480L digital reverb, Lexicon 224 digital reverb, AMS RMX-16, (3) Lexicon PCM70, Yamaha REV7, EMT 240 Gold Foil, Eventide DDL, (2) Lexicon Prime Time, Eventide H910 Harmonizer, (2) Lexicon PCM42, Eventide H3000SE w/sampling, Yamaha SPX90, TC Electronic TC 2290, Yamaha C7 grand piano, (2) Sony monitors 25" and 19", JVC 8250 3/4" U-Matic, Neumann SM69, 269, 254, U87, U47, KM84 microphones, a large selection of microphones, GML 1084/1272 4-channel mic pre/EQ, (2) Avalon M2 Class A mic preamps, Medici 2-channel EQ, (2) Drawmer DS-201 gates, Aphex Compellor, (6) Valley People Kepex II, (2) RM noise gates, (6) Valley People Gain Brains, (2) UREI 1176, (2) UREI LA-4A, (2) Apogee ADA converters, JL Cooper PPS-1000, Crown OC-300A w/Michrotech 1000, BGW 500, Phase Linear Dual 500, Yamaha P2100/P2200, Macintosh IIci w/Studio Vision, Sound Designer II, and Sample Cell, Mackie CR-1604 mixer, Kawai KR-1, Roland D-110. **Specialization & Credits:** Complete seclusion and custom service in a very private atmosphere. Spacious lounge, kitchen, sauna, showers, washer/ dryer, 26" cable TV and off-street secured parking. Recent clients include Bobby McFerrin, Tuck & Patty, Mr. Bungle, Primus, George Winston, Merl Saunders, Phil Collins, Xtra Large, The Monks of Doom, Rinde Eckert, Charlie Hayden, Windham Hill Artists, Gang of Seven Artists, music for the TV series *Unsolved Mysteries*, and *I Witness Video*. Please call for rates.

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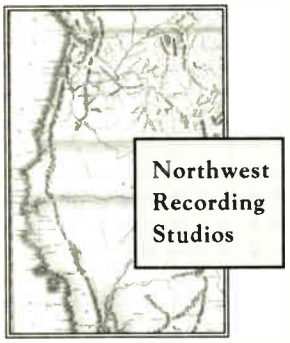

DREAMLAND PRODUCTIONS

645 E. Arques Ave.; Sunnyvale, CA 94086; (408) 773-0544; FAX: (408) 773-0546. **Owner:** Jesse Feliciano. **Manager:** Jesse Feiiciano.

EAR RELEVANT RECORDING

3328-A 24th St.; San Francisco, CA 94110; (415) 282-9675. Owner: John Karr. **Manager:** John Karr.

PHIL EDWARDS RECORDING

1522 W. Winton Ave.; Hayward, CA 94545-1311; (510) 784-1971. Owner: Phil Edwards. **Manager:** Phil Edwards.

EMERYVILLE RECORDING CO.

1331 61st St., Unit C; Emeryville, CA 94608; (510) 655-9490. Owner: Randy Rood. **Manager:** Randy Rood. **Engineers:** Randy Rood. **Oimensions:** Room 1: studio 22x25, control room 15x12. **Mixing Consoles:** Neotek IIIC. **Audio Recorders:** Ampex 1200 16/24-track, Ampex 440 2-track, Panasonic 3500 DAT, JVC cassette, Sony cassette. **Monitors:** UREI 809, Yamaha NS-10, JBL 4311, Auratone. **Other Major Equipment:** Lexicon 200, Eventide Omnipressor, Furman PQ-3 parametric, BBE Sonic Maximizer, Kawai 8x2 mixer, Crown PS-400 amplifier, Dynacord amplifier, Fender Vibrolux guitar amp, Gretsch guitar amp, Hammond B-3 organ, Solimar upright piano, Symetrix 522, Symetrix 200, (2) Lexicon LXP-1, Lexicon LXP-5, Yamaha REV7, Yamaha SPX90, UREI LA-4.

ENHARMONIK STUDIOS

PO Box 22243; Sacramento, CA 95822; (916) 443-0373; FAX: (916) 444-8972. Owner: Mad Rover Records Inc. **Manager:** John Baccigaluppi.

FANTASY STUDIOS
Berkeley, CA

FANTASY STUDIOS

10th & Parker Streets; Berkeley, CA 94710; (510) 486-2038; FAX: (510) 486-2248. Owner: Fantasy Inc. **Manager:** Nina Bombardier. **Engineers:** Michael Semanick, Eric Thompson, house independents—Michael Rosen, Wally Buck, Stephan Hart, Dave Luke, Vinnie Wajno, Tom Size, Neill King. **Dimensions:** Room A: studio 28x45, control room 16x19. Room B: studio 21x26, control room 14x18, Room C: studio 24x37, control room 16x20. Room D: studio 30x50, control room 18x21. **Mixing Consoles:** SSL 4000E 56x32 w/G series computer and Total Recall, Neve 8108 32x24 w/NECAM I moving fader automation, Neve 8108 56x48 w/NECAM 96 moving fader automation, Trident Series 80 32x24x32. **Audio Recorders:** (3) Studer A-800 24-track, (2) Studer A800 MkIII 24-track, (5) Studer A80 2-track 1/2" and 1/4", Studer A80 4-track 1/2", Mitsubishi X-850 32-track digital, (6) Mitsubishi X-80 2-track, MCI JH-110C 4/8-track, (2) Sony PCM-1630 2-track digital w/D4000, (3) Sony PCM-F1 2-track digital, (10) DAT recorders. **Monitors:** George Augspurger 3-way custom monitors, UREI 813, Westlake 3-way main monitors, Yamaha NS-10M. **Other Major Equipment:** Dolby A, SR, dbx, Audio Kinetics Q.Lock, TimeLine Lynx, (3) EMT 140, Echoplate, AMS reverb, EMT 250, Lexicon 224XL, Lexicon 200, Lexicon 480, PCM60, Bel DDL, Lexicon PCM42, AMS DDL, PCM70, Yamaha SPX90, Eventide H3000, TC Electronic TC 2290, complete selection of microphones including Neumann, Telefunken, AKG, Schoeps, Shure, Electro-Voice, Sony, Beyer, Sennheiser, RCA, Sanken, PML, etc. **Specialization & Credits:** Fantasy draws clients from the full spectrum of modern music. We work with artists on every level, from regional sensations trying to break out nationally, to established stars. Our Northern California friendliness makes Fantasy a very comfortable place to work. Fantasy's tape-copy room accommodates 1/4" and 1/2" analog, DAT and Mitsubishi X-80 cassette copies. A full mastering facility for LP, cassette and CD mastering features Neumann lathe, Zuma audio computer, Studer analog, Mitsubishi X-80, DAT and Sony 1630. A CD room prepares tapes for CD manufacturing including Sony 1630, Harmonia-Mundi, Mitsubishi X-80, DAT and Sonic Solutions NoNoise* systems for digital editing or removal of any type of noise problem. The "Childsplay" keyboard room features: K2000, J880, Wavestation, microwave, TG77, R8M, MPC60, S1100, M1R, ASRIO, JD800, Atari, Mac and IBM computers with expected software. CAD console, 8-bus, 24 inputs, 24 outputs and DM80-8 hard disk recorder. Complete jingle production, making music "childsplay."

FLAVIANI RECORDING

846 33rd Ave.; San Francisco, CA 94121; (415) 386-2722. Owner: Victor and Laura Flaviani. **Manager:** Victor Flaviani.

FLESSING & FLESSING
Auburn, CA

FLESSING & FLESSING

2015 Airpark Ct., Ste. 20; Auburn, CA 95602; (916) 888-7676; FAX: (916) 888-7421. Owner: Greg Flessing, Roger Flessing. **Manager:** Mark Dowlearn. **Engineers:** Mark Dowlearn, Kevin Hartman. **Oimensions:** Studio 10x15, control room 18x20. **Mixing Consoles:** Otari Series 54 32x24. **Audio Recorders:** Sony APR-24 2" 24-track, Sony 7030 R-DAT w/time code, memory start and digital I/O; JVC KD-V601 cassette deck, JVC VP-101 PCM digital processor, Fostex E-16 1/2" 16-track. **Digital Audio Workstations:** Studer Dyaxis II 16-track. **Monitors:** KRK 1310 main speakers, Tannoy System 2 near-field. **Other Major Equipment:** Yamaha TG77 synthesizer module, Korg M1R EX synthesizer module, Korg M3R synthesizer module, E-mu Emax sampler, E-mu Proteus 1 synthesizer module, Yamaha DX7IIi, Mark of the Unicorn MIDI Time Piece, Mark of the Unicorn Video Time Piece, Yamaha REV7, Yamaha SPX90II, Yamaha RX5 drum machine, (2) dbx 166 comp/limiter, Symetrix 564E quad expander/gate, Fostex 4010 time code reader, Fostex 4030/4035 synchronizer, Mark of the Unicorn Performer sequencing software, Macintosh IIci computer, Technics SL-1200MkII, Tascam CD-401, Sony VO-5850 3/4" U-Matic VCR, BBE 822A Sonic Maximizer, AKG 414, (2) Shure SM81, Shure SM57, Shure SM58, complete access to two multiformat broadcast edit bays in same facility.

FOCUSED AUDIO
San Francisco, CA

FOCUSED AUDIO

544 Natoma St.; San Francisco, CA 94103; (415) 626-9777. Owner: Jeff Roth. **Manager:** Jeff Roth. **Engineers:** Jeff Roth, Jay Shilliday, Marc Pittman, JD Reilly, Nic Tenbroek and independents.

World Radio History

Dimensions: Room 1: studio 10x20, control room 20x20. Room 2: studio 6.5x8.5, control room 12x16. Room 3: studio 6x5, control room 10x14.5. Room 4: control room 11x12. **Mixing Consoles:** Sony 636 w/DiskMix II Plus (40 in/24 out). **Audio Recorders:** MCI JH-24, Audiophile Plus 16-track w/8 hrs. hard disk recording, Otari MTR-10 2-track w/center-track SMPTE, Fostex E-2 2-track w/center-track SMPTE, Panasonic SV-3700 DAT. **Monitors:** Dolby XP-24 rack w/24 SR cards, (3) Dolby SR-361 rack. **Other Major Equipment:** (2) IBM computers w/Kelly Quan and Geffen software, (6) Cipher Digital Shadow, Eventide H969 Harmonizer, UREI 1178 compressor (stereo), Roland SRV-2000 digital reverb, Roland SDE-3000 digital delay, (2) Yamaha SPX90, (2) Orban 672 paragraphic EQ, Orban 516 dynamic sibilance controller, (2) Alesis Quadraverb, (2) Alesis MIDIverb, Alesis Microverb, Alesis Microverb III. **Specialization & Credits:** Focused Audio continues to be a leader in music recording as well as film and video post-production sound. Having produced over 100 soundtracks for broadcast and cable television, as well as numerous features and documentaries. Focused has moved into the '90s with a brand-new facility. Four control rooms and three recording spaces have been carefully designed and equipped with the best audio tools available today. All rooms are SMPTE-locked to picture and can record directly to either 24-track w/Dolby SR, or our 16-track AMS Audiofile Plus digital workstation. Pro Tools, Soundtools and ADAP digital workstations are available in all control rooms. Through our main machine room, the appropriate control room, recording space and recording format can be configured easily for any project. Engineers with expertise in feature film and television sound, CD-I, music and radio work are available to put this facility to work for you.

PHILIP (ROSCOE) GALLO PRODUCTIONS

A24 D2

3112 Laguna; San Francisco, CA 94123; (415) 563-8223. Owner: Philip L. Gallo. **Manager:** Philip L. Gallo.

HEART STREET STUDIO

A8 D2

PO Box 822; Novato, CA 94948; (415) 459-7594. Owner: Richard Duvall. **Manager:** Richard Duvall. **Engineers:** Richard Duvall. **Mixing Consoles:** Soundtracs FM Series 8x4x8, Mackie 1202 (12x2). **Audio Recorders:** Otari MkIII/8 1/2" 8-track, Panasonic SV-3700 DAT. **Monitors:** Digital Designs LS-161. **Other Major Equipment:** Studio Technologies mic preamp, Roland DEP-5, Alesis MIDIverb II, Eventide H969, Dynacord CLS-222 Leslie, Eventide Omnipressor, (2) Beyer MC-740 condensor mics, E-mu Emax II sampler, Yamaha DX7 w/E!, Roland MKS-20 digital piano, ARP Odyssey synthesizer, Moog Rogue synthesizer, Roland MC-50 sequencer, Dynaco Stereo 70 tube amplifier.

HILLVIEW STUDIOS

A16 D2

PO Box 110; Gilroy, CA 95021; (408) 847-5059; FAX: (408) 847-5059. Owner: Gary W. West. **Manager:** Gary W. West.

HI-SPEED TAPE DUPLICATING COMPANY

A4 D2

943 Howard St.; San Francisco, CA 94103; (415) 543-7393; FAX: (415) 543-0858. Owner: Franklin Mieuli. **Manager:** William Blum.

JOE HOFFMANN STUDIOS
Occidental, CA

JOE HOFFMANN STUDIOS

A24 D16

PO Box 840; 14039 Occidental Rd.; Occidental, CA 95465-0840; (707) 874-2278. Owner: Joe Hoffmann. **Manager:** Joe Hoffmann. **Engineers:** Joe Hoffmann, Brian Walker. **Dimensions:** Room 1: studio 23x26, control room 16x21. Room 2: studio 10x14. Room 3: studio 10x11. **Mixing Consoles:** Neotek Series II 28x24x2, Ramsa 8210A 10x4, Soundcraft Spirit 8x2x1, Mackie CR-1604 16x4x1. **Audio Recorders:** (2) Alesis 8-track digital ADAT, Panasonic SV-3500 DAT, Panasonic SV-3700 DAT, Panasonic SV-255 portable DAT, Otari MTR-90 MkI 2" 16-/24-track, Otari MX-5050 MkIII 1/2" 8-track, Otari MTR-12 1/4" 2-track, Otari MX-5050B 1/4" 2-track, Sony 1310F (3 position) hi-speed cassette, Denon DRM-800A cassette. **Digital Audio Workstations:** Macintosh IIci computer, Sonic Solutions 4-channel audio production system/waveform editing/CD mastering. **Monitors:** KEF Reference 104/2, KEF Reference 105 Series II, JBL 4408 studio monitor, JBL 4311 control monitor, Yamaha NS-10T, TOA 312-ME, Auratone 5C Sound Cubes. **Other Major Equipment:** Klark-Teknik DN780 reverb, Sony MU-R201 reverb, Lexicon PCM70 efx/reverb, Lexicon 200 reverb, Master-Room XL-305 reverb, Roland DEP-5 efx/reverb, Roland SRV-2000 reverb, BBE 422A Sonic Maximizer, (2) dbx 263X de-esser, (2) dbx 1531P 1/3-octave graphic EQ, (2) Phase Linear E-51 5-band parametric EQ; Symetrix 522 stereo processor, (2) UREI LA-4 compressor/limiter, (8) dbx 150 Type I noise reduction, (2) Symetrix 501 peak-rms comp, (3) AKG C-414B ULS, (3) AKG C-460B, AKG 451, AKG C-535EB, Beyer M88N(c), Beyer M130, Beyer M160N(c), Beyer M260N(c), Bruel & Kjaer 4006, (2) Electro-Voice PL76; Electro-Voice RE20, (2) Neumann KM84, (3) Sennheiser MD-421; Sennheiser MD-441, Shure 55 vintage, Samson SR2/ST2 wireless system, (2) Shure SM81; Shure SM85, (2) Sony C-48; Crown Sass-P. **Specialization & Credits: Hoffmann Studios is a beautiful** acoustic space nestled in the woods and vineyards of western Sonoma County, 80 minutes north of San Fransisco. The area's only custom-built studio, Hoffmann's is the premier facility for demanding acoustic recording. (Our Steinway concert grand is a favorite of many area artists.) Brian Walker is now an associate engineer and chief mastering engineer. This, along with the addition of multitrack digital audio recording and hard disk editing, make us an ideal site for contemporary acoustic, jazz, ethnic and fusion projects of any length. Digital mastering, pre- and post-production, digital remote recording and tape duplication provide for all your needs. Album credits include: Allaudin Mathieu, Richie Cole, Patrick Ball, Chrystal Wind, G.S. Sachdev, Platero, Carnahan and Petrie, Chaskinakuy, Carol McComb, Metamora, Ira Stein and Russel Walder, Solid Air, Katie Ketchum, Betsy Rose and others. Please call for rates or to arrange a visit.

HOMEWORK AUDIO

A8 D16

1800 Grove St., #3; San Francisco, CA 94117; (415) 387-1013. Owner: Mark Phillips. **Manager:** Jonathan Segel. **Specialization & Credits:** HomeWork Audio is a professional music production and recording service specializing in CD-quality demos for songwriters. We can arrange, produce and record your demo for you, or work with you as you record the parts yourself. Also, we can draw from a pool of skilled musicians and singers from throughout the Bay Area to give your music the touch you want. We provide a friendly atmosphere, years of professional experience, very high quality equipment and great sound. Rates: 1 song demo $200 complete; 3 demos $500; hourly rate $25; Macintosh digital audio editing/noise reduction (Sound Tools II/DINR) $40/hr; computer-typeset lead sheets/transcriptions $50/song; full scores $100/song & up. Credits include: Camper Van Beethoven; Jonathan Segel; Victor Krummenacher (of the Monks of Doom); Grantaloon Bus; Hieronymous Firebrain; more. Call for appointment: HomeWork Audio, (415) 387-1013.

HYDE STREET STUDIOS

A48 D8

245 Hyde St.; San Francisco, CA 94102; (415) 441-8934; FAX: (415) 441-8943. Owner: Michael Ward. **Manager:** Michael Ward. **Engineers:** Mark Needham, Terry Becker, Matt Kelly, Tom Doty, Larry Schalit, Ross Yeo. **Dimensions:** Studio A: 39x24, control room 14x23. Studio D: 31x21, control room 18x21. Room 3: studio 4x9, control room 14x15. Room 4: studio 34x21, control room 14x9. **Mixing Consoles:** Neve 8048 38x16x24 w/NECAM 96 moving fader automation, Amek 2500 48x24x48 w/MasterMix disk automation, Biamp Legend 28x16x28 w/Cooper Mixmate. **Audio Recorders:** Studer A800 MkIII 24/16 with autolocator, Ampex ATR-124 24/16 with autolocator, Ampex ATR-104 with 1/4", 1/2" 2-track & 1/2" 4-track heads; Otari MTR-12 1/2 ' 2-track, Otari MTR-12 1/4" 2-track, Otari 5050B 1/2" 8-track, (2) Otari 5050B 1/4" 2-track, (3) Nakamichi MR-1, Tascam DA-30 DAT. **Monitors:** Augspurger, JBL, TAD, Westlake, Meyer Sound Labs, Tannoy LGM, PBM-8, PBM-6.5, Yamaha NS-10, JBL 4430. **Other Major Equipment:** (3) Adams-Smith 2600, AMS RMX-16, Lexicon 480L w/3.0 update, (2) Lexicon PCM70 w/3.1 update, (2) Lexicon PCM60, (2) Lexicon PCM42, Lexicon PCM41, TC Electronic TC 2290 w/12-sec sampling, Eventide 3500, Eventide 3000 w/HS322 sampling board, Eventide 949 Harmonizer, Yamaha REV7, Master-Room stereo spring reverb, EMT stereo plate, (2) live chambers dynamics, (2) Teletronix LA-2A tube, (2) RCA BA-6A tube, (4) Neve 2254, (4) API 525, (3) UREI 1176LN, (3) dbx 165A over easy, Drawmer 1960 stereo tube, (4) Drawmer DS-201 stereo gate, (5) Valley People Dyna-Mite gate; ADR/Scamp rack modular effects system w/6 channels gates, 3 channel comp, ADT module, stereo panner, 2 parametric EQs; (2) Lang PEQ-2, (2) Neve 2076, Klark-Teknik ON27 1/3-octave, White Instruments 4000 1/3-octave, White Instruments 4100A stereo octave, (5) Neve 1272 class A preamp.

ICEHOUSE STUDIO

A24 D24

1556 4th St.; San Rafael, CA 94901; (415) 453-3330; FAX: (415) 457-5199. Owner: Marc Israel/Todd Perry. **Managers:** Terry Howard, Marc Israel, Todd Perry.

INFINITE STUDIOS

A24

PO Box 1709; Alameda, CA 94501; (510) 521-0321; FAX: (510) 521-0368. Owner: Michael Denton. **Manager:** Michael Denton.

JAMMIN PRODUCTIONS

A16 D2

PO Box 360524; Milpitas, CA 95036-0524; (408) 345-1383; (408) 263-7030. Owner: Benjamin Hinson. **Manager:** Benjamin Hinson.

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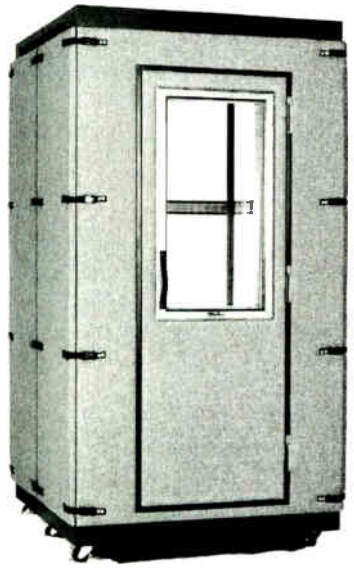

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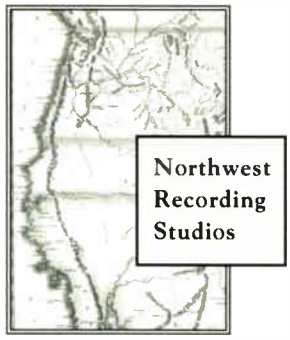

JENSEN SOUND PRODUCTIONS

A24 D2

363 Brannan St.; San Francisco, CA 94107; (415) 543-7095; FAX: (415) 543-7098. Owner: Eric Jensen. **Manager:** Eric Jensen.

KOMOTION INTERNATIONAL

A16 D2

PO Box 410502; San Francisco, CA 94141-0502; (415) 861-6423; FAX: (415) 431-6523. Owner: Non-Profit Artists' Co-Operative. **Manager:** Ann Dentel.

LIVE OAK STUDIO
Berkeley, CA

LIVE OAK STUDIO

A24 D2

1300 Arch St.; Berkeley, CA 94708; (510) 540-0177; FAX: (510) 540-0177. Owner: Priscilla Gardiner. **Manager:** Priscilla Gardiner. **Engineers:** Dale "D-Wiz" Everingham. **Mixing Consoles:** MCI JH-636 w/ARMS II DiskMix automation, Yamaha DMP7 digital. **Audio Recorders:** MCI JH-24 16-/24-track, Otari MTR-10 1/4" and 1/2" 2-track, Sony PCM-F1 2-track digital, Pioneer R-DAT, Panasonic 3700 R-DAT. **Digital Audio Workstations:** Studer Dyaxis with time/compression, expansion, etc. **Monitors:** (2) JBL 4430 bi-radial, (2) Yamaha NS-10, (2) TOA 265-ME, (2) Auratones. **Other Major Equipment:** Q.Lock 4.10E w/Eclipse editor, Lexicon 224XL w/LARC, Lexicon Prime Time II, Lexicon PCM42, Yamaha REV7, (2) Yamaha MIDIverb II, Eventide Ultra-Harmonizer S, UREI LA-2A, (2) UREI LA-3A, UREI 1176, Spectra Sonics 610, ADR vocal stressor, (2) Neumann U87, AKG Tube mic, Kurzweil 250 w/50Khz sampling, Emax SE w/hard drive, Roland S-770 sampler, (2) Macintosh IIsi w/Performer software, MIDI mini moog, Roland O-50. **Specialization & Credits:** Artists' lounge with spectacular views of the bay. Private garden with redwood decks and brick patios. Live Oak Studio is designed for the artist/composer or producer who wishes the highest quality recording tracks for his or her project. We are equipped to produce albums or to record tracks for movie scores or video work. We have the very latest synchronization gear, a computer-automation mixing console and an outstanding collection of outboard gear. We have a long list of satisfied clients who enjoy the beautiful and peaceful, private atmosphere.

MAGIC SOUND

A24 D24

1780 Chanticleer Ave.; Santa Cruz, CA 95062; (408) 475-7505. Owner: Alan Goldwater. **Manager:** Alan Goldwater.

TOM MALLON RECORDING

A16 D2

350 Bryant St.; San Francisco, CA 94107; (415) 777-9833. Owner: Tom Mallon. **Dimensions:** Room 1: studio 20x43, control room 18x23. Room 2: studio 20x20. **Mixing Consoles:** Tascam 520 (20x8), Tascam 50 (12x8). **Audio Recorders:** Otari MX-70 w/dbx, Otari 5050BII w/dbx, TEAC 3300SX-2T w/dbx, Sony PCM-2300 DAT, Sony OTC-700 OAT, Sony DTC-D3 DAT, (5) Sony/TEAC cassette decks. **Digital Audio Workstations:** Macintosh IIci 8/870, Digidesign Audiomedia II, Digidesign Sound Designer II, Opcode Studio Vision, Opcode Timecode Machine. **Monitors:** UREI 809, Yamaha NS-10M, Ed Long MDM-TA3 near-field, JBL L-100, Electro-Voice Interface II, Boston Acoustics HO-9, Infinity R1000, (12) AKG/Beyer/Sony headphones. **Other Major Equipment:** UREI LA-4, UREI 1176, Orban 424, (4) Valley People Dyna-Mites, Lexicon PCM60, Ensoniq DP-4, (2) Yamaha SPX90, Yamaha R1000, (2) DeltaLab ADM 1024, Roland SDE-3000, dbx 160X, Alesis D-4, E-mu Proteus I, E-mu Proteus II, Neumann U89, KM84, AKG C-414EB, 460EB, D-12, C-501, Sennheiser 421, 441, Shure SM57, SM58, 545, Electro-Voice 636, Beyer M201, M500.

MASTER TRACK PRODUCTIONS

A24

1524 W. Winton Ave.; Hayward, CA 94545; (510) 782-0877; FAX: (510) 782-6280. Owner: Don Enns. **Manager:** Jim Hawthorne. **Specialization & Credits:** For over 20 years we've been producing music products in the fields of contemporary and traditional gospel, jazz, rock and other styles with an emphasis on gospel music. Our facility is a completely professional, fully equipped 24-track studio with spacious rooms and high ceiling, plus a wide assortment of microphones and signal processing gear. We deliver quiet and sonically superior recordings with our transformerless 32x24 Neotek Series IIIC console and MCI multitrack recorder. We also include 15/30 ips Studer A80 2-track recorders with Dolby A and SR. Complete MIDI services, including Niche Automation available. Our engineering staff is experienced, knowledgeable and helpful with a long list of album and radio credits. Their combined expertise in the fields of musical performance and technical production assures a high level of excellence and understanding of each client's needs. MTP is also a complete, high-volume cassette dupliction and packaging plant. Please call for additional information.

MESA RECORDING
Sebastopol, CA

MESA RECORDING

A24 D8

10150 Mill Station Rd.; Sebastopol, CA 95472; (707) 823-5702. Owner: Ken Evans. **Manager:** Ken Evans.

MIP PROOUCTIONS

A16 D2

3448 N. Golden State Blvd.; Turlock, CA 95380; (209) 632-8415; FAX: (209) 668-7673. Owner: Gary Shriver. **Manager:** Chris "CJ" Jeffery.

MOBIUS MUSIC RECORDING
San Francisco, CA

MOBIUS MUSIC RECORDING

A24 D2

1583 Sanchez St.; San Francisco, CA 94131; (415) 285-7888. Owner: Oliver DiCicco. **Manager:** Oliver DiCicco. **Engineers:** Oliver DiCicco, Jane Scolieri, Christian Jones, Ken Kessie. **Dimensions:** Studio 38x17, control room 17x14. **Mixing Consoles:** Neve 8068. **Audio Recorders:** Studer A827 24-track, Studer A820 2-track, MCI JH-110 2-track, Panasonic SV-3700 OAT, (3) Sony cassette decks. **Monitors:** (2) UREI 811, (2) Altec 604 (studio), (2) Yamaha NS-10, (2) Auratone 4C. **Other Major Equipment:** Oolby XP 24-track SR, Dolby SR 2-track, Neumann U47 tube, (2) Neumann KM54 tube, (2) Neumann U87, (4) Neumann KM84, (2) B&K 4006, (6) Sennheiser 421, Lexicon 224, Eventide H3000SE, Yamaha REV7, Yamaha SPX90, Lang PEQ-2, (2) Valley Audio Oyna-Mite, (2) Valley Audio Kepex, (2) dbx 160 limiters, (2) UREI LA-4 limiters, Master-Room MR-3, DeltaLab DL-4, Yamaha C3 6' grand piano.

World Radio History

MONTAGE STUDIOS

37532 Sycamore St.; Newark, CA 94560; (510) 794-2992. Owner: Will Mullins/Bill Walsh. **Manager:** Will Mullins.

MUSIC ANNEX AUDIO POST-PRODUCTION

69 Green St.; San Francisco, CA 94111; (415) 421-6622; FAX: (415) 391-4995. Owner: Music Annex Inc. **Manager:** Laura Sarkissian Boyd.

MUSIC ANNEX RECORDING STUDIOS

970 O'Brien Dr.; Menlo Park, CA 94025; (415) 328-8338; FAX: (415) 325-6890. Owner: Music Annex Inc. **Manager:** Charles Albert.

MUSIC ARTS RECORDING STUDIO (MARS)

PO Box 1838; Aptos, CA 95001; (408) 688-8435. Owner: Ken Capitanich. **Manager:** Heather Capitanich. **Engineers:** Vinc Sanchez, Eric Bates, Ken Capitanich, Ken Kraft. **Dimensions:** Room A: studio 16x20, control room 14x16. Room B: studio 15x12. **Mixing Consoles:** Fostex 450-16 16x4, Alesis 1622 16x4 submixer, Soundcraft TS-24 32x24. **Audio Recorders:** Ampex MM1100 24-track, Tascam 80-8, Ampex 440-C 2-track, Otari 5050 2-track, Panasonic 3700 DAT. **Digital Audio Workstations:** Macintosh IIcx w/8MB RAM, 1.2GB external HD w/Digidesign Sound Tools and deck. **Monitors:** KRK 9000, (2) UREI 811, (2) MDM 4, (2) JBL 4313B, (2) Auratone, (2) Yamaha NS-10M. **Other Major Equipment:** Akai S900 MIDI sampler w/16-bit upgrade, Alesis SR-16 drum machine, Alesis D-4 drum module, Ensoniq SQ-1, Kurzweil 1200 Pro, J.L. Cooper PDS-100 SMPTE sync, Yamaha TX7, (3) Sony TC-K81, (8) dbx; Lexicon 200, Ecoplate II, EMT 140, Lexicon Prime Time 93, Eventide Harmonizer, MICMIX XL-305, ADR Time Module, Yamaha SPX90, Lexicon PCM60, ADR/Scamp expander/gate, (5) AOR/Scamp comp/limiter, (2) ADR/Scamp parametric; Aphex Exciter, dbx 165 compressor, dbx 162 compressor, (2) TLA 100 tube limiter, (2) TPA 200 tube preamp; Pultec tube EQ, (4) Valley Audio 817 Comanders, (2) Neumann U47, (5) AKG C-414, (2) Sennheiser MD-441; Sony C-37P, (2) Shure SM54, (2) Neumann U87, (5) Beyer M500; Neumann U67, Electro-Voice RE20, (2) Electro-Voice 666, (2) Electro-Voice CS15, Electro-Voice RE16, Electro-Voice DS35, Electro-Voice ND408, (2) Shure SM56, (4) Shure SM57, (2) Shure SM545SD, (3) AKG C-451, (2) AKG 330BT, AKG D-112, AKG D-12E, (4) Sennheiser MD-421; Sony ECM-22, Equitek II, Chickering 6'6" grand piano, Hammond B-3 w/Leslie, Yamaha DX77II FD, Oberheim DMX, various drums, cymbals and toys, Ampeg amp, (2) Kepex II 810 gate. **Rates:** Rate sheet available upon request.

NACNUD SOUND

6748 Hogan Ln.; Lodi, CA 95240; (209) 334-2845. Owner: Richard Duncan. **Manager:** Richard Duncan. **Engineers:** Rick Duncan, Mark Zarek, Steve Gourley. **Dimensions:** Studio 20x40, control room 22x12. **Mixing Consoles:** Soundtracs MR Series 32x8x16x2. **Audio Recorders:** Tascam ATR 60-16 w/autolocator, Otari MX-5050 1/2" Track Master w/remote, (2) Sony PCM-2500 R-DAT, Yamaha C300, Nakamichi MR-2. **Monitors:** Westlake BBSM-10, Yamaha NS-10M, Auratones, Yamaha and Sony headphones. **Other Major Equipment:** dbx 16-channel noise reduction, Yamaha MSS-1, Dynacord reverb, Yamaha REV5, Yamaha SPX900 w/remote, Lexicon PCM70, Lexicon Prime Time II DDL, Eventide H3000 Harmonizer, AKG BX-20, Alesis Quadraverb, Valley People rack w/Gain Brain/Max EQ/Kepex/ Commander/DSP, dbx 160, dbx 165, Summit Audio stereo tube preamp, Furman compressor, Crown paragraphic EQ, wide selection of microphones, Crown Macro Reference, Yamaha PC260ZM, Rane H6 headphone amp, Yamaha KX88, DX7IIFD "E", TX816 rack, Oberheim Expander, DPX-1 sample playback of Prophet 2000 and E-2, Roland D-50, U-220, MKS-20, Super Jupiter, Mini Moog w/complete MIDI interface, Korg Wavestation, M3R, Emulator Proteus, Roland R-8 drum machine, Emulator percussion, Alesis D-4, complete stereo guitar rack system, Ibanez guitar, complete SWR and Yamaha bass rack systems, complete Yamaha 7pc. recording series drums w/rims and Zildjian and Sabian cymbals, Fender Yamaha and Tobias basses, Rocktron Pro-Gap, Macintosh LC 10/40 and Mac Plus 4/20 w/Performer sequencer/editor and librarians, Opcode MIDI interface, Sycologic 32x32 MIDI switcher, Universe of Sounds CD-Rom library. **Specialization & Credits:** At Nacnud Sound, we specialize in custom original production. We offer producers, engineers, arrangers, musicians of only first-rate quality for the San Joaquin Valley. Our studio is located in a peaceful country surrounding perfect for creative endeavors. You will find a diverse selection of acoustic and electronic capabilities available to give the musician, singer, songwriter and producer the most flexible work environment in which to realize projects with a minimum of effort and cost. Nacnud Sound is a musician-owned and operated facility with a strong emphasis on musical and technical co-existence. With an emphasis on album, cassette and demo production, we have produced jazz, classical, rock, contemporary Christian, country and many other styles of music. Look for expansion in Nacnud Sound in the coming months to keep pace with our clients' ever-changing needs. We hope to work with you in the future on a most enjoyable and creative project.

NACNUD SOUND
Lodi, CA

OPEN DOOR PRODUCTIONS

PO Box 8556; Berkeley, CA 94707; (510) 527-9311. Owner: Burke Trieschmann. **Manager:** Burke Trieschmann.

OTR STUDIOS

PO Box 874; Belmont, CA 94002; (415) 573-1489; FAX: (415) 598-0915. Owner: Cookie Marenco. **Manager:** Amy Yamamoto. **Dimensions:** Room 1: studio 23x14, control room 23x17. Room 2: studio 27x17, control room 11x12. **Audio Recorders:** Otari MTR-90II 24-track, Otari MTR-10 2-track 1/2", 1/4" and 1/4" center-track time code, Panasonic 3700 DAT, Technics SV-1110 DAT. **Digital Audio Workstations:** Studer Dyaxis w/2.5 gigabytes of memory. **Monitors:** Meyer Sound Labs 833, Yamaha NS-10M, Tannoy Golds. **Other Major Equipment:** Dolby SR 24-track, (2) Dolby SR rack units, Lynx SMPTE system, Lexicon 224XL, AMS RMS-16 reverb, Lexicon Prime Time delay, Eventide HD3000, (2) Lexicon PCM42 delay, Lexicon PCM60 reverb, Roland SV-3000 reverb, Eventide 949 Harmonizer, Massenburg & Neve preamps and EQs, Massenburg compressor/limiter, (2) B&K 4012, AKG C-12, (2) AKG 414, (2) AKG 451, (2) AKG 460, Neumann M49, Neumann U87, Neumann U67, EV RE20, McIntosh 2300, Crown D-300, Steinway 7' grand piano (1885), Korg M1 synthesizer, Proteus Ix, Akai S1100, Hammond B-3 organ, Macintosh IIci computer MIDI system, Sony 9800 3/4" video deck.

PACIFIC MOBILE RECORDERS

2616 Garfield Ave.; Carmichael (Sacramento), CA 95608; (916) 483-2340; FAX: (916) 489-9102. Manager: Kat Coffey.

PAJAMA RECORDING STUDIOS

247 4th St., Loft #407; Oakland, CA 94607; (510) 832-5266. Owner: Jim Gardiner. **Manager:** Paula Telander. **Engineers:** Independents. **Dimensions:** Room 1: studio 10x10, control room 20x18. Room 2: studio 12x10. **Mixing Consoles:** Otari Series 54 46x40 80-channel w/DiskMix III automation. **Audio Recorders:** Sony/MCI JH-24 24-track, Alesis ADAT 24-track w/BRC remote, Panasonic rackmount DAT, Panasonic portable DAT, (2) Nakamichi MR-2. **Digital Audio Workstations:** Studer Dyaxis 1 hr. digital editor with Mac SE/30 interface, Studer Dyaxis digital audio processor, Studer Dyaxis MIDI time code interface. **Monitors:** (2) Tannoy System 215 DMT, (2) Yamaha NS-10M, (2) TOA studio monitors. **Other Major Equipment:** Publison CL-20C stereo comp., UREI LA-2A, (2) dbx 166, dbx 165, Audio Design 7769X vocal stresser, Publison Fullmost vocal exciter, Drawmer dual gate, Symetrix 544, Tube-Tech mid-hi EQ, Klark-Teknik DN780, Boss 550, Yamaha 1000, Lexicon 300, Sony R-7, Publison Infernal Machine 90 w/remote, (2) Alesis MIDIverb II, MI rack-mount, (4) Yamaha TFI modules, Kurzweil 250 (fully loaded), Korg Wavestation, Matrix 12, Lynn F-9000, Kawai XD-5, Alesis HR-16B, various selections of mics including Sony C-800G, (2) Crown Macro Reference, Hefler, (6) AKG 240; Proscan 35" video monitor, Macintosh SE/30 with Composer performance software, Sound Ideas sound effects library. **Specialization & Credits:** Pajama Studios is Oakland, California's first major world-class multitrack recording studio, overlooking beautiful Jack London Square near

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PAJAMA RECORDING STUDIOS
Oakland, CA

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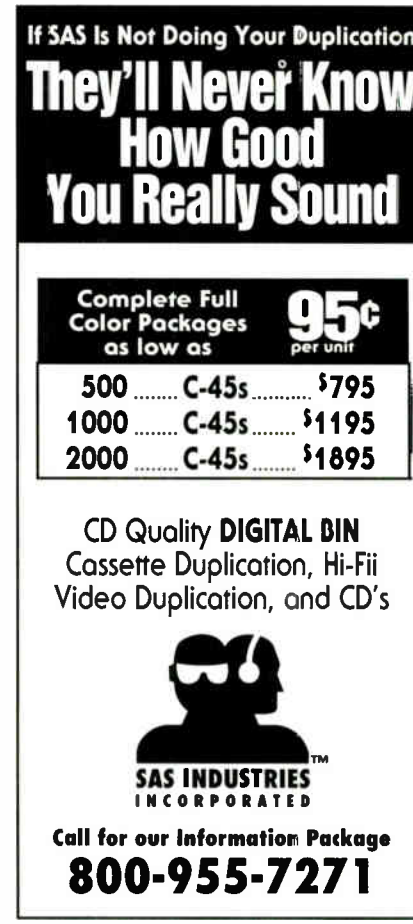

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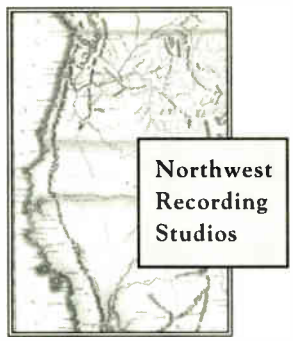

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downtown Oakland. Pajama was designed by Dennis Rice for producer Jim Gardiner, former owner of Live Oak Studio of Berkeley, California, whose credits include Toni Tone Tony, Vanessa Williams, En Vogue, Michael Cooper, Lucasfilms, Shiela E, Rosie Gaines, Nikita Germaine, Jazzy Jeff and the Fresh Prince, and many more major recording artists. This state-of-the-art facility offers world-class production and recording services within a futuristic, creative environment. Please contact us for a complete brochure.

PARADISE STUDIOS

A24 D2

1020 35th Ave.; Sacramento, CA 95822; (916) 424-8772. Owner: Arne Peterson, Kirt Shearer, Craig Long. **Managers:** Kirt Shearer, Craig Long. **Engineers:** Kirt Shearer, Craig Long. **Dimensions:** Room 1: studio 22x30, control room 22x17. Room 2: studio 14x10. Room 3: studio 18x7.5. **Mixing Consoles:** Trident 80B 30x24x24 w/40 channels of automation, Hill MultiMix 16x2. **Audio Recorders:** MCI/Sony JH-24 24-track, (2) Fostex B-16 16-track (can be synced to 24-track), Fostex E-2 1/2-track w/center-stripe time code, (2) Panasonic 3500/3700 R-DAT, (2) JVC TDV-66 cassette decks. **Monitors:** (2) UREI 813A, (2) Yamaha NS-10M "studios", (2) Auratone Cubes. **Other Major Equipment:** Lexicon 480L reverb (3.0 software), Lexicon PCM70 (1.2 and 3.0 software), Yamaha SPX900, (2) Yamaha SPX90, Lexicon LXP-1 w/MRC, Yamaha REV5, Alesis XTiC reverb, Roland SDE-3000 delay, MXR 01a reverb, Alesis Quadraverb, (2) Neve 1272 "class A" mic preamp, (2) UREI 1176 limiter, (2) UREI LA-3A limiter, Aphex Studio Dominator, (3) Symetrix 522 compressor/expander (6 channels), (2) Orawmer DS-201 noise gate, Telefunken Elam 251 tube mic (w/Stephen Paul modification), (4) AKG 414UIS/EB, (4) AKG 451, Neumann U87, (8) Shure SM57, (2) EV PL20, (2) Macintosh SE computer w/60 meg hard drive, Roland S-770 sampler w/16 meg memory and Roland Sample Library on Syquest cartridge, Yamaha 416, Korg T3, Korg M1, (2) Oberheim Matrix-1000 synthesizers, Roland D-550, Yamaha DX7, Moog MemoryMoog Plus w/MIDI, Hammond B-3 w/Leslie 122, Baldwin 6'5" grand piano, Gretsch 6pc. drum kit, Fender '62 jazz bass, Mesa/Boogie 100-watt guitar amp, Mesa/Boogie 4x12 cabinet w/EV speakers, Marshall 9000 preamp, Fostex 4030/4035 synchronizer.

PINEFOREST STUDIO

A16 D16

PO Box 1445; Aptos, CA 95001; (408) 684-1555; FAX: (408) 684-1842. Owner: Kenneth Mabie. **Manager:** Kenneth Mabie.

PLAN A PRODUCTIONS

A16

PO Box 1588; Novato, CA 94948; (415) 382-9066. Owner: Plan A Productions. **Manager:** Reid Whatley.

THE
Plant
RECORDING STUDIOS

THE PLANT RECORDING STUDIOS
Sausalito, CA

THE PLANT RECORDING STUDIOS

A48 D48

2200 Bridgeway; Sausalito, CA 94965; (415) 332-6100. Owner: Bob Skye, Arne Frager. **Manager:** Kim Lafleur. **Engineers:** Arne Frager, Bob Skye, Manny LaCarrubba, Sean Leonard, Neill King, Curtis Drake—Technical Director. **Dimensions:** Room 1 (studio A): studio 35x25, control room 23x21. Room 2 (studio B): studio 32x25, control room 23x21. Room 3 (studio 01): 17X15, control room 28X18. Room 4: studio 17X15, control room 30X20. Remote: lounge 12x8, control room 18x8. **Mixing Consoles:** SSL 4064G w/Total Recall, SSL 4056G w/Total Recall, Neve VR-72 w/Flying Faders, DDA AMR-24 36x24, Sound Workshop Series 30 35x24. **Audio Recorders:** (2) Otari MTR-100 24-track (one integral Dolby SR), (3) Otari MTR-90II 24-track, Otari MTR-12 2-track 1/2", (4) Ampex ATR-102 2-track, (2) Sony APR-5003 2-track w/center-track time code, Otari 5050 2-track, (4) Panasonic 3700 DAT, Tascam ATR-60 4-track, (8) Nakamichi cassette machines. **Digital Audio Workstations:** New England Digital 16-channel direct-to-disk. **Monitors:** (2) PRS-100 TAO component main monitors, TAD TSM-1 main monitors, (3) Yamaha NS-10, (4) Auratone 5C, KRK 13000. **Other Major Equipment:** Adams-Smith, TimeLine and Otari synchronizers; Dolby SR & A; AMS, EMT, Quantec, Sony, Lexicon, Yamaha and KT reverbs; Neumann U47, U49, KM84, KM76, M49, U67, U87; Shure SM7, SM56, SM57, SM53, 546; Sony 37P, 38P, C-500 ECM-50, ECM-23, ECM-54; Telefunken 251, KM56C; Schoeps M221, Sennheiser 211, 421, 431, 441; AKG C-24, 414, 451, 452, 460, C-61, D-12, D-112; Beyer M88N, Electro-Voice RE20, 635A, 666, RE15; RCA 77-DX, 44. **Specialization & Credits:** The Plant is located in picturesque Sausalito, just across the Golden Gate Bridge from San Francisco. Many out of town clients mix their albums at The Plant while staying in one of our comfortable bay view houseboats or houses in Sausalito. Our specialty is 24-track and 48-track (analog or digital) final mixdown of albums, with three fully automated mixing studios featuring SSL and Neve consoles with Recall. We have recently mixed major albums for Mariah Carey, Michael Bolton, Van Morrison, Primus, Exodus, Celine Dion, Santana, New Kids On The Block, and Tracy Chapman. Our remote recording facility is popular for live concert recording, remote broadcast link-up, audio for video/film, and in-house recording and mixdown. We have recently completed projects for the Doobie Bros., Kenny Loggins, Miles Davis Tribute, Concord Jazz Festival, Joe Pass, Hot Tuna, Edwin Hawkins and Mickey Hart.

POOLSIDE
Studios

POOLSIDE STUDIOS
San Francisco, CA

POOLSIDE STUDIOS

A48 D8

2269 Chestnut St. #310; San Francisco, CA 94123; (415) 931-9390; FAX: (415) 921-5087. Owner: Mitchell Stein, David Nelson. **Manager:** Diana Alden Lang. **Engineers:** David Nelson—Chief Engineer/Producer, Mitchell Stein—Executive Producer. **Dimensions:** Studio: 14x21, iso booth: 5x10, control room 1: 12x18, control room 2: 9x10. **Mixing Consoles:** Euphonix Crescendo digital 48x24 stereo w/Total automation, Soundcraft Spirit 24x8. **Audio Recorders:** Otari MX-80 2" 24-track w/Dolby SR, Otari MX-70 1" 16-track, Fostex 80 1/4" 8-track, Otari MX-55 2-track w/center-track time code and Dolby SR, Tascam DA-30 DAT, Sony DTC-700 OAT, (26) Dolby SR noise reduction, (16) Rocktron System One noise reduction. **Digital Audio Workstations:** (2) Macintosh IIci w/32MB RAM 105MB internal & 1.2GB external hard drives, (2) Digidesign Pro Tools/Sound Tools direct-to-disk recording and editing system, (2) CD Technologies CD-ROM, (2) Sample Cell; Studio Vision, Q-Sheet A/V, Alchemy, Upbeat. **Monitors:** (2) UREI 809, (2) Yamaha NS-10M, (2) Tannoy System 8, (2) Auratone. **Other Major Equipment:** Mark of the Unicorn MIDI Time Piece, Sharp XG-1500U LCD video projection system w/4x9 perf screen, JVC 8250 3/4" editing VTR w/controller, JVC professional 1/2" Hi-fi VTR, Proton 619-S monitor, Panasonic CT-110 monitor, (3) TimeLine Lynx with controller, Opcode SMPTE/MIDI time code converter; extensive digital sound effects library; Lexicon 300, 200, LXP-15, LXP-1, LXP-5; (2) DeltaLab Effectron II, (2) Alesis Quadraverb, MIDIverb II; Orban 424A stereo compressor/limiter/de-esser, Aphex Dominator II, Expressor, Aural Exciter; USAudio Gatex 4-channel expander/noise gate; dbx 166X compressor/noise gate, dbx 163X compressor/limiter, dbx 463X noise gate; Sony PCM-501ES digital audio processor, Hafler 500, Crown D-150A, BGW M-75, Telefunken 251, Neumann U67, Klaus Hynes modified; (2) Neumann KM83, Klaus Hynes modified; (4) Neumann KM84, Klaus Hynes modified; (2) Sennheiser 421, Sennheiser 441, (3) Sony ECM-50, (2) Shure SM57, SM58; Korg M1, Roland D-10, Korg M3R, Roland GR-50 guitar synthesizer, Roland SRV-2000, Yamaha studio drum kit w/Noble & Cooley snare, Wendel Jr. drum replacement module, congas, Korg Vocoder, Moog MiniMoog, (7) AKG/Sony MDR-V6 digital stereo headphones. **Specialization & Credits:** Poolside Studios is a unique recording facility specializing in soundtrack production and mixing for independent film and video. We offer complete production services from pre-production consultation, MIDI pre-production and original music composition to CD pre-mastering and Dolby Stereo Surround mixdown. Recent Poolside productions include award-winning the-

World Radio History

atrical motion pictures, PBS documentaries, television and radio programs and commercials, music videos and record albums/CDs. Our frame-accurate synchronization system makes complete soundtrack work (including sound design/effects, ADR, music and Foley) possible. Situated in one of San Francisco's most beautiful neighborhoods, Poolside Studios is an ideal location for producers and clients. Whether your project takes a few hours or a few weeks, every step has been taken to provide you with a creative, comfortable working environment. While our production services are state-of-the-art, our rates are very reasonable. Poolside Studios—we take pride in every project we produce.

PRAIRIE SUN

A24 D2

PO Box 7084; Cotati, CA 94931; (707) 795-7011; FAX: (707) 795-1259. Owner: Mark "Mooka" Rennick. **Manager:** Jeffrey Sloan. **Engineers:** Mark "Mooka" Rennick, Steve Fontano, Allen Sudduth, Joe Marquez, Steve Counter, Shawn Morris. **Dimensions:** Room 1: studio 20x30, control room 15x15. Room 2: control room 20x20. Room 3: studio 10x20, control room 15x15. **Mixing Consoles:** Trident Series 80 32x24x56. Trident TSM 42x32x80, Trident FlexiMix 32x8. **Audio Recorders:** (2) Studer MkIV 24-track 2" format, (2) Sony DTC-1000ES DAT machines, 3M 56 16-track 2" format, (2) Ampex ATR-102 2-track, Sony K-679ES cassette deck, Nakamichi 3000 cassette deck, Onkyo cassette deck. **Monitors:** Genelec 1022A 3-way, Genelec S30NF 3-way, (2) Yamaha NS-10, UREI 811B, UREI 813B, MDM 4 (Ed Long), Big Red, JBL 4311. **Other Major Equipment:** 1000 sq. ft. drum tracking chamber, (6) Neve 80 Series class A preamps, (6) Neve 80 Series class A EQs, (2) Neve 8113 mic preamp and equalizer, Neve 2254A stereo compressor/limiter, Publison Infernal 90 processor/stereo sampler, AMS RMX-16 digital reverb, AMS DMX 15-80S digital delay, (2) EMT 140 stereo plate reverbs, TC Electronic TC 2290 digital delay/sampler, Yamaha REV7, (4) UREI 1176 compressor/limiters, (2) Altec 436C, 438A vintage tube compressors, Sontec vintage stereo parametric EQ, (2) TC Electronic TC 1128 real-time analyzer/EQ, JL Cooper Magi II automation system, Hammond B-3 organ w/Leslie, Lexicon LXP-1, Pultec EQP-1 vintage tube EQ, extensive collection of vintage Neumann and AKG tube mics.

PYRAMIND SOUND

A16 D12

39 Gilbert St.; San Francisco, CA 94103; (415) 863-8565; FAX: (415) 863-8419. Owner: Gregory Gordon. **Manager:** Michael Lande.

RECORD TWO MENDOCINO PHILO'S RANCH

A48

9680 Docker Hill Road; Comptche, CA 95427; (707) 937-0436. Owner: Philo Hayward. **Manager:** Philo Hayward. **Specialization & Credits:** Record Two Mendocino is a beautiful recording studio located on Philo's 50-acre ranch in the redwoods and coastal mountains of Northern California. 13 miles from the village of Mendocino, in a serene, secluded, and exquisitely natural setting. Discrete API/Studer recording. An L-shaped studio room in an award winning design, 34'x20'x28' with a 12' ceiling. An 18'x20' control room. Four isolation booths surrounding the control room. Clients include A&M, Warner Bros., Windham Hill, Capitol, Chrysalis, EMI, Giant and Metal Blade. The studio includes a satellite TV lounge. Upstairs, there's a suite of three rooms - two bedrooms and a bath with sauna. Two additional cabins are located on the grounds to provide for a maximum of personal space. When designing Record Two Mendocino, we kept your needs in mind, and we know that true peace and natural beauty can add immeasurably to the spirit of the recording experience.

RECORDING CONSULTANTS

A8 D2

1412 Clarita Ave.; San Jose, CA 95130; (408) 244-3848; FAX: (415) 969-0140. Owner: Tom Sherry.

R.O. STUDIOS
Concord, CA

R.O. STUDIOS

A24 D8

3359 Walnut Ave.; Concord, CA 94519; (510) 676-7237; FAX: (510) 676-5132. Owner: Gerald and Dave Kaplan. **Manager:** Dave Kaplan. **Engineers:** Dave Kaplan, Rick Henry, Ralph Henry, Scott Henry. **Mixing Consoles:** Dtari Series 54 MFA. **Audio Recorders:** Dtari MTR-100, Dtari MTR-10, Tascam DA-30, Panasonic SV-3500, Yamaha C300, Nakamichi MR-1, Toshiba PCM. **Digital Audio Workstations:** Sunrize AD-516. **Monitors:** Pas/Toc Studio Monitor 1 Time Align, Tannoy PBM-8, Yamaha NS-10M, Auratone Sound Cubes. **Other Major Equipment:** Dtari DiskMix III moving fader automation, Lexicon 480L w/LARC, (2) Lexicon PCM70, (2) Lexicon LXP-1, Lexicon LXP-5, Lexicon MRC, (2) UREI 1176LN, UREI LA-4, UREI 1178, (2) Valley People Dyna-Mite gates, Drawmer DS-201, (2) RSP Hush 2000, (2) TC Electronic TC 2290, TC Electronic TC 1210, Pultec EQP-1A, Drban 674A, Eventide H969, BBE 822, (2) Roland SDE-3000A, DDD Electronics RTA-4315, Linn 9000, Roland S-550, Kurzweil 1000-PX, 360 Systems Pro-MIDI bass, Roland RD-1000, Roland D-50, Sequential Circuits Prophet V5, Casio C2-1000, Alesis D-4, (2) Neumann U87, Neumann U47, (4) Sennheiser MD-421, (2) AKG 414EB, (2) AKG 452, AKG D-112, (2) Sennheiser MD-441, (2) EV ND408, Audio-Technica AT-4033, Sony ELN-S6F, Newtek Video Toaster. **Specialization & Credits:** Complete services from tracking to post-production and duplication. Album projects including: *Sound of Money, Nothing to Loose*, and *Can't Hold Back* from Eddie Money, Workforce, Johnny Gunn featuring Lenard Hays and Bret Blumefield, Katusha, Ronnie Montrose and others. All the latest in gear. Reverb strictly by Lexicon. Limiters strictly by UREI. Plenty of MIDI gear to choose from. Plenty of space to stretch out and relax. Complete lockup to video, with video editing soon to follow. 8-track digital recording and digital editing. Soon to offer the best of both worlds with 24-track digital recording. Definitely a must-see facility. Based in Concord, CA. It's truly the Bay Area's best kept secret. Highly competitive rates, with the type of space needed to get the job done.

RUSSIAN HILL RECORDING

A48 D8

1520 Pacific Ave.; San Francisco, CA 94109; (415) 474-4520; FAX: (415) 474-7190. Owner: Jack Leahy and Bob Shotland. **Manager:** Cindy McSherry. **Engineers:** Samuel Lehmer, Jeffrey Kliment, Michael Ahearn, Christopher Haynes, Robert Conlon, Scott Strain. **Dimensions:** Room 1: studio 20x30, control room 15x24. Room 2: studio 18x28, control room 13x12. Room 3: control room 12x15. **Mixing Consoles:** SSL 4000E, Neotek Series III, Soundcraft 600 Series. **Audio Recorders:** Dtari MTR-100A 24-track, Dtari MTR-90II 24-track, MCI JH-24 24-track, (2) MCI JH-110 4-track, (5) MCI JH-110 2-track, Dtari MX-55 2-track, Dtari MTR-12 2-track, (2) Panasonic SV-3700 DAT, (2) Fostex E-16, Fostex E-2. **Digital Audio Workstations:** Studer Dyaxis Editech 4-channel, Studer Dyaxis II Editech 8-channel. **Monitors:** (4) UREI 813 Time Align, (4) Yamaha NS-10, (4) Auratone, (2) MDM 4. **Other Major Equipment:** Dolby XP-24 SR, (4) Dolby 361 SR/A, (2) Q.Lock 3.10 synchronizers, (2) Lexicon PCM70, Lexicon 224, Eventide H3000 Harmonizer, Klark-Teknik DN780, Klark-Teknik comp/limiter, AKG ADR-68K digital reverb, Lexicon Prime Time, TC Electronic delay, Emulator E-2, Yamaha DX7, Sony BVH-1100A 1" video recorder, Sony DVP-18 D2 recorder, (2) Sony BVU-800 3/4" video recorders, Sony SLV-R5UC SVHS Hi-fi, Panasonic PV-1530 VHS, Kem K-800 flatbed transfer system, (2) Yamaha acoustic pianos.

RUSSIAN RIVER STUDIO

A16

8401 Eastside Rd.; Ukiah, CA 95482; (707) 468-0282. Owner: Ken Ingels. **Manager:** Ken Ingels.

RANDALL SCHILLER PRODUCTIONS

A8 D2

1207 Fifth Ave.; San Francisco, CA 94122; (415) 661-7553; FAX: (415) 566-6238. Owner: Randy Schiller. **Manager:** Chris Herbst.

SHORELINE STUDIOS

A16 D16

PO Box 1102; Mill Valley, CA 94942-1102; (415) 389-1959. Owner: Mark Stein. **Manager:** Mark Stein.

FRANK SHORT'S BANDBOX MUSIC

A8

537 S. Main St.; Ukiah, CA 95482; (707) 462-5386. Owner: Frank Short. **Manager:** Frank Short.

SCOTT SINGER PRODUCTIONS

A16 D4

2901 Mariposa, Ste. 5; San Francisco, CA 94110; (415) 864-0203; FAX: (415) 864-0202. Owner: Scott Singer. **Manager:** Annette Singer.

THE SITE

A24

4286 Redwood Highway #365; San Rafael, CA 94903; (415) 662-2046; FAX: (415) 662-2386. Manager: Wendy V. **Dimensions:** Room 1: studio 35x42, control room 24x22. Room 2: 20x22. Room 3: 10x12. Room 4: 10x15. **Mixing Consoles:** Neve 8078 72-input w/GML automation. **Audio Recorders:** Studer A800 24-track and 16-track head, Studer A80 1/2" 2-track and 4-track head, Studer A80 RC 1/4" 2-track, Panasonic 3700 DAT, Sony 2500 DAT, (2) Studer cassettes, ITC 99B cartridge. **Monitors:** (2) UREI 813C, (2) Tannoy 10B w/Mastering Lab x-over, (2) Meyer HD-1, (4) Yamaha NS-10, Bryston 4B, (3) Phase Linear Pro-700, Crown DC-300, McIntosh MC-2105. **Other Major Equipment:** AMS 15-80S, EMT 140 reverb plate, EMT 240, Eventide 3500, (4) GML stereo parametric, (4) GML

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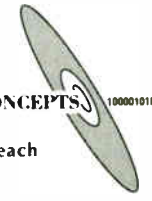

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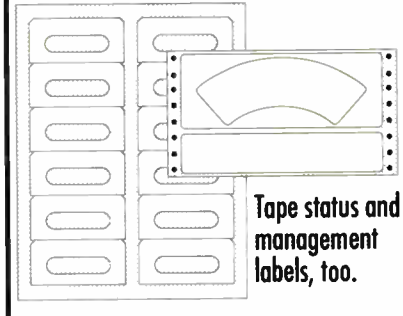

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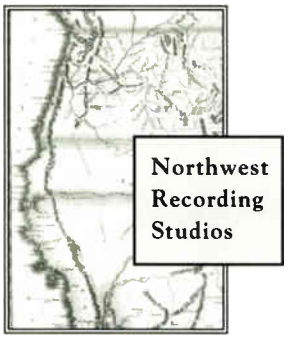

—LISTING CONTINUED FROM PREVIOUS PAGE

mic pre, Lexicon 480L, Lexicon 224, (2) Lynx synchronizers, Sony BVU-800, (2) Neve compressor/limiters, (2) dbx 160X, (2) UREI 1176, Hammond B-3 w/Leslie, Neumann SM69, (2) Neumann M49, (2) Neumann KM254, (5) Neumann U87.

SKLOWER MUSIC CO.

A2 D4

2215-R Market St., Ste. 409; San Francisco, CA 94114; (415) 863-0993. Owner: Keith Sklower. **Mixing Consoles:** Sony MX-P21 8-track broadcast mixer, (2) Rane preamps, Yamaha MX300 6x4 mixer. **Audio Recorders:** Sony DTC-1000ES DAT, Panasonic SV-3500 w/Apogee anti-aliasing filters, Apogee A/D-500 outboard A/D with lock-to-video, Sony CDW-900E CD recorder, (3) Sony TC-97ES cassette recorders. **Digital Audio Workstations:** Sonic Solutions Sonic Station w/Trackmaker CD premastering. **Other Major Equipment:** B&K omnidirectional mic set Type 3529 (matched pair of 4003's), (2) B&K cardioid mic Type 4011, (2) Neumann TLM170, (2) Neumann KM84, (2) Josephson hypercardioid mic set, (2) Josephson Omni Capsules, near-field, (2) Josephson Omni Capsules, far-field.

SOUND & VISION

A16 D16

684 Indiana St.; San Francisco, CA 94107; (415) 821-2321; FAX: (415) 821-1703. Owner: Michael Molenda, Neal Brighton. **Manager:** Neal Brighton.

SOUND BYTES INC.

A2 D16

156 Otto Circle; Sacramento, CA 95822; (916) 392-6404; FAX: (916) 392-6417. Owner: Sound Bytes Inc. **Manager:** John E. Pond III. **Engineers:** John Pond, Chris Capitano. **Dimensions:** Room 1: studio 20x23, control room 14x20. **Mixing Consoles:** Yamaha DMC1000, Biamp Maxxam. **Audio Recorders:** Yamaha DRU8, Tascam DA-30, Tascam 122, Tascam 234. **Digital Audio Workstations:** Studer Dyaxis II Editech. **Monitors:** Genelec 1031A, JBL 4206, JBL 4738. **Other Major Equipment:** Macintosh Quadra 950, Opcode Studio V, Opcode Vision, Opcode Galaxy Plus editors, Kurzweil K2000R, Kurzweil K1000, Kurzweil HX1000, Oberheim Xpander, Oberheim OB-8, Roland R-8M, Yamaha TX416, Fender Precision bass, Gibson Les Paul.

THE SOUNDSMITH

A8 D2

PO Box 1567; Monterey, CA 93942; (408) 394-6940; FAX: (408) 394-6940. Owner: David Kempton. **Manager:** Jeremy Hertzberg.

SOUNDTEK STUDIOS

A24 D2

85 S. 2nd St.; Campbell, CA 95008; (408) 370-3313. Owner: Robert Berry. **Manager:** Peter Roberts.

SPARK PRODUCTIONS

A24 D16

5854 Colby St.; Oakland, CA 94618; (510) 547-3669; FAX: (510) 652-7782. Owner: Tony Mills. **Engineers:** Burke Trieschmann—Chief Engineer, David Holmes—Assistant Engineer. **Dimensions:** Studio 12x17, control room 12x25. **Mixing Consoles:** Harrison 3232B 32x32 automated. **Audio Recorders:** MCI JH-24 24-track, MCI JH-110B 2-/4-track w/Dolby SR, (2) Nakamichi cassette decks, (2) Panasonic 3700 DAT. **Digital Audio Workstations:** Spectral 16-track, Apogee A to D, Digidesign Sound Tools 2-track editing system. **Monitors:** John Meyers ACD w/Meyers Power and White 30-band EQs; Meyer HD-1 near-field (self-powered); Yamaha NS-10, JBL 4311. **Other Major Equipment:** Lexicon 300 effects processor, Roland 880 reverb, Eventide H3500 Ultra-Harmonizer, Ensoniq DP-4, (2) Lexicon PCM70, (2) Alesis Quadraverb, Yamaha PCM90, Scamp rack w/13 different compressors, gates, flangers, EQs, mic pres and auto panners; (4) Massenburg mic preamps, (2) Massenburg EQs, Drawmer 1960 stereo tube mic pre/compressor, (2) White 30-band EQs, (8) Gatex high-speed gates, (2) UREI 1176 compressor/limiters, dbx 160 compressor, assorted other processors and signal processing; complete mic selection Neumann, AKG, Shure, Sennheiser, EV, etc.; (35) in-house synthesizers featuring: Yamaha 7'6" Disclavier grand piano, Akai S1000 HD 16-bit stereo sampler/full library, Roland S-770 16-bit stereo sampler/full library, Roland JD-800, Yamaha SY77, Korg T1, Korg 01W Pro, Korg Wavestation, Roland R-8 drum module/all cards, Procussion drum module; 486 PC, 33Mhz w/16 megs RAM, Macintosh IIfx w/16 megs RAM, Macintosh IIcx w/19" monitor, Performer MIDI sequencer/all versions, Studio Vision sequencer w/hard disk tracking, complete computer desktop publishing software w/Laserwriter NTX; JVC BR-7700 1/2" video w/3 Sony video monitors, Sony Beta SP, Adams-Smith Zeta-3, Mark of the Unicorn Video Time Piece streamer creator.

STARSHINE AUDIO ENTERPRISES

A16 D2

932 Nord Ave.; Chico, CA 95926; (916) 345-3027. Owner: Hugh E. Santos. **Manager:** Hugh E. Santos.

STUDIO C

A24 D8

2320 N. California St.; Stockton, CA 95204; (209) 944-9844. Owner: Thomas T. Chen. **Engineers:** John Edman—manager, Tony Hodson, Doc Chen—owner, Don Evans. **Dimensions:** Studio 35x40, control room 17x11, iso booth 9x11. **Mixing Consoles:** Otari Series 54 36x24x36 w/DiskMix III automation. **Audio Recorders:** Otari MTR-100 with Dolby SR/A, Otari MTR-10 1/4", Otari MTR-12 1/4" w/time code, Panasonic 3900, (2) Nakamichi MR-1, KABA Real-time duplicator. **Digital Audio Workstations:** Waveframe 1000 8-track. **Monitors:** Genelec 1022A, MDM 4, Yamaha NS-10, Rogers LS3/5A, JBL 4430 studio monitor, Bryston 3B, Crown D-75, Crown DC-300 power amp. **Other Major Equipment:** TimeLine Lynx, Opcode Studio V, Quantec QRS, Yamaha REV7, (3) Yamaha SPX90, TC Electronic TC 2290, Eventide 910, 949, Lexicon 300, Delta-T, Roland DEP-5, (3) Alesis Quadraverb, (4) Valley People Kepex II, (10) Valley People Maxi-Q, (4) Valley People Gain Brain II, (2) DSP, Aphex Compellor, Aphex Dominator, Aphex Exciter, Aphex expander/gate, UREI 1178, Demeter mic pre, Demeter tube direct, EXR exciter, (2) dbx 160, dbx 166, Hughs SRS AK-100, Orban 526A, Neumann KM53, KM84i, U67, SM69, U47 FET, U47 tube; Electro-Voice RE20, RE15, RE16; Crown PZM-31, MB-215, MB-301 ribbon; AKG C-414EB, C-451E C-12, D-112; Shure SM57, SM58; Sennheiser 421, 405; Steinway 6'8" grand piano, Hammond B-3 organ, Alembic bass, Fender P bass, Tobias bass, Guild D-50 guitar, Fernandez Strat with EMGs, Fender Strat, DMX drum machine, Fender deluxe reverb, Legend Model G amp, Fender Vibroverb, Vox cartridge, Marshall 50-watt combo, JVC 8250 3/4" video recorder, Roland Octapad, GP-8, D-550, MKS-70, MKS-20, D-110, U-220; Yamaha TX802, Proteus II, Kawai K-5M, Synclavier II digital music system, Korg Wavestation, (2) Alesis D-4s.

STUDIO D RECORDING INC.
Sausalito, CA

STUDIO D RECORDING INC.

A24 D48

425 Coloma St.; Sausalito, CA 94965; (415) 332-6289; FAX: (415) 332-0249. Owner: Dan Godfrey, Joel Jaffe, Evie Thompson. **Manager:** Joel, Dan. **Engineers:** Joel Jaffe, Karl Derfler, Larry Brewer, James "Watts" Vereecke, Robert Hodas, Matt Wallace. **Dimensions:** Studio 29x36x20 with tunable acoustic panels, (3) iso booths 8x14x16, control room 20x20 with compression ceiling. **Mixing Consoles:** Trident TSM 40x32x32 w/(10) Neve prism rack and Neve flying fader automation. **Audio Recorders:** Studer A800 MkII 24-track, Ampex ATR-102 2-track, Fostex E-2 2-track w/center-track time code, Sony 300ES R-DAT, Panasonic 3700 R-DAT. **Monitors:** Hafler 500, (5) Hafler 220, custom Z-Link modified, Hidley custom, Yamaha NS-10M, N.H.T. **Other Major Equipment:** (3) TimeLine Lynx Series 500; CCU and SSU systems & motion controls; blackburst generator for house sync; Onkyo cassette player, Yamaha REV5, Lexicon 200, Eventide 3000SB Ultra-Harmonizer, AMS RMX-16 digital reverb, Roland SRV-2000 digital reverb, Roland SDE-3000 digital delay, Bel BD-80 delay/sampler, (2) Yamaha SPX90II, Yamaha SPX90, Eventide H910 harmonizer/delay, (4) EAR 822Q valve program EQ, Pultec MEQ-5, (2) Lang PEQ-2, (2) UREI 545 parametric EQ, Aphex de-esser, Rane 1/3-octave EQ, (2) Teletronix LA-2A, (2) UREI 1176LN, (2) UREI LA-4A, dbx 165 compressor, (2) Drawmer dual gates, (8) Aphex 612 expander/gate, (4) Symetrix gate, Aphex Dominator II, Neumann M49b valve, Neumann U47 valve, (2) Neumann U67 valve, (2) Neumann U87+ FET, (2) Neumann U47+ FET, (4) AKG C-28 valve, (3) AKG C-414EB, AKG C-12A valve, (2) AKG C-451EB w/pads, (2) AKG C-452EB w/pads, AKG D-12E, (2) AKG D-200E, (6) Sennheiser MO-421u, EV 666, EV RE20, (6) Shure SM57, (4) PZM, (2) Beyer 201n, (2) AKG D-112, Sony ECM-50P, Yamaha C7-E MIDI grand, Hammond B-3 organ w/Leslie, VTR formats available upon request. All synchronizers are in-house, and no extra

World Radio History

charge for video work other than 3/4" video machine rental. **Rates:** Please call for rates. Lockout or hourly rates are available. Block rates for one week or longer will be negotiated. **Specialization & Credits:** Studio D Recording has become known as the Bay Area's foremost tracking facility. With tunable acoustics, 20-foot high ceilings and three big iso booths, our live ambient room sounds are unbeatable. Now with Neve flying faders, mixing is a breeze. All equipment is maintained in optimum operating condition by chief engineer Dr. Richie Moore. We also offer clients full kitchen and bath facilities, and a comfortable lounge for that home-away-from-home environment with comfort and privacy. Studio D has had the pleasure of working with such fine clients as Huey Lewis & The News, Bourgeois Tagg, Bruce Hornsby, Starship, KBC Band, Will Ackermann and Windham Hill, Earth, Wind and Fire, Anita Pointer, Four Tops, Pebbles, Todd Rundgren, Van Morrison, Faith No More, Gene Loves Jezebel, Dick Dale, Leon Russell, Dan Hicks, Maria Muldar, J.J. Cale and Hiroshi Kamayatsoo, Pure, Junkyard, I Love You, Soundgarden, The Call, Harvey Mandel and Psychefunkapus. Thanks to all.

STUDIO Z RECORDING INC.

A24 D4

1030 48th St.; Sacramento, CA 95819; (916) 456-2737; FAX: (916) 456-0606. Owner: Zack Boles. **Manager:** David Whitaker. **Engineers:** Zack Boles, David Whitaker, Gary Woltmon, Mike Wilson, Jay Lemmons—Technical Director. **Dimensions:** Room 1: studio 21x11, control room 19x18. Room 2: studio 9x8, control room 12x11. **Mixing Consoles:** Trident TSM 40x24x32 (72 channels to remix, 40 channels of automation); Sound Workshop Series 30 18x8x2. **Audio Recorders:** Sony APR-24 24-track, MCI JH-110C-8 8-track, Otari MTR-10 w/CTTC 2-track, MCI JH-110B2 2-track, (5) Otari MX-5050 2-track, (2) Panasonic SV-3900 DAT, Sony TCD-10 Pro DAT portable, Tascam 122 cassette. **Digital Audio Workstations:** Akai DD1000. **Monitors:** Tannoy LGM w/MasterLabs crossover, Tannoy LGM, Tannoy System 2, EV Sentry 100A, Auratone 5C, JBL 4311. **Other Major Equipment:** Lexicon 224, 300, LXP-1, LXP-5, (2) UREI LA-3; Valley People rack (Kepex, Gain Brain, Maxi-Q); (2) BSS 901 dynamic EQ, (2) Aphex Compellor; Aphex Aural Exciter, Aphex Dominator II, (2) Altec 436C tube compressors, (2) Adams-Smith Zeta-3 synchronizers, Telefunken Elam 251, Telefunken U67, (5) Neumann U87 (2 Stephen Paul modified); (2) Neumann U89, (3) AKG 414; (25) additional condenser, dynamic, ribbon and PZM mics.

SUNSET RECORDING

A8 D8

856 Airport Rd.; Monterey, CA 93940; (408) 375-2861. Owner: Sal Marullo.

SWINGSTREET STUDIOS

A24 D2

620 Bercut Dr.; Sacramento, CA 95814; (916) 446-3088; FAX: (916) 446-3588. Owner: Phil Sillas & Larry Lauzon. **Manager:** Larry Lauzon.

TARPAN STUDIOS
San Rafael, CA

TARPAN STUDIOS

A48 D2

1925-G Francisco Blvd. E.; San Rafael, CA 94901; (415) 485-1999; FAX: (415) 485-1995. Owner: Narada Michael Walden. **Manager:** Janice Lee. **Engineers:** David Frazer, Marc Reyburn, Matt Rohr, Jeff Gray, Doc Shaffer (systems engineer). **Dimensions:** Studio 25x35, control room 18x19. **Mixing Consoles:** Solid State Logic 4000G w/Total Recall (56x32x56). **Audio Recorders:** (2) Studer A827, MCI JH-24, (2) Ampex ATR-102, (4) Tascam 122 MkII, (2) Sony PCM-2500. **Monitors:** (2) UREI 813B, (2) UREI 811, (10) Yamaha NS-10MS. **Other Major Equipment:** Studer TLS4000 MkII synchronizer, (2) AMS RMX-16 reverb, AMS 15-80S digital delay, Sony MU-R201, (2) Focusrite 110, (4) UREI LA-4 compressor, (2) SSL SL-683E prog. EQs, Lang PEQ-2, Teletronix LA-2, Orban 536A de-esser, (3) Yamaha reverbs, SPX90 & SPX900; (2) Eventide Harmonizers, H3000 and H949; Neumann, AKG, Beyer, Shure, Crown microphones; Crest and Crown power amps, Countryman, Demeter and Stewart DI's; NTP 179-170 compressor, Neve compressor/limiter, Lexicon PCM41, Lexicon Prime Time, BBE 802, Yamaha C7-M MIDI-grand piano.

SEE PAGE 151 FOR AN EXPLANATION OF THE STUDIO SERVICE ICONS. FOR MORE INFO ABOUT MIX LISTINGS SEE PAGE 149.

TIKI RECORDING STUDIOS

A24 D2

195 S. 26th St.; San Jose, CA 95116; (408) 286-9840; Production: Telex: (408) 286-4091; FAX: (408) 286-9845. Owner: Gradie O'Neal. **Manager:** Jeannine O'Neal. **Specialization & Credits:** Specializing in album and single production work in all styles of music from country, rock, heavy metal, contemporary, Christian, gospel, top 40, high energy, new age, R&B, European jazz and reggae. All styles of Mexican, Chinese, Indian and Brazilian with in-house producers, arrangers and musicians with chart-proven results. Cassette duplication (real time or high speed) and DAT. Record pressing: LP, 45 RPM singles, 12" singles and CD manufacturing available. Career Planning & Record Promotion. Two 24-track recording studios. Large string-and-horn room, extra-large drum room. 9' Ibach concert grand. Publishing companies for BMI and ASCAP. Music telemarketing and record mailing. Radio and television commercials.

JOE WEEO'S HIGHLAND STUDIO

A16 D2

PO Box 554; Los Gatos, CA 95031; (408) 353-3353; FAX: (408) 353-3388. Owner: Joe Weed. **Manager:** Joe Weed.

DAVE WELLHAUSEN STUDIOS

A24 D2

1310 20th Ave.; San Francisco, CA 94122; (415) 564-4910. Owner: Dave Wellhausen. **Manager:** Janet Wellhausen. **Engineers:** Dave Wellhausen, Gary Mankin, John Altman, Mark Needham, Randy Sellgren, Gary Hobish, David Plank, Steven O'Hara. **Dimensions:** Studio 25x15 w/iso booth, control room 15x15. **Mixing Consoles:** Sound Workshop 34C w/ARMS & DiskMix, 32-inputs, 52-inputs in mixdown. **Audio Recorders:** MCI JH-24 w/24- & 16-track heads, Otari MTR-12 w/Dolby SR, Sony TCD-10 Pro DAT machine, Otari MX-5050B MkII, (2) Aiwa cassette decks. **Monitors:** Westlake BBSM8's, Yamaha NS-10M's, Auratones. **Other Major Equipment:** (4) Massenburg microphone preamps, (2) Massenburg EQs, Lexicon 224XL digital reverb, Eventide H3000SEV Ultra-Harmonizer w/sampling option, Roland DEP-5, Roland SDE-3000A, Roland SDE-1000, (2) Roland SRV-2000, (2) Yamaha SPX90, Yamaha D1500, Marshall Time Modulator, Delta-Lab ADM 1024, Drawmer gates, Valley People Dyna-Mite, ADR vocal stressor, (2) UREI 1176 limiters, (2) UREI LA-4, Aphex Compellor, Aphex Aural Exciter, Emax HD sampler w/over 3000 voices, Yamaha C3 6' conservatory grand piano, Yamaha DX7, Alesis SR-16 & D4 drum machines, Roland MKS-30, Fender Precision bass, Neumann U87, (2) Neumann KM84, (2) AKG 414EB, (5) AKG 460B, AKG D-12E, Electro-Voice RE20, RE15, (5) Sennheiser 421, Sennheiser 441, Shure dynamics, Beyer M88, M201, Sony C-36P, (4) Crown PZM, (4) Countryman direct boxes, Demeter tube direct box, IBM XT w/20 meg hard drive, Macintosh SE w/Performer 3.6 software & 4 megs RAM.

XANOOR RECORDING

A8

407 Camino Sobrante; Orinda, CA 94563-1844; (510) 254-9077. Owner: James Weyeneth. **Manager:** Jim.

ZOOMA MUSIC PRODUCTIONS

A24 D2

110 Coleridge Ave.; Palo Alto, CA 94301; (415) 323-1217. Owner: Victor Bellomo. **Manager:** Victor Bellomo. **Engineers:** Ted Savarese, Victor Bellomo, independents. **Dimensions:** Room 1: studio 20x15, control room 15x12. Room 2: iso booth 10x10. **Mixing Consoles:** Sound Workshop Series 34B 32x24 w/DiskMix automation. **Audio Recorders:** Otari MX-80 24-track, Otari MX-5050BII 2-track, Panasonic SV-2500 DAT, Sony TC-D5M cassette, Denon DRM-800 cassette. **Monitors:** UREI 809, Yamaha NS-10M, Auratone Sound Cubes. **Other Major Equipment:** UREI 1176LN compressor/limiter, Drawmer DS-201B noise gate, dbx 160X compressor, dbx 166 comp/lim/gate, Valley 4-channel noise gates, Aphex Aural Exciter, BBE 822 Sonic Maximizer, Orban 622B parametric EQ, Lexicon PCM70. Lexicon PCM60 reverb, Lexicon Prime Time II delay, Roland SRV-2000 reverb, Roland SDE-1000 delay, Yamaha D1500 delay, Yamaha SPX90II, Alesis Quadraverb, ART Proverb 200, Furman PQ-4 parametric EQ, Hafler monitor amplifiers, Macintosh IIci, Mark of the Unicorn Performer sequencing software, Opcode Galaxy editor/librarian, Roland S-550 sampler w/large library, Opcode Timecode Machine SMPTE/MIDI converter, Korg SG1D sampling grand, Roland D-550 linear synthesizer, Korg M3R AI synthesis module, Roland Octapad MIDI controller, Alesis SR-16 drum machine, Yamaha RX11 rhythm programmer, Roland TR-626, Sequential Circuits Prophet 5, Yamaha DX7, Yamaha EMT10, Hammond XB-2 w/Leslie 122, Yamaha 7'6" grand piano, Fostex 4030 synchronizer w/controller, JVC BR-S622U video tape recorder, Sony 19" video monitor, Countryman Type 85 direct boxes, large selection of microphones available.

Colorado

ACOUSTIC PROJECTIONS

A8 D2

15980 Rollercoaster Rd.; Colorado Springs, CO 80921; (719) 488-2471. Owner: Doug Wilson. **Manager:** Doug Wilson.

AKASHIC RECORDING STUDIO

A32

1670 Orchard Ave.; Boulder, CO 80304; (303) 444-2428. Owner: Prasanna. **Manager:** Danielle Chapman.

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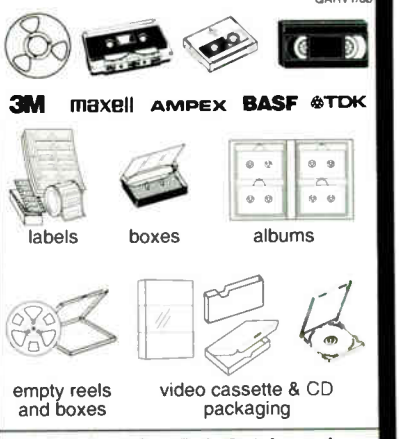

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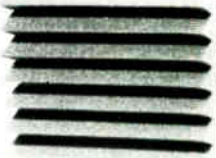

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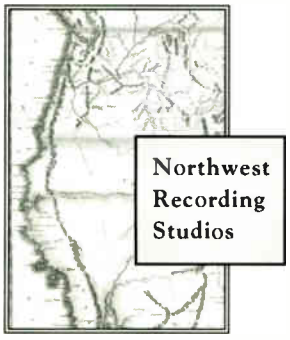

AUDIO'S AMIGOS

A8 D16

1925 Orchard Ave.; Boulder, CO 80304; (303) 442-3939. Owner: Fergus Sound Enterprises. **Manager:** Fergus. **Engineers:** Fergus. **Dimensions:** Studio 27x22, control room 12x14. **Mixing Consoles:** Peavey AMR-800, Soundcraft 200. **Audio Recorders:** (2) Alesis ADAT, Panasonic SV-3700, Panasonic SV-255, Otari MX-5050 MkIII-8, Otari MX-5050BII-2. **Monitors:** Audix HRM-3, ADL M2-S, Auratone.

AVALANCHE RECORDING STUDIOS INC.
Northglenn, CO

AVALANCHE RECORDING STUDIOS INC.

A24

10650 Irma Dr. #27; Northglenn, CD 80233; (303) 452-0498. Owner: Avalanche Recording. **Manager:** Linda Warman. **Engineers:** George Counnas, James Thomas. **Dimensions:** Room 1: studio 44x30, control room 20x30. Room 2: control room 18x20. **Mixing Consoles:** Customized Soundcraft 2400 52-channel w/SMPTE-based automation, AMR 24-channel, 56-input. **Audio Recorders:** Sony/MCI JH-24 24-track, Sony/MCI JH-110C 1/2 4-track, 1/2" or 1/4", Sony PCM-2500 DAT, Fostex D-20B SMPTE DAT. **Monitors:** (2) JBL 4430, (2) Yamaha NS-10, (2) Tannoy. **Other Major Equipment:** (2) Dolby SR, (3) TimeLine Lynx, Lexicon 480L, (2) Lexicon PCM70, Lexicon PCM42, Lexicon PCM41, Eventide H3000, Eventide 949, TC Electronic TC 2290, (2) Pultec EQs, (3) UREI 1176, (2) dbx 160 (old style), dbx 165, TC Electronic 1290 digital EQ, (2) Telefunken ELM-251, (2) Telefunken U67, JVC 3/4" video deck, Yamaha C7 grand piano, Hammond B-3 organ w/Leslie, large microphone selection. **Specialization & Credits:** Credits: Camper Van Beethoven, J.B. Allstars, Kip Winger, Fiona, Michael McDonald, Kenny Loggins, The Pretenders, The Winans, The Four Tops, Leon Russell, Jock Bartley, Highway 101, Nelson, Flash Cadillac. Producers: Paul Worley, Beau Hill, Bill Porter, Geoff Workman, Jimmy Waldo. Corporate Projects: MetLife, US West, Gannett Productions for Discovery Channel. CD/album productions, radio jingles, soundtracks, sync-to-video scoring, original music composition & productions, sound effects & Foley, broadcast & corporate TV soundtracks. Studio B: Valentine Productions, complete MIDI production suite. Accomodation service for mountain retreats and Denver's best hotels with transportation arrangements available. Less than one hour drive to Rocky Mountain serenity. Top studio musicians, producers, arrangers and composers. Digital 2-track mastering, synchronized lockup, and additional equipment upon request. Brochure and rate card available.

CLUB DOG STUDIOS INC.

D24

4919 N. Broadway #17; Boulder, CO 80304; (303) 444-0980. Owner: D. Christian Dicharry. **Manager:** Jeff Lipton. **Engineers:** D. Christian Dicharry, Jeff Lipton, Bill Thomas. **Dimensions:** Room 1: studio 30x20, control room 12x20. Room 2: studio 10x15. **Mixing Consoles:** Peavey AMR-2400. **Audio Recorders:** (3) Alesis ADAT, Tascam DA-30, Nakamichi MR-1. **Digital Audio Workstations:** Digidesign Pro Tools (4-channel). **Monitors:** (2) Meyer HD-1, (2) Yamaha NS-10. **Other Major Equipment:** Summit Audio TPA-200 tube preamp, UREI 1176 compressor, UREI LA-4 compressor, dbx 166 compressor, dbx 160 compressor, Drawmer DS-404 quad gate, TimeLine Micro Lynx synchronizer, Lexicon 300, Eventide H3000SE

—SEE PHOTO/LOGO TOP OF NEXT COLUMN

CLUB DOG STUDIOS INC.
Boulder, CO

Harmonizer, TC Electronic TC 2290 digital delay, (2) Lexicon LXP-1, Yamaha SPX900, Alesis MIDIverb III, Tascam CD-401, Opcode Studio Vision, Digidesign Sound Designer, Neumann U87, AKG 414, (2) AKG 460, (4) Sennheiser 421.

COLDRADO SOUND RECORDING
Westminster, CO

COLORADO SOUND RECORDING

A24 D4

3100 W. 71st Ave.; Westminster, CO 80030; (303) 430-8811. Owner: Kim Propst, Andy Smith, Kevin Clock, Alan Schott. **Manager:** Kevin Clock, Barbi Springer. **Engineers:** Kevin Clock, Tom Capek, Jeff Shuey, James Tuttle. **Dimensions:** Room 1: studio 1,000 sq. ft., control room 500 sq. ft. Room 2: control room 200 sq. ft. **Mixing Consoles:** Trident TSM w/moving fader automation. **Audio Recorders:** Otari MTR-90II 24-track, Ampex ATR-104 2/4-track, 1/4" and 1/2", Studer A80 2-track, 1/4" and 1/2" w/time code, Panasonic SV-3700 DAT, Panasonic SV-3500 DAT, Sony DTC-59ES DAT, Nakamichi MR-2, (2) Technics RSB100. **Digital Audio Workstations:** Digidesign Pro Tools (4-channel). **Monitors:** UREI 813, Meyer HD-1, Genelec 103, Yamaha NS-10M. **Other Major Equipment:** 24-channel Dolby SR, (2) Adams-Smith Zeta-3, Lexicon 480L digital reverb, AMS RMX-16, Lexicon PCM70, Eventide H3000SE, (2) TC Electronic TC 2290 digital processor, UREI LA-2A, (2) UREI 1176, Sontec MEP 250 EQ, Sontec MPA1 stereo mic preamp, Neumann U48 tube, AKG C-24 stereo tube, (3) Neumann U87, (2) Neumann U47, (4) AKG 414, Yamaha C7 grand piano, Hammond C-3 organ w/Leslie, Korg M1R, much more!

COUPE STUDIOS MUSIC INC.

A24 DB

2888 Bluff St., #115; Boulder, CD 80301; (303) 447-0551; FAX: (303) 447-8603. Owner: Scott Roche. **Manager:** Steve Carter.

DENVER CENTER MEDIA SOUND
Oenver, CO

DENVER CENTER MEDIA SOUND

A24 D2

1245 Champa St.; Denver, CO 80204; (303) 893-4000; FAX: (203) 893-3206. Owner: The Denver Center for the Performing Arts. **Managers:** Phil Hegel, Dirk Olson, Glenn R. Ziemba.

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EAGLE SOUND

A16

1480 E 2nd Ave., #1; Durango, CO 81301; (303) 247-5452. Owner: Doug Eagle. **Manager:** Scott Smith.

EYE IN THE SKY SOUND

A16 D24

4315 County Rd. 54G; PO Box 642; La Porte, CO 80535; (303) 482-3947. Owner: Randy Miotke. **Manager:** Randy Miotke.

FANFARE RECORDING STUDIOS

A24 D24

5142 Quaker St.; Golden, CO 80403; (303) 279-2334; FAX: (303) 278-0079. Owner: Guy Bianchini. **Manager:** Guy Bianchini. **Engineers:** Mark Derryberry, Guy Bianchini, Dan Polizzi. **Dimensions:** Studio 16x35, control room 17x15. **Mixing Consoles:** Trident Series 24 w/36 channels of Uptown moving fader automation. **Audio Recorders:** Studer A827 24-track analog, (3) Alesis ADAT 8-track digital, Otari MTR-10CT 2-track analog, Sony PCM-2500 R-DAT, Nakamichi MR-2 cassette, Technics RS-B905 cassette. **Digital Audio Workstations:** Digidesign Pro Tools 4-channel system running on a Mac IIfx. **Monitors:** Gauss custom 15" co-axial, Audix HRM-3, Yamaha NS-10M, JBL Control 5. **Other Major Equipment:** (10) Cherokee "Trident A-Range" mic pre & EQ, Lexicon 300, Eventide H3500 Ultra-Harmonizer, Lexicon 200, Lexicon PCM70, (2) Yamaha SPX90II, (2) Lexicon LXP-1, ADA D1280 digital delay, (2) UREI 1176LN, (2) dbx 160, (2) Valley People Gain Brains, (5) Valley People Kepex II, Audioarts 4200B parametric EQ, Valley People DSP-815 de-esser, JVC CR-6000 3/4" VCR, Adams-Smith Zeta-3 synchronizer, Yamaha C7 grand piano w/MIDI, Kurzweil K2000 sampling keyboard, Korg O3R w/tone module, Roland R8M drum machine, (2) Neumann U87, AKG "The Tube", Neumann 269C, (2) AKG C-414, (4) AKG C-460 w/CK-61 and CK-62 capsules, (2) Sennheiser 441, (4) Sennheiser 421, EV RE-20, (4) Shure SM57, (2) EV PL95.

FTM STUDIOS
Lakewood, CO

FTM STUDIOS

A48 D8

1111 S. Pierce St.; Lakewood, CO 80232; (303) 922-3330; FAX: (303) 922-3614. Owner: John and Diane Sundberg. **Manager:** John Sundberg. **Engineers:** John Sundberg, Steve Avedis, Kerry Conner, Jim Iltis, Mike Pfeifer, Steve Sundberg. **Dimensions:** Room 1: studio 42x40, control room 18.5x22. Room 2: studio 31x29, control room 16x18.5. Room 3: studio 11x16, control room 16x9. **Mixing Consoles:** Otari Series 54 96-input w/DiskMix V4 moving fader automation, custom 28x24x2, Soundcraft 2400 24x24x2, modified. **Audio Recorders:** (2) Otari MTR-90 Series II 2" 24-track w/autolocator and dbx NR, Otari MTR-10 2-track 1/2" and 1/4" w/center-track time code, (5) Otari MX-5050 1/4" 2-track, (2) Soundcraft 761 2" 24-track w/autolocator, Tascam DA-30 DAT, (2) Panasonic SV-3500 DAT, (2) Technics RS-B100 stereo cassette deck. **Digital Audio Workstations:** WaveFrame 1000 w/8-track disk recorder, 16MB sampler w/instruments. **Monitors:** (2) UREI 813C, (2) EV Sentry 500, (2) KRK 703, (2) Tannoy SRM-12B, (4) Auratone 5C Super Sound cube, (4) Yamaha NS-10M. **Other Major Equipment:** Lexicon 480L, Quantec QRS, AMS RMX-16, TC Electronic TC 2290 w/14-sec sampling, (2) Eventide H3000SE, Eventide H949, Eventide H910, Drawmer 1960 stereo tube compressor, (2) Valley People 440 compressor/limiter, (4) dbx 160X compressor/limiter, (2) dbx 161 compressor/limiter, dbx 162 compressor/limiter, Symetrix 522, Lexicon Prime Time II, Lexicon Prime Time, (3) Valley Audio Dyna-Mite stereo gates, (2) Gatex, Lexicon PCM70, (2) Lexicon Model 200, Sontec MEP-250C parametric EQ, Audioarts 4200B parametric EQ, Adams-Smith 2600 synchronization system w/compact controller, Roland SRV-2000, (2) Yamaha SPX90, (2) Alesis Quadraverb, Alesis 3630 compressor, (3) Aphex Aural Exciter Type B, Ursa Major SST-282 Space Station, (2) Effectron II ADM 1024, DeltaLab DL-5, BBE 802, Kurzweil 250 w/all sound blocks, Steinway 9' grand piano.

KERR/MACY MUSIC GROUP

A24

7700 E. Iliff, Ste. E; Denver, CO 80231; (303) 755-9422; FAX: (303) 755-9377. Owner: Bill Kerr, John Macy. **Manager:** John Macy. **Engineers:** John Macy, Mark Fuller, Tom Payetta. **Dimensions:** Room 1: studio 35x40, control room 20x17. Room 2: studio 14x17, control room 14x18. Room 3: studio 12x8, control room 14x16. **Mixing Consoles:** Peavey ARM-2400 36x24x92 w/moving fader automation, Neotek 32x8x24, Tascam MS600 40x16. **Audio Recorders:** (2) Otari MX-80 24-track, (3) Alesis ADAT digital w/controller, Fostex E-2 CCTC 2-track 1/4", Ampex HTR-100 1/2" 2-track, (3) Panasonic SV-3700 DAT, Tascam 48 1/2" 8-track. **Digital Audio Workstations:** Sound Tools 2-track direct-to-disk w/Mac IIci w/720MD hard drive. **Monitors:** (2) JBL 4333, (2) Meyer HD-1, (6) Yamaha NS-10, (2) JBL 4412. **Other Major Equipment:** (2) Focusrite ISA 115HD mic pre/EQ, (2) New Modules 3118, (2) Sontec mic pre/EQ, Lexicon 224XL, AMS 1580, Lexicon 300, Eventide H3000, Lexicon PCM70, Tube-Tech CL-1B, (6) dbx 160X, dbx 165A, (6) Amek EQ, SPL Vitalizer, (40) channels Uptown moving fader automation, Adams-Smith Zeta-3 synchronizer w/remote, JVC 6650 3/4" VCR, UREI 1178, (2) UREI 1176, (4) UREI LA-3A, UREI LA-4, (2) Neumann M50 tube, (2) Neumann M49 tube, (2) Neumann U47 tube, (2) Neumann KM54 tube, (5) Neumann U67 tube, Neumann SM2 tube, (2) AKG C-12 tube (1 w/Stephen Paul 1-micron capsule mod), Telefunken SM2 tube, (30) various microphones, (4) Tube-works tube direct boxes, (5) dbx 160, (2) Drawmer 201 gate, (2) Aphex 602 gate, Yamaha KX88 controller, (10) various MIDI modules, etc., Roland Dimension D, Yamaha SPX900, (8) various other reverbs, (10) various other gates, Lexicon Super Prime Time.

MASTERTOUCH PRODUCTIONS

A2 D24

Evergreen, CO 80439; (303) 674-8355. Owner: Rob Horton. **Manager:** Marsha Lu Horton. **Engineers:** Rob Horton. **Dimensions:** Studio 22x11, control room 18x13. **Mixing Consoles:** CAD Maxcon II 80-input (24 mic). **Audio Recorders:** (3) Alesis ADAT w/BRC, Panasonic 3700 DAT, Otari MX-5050, Technics RS-TR555. **Digital Audio Workstations:** Digidesign Pro Tools w/CS10. **Monitors:** (2) Genelec 1031-A, (2) JBL 4412, (2) JBL 4301B, (2) Yamaha NS-10M. **Other Major Equipment:** Aphex 9000 modular system, TC Electronic M 5000, Lexicon LXP-1, LXP-5, MRC, (2) Orban 622B parametric EQ, Rane DC24, HC6, Symetrix 528 voice processor, (2) Yamaha SPX90, Valley People Gatex, ADA MP-1 guitar preamp, BBE 402, numerous mics including Neumann, AKG, Sennheiser, etc., Apple Macintosh IIfx w/20 meg RAM, Opcode Studio Vision w/Galaxy and Studio 5, Digidesign Sample Cell, Yamaha KX88 keyboard controller, Roland Octapad II w/external pads, Korg Wavestation A/D, Roland R8M, P330, numerous other MIDI modules, numerous acoustic instruments.

PROFESSIONAL SOUND AND RECORDING

A24 D2

3100 W. 71st Ave.; Westminster, CO 80030; (303) 426-7819. Owner: Chris Mickle. **Manager:** Phil Crumrine. **Engineers:** Kevin Clock, Mickey Houlihan, Phil Crumrine. **Mixing Consoles:** Soundcraft 1624 24x16x24, Rowland Research Audiophile 8x2. **Audio Recorders:** Stephens 1824A 24-track recorder, (2) Nakamichi DMP-100 PCM digital 2-track, Revox PR99 2-track analog. **Monitors:** Yamaha NS-10M, B&W DM-100, EV Sentry 100. **Other Major Equipment:** (10) TEAC V-2RX cassette decks, Yamaha REV7 effect, Lexicon PCM60 reverb, ADM 1024 delay, UREI LA-3 compressor, (2) Symetrix 501 comp/limiter, (2) Symetrix 522 comp/limiter/gate, dbx 900 rack w/(2) parametric, (4) compressor, (3) gate; Barcus-Berry BBE-202, (2) AKG C-414EB P-48, (2) AKG C-451 shotgun, Schoeps CMTS-301 stereo, (4) Schoeps CMC-3, AKG C-33 stereo, (2) Sennheiser MD-421U, (3) Shure SM81, (2) Countryman Lavalier, (2) pre-Crown PZM, EV RE20, Rowland Research model 5, Hafler DH-200, Canon VC-20A camera, Panasonic AG-6400 Hi-fi VHS stereo VCR, (3) color monitor, 1984 Winnebago Centauri Van 20', air conditioning, Mogami wiring, isolation transformer.

"THE RANCH"
Westcreek, CO

"THE RANCH"

A24 D2

15849 Stump Rd.; Westcreek, CO 80135; (303) 647-2482. Owner: Flash Cadillac. **Engineers:** Jody Stewart, Duane Scott, Sam McFadin, Linn Phillips, Dan Berthelot. **Dimensions:** Room 1: studio 20x20, control room 18x16. Drum room 10x10, piano room 18x10, iso booths 25x8 and 7x10. **Mixing Consoles:** Sony MXP-3036 36x36, 4-band parametric EQ, 6 cue sends, optional EQ L.C. type MXBK-EQ34, CAF 3000 fader automation system, dbx VCA system. **Audio Recorders:** Panasonic SV-3900 DAT, Panasonic SV-3700 DAT, MCI JH-24 24-track, MCI JH-110C 2-track 1/2" headstack w/Dolby SR, MCI JH-110B 4/2-track. **Monitors:** Meyer MS-1000 amps, Spectra Sonics 701 series, Meyer 833 sound monitor sys-

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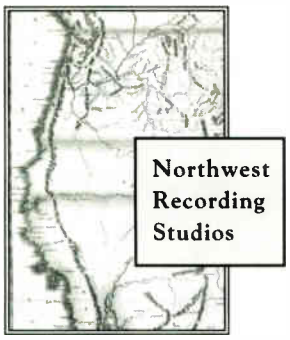

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tem, Yamaha NS-10T, Visonik David 7000, JBL 4333A (studio). **Other Major Equipment:** Technics RSB100, Yamaha YX1200, Dolby SR, Lexicon 224, Yamaha SPX90II, Yamaha REV7, Lexicon PCM70, Alesis MIDIverb II, Harmonizer 910, (2) Lexicon PCM42, Aphex Aural Exciter, dbx 165A overeasy, dbx 904 noise gate, dbx 903 limiter/compressor, UREI 1176 limiter, rack-mounts, Ibanez multi-effects, Hush II, Sontec stereo parametric EQ, AKG, Shure, Sony, Beyer, ElectroVoice, Neumann tube mics. A complete selection of microphones is available. Roland R-5, Octapad 2, Roland DDR-30 MIDI drums, Kurzweil K1000, Kurzweil HX1000, Alesis drum machine, Linn drum machine, acoustic drums (two full sets), 1930 Mason Hamlin acoustic grand piano, church pump organ, Hammond with Leslie, Leslie speaker with all JBL components, Sho-Bud pedal steel, Casio M6510 MIDI guitar, Korg with TX rack, (2) Yamaha DX7, Fender amps, Vox amps, Marshall amps, Gibson acoustic Hummingbird, Gibson acoustic 2-50, Martin acoustic D28, Rickenbacker 6- and 12-string guitars, 1950 Fender Broadcaster, 1957 Gretsch, Dean Bel-Air with Floyd Rose tremolo, Mosrite 12-string w/tremolo, Jacksons, 1955 and 1958 Stratocasters, 1958 Precision bass, Hofner "Beatle" bass, Voyetra SMPTE/MIDI interface, IBM-compatible (AT) system, Roland S-550 digital sampler, JL Cooper MIDI patch bay, Patch Master Plus, Sequencer Plus Gold Version 4.02. **Rates:** $750 a day (lodging included). **Specialization & Credits:** Located near Pike's Peak, just 45 minutes from Colorado Springs and 90 minutes from Denver, you will find Flash Cadillac's Ranch. This beautiful recording complex in the Rockies is located on 120 secluded acres surrounded by Pike National Forest. The Ranch blends computerized 24-track recording and high-technology with vintage acoustic and electric instruments. The Ranch's vaults contain a large library of classic rock 'n' roll songs from the '50s through the '90s for your film, video or commercial needs. Flash Cadillac has used their 20+ years of experience in recordings, movies, television and live concerts to design this industry-standard recording studio. Relax in the beautiful surroundings of The Ranch, fish in the trout ponds, shoot some hoops, or just escape into the woods. Lodging is provided in a 2-story, 5-bedroom ranch house, complete with moss-rock fireplace, fully equipped kitchen and wide-screen TV. The studio and lodging are yours 24 hours a day without interruptions.

ROCKY MOUNTAIN RECORDERS

A32 D8

1250 W. Cedar Ave.; Denver, CO 80223; (303) 777-3648; FAX: (303) 777-3923. Owner: Paul Vastola, Gannon Kashiwa. **Manager:** Guila Montoya.

SAVAGE STUDIOS

D16

P.O. Box 10916; Aspen, CO 81612; (303) 927-3018; FAX: (303) 925-9182. Owner: Bryan Savage. **Manager:** Bryan Savage.

SCM PRODUCTIONS

A24 D8

5070 Dover; Arvada, CO 80002; (303) 422-5244; FAX: (303) 422-8985. Owner: Steve Cooper.

TIME CAPSULE RECORDING

A24 D2

1042 Perry St.; Denver, CO 80204; (303) 534-6977. Owner: James L. Jackson. **Manager:** James L. Jackson. **Engineers:** Kirby Orrick, James Jackson, T.J. Jackson, Lindsey Parker. **Dimensions:** Room 1: studio 40x20, control room 22x14. Room 2: studio 24x22. Room 3: studio 24x14. **Mixing Consoles:** Tascam M3700 32x32x8 automated console, Fostex 2050 line mixer. **Audio Recorders:** Tascam MSR-24S 24-track, Tascam MSR-16 16-track, Tascam 32 2-track, (2) Panasonic SV-3700 DAT, Sony PCM-2300 DAT, Technics RSB-100 cassette, Tascam 122 cassette, Nakamichi DPM-100 2-track digital deck, Tascam 202MkII cassette. **Monitors:** JBL 4425 studio monitors, Yamaha NS-10 near-field monitors, JBL 4410 studio monitors, Fostex 765 near-field monitors, Wharfdale Diamond near-field monitors. **Other Major Equipment:** (2) Lexicon LXP-15, (3) Yamaha SPX900, (3) Yamaha SPX90, (2) Yamaha REV7, (2) Drban 622B dual channel 4-band parametric EQ, (2) Orban 742A parametric EQ, (2) Yamaha Q2031 graphic EQ, (2) JBL M-712 dual channel compressor, (2) Symetrix 522 dual channel compressor, (2) Valley People Gatex 4-channel expander gates, (2) Audio Logic MT44 4-channel gates, Yamaha DX7IIFD synthesizer, Kawai K4 synthesizer, Yamaha TX16W stereo sampler, (3) AKG 414, (4) AKG C-1000S, (5) Audio-Technica AT-4031 condenser mics, (3) AKG D-112, (12) Shure various models, (8) Shure SM57.

VALENTINE PRODUCTIONS

A32 D2

10650 Irma Dr., Unit 27; Northglenn, CO 80233; (303) 457-1755; (800) 728-6999. Owner: Laurie Gordon/Sam Beaman. **Manager:** Laurie Gordon.

Idaho

MOUNTAIN BEACH

A24 D2

808 Warm Springs Rd.; Ketchum, ID 83340; (208) 726-3509; FAX: (208) 726-9694. Owner: Amos Galpin. **Manager:** Randy Young. **Engineers:** Randy Young. **Dimensions:** Room 1: studio 24x24, control room 16x30. Room 2: studio 10x20. **Mixing Consoles:** ICC 9000. **Audio Recorders:** Otari MX-80, Stephens 24, Ampex ATR-102, Ampex ATR-104, Panasonic 3700 DAT, Panasonic DAT 250, Sony 7030. **Monitors:** JBL/TAD custom, Yamaha NS-10M, Auratone. **Other Major Equipment:** Akai GX-912, TimeLine, Lexicon PCM60, Lexicon PCM70, Lexicon LXP-1, Lexicon LXP-5, TC Electronic TC 2290, Eventide 949, Eventide flanger/phaser, Echotron, (4) Valley Audio Kepex II, Drawmer M-500, (2) UREI 7110, AKG Tube, (2) AKG 414, (4) AKG 460B, Shure SM98, (4) Shure 849, (2) Sennheiser MD-421, Bryston 4B, Akai ASQ 10, Alesis SR-16, Yamaha DX7II, Korg T3, North drums. **Rates:** $75 per hour. **Specialization & Credits:** To fill out a full-service profile, Mountain Beach has developed a pro audio and recording equipment division to provide equipment and technical support to the growing numbers of 4- and 8-track studios in the state. Direct-to-DAT recording. Dealerships include AKG, Alesis, Bryston, Eventide, JBL, Lexicon, Otari, Panasonic, QSC, 3M/Scotch audio tape, and Yamaha.

ROCK HOUSE RECORDING STUDIO

A16 D24

72 N. 1st E.; Rexburg, ID 83440; (208) 356-8705; FAX: (208) 356-2402. Owner: Trent Walker. **Manager:** Trent Walker.

Montana

PEAK RECORDING & SOUND

A24 D2

PO Box 1404; Bozeman, MT 59715; (406) 586-1650. Owner: Peak Recording & Sound Inc. **Manager:** Gil Stober.

THE RECORDING CENTER

A16 D2

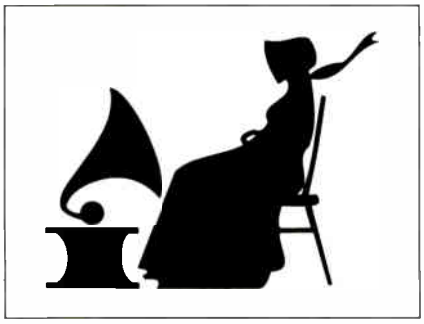
118 W. Pine St.; Missoula, MT 59802; (406) 721-4172. Owner: Richard H. Kuschel.

Nevada

AKASHIC RECORDS GROUP

A24 D16

PO Box 436; Glenbrook, NV 89413; (702) 749-5813; (510) 837-7959. Owner: Stephen G. Jarvis. **Specialization & Credits:** High-end signal path rental solutions, 9 xp-24 SR Dolby systems, auto-switching for Studer A80/800/820/827, MCI JH-24 (Cannon or Tuchel), Sony APR-24, Otari MTR-90/100, MX80, Tascam ATR-80, Ampex ATR-124, 3M M79, manual switching panel. Shipping available throughout the Western United States. 280 Dolby SR cards, stereo pair 361/363 SR/A Dolby systems, George Massenburg preamps, parametric EQ, limiter, Focusrite 115 pre/EQ, 131 dynamics, Neve class A 1084 pre/EQ, 1272 class A pre/dir., 10x2 class A mixers, 2254E limiters, API pre/550A EQ, Didrik De Geer MOSFET mic/pre, Avalon class A mic/pre, 24 Maselec 9001 replacement EQ cards for SSL consoles, DCS 900 A/D convertor, Panasonic DATs, Sony F-1, Meyers correction filter, Apogee A/D convertor, tube mics, Demeter tube directs, B&K, Coles, AKG, Telefunken, Neumann, Sennheiser, Sony, Shure, Beyer, Electro-Voice mics, Genelec S-30NF monitors, Tannoy 10B speakers with Mastering Labs crossovers, Lexicon 480L and more. Rentals by the day, week, month, project. Please call for rates.



GRANNY'S RECORDING STUDIOS
Reno, NV

GRANNY'S RECORDING STUDIOS

A48

1515 Plumas St.; Reno, NV 89509; (702) 786-2622; FAX: (702) 786-2685. Owner: Gerald Roth. **Manager:** Bjorn Thorsrud. **Engineers:** Bjorn Thorsrud, Tom Gordon. **Dimensions:** Room 1: studio 35'4"x21'2", control room 27'3"x24'8". Room 2: studio 19'9"x17'2", control room 17'7"x14'2". **Mixing Consoles:** Neve VR-60, Soundcraft 6000 36x24. **Audio Recorders:** (2) Studer A800 MkIII, Studer A820 1/4" w/SMPTE stripe, Sony APR-24, Otari MX-5050, (2) Panasonic 2700, Casio DA-2. **Monitors:** (2) UREI 813, (2) UREI 811, (2) UREI 809, (2) KRK 7000, (6) Yamaha NS-10M, (2) Tannoy SGM-10B, (2) Auratone 5C, (4) EV Sentry 100A. **Other Major Equipment:** GML 8200 EQ, (2) Pultec EQP-1A3 EQ, (2) Lang PEQ-2 EQ, (4) GML transformerless mic pres, (2) Teletronix LA-2A compressor/limiter, (2) dbx 160 compressors, (4) dbx 160X compressors, Lexicon 480, (3) Lexicon PCM70, Lexicon PCM42, Yamaha SPX1000, Yamaha SPX90II, (2) Drban 536A Sibilance controllers, Barcus-Berry 802, Neumann U67 (Stephen Paul modified), AKG "The Tube," (2) Neumann U87, (2) Neumann KM84, (2) AKG 460, (4) Sennheiser 409. **Specialization & Credits:** A bed and breakfast facility at the foot of the Sierra Nevada mountains. Dur features include: seven bedrooms, full kitchen and laundry facilities, walking distance to our athletic club, 10 minutes from the airport, 5 minutes from downtown Reno, 45 minutes from Lake Tahoe, and an in-house gourmet chef (great cheesecake). Equipped for complete album production, jingle and advertising production, and even film and video post-production with our own Foley pit. We're under new ownership/management. However, we still have the friendly and professional staff that has come to be expected here.

STARSOUND AUDIO INC.

A24 D8

2679 Oddie Blvd.; Reno, NV 89512; (702) 331-1010. Owner: Scott Bergstrom. **Manager:** Lee Taggart. **Engineers:** Lee Taggart, Scott Bergstrom. **Dimensions:** Studio 35x30, (3) iso rooms 8x14, 7x10, 8x16; control room 15x25. **Mixing Consoles:** Amek Angela 28x24. **Audio Recorders:** Studer A80 24-track, Otari MkIII-2 2-track, Tascam 52 2-track, Alesis ADAT, Panasonic SV-3700 Pro DAT. **Monitors:** JBL 4425, JBL 4410, Auratone T6, Yamaha NS-10, Tannoy Super Gold series. **Other Major Equipment:** Yamaha C200, Lexicon LXP-1/5, Yamaha REV7, (2) Yamaha SPX90, SPX900, Roland SRV-2000, Roland SDE-3000, (2) DEP-5 Brick Audio 3300 plate, AKG ADR-68K, Aphex II broadcast, Aphex C (mod), UREI LA-4, dbx 166, Valley People Dyna-Mite, Symetrix 522, 525, 528, Orban 674A parametric, Dimension D, dbx 503, Aphex compellor, Aphex Impulse, MRC, Crown DC-3000, Yamaha PC2002, Crown PS-400, Kawai 7'4" grand piano, Ensoniq EPS, Korg M1, Roland D-70, (2) JVC 8250 3/4" recorder, (2) JVC 5550 3/4" players, JVC 86-U editor, Sony SEG-2000 6-camera switcher/special effects generator, Sony DCX-M-3A camera, Sony CCD-3000 chip camera, and the perfect selection of microphones! **Rates:** $45-$65/hr. depending on project.

Oregon

DIGITAL ONE

A24 D12

2020 SW 4th, 7th Flr.; Portland, OR 97201; (503) 226-7223; FAX: (503) 224-7413. Owner: Michael Carter. **Manager:** Michael Carter. **Engineers:** Michael Carter, Bill Stevens, Eric Stolberg. **Dimensions:** Room 1: studio 23x11, control room 37x25. Room 2: studio 15x10, control room 17x15. **Mixing Consoles:** (2) Sony MXP-3000. **Audio Recorders:** Otari MTR-90 24-track, (2) Sony APR-5003 2-track center-track time code, (4) Scully 280B 2-track. **Digital Audio Workstations:** SSL ScreenSound, 6 hrs. HD storage, (2) Digidesign Pro Tools, 6 hrs. HD storage (ea), Digidesign Sound Tools, 3 hrs. HD storage. **Monitors:** (2) UREI 813, UREI 811, (4) KRK 703, (4) Auratone 5C, (4) Yamaha NS-10. **Other Major Equipment:** (2) Sample Cell, (2) Lexicon 300 digital reverb, (2) magneto optical recorders,

LEGEND

- D48 Maximum digital tracks
- A48 Maximum analog tracks
- Remote audio recording
- MIDI production
- Tape duplication
- Mix to picture
- Digital editing/CD prep
- In-house music services

World Radio History

Sony 7030 Timecode DAT, (5) Panasonic SV-3900 DAT, Sony TCD-10 Pro II portable DAT, (2) Summit Audio tube limiters, Summit Audio tube EQ, TC Electronic TC 2290 effects/sampler, Eventide H3000 Harmonizer, AKG ADR-64K reverb, (2) Aphex 601 compellors, (2) Aphex 610 gates, (2) BBE 802 exciters, Ensoniq SQR synthesizer, (3) MIDI keyboards K1, DX-100, X-7000; (13) Nakamichi MR-2B cassette recorders, (2) Lexicon PCM42 DDL, TimeLine Lynx V synchronizer, Sony BVW-40 Betacam video recorder.

FALCON RECORDING STUDIDS INC.

15 S.E. 15th; Portland, OR 97223; (503) 236-3856. Owner: Dennis Carter, Axel Unbehaun. **Manager:** Dennis Carter. **Engineers:** Dennis Carter, Sean Norton, Mike Moore. **Dimensions:** Room 1: studio 30x25, control room 17x18. Room 2: studio 10x10, control room 15x10. **Mixing Consoles:** Sony MXP-3036 w/JL Cooper MS3000, Ramsa WR-T820B. **Audio Recorders:** Sony/MCI JH-24, MCI JH-110, Tascam MS-16, Panasonic SR-3500. **Monitors:** (2) UREI 813C, (2) UREI 809, (2) KRK, (2) Tannoy SRM-B, (2) Yamaha NS-10. **Other Major Equipment:** Lexicon 300, AKG 64K, Eventide H3000, (2) Lexicon PCM70, BASE, Klark-Teknik, (2) API 512-B mic preamps, (2) API 550-B EQs, Neve 33609/C, (2) UREI 1176, (2) JBL 7110, (2) dbx 160, (2) dbx 160X, (4) Drawmer DS-201, (2) Neumann U47 tubes, Klaus Hynes modified; Neumann U67, Klaus Hynes modified; (2) Neumann KM84, Klaus Hynes modified; Neumann U89, (3) AKG 414, (6) Sennheiser 421, and other assorted mics.

FULL MOON RECORDING COMPANY
Eugene, OR

FULL MOON RECORDING COMPANY

197 W. 12th Ave.; Eugene, OR 97401; (503) 343-1294; FAX: (503) 686-0248. Owner: PRN Inc. **Manager:** Steve Diamond. **Engineers:** Steve Diamond, Jon Davie, Kyle Anderson, John Scurlock. **Dimensions:** Room 1: studio 24x15 plus 2 isolation booths, control room 15x12. Room 2: control room 15x12. **Mixing Consoles:** (2) Spectrum custom consoles w/John Hardy 990s, Jensen transformers, P&G faders. **Audio Recorders:** Otari MX-70 1" 8-track, (2) Otari MTR-10 1/4" 2-track w/center-stripe time code, Otari MX-5050 1/4" 2-track, Ampex 700 1/4" 2-track, Ampex 350 1/4" full track, (2) Panasonic SV-3700 DAT, Nakamichi MR-1 cassette, Nakamichi MR-2 cassette, Sony TCD-5 cassette. **Digital Audio Workstations:** 4-channel Digidesign Pro Tools w/ProDeck, ProEdit, SoundDesigner II, SMPTE Slave Driver & JL Cooper FaderMaster. **Monitors:** Tannoy "Little Reds" w/Sync Source, JBL 4315, JBL 4311B, Auratone 5C, Dahlquist ALS-3. **Other Major Equipment:** (4) dbx 150X dual channel noise reduction, Dolby SR, Aphex Compellor, (2) Aphex Expressor, Audio Concept 4-channel gate/compressor, Lexicon PCM70, Lexicon LXP-1, Alesis Quadraverb, Yamaha SPX90, Rane SP15 5-band parametric EQ, UREI 10-band graphic equalizer, BBE 822 Sonic Maximizer, Summit Audio tube mic preamp, (2) Adams-Smith Zeta-3 SMPTE generator/controller, Zeta remote, Panasonic 6500.

GUNG-HO STUDIO

86821 McMorott Ln.; Eugene, OR 97402; (503) 484-9352. Owner: Bill and Julienne Barnett. **Manager:** Bill Barnett. **Engineers:** Bill Barnett, Michael Edwards, independents. **Dimensions:** Studio 20x30, control room 18x17. **Mixing Consoles:** Westar/Virtuoso quad eight, 36x24x36. **Audio Recorders:** Otari MX-80 24-track, Otari 5050B 2-track w/Dolby SR, Panasonic SV-3700 DAT, Panasonic SV-3500 DAT, (5) Nakamichi MR-2 cassette. **Monitors:** JBL 4411, Yamaha NS-10, Tannoy PBM-6.5, (3) Hafler Pro 505, P-220, McIntosh G100 headphone amp, Rane HC6 headphone console, (8) AKG 240, (8) Fostex T-20. **Other Major Equipment:** Fender 1959 P-Bass, Fender 1967 Telly w/Bigsby, Fender 1976 fretless P-Bass, Martin 1947 OO-18, Ampeg B-15 Portaflex, Marshall Master Reverb 30, Lexicon 480L, Lexicon PCM70, Eventide H3000, TC Electronic TC 2290, Lexicon PCM41, (2) Yamaha SPX90, Drawmer 1960 dual tube mic preamp comp/limiter, Summit Audio TPA-200 dual tube mic/line preamp, Summit Audio TLA-100 tube comp/limiter, Summit Audio EQP-200 tube dual program EQ, Summit Audio EQF-100 tube 4-band EQ (full-range), Bedini BASE audio spacial environment, UREI 7110 comp/limiter, (2) dbx comp/limiters, 160X, etc., (4) Neumann U87, KM140, KM84, (8) AKG 414, 451-EB, D-112, D-12E, (6) Sennheiser 441, 421, etc., Stephen Paul modified Neumann U87, Yamaha C3 6'1" conservatory grand piano, etc., etc., etc.!

SEE PAGE 162 FOR AN EXPLANATION OF THE STUDIO SERVICE ICONS. FOR MORE INFO ABOUT MIX LISTINGS SEE PAGE 149.

LITTLE WINGS ARBORETUM RECORDING

7534 S.E. Taggart Ct.; Portland, OR 97206; (503) 775-2894. Owner: Collin G. Heade. **Manager:** Collin G. Heade

MUSICON RECORDING
& DUPLICATING
Wilsonville, OR

MUSICON RECORDING & DUPLICATING

27501 SW 95th Ave.; Wilsonville, OR 97070; (503) 682-8668; FAX: (503) 682-3043. Owner: Bill Berry. **Manager** Dave Cohen. **Engineers:** Dave Cohen, Dave Keohi, Mike Moore, Tory Lash, Matt Meyer, Doug Durbrow, others. **Dimensions:** Studio A: 40x22, control room A: 22x20, Iso A: 12x10; Iso B: 12x12; Production Suite: 24x20; Mastering Room: 10x15. **Mixing Consoles:** Studio A: DDA AMR-24 36x24x24 with Uptown moving fader automation. Studio B: DDA Q-Series 24-input. **Audio Recorders:** Studer 827 2" with SR, Studer 820 1/2" with SR, Studer 807 1/4" with CTC and SR, Otari MTR-12 1/2" 4-track, Technics 1520 1/4" 2-track, (2) Panasonic 2700 Professional DAT, (2) Sony DAT. **Digital Audio Workstations:** Doremi Labs DAWN 8-channel, Studer Dyaxis 2+2 4-channel. **Monitors:** Tannoy DMT-15, Meyer HD-1, Yamaha NS-10, Smithline, JBL, Auratone, others. **Other Major Equipment:** Lexicon 480L, AMS RMX-16, Lexicon 300, Yamaha SPX1000, Lexicon Super Prime Time, GML EQ, TC Electronic TC 2290, Summit Audio tube limiters and tube EQs, tons of outboard from Klark-Teknik, UREI, Drawmer, Aphex, BBE, BSS, Valley, others; Adams-Smith Zeta-3 synchronizers. Sony BVU-800 3/4" VTR, (3) Mitsubishi 1/2" VCRs, Oregon's finest microphone collection featuring Neumann, AKG, B&K, Beyer, Shure, Sennheiser, Audio Technica, others; complete MIDI system featuring Akai S1100 sampler, Yamaha SY77, Korg M1, Roland A-80 controller, Roland R-8, Roland D-110, E-mu Proteus. Oberheim Xpander, all controlled by a Mac II running Vision, Galaxy and Finale. Steinway concert grand piano. Geffen SoundFX software running BBC, Hollywood Edge, Network, Sound Ideas, Lucasfilm and Digi-effects libraries **Specialization & Credits:** Recent satisfied customers include CBS Television (music for the 1992 Winter Olympics), ABC Television (*General Hospital, American Detective* and TV movie), American Gramophone, the Portland Trailblazers, Michael Abene (GRP Records), and many others. We also have the Northwest's largest cassette duplication and packaging plant with a monthly capacity of over 1 million units. Whether you want 50 dubs of your mix or 250,000 fully-packaged cassettes of your seminar, we can handle it with ease.

NORTHWEST VIDEOWORKS

1631 S.W. Columbia; Portland, OR 97201; (503) 227-7202; FAX: (503) 223-7528. Owner: Wayne & Diane Ahrenct. **Manager:** Doug Barry.

DREGDN SOUND RECORDING

1150 Knutson Ave., Ste. 12; Medford, OR 97504; (503) 773-3292; FAX: (503) 772-4718. Owner: Sean McCoy, Michael Lewis. **Manager:** Sean McCoy, Michael Lewis. **Engineers:** Sean McCoy, Michael Lewis, John Mazzei, Chris Wood **Dimensions:** Room 1: studio 26x20, control room 20x19. Room 2: control room 12x12. **Mixing Consoles:** Amek Angela 32-input, Ramsa WRT-820 20-input. **Audio Recorders:** Otari MX-80 2", (2) Panasonic SV-3700 DAT, Panasonic SV-3500 DAT, (2) Otari MX-5050 1/4", Tascam 112 cassette (7) Nakamichi MR-2 cassettes. **Monitors:** (2) UREI 813B, (2) UREI 809, (2) JBL 4311, (2) Tannoy PBM-6.5, (2) Yamaha NS-10, (2) Auratone Cubes, (2) Realistic Minimus 5. **Other Major Equipment:** dbx 24-channel Type I NR, (40) Neumann, AKG, Sennheiser, Beyer, EV, Shure, Crown, etc. microphones; Lexicon 300, Lexicon PCM70, Lexicon PCM60, Ecoplate II, Yamaha SPX900, Alesis Quadraverb, Lexicon LXP-1, Lexicon LXP-5, BBE 822A Sonic Maximizer, Aphex Aural Exciter Type C, UREI 1171 comp/limiter, (2) Valley Commanders, (2) Valley Maxi-Q parametrics, (2) Valley Kepex II gates, Valley DSP de-esser, Valley Dyna-Mite II comp/limiter, (2) Aphex 612 gates, Drawmer DS-201 gate, (2) dbx 166X compressor, Symetrix SX-203 phone interface, Demeter D-1 tube Niche 16-channel MIDI automation, (4) Roland synthesizers, (3) Oberheim synthesizers, (4) Yamaha synthesizers, E-mu Emax SE sampler, (6) various other synthesizers, (64) SFX libraries (Hollywood Edge, Network, etc.), Tama, Gretsch, Zildjian drum sets; much misc. percussion, UREI 6290 power amp.

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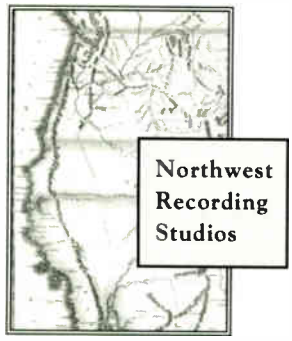

PYRENEES PRODUCTIONS

A8 D2

PO Box 13303; Portland, OR 97213; (503) 284-6155; FAX: (503) 284-6155. Owner: Richard Mathis. **Manager:** Richard Mathis.

RAINBOW RECORDING

A16

6614 SW Garden Home Rd.; Portland, OR 97223; (503) 246-5576. Owner: Gailen Hegna. **Manager:** Thomas Dietsche.

REX RECORDING CO.

A24 D8

1931 SE Morrison; Portland, OR 97214; (503) 238-4525; FAX: (503) 236-8347. Owner: Sunny Day Productions Inc. **Manager:** Greg Branson. **Engineers:** Russ Gorsline, Rob Perkins, Chris Douthitt, John Lansing, Doug Durbrow, Greg Branson. **Dimensions:** Room 1: studio 25x25, control room 15x18. Room 2: studio 11x7, contol room 14x11. Room 3: studio 11x6, control room 13x11. Room 4: control room 12x11. **Mixing Consoles:** Amek Angela 28x24 w/automation, (2) Tascam 16x4, Tascam M2516 16x8. **Audio Recorders:** MCI JH-24 24-track, Tascam 80-8 8-track, Tascam ATR60-T 2-track w/SMPTE, Tascam BR20-T 2-track w/SMPTE, (2) Tascam A32 2-track, Fostex E-2 2-track w/SMPTE, Otari MTR-10 2-track w/SMPTE, Otari 5050 MkIII, (2) Scully 280-B 2-track, Sony 110 1" audio layback, (2) Panasonic SV-3700 DAT. **Digital Audio Workstations:** Digital Dynamics/Otari ProDisk 464 8-track, Digital Dynamics/Otari ProDisk 464 4-track, Digidesign Pro Tools 4-track. **Other Major Equipment:** (30) Technics RS-B605, (10) dbx Type 1, Q-Lock 4.1, Lexicon LXP-15, Lexicon LXP-1, Lexicon PCM70, Yamaha SPX90, EMT 140, (2) Alesis MIDIverb II, (2) UREI 1176LN, Symetrix 501 limiter, Symetrix 522 limiter, Symetrix 564 quad gate, Aphex Compellor II, Aphex Aural Exciter Type C, (4) Scamp compressor, Scamp de-esser, Neumann U87, Neumann U67, Neumann KM84i, Sony C-37P, AKG C-414, (2) Shure SM81, (4) Shure SM57, Sennheiser MD-421, (2) Sanken CU-31, Chickering 8' grand piano, complete complement of MIDI instruments, (2) Hybrid Arts SMPTE track II sequencer, BTS DCR-10 D-2 recorder, Sony BVW-65 Betacam SP, Sony BVW-70 Betacam SP, JVC 8250 3/4" U-Matic. **Specialization & Credits:** Rex Recording is a collection of exceptional individuals offering the finest services for music, commercial and video production. Our creative engineering team has won numerous awards. Our multiple digital audio workstations, video post suite and extraordinary staff are what sets Rex apart. Our engineering staff is experienced in working on national label projects. Rex Recording truly is—good people helping you sound great.

DON ROSS PRODUCTIONS

A16 D4

3097 Floral Hill Dr.; Eugene, OR 97403; (503) 343-2692. Owner: Don Ross. **Manager:** Don Ross. **Engineers:** Don Ross. **Dimensions:** Studio: 24x15x14, control room 24x15x10. **Mixing Consoles:** Tascam M-3700 32x8 w/automation. **Audio Recorders:** Tascam MS-16 16-track 1", Tascam DA-30 2-track DAT, Panasonic 3700 2-track DAT, Revox PR-99 MkII 2-track, Revox B-77 2-track, Fostex 20 2-track w/SMPTE trk. **Digital Audio Workstations:** Oigidesign Pro Tools digital hard disk recording/editing system w/Mac II, HP 635MB hard drive, DECK & Studio Vision. **Monitors:** Tannoy NFM-8, Yamaha NS-10, Auratone 5C. **Other Major Equipment:** Nakamichi, Aiwa, dbx Type 1, Lexicon 200, LXP-1, LXP-5, PCM42, MRC digital reverbs & EFX, Yamaha SPX90, dbx 163X comp/limiter, Drawmer DL-241 comp/limiter, BSS DPR-504 noise gate, Ashly Audio SC-50 comp/limiter, Aphex Aural Exciter, Gaines mic preamp, Symetrix SX-201 parametric EQ, Neumann U87, KM84, AKG 414, 460, 451, Sennheiser MO-421, EV RE20, Shure SM53, SM57, Steinway M grand piano (1925), Ensoniq EPS w/44 meg Syquest removable drive, JL Cooper PPS 100, Opcode Studio 3, JVC CR-850U 3/4" video deck w/SMPTE address track, Sony video monitors 13" and 20", Fostex 4030/4035/4010 SMPTE synchronizer system, Sony SLV-575, SLV-585 1/2" VHS, Black & Decker 10-cup coffee maker.

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SOUND IMPRESSIONS

A32 D4

4704 SE View Acres; Milwaukie, OR 97267; (503) 659-5953. Owner: Dan Decker. **Manager:** Dan Decker. **Engineers:** Nick Kellog, Dan Decker. **Dimensions:** Studio 24x24, control room 18x20. **Mixing Consoles:** Amek Matchless 26x24x8x2 w/70 inputs on mixdown, Biamp 1642, Mackie 1602. **Audio Recorders:** Otari MX-80 24-track/32-track, Otari MTR-12 II 1/4" w/center-track, Tascam 52 1/4", Panasonic SV-3500 R-DAT. **Digital Audio Workstations:** Digidesign Pro Tools with video sync, Digidesign Sound Tools Pro I/O, (2) 1.2 gig, 660 meg and 100 meg drives. **Monitors:** (2) UREI 813, (2) Yamaha NS-10M with matching subwoofer, (2) Auratone 5C. **Other Major Equipment:** (26) channels of Dolby SR, (2) Adams-Smith Zeta-3s computer-controlled with Kelly Quan software; Lexicon 480L, (2) Lexicon PCM70, Lexicon LXP-1, Lexicon PCM41, (2) Yamaha REV7, Yamaha SPX90, Alesis Multiverb, Ibanez SDR-1000, Eventide H3000 Ultra-Harmonizer w/dynamics, Roland SOE-3000, OeltaLab 64, DeltaLab 1064, Audio Design delay, BASE spatial processor, Aphex Type II Aural Exciter, Aphex Type B Aural Exciter, (2) dbx 263X de-esser, Orban 672A 8-band full parametric EQ, Orban 622B 4-band stereo full parametric, NIH PE-30 4-band full parametric, UREI A522 1/3 octave graphic, Aphex stereo compellor, (2) JBL 7110, (2) Symetrix CL-501, Symetrix CL-150, (2) Symetrix CL-100, (2) Symetrix 544 quad gate, Aphex 612 stereo gate, Audio Logic quad gate, (8) AKG "The Tube", AKG 414, Neumann U87, KM140; EV RE20, AKG 330, 320, 451, 460, D-12; Audio-Technica ATM-63, Tascam PE-250, American Ribbon, Shure SM57, Yamaha DX7, Yamaha C3 6' grand piano, Oberheim Matrix 6R, Korg DW-8000, Sequential Circuits Prophet 5, Sequential Circuits Drumtrax, Korg M3R, E-mu Proteus, Performer sequencing software, MIDI Time Piece interface (128 MIDI channels), Sony VO-9850 type II SP U-Matic 3/4" editing recorder, Sony RM-450 editing controller, NEC 27" monitor, (2) Roland Compu-editors (30 programmable faders and mutes). **Rates:** $45/hour—$400/day block music, $75/hour—$500/day video sweetening, $700/day lockout.

SOUND STORM

D8

12326 Golf Ln. SE; Sublimity, OR 97385; (503) 769-7182. Owner: Aaron J. Frichtl. **Manager:** Aaron J. Frichtl.

STAUNTON STUDIOS INC.

A24 D4

5450 Coleman Creek Rd.; Medford, OR 97501; (503) 535-3972. Owner: Web and Karen Staunton. **Manager:** Web Staunton.

SULLIVAN RECORDING

A16 D16

1390 Frank Hill Rd.; Ashland, OR 97520; (503) 482-8181. Owner: Frank J. Sullivan. **Manager:** Lisa Campbell.

Utah

KLAY ANDERSON AUDIO INC.

D2

4689 S. Holladay Blvd.; Salt Lake City, UT 84117; (801) 272-1814; FAX (801) 278-3886. Owner: Klay Anderson.

L.A. EAST STUDIOS

A48 D2

915 W. 100 S.; Salt Lake City, UT 84104; (801) 532-3278; FAX: (801) 531-0346. Owner: Non-Stop Productions Inc. **Manager:** Robin Leishman. **Engineers:** Glen Neibaur, Judd Maher, Robert Abeyta, Jeff Isaac. **Dimensions:** Room 1: studio 35x25, control room 16x18. Room 2: studio 8x11, control room 16x18. Room 3: studio 49x54. Room 4: control room 14x17. **Mixing Consoles:** Custom Quad Eight Virtuoso, 60-input w/automation, Amek Angela 28-input. **Audio Recorders:** (2) Studer A827 24-track w/Dolby SR, Otari MX-80 24-track w/Dolby SR, Otari MTR-12 1/2" and 1/4", Otari MTR-10 2-track 1/4", Ampex ATR-104 4-track 1/2", Ampex ATR-102 2-track 1/4", Otari MX-5050 4-track 1/2", Otari MX-5050 2-track 1/4", (8) Panasonic SV-3700 DAT, (10) Sony K-890 cassette decks. **Digital Audio Workstations:** Studer Dyaxis 640 w/synchronizer. **Monitors:** (2) JBL 4435, (2) JBL 4430, (4) Tannoy SGM-10, (4) Yamaha NS-10, (4) Auratone. **Other Major Equipment:** (3) Adams-Smith Zeta-3 synchronizers, Lexicon 480L w/LARC, Lexicon 224 w/LARC, (2) Eventide H3500 w/sampler, TC Electronic TC 2290, (3) Lexicon PCM70, Lexicon 200, (2) Yamaha REV7, (2) Sony MUR-201, Klark-Teknik DN780, (4) Summit Audio tube preamp channels, (2) Summit Audio tube compressors, (8) Valley Dyna-Mite, Samick 9' grand piano, Yamaha 7' grand piano, (12) dbx 165A, 166, Symetrix 5-10 compressors, (17) Neumann TLM170, U87, KM88, KM84, (10) AKG 414EB, 460, D-12, (8) Sennheiser MKH-40, 20, 421, Dolby SR 4-channel.

Washington

AFFINITY PRIVATE MUSIC DIV. OMEGA

A16 D48

PO Box 33623MX; Seattle, WA 98133; (206) 364-7881; FAX: (206) 784-9827. Owner: Omega International. **Manager:** Cameron Powers.

AMERICAN PRODUCTION SERVICES

A4 D8

2247 15th Ave. W; Seattle, WA 98119; (206) 282-1776; FAX: (206) 282-3535. Owner: Conrad Denke. **Manager:** Nick Denke.

AUDIO RECORDING INC.

A8 D2

4718 38th Ave. NE; Seattle, WA 98105; (206) 525-7372. Owner: Kearney W. Barton. **Manager:** Kearney W. Barton.

AVAST RECORDING & STUDIO RENTALS

A16 D2

1325 N. 46th St.; Seattle, WA 98103; (206) 633-3926. Owner: Stuart Hallerman. **Specialization & Credits:** In addition to our 2" 16-track studio, Avast offers equipment rentals in Seattle...First class equipment which will enhance your studio, too. New items include Massenberg, Focusrite, API, and Summit mic pre's and EQs, Neumann tube U67s, portable and studio OATs, 2" 24-track MM1200, monitors, headphones, mixers, reverbs and more. Recent album credits include Soundgarden, Jesse Bernstein, Shame (Pearl Jam side-project), Skin Yard, Screaming Trees, The Gits, Beat Happening, 7 Year Bitch, Creep, Bikini Kill and others. Avast...state of the art...1978. Call (206) 633-3926 for propaganda about rental or recording.

BAD ANIMALS/SEATTLE
Seattle, WA

BAD ANIMALS/SEATTLE

A48 D48

2212 4th Ave.; Seattle, WA 98121; (206) 443-4666; FAX: (206) 441-2910. Owner: Steve Lawson. **Manager:** Reed Ruddy. **Engineers:** Ed Brooks, Vince Werner, Ella Brackett, Jim Wilson, Tom McGurk, Carol Howell, Sam Hofstedt. **Dimensions:** Studio X: studio 35x60, control room 25x27. Studio A: studio 35x25, control room 25x27. Room B: studio 19x29, control room 18.5x19. Room C: studio 8x8, control room 16x19. Room D: studio 8x12, control room 17x19. **Mixing Consoles:** Solid State Logic 4064 6-input w/Ultimation and Total Recall, API w/DiskMix moving fader automation, API w/ARMS DiskMix moving fader automation, (2) Sony JH-636 w/DiskMix automation, Tangent 3216. **Audio Recorders:** (2) Sony 3324-A 24-track digital, Studer A827 24-track analog, Otari MTR-90III 24-track analog, Sony JH-24 24-track analog, (2) Ampex ATR-100 2-track 1/4" and 1/2", Sony JH-110 8-track, (2) Sony APR-5003 w/Center Track, (4) Panasonic SV-3700 R-DAT, Panasonic SV-3500 R-DAT, Sony 7030 Time Code R-DAT. **Digital Audio Workstations:** (2) New England Digital Post Pro 16-track, New England Digital Post Pro 8-track. **Monitors:** TAD, Meyer, Tannoy, JBL, Yamaha, UREI, Auratone. **Other Major Equipment:** Dolby SR (XP-24), (2) Dolby A 24-track, Dolby A, SR and dbx on all 2-track recorders, TimeLine Lynx and Adams-Smith Zeta-3 available to all studios, (2) Lexicon 480LX reverb & effects, Lexicon 224XL reverb, (2) Lexicon 300 reverb & effects, (2) Prime Time/Super Prime Time, (3) Lexicon PCM42, (3) Eventide H3000 (1 with sampling), AMS RMX-16, (2) EMT 140 plates, (2) Yamaha SPX1000, (3) Yamaha SPX90, (2) Klark-Teknik DN780, TC Electronic TC 2290, Dynacord DRP-20, (9) UREI LA-2A, (8) UREI LA-3A, (6) UREI 1176, (2) Summit Audio TLA 100A compressor, Summit Audio DCL 200 dual limiter/compressor, Drawmer 1960 stereo tube compressor, (3) Summit Audio stereo tube EQ, (12) Neve 1073 modules, (2) ITI parametric EQ, (4) Pultec EQP-1A3, (2) Pultec MEQ-5, (6) UREI 545 parametric EQ, (6) Drawmer DS-201 gate, Aphex 612 gate, (120) microphones, including AKG, Neumann (2 M49B, U67), Electro-Voice, Beyer, Shure, B&K, Sennheiser, Crest, Crown, Hafler, UREI, (2) Yamaha C7 grand pianos, (2) drum kits, Hammond B-3 w/Leslie, Sony BVU-800, JVC CR-850, JVC CR-650, MCI 1" layback, Sony BVW-75 Betacam SP, huge CD sound effects and needle-drop library. **Specialization & Credits:** Music: R.E.M., Heart, Mindfunk, Dr. John, Wildhearts, Pond, Sweetwater, Metal Church, Best Kissers in the World, Tad, Hammerbox, The Walkabouts; Commercial: Nike, Nintendo, Microsoft, Subaru, Chevrolet, Bud-Lite. We've taken years of experience and have built an award-winning facility that rivals any in the world. Studio X features unparalleled architecture and equipment. We know people are the most important element in the creative process and we offer a diverse, professional staff, ready to make your project a success. Enjoy Seattle's cutting-edge music scene and the pristine Northwest while recording your project in a relaxed, professional atmosphere. Please call for more information.

FOR MORE INFORMATION ABOUT *MIX* LISTINGS SEE PAGE 149.

World Radio History

BEAR CREEK RECORDING STUDIO
Woodinville, WA

BEAR CREEK RECORDING STUDIO

A24 D48

6313 Maltby Rd.; Woodinville, WA 98072; (206) 481-4100; FAX: (206) 486-2718. **Owner:** Joe and Manny Hadlock. **Manager:** Pamela "2-E" DeMeerleer.

BOB'S GARAGE

A24

13036 459th Ave. SE, North Bend, WA 98045; (206) 888-5249; FAX: (206) 888-5269. **Owner:** Bob & Lisa Rivers/Twisted Radio Inc. **Manager:** Lisa Rivers. **Engineers:** Bob Rivers, Rob Baker. **Dimensions:** Studio 20x24, control room 14x18. **Mixing Consoles:** Trident Series 80B 32x24 console. **Audio Recorders:** Otari MTR-90 24-track, Otari 5050B 2-track, Panasonic SV-3500 DAT. **Digital Audio Workstations:** Digidesign Pro Tools. **Monitors:** Yamaha NS-10 near-field monitors, JBL 4311 mid-field monitors. **Other Major Equipment:** Lexicon 224XL, AMS RMX-16 reverb, AMS S-DMX digital delay/sampling, Pultec EQP-1S, Lang PEQ-1 tube EQ, UREI 1176LN, Drawmer noise gates, Eventide Harmonizer, TC Electronic TC 2290 delay, AKG C-12 tube, AKG C-451-EB, AKG "The Tube," Neumann U67 tube, (2) Neumann U87, Neumann TLM170, Neumann U89, Neumann KM86, Neumann KM84, (2) Sennheiser MD-441, Sennheiser MD-421, (3) Shure SM56, (2) Sony ECM-377, Sony ECM-22p, Beyer M88, (2) Beyer M201, Electro-Voice RE-20, MIDI workstation equipped with a Macintosh SE/30 computer, Mark of the Unicorn's Performer and MIDI Time Piece, Korg M1EX, Ensoniq EPS-Plus 16-bit sampler, Yamaha DX7 with E! library, Roland U-220 sound module, Roland R-8 percussion sound module, E-mu Proteus 1 & 2 sound modules.

CASCADE RECORDING

A16 D2

1107 E. 3rd St.; Cle Elum, WA 98922; (509) 674-2891. **Owner:** Allen Larsen. **Manager:** Teresa Larsen.

CROW RECORDING STUDIO & MUSIC PROD.

A24 D2

4000 Wallingford Ave. N; Seattle, WA 98103; (206) 634-3088. **Owner:** John Nelson. **Manager:** John Nelson.

55TH STREET STUDIOS

A16 D4

5503 Roosevelt Way NE; Seattle, WA 98105; (206) 525-3087; FAX: (206) 524-1102. **Owner:** John "Buck" Ormsby. **Manager:** Brian Sykes and Wendy Cook.

HANZSEK AUDIO

A24 D4

1414 NW Leary Way; Seattle, WA 98107; (206) 784-4909; FAX (206) 784-4909. **Owner:** Chris Hanzsek. **Manager:** Chris Hanzsek.

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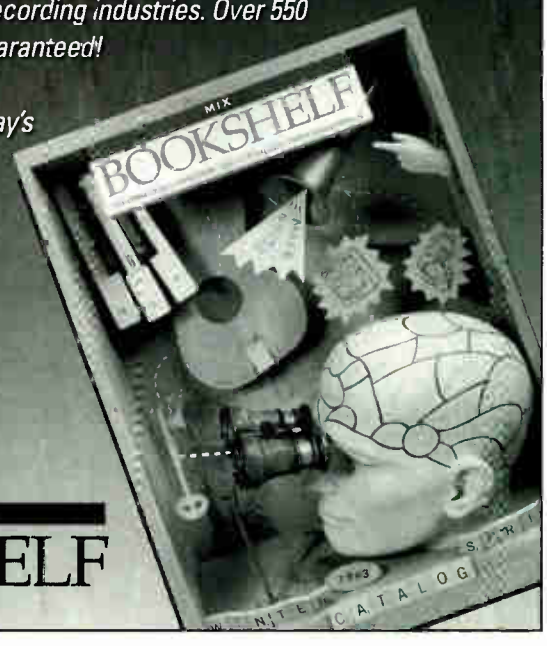
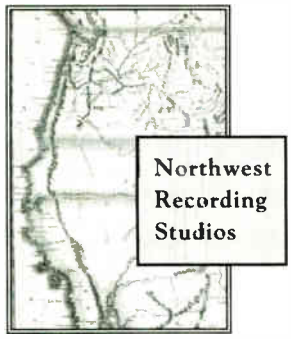


MIX
BOOKSHELF

World Radio History



IRONWOOD STUDIOS
Seattle, WA

IRONWOOD STUDIOS

A24 D2

601 NW 80th St.; Seattle, WA 98117; (206) 789-7569. Owner: Paul Scoles. **Manager:** Jay Follette. **Engineers:** Paul Scoles, Jay Follette, David Schans, Rod Johnson. **Dimensions:** Room 1: studio 34x28, control room 16x14. Room 2: studio 36x34, control room 22x18. **Mixing Consoles:** Harrison Raven 32x24 automated, Harrison MR-3 28x24 automated. **Audio Recorders:** (2) Sony JH-24 24-track, (2) Sony JH-110C 2-track 1/2" and 1/4", Tascam ATR-60 2-track 1/4" w/center-track time code, Sony JH-110C 1" layback, (2) Tascam DA-30 2-track digital tape recorder. **Monitors:** Yamaha NS-10M, (2) Auratone 5C, JBL 4435, JBL 4430, Tannoy System 8. **Other Major Equipment:** Teletronix LA-2A compressor, (2) UREI 1176 compressor, (2) UREI LA-4 compressor, Aphex Compellor, dbx 900 rack w/gates, compressors and de-esser; (2) Symetrix 544 gate, (2) dbx 160 compressor, (2) Roland Dimension D, Lexicon 480L, Lexicon M97 Super Prime Time, Lexicon PCM70, Lexicon 200, Lexicon LXP-15, (2) Lexicon LXP-1, Lexicon LXP-5, Yamaha SPX900, (2) Yamaha SPX90II, DeltaLab DL-2 delay, Pultec MEQ-5 tube EQ, UREI 527A EQ, Adams-Smith Zeta-3 synchronizer, Audio Kinetics Q.Lock 4.10, Telefunken U47 tube mic, Neumann U67 tube mic, (5) Neumann U87, (2) Neumann KM84, (2) Neumann KM56 (tube), Neumann U47 FET, AKG "The Tube," (4) AKG 451, AKG D-12, AKG D-112, (2) Microtec-Geffel M-70, Norelco C-6C (tube), Norelco C-61 (tube), Sony JH-110C 1" layback recorder, (3) Sony VO-5600-3/4" VTR, Betacam A-B roll video edit suite, Sony BVP-30 Betacam package, full lighting and ancillary packages.

ROBERT LANG STUDIOS

A24

19351 23rd Ave. NW; Seattle, WA 98177; (206) 542-1041. Owner: Robert Lang.

LONDON BRIDGE STUDIOS INC.

A24 D2

20021 Bellinger Way NE, Ste. A; Seattle, WA 98155; (206) 364-1525. Owner: Rajan and Rick Parasher. **Manager:** Rajan Parasher.

MICHAEL LORD PRODUCTIONS

A24 D2

9508 17th Ave. NE; Seattle, WA 98115; (206) 527-9002. Owner: Michael Lord. **Manager:** Michael Lord.

MILLTREE PRODUCTIONS

D24

PO Box 70322; Seattle, WA 98107-0322; (206) 782-3115. Owner: Milltree Productions Inc. **Manager:** Claude Autry.

MIRAMAR RECORDING STUDIOS

A24 D2

PO Box 70127; Bellevue, WA 98007; Owner: Miramar Images Inc. **Manager:** Paul Speer.

SEE PAGE 152 FOR AN EXPLANATION OF THE STUDIO SERVICE ICONS. FOR MORE INFO ABOUT MIX LISTINGS SEE PAGE 149.

THE MUSIC SOURCE

A48 D32

615 E. Pike; Seattle, WA 98122; (206) 323-6847; FAX: (206) 323-6896. Owner: Jim Wolfe. **Manager:** Peter Barnes. **Engineers:** Glenn Lorbiecki, Steve Fisk, John Goodmanson, Barry Dowsett, Scott Weiss, Dimitri J. **Dimensions:** Room 1: studio 27x24, control room 27x18. Room 2: studio 15x13, control room 15x21. Room 3: studio 11x12, control room 15x15. **Mixing Consoles:** Euphonix CSII 56-input console w/Total Automation, MCI JH-636 36-input console, modified, w/Automation, MCI JH-628 28-input console. **Audio Recorders:** (2) MCI JH-24 24-track recorders, (2) MCI JH-114 24-track recorders, (3) MCI JH-110 2-track 1/2" and 1/4" recorders, (6) Panasonic SV-3700 DAT recorders, Sony 7030 Time Code DAT recorder, (2) Tascam ATR-62 center-track time code 2-track recorders, Sony JH-110 1" video layback recorder, (13) Nakamichi MR-1 cassette recorders, Magna-Tech 16mm/35mm mag-film recorder, (5) Tascam 22-2 1/4" recorders. **Digital Audio Workstations:** AMS Audiofile 8-track, Otari 464 Pro-Disk 16-track. **Monitors:** Tannoy FSM dual 15" concentric, KRK 703 near-field monitors, JBL 4430 15" two-way monitors, UREI 809 concentric monitors, (4) Yamaha NS-10M near-field monitors, (3) Auratone 5C near-field monitors. **Other Major Equipment:** (2) Adams-Smith 2600 5 machine synchronizers, Adams-Smith Zeta-3 synchronizer, (2) Dolby 363 SR/A stereo noise reduction, (2) Lexicon 224X reverb w/LARC, (2) Yamaha REV7 reverb systems, (2) Lexicon PCM60 reverbs, Klark-Teknik DN780 reverb, Eventide H3000 Ultra-Harmonizer, Summit Audio TPA-200 stereo microphone preamp, Neve Prizm rack (EQ and mic-pre/compression), (2) UREI 1176 limiters, (2) Spectra Sonics 610 comp/limiters, Scamp rack w/gates and compressors, Kawai 9' grand piano w/MIDI interface, (2) Macintosh SE/30 computers w/Performer and Vision, Neumann U67, (2) Neumann U87, (4) Milab DC-96B, (2) AKG 414, Gaggia Espresso machine.

PARADISE SOUND RECORDING

A24 D4

803 Index Ave.; PO Box 410; Index, WA 98256; (800) 877-MTNS; FAX: (206) 793-7713. Owner: Pat Sample. **Manager:** Karen Sample.

PERFECT GENTLEMAN PRODUCTIONS

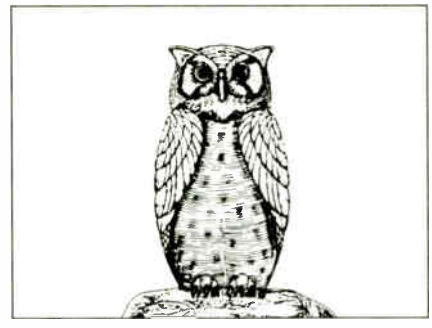
A8 D2

PO Box 69113; Seattle, WA 98168; (206) 824-3641; FAX: (206) 244-1856. Owner: Perfect Gentleman Records. **Manager:** Mark Anthony Holt.

PLU AUDIO SERVICES

A16 D2

Pacific Lutheran University; Tacoma, WA 98447; (206) 535-7268; FAX: (206) 535-7799. Owner: Pacific Lutheran University. **Manager:** Bob Holden.



SAGE ARTS RECORDING STUDIO
Arlington, WA

SAGE ARTS RECORDING STUDIO

A16 D24

Littlefield Farm; 14311 Stehr Rd.; Arlington, WA 98223; (206) 691-5203. Owner: Edmund W. Littlefield Jr. **Manager:** Warren Argo. **Engineers:** Daniel Protheroe, Ed Littlefield Jr., Dan Wheetman, Neville Pearsall, Julian Adamaitis. (Other qualified engineers welcome.) **Dimensions:** Studio 15x30x10, control room 21x30x10, isolation room 15x15x10. **Mixing Consoles:** Sony MXP-3036 w/Sony hard disk automation. **Audio Recorders:** Sony PCM-3324 24-track digital w/Apogee filters, Sony PCM-3202 digital 2-track, Sony R-DAT 2500 w/Apogee filters, Sony/MCI JH-24-16 16/24-track, Sony/MCI JH-112 2-track with 1/2" or 1/4" head, Nagra IV, (4) Nakamichi MR-1. **Monitors:** Meyer HD-1, Nestorovic, Tannoy, MDM-20, Westlake Audio, Auratone. **Other Major Equipment:** Digidesign 4-channel Pro Tools system w/JL Cooper CS10 controller, 1 gig hard drive & Macintosh IIci computer, Lexicon 480L, Lexicon PCM70, Lexicon 41, Lexicon 15, Lexicon LXP-1, EMT 140 plate, Ursa Major 8x32 MkII, Lexicon LXP-5, TC Electronic TC 1280 digital delay, (2) Lexicon PCM40 digital delay, Aphex Aural Exciter, Yamaha SPX900, GML stereo model 2800 parametric EQ Series 2 (2-channel, 5-band), Meyer VX-1, (2) API 550A (3-band), (2) API 550B (4-band), (4) Summit Audio EQP-200 stereo (4-band) tube EQ, (2) Summit Audio EQP-200 dual program tube (3-band) EQ, (4) Summit Audio TLA-100 tube, (2) UREI Teletronix LA-2 tube, (2) UREI 176 tube, (2) UREI 1176, (2) UREI LA-3A, (2) Valley People Gain Brain, Forssell tube comp/limiter, (2) Matherly 2-ch. transformerless tube preamps, (3) Summit Audio TPA-200 dual tube preamps, (2) 2-ch. Demeter tube preamps, Forssell 2-ch. tube mic preamp, (2) Jensen-Hardy preamps, (5) Demeter tube direct boxes, (4) Kepex noise gates, Aphex stereo gate, Klark-Teknik spectrum analyzer, Mesa/Boogie Quad preamp, Mesa/Boogie studio preamp, (10) Mesa/Boogie speaker cabinets, (6) Bruel & Kjaer 4003, (2) Bruel & Kjaer 4004, (2) Bruel & Kjaer 4006, (2) Bruel & Kjaer 4007, (2) Bruel & Kjaer 4011, (2) Bruel & Kjaer 4012, (3) Neuman TLM170, (2) Schoeps, AKG "The Tube," RCA 77-DX, (2) CAD Equitec II, plus a large selection of dynamic standards including Beyer, Sennheiser, Electro-Voice, (4) Yamaha PC2002, Yamaha PC2001, UREI, Bryston 4B. **Rates:** Please call for rates. Block booking and accommodation package rates available. **Specialization & Credits:** Our Mac II is the heart of a sophisticated MIDI sequencing system, Mark of the Unicorn Time Piece, Lexicon LARC, Lexicon MCR. All of our machines, sequencers, and hard disk recorders are set up to run in sync, providing a virtually unlimited number of tracks for recording. All formats of video playback are available for synchronization work. An extensive digital patch bay in conjunction with our Lexicon LFI-10 digital interface allows unrestricted digital transfers. We offer complete CD premastering services. Acoustic music is one of our specialties. Wide selection of fine vacuum tube gear. Call for more details concerning our unusual collection of fine instruments including Alembic, Martin, Gibson, Matlin, Sierra, Dobro, Scheerhorn, and super guitars by Robert Girdis. We can provide quality photographic services and album cover design. Comfortable ranch-style accommodations are available. Credits: *First Generation*, Bertram Levy & Peter Ostroushko; *New Melody Stomp*, How's Bayou; *Box Lunch, Happy Jive Live*, Sandy Bradley & the Small Wonder String Band; *Desert Visions*, David Lanz & Paul Speer; *Sweet Rural Shade, Live At Carnegie Hall, Green Hills of Ireland*, Boys of the Lough; *Moose on the Roof*, Noorsken; *Timepieces*, Larry Edelman; *Singing a Glad Noel*, Seattle Symphony Chorale; *Cataract*, The Walkabouts; *Let De Groove Rise Up, Ghost Country, Haunting Melodies, Marley's Ghost Gospel*, Marley's Ghost; *Honey Be There*, Dan Wheetman; *Enrichez Vous!*, Erin Shrader & Edith Farrar; *Greasy Coat*, Rodney Miller Band; *Strangers with Candy*, Strangers with Candy; *Hassle the Caller*, Hank Bradley; *Burning Times*, Rumors of the Big Wave; *Ranch Romance*, Tom Ball & Kenny Sultan; Jim Arvitt.

SOUND SOUND/SAVAGE FRUITARIAN PROD.

A24 D2

PO Box 22999; Seattle, WA 98122-0999; (206) 322-6866; FAX: (206) 329-7554. Owner: Tom Fallat. **Manager:** Steven M. Miller. **Engineers:** Tom Fallat, Steven M. Miller, qualified independents welcome. **Dimensions:** Studio 20x30. **Mixing Consoles:** Tascam M3500 (modified) 32-channel in-line, Mackie CR1604 w/XLR-10 mic preamp extension unit. **Audio Recorders:** Tascam MSR-24 1" 24-track w/dbx Type 1 NR, Tascam DA-30 DAT w/48-, 44.1-, 32kHz sample rate (SCMS disabled), Studer A77 1/4" 2-track, Sony D-10 Pro portable DAT. **Monitors:** Westlake BBSM-10, Tannoy System-12 DMT, Radian MM-8, (5) Sony MDR-7506 headphones. **Other Major Equipment:** (2) Bruel & Kjaer 4006 Omni w/nose cones, (2) Bruel & Kjaer 4011 cardioid, other assorted microphones from AKG, Audio Technica, Sennheiser, Shure, EV, Nakamichi; Eventide H3000SE Ultra-Harmonizer, Klark-Teknik DN780 digital reverb, Klark-Teknik DN780 digital reverb, Klark-Teknik DN514 quad autogate, Klark-Teknik DN504 quad compressor/limiter, Klark-Teknik DN410 parametric EQ, Rane MPE-14 dual 2/3-octave MIDI-programmable EQ, Aphex Compellor stereo compressor/limiter, Aphex 612 dual expander/gate, DeltaLab Effectron II ADM 1024 digital delay, DeltaLab Effectron II ADM 64 digital delay, vintage Furman RV-1 spring reverb, Tascam MTS-1000 MIDIizer SMPTE sync & ATR remote controller, Bryston 4B Pro monitor amplifier, cassette decks from Nakamichi, Sony, Marantz, Technics; Wurlitzer 1929 grand piano; drums and cymbals from Ludwig, Tama, Remo, Zildjian, Paiste, Sabian; many assorted hand-drums and percussion from around the world; access to 3 complete gamelan (Cirebonese, Javanese, American) rare and vintage string instruments from National, Folksroots, Regal; Korg T1 music workstation, Roland S-770 16-bit/44.1kHz stereo sampler w/16MB RAM & 40MB HD, MIDI keyboard controllers from Roland & Oberheim, Ensoniq ESQ-M, Kawai K5M, Yamaha TX81Z, DX100, vintage Sequential Circuits Pro-One analog synthesizer, DrumKAT MIDI percussion controller, Roland R-8, Roland TR-505, Yamaha RX21L, Macintosh Portable 6/40, Macintosh Plus w/105MB HD, Opcode Studio 3 MIDI/SMPTE interface, Opcode Vision & Galaxy, Coda Finale, MOTU Performer & Professional Composer, Leica R4 & Hasselblad 500CM cameras. Champion juicer. **Specialization & Credits:** Sound Sound is a 24-track audio recording and production facility located in Seattle, WA. We are an artist-owned and run business committed to bringing you the finest in audio recording knowledge, experience and service. We strive to provide access to professional tools in a healthy, supportive and artistically sensitive environment where alternative and experimental music is actively pursued, not merely tolerated. Our interests include all kinds and sizes of commercial and non-commercial projects. Sound Sound can take your project from initial planning to final product. Recent recordings have included: New Music Across America; Bill Frisell; Michael Shrieve; Robin Holcomb; Sumita Chakravorty; Jeff Greinke; Jay Clayton; Julian Priester; Stuart Dempster; Janice Giteck; Andrew Hill. Previous projects include: Anthony Braxton; Steve Lacy; Fred Frith/Skeleton Crew; Ingram Marshall; Ellen Fullman; Trichy Sankaran; Will Ackerman/Gang of Seven Records; Gamelan Pacifica; American Gamelan Institute and many others.

SOUNDHOUSE RECORDING STUDIO

A16 D2

7023 15th Ave. NW; Seattle, WA 98117; (206) 784-4848; FAX: on request. Owner: Scott Crane. **Manager:** Scott Crane.

World Radio History

JACK STRAW PRODUCTIONS

A16 D16

4261 Roosevelt Way NE; Seattle, WA 98105-6999; (206) 634-0919; FAX: (206) 634-0925. Owner: The Jack Straw Foundation. **Manager:** Steve Malott. **Engineers:** Steve Malott, Doug Haire, Tom Stiles, Eric Bowerman. **Dimensions:** Room 1: studio 23x26, control room 14x23. Room 2: studio 11x15, control room 9x13. **Mixing Consoles:** Harrison MR-4 w/MasterMix, JBL/Seck 1882 MkII, Sonosan SX/S, Soundcraft 200SR. **Audio Recorders:** Tascam MS-16 w/dbx Type 1, Otari MX-55 8-track 1/2", Otari MX-5050 4-track 1/4", (2) Otari MX-55 2-track, (4) Otari MX-5050B 2-track, Nagra T 2-track w/time code, (2) Panasonic SV-3500 R-DAT, (2) Panasonic SV-255 R-DAT, Fostex D-20B R-DAT w/time code, (6) Nakamichi MR-2 cassette. **Digital Audio Workstations:** Digidesign Pro Tools 16-channel 2.1 gig w/8mm tape. **Monitors:** Nestorovic Type 4 & Type 8, (2) Yamaha NS-10M, JBL 4406. **Other Major Equipment:** Eventide 3000SE/B, Multiverb III, ART DR-1 reverb, Lexicon 300 digital reverb, Lexicon LXP-1 digital reverb, (20) B&K, Neumann, AKG, Sennheiser, Crown, etc. mics.; Sony BVW-50 Beta SP video editing deck, Sony BVU-800 3/4" video editing deck, Sony EVO-9650 Hi-8 video editing deck, (3) Hafler, Symetrix, Crown monitor amplifiers; Samick 6'8" grand piano, Adams-Smith Zeta-3 SMPTE generator/reader.

THE STUDIO AT THE CENTER

A8 D24

317 W. Riverside Ave.; Spokane, WA 99201; (509) 838-8910; FAX: (509) 838-8550. Owner: Richard Totusek. **Manager:** Gene Hall. **Engineers:** John Van Houdt. **Dimensions:** Studio 18x25, control room 14x20. **Mixing Consoles:** TAC Scorpion II 32x16x2. **Audio Recorders:** (3) Alesis AOAT w/BRC remote control, Panasonic SV-3700 Pro DAT, Technics SV-DA10 DAT, TEAC 80-8 1/2" 8-track, Fostex Model 20 1/4" half track, Akai GX-912 Pro cassette. **Digital Audio Workstations:** Mastertracks Pro sequencing software, Finale notation software, Alesis Data Disk. **Monitors:** (2) Tannoy PBM-8, (2) Tascam, (2) Auratone Cubes. **Other Major Equipment:** Roland RSP-550 digital effects processor, Lexicon LXP-5 digital effects processor, Boss SE-50 digital effects processor, Alesis Quadraverb, Alesis MIDIverb, DigiTech VHM-5 "Vocalist" harmonizer, dbx 166 compressor, Alesis 3630 compressor, Furman QN-44 noise gate, (2) AKG 414, (2) AKG 460, AKG D-112, (5) Shure SM57, Crown PZM-30, (2) Sennheiser 421, (2) Tech 21 SansAmps, BBE 822A Sonic Maximizer, Aural Exciter Type C, (2) Alesis M-EQ230 1/3-octave graphic EQ, Young Chang full-size grand piano, Ensoniq SQ-2 workstation, Alesis HR-16, (2) Slingerland timpani, Slingerland 5-piece drum set.

STUDIO 5 RECORDING

A16 D8

13400 Northup Way, Ste. 5; Bellevue, WA 98005; (206) 643-1755; FAX: (206) 641-2522. Owner: Mark Mininger, gen. mgr. **Manager:** Becky McPeters. **Engineers:** Thad Crowe—chief engineer, Bill Levey. **Dimensions:** Room 1: studio 12x15, control room 10x15. Room 2: control room 10x17. **Mixing Consoles:** Amek Matchless 26x24, Ramsa WR8210. **Audio Recorders:** Sony/MCI JH-24/26, (2) Otari 5050 MkIII, Otari MX-50, Panasonic SV-3700 DAT, (2) Nakamichi MR-2 cassette, (2) SAE C-102 cassette, (3) Otari CD-4050, Fostex D20B Timecode DAT. **Digital Audio Workstations:** WaveFrame 401 8-track system. **Monitors:** (2) Westlake Audio BBSM-10, (2) Yamaha NS-10, (2) Tannoy PBM-8, (4) JBL 4408, (2) JBL 4301. **Other Major Equipment:** (2) Hardy M-1 mic preamp, (2) Neumann U87 w/Stephen Paul modifications, (2) AKG 451, Lexicon PCM70, Eventide 969 Harmonizer, (2) Symetrix 501 compressor, (2) Symetrix 525 multiprocessing, UREI 6250 power amp, UREI 6150 power amp, Crest 901 power amp, Yamaha KX88 keyboard control, (2) Roland S-550 sampler, Roland D-50 LA synthesizer, Yamaha TX802 module, Voyetra Sequencer Plus Gold, Temporal Acuity Products Music Printer Plus, (8) AKG K-240 headphones, (2) Symetrix SE400 graphic/parametric, Sony PVW-2800 Betacam video deck.

TINDERBOX PRODUCTIONS

A8 D4

901 E. Denny Way, Ste. A; PO Box 9351; Seattle, WA 98109; (206) 323-5066. Owner: Jamie Jones. **Manager:** Alan McMillan.

TRIAD STUDIOS

A48 D24

4572 150th Ave. NE; Redmond, WA 98052; (206) 881-9322; FAX: (206) 881-3645. Owner: Full Scale Corporation. **Manager:** Chris Middaugh. **Engineers:** Lary "Larz" Nefzger (chief engineer), Tom Hall, Dave Dysart, Tyler Tullock, Mark Yeend. **Dimensions:** Studio A: studio 40x24, control room 19x24. Studio B: studio 35x24, control room 16x19. Studio C: studio 10x10, control room 10x14. **Mixing Consoles:** Mitsubishi Westar 52-input w/DiskMix moving fader, Neotek IIIC modified 36-input w/DiskMix moving fader, Saber modified 32-input. **Audio Recorders:** Sony 3324A digital 24-track, (2) Sony/MCI JH-24 24-track, Sony/MCI JH-16 16-track, (2) Alesis ADAT, Ampex 440B 4-track with various heads, Digidesign Sound Tools, Otari MTR 12-2 2-track with center-track time code, Sony/MCI JH-110B 2-track with 1/2" and 1/4" heads, Ampex 102 with 1/2" and 1/4" heads, Panasonic SV-3700 DAT, Sony 2500 DAT, (3) Nakamichi MR-1B cassette recorders, Aiwa F660 cassette, KABA real-time duplication system, Versadyne high-speed duplication system. **Monitors:** (4) Tannoy SGM-10B w/Master Lab X-over, (4) PAS SM-1 w/Mastering Lab mods, (6) Yamaha NS-10M, (6) Auratone 5C. **Other Major Equipment:** Dolby SR 2-channel, (6) TimeLine Lynx, Lexicon 224XL, (2) Klark-Teknik DN780, (2) EMT 140TS plate reverb, Lexicon PCM70, (2) Lexicon PCM41, (2) Lexicon Super Prime Time, Yamaha REV5, (3) Yamaha SPX90II, (2) Eventide H3000, (2) Eventide H910, (2) TC Electronic TC 2290, (3) Alesis Microverb, Klark-Teknik RTA, ADR Panscan, (2) Aphex stereo Compellors, ADR F760X, (4) dbx RM160, (2) BBE Sonic Maximizer, (12) Valley People Kepex II gates, (2) Drawmer 201 gates, (2) UREI 1176, (3) Teletronix LA-2A, (2) API 500A, (2) B&B EQF-2, Orban 536A de-esser, (2) Valley People dynamic sibilance controllers, Pultec EQH-2, (10) AKG, (11) Neumann, (2) B&K 4006, (5) Sennheiser, (7) Shure, (6) Electro-Voice, (3) Sony C-37A tube, (2) Beyer, Yamaha C-7D grand piano w/Forte MIDI-mod, Paul Reed Smith electric 6-string, Yamaha acoustic 12-string, Gretsch drums, misc. percussion instruments, Marshall amplifier, (3) Macintosh computers w/external drives, Opcode SMPTE "Time Machine," Digidesign Sound Designer, Digidesign Sound Tools, Digidesign Soft Synth, Opcode DX Librarian and Patch editor, Mark of the Unicorn Performer and Composer, (2) Emulator II w/library, (2) Akai S900, (2) Yamaha TX802, (2) Roland D-550, (2) Roland MKS-70, (2) Alesis HR-16, Roland R-8, (2) Emulator Emax, Oberheim DPX, Yamaha MJC-8, Yamaha DX7, E-mu SP-12, Prophet 5 with MIDI, Linn Drum, Synhance MTS, Akai ME30P, Sony BVU 800 3/4" video recorder, JVC CR-6650U video recorder, (2) Panasonic AG 7510 SVHS, Panasonic AG 7500 SVHS, (2) Panasonic AG 7400 portable recorders, (2) NEC DX-2500U VHS-HQ, (2) NEC CT-2020 20" color monitors, (2) Panasonic BTD 1910V color monitors, (2) Panasonic BTM 1310V color monitors, (2) Panasonic WVT 300 SVHS cameras, Pinnacle Paintbox system, Sound Ideas SFX library, various CD players, Technics SL-1200 turntable. **Rates:** The best deal on digital multitrack in the U.S., our rates are reasonable and very competitive. Block time available. Please call. **Specialization & Credits:** Guns N' Roses, Queensryche, Deniece Williams, Michael Tomlinson, David Lanz, Steve Miller, Eric Tingstad/Nancy Rumbel, Ralph Towner/Gary Burton, Tim Noah, UB40. Nestled in evergreens, minutes from downtown Seattle. Complete subcontracting, equipment rental and hospitality services available. For ten years, we've been called the best-sounding studio north of San Francisco. Triad prioritizes your creative comfort in everything from the ergonomics of the MIDI workstations to the gourmet coffee in the lounge areas. State-of-the-art studios are balanced with warm, contemporary design elements. Award-winning rooms, outstanding engineers, sensitive support staff and attractive rates make Triad worth the trip from anywhere!

THE WRECK ROOM

A8 D2

19827 30th Ave., NE; Seattle, WA 98155; (206) 363-6914. Owner: Steve and Tyler Carlson. **Manager:** Tyler Carlson. **Engineers:** Steve Carlson, Tyler Carlson **Dimensions:** Room 1: studio 18x13, control room 20x16. **Mixing Consoles:** Ramsa WRT-820. **Audio Recorders:** Tascam TSR-8, Sony DTC-75ES DAT, Nakamichi MR-1B cassette. **Monitors:** (2) JBL 4410, Proton P-300, Panasonic Boom Box. **Other Major Equipment:** Roland SRV-2000, Alesis MIOIverb II, Alesis MIDIverb III, Alesis Quadraverb, Yamaha SPX90, Symetrix 525, Alesis 3630, BBE 822 Sonic Maximizer, AKG 451, EV PL20, AKG D-112, (5) Shure SM57, (2) Shure SM58, (2) RS 33-1080, QSC 3200 monitor amp, Marshall JMP-212 amp, custom studio bass, Hybrid Arts studio drum set, Roland 707 drum machine, Epiphone acoustic guitar. **Specialization & Credits:** The Wreck Room is a comfortable, low-key demo studio, catering to musicians who are tired of playing with home 4-tracks. Can't find the sound? Get off the porta-potty and make a real record. Our staff has additional experience (alright, day jobs) in printing and CD mastering, and can help you make that demo a reality. In the past year, we've worked with Tony Patton, Kid Virtue, Major League Players, Elysian Fields, Gutter Bunny, Phil Maxwell and Andrew Faltanson, among others. Never mind that most of these bands have long since broken up, and that some of these people still owe us money. (Are you listening, Michael?) Anyway, we're having a great time, and R.E.M. even used our kick drum mike at Bad Animals last summer. Call us. Rates are available on request.

Wyoming

MEDIA WORKS

A16 D2

3545 S. Park Dr. (8ox 15); Jackson Hole, WY 83001; (307) 733-1300; FAX: (307) 733-1324. Owner: Jeff McDonald, Mark Rohde. **Manager:** Jeff McDonald.

ROCKY MOUNTAIN SOUND

A24

416 Central Ave.; Cheyenne, WY 82007; (307) 632-2819. Owner: Jim Wyatt. **Manager:** Jim Wyatt.

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06. ☐ Broadcast/radio/television
07. ☐ Record company
08. ☐ Record/tape/CD mastering /manufacturing
09. ☐ Equipment manufacturing (incl. rep firm)
10. ☐ Equipment retail/rental
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12. ☐ Facility design/acoustics
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20. ☐ Other (please specify)

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3) Your role in purchasing equipment, supplies and services (check ONE):
21. ☐ Recommend the purchasing of a product or service
22. ☐ Specify makes, models or services to be purchased
23. ☐ Make the final decision or give approval for purchase
24. ☐ Have no involvement in purchasing decisions

4) Your company's annual budget for equipment, supplies and services:
25. ☐ Less than $50,000
26. ☐ $50,000 to $149,999
27. ☐ $150,000 to $249,999
28. ☐ $250,000 to $499,999
29. ☐ $500,000 or more

5) Purpose of Inquiry:
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31. ☐ Files/future purchases

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37. ☐ Commercial (public) production facility
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39. ☐ Corporate or institutional facility
40. ☐ Remote or variable locations

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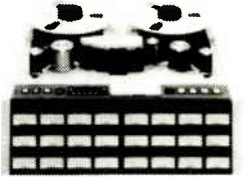

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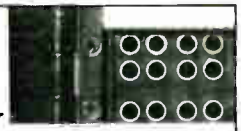

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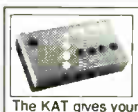

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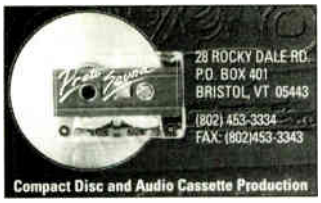
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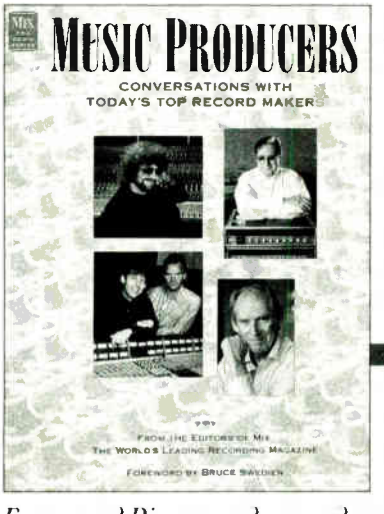

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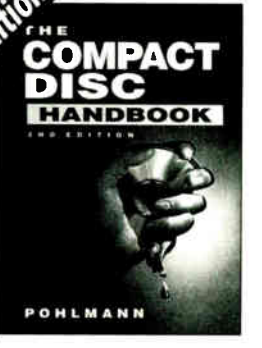

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World Radio History

—FROM PAGE 63, CD-ROM RECORDERS

common formats from an MS-DOS platform for a suggested retail price of $7,900. The JVC system comes in several versions, from $9,950 with DOS software for making basic ISO-9660 CD-ROMs to $15,700 for making mixed mode discs (CD-ROM and CD-Audio). A Macintosh version was expected to be available by the time you read this. Alternatively, you may purchase turnkey systems including third-party software from a number of other companies.

One of those, Optical Media International, has been in the CD-ROM business since 1985. OMI consists of three internal groups: CD Express Services Group, TOPiX CD Systems Group and Reflective Arts Publishing Group. The CD Express Services Group specializes in premastering and production services for CD and CD-ROM. But if you'd rather "roll your own" CDs, the TOPiX Group provides systems for recordable CDs in all formats. OMI packages are available for Sony, Philips and, by the time you read this, Yamaha. The price for the Philips hardware with mixed-mode software is $8,500. Various software-only packages are also available.

Sonic Solutions, (San Rafael, Calif.) has decided to move into CD-ROM from its strong position as a provider of CD-Audio mastering products. "We're getting ready to release a set of CD-ROM extensions to our regular CD prep package," president Bob Doris says. "The first set of extensions will permit basic CD-ROM imaging: the ability to image an already-assembled disk volume or disk partition into a CD-ROM or, more accurately, a data track on a CD. Anyone who has Macintosh, PC or Unix data on a hard disk can use this system to create that same image on a CD-ROM, which can then be read by its native operating system. Along with that, it will support audio CD and mixed-mode CD-ROM formats. Since it runs on a Sonic System, it's a trivial exercise to assemble a mixed-mode CD.

"We thought we could help the community by having an imaging capability that can move across platforms very easily and support mixed mode," Doris continues. "While the Mac is used as a front end for the Sonic System, because we have our own independent SCSI bus we're able to manipulate the data in ways that you wouldn't expect in a typical Macintosh system."

The CD-ROM-making capability is offered in Sonic's PQ-editing, CD-premastering package. The system uses the Sony 990E CD-ROM Recorder, marketing it under the trade name CD Printer. "We charge $9,750 for the CD Printer option with the Sonic System," explains Doris. "In order to run the CD Printer you buy one of two software options: Track Maker, which is used for simple audio CD assembly and sells for an additional $895, or the more comprehensive package, which is used for burning CD-ROMs and sells for an additional $2,995."

Other companies in the business of providing CD-ROM recording software for one or more of these boxes include Young Minds, Meridian Data and DataDisc.

—Paul Potyen

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sell it. rent it. fix it. teach it.

MIX CLASSIFIEDS

"I just wanted to say 'thank you' to the *Mix* Classifieds. Recently, I signed on as a recording engineer at Pan Studios in Colorado Springs, a position advertised in the *Mix* Classifieds. I'm now enjoying a terrific job at a wonderful studio with fabulous people in an incredibly beautiful area. *Mix* magazine has always been my window on the world of professional sound, and now the *Mix* Classifieds proved to be my door to opportunity."

—Bob Gussin, Pan Studios

Think about it. Who *doesn't* read the Classifieds?

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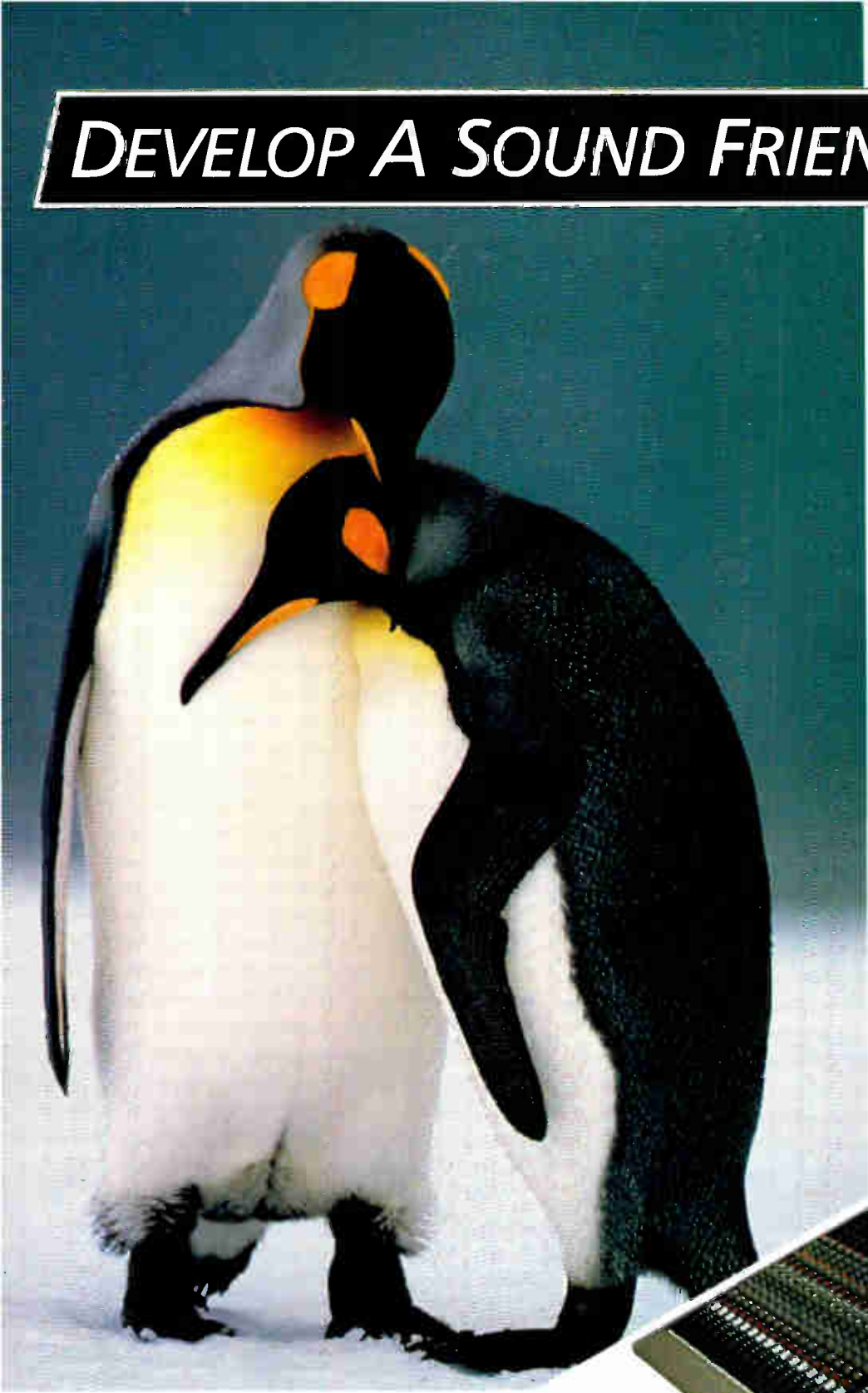

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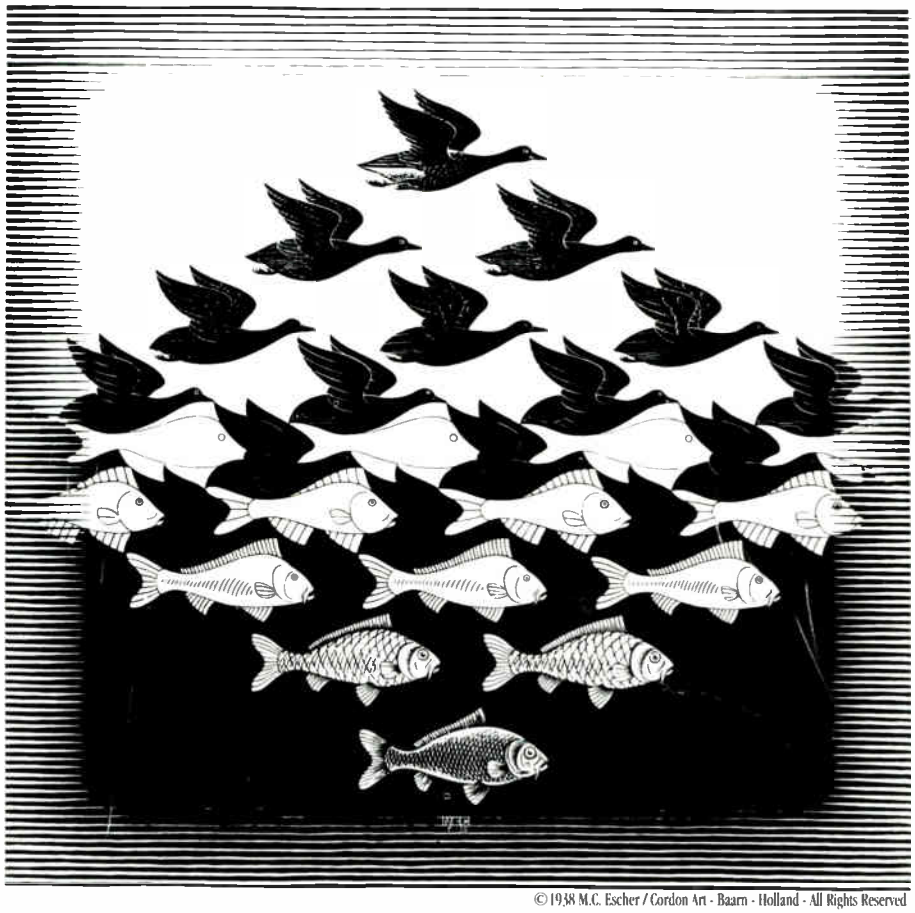
If you think only your eyes can play tricks on you...



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Study the illustration. Are the geese becoming fish, the fish becoming geese, or perhaps both? Seasoned recording engineers will agree that your eyes *and* your ears can play tricks on you. In the studio, sometimes what you think you hear isn't there. Other times, things you don't hear at all end up on tape. And the longer you spend listening, the more likely these aural illusions will occur.

The most critical listening devices in your studio are your own ears. They evaluate the sounds that are the basis of your work, your art. If your ears are deceived, your work may fall short of its full potential. You must hear everything, and often must listen for hours on end. If your studio monitors alter sound, even slightly, you won't get an accurate representation of your work and the potential for listener fatigue is greatly increased.

This is exactly why our engineers strive to produce studio monitors that deliver sound with unfailing accuracy. And, why they create components designed to work in perfect harmony with each other. In the laboratory, they work with quantifiable parameters that do have a definite impact on what you may or may not hear. *Distortion*, which effects clarity, articulation, imaging and, most importantly, listener fatigue. *Frequency Response*, which measures a loudspeaker's ability to uniformly reproduce sound. *Power Handling*, the ability of a loudspeaker system to handle the wide dynamic range typical of the digital domain. And, finally, *Dispersion*, which determines how the system's energy balance changes as your listening position moves off axis.

Models pictured (L-R)
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