

MIX

**The Class of '91:
15 Hot New Rooms**

**Understanding
and Using
Test Equipment**



**Sound Design for Broadway's
"Miss Saigon"**

**Studio Design
and Acoustics Issue**

**Directory:
Facility Designers
and Suppliers**



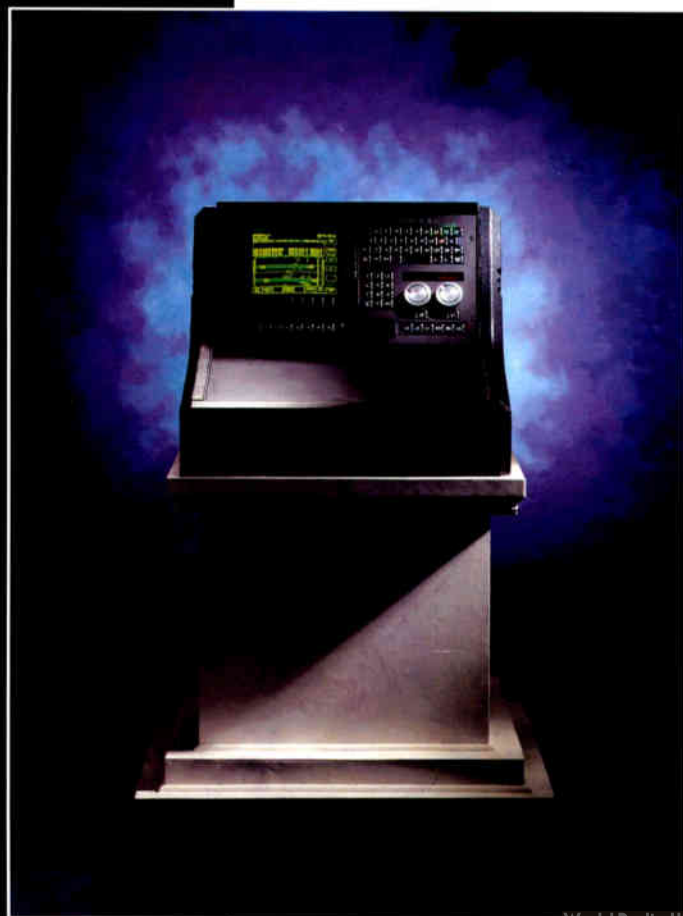
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**1991 TEC Awards
Official Ballot
Page 8**

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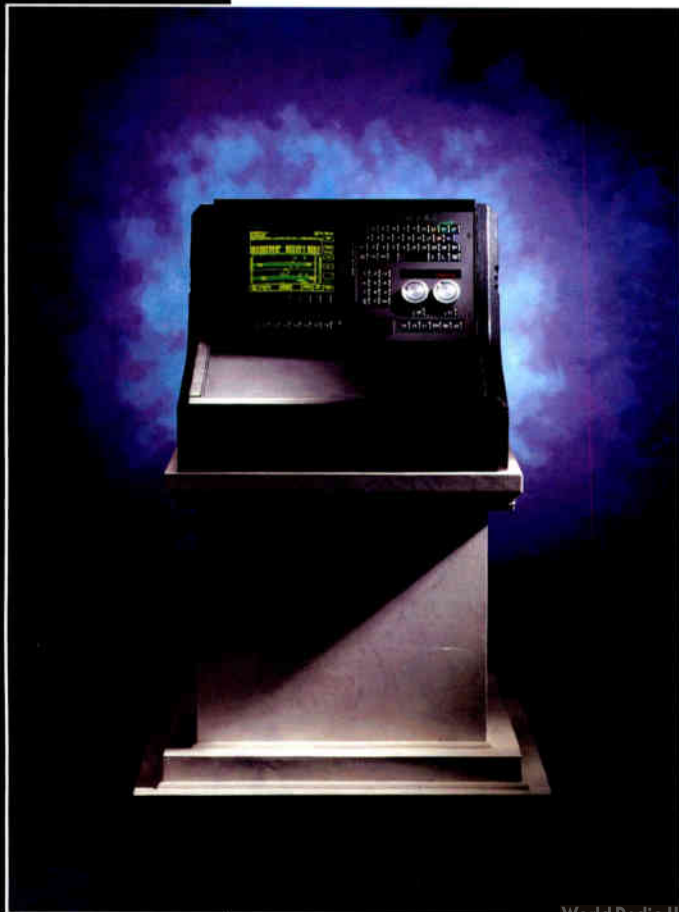
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1991
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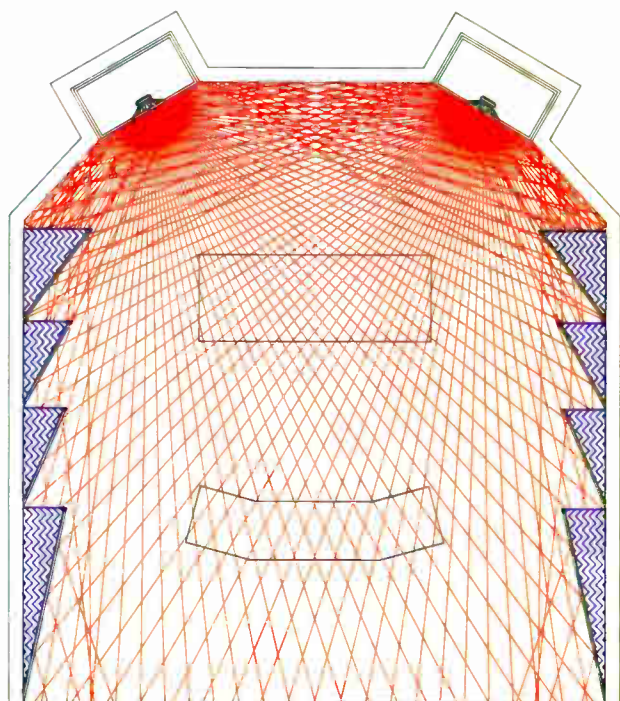
MIX

PROFESSIONAL RECORDING • SOUND AND MUSIC PRODUCTION

AUGUST 1991, VOLUME 15, NUMBER 8

AUDIO

- 14 Insider Audio: MD** *by Ken Pohlmann*
- 22 The Fast Lane: Purple Reign**
by Stephen St. Croix
- 32 Understanding and Using Test Equipment**
by Stephen Paul
- 68 Artist's Studio: Howard Jones**
by Paul Tingen
- 78 The Byte Beat: Atari at the Crossroads**
by Paul Potyten
- 110 International Update:**
BBC's Radiophonic Workshop
by Richard Elen
- 130 Studio View: MadPark** *by Dan Daley*



SPECIAL TEC AWARDS SECTION

- 90 Profiles of 1991 Nominees**



STUDIO DESIGN & ACOUSTICS

- 18 Juxtapositions: Acoustics & Studio Design—A Spectrum of Choice** *by Mel Lambert*
- 28 The Class of 1991: A Look at Some of America's Hottest New Rooms**
- 48 The Metropolitan Opera: Redesigning the Audio Facilities**
by Vin Gizzi
- 52 Signal Flow at The Met**
by Greg Hanks
- 64 Staggered Geometry Designs: Larger Listening Areas for Control Rooms** *by Bill Morrison*

PRODUCTS

- 100 Preview/Hot Off the Shelf**
- 102 Auditions: Sendit Electronics 4X3; PAST Equalizer and Mic Preamp; "The Musician's Guide to the Recording Studio"**
by George Petersen
- 106 Field Test: Biamp Rackmax IIex Mixer**
by Larry Oppenheimer



PAGE 48

LIVE SOUND

- 134 Sound Design for Broadway's "Miss Saigon"**
by David (Rudy) Trubitt
- 138 SoundCheck/News Flashes**
by David (Rudy) Trubitt
- 142 The World Amphitheater: Chicagoland's Enormous High-Tech Shed**
by Gregory A. DeTogne
- 150 New Sound Reinforcement Products**

TAPE & DISC

- 158 ITA "How & Why": Record Attendance for Cassette Seminar** *by Philip De Lancie*
- 162 Tape & Disc News/Splices** *by Philip De Lancie*

POST-PRODUCTION

- 152 A Closer Look at Editel: Now There Are Five**
by Peter Caranicas
- 155 Post Notes/Post Briefs** *by Iain Blair*



PAGE 87

MUSIC

- 87 Lunching with Bonzai:**
Toots Thielemans
by Mr. Bonzai

DEPARTMENTS

- 6 From the Editor**
- 9 Current**
- 10 Industry Notes**
- 170 Coast to Coast:**
Sessions, L.A. Grapevine,
N.Y. Metro Report,
Nashville Skyline
- 192 Ad Index**
- 193 Classifieds**
- 200 Feedback**

Cover: Studio A at New York City's Chung King Studios was completed last March. Designed by Frank Cometelli, it features a Neve VR60 console with Flying Faders, Tannoy System 215 DMT monitors, and two Studer A827 24-track tape machines in an adjacent machine room.
Photo: Michael Partenio.



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FROM THE EDITOR

August is the month we traditionally look at the field of studio design. This year Mel Lambert hosts our designer's forum, Vin Gizzi and Greg Hanks tell us about the elaborate scheme for the new Metropolitan Opera Studio, control room acoustics is discussed by Bill Morrison, and Richard Elen takes us on a tour of the new BBC Radio broadcast studios. And to prove that the economy can't keep good recording people down, our "Class of '91" photo-feature spotlights 15 stunning new recording rooms opened in the past year.

◆ ◆ ◆
This issue also contains the annual TEC Awards Voter's Guide and ballot. For the past seven years *Mix* readers have been selecting the most innovative audio products, the top production and recording facilities, and the engineers and producers who have gone the extra distance to make great things happen in our industry. The TEC Awards culminate in an evening of celebration and recognition during this fall's AES convention in New York City, where the results of the voting are revealed.

There are two categories of awards whose winners have already been announced: the TEC Awards Hall of Fame and the new Les Paul Lifetime Achievement Award. This year the Hall of Fame adds to its esteemed assemblage the father of noise reduction and one of the few industry personalities to become a household name, Ray Dolby; the recording engineer's engineer and all-star hitmaker, Bruce Swedien; and one of the industry's original Renaissance men and master of all trades, Bill Putnam.

The new Les Paul Awards are being presented to three multi-TEC Award winners who have maintained a history of leadership and remain at the highest ranks in their field. Our salute this year goes to mastering engineer Bob Ludwig, sound reinforcement specialists Clair Brothers, and super studio The Power Station.

The Mix Foundation for Excellence in Audio sponsors the TEC Awards and donates the proceeds to hearing protection and audio education scholarships. Beneficiaries include the Hearing is Priceless (HIP) campaign of the House Ear Institute; the Audio Engineering Society Educational Foundation; the Society of Professional Audio Recording Services (SPARS) and the TEC-nominated audio recording programs and educational institutions. Since the first TEC Awards in 1985, over \$130,000 has been raised for these causes.

This year's TEC Awards ceremony is being held Saturday night, October 5, at New York City's Grand Hyatt Hotel. We invite you to come and join in the celebration, applaud the fine work being done in our industry, and support the goals of preventing hearing loss and furthering educational excellence.

Keep reading,



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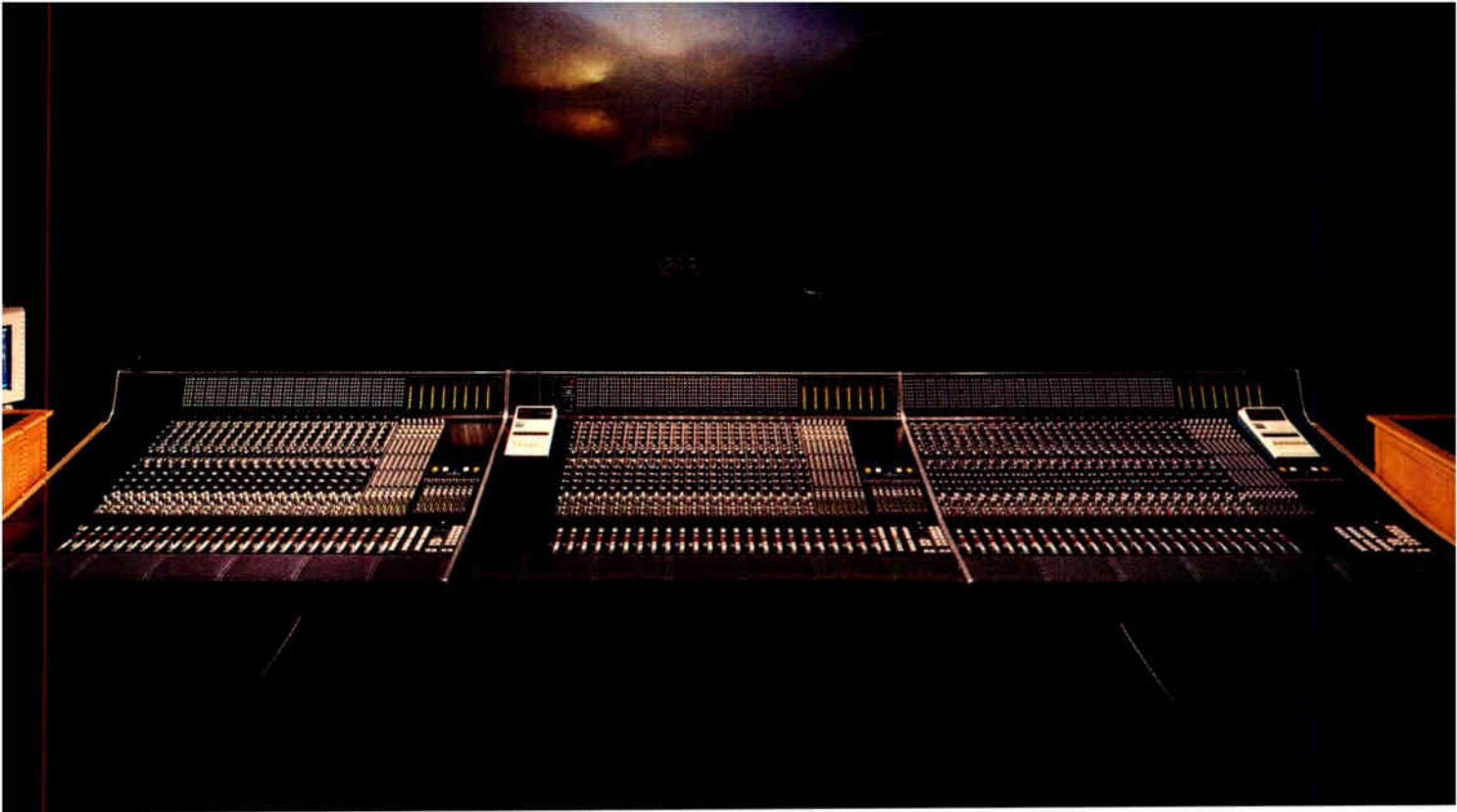
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Founded in 1977 by
David Schwartz and Penny Riker Jacob



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Saul Zaentz Company expands... with Otari!

The Saul Zaentz Company Film Center has just completed a major expansion featuring Otari's *Premiere* film post-production console for dub stage 2.

The *Premiere* is the result of extensive collaboration between The Saul Zaentz Company and Otari, and was designed to meet the needs of the Center's new dubbing stage.

The *Premiere* was designed and built especially for film mixing, and is configured for easy operation by one to three Sound Mixers. In addition to

Otari's *Virtual Monitor System*, the *Premiere* features the new DISKMIX 3 Film Moving Faders automation system, providing fader level, mute, and switch automation on each input. This system, while using SMPTE internally, displays cinematic increments of feet and frames, allowing the sound mixer to easily work directly from a film cue sheet or edit decision list.

This unique console continues The Saul Zaentz Company Film Center's long tradition of combining creative talent with advanced technology.

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CURRENT

Report from APRS

At 11 a.m., June 5, the doors to London's cavernous Olympia 2 convention center swung open, marking the beginning of the 24th International Exposition of Professional Recording Equipment, organized by the Association of Professional Recording Services. Over the next three days, some 5,000 audio pros dropped by to check out the latest in recording and live sound technology from representatives of over 150 companies. And while the show's overall attendance was slightly under last year's record of 5,400 visitors, there was plenty of action on the show floor, especially in the area of consoles.

A major development was the disclosure of plans for a joint sales/leasing venture—exclusive to the U.K.—involving Mitsubishi digital recorders and Amek consoles. Mitsubishi U.K. was particularly interested in packaging its X-880 32-track with 56-input versions of Amek's Mozart-RN, which features main signal path and EQ sections designed by Rupert Neve.

Soundcraft unveiled Europa, its first new high-end sound reinforcement console in eight years, providing high-performance amenities such as 12 aux sends, noise gates on each input, eight VCA subgroups and stereo "width" controls on its eight routable stereo effects returns. Stockholm's China Theatre placed an order for the first 40-input board, which is also available in 24- and 32-input frame sizes; options include stereo inputs and dual matrix modules.

Euphonix, in conjunction with its U.K. distributor, Stirling Sound, unveiled Crescendo System II, the second generation of its digitally controlled, analog mixing system. CSII features include full dynamic automation of all faders, knobs and switches to time code, and Snapshot Recall™ of all console functions, with memory storage and reset-ability in 30 ms.

In another second-generation de-

velopment, AMS previewed Logic 2, its large-format digital audio console. The first full-function digital mixer to offer total dynamic automation, Logic 2 is competitively priced with top analog boards, yet has more features in a compact frame, accommodating up to 256 audio channels in less than two meters width. Austrian national broadcasting (ORF) has ordered the first Logic 2, a 32-channel model to be installed in an all-digital television post-production suite slated for completion next spring.

TOA chose APRS for the official U.K. launch of its IX-9000 digital mixing system, a 64x48 console featuring 256-channel programmable patch routing. While two touch-sensitive screens provide operator control of mix and channel configurations, the IX-9000 maintains a conventional approach in terms of ergonomics and physical layout, such as motorized channel faders. The first IX-9000 has been in use at Vienna's State Opera House since last fall.

Aside from the big-ticket items, there were plenty of small surprises, as well. Denmark-based firm Monitor Technology showed its Monitor Ones, a splendid-sounding set of compact reference loudspeakers that should create quite a splash when they begin arriving in North American studios.

The race may definitely be on in the realm of near-field speakers, as numerous booths demoed their gear on Quedsted Q108s, a small, bi-amplified system whose 8-inch woofer, 1-inch dome tweeter, dual front-firing ports and punchy sound bear a more-than-vague similarity to a certain high-performance system popular in many U.S. studios today. Keep an eye out for this one.

While not exactly glitzy (or even programmable), one of the most interesting items at APRS was the debut of RPG's acoustical concrete blocks. Rushed in at the last minute

by inventor Peter D'Antonio (no model name, pricing or preliminary specs were available), these materials could have a profound impact on the design and construction of studios and performance spaces for years to come. Quite an accomplishment for 30 pounds of molded concrete, indeed.

Overall, APRS 1990 was a success on every level. Over the past five years, the APRS expo has grown to prominence in the world audio community, and the organization's chief executive Philip Vaughan and crew have done a splendid job in attaining this goal. A jolly good show!

—George Petersen

JBL Acquires ADI, Forms New Systems Group

JBL Professional (Northridge, Calif.) recently acquired Eugene, Oregon-based Audio/Digital Inc., manufacturers of high-quality digital delay lines for the sound contracting and pro audio markets. The ADI product line ranges from the low-cost, 1-in/1-out TC-5 to the 1-in/3-out, 18-bit PAD-300/18.

At the same time, JBL president Ron Means announced the formation of the new JBL Systems Group, to be headed by Gary Hardesty, founder of ADI. The Systems Group will place special emphasis on large-scale installations, such as arenas, stadiums and large churches. For more information, contact JBL at (818) 895-3435.

Mitsubishi 64-Track

At the recent APRS Exhibition in London, Mitsubishi announced that the go-ahead has been given on the development of a 64-track PD digital recorder utilizing 1-inch tape. Sonny Kawakami, Mitsubishi Pro Audio international marketing manager, says that the proposed design has been agreed on by Mitsubishi and Otari, and it has already been submitted to the IEC working group in Tokyo.

INDUSTRY NOTES

Studer Revox welcomed a new national sales manager of the Revox division, **Thomas M. Spain**. He will be in charge of U.S. sales activities for all pro and consumer Revox product lines... **SoundTech** (Buffalo Grove, IL) also greeted a new national sales manager: **Mark Lierly** is responsible for managing the company's sales reps, developing new accounts and organizing promotions... **Ronald Remschel** was appointed marketing manager of professional audio products at the Montvale, NJ-based **Sony Business and Professional Group**... **Al Watson** was promoted to vice president of engineering at **Electro-Voice**. As such, he is responsible for the acoustic engineering effort of the **Mark IV Audio Group** companies; Watson also assists EV president **Paul McGuire** in shaping EV's strategy... **QSC** (Costa Mesa, CA) named **Barry Ferrell** Eastern regional sales manager; Ferrell was previously applications engineer at the company... **Curt Rawley** was promoted to the position of president at **Avid Technology** (Burlington, MA). Avid produces the **Media Composer** digital video editing system... **Artel Communications** (headquartered in Hudson, MA) named **Andrew C. Knowles** president and chief operating officer... **TDK** announced two appointments—**Bob Roney** was promoted to national key accounts sales manager, and **Bob Terrell** was hired as the new regional sales manager... Two marketing companies have been launched by **Phil Moon** (formerly of Yamaha); **Loft Marketing** and **Loft Market Research** are both based in Stanton, CA, and may be reached at (714) 373-4893... Promotions at **Pioneer's Technical Audio Devices** division: **Hiro Takahori** is manager of technical applications and development and will oversee TAD operations and marketing; **Leon Sievers**, now senior product planner, will be responsible for TAD product development, sales and marketing... **John Vitale** was made sales manager at **Bag End Loudspeakers**... **Klark-Teknik** added two new reps for its product lines in the U.S. **Riley & Petchell** will cover Michigan, and

Loppnow & Associates will handle Oregon, Idaho, Montana and Washington... **Westech Marketing** was appointed the **White Instruments** rep in Southern California and southern Nevada. Westech may be reached at (213) 870-9286... The **Walters-Storyk Design Group** chose **Robert Margouleff & Associates** as the exclusive West Coast reps for the New York-based design company... **Audio Animation** signed on **Audio Images** (San Francisco, [415] 957-9131) and **Harris Allied Broadcast Equipment** (Richmond, IN, [317] 962-8596) as dealers. **Audio Animation** also promoted **James M. Ruse** to product development and marketing manager and appointed **Jeff Berry** customer service supervisor... **Professional Audio Systems** added several manufacturer's reps, including **On The Road Marketing** (for NYC, Long Island and northern New Jersey), **Audio Associates** (for southern New Jersey, eastern Pennsylvania, Virginia, Maryland, the District of Columbia and Delaware), **AMH Sales** (for Southern California and southern Nevada), **Online Marketing** (for Ohio, Michigan, West Virginia, western Pennsylvania, Indiana and Kentucky) and **Audio Biz** (for Illinois and Wisconsin). Call **Daniel Abelson** at (608) 767-3333 for phone numbers... **Editing Machines Corporation** added new dealer organizations in Atlanta and New York; for information, call (212) 366-6669... **Steve Albanese** was named media production supervisor of the **Recording Workshop**, located in Chillicothe, OH... The cost of a four-day pass to **SMPTE's Technical Conference and Equipment Exhibit** (which will be held in Los Angeles, Oct. 26-29, 1991) is \$20, not \$50 as listed in the **SMPTE** newsletter... **Philips Consumer Electronics Company** welcomed **Bernie L. Mitchell** as national marketing manager for sales and information and **Linda Olsen** as Southern regional sales manager. Both will work in the professional interactive media systems division, with Mitchell responsible for developing CD-I, CD-ROM and Laserdisc business, and Olsen handling product sales through value-added resellers and other solution companies. ■

Mitsubishi will be presenting a full paper on the format in October at the AES convention in New York City. No schedule yet for availability.

Editel/SF Fire

Editel/San Francisco, one of the five Editel facilities profiled in this month's post-production feature, was severely damaged by fire on June 12. Four edit suites, a Harry suite, a PaintBox suite, and an IMC animation suite were all burned, though the two Rank suites were virtually untouched. No client elements (i.e., masters) were harmed, and the vault was relocated within four hours of the blaze.

The two Rank suites have been relocated to 724 Battery Street, and **Randy Sparks** has been hired for a quick design. They expected to be up and running by July 8. Sister production company **The Kenwood Group** sustained only minor damage.

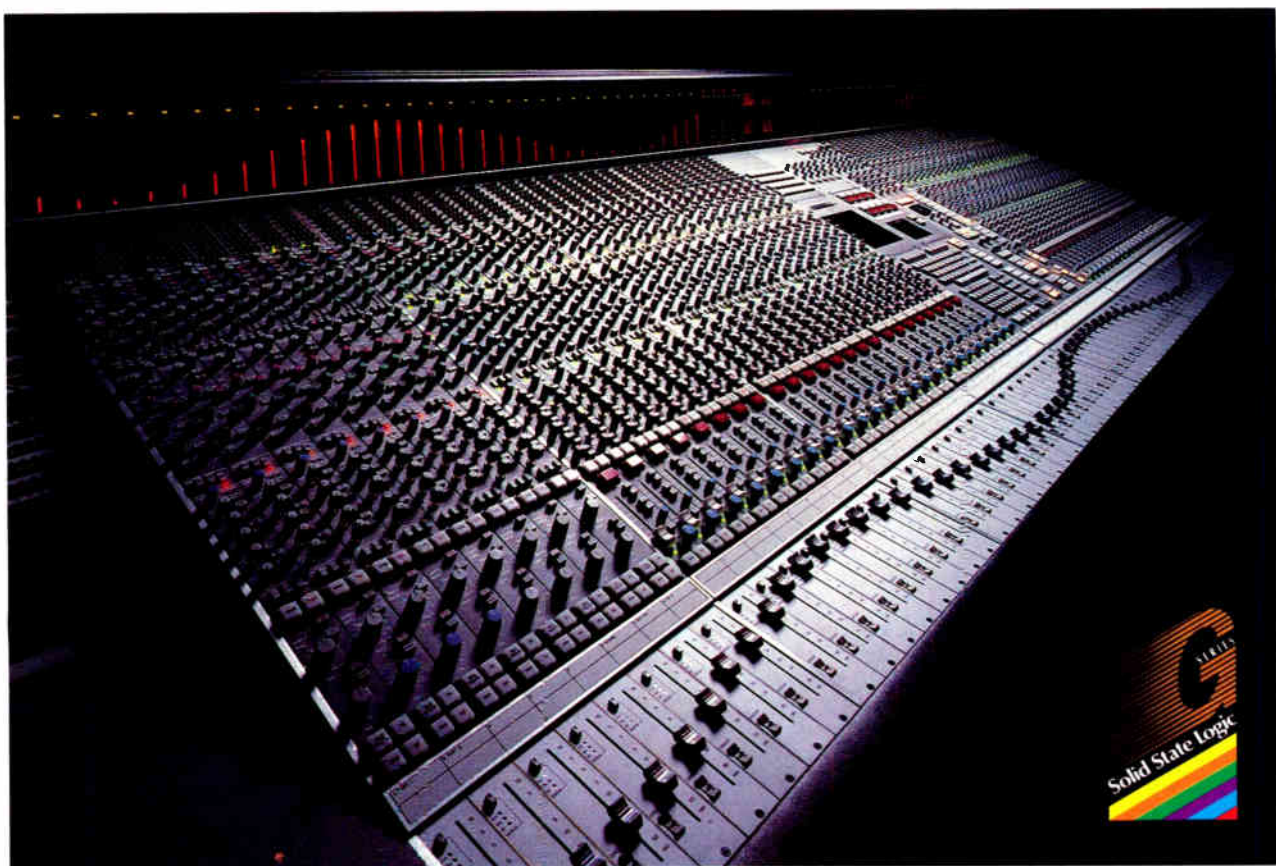
Corrections

Due to a printing error, the photographs of **Walter Murch** and **James Stewart** were switched in our July feature on soundtrack design.

In the "Synchronizer Buyer's Guide" (May 1991), the **Adams-Smith** photo shows only the optional remote control and *not* the complete system. The correct caption should have read: "Compact Controller for the Adams-Smith 2600 A/V Editor."

Also, in the May 1991 "Field Test," two of the alias level captions in Fig. 5 were reversed: the lightest line should represent the **BTS** unit, while the black plot shows the converter from **Singular Solutions**; and the price for the **DCS Model 900B** was listed as \$10,000 when it should have been \$9,500, with a free AC power cable.

Two Directory corrections from May: The owners of **I.N.S. Recording** in New York are **Ian** and **Deborah North**; **Trude Kay** is studio manager. And **HBS Productions/Honeybear Studios** in Cambridge, Mass., is a 16-track facility, not 8-track. Our apologies. ■



Now the world's favourite recording console has added the ultimate moving fader system

THE SUCCESS of Solid State Logic's SL 4000 Series console is legendary.

The system remains successful by growing alongside the creative individuals who use it. An example of this evolution was the introduction of G Series electronics, where new technology allowed subtle improvements to be made to the entire audio path. Now, SSL has changed the face of console automation by devising an automation system which combines the best features of both moving faders and VCAs.



Called ULTIMATION™, this unique dual automation system has been fully integrated with the G Series console. It reads existing G Series mix data, and its commands are immediately

familiar to all SSL users. The system's unique dual signal path circuitry allows the engineer to select operation – either as a full feature moving fader system, or as standard G Series automation. Ultimeation even allows moving faders to perform SSL-style Trim updates without resorting to complex subgrouping software.

Today's G Series consoles, with Ultimeation, take the art of recording one stage further. Together they set new standards, continuing in the innovative tradition of the world's most respected console system.

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by Ken C. Pohlmann

MD

No, it doesn't stand for Medical Doctor. It doesn't stand for Mogen David, or even Mad Dog. It stands for Mini Disc. One look at Fig. 1 explains the name. The Mini Disc is a 2.5-inch optical disc format. It stores 74 minutes of stereo digital audio with a frequency response of 5 Hz to 20 kHz, a dynamic range of 105 dB, and a sampling frequency of 44.1 kHz. Data is encoded with EFM, and error-protected by CIRC. But MD is not CD-compatible. It employs data compression. And it is completely recordable and erasable.

The Mini Disc is the latest brainchild of Sony and is clearly targeted at the analog cassette market, as well as any new formats with similar targets, specifically the Philips DCC digital cassette format. The MD is a consumer product that has the potential of redefining the economics of music retailing, and takes us all one step closer to the day when tape sheds its mortal coil and goes to that great head gap in the sky.

MD attempts to snatch the Holy Grail of audio media: high sound quality, random access, durability, portability, convenience, shock resistance and recordability. Cassette tape comes close, but ultimately fails, especially in terms of sound quality and random access. The CD fares well in these criteria, but is not as portable as one would like and is not recordable. MD proposes to merge analog cassette tape (emphasizing the portability of a Walkman-type concept) and compact disc, resulting in a high-fidelity, portable, recordable medium.

The MD system employs two kinds of media: magneto-optical media for recordable blank discs and CD-type optical media for prerecorded software. The magneto-optical drive (MOD) technology in MD is similar to others already in use, but brings some clever ideas to the party. For example, it allows overwriting, whereby previously recorded data can be erased and new data written simultaneously. As with

other MOD systems, a magnetic head is positioned over the laser source and on the opposite side of the disc. To record, the laser heats the magnetic surface beyond its Curie point at 400° F so that the polarity of the heated magnetic spot is directed by the bathing magnetic field. As the disc rotates, the heated spot moves away and cools, and the magnetic information is stored. The size of the recorded spot is determined by the reversal cycle of the modulating magnetic field, as opposed to methods in which the laser is turned on and off. Because the laser source is always on, the controlling circuitry is simplified.

The MOD disc is built on a polycarbonate substratum, with a terbium ferrite cobalt recording layer covered by a reflective aluminum layer and top protective layer. The terbium ferrite cobalt recording layer changes polarity with 80 Oersteds—about one-third the coercivity of other MOD media; this is important because the magnetic head does not touch the media, and the need for stronger fields at the recording layer would necessitate higher heat generation and power consumption. The magnetic head itself is said to be particularly power-efficient, and able to perform polarity reversals at a rate of 100 nanoseconds per cycle.

The dual-function, 0.5 milliwatt laser can operate with both recordable and read-only MD media. Its design is essentially taken from a conventional CD pickup, with the addition of a MOD analyzer. When using a MOD disc, the pickup distinguishes the polarization angle of the reflected light, which is determined by the magnetization of the recording layer. The MOD analyzer converts the polarization angle into a light intensity, and light is directed to two photodiodes; these signals are subtracted to generate a positive or negative readout signal. When playing back a CD-type disc, the pickup reads the intensity of the reflected beam as

modulated by the pit surface. The signal from the photodiodes is summed to generate a readout signal. In either case, the optical disc is captive in a protective caddy; the total package weighs about 0.6 ounces. The small disc size means quick access—less than one second to any data.

ATRAC (Adaptive Transform Acoustic Coding) data compression is used to encode data on MD, reducing the

ment and generates corresponding frequency component data. Using psychoacoustic modeling, the system identifies the audio components that are audible and encodes them, assigning bits as needed according to the amplitude of audible frequency components. Other inaudible material is discarded.

data undergoes CIRC and EFM encoding and is recorded to disc along with subcode and address information. The data track is recorded with constant linear velocity of 1.2 to 1.4 meters per second, depending on playing time, as on the CD.

During playback, following CIRC and EFM decoding, frequency information is deciphered by an ATRAC decoder, and the 20-millisecond in-

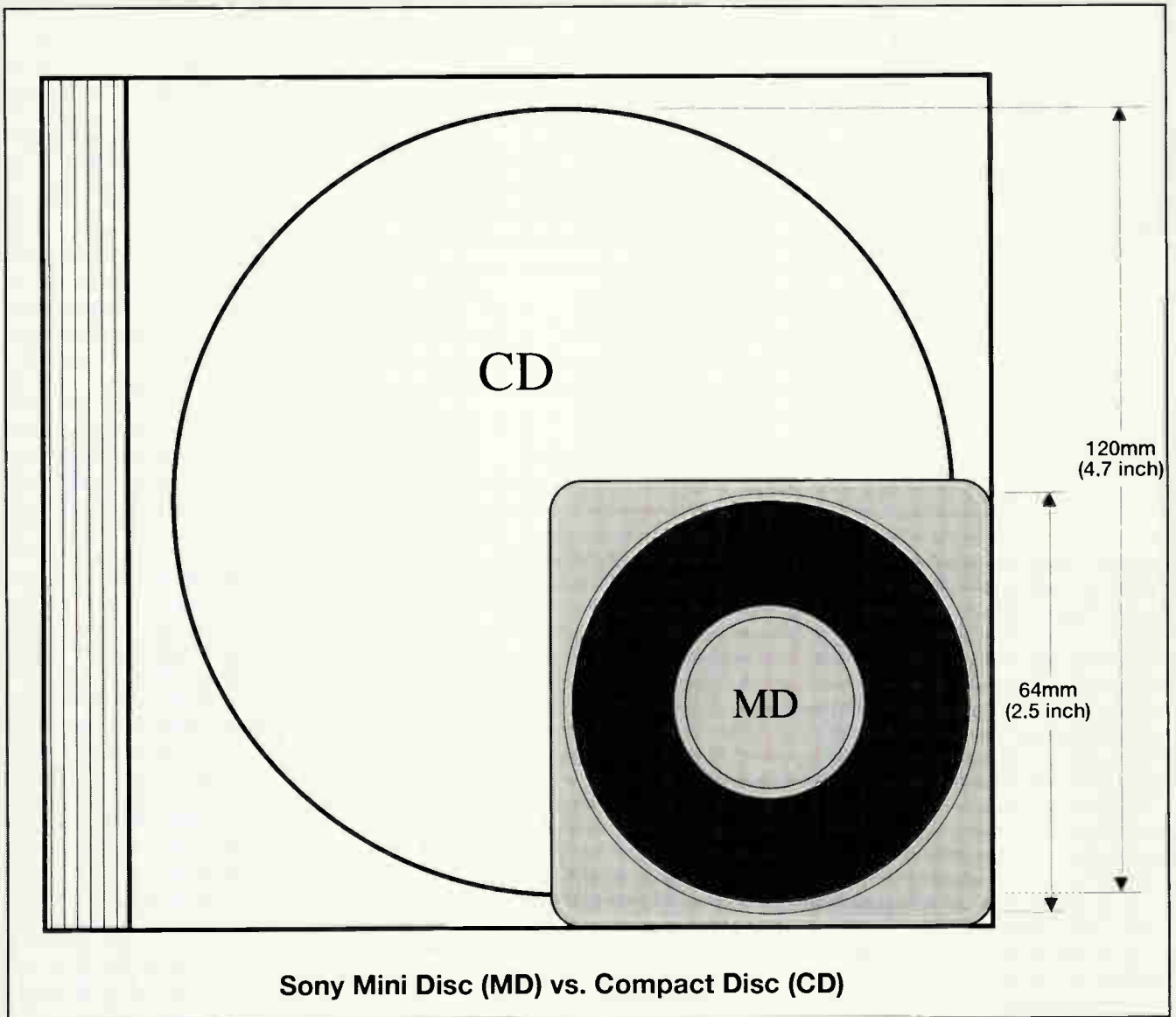


Fig. 1: actual size

data rate to nearly one-fifth, from 1.41 megabits per second to 0.3 megabits per second. During recording, analog signals are sampled at a rate of 44.1 kHz and quantized with a conventional A/D converter. The ATRAC encoder divides this PCM data into segments in intervals up to 20 milliseconds long. Fourier transform software analyzes the waveform data in each seg-

This method is based on the workings of the human ear; sound below a certain level cannot be detected, and low-level signals are masked by high-level signals at a similar frequency. In addition, as overall sound level increases, the ear is relatively less sensitive. These inaudible components can be removed with minimal sound degradation. Following ATRAC encoding,

intervals are reconstructed into digital waveform data. This data is then processed by a conventional D/A converter.

Data compression provides another important feature. As noted, while the data rate off the disc is 1.41 megabits per second, the ATRAC decoder requires only 0.3 megabits per second. This low rate permits efficient use of a

look-ahead buffer; a 1-megabit memory chip placed between the pickup and decoder could store three seconds of real-time audio. Data enters the buffer faster than it leaves; when the buffer is full, the pickup stops reading data until the buffer is ready to accept more data. If the player mistracks, the pickup has ample time (three seconds) to return to the correct tracking position. This is facilitated by a sector-repositioning method in which address information is placed in the recorded bit stream every 13 milliseconds. When the pickup mistracks, the system detects the wrong address and returns the pickup to the correct address position. In other words, thanks to the low data rate, look-ahead buffer, and sector repositioning, the MD is essentially immune to shock and vibration during both recording and playback.

One question you might ask: Why develop an entirely new format, instead of a recordable CD? First, Sony wanted a more portable product, a disc of smaller diameter. Data compression provides for this. More importantly, record labels simply would not tolerate a recordable CD that matched the

sound quality standards of the professional master recording. Instead, they might support a new format of slightly lower sound quality (specifically, non-cloned data). Handily, data compression also solves that problem. In addition, unlike a recordable CD format, MD brings an entirely new opportunity

The MD takes us all one step closer to the day when tape sheds its mortal coil and goes to that great head gap in the sky.

to sell prerecorded material; depending on your point of view, this is either good news or bad news. What will happen to recordable CDs? Don't worry, these will be as common in studios as DAT recorders. In fact, they will probably replace DAT recorders.

Some other things you'll want to know: The MD is slated for market introduction in late 1992. Prerecorded

playback-only MD discs can be manufactured using existing CD pressing facilities. The MD standard will include the Serial Copy Management System (SCMS) in which first-generation digital copies are enabled, but not second-generation copies. Price? Only vague statements: "Initial pricing will make the Mini Disc an affordable product for personal audio customers. The price of blank recordable media will be comparable to analog metal tape."

Although Sony is loath to admit it, their announcement of MD as the recording format of the future signals that company's abandonment of DAT as a mass market product. In other words, although there might be room for DAT as a pro and high-end niche product, Sony's new view of the consumer audio market only has room for two systems: CD as the heir apparent to LP, and MD as heir apparent to the analog cassette. No, I haven't been able to do any critical listening to MD yet. When I do, I'll get back to you. ■

Ken Pohlmann is professor of music and director of the Music Engineering Program at the University of Miami in Coral Gables, Fla.

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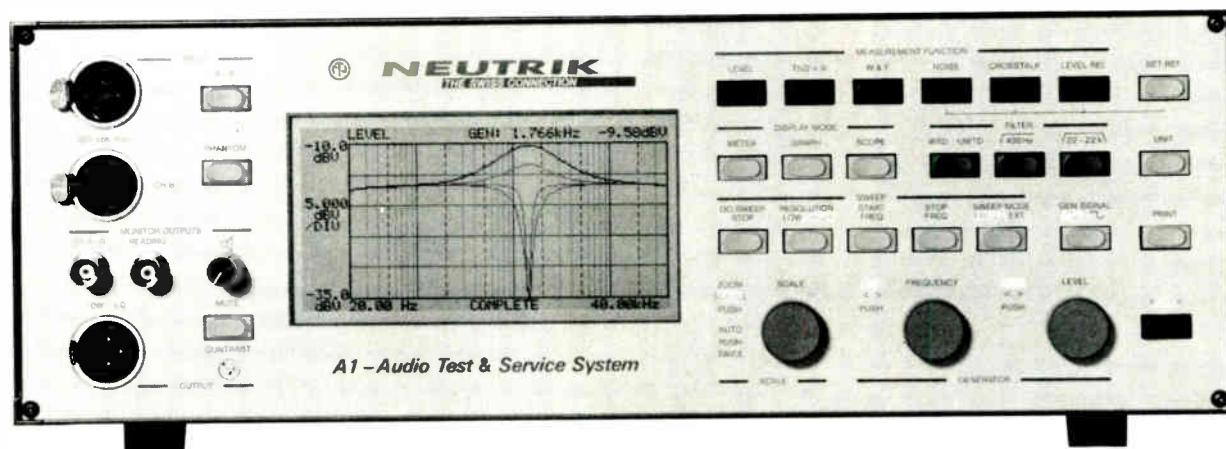
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by Mel Lambert

ACOUSTICS AND STUDIO DESIGN

A SPECTRUM OF CHOICE

In today's competitive studio business, return on investment and other financial parameters figure heavily in the planning or upgrading of any new facility. It makes sense for studios to maximize their potential user-base by offering multipurpose environments. But is it really possible—or desirable—to redesign an existing control room and/or recording area so that it can be used for a variety of sessions, ranging from music recording, through audio-for-video post/sweetening and other areas of potential diversification?

To gain a useful insight into the areas of primary interest for facility owners, I spoke to several leading acousticians and studio designers, with a view to determining if there is such an entity as a "multifunction" studio, and what it should comprise.

According to Bill Morrison, president of Acoustical Physics Laboratory, the majority of music recording control rooms are now "larger in size—mainly because more and more MIDI-based instruments are being recorded there—with smaller vocal booths. Primarily, my design brief is one of logistics: to lay out the room so that the engineer can control all of the hardware and maintain visual communications with the other production areas."

Morrison adds, "Whatever the control room size, the critical role of the designer is to provide a well-defined reflection-free zone, or RFZ, at the engineer's mix position." With conventional designs, this zone may only extend a few feet either side and back to front of the central "sweet spot." If the rear of the room needs to accommodate additional working areas for musicians and others, then this zone has to extend backward.

"For today's rooms," Morrison continues, "designers are turning to staggered-flair geometry on the ceilings and walls to enlarge the reflection-free zone. These rooms feature stepped acoustic wedges on the walls, with openings toward the monitors filled with absorbent material, while the reflective sides of the wedges are angled in such a way as to provide a deeper and wider RFZ."

For well-known acoustician Chips Davis, multipurpose environments can be achieved in several ways. Now a partner in the San Francisco-based design firm of Frank Hubach & Partners, Davis says that his Variable Acoustic Control Room provides different zones of diffusion within a larger, more defined area. An advocate of Live End/Dead End™ design techniques, Davis is now providing ways for a facility owner to modify the acoustic space so that the ratio between direct to reflected sounds within the initial 10ms arrival-time window can be enhanced or reduced.

"Through the use of moving surfaces," Davis explains, "I can let engineers select their own amount of LEDE, modifying the transition point for the type of ambience they need to suit the session."

Even more interesting is Davis' work on a new multifunctional concept for the recording area, which he refers to as Electro-Acoustic Air. A series of equalized and processed signals from the control room are fed to an array of speakers and diffusers located 18 to 24 inches from a corner of the studio. The output is re-mixed with a dedicated stereo pair. "This new 'ambient signature' can be created live during the session," Davis says, "or during remix by feeding the sound

back into the room and miking it. In this way, the engineer can generate virtually any-sized room and acoustics from the basic tracks."

Signal processing is handled by the new Lexicon Acoustical Reverberance Enhancement System (LARES), which comprises a 480L Digital Processor running DSP software developed specifically for acoustic enhancement. "For example," Davis says, "drums can be recorded dry in a medium-sized tracking room and then processed during the mix through LARES to produce a live, stadium-like sound. The creative possibilities are virtually limitless."

Davis is currently completing designs for a new studio complex in Oakland, Calif., for 2-Tuff-E-Nuff Productions. The single-control room facility, which should be online by early next year, will be the first to incorporate his new LARES-based Electro-Acoustic Air techniques.

Within the control room itself, the choice of monitoring systems also dictates the degree of flexibility in handling a variety of sessions. As Carl Yanchar, president of Lake-side Associates, points out, "Near-field monitoring is now a fact of life—and can be more important than the mains. But I wouldn't advise clients to rely on *just* the near-fields; stereo and surround sound mixes should sound good on a variety of playback systems and at a range of replay levels. All of this means that well-designed near-field and soffit-mounting systems are essential for a multifunction room.

"Control room acoustics are now a hybrid of several types," Yanchar continues. "I'm using compression ceilings and RPG Diffusors in both conventional and LEDE-type designs. In the recording area, I often need to extract more flexibility from a small space. Also, more studios are looking to offer Foley and ADR services, which means that acoustics need to be very dead, with very efficient noise control."

To accommodate such a wide spectrum of sessions and provide var-

iable acoustics, Yanchar utilizes "sliding panels, hardwood floors with throw carpets, as well as rotating baffles that are faced with absorbent and reflective surfaces."

Keith Klawitter of KRK Monitoring Designs says that the majority of today's studio owners are focusing on the types of sessions they want to handle, such as music recording at night, for example, with film, video post and sweetening during the day. "By implementing the appropriate acoustic design, and correctly setting up the monitors, it's possible to create



a very good-sounding multichannel mixing room in a space only ten by 15 feet. There is no real 'magic' to selecting monitors. If they sound good straight out of the box—with good polar response, good phase response and good frequency response—then they will work in a well-designed acoustic space.

"The soffit wall should be as solid and heavy as feasible," Klawitter adds, "with the bottom of the monitor cabinets around five feet from the floor. For best results, I prefer to keep them as level as possible, with the main acoustic axis parallel to the floor. This layout prevents sound from bouncing back from the console and floor into the main reflection-free zone at the

engineer's position."

In contrast to music recording and post, radio presents its own set of design problems. As Alfred D'Alessio, president of Northeastern Communications Concepts, points out, "The control room and studio are often the same space!

"NCC has developed a 'room-within-a-room' concept that provides short reverb times—so that the talent or engineer can open up several mics simultaneously—combined with accurate control of low frequencies using absorbers, which is extremely important for speech studios. The space should also be well isolated, which we achieve with modular walls, floors and ceilings that are built off-site, and then floated within the existing room."

For larger music control rooms, NCC turns to its proprietary Controlled Geometry Acoustics, in which "the room shape is based upon a flared design with a rectangular rear," D'Alessio says. "Evenly distributed reflective and absorbent materials are then laid onto the walls to create a well-defined RFZ at the mix position. These parameters are adaptable to a variety of environments, which means that we can tailor just about any new or existing area to create a versatile music/post/radio

facility."

By combining accurate sound control and isolation with the correct selection and alignment of control room monitors, it is easy to create a control room and recording area that will handle a broad spectrum of sessions, without compromising the specialist needs of music recording, film/video post and radio production. ■

Drawing upon over 15 years of active involvement with all dimensions of professional audio on both sides of the Atlantic, Mel Lambert now heads up Media & Marketing, a high-tech consulting and marketing service for pro audio firms and facilities.



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physics. Equalizing monitors is a lot like dealing with a gunshot wound in the chest by putting on a clean shirt, thereby eliminating the unsightly hole and localized discoloration.

I shall elaborate. You knew that, didn't you?

When building a control room, you are faced with a kind of unsolvable dilemma. You want to make it acoustically correct, but you have to fill it with all kinds of very acoustically *incorrect* stuff like consoles, huge color monitors, equipment racks, doors and, well—you know—speakers. Those

coils of wire glued to flattened paper party hats (dyed black to seem a little less humorous).

Anyway, these speaker things are going to generate acoustic energy of various frequencies. This energy is going to be sprayed out into the room, and all kinds of things are going to get excited. Not just the producers, but walls, equipment, cabinets and ceilings. This is bad.

When a mass becomes excited by acoustic energy, it resonates, and it likes it, a lot. It likes it so much that it may continue to stay excited long after the actual exciting energies are gone.

When I was a kid, my very own Mr.

Wizard (we called him Dad) showed me that great old tuning fork trick. Oh, come on now, you remember this one: You get two 440s, strike one and hold it near the other for a couple of seconds. Then you sit on the one you hit so that it stops ringing, and amazingly, the one that was merely *near* that one is now ringing on its own. You remember now, don't you? Sympathetic resonance; what your entire control room (and the components of your speakers themselves) wants to do more than anything.

It is true that any audio chain may have deviations from the desired frequency-response curve, and judicious application of conservative EQ may in fact be indicated as a remedy. Outside of this rather minor problem, however, equalizing monitors is just plain crazy.

You see, resonances are a *time* problem, and EQ is an *amplitude* solution. Helpful hint #1: This is the point of the column.

Bring a real-time analyzer into the control room, fill the air with pink noise, and look at the scary twisted line onscreen that you had desperately hoped would be basically straight. Ha!

Are you looking at electronic frequency-response problems? Not likely if you spent over \$700 on your studio. You are in the presence of resonances. Ringing masses, standing waves: I'm thinkin' of bad vibrations, maybe even sympathetic excitations.

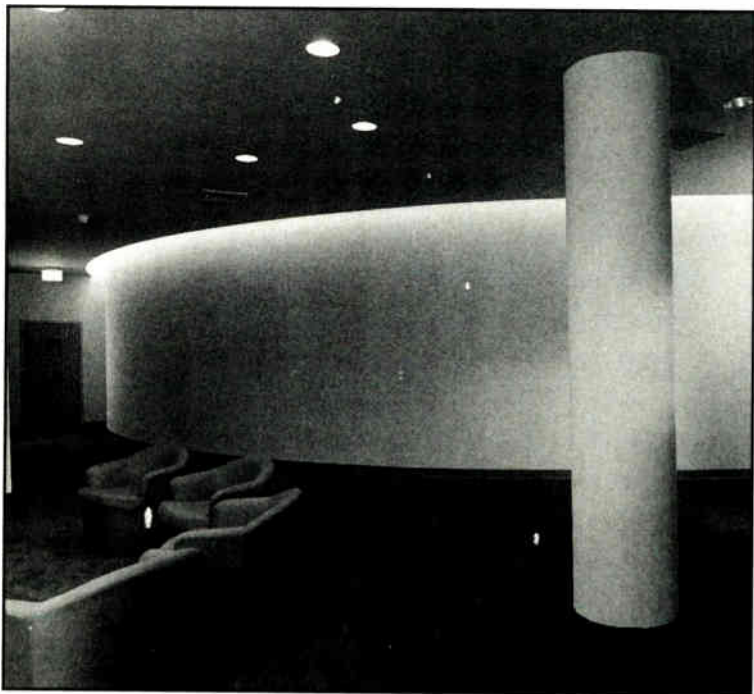
If pink noise produces a peak on your RTA at 1.3 kHz, it is a *physical* phenomenon: something resonating, ringing like a bell and returning that energy as a standing, reinforcing wave. The *energy* response of the room is uneven. A very short pulse (a click) will do a fine job of showing you this, and one guy in particular has made a living from doing just that. Pop the click into the air, wait until it is over, *then* look at the room to see which frequencies have lingering energies hanging on (actually little baby reverbs, in a way).

Obviously, the right thing to do is to go after these hot frequencies with acoustic treatment, damping and trapping, diffusing, and absorbing. You take this as far as you can.

This can be a lot of work, take up considerable space in the room (especially for low frequencies), and can become a bit expensive. But it *is* the right way.

Because of the drawbacks mentioned above, it has always been a temptation for some to attempt to

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equalize their problems away. This is actually quite a fascinating thing. If you have an acoustic resonance that insists on ringing milliseconds after the actual original sound from the speaker is gone, you have too much energy for too long at that frequency. If you go after the problem with an equalizer and turn down the level of the system response for that frequency, then the overall room response will appear to flatten out, but you have merely pulled a trick to mask or hide the real problem. That frequency still causes resonances that linger just as long as before, but now the speaker is pulled down three or four dB, so the apparent result is a flatter room (since we don't notice the resonance so much), simply because it's not as loud now. Big deal. Not as loud but just as long.

Conventional monitor EQ leaves all the transient-destroying ringing, the image-slurring standing waves and all those thrilling flutter echoes intact. To make matters worse—much worse, in fact—all analog and even digital IIR EQ adds unforgivable phase shift, especially if you attempt different EQ on each monitor, a common practice. Ick.

So, if you are remodeling or building a new room, now is your chance to do it right. Put every penny you can into a good body—someone who can design a proper acoustic environment. They may be the best bucks you spend.

Equalizing monitors is a lot like dealing with a gunshot wound in the chest by putting on a clean shirt.

After 15 years of running the best passive EQ on my monitor systems that money could buy, I switched to EQ-less monitoring seven years ago when I switched to Meyers. I treated and tuned the room for the best possible acoustic response, and simply chose to live with whatever response aberrations remained.

For the first few days, I feared that I had made a terrible mistake. There was no question that my system was not quite as flat as it had been, though I had to admit that my imaging seemed a little better.

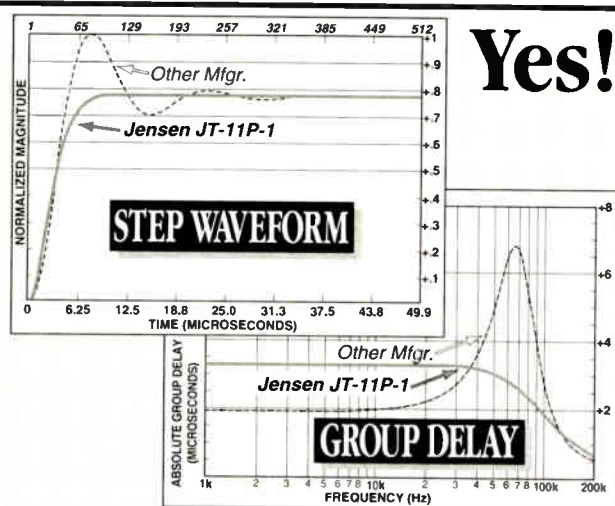
As the days went by, I realized that

my imaging was in fact a lot better and no longer shifted as I moved. The stereo field was much more responsive; there was definitely more transparency and clarity. Transients jumped out like never before. Little details like a small nudge of a pan pot or a tiny bit of reverb change on the snare became very easy to identify, where before they had occasionally gone unnoticed. After a week, I no longer felt that I could hear the minor frequency deviations I knew remained.

In fact, after two weeks I EQ'd the monitors ("properly," with nothing over 3 dB) so that I could do an A/B. When I sat down and actually switched in the EQ, I was shocked. I had accidentally touched a live 110-volt wire. No, no. Just kidding. I could hear the difference in "frequency response" all right, but I wasn't so sure I even liked it. I did know that I did not like the slurred image and muddy veil that accompanied the "corrected" EQ. I simply was not willing to trade away those last couple of deebbs of error for that distinctly uncomfortable, claustrophobic, thick cloud of phase hell. ■

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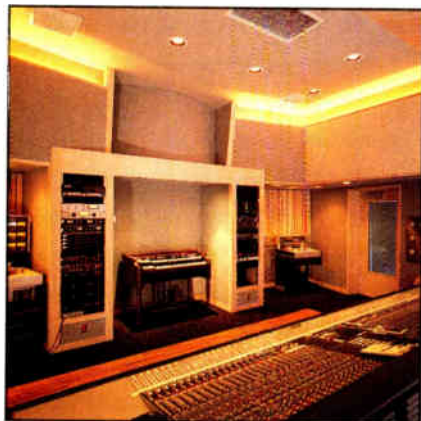
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Left: Encore Studios, Burbank, Calif. This back-wall view shows the Studer A800 24-track, a large assortment of outboard gear, a vintage Hammond B-3 and a partial view of the SSL 6000 E console. Not seen are the custom George Augspurger monitors. Design is by studio bau:ton; the room was completed in August of 1990.



Above: Optimus, Chicago. This film and video mixing suite and post-production room is equipped for multichannel Dolby film mixing. Designed by Mark Sarantakos, the room was completed in the fall of 1990. The room features a Neotek console, an AMS AudioFile and Tannoy monitoring.



Above: Manhattan Center Studios remote bus, based in New York City. Housed inside a 40-ft. Prevost is a Neve VR48 with Flying Faders, two Sony PCM-3348 digital recorders and a Tannoy/Perreaux monitoring system. The bus, designed by Manhattan Center Studios staff with consultancy by Richard Rose of Hot House Professional Audio, hit the road in the spring of 1991.



Above: Music Annex, Menlo Park, Calif. This room, which features a Soundcraft 3200 console, was designed by Charles Albert and opened to the public in August 1990. Other equipment includes UREI and Yamaha monitors and Studer, Otari and Nakamichi tape machines.

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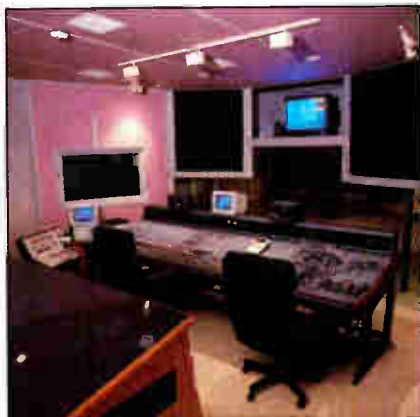


Left: Meyer Sound Studios, Bismarck, N.D. Designed by Bill Morrison of Acoustical Physics Labs, the control room uses sprayed wall geometry and a staggered wedge ceiling design to achieve a large reflection-free area. The facility opened in March 1991 and includes a Neotek Elite console and UREI 813 monitors.

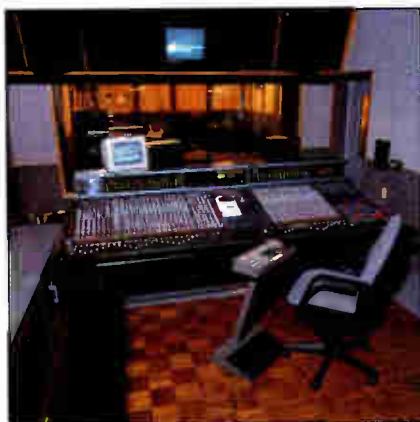
1991

A LOOK AT SOME OF AMERICA'S HOTTEST NEW ROOMS

Right: Showplace Studios, Dover, N.J. Showplace is a collaboration between club owners/promoters Larry Grioler and Steve Shiff and engineer/producer Ben Elliott. Equipped with an Amek Mozart console, the studio opened in March 1991 and was designed by Horatio Malvino (designer of a Barcelona recording and post-production complex for use in the 1992 Olympics). Far right, Photomagnetic Sound Studios, Studio E, New York City. A rear-wall window lets the sun shine in on a Neve V Series console with Necam 96 automation. Design is by Jim Maher of Sound House Design; the room opened in March 1991.



Right: Music Nouveau, Hollywood, Calif. The staff of Music Nouveau must whistle while they work—they handle ads for every film done by Disney's movie companies. The facility, designed and installed by Vertigo Recording Services, opened in February 1991 and relies on an Amek Mozart console and Tannoy monitors. Far right, Digital Sound and Picture, Los Angeles, Calif. Equipped with a Euphonix CS II digitally controlled analog console, the John Ross-designed mixing room was completed in August 1990 and has Tannoy monitoring, two D.A.W.N. workstations and a Fairlight Series 3.



Right: Rumbo Recorders, Studio C, Canoga Park, Calif. Studio C began life as a lowly storage area, but with the help of owner Daryl Dragon and designer Greg Edwards, the room opened in August 1990 as a full-fledged studio. A 32-input Trident Series 80 shares space with an Otari MTR-9J.



THE CLASS OF 1991

C O N T I N U E D



Above: TMP Recording, Berlin, N. J. Completed in August of 1990, TMP Recording was designed by owner Tom DiGangi. The facility offers a 32-input Tascam M3500 console, a MIDI studio and Tascam 16- and 24-track recorders.



Above: Bob Green Productions, Houston, Texas. The production/control room features a Harrison MR-4 console and Otari and Sony recorders, and was designed by the facility's owner, Bob Green. The production facility's revamped room opened for business in May of this year.



Left: Howard Schwartz Recording, Studio Nine, New York City. John Storyk was the guiding hand behind Studio Nine, which opened in May 1991. The digital post-production suite features an SSL 4048 console, UREI and Yamaha monitors, and Betacam, 3/4-inch, 1-inch and D2 video capability.



Above: Looking Glass, New York City. The remodel of the original design by Jim Falconer was done by the staff at Looking Glass, and is home to an SSL SL-4000 console, two Otari 24-tracks and a Digidesign Sound Tools. The studio was completed in the spring of 1991, and is jointly owned by Philip Glass' Euphorbia Productions and The Poppies' Power Flower Productions.

Right: Advantage Audio, Hollywood, Calif. When you walk into Advantage Audio, look up—way up. This post-production room has a 25-ft. pitch in its ceiling, leaving plenty of room to accommodate the Otari Sound Workshop Series 54 console and an Otari MTR-100 24-track with built-in Dolby SR. The unusual design is thanks to Scott Putnam, and was completed in August 1990.



Understanding and Using

Test Equipment

TH+D; SNR; Frequency Response; Slew Rate; Intermodulation Distortion. We in the audio world hear these terms bandied about daily. We talk about headroom, transparency, claret...oops! I mean clarity. (You wine buffs out there understand.) Just how is all this stuff measured? Can we in fact measure it at all? How does the scientist of today go about determining the specifications of a particular piece of audio equipment? Are these tests static or dynamic? Which tests really matter the most?

BY STEPHEN PAUL

Some of these questions have doubtless occurred to most of us at one time or another. And it's amazing how few engineers understand what a harmonic-distortion measurement really is, or are familiar with the basic underlying theory. I had the good fortune (well, good in some cases; in others, I'm not so sure) to have been in charge of several major studios in L.A. over the years, and the even greater fortune to have coerced the studio owners into acquiring high-end spectrum analyzers. The experience of spending hours and hours measuring spectra, and listening to what was measured, allowed me to develop a highly discriminating ear. (Actually, two ears!) Now wait a minute... measuring *spectra*? What in the hail is that boy talkin' about? What'n th' Sam Hill is *spectra*, anyway? Well, hold your horses, sons 'n' daughters, we're com-

P H O T O B Y B I L L S C H W O B

ing to that.

Most pieces of test equipment in the old days were special-purpose boxes designed to do only one, or at the most, two jobs. Nowadays, with the proliferation of computers and microprocessors, the new generation of test gear is such that one box can do work that previously required five or six different pieces. This fact aside, let's break these functions down into a few separate categories. Where a device permits more than one kind of measurement, we will mention some of the more sophisticated capabilities, and possibly a brand name or two as an example. The

proliferation of gear in today's market naturally precludes us from mentioning all makes available, but you will get an idea of what to look for when purchasing a rig of this ilk.

So, let's talk a bit about the most common measurements used today to spec a piece of studio or audio equipment and the basic idea behind those measurements. Then, we'll breeze by some of the more state-of-the-art tools in the field, and finally, we'll talk about the future of measurement.

Come, let us explore the lofty heights of science together. Pop open a brewski, get out the dictionary and

let's go hikin'.

DMM

Probably the most commonly known piece of test equipment is the DMM, or digital multimeter. Formerly known as a VTVM (Vacuum Tube Volt Meter), the digital versions now available are a veritable Swiss army knife full of functions. Just about everybody's gotten into the act with their version of this classic piece, but for purposes of illustration, the unit manufactured by John Fluke and Co. will serve as a quintessential example of this technology. (Interestingly enough, the old-style analog meter is still preferable for many high-precision jobs, such as aligning a tape deck.)

For example, the 8060A DMM contains test-bench accuracy, AC and DC voltage meters, continuity checker with audible beep and instant visual bar indicator (this helps because the time it takes the analog-to-digital converter in the unit to settle out for a meter reading is relatively long), frequency counter (a device that allows the frequency of an AC input to be determined accurately), and variable-reference, high-impedance AC meter (this will read in dBv or dBm as well as absolute voltage, and any reference voltage may be stored as zero and deviations read as plus or minus from this point).

The Fluke unit also has the ability to measure super high-impedance resistance in Siemens, and can deliver enough voltage to turn on a semiconductor junction, thus facilitating the checking of beta in transistors and the investigation of the leakage of a silicon junction. (Silicon junctions are the material interfaces that allow diode action to occur.) It is this diode action that is harnessed to produce transistors, diodes and integrated circuits. (One could say it's the function junction!) It is even capable of nulling out the resistance of the test leads attached to the meter itself, thus making possible the precise measurement of extremely low impedances. There are a few other things that it does, but I would recommend you consult a Fluke brochure. I should also point out that this entire affair resides in a box that fits in the hand and is powered by a 9-volt battery. This is what's happening in test equipment today. By the time tomorrow comes around, this thing'll have a clock and personal calendar built-in, and will probably tell you to go home because you've been up too long

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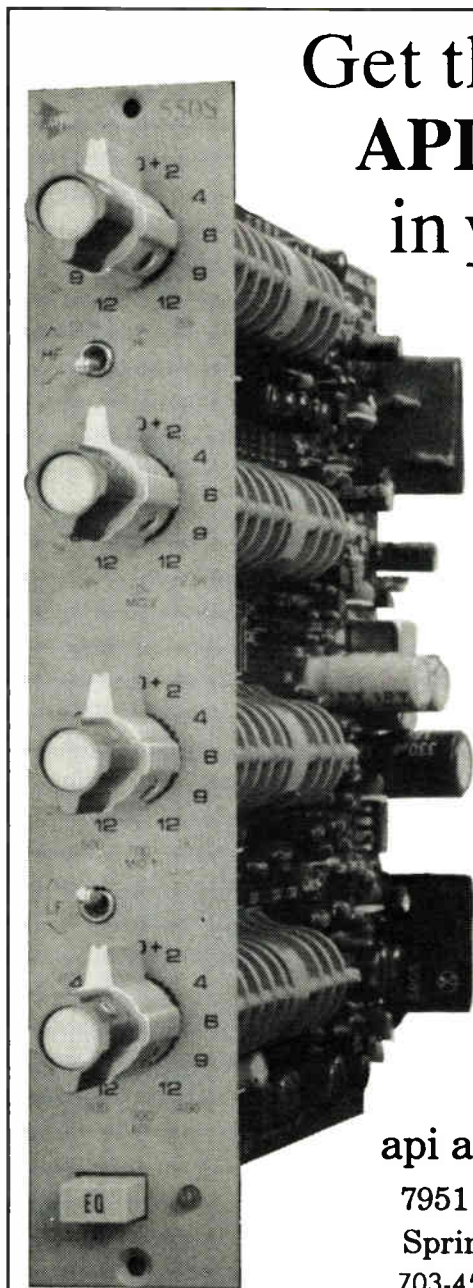
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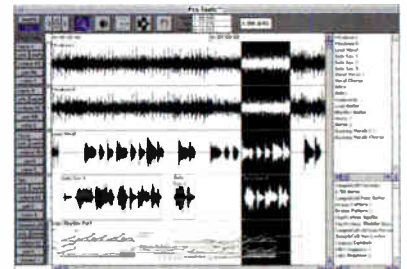
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measuring stuff with it!

DMMs have the advantage of being extremely rugged, stable and portable. Though their older cousins, the VTVMs and VOMs (Volt Ohm Meters), are more delicate and subject to visual parallax error in the interpretation of the reading, their nearly instantaneous response still make them desirable for hairline tweaks in alignment. The parallax problem is solved by the mirrored strip you will see running between the scales. The idea is that if you move your head and eyes so that the reflection of the needle in the mirror disappears, you will be looking dead on at the pointer value, and thus have defeated the parallax inaccuracy. The Hewlett-Packard 400 Series is an excellent example of a top-grade VTVM in this class.

OSCILLOSCOPES

The oscilloscope (the scope) is probably the modern technician's most intriguing workhorse. With a good scope, you can measure voltage, phase delay, noise and a host of other things. The most important aspect of a scope is that you can actually see the waveform under investigation. An oscillo-

scope has one or more wideband, sensitive, quiet and ideally drift-free channels of input amplifiers, which are used to vertically deflect the electron beam in a cathode ray tube (CRT). Scopes also include an oscillator (with accurate frequency steps) to drive the beam horizontally. This is known as the "sweep," and the sweep speed is dependent on the sweep-oscillator frequency. (The higher the frequency, the faster the sweep.)

Before making an oscilloscope purchase, determine your needs carefully, because it's possible to get into some serious overkill. A good general rule of thumb is to obtain a scope that has a bandwidth which is double the highest frequency you want to observe. That way the sweep speed and the bandwidth of the deflection amplifiers will be within the parameters you require. The sweep speed is important because it has a direct relation to the frequency of the signal that you wish to observe. For example, if you want to see two complete cycles of a 10kHz wave, set the sweep speed to 5 kHz. If, on the other hand, you wish to observe a portion of a 100kHz signal, you will require a sweep that is a multiple of that

frequency. To look at a piece about one-quarter the time duration of a single cycle of that 100kHz wave would require almost half a megahertz sweep speed, or about 400 kHz. Obviously, looking at a portion of a really fast trace (such as the 25mHz to 40mHz clock rates commonly encountered in today's digital circuits) can require extremely high sweep speeds and a very wide bandwidth amplifier. The cost of a scope increases proportionally with these specifications.

You may want to consider a unit with a delayed sweep function. This is important for modulated high-frequency signals, because even at the high-acceleration potentials available in today's CRTs, the faster the sweep speed, the dimmer the trace. (Acceleration determines the number of electrons that can be hurled against the phosphors within a given time slice. It also determines their energy level. Fewer electrons at a lower energy level hitting the face of the tube means a dimmer trace. At very high sweep speeds, you need lots of acceleration to get adequate numbers of high-energy electrons to light the screen.)

For example, when examining a

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slice of a high-speed clock, the trace can nearly disappear when we magnify the wave with a sweep rate that is a high multiple of the fundamental. Also, selecting the exact segment you want to see can be tricky. With a delayed sweep system, one frequently puts several cycles on display. Then, using the delay line, you can select a piece of the waveform, which appears as a highlighted area on the trace, and display that section separately on the CRT with total control over the bit you wish to see—and with more brightness than the main undelayed sweep would have provided.

A full range of triggering features is another plus, as many complex waveforms can create difficulties in synchronization. The scope's trigger syncs to the signal when the start of a sweep is locked to any valid periodic point along the vertical axis of the wave. This point can be adjusted by the trigger level and hold-off controls. If sync does not occur, the wave will not appear to stabilize onscreen, but instead wanders across the CRT. The trigger setting can be extremely critical for viewing complex high-frequency signals. Trigger filtering is also nice, as it can help

eliminate ghosts and stabilize jumpy waveforms.

Another feature that's increasingly showing up in less-expensive scopes is a cursor set that allows very accurate measurement of voltage, delay, phase and frequency. Some contemporary units will give digital voltage readings onscreen, taken right off the probe you're scoping with, thus eliminating the usual tangle of test leads that can accumulate on the average safari into the digital jungle. X-Y display is a useful feature that can display the phase content of a stereo mix.

STORAGE OSCILLOSCOPES

In the old days, a storage scope was achieved by a special CRT, whose components could "freeze" a trace for several hours in order to examine a non-repetitive waveform, such as a transient. Today, most storage scopes use digital sampling electronics to capture and display such waveforms. Using the same techniques as today's digital audio, a wave can be stored in RAM or on disk; it is then reconverted back to analog and is continually replayed into the deflection amps.

One rule of thumb to keep in mind

here is the Nyquist theorem: Nyquist stated that the sampling rate must be at least twice the highest frequency in the band of interest. The main shortcoming of a digital storage scope is apparent from the poor reproduction that usually results when a delicate transient is captured. For this reason, a sample rate of ten times your upper limit is recommended. Also, 8-bit systems should be avoided. Try to get a system with a resolution of at least 12 bits.

THD+N MEASURING DEVICES

Often in brochures, a manufacturer will talk about harmonic distortion figures. Just what do these numbers tell us? Two pieces of gear can have identical specs in Total Harmonic Distortion plus noise (THD+N) and sound completely different. There are several ways you can measure THD+N, and this adds to the confusion, but one of the most common ways is to shoot a very pure fundamental (sine wave) into a system, then knock it out with a very steep and selective notch filter, and read what's left over. If we know the purity of the sine wave that's being fed into the system, and the figure of purity that we get from the output of our test device

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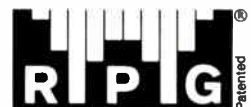
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doesn't match the generator's figure, then we can assume (if our test gear is in good shape) that any additional products seen are being produced by the device under test. Clear as mud, ain't it?

Since the advent of synthesizers (and actually before that, pipe organs), we have been controlling harmonics to change the "patches" in our instruments. Suppose we're looking at a fundamental of 1 kHz, with its second harmonic at 2 kHz (or one octave above the fundamental), its third harmonic at 3 kHz, and so on. If we added all these harmonics together and took the Root Mean Square of the sums, we would have a value corresponding to THD RMS. Since all of the components of the spectrum up to the limit of the measurement band, along with any random components present (noise), are included in the measurement, it is technically known as THD+N. This is known as a static measurement, because the circuit is not changing gain or other radical parameters during the course of the measurement. Everything ideally is stable while the measurement is taking place. THD measurements are also bandpassed in some cases, limiting the observed bandwidth to prevent noise that is beyond the audible range from influencing the residual reading. Sometimes this can make a box look like it's performing better than it actually is. This is what is meant by "weighting" a measurement.

Most THD+N boxes can perform VTVM functions as well, and some have an internal high-quality oscillator to provide the test signal. The best of the stand-alone units, such as Hewlett-Packard's 339 and the Tektronix AA501, have circuitry that automatically determines the frequency of the fundamental and automatically tunes the notch filter to a null. This is really the way to go. Tuning the filter on an older unit can be very time-consuming and imprecise. The THD+N reading is normally expressed as a percentage of the reference level of the fundamental frequency. This RMS sum of energy can also be expressed as a dB figure. The better units will allow conversions between these methods fairly easily.

SPECTRUM ANALYZERS

If we want to get a more exact picture of the residual harmonic contribution of a circuit, a spectrum analyzer is the only way to go. Formerly restricted to very expensive stand-alone boxes, analyzers have recently come into the

forefront of measurement techniques that tie computers into the picture. This has some wonderful advantages, perhaps the most obvious being that the measurement can be stored for later detailed analysis. Another advantage of computers is that single-slot boards that work on an IBM or Mac bus can be plugged into an ordinary computer, thus transforming it (with the proper software, of course) into a highly sophisticated measurement engine.

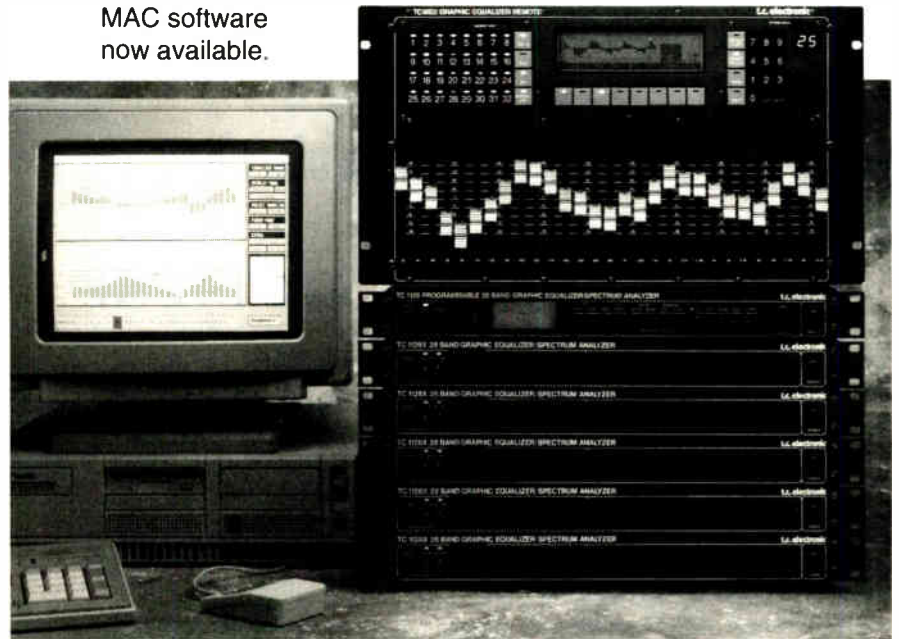
Most spectrum analyzers have a sweep generator and a sweeping notch filter whose sweep can be synchronized with the generator if desired. This

synching ability enables the analyzer to perform frequency-domain measurements of response. When a harmonic analysis is desired, the sweep generator is disabled, and a single stable frequency of high harmonic purity is fed into the system under test. (High harmonic purity means that through sophisticated design techniques, the sine wave generator has no appreciable harmonics beyond the fundamental.) The analyzer then looks at the output of the test device through its swept filter. (A "swept filter" simply means that the center frequency of the filter can be continuously varied over time,

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COMPUTERIZED TEST EQUIPMENT

Companies such as Techron and Audio Precision take full advantage of the personal computer platform as a housekeeping device and build their testing tools around the parallel and serial buses available with these computers. They both offer full-function measurement equipment using a conventional personal computer as the host base. One of the nice things about this approach is that all your data is contained in the same machine that you might use to word process your report about what you discovered. You can also generate plots, and if you're really careful, you could take over the world! (Actually, I meant *response* plots.)

A special word about the Techron TEF[®] is in order here, as this machine has some very special capabilities that distinguish it from the garden-variety analyzers out there. The TEF (Time, Energy, Frequency) analyzer is the brainchild of Gerald Stanley and is based on the pioneering work in acoustic analysis that was done by Richard Heyser. Heyser was a scientist at the Jet Propulsion Laboratory in Pasadena, which still owns the patent on this special measuring technique, TDS (Time Delay Spectrometry).

Essentially, what makes this system unique is that it can be adjusted to compensate for the time delay that occurs when a sound wave propagates through air (or tape-head distances or any other delayed system). This allows the user to make accurate measurements of acoustical systems and tune out the environment in which the measurement is being made. Alternatively, the environment can also be examined to a high degree of accuracy and its effects pinpointed.

In addition to the aforementioned abilities, the TEF machine can make time determination with 1-microsecond resolution. This enables viewing of the reflections in an acoustic environment as well as accurate determination of the initial arrival times (and therefore the distances) of acoustic events. This is most likely the highest state-of-the-art in acoustic measurement. These days, almost every microphone and speaker manufacturer has one of these babies. Thanks, Richard!

A quick word about FFT analyzers is important also. Where the TEF unit uses swept sine waves to accomplish its magic, a pulse can be used as well. By applying the famous Fourier

Transform to a time domain event, we can obtain its frequency-domain response (or so they tell us). FFT (Fast Fourier Transform, not famous Fourier Transform) boxes use this technique to measure acoustic systems. A pulse is input to the system, and both time and frequency characteristics can be obtained. It's a wonderful life.

There are also computer-based specialty machines such as the Sound Technologies 1500 Series tape recorder/alignment device. This is a full-function machine designed to test flutter, second and third harmonic distortion, and general alignment of audio parameters. Though it is computerized, this device only allows you to perform the specific functions for which it is designed. This is another type of prevalent approach taken by today's test equipment designers. There are also companies such as Ariel and National Instruments, with products that turn your desktop computer into a data-acquisition center through the use of plug-in boards. These systems' use of digitization technology has become fairly advanced and permits the user to have a full-function, digital, sampling oscilloscope in software and hardware. Also, there are many plug-in boards that offer full-digitizing, sampling-scope capability for an affordable price.

WRAPPING IT UP

While we haven't covered every product in the world of test equipment, this should at least give you a good grounding (no pun intended) in basic test tools and how they operate. There is plenty of room for creativity, and new measurement techniques are being developed to quantify those things that have still not yielded to measurement but which humans somehow manage to hear.

We don't know why two pieces of gear that measure the same with today's methods still have completely different sounds to the trained listener. We do, however, know that the measurement limits of the past cannot serve the needs of the future adequately.

Good luck measuring and listening, and remember, a trained ear is a tremendous asset, and test equipment is still one of the best methods to train a good set of ears! ■

Stephen Paul is the president of Stephen Paul Audio, a Burbank, California-based firm specializing in the repair, restoration and modification of high-quality studio microphones.

LIVE FROM NEW YORK!

BY VIN GIZZI

IT'S THE METROPOLITAN OPERA

INSIDE THE REDESIGN OF ITS AUDIO FACILITIES

The Metropolitan Opera is probably the most famous opera company in the world, with a rich history spanning 108 years. Less well-known, but with a long and glamorous past of its own, is the Texaco/Metropolitan Opera Radio

Network (part of its roster of over 300 American and Canadian stations.)

In 1977, the Met aired its first live television broadcast—*La Boheme*—and has never looked back. Television and its related home video formats have since become a major market, accounting for 65 productions over the past 14 years. The advent of laserdisc and

CD-V have made opera a significant source for software producers eager for material that takes advantage of the superior audio and video capabilities of these media. In fact, the digitally recorded and mastered audio tracks for the Met productions may now be recognized as the standard for live opera recording, if not for all opera recording, regardless of video. The pinnacle was perhaps the mammoth 17-hour television presentation of Wagner's *Ring*



Left: The mix room. Note the RPG Abffusors® on the side wall and the outboard equipment mounted adjacent to the monitors. The main hall is visible through the glass.

Network, which has been broadcasting Saturday afternoon performances to millions of listeners for 50 years. According to Ellen Godfrey, associate producer of the radio broadcasts, "Texaco took over sole sponsorship of the broadcasts in 1940 and set up an independent network in 1960 that could reach 95% of the population. As part of the 50th anniversary celebration of the 1990/1991 season, the network became international, adding 18 European countries (under EBU distri-

Right: An expanse of RPG Diffusors™ covers the entire rear wall of the mix room.

Below: The announce booth.

Abffusors on the ceiling and distributed absorption on the walls reduce small-room boominess and provide a neutral acoustic character.



cycle last spring, which won high praise from reviewers, and is scheduled for laserdisc release this year.

The technical standards required to meet these high expectations came so far so fast that the audio facilities at the Met (originally a film projection booth) were hopelessly outmoded. At the strong urging of operations director Bill King, Met management decided to overhaul them in 1990. My company, Benchmark/Downtown Design, was





PHOTO: I. MEISERSCHMIDT/WESTLIGHT

hired to design the new facilities, which included a mix room, announce booth, and recording and distribution rooms.

King, who has been the engineer in charge of the radio suite since 1981, planned a complete overhaul of physical facilities and equipment. "The main impetus for the renovation was to make the rooms more functional," he says. "Even though they would always be small, they could be laid out to be a lot easier to work in. At the same time, we wanted to upgrade equipment, particularly with a new console, and improve the monitoring acoustics."

The unique nature of the "product" at the Met requires a comprehensive and sophisticated facility. Probably first on the list of technical challenges is the immensity of many of the productions: an orchestra of up to 100 players, dozens of principal singers, and a chorus of perhaps 70 spread out on a stage

100-feet wide and 70-feet deep. This must be captured in its full dynamic glory with microphones located out of the sight lines of any of the 3,800 seats in the hall. King explains: "We use eight microphones in the orchestra pit, basically section mics. On the lip of the stage are four groups of mics, each consisting of a cardioid and a shotgun, which pick up the singers and chorus. The cardioids are used to capture the stage 'picture,' and the shotguns are there for specific situations,

Right: The recording room includes both analog and digital recorders.

such as reaching for a singer upstage."

The micfeeds, which can be spit off at the stage to feed a remote truck, then go up to the four-room radio suite: the mix room, which produces the stereo music mix and radio feed; the distribution room, where all feeds and trans-

mission paths are monitored and tested; the recording room, where archive tapes (digital and analog) are recorded; and the announce booth, which houses the Met's longtime Saturday afternoon announcer, Peter Allen.

From there, continues King, things really got complicated. "We have nine



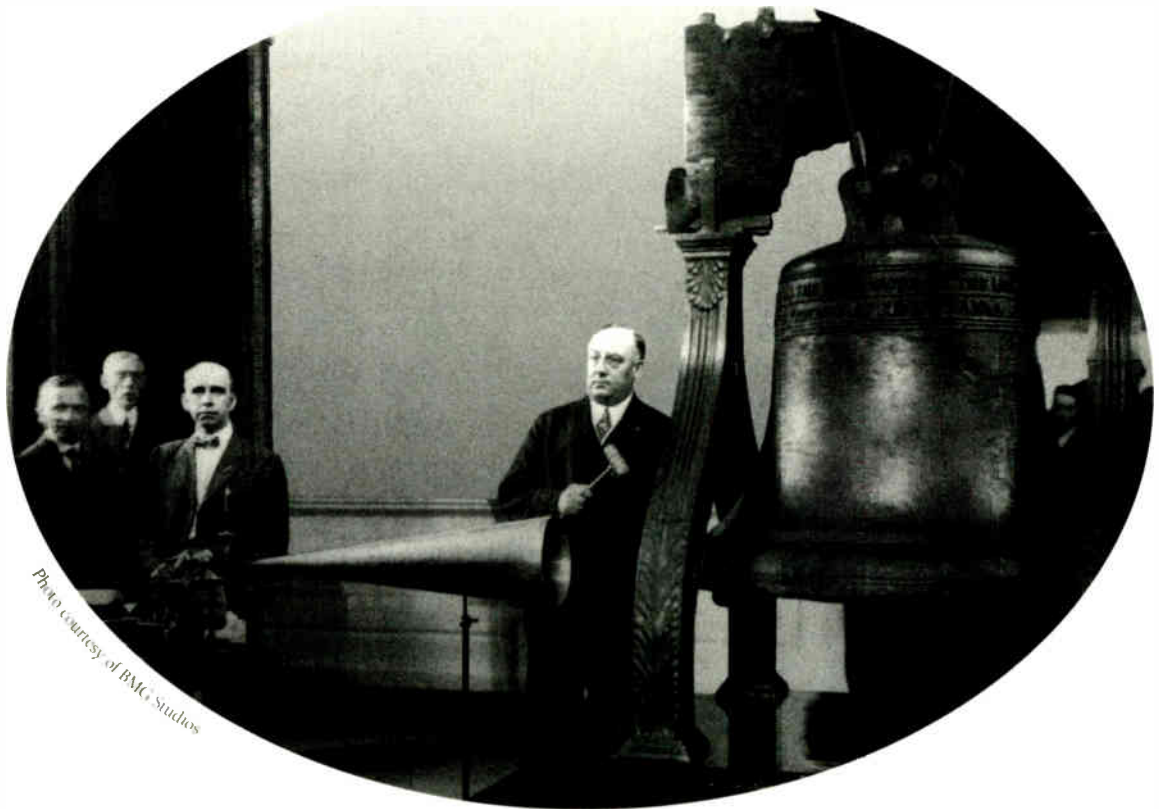


Photo courtesy of BMC Studios

1918

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microwave paths leaving from the roof, four equalized telephone lines, a dial-up phone line, and internal feeds going around the building. We supply both the NPR and Multicom satellite systems for U.S. distribution, and the EBU, via fiber optic cable, for European distribution."

For television productions, the live stereo mix is recorded digitally without any limiting or compression, for eventual use in laserdisc releases. An additional feed with compression is sent to the videotape machines and is used for live broadcast. Digital multitrack backups are also recorded for possible remix in post-production. It's a lot to keep going.

Handling the producing and mixing of all this is Jay David Saks, a 20-year veteran of the music business. Saks, who has been audio producer for radio and TV at the Met for 11 years, is also executive producer in the classical division of BMG Music (formerly RCA Records), with five Grammys and two Emmys to his credit. Despite the considerable pressure and complexity of the process, he feels live opera recording has great potential for a musically and sonically satisfying recording. "There is excitement and electricity in a live performance that sometimes gets lost in a recording session. Of course, you have more control in a traditional session, but in a good hall like the Met

Figure 1: The Energy Time Curve of the mix room's left monitor speaker. Note the first significant reflection, from the rear wall, is approximately 17 dB below the level of the direct sound.

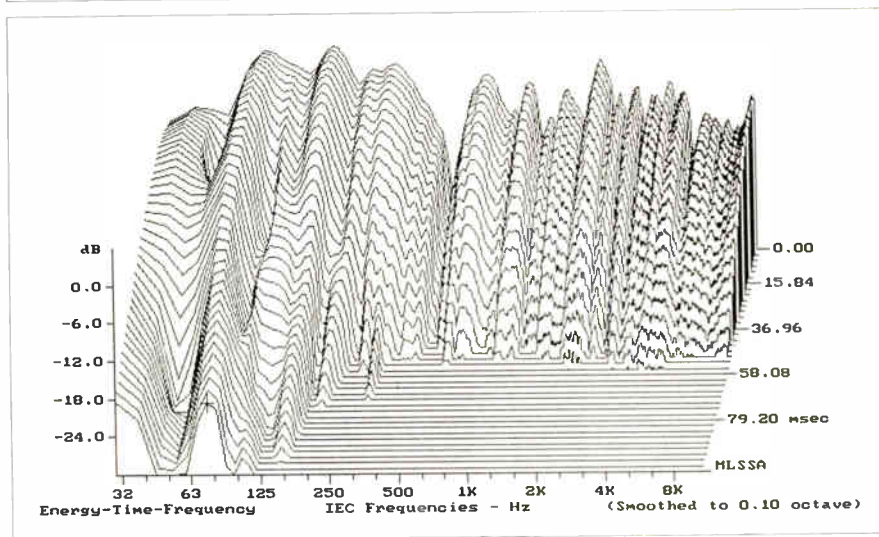
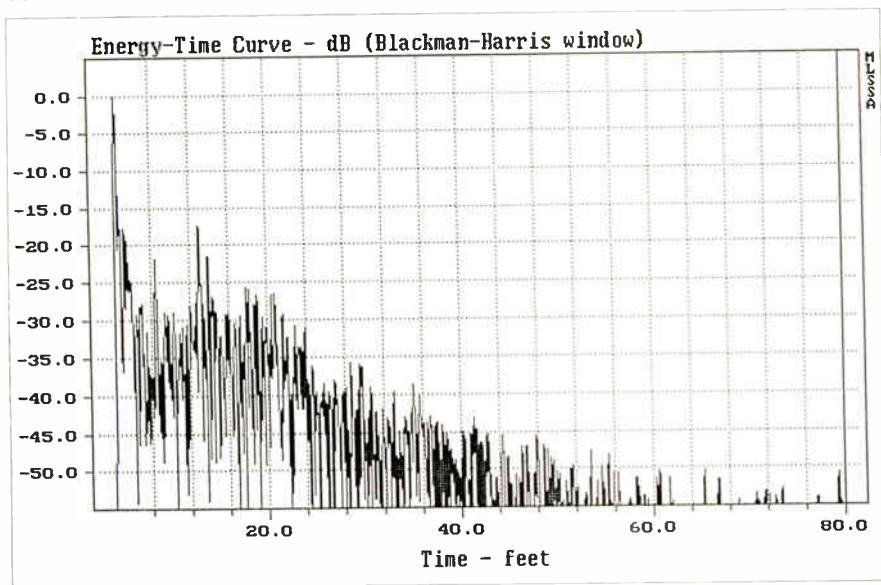


Figure 2: The Energy Time Frequency (waterfall) plot of the first 100 ms of response of the mix room before renovation. Note the broad notch from 350-550 Hz caused by destructive reflections, and the excessive low-frequency decay time.

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with a conductor like James Levine controlling the balances, we can get a sound that is absolutely comparable to the best of conventional opera recordings. Of course, a lot depends on the production—staging, sets and costumes—and we have to work more actively at getting the sound than we would with a “stationary” pickup. But I think there is definitely more potential in live opera. The fact that more recordings are being done as though they were live bears me out.”

Turning out a live mix comparable to one that would normally take two weeks in a control room places an enormous demand on both the mixer and control room. The dynamics onstage are tremendous—from full orchestra and chorus at triple *forte* to a whispered aside at the far end of the stage. Maintaining a consistent sonic image with singers moving all over the huge stage is a challenge. Saks explains: “For radio I like a full stereo spread so I can pan wide left and right—orchestra, ambience and voices. But for television I restrict the panning of the vocal microphones to avoid conflicts with the picture—voices moving left or right while the picture

seems stationary. It’s tricky. We’re watching the actual stage through the window in the radio booth, so we know which mics the singers are on. But we’ve also got to match the visuals of the TV.”

Accurate audio monitoring is critical to keeping a living, breathing production in coherent form. Because of the small size of the mix room (9.5 feet by 10.5 feet), the monitors are, of necessity, near-fields. One of the design goals, however, was to ensure that the sound in the mix room would translate to a larger listening room. Knowing that many opera fans are also audiophiles, we realized that we had a very critical audience who would be comparing the Met’s sound with the best digital studio recordings available.

The acoustic design philosophy was to provide full-range monitoring with as little coloration and as much diffusion as the small space would permit. As in all control rooms, accurate imaging requires eliminating early reflections that degrade the direct signal from the monitors. Part of the solution in this case (compliments of Bill King) was to mount almost all outboard gear in small racks between and immediately adja-

Signal Flow at the Met

by Greg Hanks

The newly renovated Metropolitan Opera venue provides a variety of live performance services. Very much in the style of “the old days,” the Met offers facilities to accommodate live radio broadcast feeds to U.S. and European networks, video recording, live television, and live television with simultaneous radio feeds to the U.S. and Europe.

The sources include orchestra and stage mics, radio intermission mics, radio announcer, television host mics, U.S. and foreign television intermission feeds, and foreign network production coordination. The various program feeds are routed to destinations such as telephone line transmissions, radio archive recording, microwave transmissions to satellite, TV production

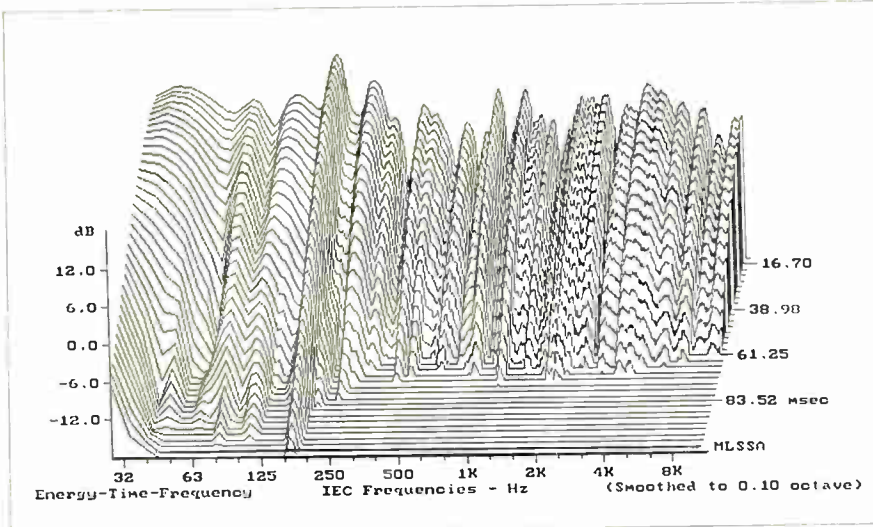
—CONTINUED ON PAGE 60



Figure 3: The Energy Time Frequency plot of the room after renovation. The midrange notch is gone, the low-frequency decay is controlled and the mid- and high-frequency decay has been increased by diffusion to a more natural-sounding range.

cent to the monitors. By setting the splay angle of the side racks, reflection paths were directed at RPG Diffusors™ at the rear of the room, rather than into the mixing position. The Diffusors, coupled with Abffusors® (panels that combine absorptive and diffusive properties), produce a greater sense of spaciousness in the mix room than its minuscule proportions would suggest. The Abffusors also play a role in suppressing the buildup of room modes in the low/mid-frequency bands.

The overall proportions of the Met mix room—length, width and height all about ten feet—seemed designed to produce acoustic nightmares. In most projects involving new construction or major renovation, a lot of work goes into evaluating and optimizing room proportions for good low-frequency response. At the Met, however, chang-



ing the room's size or shape was not possible, so we had to look at other solutions. We decided to neutralize the room's contribution with a combination of broad-band passive absorption and mid-band diffusion.

Since the room was so small, any character it imparted to the monitored sound would be problematic and certainly not typical of an ultimate listening environment. First, the small dimensions wouldn't support any modes

below 50 Hz, so low-frequency response would be attenuated. Furthermore, since all three dimensions were so equal, the axial modes would bunch up in a periodic pattern, all occurring (and summing) within a narrow band, then skipping a half-octave or so to bunch up again within a narrow band, and so on. To eliminate this, we placed deep (over 12-inch) batts of fiberglass within the ceiling cavity, particularly near the walls (since room modes are

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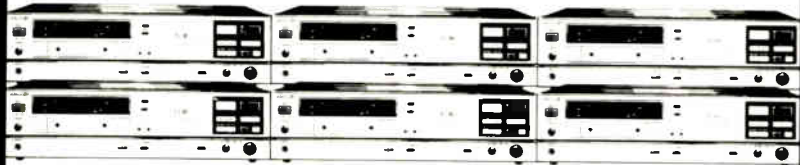
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at their maxima at corners) to absorb and dampen low-frequency modes.

However, we didn't want the room to be too dead. To promote some mid-band diffusion, we used Abffusers on the side walls and in the lay-in ceiling grid over the mixing position. These provided a combination of broad-band absorption with diffusion. Virtually the entire rear wall of the room is covered with RPG Diffusers, representing an unusually large area to help make up for the restriction of signal delay—the short path length of a small room. This compensation helps produce a “bigger” and more spacious sound in the room. Fig. 1 is an Energy/Time Curve showing the initial time delay gap before the first significant reflection (from the rear wall) arrives approximately 17 dB down in level. Figs. 2 and 3 are waterfall plots “before” and “after” the mix room renovation. Fig. 3, after renovation, reveals a smooth overall response with only traces of low frequencies hanging on after the higher frequency bands have decayed.

The space limitations presented numerous other problems during design. Peter Willcox, project architect from the Benchmark/Downtown office, found the job more like designing a remote truck than a typical studio: “Since they often record multitrack backups from the radio room as well as send out multiple signals for distribution, the cable requirements are just as complex as any music studio. But we literally didn't have the room for large troughs. We ended up making almost all the wall cavities into raceways, and we designed a wall panel system that allows access to all of them for future changes.”

The removable wall panels actually became a major design element since they make up most of the visible room interior. They needed to be cost-effective, durable, quickly removable and made in dozens of odd sizes to fit into corners and around existing construction. Since no standard product met all these criteria, we designed a panel made from high-density particle board. They are finished in a dyed lacquer that matches the reddish wood theme at the Met, and they have a routed edge that conceals mounting screws and establishes an interesting grid pattern once installed.

The project included a complete overhaul of the radio suite's electrical and mechanical systems. New electrical power was run for technical equipment with regulation and backup. An

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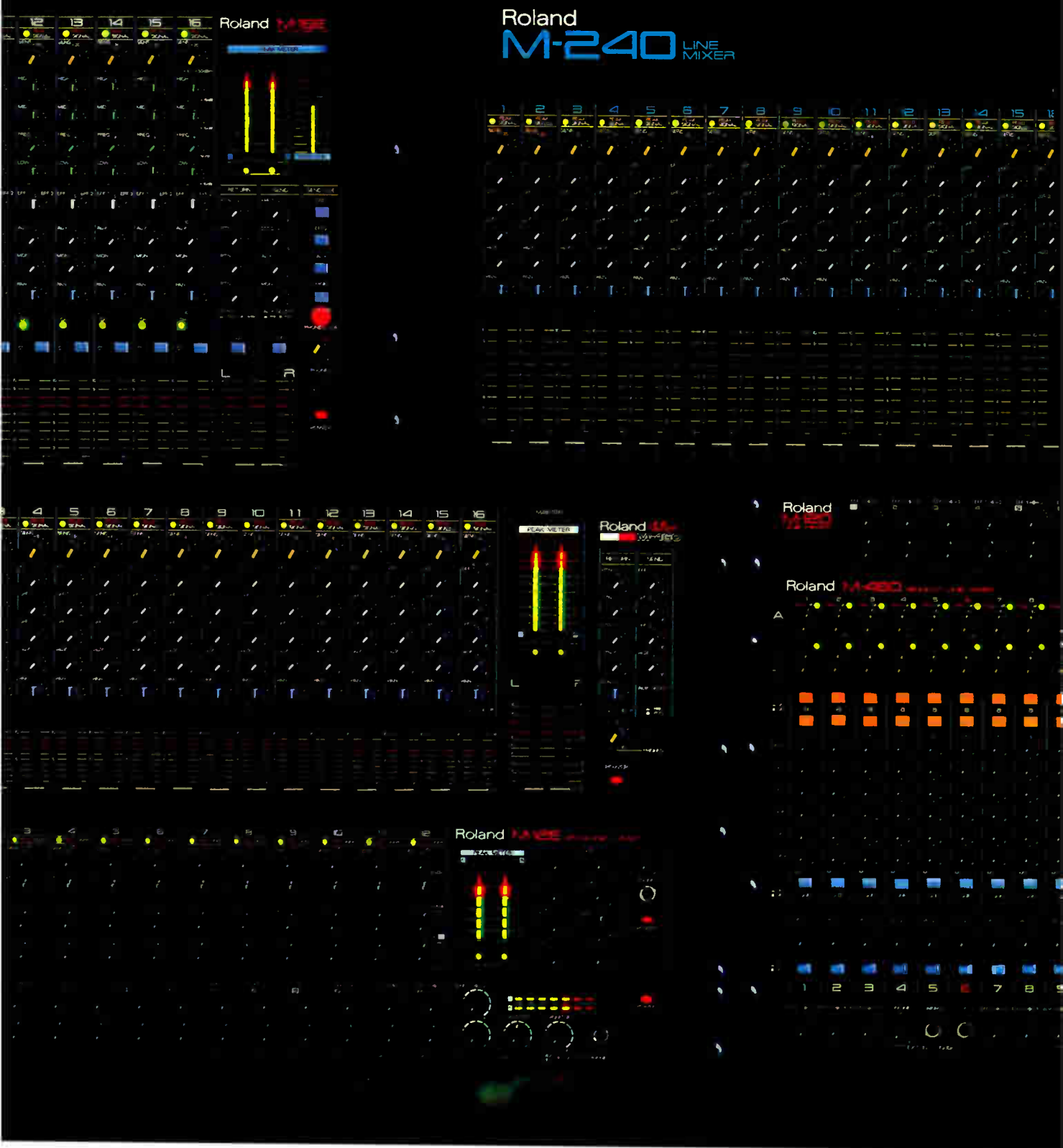
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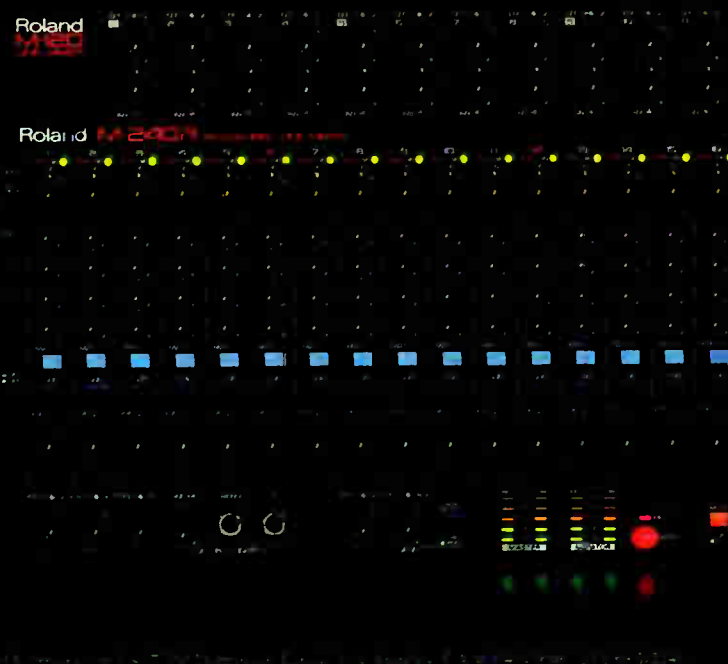
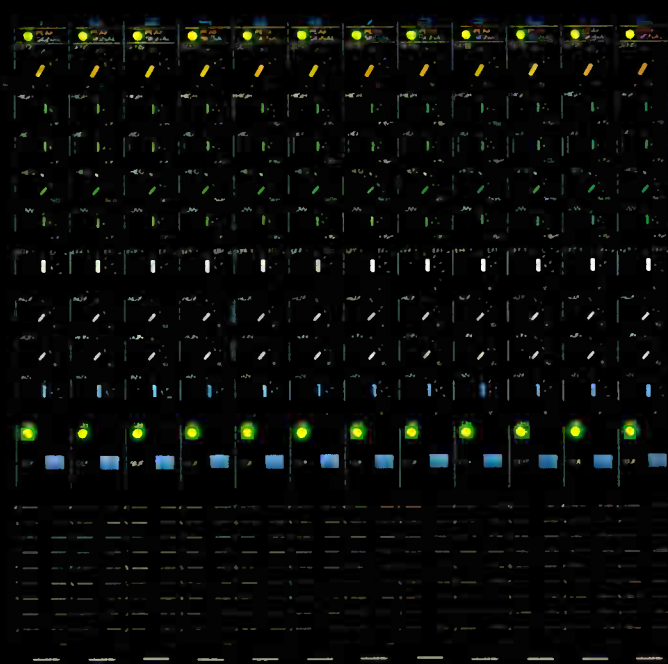
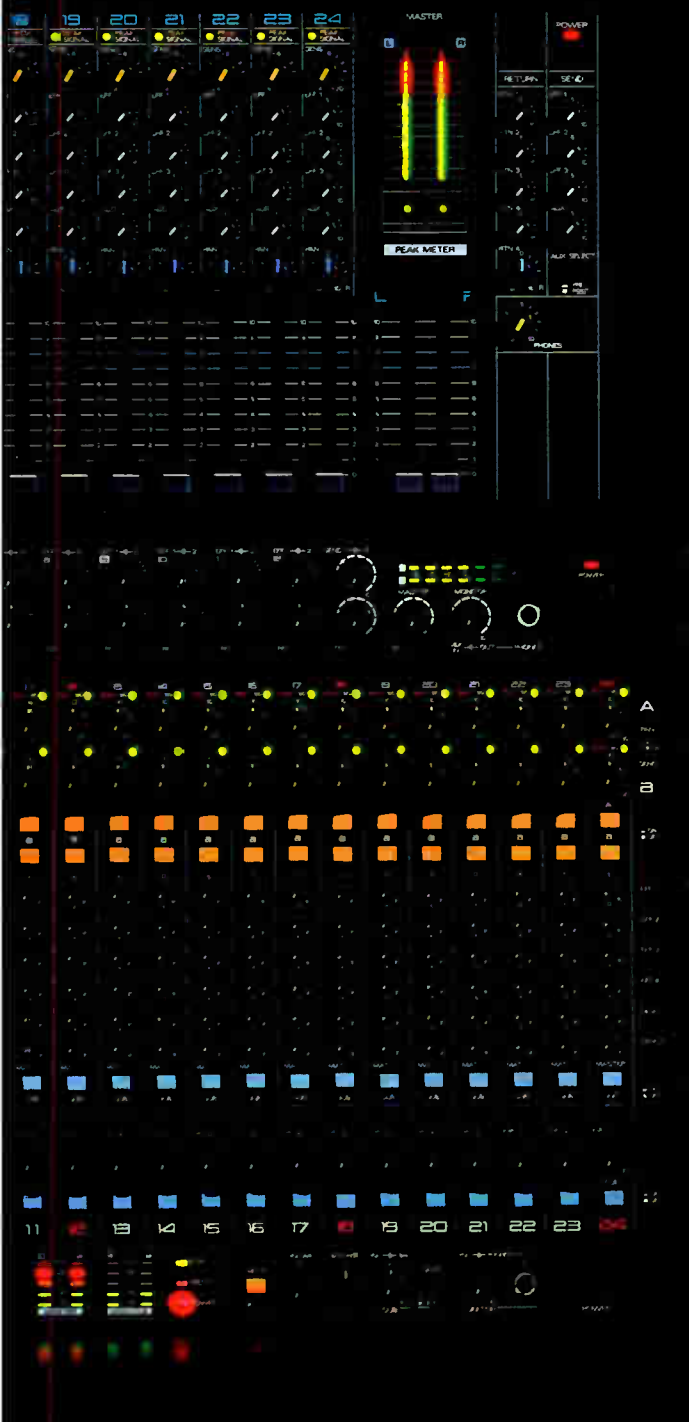
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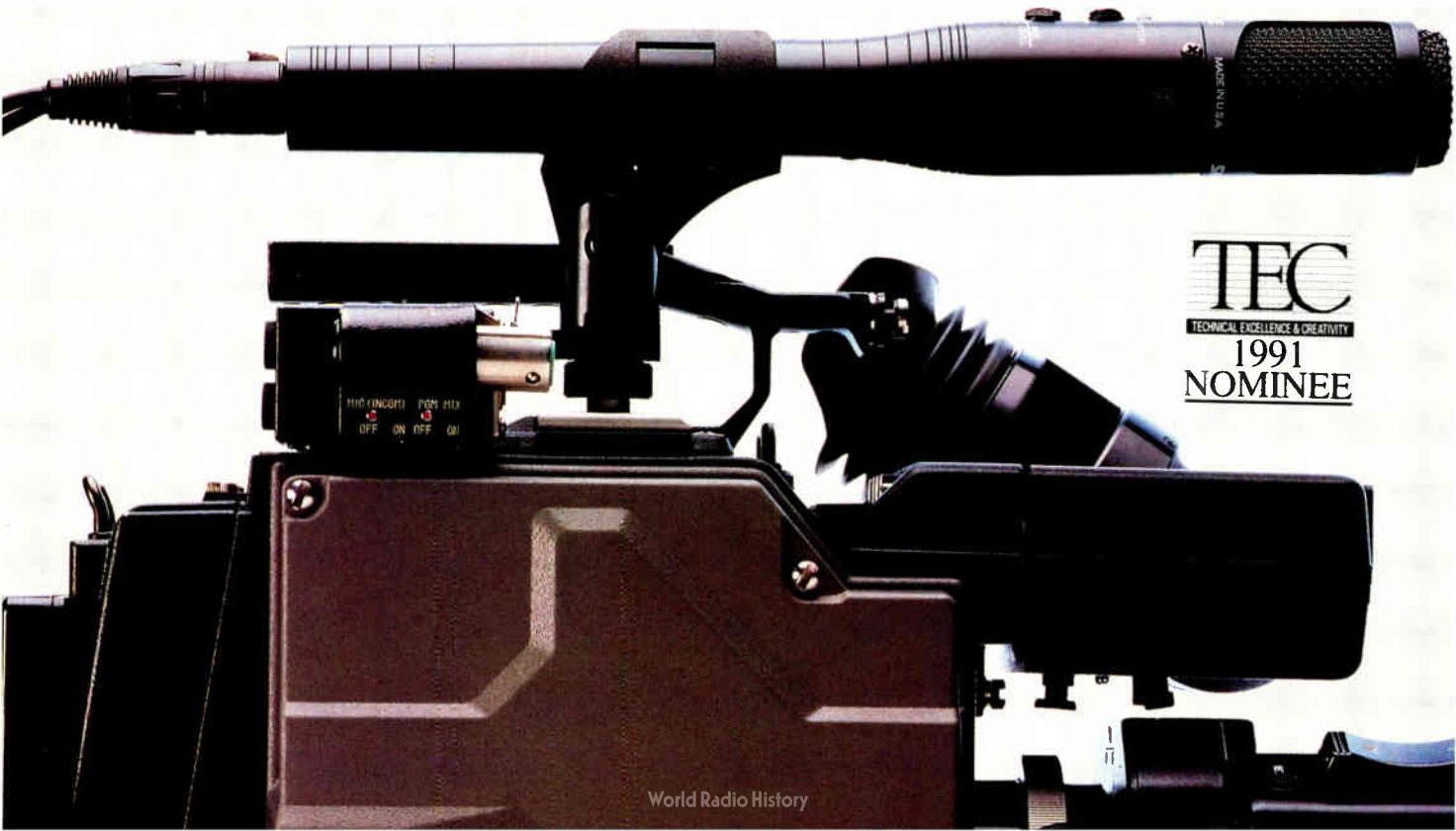
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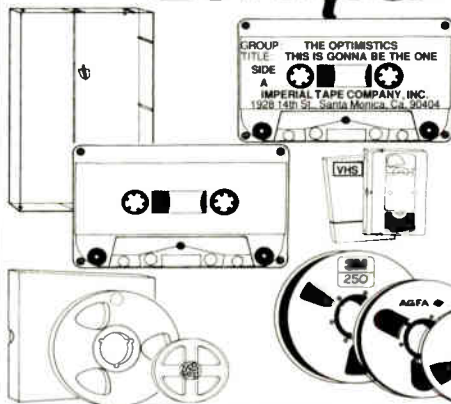
uninterruptible supply feeds key pieces of equipment, so the radio room can continue to operate even in the midst of a major power failure. The previous air conditioning system was simply part of the main hall system and didn't operate when the stage was dark. This was obviously a problem during setup, maintenance and other activities not directly related to a performance. The old system was also originally designed to handle the intense heat of 35mm projectors and included a high-speed (i.e., high-noise) exhaust fan. We modified the exhaust system (lowering the ambient noise level by over 10 dB) and added small, backup package units to supply ventilation and cooling during setups.

Despite a hectic construction schedule and the complications of working around performances and rehearsals, the new facilities were ready for the opening broadcast of the 1990/91 season, *La Traviata*. The broadcast was the occasion for a celebration of Texaco's 50th year of sponsorship, and also saw the debut of the European link, making the network truly international. The opening went without a hitch, and the media staff celebrated the success of the new facilities. "The new room is fabulous," according to Jay Saks. "It feels positively spacious, even with all the equipment that we've packed in. And the sound has improved dramatically. It's very even now—smooth and clean. It's changed some of my thinking about EQ, not so much that the final sound is much different, but that I have confidence now in what I'm doing. I don't walk away after a show thinking, 'I should have added a little more bass.' Now I know exactly what I'm getting. There are no more surprises."

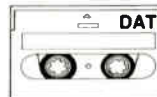
Praise for the new facilities hasn't been confined to staff, reports Ellen Godfrey; the listening public has been able to appreciate the improvements, too. "I've heard many comments from listeners about the better sound this year," she says, "including a letter from one of our local stations who wrote '...to tell you how impressed I am with the technical improvements in the weekly radio transmissions. The quality and the sense of presence is really incredible...The new sound is clearly evident.'"

Vin Gizzi is a partner in Benchmark/Downtown Design, a NYC-based architectural and acoustic design firm specializing in sound studios.

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—FROM PAGE 52, SIGNAL FLOW AT THE MET
control (inside the television truck), television remote truck (for audio and video record), the multitrack audio recording truck, and T-1 digital audio network feeds.

The house system must provide mic splitting, music mixing, limiting, distribution, switching, metering, monitoring, communication, television mixing, radio mixing, satellite reception and testing. Network source testing and loop-back verification, archive recording and intermission production services are also provided by the house. Whew!

An environment of this sophistication is normally found only in a network broadcast facility. At the Met, it's spread out over five rooms in three different locations, all totaling less than 2,000 square feet! Each room is equipped for specialized system tasks. The first three rooms comprise the "radio booth," and are located on the Grand Tier in the back of the opera hall. For the last five years, New York Technical Support Ltd. has been instrumental in designing a grounding and shielding system for the Met, while performing the redesign and installation and wiring of the radio booth in conjunction with operations director Bill King.

The mix room contains the music console, the radio console and the music limiters and compressors, as well as all of the switching necessary to provide local metering and monitoring. The music console position has a direct line of sight to the stage. The radio announce booth is adjacent to the mix room, and for the purposes of simplification, is included in this category. Music distribution is provided at the music console for transformer-isolated +4dBu feeds to the TV console, TV distribution and radio console.

The distribution room is used to feed audio for radio to the outside world, as well as provide the lion's share of the music distribution. The main distribution matrix provides switching of six input paths to 45 outputs at either +8dB at 100- or 600-ohm output impedance or +4 dB at 100 ohms. These outputs are transformer-isolated, and the +8dB feeds are designed to be terminated. All of the +4 outputs are intended to provide their given level into a 600-ohm or greater bridging load. There are also a number of fixed, resistor-isolated outputs from the main output driver amplifiers that feed four different test signals throughout the complex. The sat-

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ellite and microwave downlink equipment is located in the distribution room, as are the prime interconnect patch facilities that tie all of the diverse locations together. The telephone line interface equipment, local database computer system, and video and system test equipment also reside here.

The record room provides radio archive in a number of formats, including analog 1/4-inch 15 ips, Dolby B cassette, PCM-1630, DAT, or EIAJ format to a PCM-F1 processor (using 3/4-inch or 1/2-inch videotape). This room also contains isolation and distribution amplifiers for isolated and buffered feeds to and from distribution. Local monitoring and metering are provided. Stage communication, telephone feeds, video intercom and interface logic are also provided.

Located in List Hall (down two stories, on the side of the main hall) is the radio intermission console and intermission production control room. The intermission microphones are located on the stage of List hall, and there is a logic system interconnect to the radio console for local and remote monitor muting and switch operation tallies. A 16-input Soundcraft console, various limiters, three 1/4-inch tape machines and other production equipment comprise the arsenal of gear.

B-3 houses the television audio distribution, television audio mixing, communications distribution and all of the microwave transmission equipment. This room is four floors down and a block away from the radio booth, and serves as an interconnect station between the television and audio trucks on the street and the Met. Super-compressed mono is sent from here to TV production, and both the TV host microphones and TV intermission audio are received and mixed here. The TV truck recorders receive mixed wide dynamic range audio. B-3 also receives a stereo mix from the audio truck in case of failure within the radio booth for live broadcast.

The audio system wiring spans 12 floors across a New York City block. This topology presents a significant wire length to the outputs of the driving devices, and the neutrals of the various electrical services do not necessarily have any relationship to each other. Balanced inputs and low-impedance (less than 100 ohms), transformer-balanced, floating outputs are utilized throughout. Local monitor switching, metering and patching are available at each location.

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World Radio History

Maintaining signal isolation, ground isolation and low crosstalk with a good signal-to-noise ratio is a challenge. Each of the rooms is internally grounded using a star method, and the mix and record rooms are brought together in the distribution room. All shields are telescoped from their respective outputs and dropped at all inputs. The only exception to this is within B-3, where one has the option of carrying the shield on the inputs and dropping it on the outputs to minimize conflict with any of the servicing audio and video remote facilities. Ground is to the building steel within the distribution room, as well as at B-3 and List Hall.

DL connectors form the primary interconnect. We utilized 26 96-point Bantam patch bays in the wiring of the distribution, mix and recording rooms. All bays interface with the rack via DLs, and the racks talk to the world through DL panels. These custom, single-rack-unit, shielded bays were provided by Audio Accessories with the top row mulleted to two DLs, mult normaled to the bottom row, with the shield not carried, and then brought out via another DL. The bottom row sources the shield via an internal bus brought out to a gold binding post that is brought to technical earth within each rack. A 12 x 2-inch copper bus bar was mounted in each rack, and each component was connected to it with #12 wire. All of the racks were then brought together within each room via a piece of #8 wire to the rack that contains the patch bays. Each room was brought back to the rack in distribution that contains the bays, and this rack was brought to building steel.

Technical power in the radio booth is a single phase of 120V from a Topaz 15 kVA power conditioner. Power comes in at 220-volt/3 phase and is converted to single-phase in the conditioner.

The net result of all this attention to detail is a dynamic range in excess of 90 dB, frequency response within 0.2 dB from 20 Hz to 20 kHz, and an improvement in the signal-to-noise ratio of approximately 15 dB compared to the previous system! ■

Greg Hanks has been building high-performance audio systems for 23 years, and now heads New York Technical Support, providing installation, service and consulting to the audio industry.

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Recent credits

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On what he does

“I like it all, I have to do it all - I feel a need to challenge myself in areas I haven’t entered before.”

On his technique

“I find the air and space around the principal elements in a recording are becoming more important to me. The music becomes more centered, with less need for effects and layering.”

On Dolby SR

“I prefer and am accustomed to recording on analog tape. But I don’t like tape noise - who does? Dolby SR assures a quiet, transparent recording.”



*“Toy Matinee” (Reprise Records)
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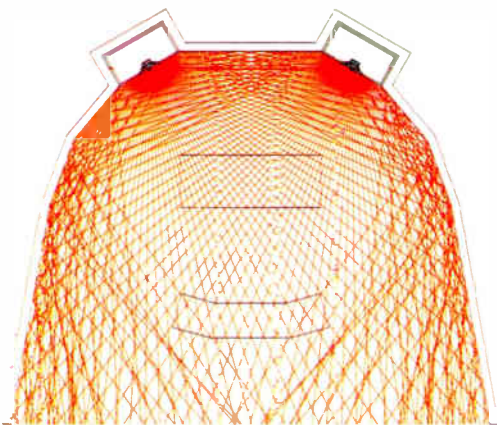


Fig 1A Reflection Analysis of Conventional Splayed Wall Control Room

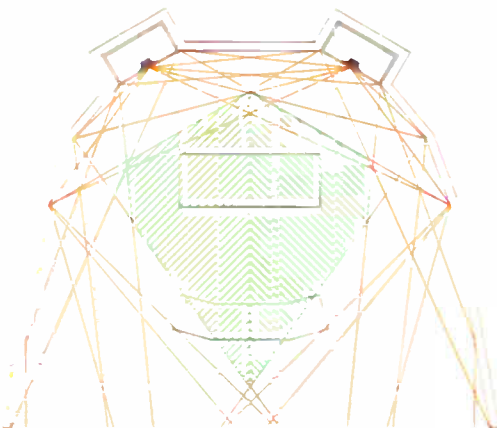


Fig 1B Reflection Free Area of Conventional Splayed Wall Control Room

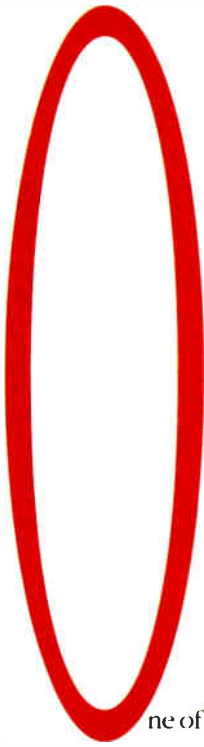
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**Larger  
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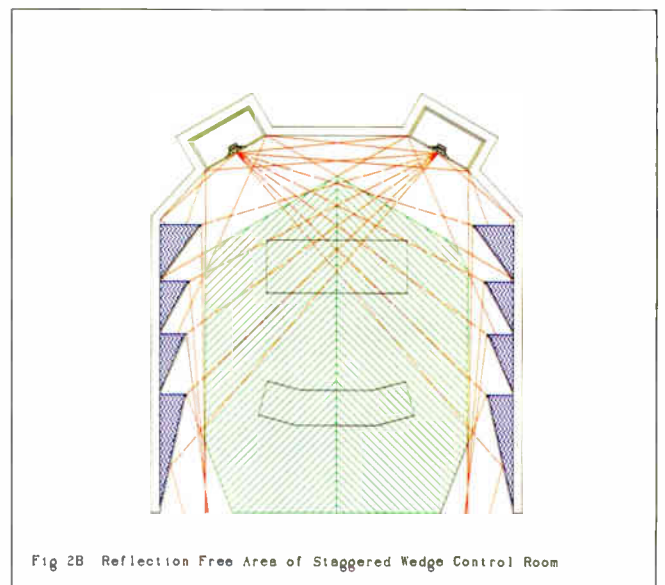
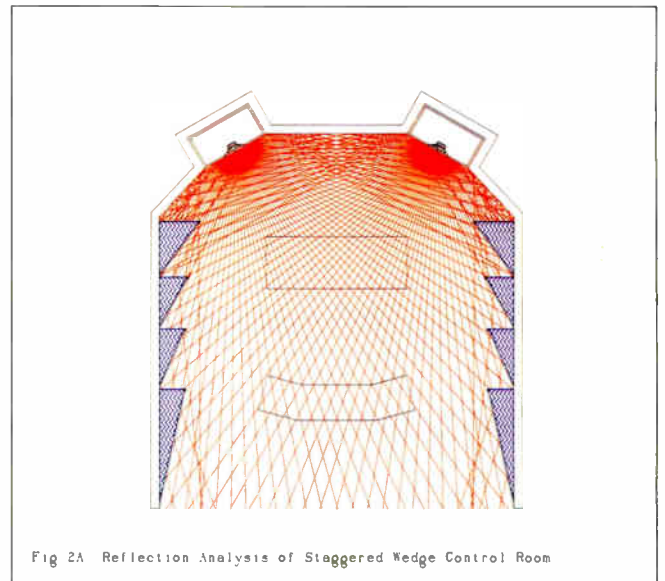
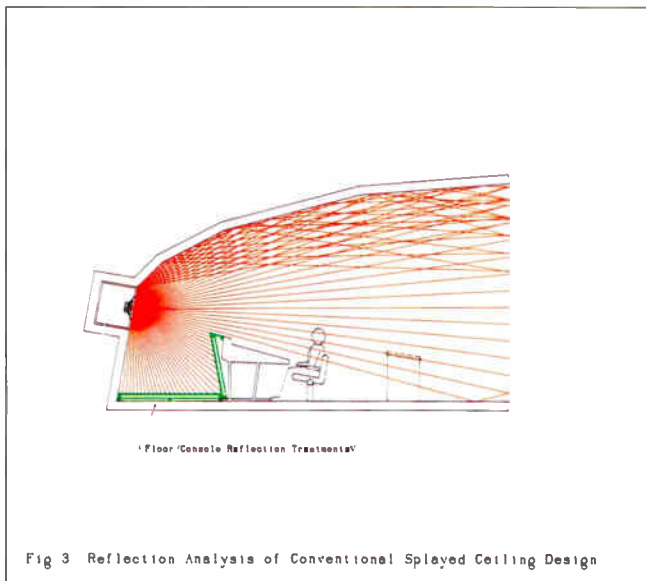
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by Bill Morrison

One of the main objectives in control room design is to create an environment for the accurate monitoring of the spatial, tonal and reverberation characteristics of the music being recorded and produced. The room must be designed such that the loudspeaker system's acoustical output does not strongly reflect from room boundaries (ceilings, walls, floors and equipment) into the engineer's listening position. If reflections are allowed into the listening area, the reflections combine with and—because of phase differences—interfere with the direct output from the loudspeaker. Such interference produces frequency-response inaccuracies and spatial or time arrival misinformation. (See *Mix*, August '88, "A Look at Control Room Geometry," by Bill Morrison.)

Conventional control room designs prevent detrimental



room boundary reflections from entering into the listening area, either by utilizing absorption to attenuate sound energy that would reflect into the listening area, or by diverting boundary reflections away from the listening area through the use of geometrically splayed walls and ceilings. Through modeling or mathematical approaches, the geometrical orientation of the walls, ceilings and equipment can be

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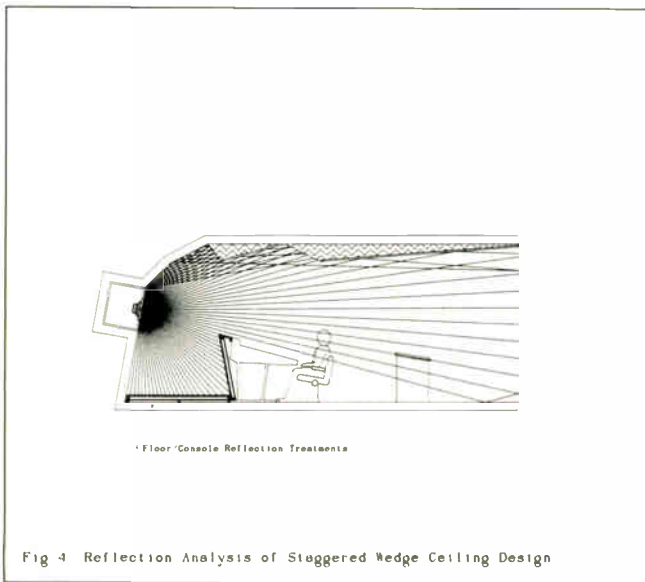


Fig 4 Reflection Analysis of Staggered Wedge Ceiling Design

designed such that acoustical reflections from room boundaries are directed away from the engineer's position. This approach allows the creation of a reflection-free area at the engineer's position.

A reflection analysis of this design approach applied to wall design is shown in Fig. 1A, with the resulting reflection-free area shown in Fig. 1B. Fig. 3 shows the reflection analysis of a ceiling design based upon this approach as seen through the monitoring axis. Combined with absorptive/diffusive back wall treatments and floor/console reflection treatments, this geometrical approach can provide an environment for high-accuracy monitoring.

A disadvantage of this design is that relatively large control rooms and high ceilings are required to produce medium-sized, reflection-free areas. Unfortunately, in many cases the space or ceiling height available for a control room is limited. In other cases, the listening area needs to be larger/deeper to accommodate MIDI equipment, client seating, producer space, etc.

Control rooms designed for spaces that are limited in size or ceiling height, as well as control rooms that require a very large accurate monitoring area, can make use of staggered wall and ceiling wedge segments to optimally produce large, reflection-free areas. By breaking the wall or ceiling into correctly designed, reflective segments with absorptive wedge openings facing the loudspeaker monitor front wall, a much larger accurate monitoring area can be obtained than with a conventionally splayed control room design. This approach applied to wall design is shown in Fig. 2A, with the resulting reflection-free area shown in Fig. 2B. Note that a much larger reflection-free area is produced by the staggered wall system than in the conventional splayed wall

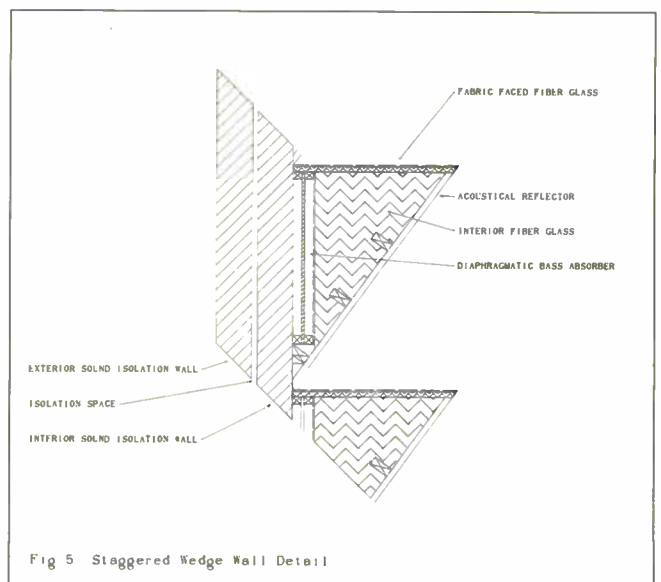


Fig 5 Staggered Wedge Wall Detail

systems of Figs. 1A and 1B. This larger and deeper reflection-free area is achieved even though the actual size requirements of the staggered wall room are smaller. This approach allows the accurate monitoring area of the control room to be easily widened and extended to the back of the room.

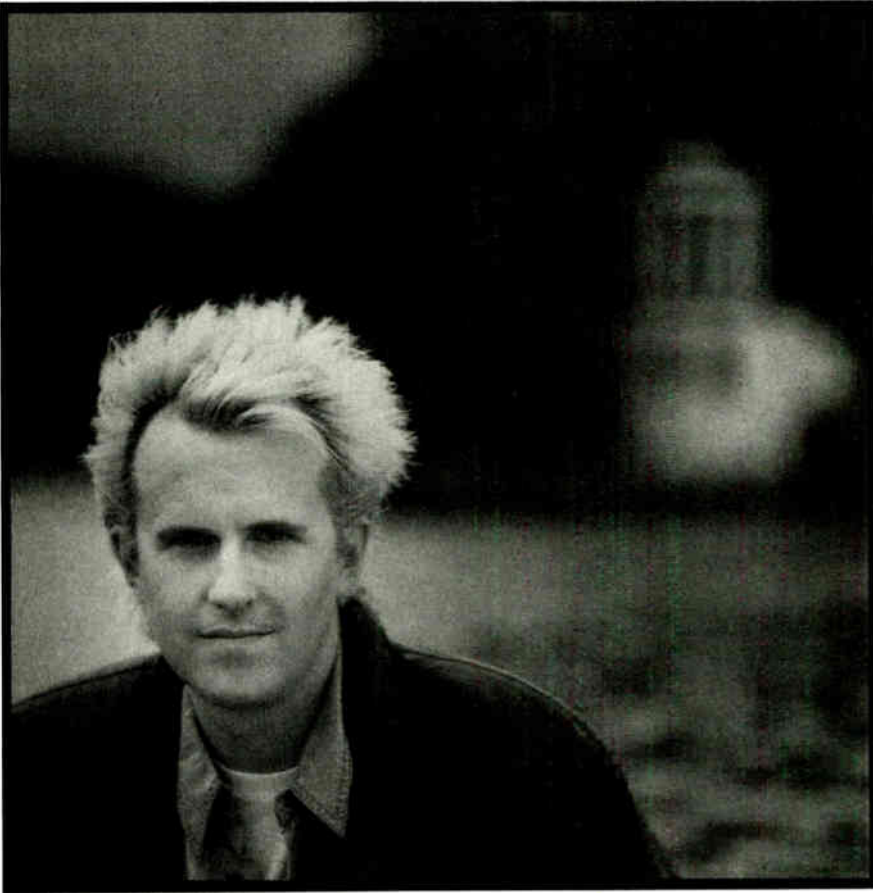
Fig. 4 shows how staggered modular wedges can be applied to a ceiling of restricted height to achieve a reflection-free area comparable to a conventionally splayed control room with much higher ceiling requirements.

The staggered wedge segments are constructed of rigidly attached, acoustically dampened materials such as plywood, wood planking, baraboard or sound board-dampened gypsum. The open areas of the staggered wedges face the control room front wall and contain diaphragmatic bass absorbers and gradient-density, acoustical-grade fiberglass. Acoustically transparent fabric is used to cover the front openings of the wedges.

Staggered wedge boundary treatments should be considered when designing control rooms with limited space or control rooms with requirements for large-sized listening areas. Staggered control room wedge segments are particularly useful when creating an accurate, cost-effective monitoring area in a room that may not have been originally designed as a control room. In such a case, the wedge segments can be added to the existing control room's boundaries. Staggered-wedge segments may also be used to increase the reflection-free area of existing control rooms. ■

Bill Morrison operates Acoustical Physics Laboratories, a firm specializing in the design, analysis and installation of studios and monitoring systems.

by Paul Tingen



HOWARD JONES' HIGH-TECH WONDERLAND

Howard Jones ponders the question of what distinguishes the truly successful from the ever-trying-but-never-arriving. Then his answer comes back, sharp and cutting: "It's because these successful people *have* to do it. They don't have a choice. You don't start out saying to yourself, 'I'd like to be a successful songwriter or pop star.' It's not like that. It's more like: 'I bloody well *have* to do this.' It's like an obsession.

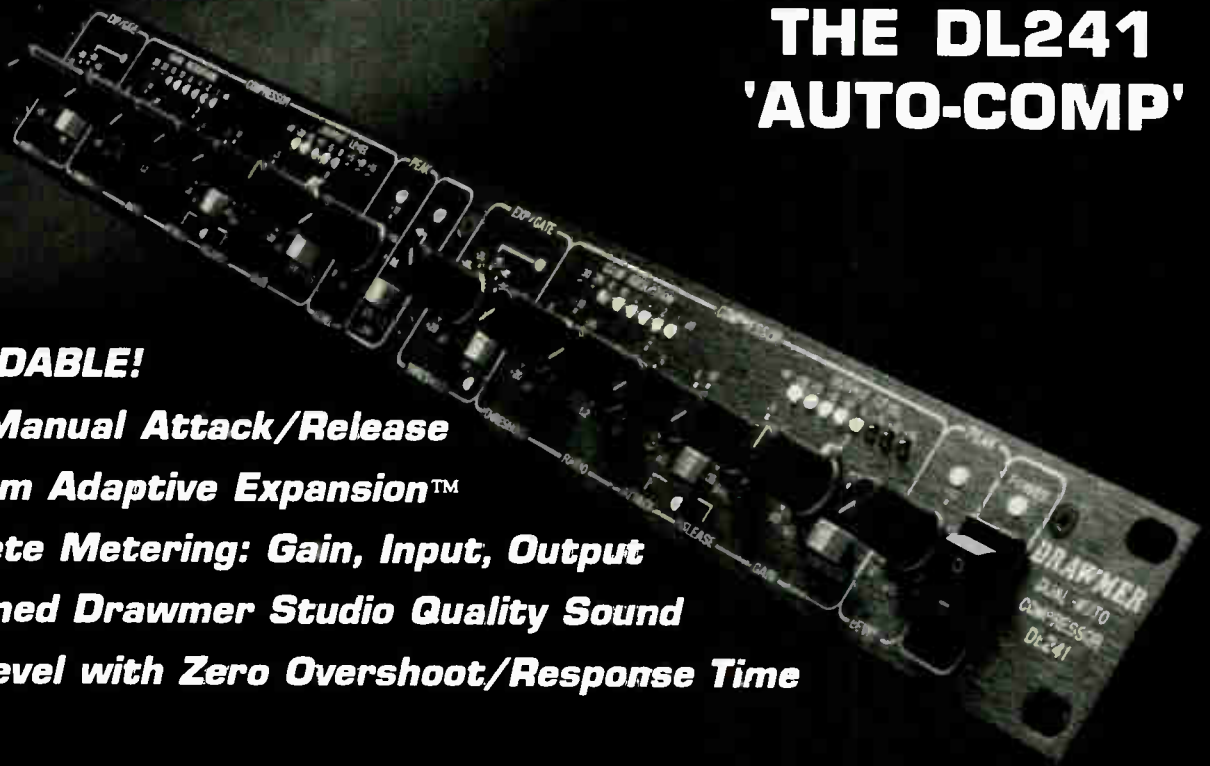
With people who don't make it, there's always a plan B, an alternative career to fall back on. And if there's a plan B, then forget it. It's that simple."

Jones leans back and smiles. We are surrounded by evidence that *he* didn't have a plan B. His hermitage is in many ways typical for the have-made-its: a gorgeous, 300-year-old farm house set in a small estate, enclosed by Victorian walls. There's a strongly soothing, ru-

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ARTIST'S STUDIO

ral atmosphere permeating the whole Jones' residence and grounds. In the former garden shed there's further testimony to Howard Jones' "obsession." The shed has been transformed to house a comprehensive digital recording studio.

The hardware is impressive: an E Series 48-channel SSL with Total Recall, Westlake BBSM10 and Yamaha NS-10 monitors, a recently acquired Mitsubishi 850 32-track, a 24-track Studer A800II, Opcode Studio 3 synchronizer, Sycologic MIDI Matrix, Studer A820 2-track, Technics DAT player, Macintosh computer and a wide range of effects that includes Lexicon, AMS, the Focusrite PSU121, a Teletronix LA-2A limiter/compressor ("It's like gold dust. It sounds great on my voice."), SPX90s and so on. On top, Jones' collection of sound sources is breathtaking. Inhale deeply for an (incomplete) overview: Fairlight Series III, Yamaha TX816 rack, Akai S1000, Roland Super JX, MKS-50, D-550, D-50, Jupiter-8, Juno-60 and MKS-20 digital piano, Korg Wavestation, Prophet-T8, Minimoog, Vocoder VP330, Yamaha KX88 and TG77, and somewhere in a corner the battered TR-808 drum machine, which was once his trademark.

Howard Jones came to fame in the early '80s with albums like *Human's Lib* (1984) and *Dream Into Action* (1985) and a succession of catchy electronic pop singles. Those tunes earned him a reputation as a very positive and idealistic, if a little naive and lightweight, pop singer. This image started to change, however, with his subsequent record output. His third album, *One To One* (1986), produced by Arif Mardin and featuring R&B-based music, was a step in a new direction, but it was the largely self-produced *Cross That Line* (1989) that yielded two major American hit singles, "The Prisoner" and "Everlasting Love," and established him as a serious songwriter.

Jones' studio, which he built about five years ago, was financed by the revenues of his first two albums. Jones explains why he decided to make the investment: "I see myself as a songwriter first, a keyboard player second and thirdly as a singer. Songwriting is something that develops over years. To make a great album, you have to start with great songs you're really convinced by and that you have lived with

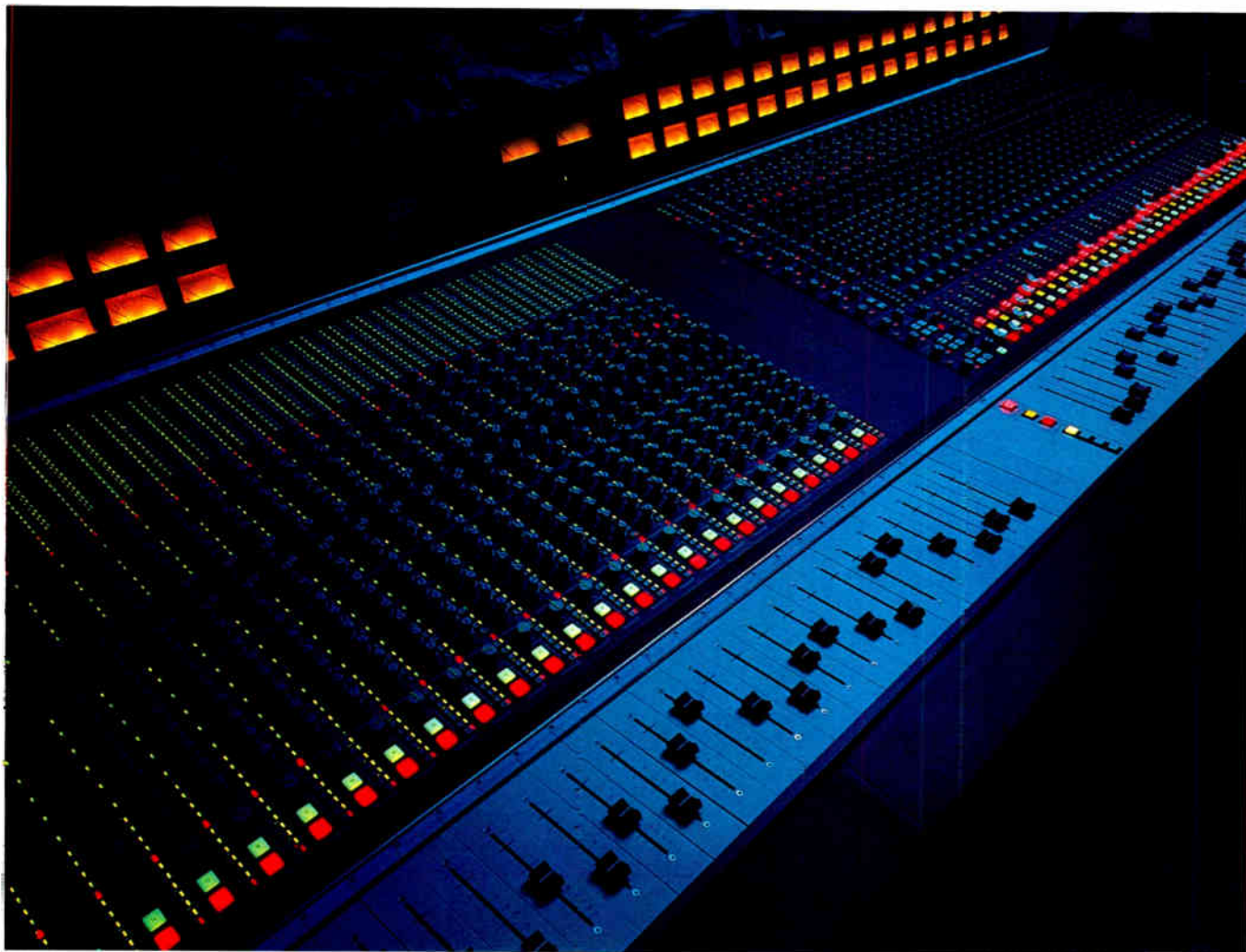
for several months, still liking them after all that time. I realized that if I was going to be serious about making records for a long time, I just couldn't afford to rent commercial studios anymore. I would never be able to experiment as much as I felt I needed to. So, I decided to go for it and build my own place and put proper equipment in there, which hopefully would stay current for a least five to seven years."

Jones indeed went for it, with a studio—affectionately called The Shed—that's on par with many commercial studios. His most recent album, *Cross That Line*, was recorded and mixed there, and for his forthcoming album, probably out this autumn, he's spent 18 months there writing and experimenting. "I could have written more quickly, but it wouldn't have had the same quality. I'm convinced that this working method enhances the quality of my writing. I don't have to worry about the bill, so I can spend two weeks demoing a song and then see that it hasn't worked. If you'd spent thousands of pounds in studio time, you might be tempted to keep it. In fact, my studio has already paid for itself."

However, the singer/songwriter admits that working on your own in your own studio can have a very limiting, even numbing effect. For this reason, he decided that he didn't want to get involved in the engineering side. He prefers to remain blissfully ignorant about the multitude of toys in his possession: "I don't know how the studio side works, and that's the result of a conscious decision I made very early on. I knew what would happen if I would get involved in engineering: I would be stuck up here forever, my mind cluttered with technical details.

"Instead, I decided to concentrate on my songwriting tools, my keyboards and the Mac with StudioVision software. When I get into songwriting mode, I'll get an engineer to set me up on the desk, so that I only have to work the big faders and a few effects. For the actual songwriting process, I need to be on my own. But for demoing and track laying, I need people around me to bounce ideas off of."

This necessity was demonstrated to him by his experience with *Cross That Line*, which taught him that producing as well as writing, arranging and playing, was too much to handle. So, for the new album he's enlisted the full-time helping hands and ears of Ross Cullum,



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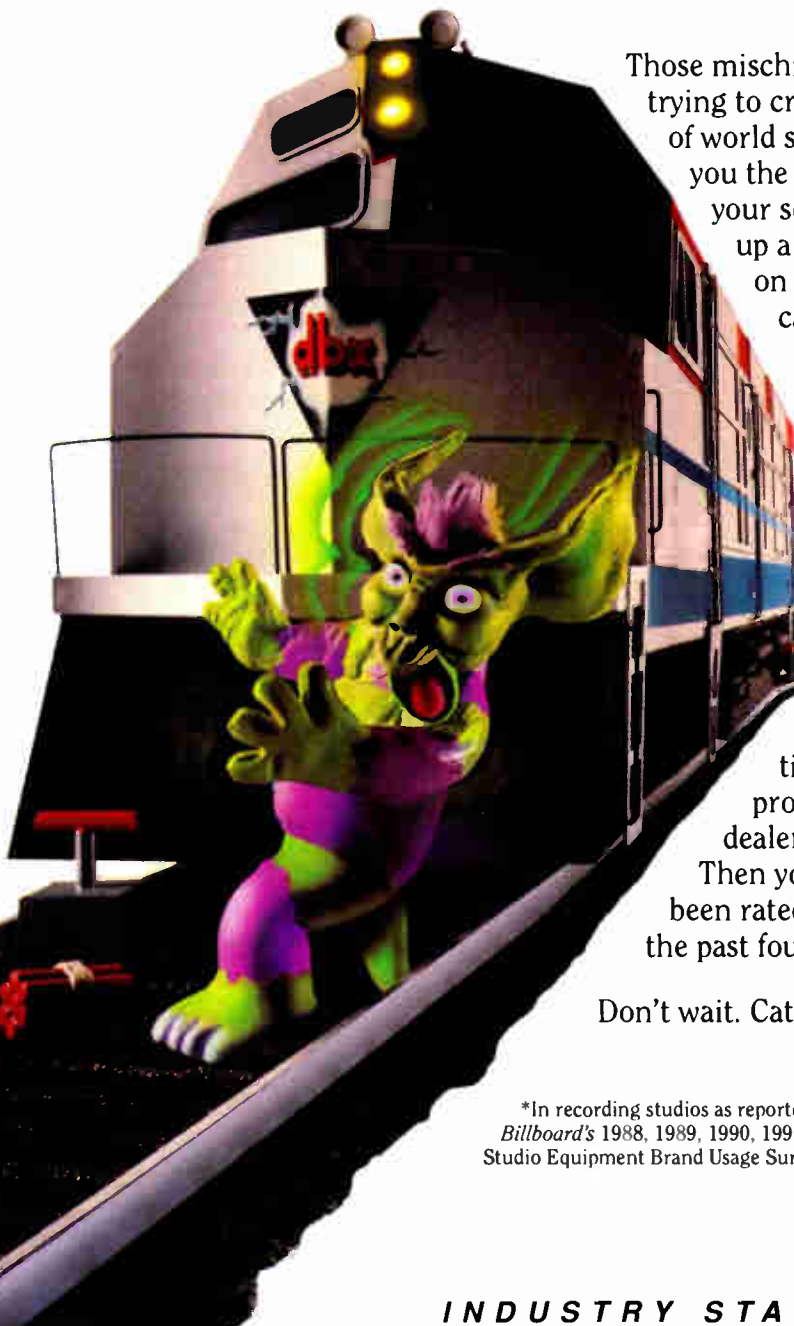
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an engineer and producer who's worked with Paul McCartney, Enya, Propaganda and Tears For Fears. (Cullum also co-produced two tracks on *Cross That Line*, together with Chris Hughes and Ian Stanley.)

The new album will also feature the blending of his own sequenced playing with live work by session musicians, as did his two previous albums. Jones spent part of last December and January in studios in Los Angeles, recording players like Ritchie Hayward, Steve Farris, Dean Parks and David Lindley. This illustrates his belief that artists' home studios will not mean the end of commercial studios, as he's still using commercial studios himself. Also, he says, "The high end of the studio market will always have equipment that you can't possibly afford."

As is to be expected from a man who is a self-pronounced studio illiterate, Jones' reasons for buying the particular pieces of equipment he owns are remarkably simple and straightforward. He says the SSL is there because of sheer habit: "I've never worked on another desk," he admits. "I know people are getting into different boards these days, but the SSL has always been good to me. I have no complaints."

His recent acquisition of a second-hand X-850, replacing his beloved Studer A800 (which is up for sale), has a bit more behind it. "My two main reasons for getting the Mitsubishi," he notes, "were its 32 tracks and its ability to bounce as often as you like without loss of quality. I can't categorically say that people will be able to tell the difference between analog and digital on a finished CD, but I like the fact that things come back on the 850 very accurately. I have Apogee filters on them, which make the high end less crunchy and the stereo image more correct. It's most noticeable when you do a lot of bouncing."

Studio gear is definitely not Howard Jones' greatest interest. But what does make him catch fire is the mention of computers and keyboards. In these areas he is a real techno-buff, who loves to talk for hours about the intricacies of some amazing high-tech toy. His main love of the moment is the StudioVision software. "I can put a whole track of live performance in there and have it running alongside the sequence and move things about, re-

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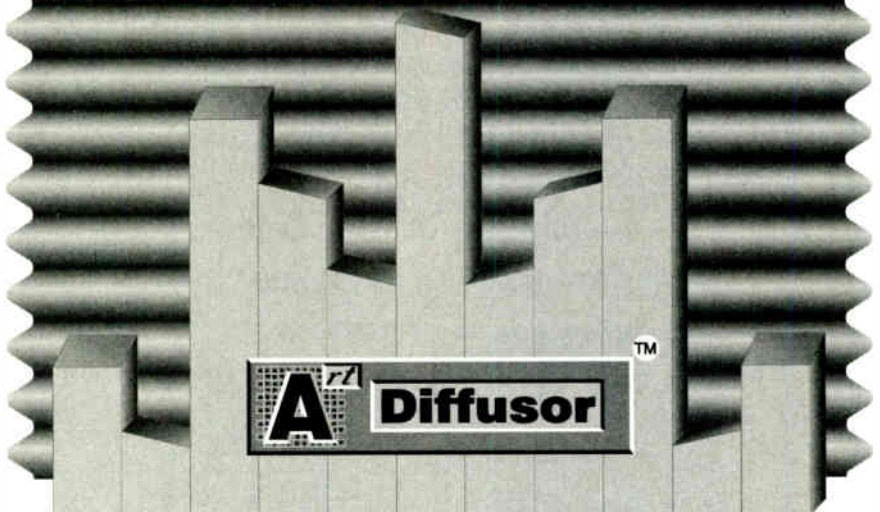
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peat these 16 bars because I like them, and so on," he says. "I use it as an editing tool. Without having the multi-track running, I can check out the live performances in conjunction with all the MIDI data. I find that very exciting."

Jones asserts that this working method, rather than leading to sterile, studied perfectionism, enhances the joys and spontaneities of live playing. "The players I recorded in L.A. were playing to some basic sequenced guide tracks, and now what we're doing here is compiling the best of those sessions with StudioVision," he says. "Knowing that we can edit things later means we can keep the spirit of live playing, yet still have the control afterward. It means that you don't have to be so microscopic about details or mistakes, which often takes all the fun out of live recording. I think that's a great development. It will make records sound more interesting, because there will be much more variety and everything won't be so locked and quantized."

For his sampling work, Jones uses the Fairlight. He finds the S1000 "dead crunchy and also very fiddly to work. I wonder why nobody has come up with a Macintosh front end for it. I just can't bear all these tiny buttons. It's utterly user-unfriendly, whereas on the Fairlight it's really easy to see what you're doing." As with his synthesizers, where he finds it important to use self-created sounds, he still takes the trouble to record his own samples. "We have whole days during which we sample things. It's important to keep that side up.

"The '80s were a lot about experimenting with the new equipment," he concludes. "It sparked some great music, but I think that now it's about getting a sense of classicism back in songwriting and also in the way records are made. That's why I've taken such a long time in writing my songs this time, and it's also why we're bringing in all kinds of old guitars and amps and sampling some of those classic sounds. Without trying to be pretentious, my new album will be a kind of post-modernist album, not trying to be new or modern for its own sake, but drawing from the great things of the past, while putting them against a modern backdrop." ■

Paul Tinggen is a London-based writer who frequently contributes to Mix.

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was a symbiotic relationship: They were our distributor in Germany. Notator and Creator were both enormously successful sequencing and notation software in Europe. We enjoyed a lot of success with them in this market as well.

"As a result of learning the Atari market, we decided to port Sound Tools to that platform," Howells adds. "We did well with that product in Europe, but in the domestic market we found that it required a new Atari. Most people were running their C-Lab products on the 1040. Because Sound Tools includes a hardware card, it requires a Mega 2 or Mega 4. When customers were faced with having to buy a new CPU, in virtually every case they opted for the Macintosh. That isn't the case in Europe, because the Mac is priced much higher there, and there is a much higher awareness of the Atari there than in the U.S. However, in recent months we've seen a dramatic increase in our Macintosh Sound Tools sales in Europe. The transition seems to be starting to take place over there as well.

"Given those things—domestic customers seem to be moving to the Macintosh, and the fact that our whole Macintosh product line took off—we decided to focus on what was the largest part of our business and what seemed to have the longest life for the U.S. market."

According to C-Lab product development coordinator and international spokesman Mikail Graham, C-Lab products are now distributed in the U.S. by San Francisco-based Thinkware, and in Canada by Thinkware in Toronto.

Over in Half Moon Bay, Calif., Anastasia Lanier at Passport Designs explains that company's reasons for ceasing development of software for the Atari platform: "We decided to focus on fewer platforms and do them well. We chose the Mac and PC because historically that's where we've seen the most volume, and that's where we think there is the greatest potential.

"The sales of Atari computers in the U.S. haven't really justified [our continued development], although Atari remains strong internationally. That's not to say that if in a year the ST becomes a really strong and relevant machine again, that we won't take

another look at it. Also, the TT030 looks like an interesting computer.

"It was not an easy decision," Lanier explains, "especially in view of the fact that Atari seems to be taking a new, more cooperative position. There is a real disappointment in the Atari marketplace that we're not going to pursue it, especially because of Encore. I guess there still is a hole in the marketplace for a strong notation program for the Atari."

To find out Atari's version of what happened over the last few years, and to hear the company's plans for the future, I talked to James Grunke, who recently took on what he admits is a daunting responsibility at Atari: that of MIDI product manager. His degree is in classical keyboard performance from the University of Wisconsin, where he helped finance his education by tuning pianos. Then he studied synth programming at the Grove School of Music, where he was introduced to Atari computers. Out of college, he toured with Crosby, Stills & Nash as keyboard technician. His business background is in digital keyboard sales at varied locations, mostly in Southern California. Prior to coming to Atari, he worked as a sound designer, keyboard technician and synth programmer for the Beach Boys.

Mix: So why have Ataris been so scarce in the U.S. for the last year or two?

Grunke: Europe is a proven market for us, so the European countries have historically received first priority on shipments of new units.

Mix: Apparently, part of the problem has been getting FCC approval. Where does that stand now?

Grunke: We're pleased to announce that the Atari Mega STE just received Class B license [consumer use]. The 1040STE, which is a *de facto* standard among musicians, has always had FCC Class B approval.

Mix: Do you have any explanation for why Atari didn't increase production to meet a willing and ready market here in the U.S.?

Grunke: If you are referring to the short supply of STACY portables, they have an FCC Class A rating [professional use only], which our legal department didn't especially want us to deal with from a retail point of view.

Mix: But isn't it true that the 1040STE has a Class B license, and even those machines were hard to get for a while?

Grunke: There was a period in early

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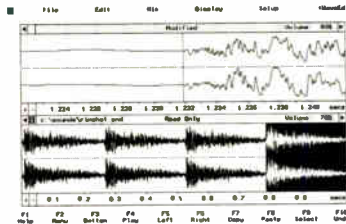
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1990 during the changeover from 1040ST to 1040STE when there was a supply problem. That situation has been resolved since June 1990. Now that we have significantly lowered the prices of the 1040STE, they are selling in greater numbers than ever before.

Mix: What about the TT030?

Grunke: The TT030 is Class A. We're hoping for FCC approval for the TT030 very soon, but I would prefer not to speculate on when that approval will come.

Mix: What is Atari's current position

with respect to the pro audio industry?

Grunke: Our most direct interface to the pro audio industry is via the SMPTE I/O. Part of the advantage is that our operating system can access the clock chip with the accuracy necessary to read 80-bits/frame SMPTE directly, and we are not required to use MIDI Time Code (MTC). We can now even lock to VTC direct. Our strong points include MIDI sequencing combined with our tape lockup abilities, and the fact that there are many hundreds of music software titles available on the platform. Some of these titles are integrated notation/sequencing/SMPTE pack-

ages, which are not available on other platforms. I see every Macintosh owner's studio as a potential candidate for an additional Atari system.

The professional hard disk recording market for the Atari is led by the Hybrid Arts ADAP System. Several other companies are developing for this application, and some are ready to market with their products in Europe. In the effort to build better computers, our decision to switch to the industry-standard Motorola VME expansion bus on the new Mega STE and 030 machines had the unfortunate side-effect of leaving Digidesign's Sound Tools without a connector, short of them retooling their card. It is mostly a physical changeover, and other developers have done so already with no problems. In fact, the VME bus offers additional addresses beyond the original Mega expansion bus. With the base price of a 32MHz/2MB 030 machine with a 50MB hard drive at \$2,399, there is an opportunity for enterprising developers.

Mix: What do you expect to do about your relationship with software developers?

Grunke: I am working directly with them with respect to marketing and technical support. We are currently implementing a marketing plan for the U.S. that will directly feature their products.

Mix: What about Atari's MIDI-Tasking software? Is it available?

Grunke: The MIDI-Tasking software you're referring to is currently not available, as each of the developers have developed their own systems, which work quite well, such as M-ROS, KCS and Softlink. It's not an in-house project.

Today, Atari's product line includes the 8MHz 1040STE (1MB RAM, expandable to 4MB), the 16MHz AegaSTE (1, 2 or 4MB RAM, and an optional 50MB hard drive), the 32MHz TT030 (expandable to 26MB RAM), and limited quantities of the STACY2 portable (2MB RAM/20MB hard drive).

Among those software developers who continue to support Atari are Dr. T's, Steinberg Jones, Hybrid Arts, C-Lab and Plasmec Technologies. Join me next month to find out what they have up their sleeves. ■

Paul Potyen is an associate editor at Mix who also works as a freelance composer, producer and keyboardist.

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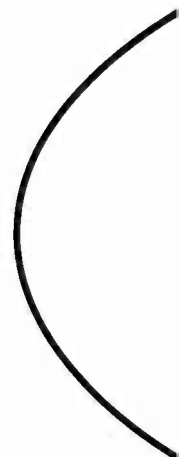
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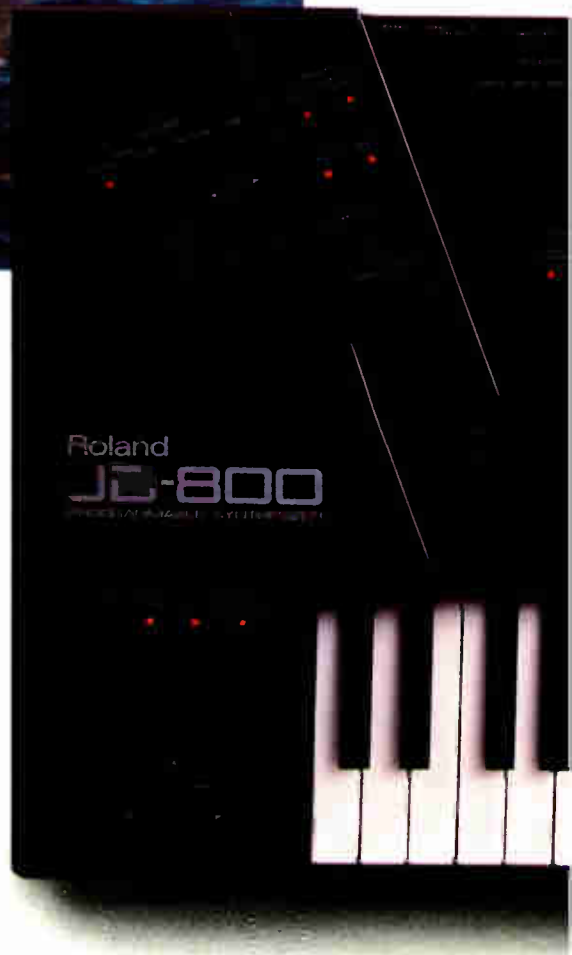
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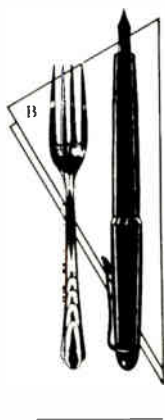


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The Art and Science of Sound

by Mr. Bonzai

TOOTS THIELEMANS

MAN BITES HARMONICA



Toots Thielemans is a big bopper, a rare bird, a soul swinger and a real character. Imagine his beginnings, playing the accordion at the age of 3 in his parents' sidewalk cafe in Brussels, Belgium, in the mid-1920s. Skip college, like he did, and pick up life in the war-torn '40s, when he fell in love with the harmonica and discovered jazz... All these years later, Toots is still filling the house.

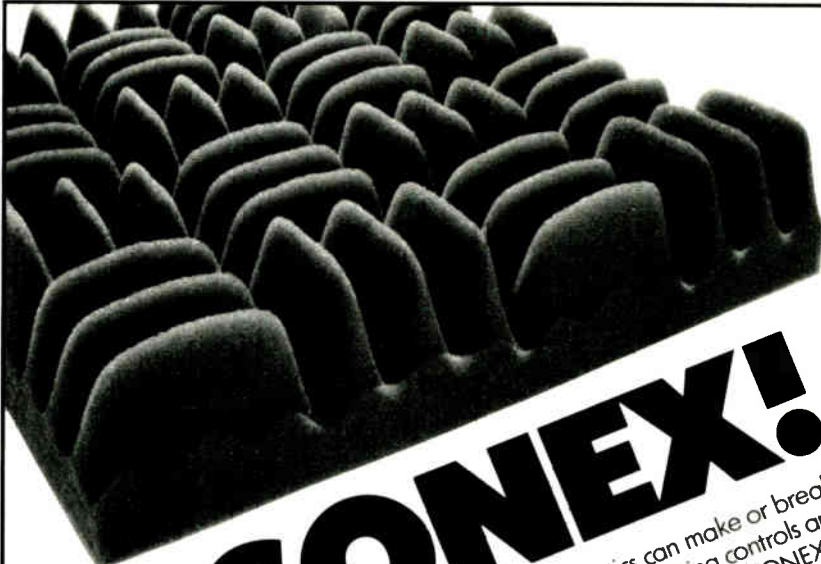
A large audience knows Toots from his music for films like *Midnight Cowboy*, *The Getaway*, *Sugarland Express* and last year's *Funny About Love*. Jazz aficionados have followed him since his bebop days, through his years with

Benny Goodman, George Shearing, Ella Fitzgerald, Peggy Lee, Bill Evans and other luminaries. Pop purists know him through his work with artists such as Quincy Jones, Paul Simon and Billy Joel.

Not only can Toots squeeze life out of a harmonica, he also plays a mean guitar and whistles up a storm. Yes, that's Toots whistling the memorable "Old Spice" deodorant theme. And let's not forget that he dreamed up the whistle and guitar combo. The emotion was always there, the mood was there, but it was never given expression before Toots.

Last year's *Footprints* is a sweet

Toots in session at A & M Studios



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showcase of Thielemans' range, backed up by the piano of Mulgrew Miller, Rufus Reid on bass and Lewis Nash on drums. You get a nice taste of originals and some inspired interpretations of Eric Satie, Thelonius Monk, Michel Legrand and Johnny Mercer.

Toots is exactly the kind of artist the world needs, one who shares his free spirit, but who also has his own demanding standards. He is living, ever-lovin' proof that a musician can satisfy both himself and the listener—that's what music is all about. Toots and I had a glass of wine during his visit to Los Angeles for the recording of a new Brazilian-flavored album. As you read his wordjazz, try to hear the bright mix of his Belgian/French accent and hepcat delivery.

Bonzai: How did you get the nickname "Toots"?

Toots: I first got the name back in 1946, in Belgium. I had become a pretty good player, and "Jean" Thielemans didn't swing at all. [Laughs] We were reading the American magazines, and there was Toots Mondello, who played saxophone with Benny Goodman, and Toots Camarata, trumpet with Tommy Dorsey and arranger for Billie Holiday. The drummer in our band thought it sounded nice and started calling me Toots. It got on a new poster, and on a record, and it stayed.

You know, it was confusing when I came to America because they thought it was maybe a girl's nickname, and then my first name being Jean—I was getting letters addressed to "Dear Miss Thielemans."

Bonzai: Did such a distinctive nickname help your career?

Toots: Well, now that I'm getting older, I guess it keeps a certain not-so-old image. Instead of [in a distinguished voice] "And now Mr. Jean Thielemans will play for you."

Bonzai: You seem busier than ever lately.

Toots: Yes, and doing things I enjoy. It's no secret that there is more jazz activity now in terms of concerts—let's call it the jazz market for a minute. Many of the jazz musicians who get acceptance in this country right away start performing also all over Europe and in Japan, where they have more possibilities for work. There is a receptivity. So I benefit from that—I am

—CONTINUED ON PAGE 122

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THE 1991 TEC AWARDS



THE 1991 TEC AWARDS

Editor's Note:

Beginning on page 93 are six pages of descriptions and biographies of this year's TEC Awards nominees. A voting ballot can be found on page 8 of subscriber issues.

Please take the time to read the nominee information and vote. Ballots must be postmarked by

*Saturday,
August 31, 1991.*

The Technical Excellence & Creativity Awards have been the meeting place for such musical legends as George Martin and Les Paul. They have been a forum for raising awareness of the importance of hearing protection and audio education. They have also spotlighted the outstanding products, facilities and people in the audio industry. Seven years after their creation, the TEC Awards have become one of the most eagerly anticipated annual events in the professional audio industry.

Created and presented by *Mix* magazine, the TEC Awards have become an institution in the industry, and the unique TEC trophy is a coveted symbol of achievement for both individuals and companies in the audio profession.

Along with the glamor and camaraderie, the TEC Awards have been extremely successful as a fundraising event. They have been attended by nearly 4,000 people and distributed more than \$130,000 to numerous worthy organizations.

The awards are divided into three major categories—Technical, Creative and Institutional achievement—and 23 sub-categories. Voting for the TEC Awards winners is a two-step process. A Nominating Panel, comprising approximately 200 prominent audio industry members, makes the initial selections. Their choices are tabulated, and a voting ballot appears in the August issue of *Mix*, whose 36,000 BPA-qualified subscribers select the winners. The results will be announced in a gala ceremony October 5 at the Grand Hyatt Hotel in New York City.

TEC Awards Hall of Fame

In 1988, the producers of the TEC Awards created the TEC Awards Hall of Fame to recognize the contributions of those special individuals who have exemplified the pursuit of excellence in our industry. Past inductees include Wally Heider, Deane Jensen, Quincy Jones, Bob Lipton, George Martin, George Massenburg, Rupert Neve and Les Paul. This year the TEC Awards Hall of Fame will honor Ray Dolby, Bill Putnam and Bruce Swedien.

The Les Paul Award

This year the Mix Foundation for Excellence in Audio and the producers of the TEC Awards have unveiled a new award named for one of the industry's most revered personalities—Les Paul.

The Les Paul Award will honor individuals or institutions who have set the highest standards of excellence in recording and sound production over the years. It is awarded to those individuals or companies who have successfully combined art and technology year after year, and whose contributions have been widely acknowledged by their peers, including, but not limited to, past recognition by the TEC Awards.

This first recipients of the Les Paul Award are each five-time TEC Award winners—mastering engineer Bob Ludwig, sound reinforcement company Clair Brothers, and recording studio Power Station.

Mix Foundation for Excellence in Audio

The Mix Foundation for Excellence in Audio was formed as a nonprofit, public-benefit corporation in the State of California in 1990 to help realize to the greatest extent possible the objectives of the TEC Awards. Its purpose is to encourage public interest in and understanding of audio, video, music and other communications media arts, and to assist programs such as those benefited by the TEC Awards.

The proceeds of the 1991 TEC Awards will be distributed by the MFEA to the following organizations:

50% to the "Hearing Is Priceless" (HIP) campaign of the House Ear Institute, Los Angeles, CA. HEI is a world leader in the assessment, treatment, and prevention of, and education about, deafness and other disorders of the ear. The House Ear Institute is a nonprofit organization supported entirely by private donations.

20% to the Audio Engineering Society Educational Foundation and the Society of Professional Audio Recording Services (SPARS) to provide scholarships and financial aid to students of audio.

20% to be divided between the winning institution and nominees for the TEC Award in the category of Recording School/Program, to establish scholarships for deserving students in the study of recording and communications arts and sciences.

10% to other charities that meet the criteria set by the board of directors of the Mix Foundation for Excellence in Audio.

TEC AWARDS VOTER'S GUIDE

House Ear Institute

Since their inception the TEC Awards have contributed a part of the proceeds to the research and prevention of hearing disabilities. For the past six years, 50% of the proceeds have been donated to the House Ear Institute of Los Angeles, California.

This year's proceeds will support the Hearing Is Priceless (HIP) campaign, co-sponsored by *Mix* magazine. This nationwide effort is attempting to increase the public's awareness about the irreversible effects of loud noise on hearing. The HIP campaign is targeting the youth audience, emphasizing the dangers of loud rock music, and, also addressing the issue of excessive noise in other forms of recreation, including motorcycles and race cars.

Earlier this year, members of the HIP board presented a seminar at Berklee College of Music in Boston, MA, and the Grove School of Music in Hollywood. Ear plugs and HIP brochures were also given to all attendees at the 1991 Grammy Awards. Board members and HEI physicians have passed along the information on national and local TV, including *The Today Show* and *20/20*. An educational package, which includes a half-hour video, a brochure, ear plugs and buttons, will also be made available to the 11,000 school districts in California beginning this fall.

The HIP advisory board is headed by guitarist Jeff "Skunk" Baxter" (former member of Steely Dan and the Doobie Brothers), and is composed of leading recording and entertainment figures from around the country, including rock correspondent Nina Blackwood, Ambrosia lead singer David Pack, A&M Records vice-president David Alpert and Doors guitarist Robby Krieger.

HEI is a world-renowned research center dedicated to clinically applied research, professional education and the prevention, treatment and diagnosis of hearing disorders. Located in downtown Los Angeles and affiliated with the USC School of Medicine, HEI pioneered the cochlear implant, which provides some hearing capability to the profoundly deaf.

Anyone interested in learning more about the HIP campaign or the House Ear Institute should contact Charlie Lahaie, PR/Promotions Coordinator for the House Ear Institute, at (213) 483-4431.

Education: Contributing To Our Education

Over the past seven years, the TEC Awards have donated more than \$60,000 to audio scholarship programs for the winners of the Recording School/Program category and the AES Educational Foundation. Schools that have received TEC Awards funds include Berklee College of Music (1985-87), University of Miami (1988) and Full Sail Center for the Recording Arts (1989, 1990).

With education now playing such an important part in our industry, the directors of the Mix Foundation for Excellence in Audio this year decided to divide 20% of the evening's proceeds among the five nominees in the Recording School/Program category, with the larger share going to the TEC Award winner. This new distribution plan has received overwhelming approval from this year's nominees.

"We're really excited. Our money will definitely be used for scholarships for students who wouldn't normally be able to attend," says Chris Haselou, chairman of the Recording Industry Management program for Middle Tennessee State University. MTSU, a seven-time nominee, is a public institution and has many students who are barely able to scrape enough money together to attend, says Haselou. Receiving part of the TEC proceeds will make things a little easier for some students. "We're really glad to have this kind of support," Haselou says.

Each year since 1985, the Audio Engineering Society Educational Foundation has received a percentage of the ticket proceeds. The money has gone into a general fund that furnishes grants to graduate students in the field of audio engineering. Since 1984, grants have been issued to more than 24 students, with the TEC Awards contributing more than \$37,000.

Beginning this year, the Society of Professional Audio Recording Services will also receive a percentage of the TEC Awards proceeds. SPARS has set up a Student Grant and Aid Program to assist qualifying students enrolled in audio recording programs nationwide. These funds will be earmarked for the payment of travel and/or per diem expenses incurred in connection with internships, job interviews, attendance of industry technical and business conferences and other SPARS-approved educational travel needs. Grants will be awarded based primarily on financial need, but with consideration for student achievement, promise, motivation and the end use of the grant.



The Ceremony

This year's TEC Awards will be held Saturday, October 5, at the Grand Hyatt Hotel in New York City. The evening's festivities begin at 6 p.m., with the awards ceremony beginning at 8:30.

Anyone wishing more information about the TEC Awards or the Mix Foundation for Excellence in Audio, contact Karen Dunn, TEC Awards Executive Director, at (415) 562-7519.

TEC SPONSORS

PLATINUM SPONSORS

To help realize to the fullest possible extent the charitable goals of the TEC Awards, the board of directors of the Mix Foundation for Excellence in Audio created a sponsorship program to help support and benefit the TEC Awards.

There are three levels of sponsorship: Silver (\$3,000), Gold (\$7,500) and Platinum (\$10,000). For the second consecutive year, four companies have elected to support the TEC Awards by becoming Platinum sponsors. They are: Act III Publishing, Ampex Corporation, JBL Professional, and Neve/AMS Industries. The Mix Foundation for Excellence in Audio and the TEC Awards are grateful for their continued support, as well as the companies listed below that have purchased Gold and Silver sponsorships.

Act III Publishing



Act III Publishing is the parent company of *Mix* magazine, *Electronic Musician* magazine and the *Mix Bookshelf*. *Mix* is the leading professional publication for audio and music production, with 40,000 subscribers in the U.S. and more than 90 foreign countries. *Electronic Musician* is devoted to the application of electronic instruments and computers in music performance and production, and has a circulation of more than 75,000. *Mix Bookshelf* is the largest direct mail source of books and software dealing with audio, video and music production. Act III Publishing is a subsidiary of Act III Communications, a diversified entertainment company with substantial interests in movie theaters, television stations and TV and motion picture production.

Ampex Corporation



For the second year, video post-production is being supplied by Ampex Recording Media Corporation. Ampex contributes editing and technical support via the Ampex Teleproduction Center in Redwood City, CA. Ampex is a worldwide leader in the manufacture of video and audio tape, and video hardware.

Neve and AMS Industries



Neve has designed and manufactured multitrack audio consoles for the music recording and mastering, video post-production, film and broadcast industries for more than 30 years. A pioneer in the design of console automation systems for more than ten years, Neve is the manufacturer of Flying Faders, a breakthrough in console automation technology. Neve has also been the exclusive North American distributor of Mitsubishi Digital Pro Audio tape machines since April 1989.

AMS Industries is a world leader in the design and manufacture of hard disk audio recording and editing systems. AMS is also well-known for its digital delays and reverb units.



In July of 1986, Neve was acquired by Siemens AG of Austria and Germany and became part of the Siemens Audio Video Group of companies. Neve North America, headquartered in Bethel, CT, has offices in New York, Los Angeles, Chicago, Nashville and Toronto.

AMS Industries joined the Siemens A/V Group in September of 1990. AMS North America is also headquartered in Bethel, with offices in New York, Los Angeles, Nashville, Chicago and representation in Seattle.

JBL Professional



One of the early pioneers in motion picture and professional sound, JBL has developed an industry-wide reputation for manufacturing high-quality loudspeaker transducers and systems. Recording studios around the world have used JBL monitors for years to mix and master some of the finest music ever recorded. Today JBL (headquartered in Northridge, CA) holds numerous loudspeaker design patents and registered trademarks, including Bi-Radial® as applied to horn design, Vented Gap Cooling™ as applied to loudspeaker design, and Control® Series as applied to studio monitor design.

JBL manufactures JBL/UREI signal processing equipment and power amplifiers, and UREI Time Align® monitors, and distributes Soundcraft consoles. In 1991, JBL Professional acquired the Audio Digital lines of digital delays for the sound contracting market. A division of Harman International Industries, Inc., JBL Professional markets products to many segments of the sound reinforcement industry in the United States, Canada and Mexico.

GOLD SPONSORS

Yamaha Corporation of America

SILVER SPONSORS

Alesis Corporation

Dolby Laboratories, Inc.

Panasonic/Ramsa

Aphex Systems Ltd.

Lexicon Inc.

TASCAM

Crown International, Inc.

Meyer Sound

3M Corporation

Laboratories Inc.

I. OUTSTANDING INSTITUTIONAL ACHIEVEMENT

Awarded to those companies, facilities or institutions that have contributed most significantly to excellence and innovations in audio.

A. Recording Studio

A&M Studios, Hollywood, CA: Founded in 1967 by Herb Alpert and Jerry Moss, A&M Studios include five recording studios, a post-production duplication facility operating 130 cassette machines in real time and a digital mastering suite featuring the Sonic System. Artist credits were not available.

Conway Recording Studios, Hollywood, CA: Musical ventures performed at Conway during the eligibility year included Guns N' Roses, Dire Straits, B.B. King, Rod Stewart, Bad English, Bonnie Raitt, Hall & Oates, Little Feat, Aaron Neville, Michael Bolton, Julio Iglesias, Rick Astley, Neil Diamond, L.A. Guns, Simply Red and Teenage Mutant Ninja Turtles. Soundtrack work included *Look Who's Talking, Too, Out For Justice* and *If Looks Could Kill*. Conway is Los Angeles' only Focusrite studio (with GML automation). Neve VR72s equipped with moving fader automation and GML recall reside in Studios A and B. Other equipment includes three digital Mitsubishi X-880s, and two digital Mitsubishi X-86HS.

Ocean Way Recording, Hollywood, CA: During the eligibility year, Ocean Way played host to Paula Abdul, Elvis Costello, Crowded House, Bob Dylan, John Hiatt, Iggy Pop, Michael Jackson, Elton John, Nils Lofgren, Branford Marsalis, Sinead O'Connor, Sandi Patti, Bonnie Raitt, Bruce Springsteen, Stray Cats, Was (Not Was), Sam Phillips and Wilson Phillips. Film score work included *Hot Spot, The Russia House, Marrying Man* and *Godfather III*. Ocean Way has seven tracking/scoring and mixing rooms equipped with custom API and Neve consoles, all with GML automation, ATR-124, 104/102 and A800 MkIII analog tape machines, and 3348, X-850 and X-86HS (with Apogee filters) digital machines.

Right Track Recording, New York, NY: During the eligibility year, Right Track worked with Madonna, Yes, Luther Vandross, Carly Simon, Sting, Living Colour, Hall & Oates, M.C. Hammer, The Boys, C&C Music Factory, Amy Grant, Whitney Houston, Lisa Fischer, Foreigner, Richie Sambora and Mariah Carey. Equipment in Right Track's two rooms includes a custom 80-input SSL G series board in a winged design (Studio A) and a 64-input SSL E series with G computer (Studio B). The facility also sports two Sony PCM-3348 digital multitracks and four Studer A800 Mark III analog multitracks.

Skyline Studios, New York, NY: During the eligibility year Skyline Studio's three-room facility was occupied by Nile Rodgers, who produced such acts as The Vaughan Brothers, Stray Cats, Ric Ocasek, Cathy Dennis and his own band, Chic, with Bernard Edwards; Neil Dorfsman who worked on the first solo record by Bon Jovi lead guitarist Richie Sambora, and a new MCA release, *The Blessing*; producers Cliviles and Cole who worked with C&C Music Factory in the studio and MIDI room; and Scott Litt, who produced *All Shook Down* by The Replacements.

B. Remote Recording Facility

ASL Mobile Audio, Flushing, NY: During the eligibility year, ASL worked with Robert Cray, Stanley Jordan, Manhattan Transfer, Bob James, Michael Franks, Basia, David Benoit, Lee Ritenour, Grover Washington, Jr., Spyro Gyra, Savoy Brown, Mick Taylor, Blues Project, John Zorn, De Dannan, Modern English, Jack Rubies, The Godfathers, Lenny Kravitz, Ernie Isley, Faith No More, Voi Vod, Soundgarden, and Flo and Eddie/The Turtles, as well as VH-1, BBC, NHK, Harcourt Films, PolyGram, PMV, FM-Osaka, WBCN-FM, WQCD-FM, WFNX-FM and the Stoli

World Music Series. ASL is a complete audio production facility equipped to handle on-location live or studio TV and radio broadcasting, audio for video/film, and album work nationwide.

Effanel Music Inc., New York, NY: Effanel's 1991 credits include: Peter Gabriel—"POV" (concert video, Athens, Greece); Rolling Stones—"Flashpoint"; Phil Collins—"Serious Hits Live"; Kathleen Battle/Jessye Norman—"Spirituals" (Great Performances); Eric Clapton (Royal Albert Hall); Ziggy Marley--*Jahnekya* (Kingston, Jamaica); the 1991 Grammys; INXS—Live; Lincoln Center's "Classical Jazz" series; R.E.M.—"Tour Film"; and Amnesty International's celebration of democracy in Santiago, Chile, featuring Sting, Peter Gabriel, Wynton Marsalis and Sinead O'Connor. Effanel has two recording systems—the "Porta-Forty-Eight" flight case system for worldwide coverage and a 45-foot SSL Total Recall mobile control room. Both systems offer dual 48-track digital or 24-track Dolby SR analog formats.

Le Mobile, North Hollywood, CA: During the eligibility year Le Mobile recorded Jon Bon Jovi's "Blaze of Glory," the choir for the "Voices That Care" project, audio for a Carol N' Company TV production, "Roxy Blue" for Geffen (with Guns N' Roses producer Mike Clink), the live music for Oliver Stone's film *The Doors*, and recorded and mixed the audio for Jane's Addiction's MTV video "Ain't No Right." Le Mobile is equipped with a Neve 8058 console, newly fitted with Flying Faders automation and an added 10 channels from a new Neve Prism rack (also with Flying Faders). Other equipment includes two Studer A800s with Dolby SR and a new Studer TLS4000 for locking the two 24-track recorders.

Remote Recording Services Inc., Lahaska, PA: Remote Recording Services is now operating its third-generation mobile unit, the "Silver Studio." The new 60-foot tractor/trailer features API's all-discrete 48-bus console with instant I/O reset and GML faders, Audio Scope's video displays with metering of up to 96 tracks; and KRK's three-way monitoring system powered by Bryston amps. The machine room is wired for up to five 48-track recorders, each with a Lynx synchronizer. House machines are two Studer A820s with Dolby SR. Recent credits for RRS include Billy Joel's video "Live From Yankee Stadium," the Harry Connick Jr. TV special "Swinging With Harry," and live albums by Jimmy Buffett (*Feeding Frenzy*), Donald Fagen (*NY Rock & Soul Revue*) and the Rolling Stones (*Flashpoint*).

Westwood One Mobile Recording Division, Culver City, CA: During the eligibility year Westwood One worked with such artists as Guns N' Roses, Steve Winwood, The Pet Shop Boys, Aerosmith, Janet Jackson, Madonna, Fleetwood Mac, Black Crowes, Little Feat, Bruce Hornsby, Midnight Oil, Motley Crue, Billy Idol, REO Speedwagon and Bad Company.

C. Sound Reinforcement Company

Audio Analysts, Plattsburgh, NY: During the eligibility year, Audio Analysts worked on a major stadium tour with New Kids on the Block, and made history with Billy Joel by being the first to hold a rock concert in Yankee Stadium. Other clients included Heart, Freddie Jackson, Front 242, Bell Biv DeVoe, Moscow Circus and the Teenage Mutant Ninja Turtles. Audio Analysts installed a permanent system at the Superstars Nightclub in Toronto, and semi-permanent systems at the Chene Park Amphitheatre in Detroit, the Pacific Amphitheatre in Costa Mesa and the Kingswood Music Theatre in Toronto. The company's R&D office, located in Montreal, completed a series of custom digital cross-overs and six custom-designed consoles (the AA/CADD-SM 56-input series) in January.

Electrotec Productions Inc., Canoga Park, CA: During the eligibility year clients included Tom Petty, Rush, Billy Idol, Barry Manilow, Randy Travis, Alabama, Cher,

Rickie Lee Jones, Lynch Mob, Lenny Kravitz, Tesla, Alice Cooper, Clash of the Titans, Queensryche, Ratt, Don Dokken, Great White, Ted Nugent, Ricky Van Shelton, Megadeth and Rod Stewart. Electrotec provides touring sound services from Canoga Park, CA, Nashville, and London, England. Principals include Rikki Farr, CEO; Pierre D' Astuges, president; Mick Whelan, research and development; Jim Douglas, operations manager; and David Gautrey, chief service engineer.

Maryland Sound Industries Inc., Baltimore, MD: MSI can field 16 arena-sized installations at the same time. Current installation projects include Anaheim Stadium, Baltimore Stadium, Universal Studios Hollywood ("E.T.'s Adventure"), Telemecanique World Headquarters Building, the Carlos Moseley Pavilion for the New York Philharmonic and the New York Metropolitan Opera. The touring department's roster includes Pink Floyd, Whitney Houston, Hall & Oates, Dolly Parton, Gloria Estefan and Miami Sound Machine, Crosby, Stills & Nash, Neil Young, Sheena Easton, Frankie Valli, The Cure, Anne Murray, Kenny G, Patti LaBelle, Depeche Mode, Paula Abdul, David Bowie, Luther Vandross, Joe Jackson, Dan Fogelberg, Morrissey and The Pet Shop Boys.

Showco Inc., Dallas, TX: During the eligibility year Showco and its Prism® sound system have been the worldwide choice of Paul McCartney, the Rolling Stones, ZZ Top, Phil Collins, Reba McEntire, INXS, Eric Clapton, Living Colour, James Taylor, George Michael, Steve Winwood, Diana Ross, the late Stevie Ray Vaughan, Joe Cocker, Winger, Lynyrd Skynyrd, The Highwaymen, Linda Ronstadt, Moody Blues, Little Feat, Joe Satriani, Robert Palmer, Santana, the Beach Boys, the Bee Gees, ELO Part 2 with the Moscow Symphony Orchestra, Willie Nelson, and the Rock in Rio II Festival. Now in its 21st year, Showco continues to expand its international scope through rapidly growing European and Japanese operations, while serving major artists throughout Australia, Latin America and Asia.

Ultra Sound, San Rafael, CA: Credits were not available at presstime.

D. Audio Post-Production Facility

Advantage Audio, Burbank, CA: Opening its doors in July 1990, Advantage Audio worked on 20 episodes of *Captain Planet* and *The Planeteters*, five half-hour episodes of *Captain N*, 16 new episodes of *The Real Ghostbusters*, and six half-hours of *Star Street*. They also created and built the sound effects and Foley for a live-action film called *Dinosaurs* (working title), produced by Golden Ratio Films.

EFX Systems, Burbank, CA: During the eligibility year, EFX Systems completed *Final Approach*, the first feature film to be all-digital from dialog recording (DAT) to release print (CDS). Among the 18 other features posted completely in digital were *Frankenstein Unbound*, *The Lunatic* and *To Sleep With Anger*. *thirtysomething* completed another season at EFX, using seven NED digital systems. Surround sound digital post was provided for Disney's *Hull Street High* and telefilm *Plymouth*. Digital post was also done on Lifetime Cable's *Days and Nights of Molly Dodd*. EFX created digital tracks for theme parks from Florida's Universal Studios and Epcot Center to Japan's Sanrio Puroland and Oita Park.

Post Logic Inc., Hollywood, CA: During the eligibility period, all four networks did on-air promotion with Post Logic. Series work included *Star Search*, *Comic Strip Live*, *Showtime at the Apollo*, *Jeopardy*, *The Simpsons* (ADR looping), *Doctor, Doctor*, *Teach*, *Inside Track* and *The Adventures of Mark and Brian*. TV specials finished at Post Logic included "Frank Sinatra's 75th Birthday," "America's Hope Awards," "America's Dance Honors," "Phil Collins Seriously," "The Moscow Peace Festival," and "Julie Andrews in Concert." Other work included a feature for Republic Pictures (9-1/2 *Ninjas*), music scoring

for David Foster's "Voices That Care," and music videos for M.C. Hammer and Aerosmith, among others. Post Logic also installed new Neve and Synclavier systems.

Howard M. Schwartz Recording Inc., New York, NY: During the eligibility year, Howard Schwartz Recording completed audio projects for TV and cable, including *Dinosaurs*, PBS' "Into The Woods," Oprah Winfrey's "Nine," NBC-TV's "Spy TV Pranks" and *Saturday Night Live*, "Amnesty '90," and Showtime's "Really Big Shoo." Music video work included "Midnight Oil—Black Rain Falls" and Spike Lee's "Spike and Co.: Do It A Capella." Other projects included promotions for "The Will Rogers Follies" and "Bye Bye Birdie," as well as industrials for many leading Fortune 500 companies.

Sync Sound Inc., New York, NY: During the eligibility period, Sync Sound did audio post-production work for concert videos by Harry Connick Jr., Billy Joel, Mariah Carey and Johnny Mathis. Series work included *Monsters*, "The Barbara Walters Specials," *Great Performances*, *Dance in America*, *American Playhouse*, *Frontline* and *CTW*. Sync Sound's nine studios are equipped with Sony 3348, 3324, 1630 and DAT digital, as well as Otari 24-, 16-, 8-, 4- and 2-track analog. Video formats include D-2, 1-inch Type C, Betacam SP and 3/4-inch. The seven-year-old facility recently installed a New England Digital PostPro SD, complementing the existing disc-based capabilities of four 4-hour AMS AudioFiles.

E. Mastering Facility

Artisan Sound Recorders, Hollywood, CA: During the eligibility year, Artisan Sound mastered work for Frank Sinatra, The Scorpions, Iggy Pop, Don Henley, Colin James, Bruce Hornsby, Kylie Minogue, Nelson, Material Issue and Sonny Boy Williamson. Now in its second year of ownership by CMS Digital, Artisan has updated the studio with a complete digital editing system and CD reference disc capability.

Bernie Grundman Mastering, Hollywood, CA: During the eligibility year, Bernie Grundman Mastering worked on recordings for such artists as Wilson Phillips, Barbra Streisand, Anita Baker, NWA, Quincy Jones and Yanni. The facility offers three fully equipped studios, capable of all-digital domain processing, with a hard disk editing system and a digital evaluation room complete with a CD reference cutting system.

Masterdisk Corporation, New York, NY: During the eligibility year, Masterdisk worked on "Drella" by Lou Reed and John Cale, and projects for the B-52's, Gloria Estefan and Miami Sound Machine, Guns N' Roses, Hall & Oates, Joni Mitchell, Kings X, Mariah Carey, Mother Lovebone, New Kids on the Block, Pat Metheny, Paul McCartney, Phil Collins, Prince, Public Enemy, Roger Waters, Ruben Blades, Rush, Shelia E., Sinead O'Connor, Sisters of Mercy, Slaughter, Stanley Jordan, Sting, Tears for Fears, Tevin Campbell, The Law, The Mission, The Vaughan Brothers, The Who and ZZ Top.

MasterMix, Nashville, TN: During the eligibility year MasterMix worked on projects by Alan Jackson, K.T. Oslin, Ray Pennington, Holly Dunn, Bruce Carroll, D.C. Talk, Eric Darkin, 4 Him, Margaret Becker and Kennedy Rose. MasterMix's analog equipment includes a Neumann VMS 70 lathe with Technics quartzlock, direct motor drive, SAL 74 B cutter rack and SP 272 console. The cutting console is an all-transformerless, highly modified design that employs Sontec and API equalizers, and Sontec and NTP compressors. Digital signal processing is taken care of via an extensive Harmonia Mundi Acustica system. Other equipment includes an AMS AudioFile, Sonic Solutions Sonic System, and outboard devices by Apogee, Pygmy and VTL.

Sterling Sound, New York, NY: During the eligibility year, Sterling Sound mastered projects for such artists as Madonna, Led Zeppelin (box set), Whitney Houston, Warrant, James Brown (box set), C&C Music Factory,

Steve Winwood, Poison, AC/DC, Extreme, Ric Astley, Yes, Lenny Kravitz, Winger and Roxette. Sterling Sound is outfitted with Neve DTCs, Sony and Mitsubishi digital playback systems, the Teldec DMM system and the Audio Animation Muse Digital Transfer system. Mastering engineers include George Marino, Ted Jensen, Greg Calbi and Jose Rodriguez.

F. Acoustics/Studio Design Company

Russ Berger Design Group Inc., Dallas, TX: During the eligibility year RBDG's projects included mastering rooms for Sterling Sound, NYC; private studios for Steve Miller; two new audio suites for GTN, Detroit; audio and video post rooms for ABC-TV, NYC; JC Penney's new 25,000-square-foot recording and broadcast facilities; W*USA TV facilities, Washington, DC; NBC's *Saturday Night Live* and David Letterman; National Public Radio, Washington, DC; Battery Studios, NYC; Bill Yound Productions, Houston; WFDD-FM, Winston-Salem; James Neel Productions, Dallas; NBC Edit 4 and WNBC Edit 2; NBC *Today Show* set; Beach Boys; control rooms for the Donahue show; University of Northern Colorado; University of Utah—KUED/KUER/EDNET; International Cassette Corporation, TX; Triad Studios, Des Moines; and MasterMix, Nashville.

Perception, Inc., Los Angeles, CA: During the eligibility year Perception worked on Sony Music and Huzo's Studios in Mexico; Sony Music in Canada; a room at Criteria in Miami; a room at Cherokee in Los Angeles; and RMS Music in North Hollywood.

RPG Diffusor Systems Inc., Largo, MD: During the eligibility year, RPG Diffusor Systems™ developed a new diffusing fractal surface called a Diffactal™ and applied it at several studios including Crawford Post in Atlanta and Winfield Sound in Toronto. Dr. Peter D'Antonio founded RPG Diffusor Systems in 1983 to develop new architectural acoustic materials and designs to enhance the acoustics of critical listening and performance environments.

Walters-Stork Design Group, New Paltz, NY: During the eligibility year, acoustic design projects included Studio 9, Howard Schwartz Recording, New York, NY; 13,000-square-foot/six-studio complex, JSM Music, New York, NY; seven studios, Margarita Mix and Admusic, Hollywood, CA; Studio/Control A renovation, Soundshop, Nashville, TN; Control A renovation, Crawford Post, Atlanta, GA; two tapeless suites, Electric Melody-Lantana Center, Santa Monica, CA; a complete tracking suite at Cove City for producer Rick Wake, Long Island; and acoustical consulting for SBK/EMI Records and Mercury Records.

Waterland Design, Los Angeles, CA: During the past year Waterland has worked on projects in the U.S., Canada, Italy, Spain and Japan. They include DeMann Entertainment, Interscope offices (acoustic design), and The Complex Studio A, in Los Angeles; Conway Studio C, Music Grinder Studio B, 525 Post production room, and A&M conference room, Hollywood; Bryan Adams' studio, Vancouver; Psycho Studio, Milan; IRc2 Studio and rehearsal room and LAB Club (acoustic design), Tokyo; and AIM Resort Studio, Karuzawa, Japan.

G. Recording School/Program

Berklee College of Music, Boston, MA: The Music Technology Division offers a four-year degree/diploma program focusing on professional production, engineering, music synthesis skills and extensive hands-on training. The Berklee facilities include seven fully equipped studios (three 24-track); a digital/video post-production editing room; three synthesis rooms with individual workstations and MIDI-equipped ensemble/recital rooms. Courses include analog/digital audio, automated mixing, digital/video post-production, maintenance, music business, sound reinforcement and MIDI-SMPTE synchronization systems.

Full Sail Center for the Recording Arts, Winter Park, FL: The official training center for Neve and New England Digital, Full Sail offers a Recording Arts Specialized Associates degree and/or Video and Film Production Specialized degree. Over 2,700 hours of training are offered with more than 1,350 hours of hands-on lab work. The school is located on a 50,000-square-foot, nine-studio complex and equipped with a Neve VR60, SSL 6000E and Sony MXP 3036 consoles, five 24-track tape machines, three Synclavier suites with Direct-to-Disk, a 48-track mobile recording unit, a MIDI studio and a newly acquired performing arts theater.

Institute of Audio Research, New York, NY: During the eligibility year, IAR updated its multitrack recording program with the new Recording Engineering & Production (REP) program, which places special emphasis on digital recording, editing, storage formats, MIDI and computer control. IAR also offers a separate diploma program in video technology. IAR has increased its offerings of advanced training programs for working audio and video professionals and is also the U.S. training facility for Solid State Logic.

Middle Tennessee State University, Murfreesboro, TN: During the eligibility year a \$15 million communications complex was completed. It houses recording studios, video studios, video and audio post-production rooms, a remote recording truck, a MIDI laboratory, classrooms, and maintenance and research facilities. Acoustical spaces were designed by Russ Berger. Major equipment suppliers include SSL, WaveFrame, Sony, Studer, Dolby, Otari, Apple, Meyer, Lexicon, Eventide, RPG, Klark-Teknik, Bryston, J.L. Cooper, Durrroughs, TimeLine, Aphex, AKG, Neumann and Audio Precision. The Recording Industry Management Department provides a comprehensive liberal arts education along with educational opportunities in the creative, technical and business sides of the industry.

University of Miami, Coral Gables, FL: Graduates engineered or assisted on Grammy-winning albums by such artists as Whitney Houston, The Bee Gees, the Allman Brothers, Vladimir Horowitz, Itzhak Perlman, Daniel Barenboim, Willie Nelson, 2 Live Crew and The Simpsons. Graduate students authored research papers on optical recording, laser optics, data compression, digital video and digital signal processing. Faculty member Ken Pohlmann was voted a Fellowship in the AES, edited a new book and lectured on DSP in Japan. John Montiforte recorded a direct-to-CD live concert featuring graduate Pat Metheny with the school's concert jazz band.

II. OUTSTANDING CREATIVE ACHIEVEMENT

Awarded to those individuals or teams who have achieved the highest levels of excellence in professional audio.

A. Recording Engineer

Bob Clearmountain: During the eligibility year, Bob Clearmountain has produced and mixed albums for King Swamp (*Wise Blood*), Paul McCartney (*Triping the Live Fantastic*), mixed albums for Edie Brickell & New Bohemians and Altered State, and singles and selected album tracks for Wendy and Lisa, The Neville Brothers, Michael Penn and Toni Childs.

Frank Filipetti: Filipetti's work during the eligibility period included recording and mixing McAuley-Schenker Group (MSG); Carly Simon: *My Romance*, *Have You Seen Me Lately?*; Carly Simon In Concert—*My Romance* (an HBO Special), and *The Postcards From The Edge* soundtrack, featuring music by Carly Simon. He also mixed Beverly Craven (*Beverly Craven*) and Beth Nielsen Chapman (*Beth Nielsen Chapman*).

Roy Halee: During the eligibility period Roy Halee engineered Paul Simon's album *Rhythm of The Saints*.

Roger Nichols: During the past year Roger Nichols engineered albums for country artists Roseanne Cash, Jim Lauderdale and John Denver; jazz saxophone players Jackie McLean, Bob Sheppard and Marty Krystal; jazz pianists John Beasley, Andy Beasley, Andy Lavern and Lee Ann Ledgerwood; Indian-based music by Ali Akbar Khan and Jai Uttal; as well as the Michael Franks album *Blue Pacific* that went to Number One on the charts.

Hugh Padgham: During the eligibility year, Hugh Padgham engineered and mixed Sting's *The Soul Cages*, remixed Joan Armatrading's single "Love and Affection," and mixed Suzanne Vega's *Days of Open Hand*.

B. Record Producer

Bruce Fairbairn: During the eligibility period, Bruce Fairbairn produced Poison's *Flesh and Blood* and AC/DC's *Razor's Edge*.

Patrick Leonard: Last year's projects included producing several tracks for Madonna's *I'm Breathless* and "Broken Arrow" for Rod Stewart's *Vagabond Heart* LP.

Scott Litt: During the eligibility year Scott Litt directed traffic for The Replacement's *All Shook Down* album, the Indigo Girls' *Nomads, Indians, Saints* and R.E.M.'s *Time Out*.

Hugh Padgham: During the eligibility period Hugh Padgham produced Sting's *The Soul Cages* album.

Nile Rodgers: During the eligibility period Nile Rodgers produced "Soldados del Amor," "Puerta" and "Te Dare Todo" for Ole Ole, "A Little Bit of Love" for Paul Young, *Family Style* by the Vaughan Brothers, *Let's Go Faster* by the Stray Cats, co-produced Cathy Dennis' latest LP and worked with Chic, Charlie Sexton, Ric Ocasek and Lionel Richie.

C. Mastering Engineer

Greg Fulginiti: During the eligibility year Greg Fulginiti mastered records for Aerosmith, Black Crowes, Jane Child, The Church, Bo Diddley, Chris Isaak, Colin James, Elton John, The Lightning Seeds, Megadeth, Nelson, Iggy Pop, Bonnie Raitt, Scorpions, Timmy T., Trixter and Johnny Van Zant.

Bernie Grundman: During the eligibility period Bernie Grundman mastered work for such artists as Billy Joel, Anita Baker, Roseanne Cash, Quincy Jones, James Ingram, Barbra Streisand and Sheena Easton.

Ted Jensen: During the past year Ted Jensen, vice president of Sterling Sound, mastered albums or CDs for Madonna, Simple Minds, C&C Music Factory, Mike & The Mechanics, Carly Simon, Robbie Neville and Foreigner.

George Marino: During the eligibility year George Marino mastered projects for Roxette, AC/DC, Whitney Houston, Guns N' Roses, Led Zeppelin (boxed set), Cinderella, Extreme, Great White, David Lee Roth, Skid Row, Robert Palmer, Chicago, White Lion, Edie Brickell, EMF, Tesla Live and Neil Diamond.

Denny Purcell: Owner and president of Georgetown Masters, Purcell mastered works for Garth Brooks, Mary Chapin Carpenter, Carlene Carter, Vern Gosdin, Bela Fleck & the Flecktones, Highway 101, Brenda Lee, Kathy Mattea, Mark O'Connor, Dolly Parton, Sandi Patti, Ricky Van Shelton, Doug Stone, Take 6, Pam Tillis, Travis Tritt, Don Williams and Hank Williams Jr.

D. Sound Reinforcement Engineer

Dave Kob: During the eligibility year Kob provided sound reinforcement for Sting's tour in the U.S., Japan, Australia, South America and now Europe.

David Morgan: During the eligibility period Dave Morgan was house engineer with Sheena Easton and Paul Simon's "Born At The Right Time" tour.

Mike Ponczek: During the eligibility year Mike Ponczek was engineer/mixer for Paul McCartney's arena/stadium tour of the world including Japan, the U.K. and the U.S., and system engineer/audio project coordinator for Rock in Rio II, featuring George Michael, INXS, Prince, Guns N' Roses, New Kids on the Block and a-ha. He is currently system engineer/mixer for the ELO Part II with Moscow Symphony Orchestra tour.

M.L. Prociase: Senior sound engineer and senior sales executive for Showco, M.L. Prociase mixed ZZ Top's "Recycler World Tour" during the eligibility period.

David Scheirman: During the eligibility period David Scheirman mixed Linda Ronstadt's "Cry Like A Rainstorm" tour, was sound reinforcement director for the Hawaii Jazz Festival and the Pacific Symphony Orchestra's outdoor summer season, worked on Rock in Rio II, and was sound designer/sound mixer for ELO Part II with Moscow Symphony Orchestra Tour.

E. Remote/Broadcast Recording Engineer

Barton Chiate/Gordon Klimuck: During the eligibility year Klimuck and Chiate provided the sound mixing for *The Arsenio Hall Show*.

Bob Clearmountain: During the eligibility period Bob Clearmountain mixed the television sound for the Roy Orbison Tribute Concert, the Rolling Stones concert from Atlantic City for Fox TV, the John Lennon Tribute from Liverpool and "The Big Day," the 1990 "City of Culture" celebration from Glasgow, Scotland for British TV.

Randy Ezratty: During the eligibility period Randy Ezratty's mixing credits include the performances of Aerosmith, Phil Collins, Bob Dylan, Billy Idol and Living Colour on the 1991 Grammys telecast.

Ed Greene: During the eligibility period Ed Greene worked on the "100th Anniversary of Carnegie Hall," the 1991 Grammy Awards, the Tony Awards, Kennedy Center Honors, Christmas in Washington, AFI Salute to Kirk Douglas, the Easter Seal Telethon, Grammy Living Legends and *Star Search*.

David Hewitt: During the eligibility period David Hewitt was recording consultant and co-engineer for the Rolling Stones "Steel Wheels" tour and their *Flashpoint* live album and video; audio producer and engineer for Harry Connick Jr.'s "Swinging With Harry" and the Broadway show "Black and Blue" television specials; and recording engineer for the Billy Joel "Live From Yankee Stadium" video, Neil Young's *Ragged Glory* live album and video, Midnight Oil's "Black Rain Falls" video, and Tesla's *Five Man Acoustical Jam* live album and video.

F. Audio Post-Production Engineer

John Alberts: During the eligibility period John Alberts provided music mix/audio post-production for *Into The Woods* (PBS) and *Midnight Oil*, "The River Runs Red"; audio post-production for "The Rolling Stones-Steel Wheels" (Fox) and "Toonces: The Driving Cat and Friends" (NBC); sound design and audio post for *Spy TV Franks* (NBC) and "The Roy Orbison Tribute" (Fox). Film work included *Object of Beauty* (dialog replacement and premixing). Series work included audio post work for *Saturday Night Live*.

Tom Davis: Eligibility year projects for Tom Davis included "The Rolling Stones 25x5" documentary, "The Very Best of the Ed Sullivan Show," "The 1991 Billboard Music Awards," *The Tracey Ullman Show*, the pilot for *Dream On*, *The Cowboy and the Frenchman*, a short film by David Lynch, *Star Search*, and "The Moscow Music Peace Festival." Commercial and promotional work includes the "This is not your father's Oldsmobile" campaign and the "Voyager, Sundance, Acclaim" campaign.

Ken Hahn: Audio post-production credits for Ken Hahn include "Billy Joel Live at Yankee Stadium," "Van Morrison Live," Johnny Mathis "Chances Are," "Black and Blue" and "Michael Jordan's Playground" for home video release. Television specials include "The Muppets Salute Jim Henson," "Tchaikovsky 150th Birthday Gala From Leningrad" and "The Barbara Walters Specials." He also mixed documentaries, children's programs, and series work for PBS, NBC, ABC, CBS and HBO.

Gregg Landaker/Mike Minkler/Wylie Stateman: During the eligibility year, the team of Landaker, Minkler and Stateman provided audio post-production for the Oliver Stone movie *The Doors*.

Mel Zelniker: Audio post credits for Zelniker include *Kojak* (TV series); *H 2 Worker* (Sundance Film Festival winner); *Journey to America* (shown daily at Ellis Island); *Journey to America* (PBS); *Men of Respect*; *The Comfort of Strangers*; *The Sunset Gang* (PBS); *Nova* (PBS TV); *Straight Out of Brooklyn*; *Hangin' With the Homeboys* and *Stepkids*.

III. OUTSTANDING TECHNICAL ACHIEVEMENT

Awarded to those products or innovations that have made the most significant contributions to the advancement of audio technology during the eligibility year.

A. Signal Processing Technology

Amek Medici Equalizer: The Medici equalizer is a dual-channel unit with four bands of equalization and swept 20dB pass filters on each channel. Bands may be cascaded to make a mono eight-section unit. EQ can also be switched into a side chain. Other features include a variable Warmth control and a Sheen control. Thirty-two of the EQ switches can be controlled via MIDI, allowing bands to be swapped or switched in and out from code.

Apex Model 720 Dominator II: The Dominator II is a stereo multiband peak limiter with zero overshoot. Once the peak ceiling is set, there is no higher amplitude at the output. Multiband processing solves the problem of spectral gain intermodulation by splitting the audio into three frequency bands and processing these bands separately. The Dominator II uses program-dependent, intelligent circuits to reduce the number of controls. It also uses Automatic Limit Threshold (ALT) to produce a predictable peak output while maintaining maximum loudness, without audible distortion.

Drawmer Auto-Comp Model DL241: The DL241 is a 2-channel expander/gate/compressor/limiter. Features include the Gate design to deliver optimum sonic quality within the limitations of a single knob; a new Drawmer circuit, "Program Adaptive Expansion," which automatically adapts the expander to the dynamics of the incoming signal; a smooth, soft knee compressor design (controls include Threshold, Ratio, Attack, Release and Gain); Auto mode for attack and release to extend the application range; Peak Level, with Zero Response Time and Zero Overshoot, is a soft clipper, and prevents excessive continuous peak levels from distorting the output.

Lexicon LXP-15 Multi-Effects Processor: The LXP-15 contains 128 Lexicon sounds built from reverb, pitch-shift, stereo chorus-delay, gate, plate and multi-effects algorithms, all controlled via the front panel. Everything is controlled by a page knob and five-choice LCD menu display. All 27 effects parameters can be automated in real time with Lexicon's Dynamic MIDI®. MIDI program changes allow access to the unit's 128 user registers. For MIDI-phobic users, the LXP-15 has five assignable foot control jacks on the rear panel that use switches, 50k pots or pedals to access parameters and change programs.

Lexicon 300 Digital Effects System: The Lexicon 300 features Dynamic MIDI® for complete automation of all effects parameters in real time, as well as the ability to write MIDI information directly from the 300's soft knob to sequencer. Effects can be changed via SMPTE time code (50 events) or MIDI (128 events). Sixty-four times oversampled delta-sigma A/D converters and 8x oversampled D/A converters give clear audio performance. Digital I/O is supported for PDIF (coax and optical) and AES/EBU formats. The 300 can convert between these formats and combine analog and digital inputs to function as a stereo mixer.

Zoom 9010: The Zoom 9010 offers studio-quality, 16-bit, 44.1kHz sound in a single rackspace. It can change into an individual reverb designed to accurately reproduce or create any performance space, or four discrete signal processors with onboard mixing, or a multi-effects processor for solo instruments. The 9010 features 60 preset patches, 60 user patches, RAM card storage of 180 patches, and 40 effects programs. New effects programs or new routings can also be loaded into the 9010's open-ended architecture.

B. Recording Devices/Storage Technology

Akai DD1000 Optical Disk Recorder: The DD1000 is a stereo recorder and digital audio editor utilizing a removable, rewritable magneto-optical disk with a capacity of 650 MB. The DD1000 records in mono or stereo and can output four channels (two stereo pairs). 1-bit A/D conversion (64x oversampling) and 18-bit D/A conversion (8x oversampling) are utilized. The DD1000 provides nondestructive editing capabilities and many DSP functions. Recordings can be triggered by a built-in SMPTE-driven cue list via MIDI or by real-time trigger. Rear panel ports include SCSI I, SCSI II, SMPTE, RS-422, MIDI, word sync, and digital and analog audio.

AMS AudioFile Plus: The latest 16-output, 8-input version of the AudioFile hard disk digital audio editing and recording system, the AudioFile Plus has analog and digital inputs/outputs, ADR software, remote machine control and powerful editing functions and operation speed. Software to process and auto-conform video-edit decision lists, combined with machine control functions, allow the system to offer a high degree of automation when conforming original source material and final edits. DSP processors provide scrub-editing and "Timeflex" real-time time compression and expansion.

Panasonic SV-3700 Professional DAT Recorder: The SV-3700's 1-bit converters bring improved performance and linearity over conventional A/D converters and reduce both zero cross and signal distortion, producing cleaner, clearer audio at low or high levels. Other features include push-button fade-in and fade-out functions; balanced inputs and outputs; and -10 dBu or +4 dBm output levels, for interfacing with virtually all studio systems. Up to 400 times fast-forward/rewind and search speeds, to provide high-speed access to any point on a two-hour DAT tape within 27 seconds.

Sony PCM-7000 Series: The PCM-7000 Series includes the PCM-7050 editing recorder and the PCM-7030 and PCM-7010 recorders/reproducers. The RM-D7300 Editing Controller provides 1 ms accurate electronic editing of audio and ID codes with adjustable crossfade time and preview, and edit and review operations. Available features include time code recording, reference video input, confidence monitoring, electronic editing, AES/EBU digital I/O, serial 9-pin and parallel control interfaces, RS-232C interface, instant start, chase synchronization, ID code writing, spot erase and time code format conversion.

Studer D820-48 48-Channel DASH Digital Recorder: The D820 offers 48 tracks along with four auxiliary channels and is fully compatible with all 24- and 48-track DASH recorders or video machines. Its 40-second RAM-based sound memory board can be utilized for track slipping and digital ping-pong. To match the 4x oversampling D/A converters, Studer designed low-noise passive filters. Other features include fast tape

transport, digital input/output for AES/EBU, MADI, SDIF Multi, DSP-based signal processing for crossfading, switching and error-correction, an internal synchronizer, and a remote meter.

3M 996 Tape: 3M 996 is able to record at operating level +9 with virtually no distortion. The tape's signal-to-noise ratio is 79.5, the highest of any analog audio mastering tape on the market. It also offers maximum output levels of 14.0 dB and improved signal-to-print characteristics. 3M 996 is bias-compatible with 3M 226 and other industry products, so the user can record without major adjustments to equipment. Available in a variety of formats and sizes, 3M 996 is 100% laser scanned for consistent end-to-end quality.

C. Console Technology

Crest/Gamble EX Monitor Console: Based on the Series EX House Console, the EX Monitor Console offers features and layout optimized specifically for stage monitor mixing. The console is configured with 48 inputs with 16 mono mix buses feeding a 16 x 16 matrix and 16 output channels, all within 74 inches. In addition, each channel includes 4-band full parametric EQ, sweepable low-cut filter, stereo aux level and pan, 20-segment LED meter and eight programmable scene mutes. Each of the 16 output groups includes a 5-band full parametric EQ, eight programmable scene mutes, master control level and 20-segment LED meter. Standard features include a comprehensive patch bay system with mic and stage box scrambling.

Euphonix Crescendo Audio Mixing System: The Euphonix Crescendo is a digitally controlled, analog mixing system. Its compact mix controller acts as a digital interface between the console operator and a remote audio mainframe, connected via a single control cable allowing convenient installation in a room. The Crescendo's onboard computer system operates in conjunction with a personal computer to store, retrieve and edit all aspects of a recording or mixing session. Snapshot Recall™ restores all console settings, including levels, mutes, EQ, sends, preamps and routing, in less than 1/30th of a second. Dynamic Mix Automation™ provides a powerful word processor-like approach to mixing.

Harrison SeriesTen-B: The SeriesTen-B is the first and only totally automated audio control console system. It can be instantly configured for use in video post, teleproduction, motion picture production, music recording and mixing, and live theater. Interfacing with the Macintosh II, the SeriesTen-B can change configurations in less than 1.5 seconds. It also stores all parameters and settings of every module, grouping faders and monitor control to the computer system for later use. Every knob and switch resets automatically, and every move is followed in real time and replicated exactly during playback.

Mackie CR-1604: In just seven rackspace, the CR-1604 provides low noise and high headroom (90 dB S/N at +4 dB all channels assigned, and +22 dB at all outputs); phantom-powered 48V mic inputs with discrete front ends (-129 dBm EIN); seven aux sends per channel; EQ at musically useful points; in-place stereo solo; UnityPlus fader design; sealed rotary controls; double-redundant, parallel-wired dual pots; steel chassis; and internal power supply. The \$1,099 16-channel mixer is the first four-way configurable mixer. An add-on mic input pod and combiner can expand its capabilities to 32 or 48 channels.

Otari Premiere Console: Designed for feature film and television post-production, the Premiere is available with an unlimited number of input modules, and can be configured to accommodate from one to three or more engineers. Each input module features dual line inputs, sweepable highpass and lowpass filters, 4-band fully parametric equalizers, LED input level meter, 4-channel panning with precise divergence control, and eight aux sends. Other features include integrated machine control, comprehensive monitor system computerization and Diskmix 3/Film Moving Fader Automation providing switch, fader and mute automation on each input module.

Soundcraft 3200: The 3200 offers a classic split-configuration with full 32-bus routing and direct access to a total of 64 tracks. True differential summing buses offer excellent noise and crosstalk performance. A maximum of 100 fader-controlled line inputs are available for mixdown and can generate up to 20 aux sends. An advanced noise gate is included on every channel and monitor input. The 3200 features full-range, padless microphone preamps, A/B switching on the monitors, and patented active panpot device. Central control of a number of major functions is also available, including mic/line switching on the inputs and global multitrack.

D. Musical Instrument Technology

Alesis SR-16 16-Bit Stereo Drum Machine: By using dynamic articulation to incorporate timbral changes into drum sounds, the SR-16 attains a new level of expression and realism for drum machines. Included in the more than 233 sounds are numerous stereo samples, many including reverb and ambience. The recorded preset rhythms and "song on the fly" programming give the user instant access to rhythm accompaniment. Extensive programming is also offered with features that include rhythm shift of any beat to single-pulse accuracy, comprehensive MIDI implementation and good sound module capability.

Akai S1100 Stereo Digital Sampler: The Akai S1100 is a 16-bit stereo, RAM-based sampler designed both as a musical instrument and as a digital recording/editing device for audio/video post-production. One-bit A/D (64x oversampling) and floating D/A conversion techniques are utilized, and internal memory can be expanded to 32 MB. Standard features include 11 polyphonic outputs, AES/EBU digital output, a SCSI port, and SMPTE time code read/write, with a cue list programming function for direct synchronization and triggering. A built-in DSP board offers 50 digital effects programs, all user-editable.

E-mu Proteus/2: The Proteus/2 multitimbral digital sound module is a 32-channel, ROM-based sample/synthesis instrument with 128 ROM presets and 64 user-definable presets containing 8 MB of 16-bit "orchestral" samples from the Emulator III sound library. It also features six polyphonic outputs, effects send/returns, extensive modulation and real time controls, and it is multitimbral on all 16 MIDI channels.

Ensoniq EPS-16 Plus Digital Sampling Workstation: The EPS-16 combines high-quality sampling with digital effects processing. Featuring true 16-bit sampling resolution, the EPS-16 Plus has a 100dB signal-to-noise ratio and a frequency response of 2-20 kHz. The 24-bit effects processor can produce single and multiple effects algorithms with real-time modulation of a variety of parameters. Features include Ensoniq's Poly-Key™ Pressure keyboard and Patch Select buttons, as well as a play-while-load disk and a 16-track sequencer with extensive editing capability and automated mixdown for final production. A variety of DSP functions and an extensive voice architecture give the user total control to shape sound.

Korg Wavestation: This 32-voice synthesizer features advanced vector synthesis and wave sequencing technology. More than 350 waveforms are onboard (more on PCM cards), including attack transients, "loop-only" waveforms and time splices. Synthesizer parameters include dynamic lowpass filters, envelope generators, low-frequency oscillators and modulation matrix. Onboard dynamic digital multi-effects allow dynamic control over effects parameters. Other features include two effects processors, 47 effects algorithms, 64 x 240 graphics LCD, four audio outputs and two programmable foot control inputs.

Roland S-770 Digital Sampler: This 16-bit stereo sampler offers a variety of features, including a built-in 40MB hard disk, 24-voice polyphony, 32-part multitimbral capabilities, 44.1 and 48kHz sampling rates, digital inputs and outputs, seven looping modes, expandable memory using standard Macintosh SIMMS, and a CRT interface. The S-770's digital Time Variant Filters incorporate multimode

filtering and a resonance parameter for flexible sound creation capabilities; new sounds can be created using the unit's internal resampling function. The S-770's new Version 2.0 software adds sample rate conversion, time stretching, cut and splice, compression and expansion, and the ability to scrub waveforms.

E. Transducer Technology/Microphones

AKG C 1000S: This electret condenser microphone has a cardioid pickup pattern, with the ability to convert to hypercardioid by placing the included PPC 1000 polar pattern converter over the diaphragm element. Operable with phantom power or a standard 9V battery, there is no change in the mic's sound quality between cardioid, hypercardioid, phantom or battery power. Its backplate design provides ruggedness and minimizes handling noise. High-sensitivity (6 mV/Pa), high maximum sound pressure level handling capability (137 dB for 1% THD), and a smooth frequency response curve make the C 1000S a good choice for a variety of recording and sound reinforcement environments.

AMS ST-250: The ST-250 is a flexible, single-point stereo condenser microphone system that produces an accurate stereo image with total remote control flexibility over the effective capsule angle and polar patterns, allowing for a variety of applications for stereo and mono broadcast recording. Its sonic flexibility is the result of its patented, four-capsule, tetrahedral array combined with surface-mount component technology. The ST-250 can switch remotely from X-Y to M-S stereo formats, and from vertical to end-fire orientation. The system is powered via AC mains, battery or 48V phantom powering, allowing unrestricted use both in the studio and on location.

Beyer MC742: The MC742 is ideal for all stereo, mid-side and X-Y recording configurations. The microphone is designed with two double-diaphragm capsules arranged vertically, one on top of the other. The upper condenser can be rotated 360 degrees in relation to the lower capsule to accommodate a complete range of recording techniques. Other features include elastically suspended capsules containing membranes 21.5 mm in diameter; five polar patterns that can be manually adjusted or remotely adjusted with the MSG 740 power pack; a 10dB attenuation switch for when high SPLs are expected; and a built-in bass roll-off filter that cuts the frequency response below 35 Hz at 12 dB per octave.

Electro-Voice RE27N/D: The E-V RE27N/D microphone is designed for use in production, recording and live sound. Similar in design to the RE20, the RE27N/D combines the neodymium technology with Variable-D® to offer increased sensitivity provided by N/DYM®. Other features include three switchable filters (one for high frequency, two for low), enabling selection of a flat high end or a shelving emphasis above 4 kHz; multi-frequency equalization; and internal shock-mounting.

Neumann TLM 50: Based on the M 50 tube-type microphone, the nickel diaphragm of the TLM 50 is only 12 mm in diameter and is mounted on a 40 mm diameter Lucite sphere. The mic exploits the special acoustical pressure build-up and diffractive characteristics of a sphere, yielding a particularly smooth transition into the pressure build-up region for frequencies above 1,000 Hz, and an even rise in the directional index as the frequency increases. As a result, in the upper frequency range the TLM 50's directional properties are comparable to a pressure-gradient mic, and in the lower frequency it operates as a pressure transducer with a linear response.

Shure VP88 Stereo MS Microphone: This single-point MS stereo condenser microphone incorporates a forward-facing cardioid capsule, a perpendicular bi-directional side capsule, and a built-in stereo matrix to provide wide, natural, uncolored response for optimal stereo imaging, yet it's 100% mono-compatible. Three switch-selectable levels of stereo effects control the degree of stereo "spread" and ambience pickup. A fourth switch position provides mid and side outputs directly.

Phantom or 6V internal battery power and low-frequency roll-off are also switch-selectable. The VP88 provides smooth, extended response and high-quality stereo imaging for film and video production, sound reinforcement, live music recording and stereo sampling.

F. Transducer Technology/Loudspeakers

Clair Brothers Audio 12 AM Portable Stage Monitor System: The 12 AM system includes amplifiers with built-in processing and crossovers, as well as a rack that features easy patching. System racks are available with 4 or 8 inputs and can drive eight or 16 monitors. The powerful bi-amplified system has built-in processing to deliver optimum response curves for both vocal and instrumental reproduction in a live stage situation. The monitor's rounded corners and compact dimensions (14.5 inches high x 22.5 inches wide) allow it to be placed on stage without blocking sight lines.

Electro-Voice MT-2: The MT-2 manifold speaker system is designed for touring sound and large club systems. First introduced in the MT-4 concert system, E-V's Manifold Technology® allows for greater output from smaller cabinets. The two-box MT-2 system comprises the MTH-2/94 mid/high cabinet and the MTL-2 low-frequency enclosure. The MTH-2/94 features two DL 10X cone drivers, manifolded into a 90 x 40-degree fiberglass horn for mids, and two modified DH1A drivers, also manifolded into a 90 x 40-degree horn for highs. Both horns can be rotated for vertical or horizontal applications. The MTL-2 is a manifolded design with two DL 18MT drivers.

JBL SR4700 Series: Offering innovative new loudspeaker technology in a high-powered, lighter-weight cabinet design, each of the 12 models incorporate titanium-diaphragm compression drivers with patented diamond surround, patented Bi-Radial™ horns and patent-pending Vented Gap Cooling™ low-frequency transducers. The flexible crossover networks offer smooth system voicing and contain switching jacks, which allow the option of bi-amplification. The cabinet is covered with a proprietary heavy fabric laminate for long life and extreme durability. The unique trapezoidal shape of the cabinets permits tight cluster grouping to form arched arrays when used in multiples.

KRK 703 Close-field Monitors: KRK 703's combine aerospace materials with advanced technology, design and construction to produce a compact, two-way system for console-top, close-field monitoring. Capable of generating SPLs above 105 dB and frequencies from 54 Hz to 15k, the 703s are custom-designed and engineered. The tweeters utilize stamped Kevlar with inverted domes for low distortion and off-axis polar response. Woofers are custom honeycomb polyglas/Kevlar, with magnets that provide maximum flux density.

Ramsa 500-Series Speaker System: Ramsa 500-Series systems comprise WS-A500 modules for mid-high frequency of 100 Hz to 20 kHz, and WS-A550 low-frequency modules. When joined by the WS-SP2A, the components combine to create a powerful, full-range sound system. Each module weighs under 39 pounds. The compact size (22 x 15.5 x 10.7 inches) makes them easy to transport and install, while enabling a large number of modules to be installed in coherent proximity to each other. Ramsa A-500s are different from other small-box units because they are nonprocessed, creating pure sound.

Tannoy Monitor Series: The Monitor Series consists of discrete System 2 NFM, the dual concentric System 8 NFM, System 10 DMT, System 12 DMT, System 15 DMT and System 215 DMT. Representing the hallmark of Tannoy's Differential Material Technology (DMT™), any speaker component capable of storing energy is effectively isolated by a surround or mount made from a different material or a fused bond generating a differential. Their application eliminates unwanted speaker biases, characteristics and acoustic signatures. The result is a more accurate representation of mix, free of extraneous harmonics and resonant vibrations generated by components, cabinets and airspace within non-DMT enclosures.

G. Computer Software/Peripherals

Digidesign/OSC DECK™: Multitrack recording and mixing is available on Sound Tools and Audiomediam hard disk recording systems with DECK digital multitrack recording software. DECK features unlimited track bouncing, sound on sound recording, automated mixdown, real-time digital effects and optional 2:1 data compression. In addition, DECK brings together the two worlds of digital audio recording and MIDI instruments by playing standard MIDI files while recording and playing audio. With Audiomediam, DECK also offers digital effects and optional 2:1 data compression.

Digidesign SampleCell™: SampleCell is a 16-bit, RAM-based stereo sample playback card for the Mac II. It features 16 CD-quality voices, eight polyphonic outputs and up to 8MB of standard Mac II RAM. SampleCell includes a 600MB CD-ROM sound library disk, interface software and Sound Designer II SC software for sample editing and universal sample transfer. Additional SampleCell cards add 16 more voices each, for up to 64 voices, 32 outputs and 32MB of RAM. The system is compatible with Sound Tools or Audiomediam.

Digidesign Sound Tools 2.0™: Sound Tools is a stereo disk recording and playback system based on the Macintosh II platform. Featuring extensive editing features and powerful digital signal processing, Sound Tools is ideal for music editing, mastering and audio post-production. Sound Tools consists of the analog interface, analog-to-digital converter, the Sound Accelerator™ digital signal processing card, and Sound Designer II audio editing software. Features include 16-bit, 44.1 kHz direct-to-disk digital recording and playback; nondestructive playlist editing; high-quality, real-time dynamics compression/expansion/noise gate; stereo time compression/expansion; pitch shift with time correction; 2:1 or 4:1 data compression options; and real time parametric/graphic EQ.

JL Cooper CS-1 Control Station: The CS-1 Control Station is an easy-to-use mouse replacement for hard disk-based recording systems, MIDI sequencers and multimedia software. The CS-1 features conventional controls that look and feel like a tape recorder transport with large buttons for Record, Play, Stop, Fast Forward and Rewind. Other features include an optically encoded jog/scrub wheel, large tape transport-type buttons, programmable function keys, cursor keys and a programmable footswitch input. Using the optional CS-1 Remote software for Macintosh computers, multiple key command sets can be saved as templates for different applications. The CS-1 is available in Macintosh, MIDI and RS-232 versions.

Opcodes Studio Vision: Studio Vision combines Opcode's sequencing software program, Vision, with the ability to record and edit digital audio, eliminating multitrack syncing situations when combining MIDI and live tracks. Studio Vision works in conjunction with Digidesign's Sound Tools or Audiomediam card and allows playback of two mono digital audio channels simultaneously, with the amount of recorded digital audio material limited only by hard disk space. The program incorporates extensive nondestructive editing of the digital audio along with the MIDI. Studio Vision includes SMPTE synchronization and full automated mixing of the digital audio tracks with pan and volume control.

Techron TEF System 20: Driven by proprietary Sound Lab software for Macintosh or PC-compatible computers, Techron's TEF System 20 occupies a single-rackspace chassis, yet offers a wide array of features, including the ability to digitally filter out ambience noise and make measurements with higher signal-to-noise ratios than ever before. More general-purpose than previous versions, TEF System 20 allows users to easily verify noise levels, intelligibility, RT60 and traditional TDS measurements for time, frequency and phase. Its software-based approach safeguards against obsolescence and provides simple operation with user-friendly pull-down menus and many one-button commands.

H. Ancillary Equipment

Audio Precision Portable One: Portable One is a high-performance, lightweight audio test set for field, bench and studio use. It contains a low-distortion generator and a 2-channel analyzer, including measurement functions for noise, amplitude ratio, crosstalk, wow and flutter, as well as innovative AC mains check and generator load measurement features. Portable One is housed in a rugged, custom-fabricated case with a hinged disappearing protective cover for the front panel connectors, operating controls and bright back-lighted supertwist LCD display.

Crown Macro-Reference Amplifier: The Macro-Reference amplifier is outfitted with the essence of a 20-bit digital device, and utilizes an ultimately damped, high-excursion design that delivers a transparent sound. Features include a power supply based around an advanced toroid, virtually eliminating electromagnetic interference; Output Device Emulator Protection (ODEP) circuitry to obtain precise transfer function, as monitored by the Input/Output Comparator, and greater control of the amp's internal signal; and a state-of-the-art convection cooling system with a computerized, on-demand proportional fan to prevent thermal overload.

Niche ACM Audio Control Module: The ACM is an inexpensive way to bring professional automation into the MIDI studio. Housed in a single rackspace, the ACM uses a unique non-VCA design to control the audio levels of eight channels with a signal-to-noise ratio better than 95 dB and a frequency response that is flat to within 1 dB from 30 to 30k cycles. The ACM responds to MIDI controller data, and units may be chained to provide automation for an unlimited number of channels. In addition to eight individual outputs, each unit contains a stereo/mono mix out, allowing it to be used as a MIDI-controlled submixer.

QSC EX 4000 Amplifier: The EX 4000, the flagship of the new EX line, delivers 1,100 watts per channel into 4 ohms. Several new "core" technologies were utilized throughout the EX line. The first greatly improves the efficiency of the amp, minimizing waste heat and AC current consumption. Next, closed-loop thermal and protection systems monitor actual operation to smoothly and safely intervene only to the degree necessary. Last, the debut of Open Input Architecture allows the use of second-generation signal processing and a wide variety of computer control, digital audio or fiber optic systems as they become standardized.

RPG Diffractal Diffusor: The QRD® Diffusor, introduced in 1983, offered an innovative approach to reflection control without absorption. In an effort to provide full-spectrum sound diffusion in a single integrated diffusor, RPG combined the self-similarity property of fractals with the number theoretic reflection phase grating to produce a patented new diffusing fractal called the Diffractal™. The Diffractal consists of a high-frequency diffusor nested within a mid-frequency diffusor, which in turn is nested within a low-frequency diffusor. The diffusors differ only in scale and form a three-way, band-limited system similar to a three-way loudspeaker, with adjustable crossover points.

I. Sound Reinforcement Product of the Year

ATI Paragon Console: The Paragon is a universal house/monitor live performance mixing console. Available in formats from 24 to 64 channels, the console is capable of both VCA and audio group mixing. The large-scale bus structure features 16 aux sends per channel, 16 sub masters (16 mono/8 stereo) with 4-band parametric EQ, a stereo mix bus, four stereo matrix outputs and four mono matrix outputs. Metering is provided by 24 stereo fluorescent displays and 120 LED bar graphs. Additional features include 9 VCA masters with mutes, eight stereo effects returns with three-band semi-parametric EQ, a built-in noise generator/oscillator, and full talk-back and intercom facilities.

Crest/Gamble EX Monitor Console: Based on the Series EX House Console, the EX Monitor Console offers features and layout optimized specifically for stage monitor mixing. The console is configured with 48 inputs with 16 mono mix buses feeding a 16 x 16 matrix and 16 output channels, all within 74 inches. In addition, each channel includes 4-band full parametric EQ, sweepable low-cut filter, stereo aux level and pan, 20-segment LED meter and eight programmable scene mutes. Each of the 16 output groups includes a 5-band full parametric EQ, eight programmable scene mutes, master control level and 20-segment LED meter. Standard features include a comprehensive patch bay system with mic and stage box scrambling.

JBL SR4700 Series: Offering innovative new loudspeaker technology in a high-powered, lighter-weight cabinet design, each of the 12 models incorporate titanium-diaphragm compression drivers with patented diamond surround, patented Bi-Radial™ horns and patent-pending Vented Gap Cooling™ low-frequency transducers. The flexible crossover networks offer smooth system voicing and contain switching jacks, which allows the option of bi-amplification. The cabinet is covered with a proprietary heavy fabric laminate for long life and extreme durability. The unique trapezoidal shape of the cabinets permits tight cluster grouping to form arched arrays when used in multiples.

Sabine FBX Feedback Exterminator: This single-rackspace, microprocessor-controlled filtering device automatically finds and eliminates feedback in sound systems quicker and with less tonal distortion than is possible with an equalizer. The FBX is typically placed between the mixer and the power amp in a sound system where it can continuously monitor the program for feedback. Once feedback occurs, the FBX places a narrow notch filter on the frequency of the feedback. The depth of the notch filter is controlled to eliminate the feedback without adversely affecting the program.

Soundcraft Venue Console: The Venue is a modular, 8-bus live board available in 16, 24, 32 or 40 channels. Input modules offer six aux sends and four mute group facilities with an innovative Stereo Width control. This enables the image width of a stereo input to be continuously varied, from mono through stereo and on to phase-enhanced wide stereo. The output section offers an optional 11 x 8 matrix. Capable of handling a large number of inputs and outputs, the combined Dual Group/Stereo Return module can generate both subgroups and stereo effects returns. The Venue uses a single-piece steel frame, with each module integrated with individual rear connectors, radically reducing the number of internal looms and connectors.

TC Electronic 6032/1128 Remote Equalizer: The TC6032 is the first moving fader remote control for 1/3-octave graphic equalization, allowing instantaneous control of up to 32 TC1128 equalizers at distances up to 330 feet. Each of the connected equalizers' 99 memory internal parameters and Spectrum Analyzer may be viewed on the TC6032's LCD display. Additional features include memory transfer to/from any connected EQ, computer-aided response to display Real Response curves, and feedback Search & Destroy™. The companion MM24 MIDI distribution interface also merges TC6032 data with an IBM PC compatible or Macintosh running TC's EqTalk™ control software.

J. Recording Product of the Year

Akai DD1000 Optical Disk Recorder: The DD1000 is a stereo recorder and digital audio editor utilizing a removable, rewritable magneto-optical disk with a capacity of 650 MB. The DD1000 records in mono or stereo and can output four channels (two stereo pairs). 1-bit A/D conversion (64x oversampling) and 18-bit D/A conversion (8x oversampling) are utilized. The DD1000 provides nondestructive editing capabilities and many DSP functions. Recordings can be triggered by a built-in SMPTE-driven cue list via MIDI or by real-time trigger. Rear panel ports include SCSI I, SCSI II, SMPTE, RS-422, MIDI, word sync, and digital and analog audio.

Digidesign Sound Tools 2.0™: Sound Tools is a stereo disk recording and playback system based on the Macintosh II platform. Featuring extensive editing features and powerful digital signal processing, Sound Tools is ideal for music editing, mastering and audio post-production. Sound Tools consists of the analog interface, analog-to-digital converter, the Sound Accelerator™ digital signal processing card, and Sound Designer II audio editing software. Features include 16-bit, 44.1kHz direct-to-disk digital recording and playback; nondestructive playlist editing; high-quality, real-time dynamics compression/expansion/noise gate; stereo time compression/expansion; pitch shift with time correction; 2:1 or 4:1 data compression options; and real time parametric/graphic EQ.

Lexicon 300 Digital Effects System: The Lexicon 300 features Dynamic MIDI® for complete automation of all effects parameters in real time, as well as the ability to write MIDI information directly from the 300's soft knob to sequencer. Effects can be changed via SMPTE time code (50 events) or MIDI (128 events). Sixty-four times oversampled delta-sigma A/D converters and 8x oversampled D/A converters give clear audio performance. Digital I/O is supported for PDIF (coax and optical) and AES/EBU formats. The 300 can convert between these formats and combine analog and digital inputs to function as a stereo mixer.

Opcode Studio Vision: Studio Vision combines Opcode's sequencing software program, Vision, with the ability to record and edit digital audio, eliminating multitrack syncing situations when combining MIDI and live tracks. Studio Vision works in conjunction with Digidesign's Sound Tools or Audiomeia card and allows playback of two mono digital audio channels simultaneously, with the amount of recorded digital audio material limited only by hard disk space. The program incorporates extensive nondestructive editing of the digital audio along with the MIDI. Studio Vision includes SMPTE synchronization and full automated mixing of the digital audio tracks with pan and volume control.

Panasonic SV-3700 Professional DAT Recorder: The SV-3700's 1-bit converters bring improved performance and linearity over conventional A/D converters and reduce both zero cross and signal distortion, producing cleaner, clearer audio at low or high levels. Other features include push-button fade-in and fade-out functions; balanced inputs and outputs; and -10 dBu or +4 dBm output levels, for interfacing with virtually all studio systems. Up to 400 times fast-forward/rewind and search speeds, to provide high-speed access to any point on a two-hour DAT tape within 27 seconds.

3M 996 Tape: 3M 996 is able to record at operating level +9 with virtually no distortion. The tape's signal-to-noise ratio is 79.5, the highest of any analog audio mastering tape on the market. It also offers maximum output levels of 14.0 dB and improved signal-to-print characteristics. 3M 996 is bias compatible with 3M 226 and other industry products, so the user can record without major adjustments to equipment. Available in a variety of formats and sizes, 3M 996 is 100% laser scanned for consistent end-to-end quality.

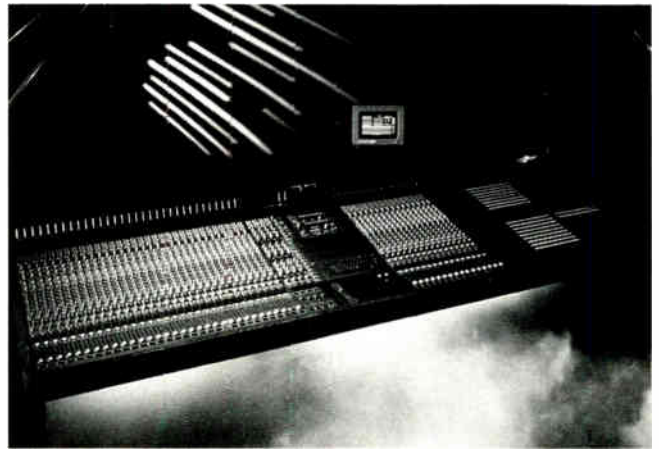
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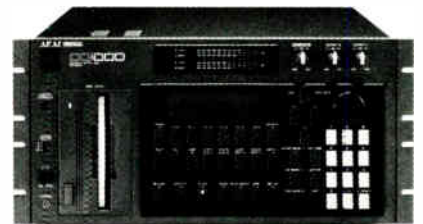
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NEW PRODUCTS



DAR DASS 100 A

Now available from Digital Audio Research (Cheshington, Surrey, England) is the DASS 100 Digital Audio Synchronizing System, a multifunction digital audio synchronizer, interface and processor. Functions include sample rate and digital format conversions, emphasis switching, time delay, synchronization, sample clock generation (from video, AES/EBU, word sync or two time code sources), digital mixing, DC removal and digital test signal generation.

Circle #275 on Reader Service Card



AKAI DD1000 A CONTROLLERS

Akai Professional (Ft. Worth, Texas) offers new systems for controlling the 4-channel Akai DD1000 magneto-optical disk recorder. The DL1000 (\$2,500) is a full-function remote that duplicates the DD1000's front panel controls but adds two data sliders (for real-time audio manipulation) and SMPTE time code capability. A VITC interface is optional. The DD1000 can also be controlled via two Mac software packages: DD-FMac (\$160) is a front screen emulator with keyboard and mouse control of the DD1000; DD-QMac (\$700) allows routine operations with onscreen waveform edit displays.

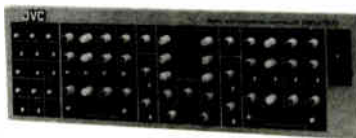
Circle #276 on Reader Service Card

YAMAHA CD RECORDER

The YPDR601 from Yamaha Pro Audio (Buena Park, Calif.) is a stand-alone (no computer required) unit capable of recording discs playable on any standard CD player.

Features include internal ADCs and DACs, XLR balanced analog inputs/outputs, AES/EBU and SDIF-2 digital ports, parallel connection of up to seven units for simultaneous copies, and the ability to write table of contents information before or after the recording. The RC601 remote features full transport, search, index and track controls, along with LED time displays, 24-segment bar graph metering and a pause control to let the user interrupt the recording process and continue at a later time.

Circle #277 on Reader Service Card



JVC DIGITAL EQ A

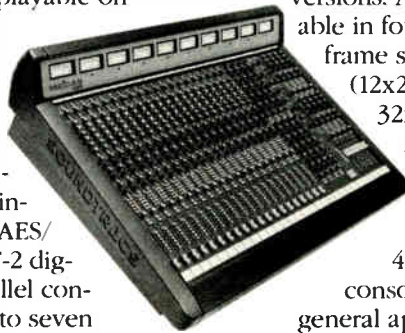
Designed to emulate the feel of an analog equalizer is the DS-LC900U from JVC Professional (Elmwood Park, N.J.). It features 28 fixed frequencies over four overlapping bands, for a total of 54 EQ points. Inputs and outputs include JVC-DAS, AES/EBU and SDIF-2, and RS-232 for displaying and saving settings on a PC.

Circle #278 on Reader Service Card

▼ SOUNDTRACS MEGAS

Distributed by Samson Technologies (Hicksville, N.Y.) are the Soundtracs Megas consoles, shipping in Stage, Studio and Mix versions. Available in four frame sizes (12x2 to 32x4x2), Mix is a line of 4-bus consoles for general applications. The Stage models are dedicated live sound mixers, with eight buses, full VU metering and six mute groups, in configurations from 24x8x2 to 44x8x2; options include stereo inputs and matrix capability. The Megas Studio is a 16- or 24-bus recording console in a variety of frame sizes; options include patch bays, stereo inputs and MIDI mute automation.

Circle #279 on Reader Service Card



BRYSTON 7B-PRO AMP

Capable of delivering 800 watts into 1 or 4 ohms is the 7B-PRO, a single-channel power amp from Bryston of Maple Glen, Pa. Features include balanced XLR and TRS input jacks, switchable parallel or series output modes, ground lift and phase switches, and a "soft start" circuit that allows racks of amps to be turned on without popping breakers. The amp retails for \$2,195 and includes Bryston's 20-year parts/labor warranty.

Circle #280 on Reader Service Card

GOLD LINE DSP-30

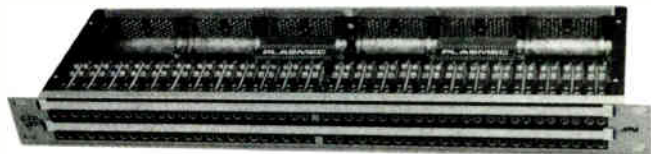
The DSP-30 portable real-time digital spectrum analyzer from Gold Line (West Redding, Conn.) features software-controlled filters that are said to be equal to triple-tuned ANSI Class 1 filters. With scaling adjustment of up to 5dB/step and a large sound window, the unit is capable of displaying dynamics changes of 50 dB (up to 65 dB using the optional RS-232 or CRT port). A precision 0.25dB/step mode simplifies machine alignment chores using standard test tapes. Other features include average/peak/peak hold displays, three decay times, six memory locations and line- and mic-level inputs (electret mic included). Ports for hooking up printers, computers, CRTs and oscilloscopes are optional.

Circle #281 on Reader Service Card

DSP AUDIO WORKBENCH

New from Gotham Technology of New York City is the DSP Audio Workbench, a system that brings real-time 2-D and 3-D FFT analysis to the IBM PC environment. Other features are VGA color plotting of frequency, amplitude and time, peak hold memory referenced to elapsed or SMPTE time, and differential memory functions for source-independent measurement. The system includes a plug-in card with a 50MHz AT&T DSP32C processor, software and manual. System requirements are a 20MHz (or faster) AT-compatible, with VGA card and color monitor. Analog and digital input versions are available, and a SMPTE reader is optional.

Circle #282 on Reader Service Card



GOLD RIBBON SOUNDWALLS™

SoundWalls, from Gold Ribbon Sound Cinema (Iowa City), are modular (92x24x7-inch) acoustic panels that are lightweight (30 pounds) and come in seven fabric finishes. The panels are easy to install and can be fitted with hidden cable runs and optional powered speakers for theaters and presentation rooms. Absorption is rated as 9.7 Sabins at 125 Hz; diffusion and reflector panels are also available.

Circle #283 on Reader Service Card

M&M FLEXI-PATCH A

Plasmec (distributed in the U.S. by Penny & Giles of Santa Monica, Calif.) recently debuted Flexi-Patch, a patch bay that can be reconfigured as normalized, half-normalized or paralleled in minutes, by exchanging internal plug-in pods. The single-rack-space unit has 96 TT jacks wired to 56-pin EDAC connectors on the back panel, and other connectors—such as Cannon D or DIN 41612—are also available.

Circle #284 on Reader Service Card

DYNACORD MCX CONSOLES

Now distributed by Klark-Teknik (Farmingdale, N.Y.) is the Dynacord MCX Series 4800 professional live and recording consoles. Available in 16-, 24- or 32-channel configurations with eight subgroups, the series features a modular design with an outboard, rack-mount power supply. A rugged steel design and retrofit multicore systems make the series ideally suited for portable live and touring applications.

Circle #285 on Reader Service Card



SRS FFT SPECTRUM ANALYZER

From Stanford Research Systems (Sunnyvale, Calif.), comes the SR760, a full-featured FFT with 90dB dynamic range and a fast 100kHz real-time bandwidth. Designed for acoustics, audio research, noise analysis and electronic design applications, the SR760's functions—such as THD, PSD, octave, band and sideband analysis—are menu-driven and supported with onscreen help. Price is \$4,350.

Circle #286 on Reader Service Card

TIMELINE CONSOLE CONTROL UNIT

The Console Control Unit from TimeLine (Vista, Calif.) is a miniature keypad that mounts directly into Neve, SSL and other consoles. CCU offers fingertip control of the TimeLine System Supervisor, interfacing to standard console automation for control of up to six analog or digital recorders, VTRs or sprocketed transports. Features include a 16-character display, readout of machine time code locations and offsets, status LEDs for each machine, and variable speed control of any master or group. A jog/shuttle wheel is optional, and multiple CCUs can be installed for each operator in film dubbing consoles.

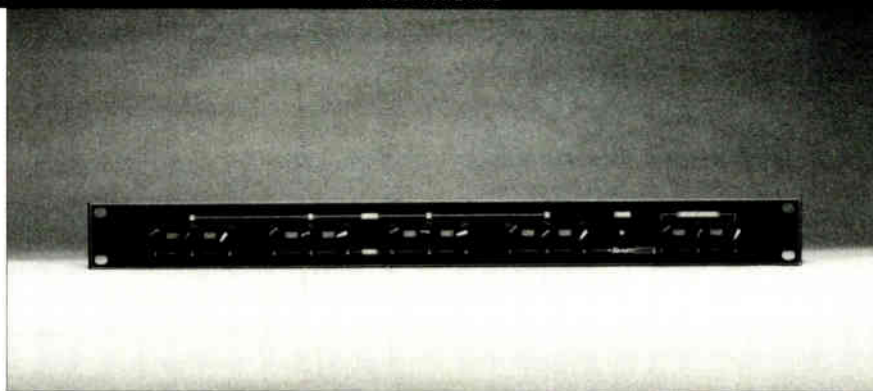
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HOT OFF THE SHELF

AES/EBU or S/PDIF format signals, indicating amplitude, sample rate, status, validity bit, error rates and more. A PC or ASCII terminal provides visual display of waveforms and operations. Call (805) 373-1828... Version 3.0 software for the **Lexicon Opus and Opus/E** adds the ability to control a VTR via Opus, along with new AutoMix™ console automation and CPEX™ time compression options. Call (617) 736-0300 for details... **AMS microphones and digital signal processors**—including the S-DMX delay, RMX-16 reverb, and the SoundField and ST-250 mics—are now available direct in North America. Call (800) 258-0267 or (203) 792-4997 for prices and info... **Audio-Technica's CP8508 phantom power supply** is an AC-powered unit supplying 24 volts of regulated power, suitable for use with a variety of condenser microphones. See your dealer or call (216) 686-2600 for info... **B&K's**

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by George Petersen

PRODUCT CRITIQUES AND COMMENTS

Sendit Electronics 4x3
One of the realities of production in this modern age is that you never have enough effects sends when you need them. The 32x8x24 console in my recording facility has six aux sends, which more often than not is adequate for most projects, but on rare occasions I need more.

Throwing the console out in favor of one of these newfangled models with 20 effects sends just isn't practical. Enter the Sendit 4x3, which at \$399 is an affordable solution, offering additional effects, cue, headphone or stage monitor sends to any console.

Physically, the 4x3 is logically laid out, with three color-coded send controls and three master outputs on the front panel. The rear panel has 20 1/4-inch input, output and insert jacks, which function equally well with balanced or unbalanced systems. Three stack inputs are also provided for combining multiple Sendit units to create additional configurations, such as 8x3 output stacks or 4x6 input stacks. One small annoyance is the unit's external 9 VAC transformer—it's not that I had any problems with the one supplied with the 4x3, but I just hate these things in principle. However, these ubiquitous little beasties do play a major role in reducing manufacturing costs and improving the noise floor.

From an operational standpoint, the 4x3 couldn't be much simpler—it re-

ally requires nothing more than plug and go. The well-written manual accompanying the unit includes a thorough section on applications and hookup possibilities, which can get a bit confusing, especially if your console is equipped with those (also ubiquitous) TRS combination send/receive jacks. Since my console has an extensive TT patch bay, I threw together some 1/4-inch-to-TT adapters and was ready to rock. I also attached a short metal piece to the 4x3's rack ears, so the unit could sit atop the board's angled meter bridge without sliding off. This proved to be an ideal spot for locating the 4x3: accessible and convenient.

Overall, I liked the 4x3. The pots have a nice feel, the audio quality is respectably clean, and the unit is flexible enough to come in handy in all kinds of situations, both live and in the studio. At \$399, it's definitely a lot cheaper than buying a new console. *Definitely.*

Sendit Electronics, 544 East Tujunga, Suite 103, Burbank, CA 91501; (818) 841-1078.

PAST Equalizer and Microphone Preamp

Based in Suffolk, England, is Professional Audio System Services, a five-year-old firm specializing in the restoration and customization of vintage British audio consoles. The company is headed by former Neve project

manager Steve Butterworth, who started Professional Audio System Technology (PAST) several years ago to manufacture rack-mount outboard gear based on 1960s and 1970s audio technology.

PAST's first product combines a mic preamp with a 4-band equalizer. Also included are highpass and lowpass filters (each with five switchable roll-off frequencies), along with switches for mic/line input select, phase reverse, bypass and EQ in/out. Those users who are tracking directly to tape will appreciate the VU meter (switchable to indicate input or output) and the output level control, which provides a maximum attenuation of -20 dB.

Both XLR and locking 1/4-inch TRS connectors are available on the rear panel, accommodating balanced and unbalanced signals, and both mic and line inputs are transformer-balanced. Either 24- or 48-volt phantom powering can be provided as an option, depending on the power supply selected. Speaking of which, several different power supplies are available, including a rack-mount version that powers up to six units.

The PAST units are hand-built, using excellent components. The construction is of the highest quality, as evidenced by the superb soldering of the switched, resistor networks on the input gain control and HP/LP filters. The meticulous wire loomwork is sharp. Gold-plated XLRs are standard. First-rate throughout.

The front panel is laid out with the highest frequency band on the left and the lowest on the right. While this is the opposite of what I expected, one easily becomes accustomed to the unit's operation. As with the old Neve 80 Series channel equalizers, the frequency selector on the HF band operates in a counter-clockwise (lowest to highest) direction, but again, this is something one can get used to. However, each band is fitted with an "off" position, allowing users to bypass any unused bands, thus optimizing audio performance.

While not a true parametric design, the equalizer has four bands with concentric controls for frequency and gain. The highest and lowest bands can be switched from peak to shelving operation, while the two center bands offer a choice of two Q (bandwidth) settings. Each band has a cut/boost

gain range of ± 18 dB, and the two upper and two lower bands include a good deal of overlap.

In the studio, I found the PAST to be extremely quiet, living up to its



equivalent input noise claims of -123 dBu. The clarity of the preamp was evident when tracking a variety of mics on acoustic six- and 12-string guitars, percussion and vocals. The equaliza-

tion was warm and musical and was particularly rich on solo voices. While the unit does not have the flexibility of a true parametric, I never felt limited in tracking or mix situations, although the lack of a center detent on the gain pots was noticeable. One thing that is apparent is the fact that you don't need radical equalization cuts or boosts to get the sound you're looking for: A gentle touch does it. I never needed to give the gain pots more than a quarter turn.

The best thing about the PAST pre-amp/equalizer is its sound, which is

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Project: *Mundos*
 Title: *Tonight's the*
 Client: *Johnny J*
 Studio: *dB Studio*

Start Time: 01:05:00:00 Stop Time: 01:10:00:00

<p>1 Elec. Piano</p> <p>Bar 1 Beat 1 Hall reverb add chorusing</p>	<p>2 Bass</p> <p>Compress short gate reverb fade in after bar 3</p>
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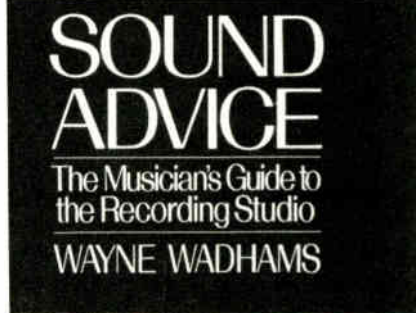
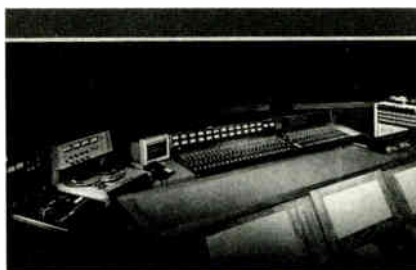
AUDITIONS

both smooth and musical. If you're unfamiliar with the sound of a superb, all-discrete circuit design, you'll be in for a pleasant surprise when you hear this box. Retailing at £1,500 (about \$2,625 U.S.), the unit ain't exactly cheap, but of course going first-class was never an inexpensive proposition. Currently, PAST products are only available factory-direct, with Federal Express or UPS air service to North American destinations. However, this situation may be changing soon as several Stateside firms are now considering U.S. distribution of PAST products. Stay tuned.

Professional Audio System Technology Ltd., 9 Fisher Close, Haverhill, Suffolk, CB9 0LZ, England. Phone: (011) 44 836-620959; fax: (011) 44 440-61342.

SOUND ADVICE: The Musician's Guide to the Recording Studio

This second text in the Sound Advice series (the first being *The Musician's Guide to the Record Industry*) is a veritable cookbook filled with delectable recipes for getting a great sound in the studio. Calling on his extensive



background as a respected author, producer with numerous major label credits in pop, classical and jazz, and audio educator who designed the curriculum for the Music Production and Engineering department at the Berklee College of Music, author Wayne Wadhams has created an invaluable, comprehensive resource for the studio recordist.

Written in a highly readable, non-

technical manner, *The Musician's Guide to the Recording Studio* delivers exactly what its title implies, yet it goes much further, and is filled with hundreds of insider tips and secret techniques that would benefit both novice and master recordist. In fulfilling its quest, the 357-page text pulls no punches, and no aspect is glossed over. In fact, over 160 pages are devoted to instrumental and vocal recording techniques.

A major portion of the book focuses on understanding the basics of studio tools—consoles, monitors, microphones, tape recorders, acoustics, reverbs, delays, digital effects, compressor/limiters, gates, equalizers, samplers, automation and MIDI—from a practical, hands-on approach. The rest of the book focuses on the realities of studio recording: session planning, budgeting, mixing, working with producers and engineers—essential ingredients in the production of a successful recording.

As an added bonus, author Wadhams has included excerpts from interviews with leading producers, engineers and artists, such as Val Garay, Billy Joel, George Martin, George Massenburg, Roger Nichols, Hugh Padgham, Alan Parsons, Phil Ramone, Bruce Swedien and others who offer their insights into the recording process.

As an adjunct to the text, a set of two 70-minute CDs is available, providing digitally recorded demonstrations of signal processing and miking techniques, and track-by-track guided tours to actual multitrack mixing sessions. Priced at an affordable \$29.95, the CDs are a useful resource to the aspiring recordist.

Whether you're tracking at Abbey Road or laying down some licks on a Tascam Portastudio, musicians will find this book to be a clear and concise roadmap through the often murky pathways of the recording process. I give it five stars. This book could be the smartest \$34.95 you ever spent. Published by Schirmer Books, a division of Macmillan Publishing of New York City, *The Musician's Guide to the Recording Studio* is available at technical bookstores or through the Mix Bookshelf, (415) 653-3307 or (800) 233-9604. ■

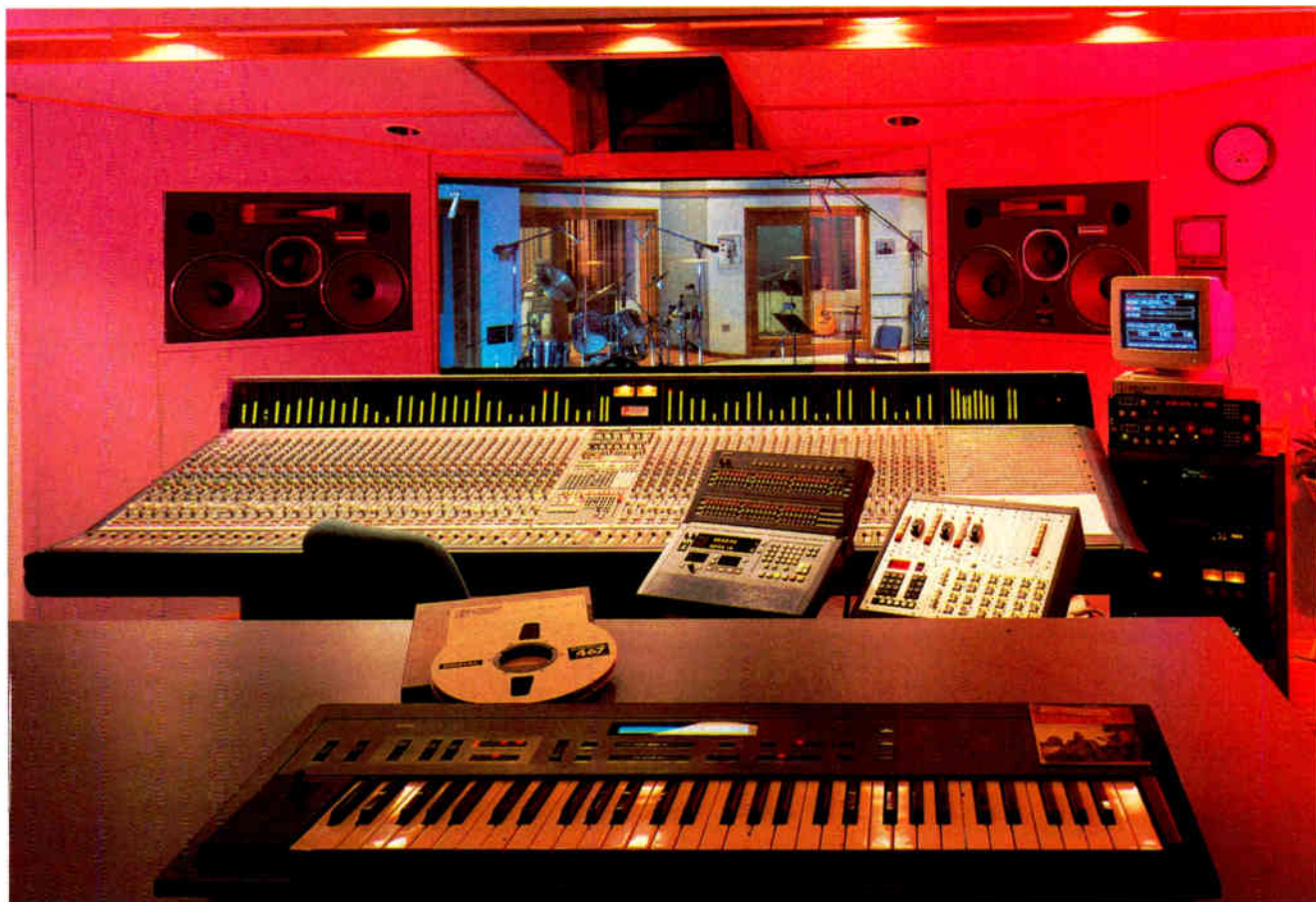
George Petersen lives with his wife and two musical dogs in a 100-year old Victorian house on an island in San Francisco Bay.

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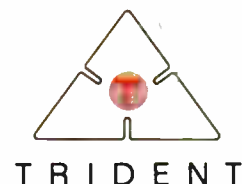
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by Larry Oppenheimer

BIAMP RACKMAX IIEX MIXER

In recent years, console users have demanded specialized mixers configured for particular applications, along with expanded functionality, higher fidelity and, of course, lower prices. Since it is not practical to simultaneously satisfy all these demands, console manufacturers have chosen their particular ground and dug in: A few go up-scale, others down-scale and some try to redefine the middle of the market.

This latter approach seems to be Biamp's goal with the Rackmax IIex. Since those features deemed as "necessary" by low- to mid-level sound reinforcement have grown in num-

ber, it is a real design challenge to include all of those and maintain a streamlined look. Even more difficult are the sonic demands created by widespread live use of samplers, digital synthesizers, high-quality signal processing and improved microphones. Biamp also attempted to address these concerns with a discrete four-transistor mic preamp and high-quality, low-noise components, like the 5532 op amps used throughout the audio paths.

Description

The Rackmax IIex, as one might guess from its name, is a rack-mount mixer that takes up 11 units of space and





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weighs a hefty 32 pounds. Mounted in its own rack, the Rackmax Ilex definitely elicits a grunt when it is lifted, but there is no doubt that you get "bullet-proof" (*i.e.*, roadworthy) construction for all that weight. This thing will last you for a while. And you will have to use it in a rack, because there are no legs, feet or other provisions for using the mixer outside of a rack.

A number of mixers in the price range just below the Ilex combine some full-featured channels with some stripped-down ones. In contrast, each of the Ilex's 16 channels offers identical features. On the front panel, this consists of signal present and clip LEDs, preamp trimpot and switchable 20dB pad, 4-band, fixed-frequency EQ (100Hz shelving, 400Hz peaking, 2.5kHz peaking and 10kHz shelving), six aux sends (with color-coded knobs), pan pot, mute and solo switches (each with an indicator LED) and 100mm fader. Only four of the aux sends are simultaneously available on a given channel; sends 1/2 or 3/4 are selected with a switch. A single pre/post switch is used for sends 5 and 6. Both settings are pre-EQ from the factory, but internal jumpers allow the user to re-configure any of the sends. On the back panel, each channel has a balanced XLR mic input, balanced 1/4-inch phone-line input jack (which can also accept an unbalanced signal) and a TRS insert jack.

There are no subgroups on the Rackmax Ilex, so the master section contains 100mm faders for the master left and right outputs, a rotary pot for a mono output, aux send masters for all six sends (sends 5 and 6 each have a solo button, also), aux return pots for the four aux returns (1-3 are stereo, 4 is mono and also has a pan pot), a headphone jack and level pot, phantom power switch (with LED), meter select switch (L/R or mono/solo), power-on LED and two PPM-type LED ladders. Patching facilities in the back are somewhat spartan: balanced XLR outputs for left, right and mono, and unbalanced 1/4-inch summing inputs that feed the left and right buses. As for aux sends and returns, the arrangement is somewhat unusual: aux sends 1-5 are unbalanced 1/4-inch phone jacks and aux send 6 is a balanced XLR, while aux returns 1-3 (the stereo returns) are TRS phone jacks,

and aux 4 is an unbalanced 1/4-inch phone.

Also found on the rear panel is a modular phone jack that carries DC output to power other devices (presumably unpowered mixer expander modules), the AC fuse, 110/220V selector switch, and the non-detachable, three-wire AC power cord. The power switch is, thankfully, on the front panel. (It never fails to amaze me when manufacturers put the power switch on the rear of a rack-mount device.)

Evaluation

I used the Rackmax Ilex mostly with my Celtic fusion band, Phoenix, which enabled our mix engineers, Chris Scarabosio and Jeff Kliment, to try it with familiar equipment and material in known venues. After getting their impressions, of course, I tried it myself, primarily in my home studio with synthesizers, vocals and critical listening material.

The sound of the board was very clean and well-behaved, even with some tough (peaky, complex and/or delicate) sources (electric violin, synthesizers, mandola). I encountered no headroom problems with any of the sources I fed it. Jeff, Chris and I all appreciated the 100mm faders and all the LEDs (signal present, clip, solo, mute) that indicate status at a glance. With only two meters, clip LEDs are absolutely necessary, but signal present LEDs are very useful in optimizing signal-to-noise. The results in my home studio showed that the Rackmax Ilex was actually a very quiet mixer, unless you got into a high-gain situation. When any of the preamps were turned up past 3 o'clock, there was an audible increase in noise.

The EQ was smooth, even at fairly extreme settings: not an uncommon situation in live environments. I prefer to have sweepable bands, but with four fixed bands we were able to meet our EQ needs with no problem. The EQ pots are center-detented, which simplifies quick changes during performances.

Muting and soloing are usually two of the first features to be omitted in low-priced boards, and it sure is nice to have them here. The solo circuit is routed only to the headphone jack. Although most headphones have 600-ohm impedance, there are some that are lower—and it would be nice to accommodate them—but at least Biamp tells you what the 'phones jack will

drive. A small, but appreciated touch are the level demarcations on the faders. Although all faders have lines, and some even mark 0, it is less common to have "-3," "-6," "+6," etc.

The rear panel patching in the master section has a few unusual aspects: with four post-fader sends and only two pre-fader, the two pre-faders use different connectors. This was a problem when I used this board with my band, as we use two monitor mixes onstage and were forced to use adapters to make both sends work. The logic of this arrangement is not clear to me. Why couldn't aux 6 have a 1/4-inch phone jack in addition to the XLR? As for the aux returns, I have never seen a TRS jack used in this way. It's bad enough that space and cost constraints usually make such an arrangement necessary for insert jacks. But for aux returns, not only does this require you to have adapters on-hand, but the manual instructs you to use a TRS plug with the tip and ring wired together if you use a stereo return for a mono signal—an even more unusual scheme.

Finally, I would like to see alternate connectors for the master left and right

outputs to make it easier to connect the board to EQs or other equipment following it—which may use 1/4-inch unbalanced connections—or to use for recording feeds. It would be nice to have inserts on the masters, too, but I suppose that could be considered a luxury.

Rack-mount mixers are certainly on the rise, but my impression is that they are more commonly used for keyboards or permanent installations than for main FOH mixers. I didn't happen to have an 11U rack laying around, so I tried to use the IIex without a rack. It wasn't easy. Standing it vertically was a little precarious, and it was difficult to lay down because of the location of the power cord and fuse holder, and the fact that all the connectors were on the rear panel (the logical place for them when the unit is rack-mounted). If the power cord was a standard IEC detachable, you could get a right-angle plug and have a chance. Another idea would be to offer optional screw-in feet or fold-down legs, as Biamp has on its Cascade model. As it was, I used foam blocks to prop it, making it easy enough to get to the connectors.

Priced at \$2,599, the Rackmax IIex is an excellent-sounding, compact mixer with all the necessary features to provide good sound reinforcement. I am a little puzzled to find some features that reflect Biamp's many years of experience (I used my first Biamp product over ten years ago), while others display what seems to be faulty logic. I'm sure that the features I didn't like were probably requested by some of their users and dealers. In any event, the Rackmax IIex is a very well-built piece of gear that will undoubtedly perform flawlessly for years under the roughest road conditions. If you need a mixer that will last, this is it. Although it has its quirks and there are cheaper models around, I recommend the Rackmax IIex as a clean, solid performer with the features that are most needed.

Biamp Systems Inc., 14270 NW Science Park Drive, Portland, OR 97229; (503) 641-7287. ■

Having completed producing and mixing Phoenix's debut album, Keepers of the Flame, Larry the O has reluctantly begun a new career promoting and distributing it.



—FROM PAGE 111, BITS & PIECES

fects compilations in the JFX Atmosphere Effects Library. The six tapes contain over 5.5 hours of grouped sound effects that Foster has compiled from location recordings in such diverse spots as the Seychelles, Norway and the Fiji Islands. The original recordings were made with Nagra 15 ips analog and digital recorders, and compiled on a DAR SoundStation II.

Additional information on the JFX Atmosphere Effects Library may be obtained by contacting John Foster, Hawksfold House, Fernhurst, Haslemere, Surrey GU27 3NT, UK.

UK Notes

Two Ramsa S840 consoles were installed in Studios A and B, the two main rehearsal facilities at Nomis Studios in London... Also in London, Recording Architecture's "bolt-on" Black Box acoustic conditioning systems were supplied to Noisegate Studios and Tape to Tape... Soul II Soul Records Inc. took delivery of a Sony PCM-3348 digital multitrack for a new state-of-the-art recording facility constructed in London's Camden Town. The control room features a 72-input Neve console and was expected to open in late spring... Robbie Weston has added to his arsenal of Opus digital audio production systems at his two London recording studios. Silk Sound installed four Opus units, while The Bridge is now equipped with two new Opus/e editing systems... Recent deliveries of the new Calrec Compact Series of sound mixers include Scottish Television for use in an O.B. vehicle, BBC TV Centre, BBC Elstree for *Eastenders*, Hillside Studios at Watford, and the first of four to the BBC News and Current Affairs Parliamentary Broadcasting Service at Millbank... West End post-production house Saunders and Gordon purchased an Audio Kinetics Reflex VCA automation system for the house's Studio 5, which specializes in TV commercial sound dubbing, radio commercials and program work... An SSL ScreenSound digital audio post-production system was recently installed at M2 Facilities in

London... Audiomation Systems appointed David Pope as European head of technical marketing support for its Uptown Moving Fader console automation system. In other Audiomation news, U.S. reps for the Uptown system include Leo's Audio & Music Technologies for Northern California; Audio Intervisual Design for Southern California; Audio Techniques for metropolitan New York; Anything Audio for New England; and S.G. Audio for the Midwest... British composer/musician Jools Holland purchased a Soundtracs Quartz production console for his recording facility, The Station... Stirling Audio Systems Ltd. announced recent sales of TimeLine Lynx synchronizers to the following UK facilities: Lillie Yard, Select Sound, Matrix and Air Edel... Hilton Sound appointed Dave Dixon to the post of group operations manager. He is responsible for coordinating the movement of all hire equipment within the Hilton Sound Group companies... Loudspeaker manufacturer Celestion International appointed Steve Dean as UK sales manager for its professional product division... The Association of Professional Recording Services (APRS) has published the 1991 edition of its reference book, the *Guide to Recording in the UK*. Copies are available from APRS, 2 Windsor Square, Silver Street, Reading, Berks. RG1 2TH, England; tel: 0734-756218.

European Bits & Pieces

Danish pro audio manufacturer Lyrec acquired the Italian company Robotecnica from AEG, Germany. Robotecnica has been known in the audio industry for many years for its cassette duplicating equipment... Studio design consultants Harris, Grant Associates announced contracts with three German facilities—Dierks Studios (Stommein), Sound Studio (Cologne) and Red Rooster (Munich)—for acoustic redesign... Recent sales of D&R Avalon consoles have been made to several European studios, including Studio Nederland (Amsterdam), R.B.S. Studios (Rotterdam), Audio Syntesis (Barcelona), Syncrom (Rome), Musica Inn (Milan) and Allba (Stockholm)... Future Sound

—CONTINUED ON PAGE 114

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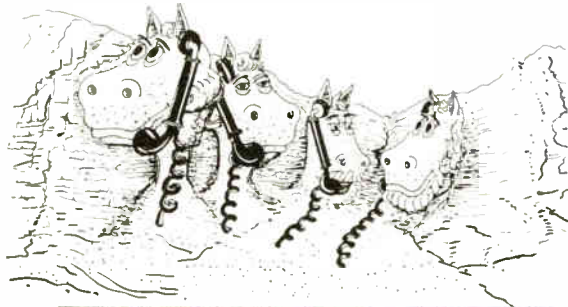
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INTERNATIONAL UPDATE

—FROM PAGE 113, BITS & PIECES

Studios (Soest, Holland) purchased the first Hill Concept mixing console fitted with Audio Kinetics Reflex automation in that country. The AK Reflex system was fitted to a 48-input Concept 8400 Series desk...A 16-output AudioFile Plus system was purchased by Parisian facility Point 12 for installation in its new digital audio suite...Another Paris facility, Studios Marcadet, ordered a Neve VR60 console with Flying Faders Automation...BRT, Belgium's Flemish radio and TV broadcast organization, equipped its recently opened CMX video editing suite in Brussels with an 8-channel DAR SoundStation...Belgium's first Sony PCM-3348 digital multitrack recorder was installed at Galaxy Studios, a small facility in Mol, near Antwerp...A second Sony PCM-3348 digital multitrack recorder has been installed at Studio Plus XXX in Paris...Munro Associates completed work on Logic West, a fully digital audio post-production facility in the center of Milan. The new complex is set up as a joint venture between Logic Recording Studios and Zeus Picture SRL...Emulating the industry's most successful event in the U.S., The First European Conference and Exhibition on Multimedia & CD-ROM will take place September 9-11, 1991, in Wiesbaden, Germany. For more information, contact Reed Exhibition Companies, Dusseldorf, Germany; tel: 211 55 62 81.

Canadian Notes

Toronto's Sounds Interchange ordered 16 Audio Kinetics ES.Lock 1.11 units. The units will facilitate machine control by the SSL consoles via Motionworkers in four new studios at that complex...Salter Street Digital is a new sound editing, recording and mixing facility located in Halifax, Nova Scotia. The facility is designed entirely for the digital domain, beginning with Apogee AD-500 Audiophile Converters. Other equipment includes a Yamaha DMC-1000 fully automated digital console, two Yamaha DRU-8 20-bit digital recorders, a Studer Dyaxis 4-channel hard disk recorder and a Digidesign Sound Tools system. ■

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World Radio History

—FROM PAGE 111, BBC

new Akai DD-1000 optical disc recorder, or more conventional machines as required. A VITC converter derives regular (EBU) time code from U-matic video sources to feed the Opcode Studio 3 interfaces.

Next, consider the ergonomics. Modern MIDI composers work by and large on their own, and all the gear is in the room with them. There's no need to have a single vast console in front of you, facing the non-existent window into a non-existent recording area, with the instruments inconveniently out of reach behind you or in tall, awkward, acoustically problematical vertical racks. Although there are still some more "traditional" studios in the Workshop, most of the workstations feature "sound blocks" that can be placed in a circle around the composer, leaving a segment open for access. All around are the sound generators, on low racks that don't obscure the audio. They rest on a raised circular shelf. On a lower level in front of them are their DMP7 digital mixers. In front of you as you sit in the center

of the circle facing the monitor speakers is a Yamaha KX88 master keyboard.

In front of the composer on the upper level are the control systems: the "master" DMP7s to the right; the Roland S-550 sampler to the left. And in the center controlling it all is an Apple color monitor, keyboard and mouse. The Macintosh IIx itself is in a cupboard under the work surface.

● **"When you start the system up, it will set the studio to the parameters defined in the starter."** ●

The first impression you get on entering the room is how compact the system is. The second is how neat and well-constructed it is—no unsightly metal panels and struts here—it's all beautifully finished wood. The wiring goes around the circumference of the circle, with slots cut at the rear of the surface for cable entry to the equipment, and a wealth of cupboards with doors on both the inside and the outside of the circle. Access panels unclip

to allow easy cable installation and maintenance, as well as plenty of storage space. The central monitoring system, designed by Workshop engineer Ray White, allows monitoring of all the main sources in the room, including multitrack, stereo recorders, the ring main, and so on. The system is controlled from a remote panel by a serial link.

Audio signals are patched via simple 1/4-inch mono jacks. The studio is comparatively small, so ground loop problems are unlikely. Audio routing is also under computer control: Three racks of Akai DP-3200 routers are hidden in a cupboard under the main mixers. They form a 72x72 crosspoint matrix, handling many of the individual instrument signals as well as the mixer outputs and inputs. The routers have been modified by the Workshop's engineers to include a patch bay that provides a simple way of getting signals into the routers. It is not a "jack field" in the normal sense of a physical interconnection system that's modified on a session-to-session basis: Physical replugging is virtually never required.

An interesting feature of the design



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is that virtually nothing is installed in the room itself—it's all in the circular table. Of course, there are facilities for bringing in external inputs, including microphones (via tie-lines from the acoustic area of the room into MLA-7 mic/line amps that feed the routers) as well as additional electronic instruments, in keeping with the Workshop staff's use of both acoustic instrumentation and electronic sound sources. In fact, it's always been that way. Additional instruments can be added to the system in a few moments, as both MIDI and audio patch bays allow rapid access.

The room has a respectable complement of sound generating and processing equipment on the upper level around the ring. On the lower level, there's the KX88 and no less than five DMP7 digital mixers. Two of them are DMP7D units for digital cascade purposes. In addition, there are external 8-track and stereo machines, a Sony 2500 series DAT machine and a U-matic recorder for video playback.

Fig. 1 shows the basic layout. In fact, this diagram represents the layout of the original prototype studio; it has proved unnecessary to have two computers, as the Macintosh can

handle everything. The SyncWriter—a time code-cueing system designed in-house—has also vanished, and only one screen is required.

On the face of it, it looks as though it might be a fairly difficult system to control. Not so, thanks to some custom software written a year or two ago in HyperCard by the facility's original development coordinator, Mark Wilson. This not only allows the Workshop's sequencing and scoring programs to be called up, ready to use; it also enables the other programs they need—editors and librarians for creating, modifying and organizing sounds—to be run at will. Opcode programs are used almost exclusively at the Workshop: Most composers use Vision (or StudioVision along with Digidesign's Sound Tools), although there are a few who use Mark of the Unicorn's applications, and are looking forward to the arrival of Digital Performer, the MOTU equivalent of StudioVision, with Sound Tools hard disk recording. Hodgson says that by the end of the year, each of the six studios will be equipped with one of these systems.

A series of HyperCard stacks allows

music cues to be created with all their timing details, instruments, sounds, levels and routings. In essence, if you want to call up a cue to continue working on it, you just click on its entry and in a few seconds the whole piece is set up and you're in the sequencer, ready to play, record or edit.

Now that the basic configuration has been tested, Wilson has moved on to other things: He's now a programmer with the MultiMedia Corporation (formerly the BBC Interactive Television Unit), working on multimedia Macintosh programs with San Francisco-based developer MacroMind. In his place is a new development coordinator, Tony Morson. Morson formerly owned a recording studio in Cheshire. For the past few months he's been working on taking Wilson's HyperCard concepts and converting them into complete stand-alone Macintosh applications.

"I'm doing a Radiophonic MacApp, if you like," Morson says. "A streamlined version of MacApp because we don't need a lot of the facilities, and it's more aimed toward MIDI. There's a generic application called Vanilla, and then there's MIDI Vanilla, which has



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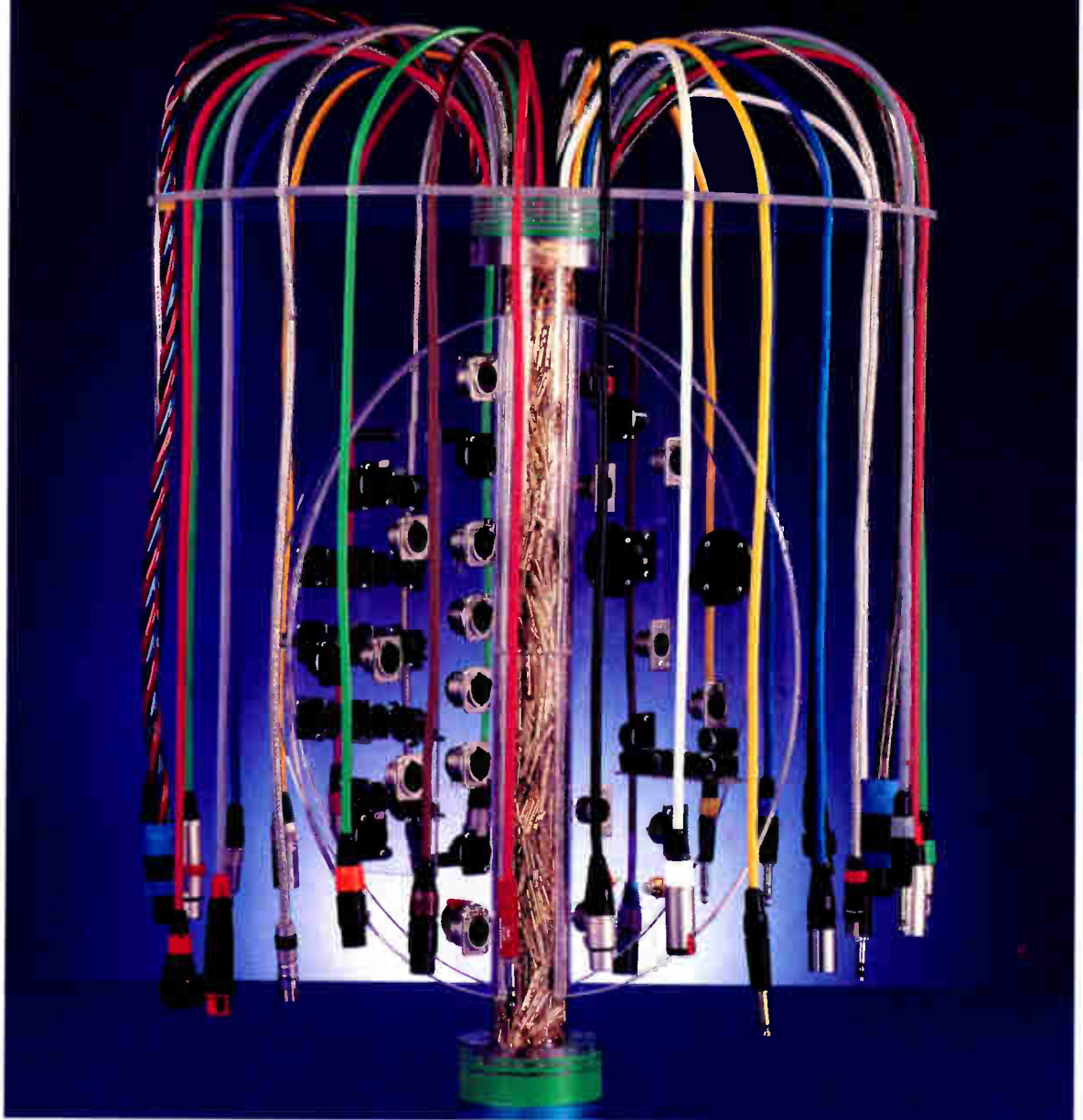
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MIDI on top of it, and then on top of that you start building applications."

The programs fully utilize Apple's MIDI Manager and don't address the ports directly at all. "I'm working on two programs," he continues. "One's called Max—short for 'matrix'—which will control any matrix device in the studio, whether it's audio or MIDI. Provided the device follows a sensible MIDI implementation, you can explain to Max how to control it. The second program is called Cupid, which handles all the cue data. It goes around the studio grabbing every sound patch out of every synthesizer and every mixer patch. Then when you go on to the next cue and finish that, it saves the differences."

Version 1 of Morson's new software is already working in some of the studios—the more traditionally laid-out ones, interestingly enough—but in others, the original HyperCard software is in constant use.

The original software features three main HyperCard stacks associated with running the studio. One is the router control stack, designed for the Akai routing matrix system. The central one, called CueCard, could be used in any studio. There is also a completely new "Home" stack (the central stack of the HyperCard system).

Along the top of the HyperCard window is a line of icons (they also appear as an "icon bar" at the bottom of the screen when you're working in a music program). Each icon allows direct access to a primary application: The Macintosh Finder (the basic desktop on the Macintosh); D50 and DX/TX editor/librarians; sequencer/keyboard configuration; sequencer/DMP7 configuration; "current cue"; "music scoring"; "routing"; and "diary." Buttons can be added, deleted and customized by users as required for their personal studio mode of work. There are also facilities to check that instruments and devices are responding correctly to control signals and MIDI data. The system is also able to automatically set up a particular routing patch on its way into a program.

There's a set of menu options similar to those on an editor/librarian program: "send to device," "load from device"; "send all to device," "load all from device"; "show device info"; "edit device"; "play device"; and "play on select."

The only difference between the mixers and the other instruments is that most of the time the current sound is stored in the edit buffer of the instrument, rather than in its memory bank. In the case of a mixer, however, it is useful to keep the mixes stored in the mixer. Each cue has its own patch, which is sent to the mixers on command.

An interesting feature is that the entire studio can be considered a *device*. So when you select "send all to device" and the device is the studio itself, it will set up the entire studio for you.

Max launches straight into the MIDI Manager to allow you to patch inputs and outputs. Then you can open documents containing grid panels that can be assigned a color to distinguish audio and MIDI routing matrices. Just by pointing at a cell in the grid, the input and output that coincide at the grid square are highlighted. Routing is set up with a simple click. The program has floating windows that allow a miniature view of the current routing matrix to be available onscreen, no matter what application is being run with it under MultiFinder. Thus, the configuration can be changed quickly

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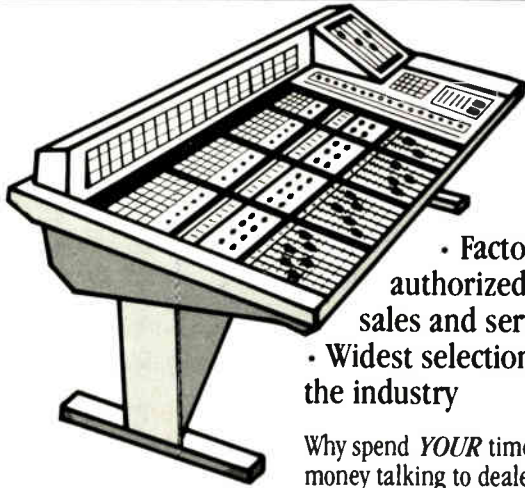
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and easily.

Although the intention is to have the new software perform the same jobs as the old HyperCard stacks, there are obviously major differences. It's been easier to install the new versions in the more traditional studios because they did not have matrix routers before, so a system could be put in from scratch for them. In the new studios, however, the handling of the routing systems and the other parts of the programs are very closely interwoven. And HyperCard is not able to utilize the MIDI Manager, which means that handling MIDI has been easier for Morson than it was for his predecessor.

An interesting aspect is the ability to define a "starter" setup for the studio. When you start the system up, it will set the studio to the parameters defined in the starter. Other patches can be made to either overlay an existing setup or replace it completely. There's also another idea that should be in every MIDI system: Every piece of software used in the system could have an "entry" and an "exit" patch associated with it for every MIDI port. So, for a particular MIDI application, the system can be configured automatically. Go into your sequencer and it can connect the keyboard to the Mac, the Mac to the instruments, the instruments to the mixers, the mixers to the DAT machine, etc. Access the patch librarian and it connects the TX816 to the Macintosh and nothing else. The only problem at the moment is that some programs don't allow this facility.

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Richard Elen is a freelance writer based in England.

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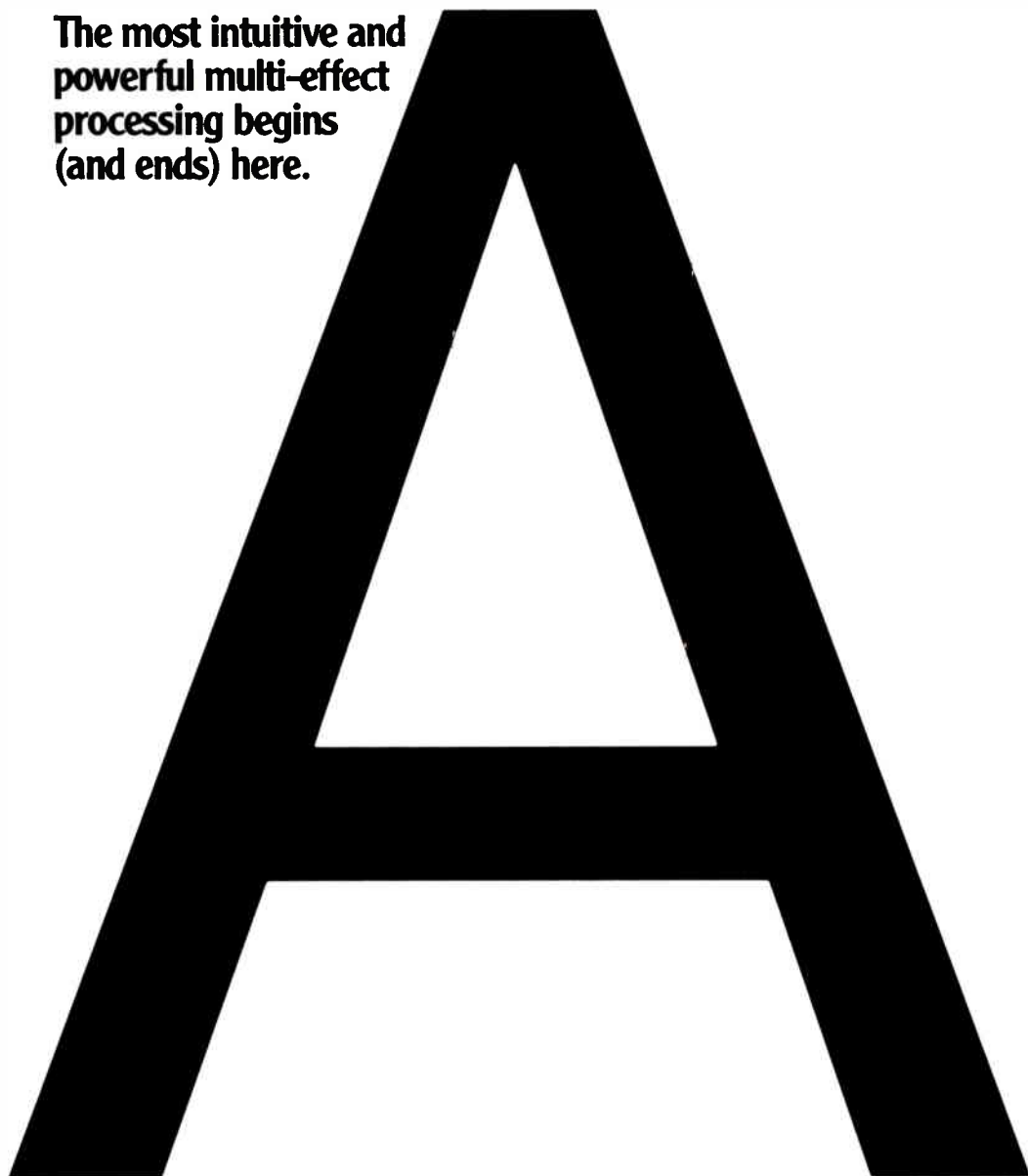
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—FROM PAGE 88

a name, right for some audiences, and some don't want to hear from me.

Being born in Belgium, I have a home and a headquarters for my European work. Each time I plan a trip to the States, it's like the Godfather says, "I get offers I can't refuse." Ten days ago I was called to Budapest for a concert that Stephane Grappelli could not do. Two days later, there was an emergency call from a Japanese jingle producer for a golf equipment commercial. He wanted 60 seconds of Toots, so they came to Brussels. Let's say it was worthwhile staying an extra day. Within the last month, I did a duo concert with the fantastic French pianist Martial Solal. I just finished a tour of Sweden, did TV in Germany and Holland, and was on a double bill with Michel Legrand in Switzerland.

In Belgium I became the "local son does good." I have that stamp of approval, but it took 30 years. I was accepted in Sweden before I was popular in Belgium. Somehow the Belgians are skeptical—to become famous you have to sleep with a famous lady, win a bicycle race, or be a great

soccer player. If you are a painter or a musician, it's a different story. Jacques Brel had to leave Belgium and go to Paris to be recognized.

I speak the two native languages fluently, French and Flemish, plus English, German, Swedish and a little bit of Italian. In Brussels, very often

"The bebop message from Dizzy Gillespie and Charlie Parker influenced me totally. I can't imagine anything more important happening in my life."

they have these multinational conventions for companies like Toyota, Xerox and IBM. Brussels has become a capital of the European Economic Community. A lot of stuff happens in Belgium, and I am the perfect attraction because I am popular in Europe. I can speak Swedish to the director from Volvo and play a Swedish song. It's not always so creative, but you can stay home and away from your suit-

case. And you make a nice living.

I was planning to come to the States in August, but I got a call for 11 shows at a convention in Luxembourg. I'll be between the cheese and the dessert. [Laughs] It spoils you a little bit, but the creative work I really like to do is play a good American jazz club, like Catalina's here in Los Angeles.

Bonzai: With all of this traveling, at least you chose an instrument that has easy cartage.

Toots: Yes, that's true, but the jet lag you don't want to know about. I move a lot, but I am not away from home as much as, say, Dizzy Gillespie. He travels one day to Los Angeles, next day Miami, Florence in Italy, then Helsinki, then back to New York. I don't have to do this anymore.

Bonzai: So you have a new album for Private Music?

Toots: Yes, it's an idea that came from the producers Miles Goodman and Oscar Castro-Neves, and Ron Goldstein from the record company. Ron tried to get me with Warner Bros. about ten years ago, and he was also with Island Records. Somehow we never got it together, and I got sick. He wanted to work with me, and then the Brazilian concept came up. I respond



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to the melodic and harmonic aspect of Brazilian music, and I've had great success in Brazil. It's me doing two sides with several composers. Tomorrow we go into the studio with Ivan Lins, and after that I work with Dori Caymmi and Oscar. We'll fool around and see what we come up with. I know it could be great.

Bonzai: I like your last album, *Footprints*, very much.

Toots: Latest album! Please! The reason I react so strongly is that in '52 or '53 I was playing with George Shearing. Each time we played Birdland, Charlie Parker used to come by. He liked to check me out. And one night during the break, there's Bird. He tells me, "I want you to listen to my last record." He used the word "last," and it *was* his last. It was *Old Folks*, and he died shortly after.

Bonzai: Tell me a little more about your experiences with Parker.

Toots: My first meetings were from the records, of course. Shortly after the war, the guys from my generation, in '45 and '46 in Belgium, started to get these records—78s with the explosive bebop message from Dizzy Gillespie and Charlie Parker. And that influenced me totally. I can't imagine anything more important happening in my life. I was floundering, looking for one way to play or express myself, and then—boom!—this explosion hits me. Boom! "This way fellas." And we followed that direction.

I came to New York as a visitor in 1948, and there was still a lot happening on 52nd Street. I could sit in with the guys. I was introduced, but they were skeptical about the harmonica. "There's this guy from Belgium who plays harmonica." "What? Booo!" You know, the guys, musicians—Hank Jones. So they asked me what I wanted to play. I said, "Anything." They said, "What? What key?" I said, "Any key." "What?" So we played "I Can't Get Started." There is a chromatic progression in the fourth bar—if you could negotiate that, you were a good bebopper. It was among the hip things to be able to do as a bebopper. I unloaded all my stuff, and the whole band was in there with me. They never asked any more questions about what key and what not. [Laughs]

The second night there was a booking agent, Billy Shaw, who was presenting most of the beboppers. He

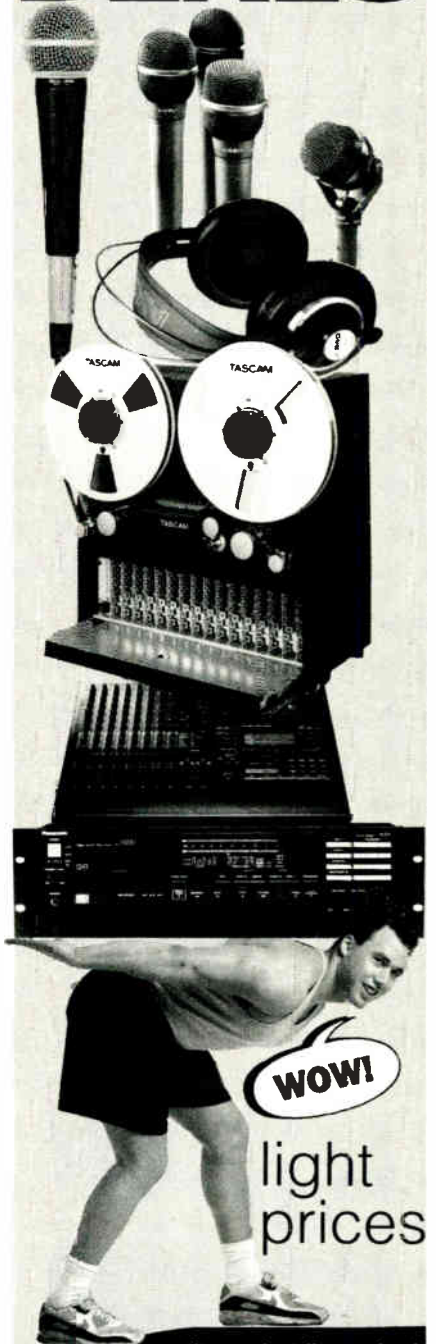
asked me to send him some records. So I went back to Belgium and made a few sides, and that started the contact with Benny Goodman and all that. In 1949 there was a big festival in Paris—the first postwar festival of any importance where the bebop school came—Parker, Miles Davis. And I shook hands with Charlie Parker and asked for his autograph. The agent had played him some of my stuff. He was drunk, and he fell and broke my beautiful fountain pen, which I had received from my father. One of those precious things, but that's okay. He said he was really sorry.

When I finally got my immigration papers to come to this country, this booking agent tried to help me out. There was a Dinah Washington show with The Charlie Parker All-Stars—Parker, Miles Davis, Milt Jackson—all names out of the encyclopedia today. This was in Philadelphia in the black theater. I was new in this country and certainly the only Belgian in the theater.

Those were my beginnings. I was seven months in this country and I needed work, of course. I'll tell you about one of the important characters. He's a fine musician, but he's primarily a character also. Tony Scott, real name Sciacca. He lives in Rome now, but he's lived in Japan and all over. He has children all over. In those years, in the early '50s, he was like the brother musician in New York. If a new little cat came from Oklahoma, or Detroit, and he could play, he knew that Tony Scott would help him find a job, a place to stay or sleep somewhere. He had a loft in the Village.

Tony Scott had heard of me and had also heard that George Shearing needed a guitar player, because his guitar player at the time—Dick Garcia—was called to go to the army. I was having a drink, showing my face, hanging out to meet the guys. People sometimes wonder how a career happens. Well, the George Shearing Quintet and Billy Eckstine were doing a double bill concert. They were playing at Carnegie Hall, and Tony took me backstage to meet George Shearing. He says, "George, I got a guy for you. You looking for a guitar player? He plays the guitar. But wait'll you hear this. Toots, do you have your harmonica? Play your harmonica for George. What would you like to hear?" Can you believe it? This is backstage, during an intermission, and they're getting ready

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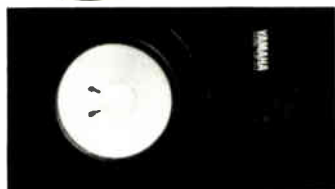
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to play. I said I could play anything in any key. George said, "Body and Soul?" Okay. "D Flat?" Okay. That did it. The agreement was that if I did a decent job as a guitarist in the quintet, I would get the job and be featured with harmonica. That's how I got the job.

Bonzai: And that ended up as six years with George?

Toots: Right, the only steady job I ever had. [Laughs]

Bonzai: This brings us up to the late '50s. Your first album as a leader was *Man Bites Harmonica*?

Toots: Yes, for Orrin Keepnews, but actually a little before that was *The Amazing Sound of Toots Thielemans* on Columbia.

Bonzai: You started off with the accordion when you were 3 years old. How did you find one small enough to play?

Toots: Just a small accordion—I still have it.

Bonzai: How did that lead to harmonica?

Toots: No lead. I was not encouraged to become a musician. I was a spoiled child, and music was not a profession then. My parents wanted the best for me, and they didn't think of music as a profession. But I bought a harmonica after seeing some Larry Adler movies. Then there was a group called the Harmonica Rascals, a comedy act with good harmonica players. Then I discovered American music, the jazz. I wanted to play more than the melody, I wanted to add my little things to it. Then I met some musicians and we listened to records.

Bonzai: Were you self-taught?

Toots: Totally. I had three guitar lessons. The rest I picked up from seeing guys do it.

Bonzai: Why did you choose the chromatic harmonica?

Toots: In the beginning I thought, "Play everything in C." I got good enough, and friends would say I should sit in with the bands we went to see. I asked if they played the blues in C. "No, B flat." I studied for a week and came back. Then it was "Tea for Two" in A flat. I had studied all the original keys where the songs were written, but if I wanted to sit in, the bands would not transpose for me. It was survival. Play in their key or don't play. That way I learned to express myself fluently in all the keys. And each key has its problems and its advantages. Some

runs, some effects are easier or sound more fluent, or *lay* better. That's a freak of an instrument, because some notes are blown and some are inhaled.

Bonzai: The harmonica strikes me as a very brave little instrument, like a voice. It hangs there, naked. If there is any mistake...

Toots: French horn also. When they have a cue to play—the pressure! Most of the time in symphonic works, the French horn sits there counting bars for five minutes and then comes up to some difficult answers, or some solo—important interventions. These guys go crazy. There are some strange people among French horn players.

Bonzai: How about harmonica players?

Toots: They ain't so cool either. [Laughs] It's a brave instrument, but also the harmonica is one of the few instruments that can create a mood all by itself. Okay, when a guy waits for the electric chair in the prison cell, you're not going to hear a violin playing all by itself, or a piano. That's almost too obvious an example, but the harmonica, somehow, can create a mood—I don't know how, but I'm happy it does, 'cause it got me a few jobs.

Bonzai: Isn't it funny that the same company that makes the accordion makes the harmonica?

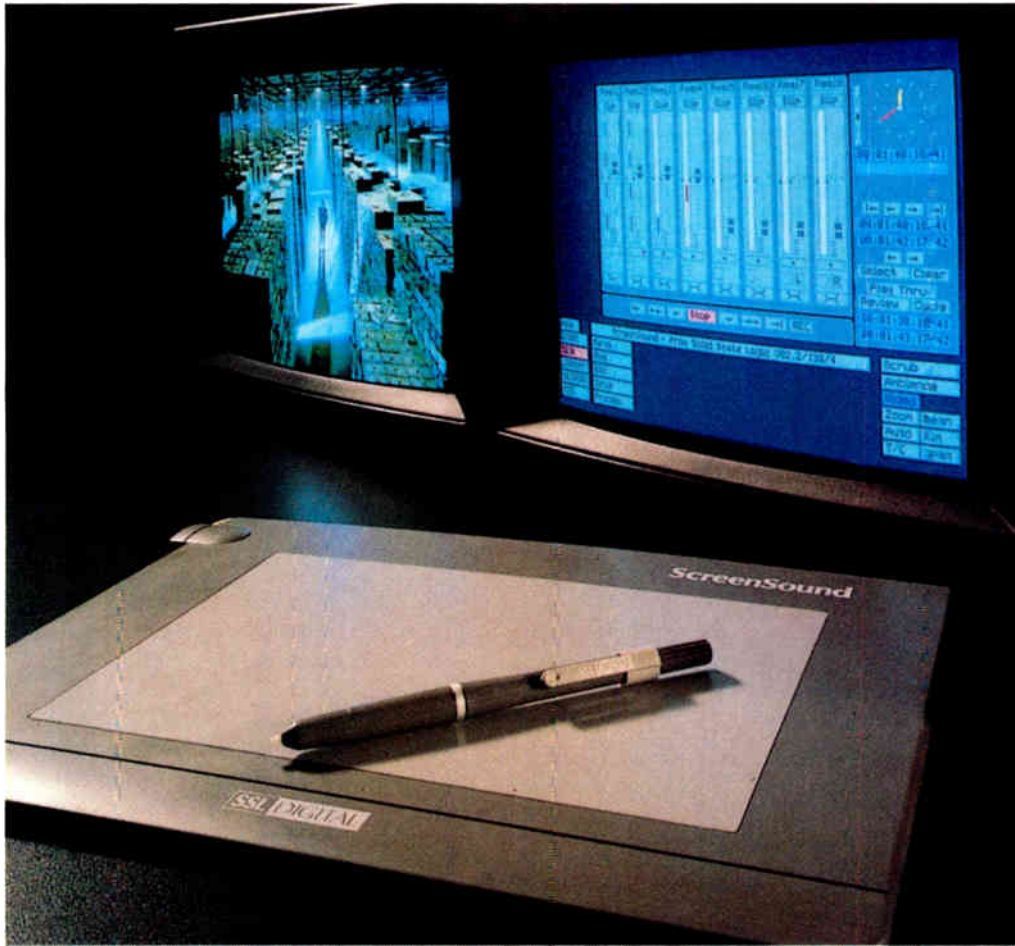
Toots: Yeah, Hohner. And some black gentleman, somewhere, took the harmonica and said, "Hey, it sounds good if I inhale instead of blowing." The inhale effect on the blues harp—all the goodies are *suck* notes. Those runs, typical runs of the blues player—that's all strong inhale. The Germans didn't know what to do with that. "*Der blues, jawohl?*" [Laughs] And they made millions. Of course, the blues players got more exposure after the Rolling Stones and the Beatles used the blues harmonica. And Bob Dylan, of course. But Bob Dylan doesn't play the blues. He plays those little answers to his songs.

Bonzai: You're also known as a whistler.

Toots: My whole musical life, and maybe the rest, is a hobby that became a passion that became part of my life and my body. I bought a harmonica and then discovered jazz—that became my passion. I didn't go to school to play the harmonica or study jazz or guitar.

The whistling is the same thing. I'm not such a good whistler in terms of whistling by myself, like Ron Macrobly, who calls himself a "puckerist." What

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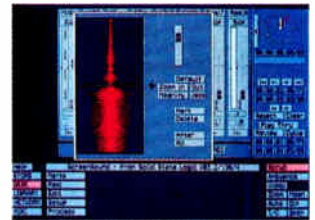
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I do is whistle together with the guitar, roughly speaking, like a flute on top, like a wind instrument playing the same runs.

Bonzai: I understand you were the first to really combine whistling and guitar?

Toots: Sure, nobody thought of it before. It may not be much, but it's something, right? Actually, it's a little like Slam Stewart. Nobody before him sang along with the bass. "Zoop zoop—Flat Foot Floogie." Slam did that. Twenty years after I did the whistling, George Benson underlined his scat singing with guitar.

Bonzai: You are quite a free spirit. Adventuresome. Trying things out.

Toots: Not that I want to have fun. Fun is a dangerous word to use. When a musician smiles a little too much, the critics say he can't be good. He's too happy. "Happy" is not serious. I can't be very serious about myself, but about enjoying.

Miles Davis once said, "I am the first one to know if I sound good or bad, and very often the only one." It's true. Some people may react differently to what you just finished doing. Because you get a standing ovation doesn't mean that you played well. You reached the people emotionally to the

point where they wanted to stand up. In some cases, maybe you weren't bad. But sometimes you play better than other times. You say to yourself, "Tonight I was good." You are the one who knows if what you tried to play came out or not. That's jazz.

Bonzai: You mentioned how the harmonica can create a mood. Whistling too. I was listening to "Bluesette," and my wife said, "Sounds like a bachelor." To her, it was the mood of a man alone, thinking...

Toots: Sure, that's how it started. When I am on the street walking my dog, I can't sing, so I whistle. Shearing's bass player, Al McKibbin, once said to me, "Man, you whistle better than you play." That made me think. I was already playing guitar and harmonica. And maybe he was right. With the whistle, you can do inflections you can't do with a guitar. Even with synthesized guitar, it sounds artificial if you do those things. Or maybe you whistle for girls: You can't do that with a harmonica.

Bonzai: And because of your whistling, you are identified with one of the most memorable commercials of all time.

Toots: Old Spice.

Bonzai: Could you whistle that for me?
Toots: [Whistles] And you know, that's one of the sidelines, the fringe benefits of recognition I have from "Bluesette." That song came out, and in the jingle business they always look for new sounds. The producer said, "Toots, I've been a fan of yours, but this time you are going to make some money." I got a Screen Actor's Guild contract. As a whistler, you are a member of SAG. Each time they use that spot, you get something—those famous residuals. I didn't even know that existed. For the guitar part I made maybe 30 dollars an hour. Twelve dollars for each subsequent use. If they use a spot for six months, I made 53 dollars. But for whistling, I make 7,000 dollars. [Laughs] The fringe benefits of jazz.

Bonzai: What's the secret of your success?

Toots: Sweat. And each day, you know, doing my best, without believing in applause—having a rewarding feeling, but it's not because of a lot of applause that you play better. ■

Inspired by Toots Thielemans, roving editor Mr. Bonzai is currently working on an all-whistling version of The Beatles' Revolver LP.



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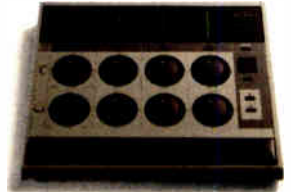
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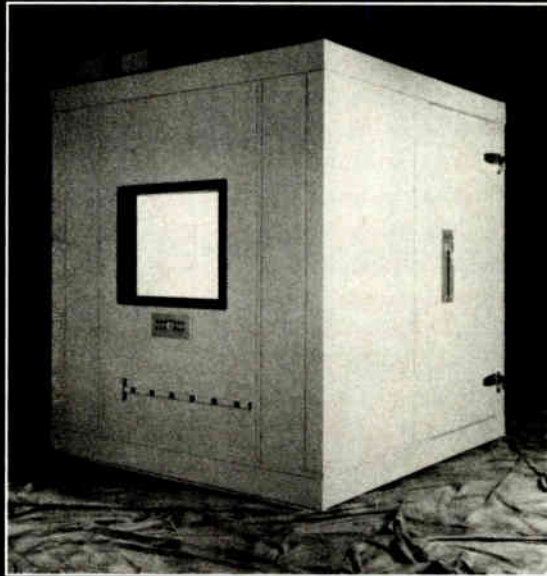
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pool our contacts and resources and make it official by trying to write and produce the jingles and underscores."

With a start-up bank of \$30,000 and equipment contributions from their individual home studios, the trio found a studio space at Bender Editorial Service, a commercial and industrial film and video editing house. Aside from the benefits of a midtown location, which Mike Coon says has positive psychological impact on potential clients, MadPark picked up work from Bender. That work was primarily sound effects, an audio category that Weiss says was not in the group's original business agenda. "We were a logical choice for them to rent to, since there was at least the potential that our companies could work together," Weiss recalls.

The proximity to Bender doesn't guarantee work, however, as Weiss is quick to point out. He estimates that Bender accounts for about 10% of MadPark's revenues, though "we've touched on the subject of an expanded relationship with some of the editors at Bender."

Projects written, produced and played by the three include underscoring for CBS Sports, a Casio keyboards Canadian radio spot, and sound effects layouts for Pizza Hut's "Ninja Turtles" national television campaign. MadPark is a good example of how well sound effects and scoring work can be done on what is basically MI-oriented equipment, using sound generators like Korg M1 and Roland D-50 synthesizers, and Casio FZ-1 and Akai S950 and 900 samplers.

The recording and outboard gear includes an Allen & Heath 24-input console, a Tascam MSR-16 with dbx NR, several of the better economy-priced reverbs—like the Alesis Quad-raverb and Lexicon LXP-1—Korg DRV-1000 and 3000 delay lines, a Rane DC24 compressor, dbx 263x de-esser and Auratone and JBL 4312 monitors. "A lot of sound effects are based on musical sounds anyway," Weiss reasons, "so these types of synthesizers, combined with the samplers, provide plenty of power."

Nonetheless, equipment expansion is on the drawing board. With a Mac II already in place, Digidesign's Sound Tools package will be the next major acquisition. "For \$3,000, we can put ourselves into the digital game cost-

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effectively. It's not a Synclavier, and we won't have the manipulation and retrieval speed of a system like that, but then again we won't be paying it off for ten years, either."

A lot of agencies are beginning to balk at the size of some budgets for sound effects and underscoring, Coon continues, a trend he feels can be met with low-cost digital recording equipment. "People want a product that will work for them, and that's something we can deliver cost-effectively."

"Sound effects is a tough area to break into," Weiss adds. "We can approximate the sounds [of expensive digital systems], although we don't have the accessibility and manipulation they do. But our end-result is excellent. I suppose we'll have to take the long road and work at a cheaper rate, but I think it'll work out in the end."

Whether you're talking about a Synclavier or Sound Tools, says Coon, the reality is that what used to be a mega-expensive enterprise has become a cottage industry, with all levels of budgeting and equipment to meet those budgets. "Digital is affordable, and it puts us into another arena," he says.

A DAT deck is also an imminent

purchase for the studio; Weiss says they've held off buying one for this long because the New York rental market is so competitive that it's cost-effective to rent for mixes.

Weiss and Coon are also pleased with the Tascam MIDiiZER they use for synchronization. "It came out just when we needed it," Weiss says, "and at a price that saved us thousands compared with something [else] with similar features and ease-of-use. It's even saved me a couple of times when I maxed out tracks on the multitrack; I used the MIDiiZER to sync up the 2-track for more tracks."

Affordable digital technology has indeed leveled the playing field for project studios to the point that project rooms have to place their emphasis upon creative talent as much, if not more, than their equipment. Weiss feels that the fact that the MadPark principals are musicians as well as writers and technical people is this company's edge. To take advantage of that, MadPark has actively pursued a market segment that has all but been given over to home recording: song demos.

"We can offer more because we're players," he says, "and for people who

want really exceptional demos, like major songwriters who are pitching to major artists, that gives us an advantage." A couple of notable writers have already enlisted MadPark, including Doug James, who co-wrote Michael Bolton's "How Am I Supposed to Live Without You," and Rhoda Roberts, co-writer on Freda Payne's R&B hit "Band of Gold."

Both Weiss and Coon acknowledge that the competition in New York is fierce. Despite having a location in what Weiss calls the "four corners of the audio/video world," the number of similar studios has made an impact. "I don't know many of the other project studios out there, but people tell me there's plenty," Weiss says, "and they're all using roughly the same type of equipment and doing very good work. So we have our job cut out for us. It's so competitive that you have to use every advantage you've got—location, talent, everything. But hey, that's New York." ■

Dan Daley is Mix's East Coast editor, which means that he gets to redeem the deposits on all the 9-millimeter shell casings he can pick up off the street.

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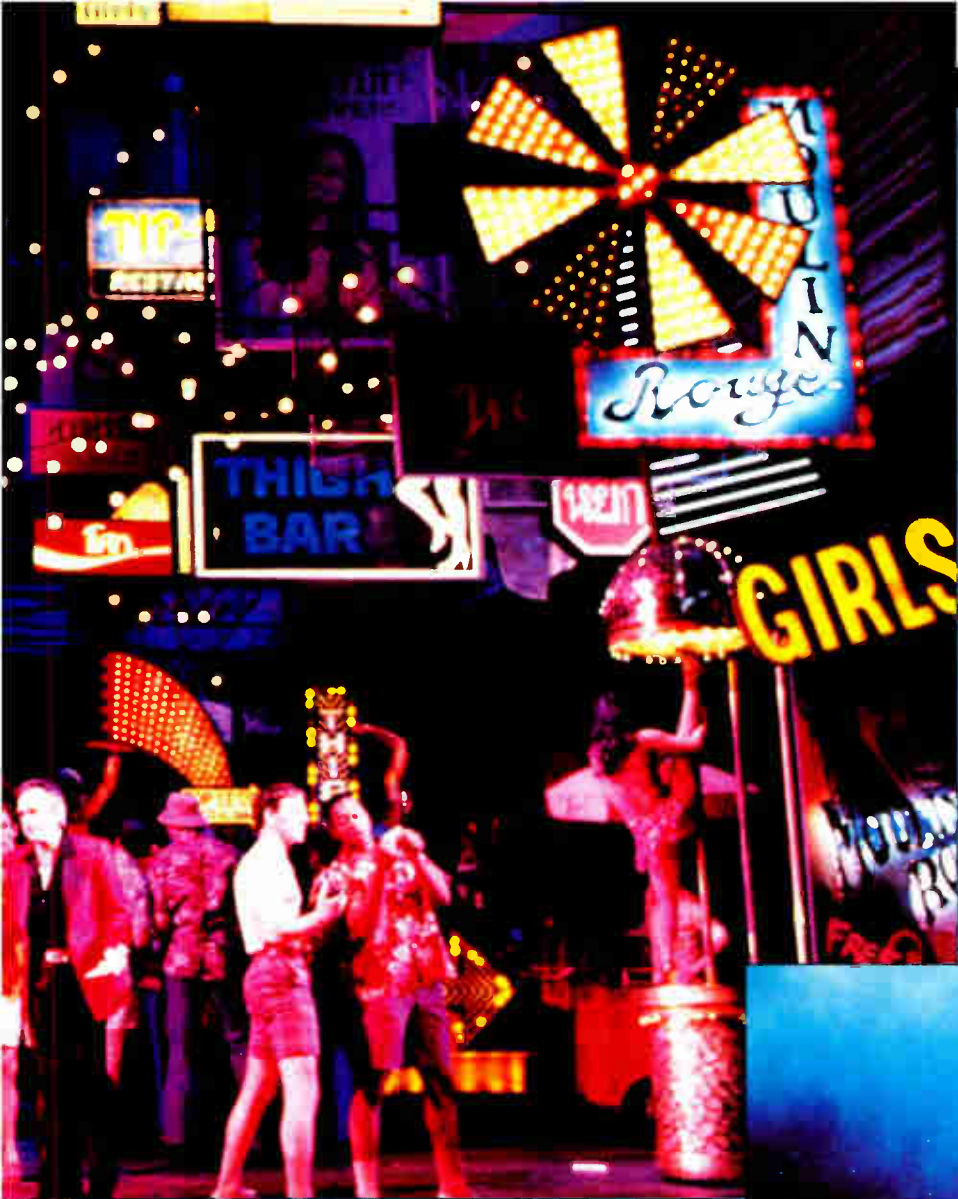
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skates, *Starlight Express*. "Various designers have different ways of doing it," says Bruce. "Generally, the best place is in the center of the forehead, quite high. I often put people's mics on their sideburns as well. It depends entirely on the shape of their face and their bone structure. Prominent cheekbones help, because there's a fair degree of bone conduction. The main advantage, apart from sounding ten times better, is that people take the mic with them when they move their head [and don't go off mic]."

Bruce uses three different mic capsules for head mounting: Sanken COS1s, Sony ECM-77s and Sennheiser MKE-2s. "Different mics suit different people," he says, "and they also suit different placements. Sanken is very good on the side of the head. It's also good in the center, but it's particularly good on the side. It's also

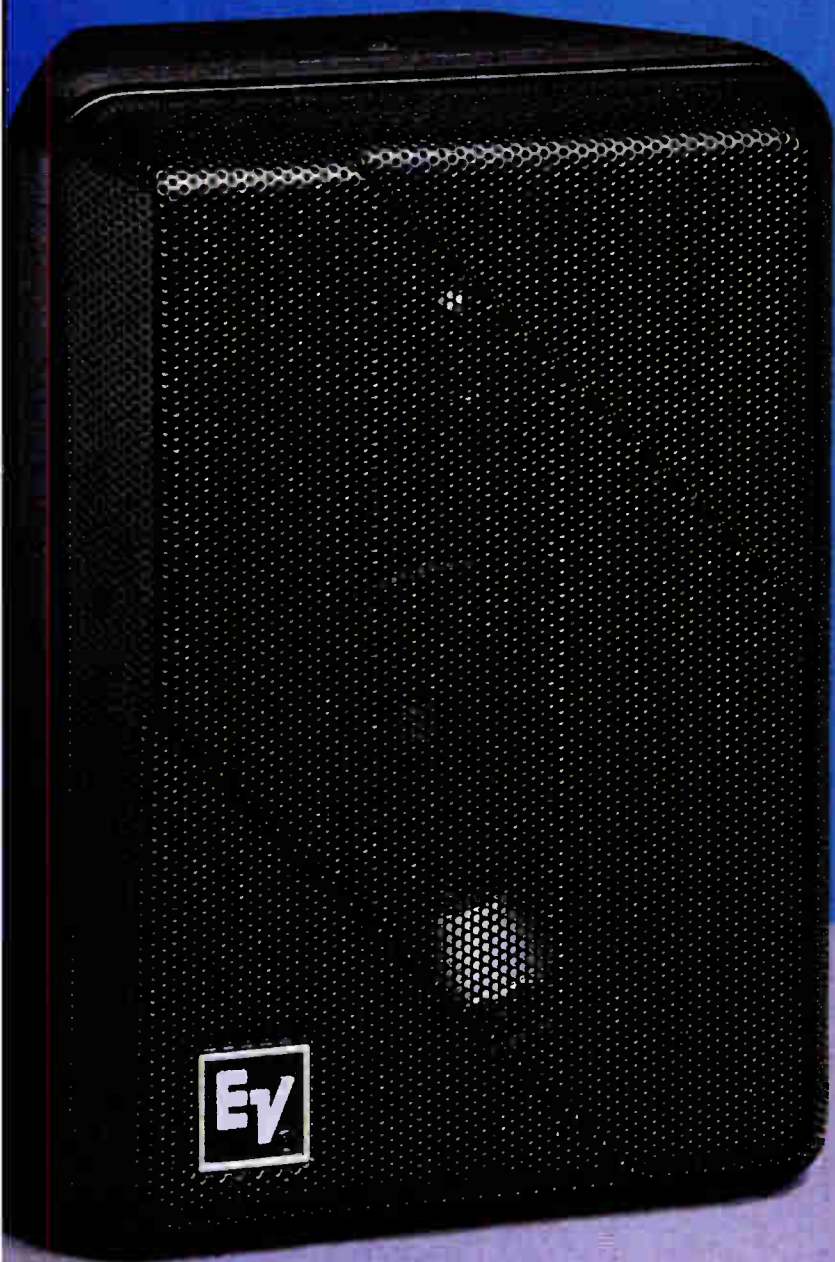
Although you can wear your heart on your sleeve, it's a lousy place for a microphone. Mounting mics on actors' chests doesn't work much better, according to Bruce. "There's one major resonance you tend to get on people's chests. You get very little brightness and a lot of lower-mid. Depending on the shape of people's chins and necks you may also get a horrible resonant cavity under the chin, which is impossible to EQ out reliably. It's a battle you can never win. You have terrible problems with clothes rustling, and if people stand close together, they mask each other."

Miss Saigon actors wear their mics on their heads, using placement techniques developed in the early '80s by Andrew Bruce and theatrical designer Martin Levan for the infamous musical-on-

**Scenes from
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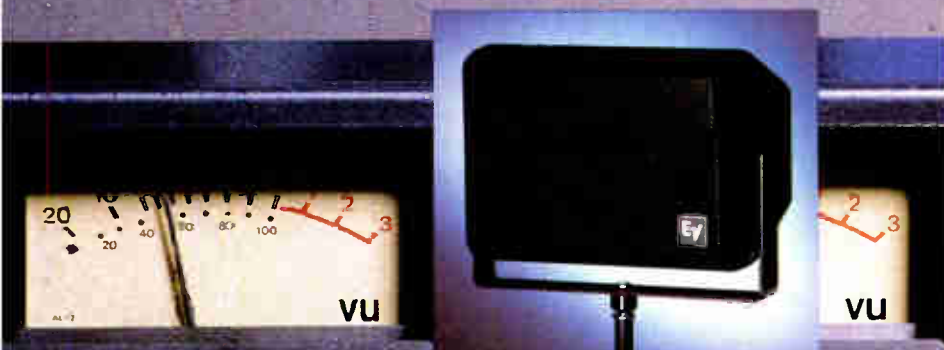
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meeting was the formation of a subcommittee to study other existing networking schemes. More on this important topic next month.

Several new acquisitions and distribution deals were announced at the show. JBL Professional acquired delay-line manufacturer Audio/Digital Inc., Eugene, Ore. JBL also announced the formation of the JBL Professional Group, which will be headed by Audio Digital founder,

president and director of engineering, Gary Hardesty. The new group will be focusing on the systems aspect of the company's contracting business, with emphasis on large installations.

Klark-Teknik announced that it would assume the distribution of the Dynacord line previously handled by fellow Mark IV Audio companies Altec Lansing and University Sound. The transfer is designed to take advantage of K-T's distribution network and the company's well-established lines,

including DDA and Milab.

Mark IV Audio has entered into a licensing agreement with Intelix Corp. of Madison, Wis. Intelix builds the MIND control system, a digital control system for audio and other building equipment. Mark IV will market the product as Intelix, Mark IV Audio Control Technology. The MIND system is one of several proprietary systems offered as an alternative to the PA-422 proposed spec.

Martin Audio of England announced the relocation of its American sales office and the appointment of Jack Alexander as Martin America's head. Alexander stresses that customer service will be one of the top priorities of the new American sales office, which will be located in Chicago. The company can be reached at (708) 758-0652.

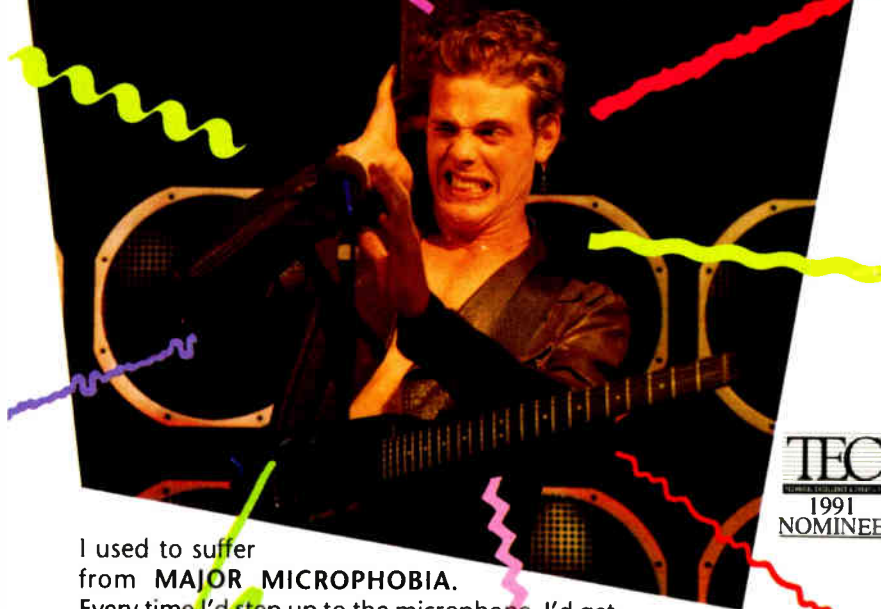
Numerous new products were announced by companies attending the show. Look for a partial rundown on our New Sound Reinforcement Products page, with more to come next month. Next year's show will be in Anaheim—hope to see you there!

Speaking of Martin, 88 of its F2 cabinets were used in a sold-out Jane's Addiction show in Madison Square Garden (see photos). Delicate Productions (Camarillo, Calif.) provided the rig, which "fulfilled all our expectations and more," according to Delicate's chairman Spy Matthews. Additional equipment included Crest 8001, 6001 and Carver PM-1.5 amps. House consoles were two Yamaha PM3000s (FOH mix by Tracy Kunstmann), and a Soundcraft Series IV 40/16 and TAC 30/12 were used for monitors (with Gerry Georgettis at the controls). Martin F1s and M1s were used for drum and sidefill, along with LE600 wedges EQ'ed by Klark-Teknik DN360 graphics.

Delicate will be fielding a festival-sized version of this system on a shed tour this summer. The "Lollapalooza" shed tour will feature Jane's Addiction, Siouxsie and the Banshees, Living Colour, Nine Inch Nails, Ice T, The Butthole Surfers and the Henry Rollins Band.

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NEWS FLASHES

Changes are afoot at Maryland Sound Industries West, with the departure of Stephen Zelenka, who handled Events & Concert Production for the West Coast office. "Stephen, on a very amicable note, has decided to pursue other ventures," says MSI general manager Mike Stahl. "He's contributed tremendously to this company, and I can't say enough nice things about him."...Force Majeure Systems has an Apogee system out with the Nitty Gritty Dirt Band and the Kentucky Headhunters. A Soundcraft Series IV 40x16 is used by house mixer Peter Vileneuve, while monitor engineer Dave Pallett works over TAC Scorpion 40x8 and 40x12 consoles. Apogee 3X3s and AE-5s are used for the house, with Odessa FH215 subs and FM100 and 200 monitors and Crest amps...BTO are on the road in Europe with rental company Hansa PA of Bremen. The tour is using a new TAC SR9000 console. Other TAC consoles have found their way to Belgium, including rental companies Promoscene and PAS, both of Namur, and ARTO Sonorisation of Genval... The 80,000-seat Olympic Stadium in Greece has upgraded its sound system, including the addition of 70 Gauss 4081 compression drivers. Alpha Sound of Greece was the installing contractor...A Neutrik survey taken at the Paris AES and Frankfurt Musikmesse shows growing demand for the company's Speakon connectors, which the company claims have become the most used in the industry. As a result, the company has doubled its production capacity for the product...

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by Gregory A. DeTogne



A WORLD CLASS ACT

CHICAGOLAND'S LATEST SHED IS THE BIGGEST IN THE COUNTRY

When you think in terms of the world, something on a grand scale is bound to emerge. Such is the case when it came to building Chicagoland's World Music Theatre, which at present has no difficulty in laying claim to the title of the country's largest outdoor amphitheater. Like many others who have traveled to this shed of sheds, I caught my first

glimpse of the World's imposing 85-foot-tall, steel-and-concrete pavilion as I sped toward the Harlem Avenue exit that leads to the theater off of I-80.

Located approximately 30 miles southwest of downtown Chicago in suburban Tinley Park, the World looms larger than life among the cornfields and greenery that comprise the surrounding

countryside. Adding to the enormity of the scene, the entrance is the size of the parking lot. When empty during off-show hours, it could easily provide enough space to land a dozen or more zeppelins the size of the Hindenburg.

The World hit the shed-circuit scene in the summer of 1990 with an inaugural season of 35 bookings. With construction for the massive project getting underway in November of 1989 and the first show scheduled for June 2, 1990, opening on time was a meteoric race against the clock. Matters get even more complicated when you consider the months of December '89 through March '90, which dramatically slowed progress with mud, snow and just about everything else short of hurricanes and tomados. April rains that year delayed construction further, and it finally got to the point where the concrete in the main pavilion from the house mix position down to the stage was being poured the Tuesday before opening day. That left just a few more days to install the 6,000 seats that were needed in the same area, and at least one afternoon to pour the concrete for the truck clocks, provide a surface for the roads leading to the parking lot, and then throw the switch for the

Above: View into the pavilion from the lawn, including entrances to private boxes. Right: A technician works with racks of Crown Macro-Tech 1200s.



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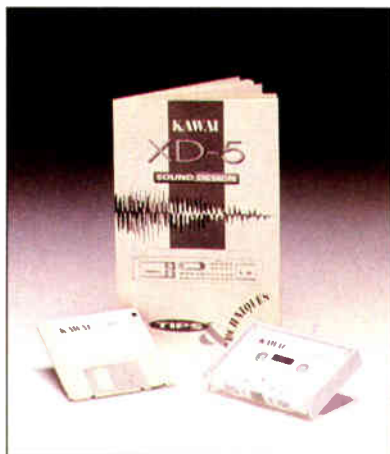
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KAWAI

Digital Magic.

opening act by Cher. Remarkably, it all came together, and just as construction workers were leaving the area with their lunch pails in hand, concert-goers began streaming in.

Based in a metro market that already has two other prominent sheds—Poplar Creek in Hoffman Estates, Ill., and Alpine Valley in East Troy, Wis.—the World faced formidable competition even as a concept. Stepping into the fray to face this challenge were the theater's owners, who jointly call themselves The Discovery Group South. Among this consortium is Tinley Park Jam, a subsidiary of Amy Granat and Jerry Mickelson's Chicago-based Jam Productions, and developer Jimmy Gierczyk, whose company handled the construction chores, and who personally helped finish the truck docks during the eleventh-hour scramble to open.

As The Discovery Group saw it, the World was to be a shed for the 21st century: large and accommodating for visitors, and equally user-friendly on professional, production and technical levels. Today, as the theater moves through its expanded second season, it's not even an arguable point that the original goals have been met. With seating for over 33,000 people, the main pavilion alone is capable of holding 11,000 under its expansive roof. Monstrous proportions don't stop on the audience side of the fence either. Docks at the rear of the sprawling stage area can hold eight trucks simultaneously, while the house P.A. grid was built 65 feet above the deck with a capacity well upward of 200,000 pounds, making it more than ample for any show.

When I visited the World last summer in mid-August on a show day featuring an evening appearance by the Allman Brothers Band, I

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LIVE SOUND

ers are located in the center racks.

Well-fed by the caterers and armed with my new skybox pass, I made my way from Sokolick's office to the front of the stage. With the show just underway, I shot some photos from right under the deck. Following more photos from Jam Productions' private skybox (there are other skyboxes offered to corporate clients and individuals as well), I made my way to my seat, which was about eight rows back, dead center. From my vantage point in the pavilion, the sound was remarkably intelligible and free from distortion. A tour through the lawn system's area of coverage out on the hill in back of the pavilion also provided ear-pleasing performance. Visually, there didn't seem to be a bad seat in the house. Sight lines were clear everywhere, even in the pavilion, which is held up by monolithic steel pillars.

"As sheds go, this venue is pretty friendly," Steve McCarthy had told me earlier. "There's nothing acoustically that will throw you except for a long reverberation time, and even with its presence, there are no strong slaps coming back. The only bad surface we really have is created by the area of the skyboxes that face the stage. Each skybox, however, is located at a different distance from the stage, and they contain upholstered chairs, carpeting, and other absorptive surfaces, so the reverb is very diffused as a result. While the RT60 in this theater is long, the only frequencies that are really affected are from 3.5 to 6 or 8 kHz. The reason for this lies in the fact that the ceiling is all steel, the floors are all concrete, and the seats are all plastic. These hard surfaces let the high end bounce and just keep on going, but overall, the rest of the frequencies hang out real well. For engineers rigging this place for the first time, I always suggest that if their system is going to be flown, they should fly it as they would in an arena. The most successful hangs we've had have

been flown high and angled outward and downward to fill the room. With this arrangement, there's plenty of SPL to get into the skyboxes and counter the long RT60."

For the Allman Brothers' World debut, Bud Snyder had his crew hang the house system (which was also supplied by dB Sound in the form of their HD sound system) from five grids. As per McCarthy's suggestions, Snyder told me that "sound people coming into this facility should be aware that they may want a little more wattage and speaker coverage than they would normally utilize in a place this size." Snyder, who also manned the Gamble Series EX56 house console that night, relied upon Crown Macro-Tech 2400s and PSA-2s to supply him with the necessary power.

In my talk with Buddy Sokolick, the issue of the long reverberation time did indeed arise, and he assured me that for the '91 season, a possible combination of diffusers, baffles and traps would be installed in the pavilion and onstage to make the acoustics even better. As for the lawn system, the components have stayed the same, while the lawn seating area's hill has had its angle increased, thereby making it four feet wider at the back corners. A wooden fence will be added at the rear as well, probably at a later date when the ground has had time to settle.

"We're increasing the grade of the hill primarily to give us the four feet on each corner," Sokolick revealed. "That much extra space should provide for easier passage when crowds get large, and acoustics and sight lines should improve as well since we're bringing the audience closer to the audio source and the stage. Toss the wooden fence in just for extra measure, and we shouldn't be in need of *anything* when it comes to good sound." ■

Gregory DeTogne is an Illinois-based writer who frequently contributes to Mix.

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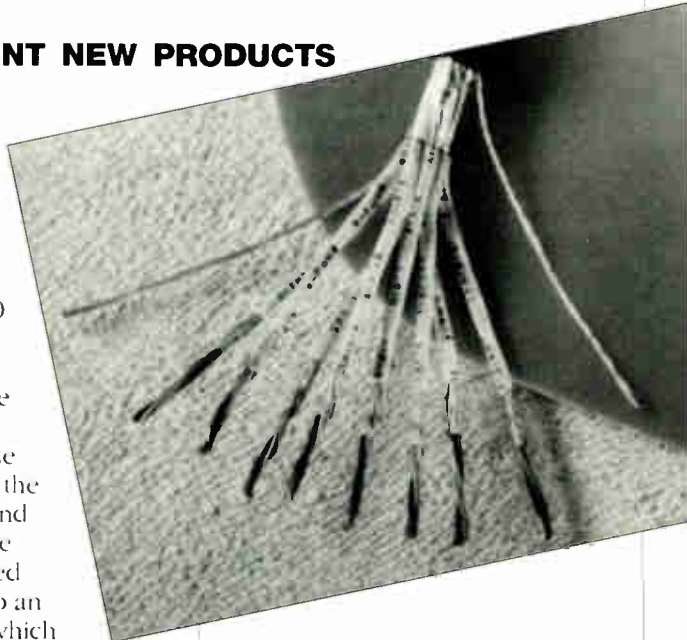
Deliveries of Europa—the new flagship house console from Soundcraft (Northridge, Calif.)—are slated to begin this fall. Available in 24-, 32- and 40-input module frames (with a provision for four optional dual-matrix modules), Europa offers advanced features such as noise gating on each input, 12 aux sends, 4-band fully parametric EQ, eight stereo inputs, and full VCA facilities with soloing. Other touches include illumination or LEDs on all switches, no concentric controls, and aluminum-extrusion frame construction with recessed handles running the entire length of the console. Circle #290 on Reader Service Card

RAMSA MUTE GROUP RETROFIT

The Ramsa division of Panasonic (Cypress, Calif.) has announced the availability of new mute group options for its WR-S852 house and WR-S840F monitor consoles. Retrofittable to existing consoles, the option offers ten mute groups, MIDI or manual control capability, and nonvolatile memory to retain operating status in case of power outages. Circle #291 on Reader Service Card

BELDEN BRILLIANCE SNAKE CABLES

Now available in 12 configurations (from 1 to 52 pairs) is the Brilliance™ line of 24-gauge, flexible snake cable from Belden of Richmond, Ind. Due to the smaller size, the cables are lighter and easier to install. The individually shielded pairs are bonded to an inner PVC jacket, which eliminates the need for heat-shrink tubing and allows the foil shield and inner jacket to be stripped simultaneously on installation. In addition, each pair is printed with an alphanumeric code for easy identification during termination. Circle #292 on Reader Service Card

**YORKVILLE IS-340**

The IS-340 paging system from Yorkville Sound (Niagara Falls, N.Y.) combines an FM tuner, mic/line input with auto priority control, two aux inputs, limiter and 35-watt amp in a rack-mount package. Circle #294 on Reader Service Card

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VEGA T-680 UHF TRANSMITTERS

Following recent FCC approval, Vega (El Monte, Calif.) is now shipping its new series of T-680 handheld wireless UHF (494-704

MHz) mics, for use with the company's 600 Series receivers.

The transmitters have a rated RF output of 150mW, for a range of up to 1,700 feet. Also featured is an Electro-Voice N/D857 neodymium vocal mic element, internal dipole antenna (inside the mic body!).

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WHITENTON ONE POWER PRODUCTS

After a decade of producing power line products under the Juice Goose name, Whinton Industries of Houston, Texas, unveiled its One Power family of products for touring and fixed installations. The CQ Series are sequenced power activators with capabilities ranging from 15 to 120 amps and one to five delay groups. The Mark Series are AC line conditioners for permanent installations, in capacities from 5-75 kVA; single- and three-phase units are available. Also offered is the 20-amp VR-20A voltage regulator/conditioner and two lighted rack-mount spike surge EMI/RFI protectors with rear AC outlets. Circle #295 on Reader Service Card

Circle #295 on Reader Service Card



by Peter Caranicas

NOW THERE ARE FIVE

A NEW LOOK AT THE EDITEL GROUP

Every few weeks or so, the men who run the nation's largest post-production facility get together for a strategy session. They would probably meet more often if they weren't based thousands of miles apart, for their facility is the



PHOTO: ROBERTO GEROMETTA

Editel Group, which operates major post houses on both coasts and in the heartland.

Several months ago, San Francisco's One Pass renamed itself Editel/San Francisco: nearly three years ago, Editel/New York, Editel/Chicago and Editel/L.A. were joined by Editel/Boston, which until then had been known as Century III. (*Editor's note: In mid-June, after this article was completed, Editel's SF facility suffered extensive damage in a huge fire. At press time, plans called for temporarily relocating the business, using the equipment that was salvaged from the fire, including gear from the Rank Cintel suites and the audio room.*)

All five facilities report to the parent company, Wisconsin-based Banta Group, which has primary business interests in the print industry. Each facility operates independently. "They are autonomous divisions," says the bicoastal Dan Rosen, president of

Editel/New York and Editel/L.A. "Every market is different. What's true for one is not necessarily true for another."

As an example, Rosen cites the advanced audio post capabilities of Editel/New York and the lack of such services at Editel/L.A., a powerhouse in commercials and music videos, best known for its electronic video post. Even though both facilities largely cater to ad agency work, far more demand for audio post emerged in New York. Consequently, the Manhattan facility recently set up a division called Editel Sound.

Editel/New York has always been strong in audio, notes Bill Kelly, the facility's VP of program sales. For years the mix room has sported an SSL 6000 console, with Studer 24-track analog and Sony PCM-3324 24-track digital recorders. "Then, a few months ago, when we added a Synclavier PostPro SD, we decided to call it Editel Sound," Kelly says. "It lets us offer clients better rates, because they can use the less-

Pictured left: Editel Audio Suite, San Francisco.

Pictured below: Planet director Gustavo Garzon (left) with Editel/L.A. editor David Blum.



expensive PostPro room to design the audio for a job before dumping it over to the mixing room, with its higher rates, for completion." One of Editel

Sound's first jobs was ADR work—overdubbing the accented lines of a French actress—for USA Cable Network's *Counterstrike* series.

In addition to upgrades in the audio rooms, Editel/New York has also placed HarryTrack into its two PaintBox Harry suites in the graphics area, allowing clients to work with broadcastable sound rather than a scratch track.



Editel/NY audio designer Bob Schott in the new Synclavier PostPro SD digital audio suite.

Editel's L.A. facility has nothing in audio to match the New York operation. "We're not considering setting up [such a capability] at this time," Rosen says. "In New York, we felt there was a better market for it. Our priorities in L.A. are more in the video area, so we're putting our investments of money and time into video."

At Editel/Chicago, the story is different. Since 1987 that facility's president, Bob Coleman, has led an ag-

gressive expansion into high-end post for both audio and video. His purpose has been to stay several steps ahead of editorial companies serving ad agencies, which are taking on more and more traditional video post-production work.

Coleman made two key strategic investments in 1987. He bought the first PaintBox Harry system in Chicago, formalizing the facility's Effects Animation Design Group (EADG), and he bought the first AMS AudioFile in North America.

"They were marketing it as a sound effects editing tool," Coleman recalls. "But that's not how we wanted to use it. We looked at it as eight digital dubbers—to slip and slide tracks, and to recreate film-style mixing for video. In film mixing you have your dubbers, you put up your music, voice, sound effects, you roll them simultaneously, you can slip and slide them—you couldn't do that in video. You had to do audio sweetening with 24-track machines. It's a cumbersome, inefficient process."

At the time, Editel/Chicago was offering Montage offline editing and trying to convince clients to transfer film to tape, edit offline and finish in video. Coleman remembers: "One of the objections was that the audio couldn't be done like the film. The AudioFile solved that problem overnight."

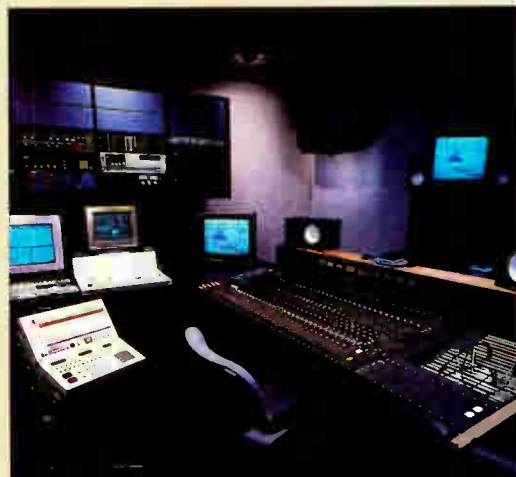
Editel/Chicago has continued its aggressive upgrade program. In video, the facility jumped into D-1 technology, not just for recording, but for real-time image compositing. A \$5 million investment brought, among other things, a Grass Valley Kadenza, an Alpha Image digital serial router, and proprietary software to control devices like the Rank telecine/color corrector, Accom noise reducer, Abekas A64 disc recorder and D-1 VTRs.

Coleman says the next step will be a \$1.3 million expan-

sion in audio. Plans call for the building of a second mix-to-picture facility, including a control room and 15-ft. x 19-ft. studio. In the equipment area, Coleman has his eye on several systems, among them an AMS Logic 2 16-channel, audio-for-video, digital post-production mixer. He'll also be looking at digital and analog systems from Neve, Harrison, Euphonix, SSI, and others. "We're ready to buy and hope to have something up and running by August," he adds.

Of all the Editels, the just-renamed San Francisco facility has probably undergone the most changes in recent months. "The new name reflects a reorganization and refocusing of the

PHOTO: BETEY CULLEN



Audio Suite 2 at Editel/Boston.

company that began two years ago," says Jack Schaeffer, Editel/San Francisco's president.

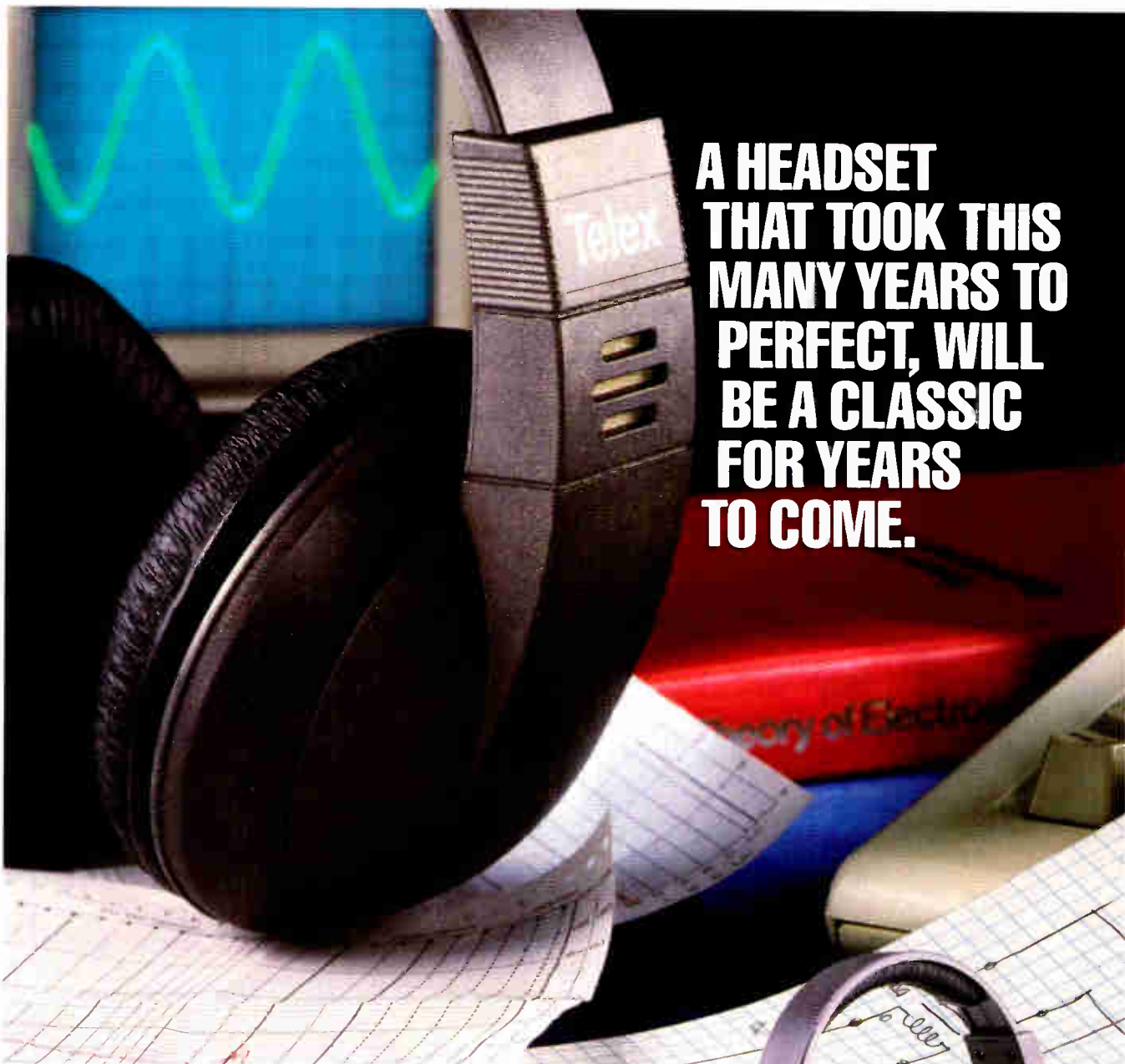
Most of the facility's work is in commercials, and one of Schaeffer's goals has been to overcome the habit of many Bay Area producers of going south for post. "In coordination with Editel/L.A., we're telling them that they don't need to go to Editel/L.A. anymore," he says. "We've got an Editel right here in San Francisco."

The company has spent several million dollars on infrastructure, with much of the money going into routing, monitoring and timing. "We took three rooms that were independent and made them into three generic rooms—all zero-timed—so you can play anything from anywhere," Schaeffer says. Equipment includes Graham-Patten audio boards, D-2 recorders and a Grass Valley Kaleidoscope.

The audio room, equipped with a Sony board and the Lynx control system, has full mix-to-picture capability.



Editel/Chicago's D-1 editing suite, featuring a Grass Valley Group Kadenza, two Abekas A60 digital disc recorders and a Graham-Patten digital audio mixer.



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An AudioFile was added late last year, and a small studio area is used for voice-over, Foley and ADR. "The audio is fully integrated with the rest of the facility, so we can lay back direct to D-2, keeping it fully digital," Schaeffer adds.

Reorganization, however, has meant the elimination of some administrative positions. Altogether, the facility has experienced 75% turnover in staff over the past two years. But, Schaeffer invested in expensive creative talent: "Good people cost what they cost, equipment costs what it costs. The only variable left is how you administer," he says.

Pain has also been felt by Editel/Boston, which has had to withstand New England's winter of discontent ever since it changed its name from Century III. The facility's business has been bolstered by its Digital Images unit, which specializes in TV station graphics. Orders come from outside the region and from corporate clients, including Applied Learning, which produces interactive training programs for videodisc and CD-ROM, and Patriot missile manufacturer Raytheon.

Editel/Boston's audio capabilities include an Otari MTR-90 24-track room, a room equipped with Digital Dynamics Pro Disk-464, and a digital music room that runs on a Macintosh with Performer software. Audio work is evenly divided between corporate accounts and TV spots.

With five post-production facilities named Editel operating in different cities, people naturally look for synergies and economies of scale. According to Editel/Boston technical director Bob Reardon, some work moves around among the facilities, especially in the graphics area, where Digital Images and Editel/New York have collaborated on several projects.

Bob Coleman cites a project for Pepsico International that required \$450,000 of special effects: "It was so big we couldn't handle it all, so we jobbed a portion of the work to Editel/New York."

In a collaboration with the San Francisco facility, Editel/Chicago sent technical director Michael Taylor to the Bay Area to make a joint presentation to Industrial Light & Magic and Colossal Pictures. The two high-end special effects firms do a lot of work for Chicago-based Leo Burnett. According to

Coleman, "We think Burnett will now encourage them to do some effects work on our system in Chicago, because that way the agency will be able to supervise the post in its own backyard."

According to Dan Rosen, the two biggest synergies that accrue from having five facilities under the same umbrella are the ability to combine brain power and buying power. "We benefit from getting our people together to discuss operations, engineering and marketing," he explains. "Plus, another advantage to being a group is our buying clout. We get the attention of the manufacturers, and we

find that valuable." ■

Peter Caranicas lives in Pleasantville, N.Y. He is the former editor of Millimeter magazine.

POST NOTES

Sanchez at Mark IV Audio

Rick Sanchez has been appointed marketing specialist for Mark IV Audio's newly formed broadcast and production group. Sanchez, who was previously a production coordinator for the Walt Disney Corporation, will be based at Vega's facility in El Monte, California. Meanwhile, the company is

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celebrating its 30th anniversary by debuting several new products, including the VX-20, a professional portable wireless system for video production, and its new T-680 series of UHF handheld transmitters. The T-677 bodypack transmitter and the R-662 true diversity receiver are the first in the line to be unveiled. Boasting a line-of-sight range of up to 1,700 feet, it is the longest range, lowest distortion UHF system available today, and has been used with great success at the Grammy "Legends" show and the Miss America Pageant.

Maxell Shows Its Metal

Maxell used this year's NAB show at Las Vegas in April to unveil its brand new 1-inch metal videotape. Designed specifically for use with HDTV digital VTR, the tape achieves the high-quality picture associated with HDTV while conforming to the professional studio production standard adopted by SMPTE and BTA. "The development of this metal tape for interactive use with HDTV demonstrates our commitment to the next wave of technology in the industry," comments Jim Ringwood,

general manager, Maxell's Professional/Industrial division.

Chiquita Goes Bananas Over SoundStation

Chiquita Banana, the Lisbon-based audio post-production company, is the first facility in Portugal to purchase the DAR SoundStation Digital Audio Production System. Well known for its TV and radio commercial work, Chiquita Banana serves Portugal's major ad agencies, corporations and video production companies, and the new 4-channel SoundStation will significantly enhance its recording and editing capabilities. Installed in Chiquita's digital audio suite, SoundStation is being kept busy in audio-for-video post-production of commercials, corporate and industrial videos, and TV and radio programming, as well as dialog and foreign language dubbing and commercial jingle production.

Photomag Sound Studios Upgrades

Photomag of New York City completed construction of another mixing suite, Studio E. The new room interfaces with the AudioFile and features a Neve V Series console with Necam

96, a 24-track Studer 820, and 4- and 2-track Studer A807s. Comments Beverly Dichter-Jacobs, Photomag's studio manager, "The unusual feature about the new room is that there's natural light, which filters in from the window in the recording booth, making for a wonderful working environment." Photomag now offers four full-blown mixing rooms and is able to mix to videotape, film, and 24-track or 35-track full coat. Acoustical designer for the new room was Jimmy Maher of Sound House Designs.

Sync Sound Installs New Database System

Sync Sound, the New York-based audio post-production facility, recently installed the Leonardo Professional Librarian System, which incorporates all of its 500-plus hours of stock and proprietary effects on every medium into a database. The new Leonardo package complements the company's Gefen System, enhancing the flexibility and efficiency of the facility's effects library. Sound effects engineers Ray Palagy and Rick Wessler are supervising the development of the library, working with clients to make selections and create customized sounds.



Any effects that can't be found in the library can be created on their Foley stage by in-house Foley artist Wessler.

B.A.S.E. Processing Adds 3-D Impact To Movie Sound

Creating soundtracks for films is as much a science as it is an art, and the new B.A.S.E. technology is being heralded by many sound designers and mixing engineers as the ultimate tool for producing realistic 3-D ambience with controllable center-image localization. Alan Howarth, who worked on sound effects for such movies as *Total Recall*, *Flatliners* and *The Hunt For Red October*, is a confirmed user, and says that the system is a "unique device that functions more as a 'dimensionizer' than as a special effects unit." According to Howarth, president of Electronic Melody Studios, B.A.S.E.—which stands for Bedini Audio Spacial Environment—presents no problems with mono/stereo compatibility, or the use of Dolby stereo matrix-encoding for surround-sound presentations. "I like to look upon B.A.S.E. as a front-end accessory for the Dolby stereo 4:2:4 matrix, and one that lets me steer the direction of the sound in a way that grabs your attention,"

Howarth says.

POST BRIEFS

Lyon Lamb Video Animation Systems Inc. debuted its RTC-HD for the real-time conversion of HDTV to standard NTSC and PAL formats at this year's NAB. The RTC-HD accepts bi-level or tri-level sync from HDTV sources and digitally converts the high-definition video signal to broadcast-quality video standards... Yessian Music Inc. of Farmington Hills, MI, recently scored a new arrangement of the '50s classic "Shake, Rattle and Roll" for the latest Frigidaire campaign. The 30-second spot was produced by Dan Yessian and engineered by Tony Campana for Shelley Berman Communicators of Columbus, Ohio. And Yessian Music has been honored with a Telly Award for its Hardee's Good Stuffin' Muffins jingle... Trio Video of Chicago recently made the switch to two new Grass Valley 300 switchers. The company also recently purchased three BVW-75 Beta SP machines and upgraded its mobile fleet with the purchase of 18 new Sony cameras... Film Craft Video, the Michigan-based teleproduction facility, has appointed Lori Jo Vest direc-

tor of sales and marketing. Vest, who has been with the company since 1989, will manage sales for both Film Craft Video and Film Craft Laboratories, a film processing lab located in Detroit... Kappa Post of Burbank, CA, has been chosen to edit a 30-minute product reel for Columbia Pictures International Television. The reel, featuring daytime serials, TV movies and mini-series, was processed on D-2... Solid State Logic announced the appointment of Igor Saulsky as Western regional sales engineer. Previously a freelancer, Saulsky will now specialize in ScreenSound sales within the Los Angeles film and television communities... Universal Video-Film-Audio has appointed Mike Solaya as VP, general manager of all divisions. Solaya was most recently at Titan Television... Planet Blue, the Hollywood visual effects house, has hired veteran colorist Mark Griffith, who made his name with campaigns for United Airlines, Levi's 501, and Bud Light's Spuds McKenzie... San Francisco's Green Street Music and Sound has hired Yvonne Champion as account representative for its music and sound design services. Prior to joining, Champion was at Independent Sound/San Francisco. ■



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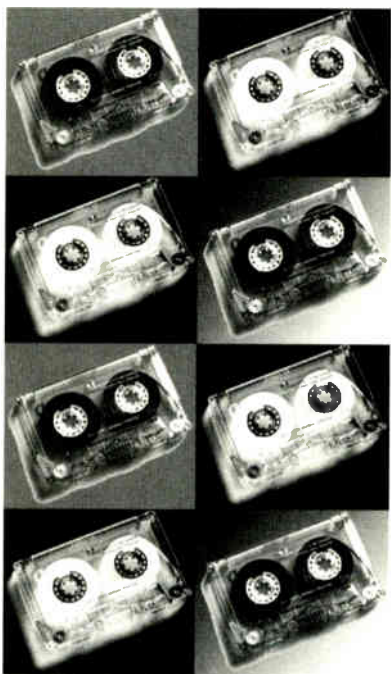
TASCAM

World Radio History

by Philip De Lancie

ITA "HOW & WHY"

CASSETTE SEMINAR BOASTS RECORD ATTENDANCE



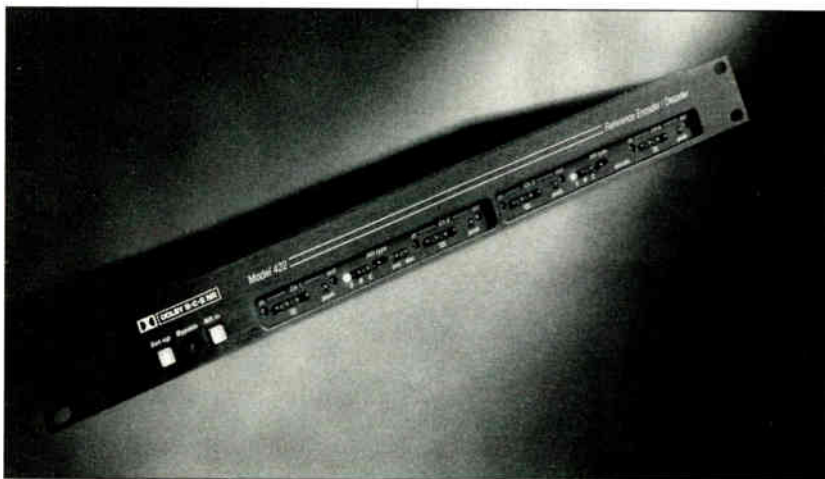
Consumer appetite for the prerecorded cassette may be leveling off, but duplicator interest in the quality of the configuration continues to grow.

This year's sixth annual ITA "How and Why" seminar, "dedicated to improving the quality of prerecorded audio cassettes," was the best attended yet. The gathering brought about 250 duplicators and their suppliers to San Diego, May 6-9, for a program covering more than a dozen topics of industry concern. All told, participants heard close to 40 presentations from their colleagues.

Given the volume and variety of information conveyed, there isn't sufficient space to do the seminar justice in one article. The related subjects of DCC, digital bins and new tape formulations seemed to provoke the most intense interest among attendees. They will be covered in depth in future issues. This month we'll take an overview of remaining topics, some new and some familiar to attendees of seminars past.

Brief, Staats gave an unplanned update on S-Type's progress. Staats reported that the Model 422 S-Type encoder, shown at AES last September, subsequently fell behind schedule. But as of this writing, units are shipping to dealers, priced at \$2,995.

As for consumer hardware, single-chip, S-Type circuits were shipped in quantity to potential licensees in March. Acceptance of the system for semipro applications has been rapid. But for standard consumers, only two production models were actually on the market at the time of the seminar. Both are expensive high-end units from Harman Kardon. Staats characterized the position of other potential licensees as "interested" and "ready to go," and he expected to see more machines at the summer Consumer Electronics Show. But he acknowledged that some companies



Dolby S-Type

At last year's seminar, Dolby Labs Licensing Corp.'s Dennis Staats was on the program for a thorough review of S-Type's implications for duplicators. This year, at the suggestion of ITA executive VP Henry

are hesitant to commit further before software is available from record companies.

The labels, meanwhile, have all tried S-Type. Staats reports that the manufacturing departments of all the major distribution companies



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are very enthusiastic about the system, and his assessment was borne out by the many positive remarks made about S-Type in various seminar presentations. But because many of the record companies' other departments, including marketing, have to sign off on a decision of this importance, he was unable to say when S-Type cassettes might appear on the market.

Azimuth Measurements

One side effect of S-Type's introduction will be the tightening of performance specifications on hardware that is licensed to incorporate the system. Among the most difficult improvements to make will be in the area of azimuth, a perennial favorite topic at ITA gatherings. Naturally, before suggesting tighter standards, Dolby had to be sure it had a means to make accurate azimuth measurements.

The combined use of Nakamichi's Dragon deck with BASF's Azimuth and Mechanical Calibration Mechanisms has provided the industry with a starting point for making azimuth measurements. But concerns have been raised about the repeatability of results obtained. As Staats explained in this year's azimuth segment, the Dragon is designed for audiophile use. For reliable performance as a piece of test gear in an industrial setting, it needs some modification.

The Dragon has a tap in the center of the right-channel head, the signal from which is compared with the full right-channel output. The amount and direction of any phase discrepancy between the signals is used to direct a mechanism that moves the head. Staats stressed the importance of matching the gain and phase of the two signals to avoid confusing the comparing circuit. He also proposed some modifications to the electronics, and reported that the use of a shim to remove "slop" in the head adjusting mechanism improves the consistency of results.

To validate his recommenda-

—CONTINUED ON PAGE 166

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Tape & Disc News

Mini Disc Bows On DCC's Turf

Sony's planned introduction of a new digital play/record system aimed at the "personal" market is the clearest threat yet to the future of the music cassette-duplication industry. The new format challenges the future role in music distribution of tape itself. In so doing, it promises to slow emergence of a consensus on an industry-saving transition to the digital age via DCC. At the same time, it brightens the outlook for the CD replication business.

The Mini Disc, technical details of which are outlined by Ken Pohlman in this month's "Insider Audio" (see page 14), uses magneto-optical recording to store up to 74 minutes of stereo audio on a 2.5-inch diameter disc. It incorporates both MOID and CD pickups, so it can play not

only MODs recorded by the consumer, but prerecorded CDs replicated in existing plants (modified for the 2.5-inch disc size).

Sony isn't the only company applying magneto-optical technology to the consumer audio market (see "Tape & Disc," March 1991 for an explanation of the MO recording process and a MOID system from Thomson). But Sony's expertise in miniaturization has enabled it to come up with product uniquely suited to the needs of the "personal music entertainment" market. By targeting the Mini Disc toward applications in which the CD has so far gained only moderate acceptance, Sony's marketing folks might hope to sidestep one of the main objections to MO: that MODs don't play back on regular CD players. To those consumers who don't already have a portable or automotive CD player, this limitation may be of little concern.

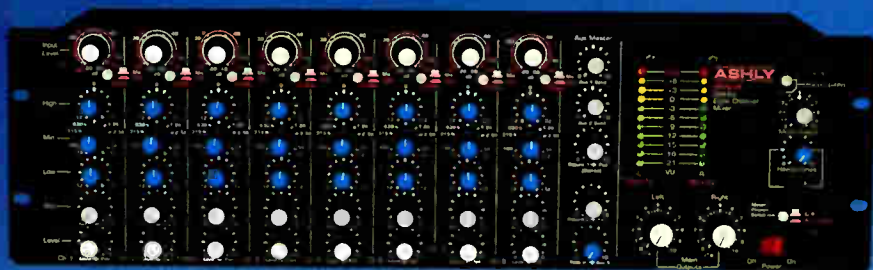
Another advantage of avoiding—at least initially—direct competition with the CD in the home market is that Sony could lessen resistance to the new format among la-

bels and replicators. The company certainly doesn't want to repeat its experience with DAT, which was seen as a threat to the phenomenal growth of the CD. With the announcement of Mini Disc, Sony is signaling its recognition that DAT is dead as a mass consumer product.

In DAT's place, Sony is positioning Mini Disc as the successor to the analog cassette. That means going head to head with Philips' DCC. Mini Disc has all the advantages of optical disc-based systems, including fast access and negligible long-term wear. DCC machines, on the other hand, will offer playback compatibility for existing cassettes and extensive text display capabilities for lyrics and liner notes. What the two systems have in common is the use of techniques to reduce the amount of data storage capacity required for a given length of program.

The data compression systems, PASC for DCC and ATRAC for Mini Disc, appear to be similar in underlying approach. Both depart from the traditional design goal of attempting to store a complete record

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of a program's sound content. Instead, they seek only to store that portion of the sound which is audible to humans. Those parts of an incoming signal that fall below the minimum threshold of human hearing, or which are masked by adjacent frequencies of far greater amplitude, are discarded. Coding bits are dynamically allocated to the remaining signal.

Both Sony and Philips claim that their techniques, by avoiding the encoding of "unnecessary" signal components, yield audio quality nearly comparable to the 16-bit, linear PCM coding used for the CD, at only 20%-25% of the bit rate. Until samples of the software, and hardware to play it on, are available for controlled listening tests, it's impossible to evaluate their claims. One wonders how differing listening volumes among consumers were taken into account in determining the hearing thresholds on which the coding systems are based.

Even if the systems do well in listening tests, their acceptance in the market is far from assured. Labels and retailers are sure to frown on the idea of four prerecorded music formats (cassette, CD, DCC and Mini Disc), so something's got to go. With hundreds of millions of cassette players in the field, it can't be assumed that format will be abandoned overnight by consumers. As with marketing the CD, Sony and Philips' first job will be to convince music buyers that they should replace existing analog hardware with something digital, even if, as is claimed, the digital bin/Dolby S-type combination will enable the prerecorded analog cassette to provide nearly equivalent fidelity for most applications.

For those who do opt for digital, the choice in record-capable systems will be Mini Disc or DCC. It won't be simply a matter of weighing the attributes of disc versus tape. Hardware pricing and features will also be important factors. But it's the interest of labels in supporting one or another of the formats that should ultimately prove decisive.

DCC has been warmly received by the major labels, at least in part because of the opportunity it offers to salvage their investments in duplication operations. But the true

cost of a changeover to DCC is not yet clear, and labels are bound to be concerned by a report in *Billboard* that sufficient manufacturing gear to mass produce the format may not be available for over two years. Mini Disc, meanwhile, is new enough that no clear picture has yet emerged of how it's viewed by record industry decision makers.

Suits Slow Switch to Digital Duping

The use of digital memory devices in place of analog loop-bins has be-

come an important element of record company strategies for extending the performance, and thereby the life, of the analog cassette. Of the majors, BMG was the first to commit to the idea. A few years back, it added hard-drive based DAAD "digital bins" from Concept Designs to its Sonopress duplication facility in North Carolina.

More recently, WEA Manufacturing has brought its DIGalog system online. As installed at both of WEA's plants, Specialty and Allied, DIGalog uses RAM-based DAAD

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units with high-speed loading capability. WEA president Henry Droz has offered other companies the use of the DIGalog name and logo, as long as their digital duplication systems, supplied by whatever manufacturer, meet WEA's specifications. WEA's goal is to increase consumer awareness of the benefits of the new duplication technique.

Unfortunately, the WEA effort may be hampered by a patent controversy surrounding the digital duping technology. One of Concept Designs' competitors, Duplitrionics, has long maintained privately that it invented the use of RAM for high-speed duplication of audio tapes, and that Concept Designs' RAM-based DAAD systems infringe on Duplitrionics' patent. Concept Designs dismisses the Duplitrionics assertion, claiming that the Duplitrionics patent is invalid.

The issue recently came to a head when Concept Designs filed suit against Duplitrionics. According to Concept's Kathleen Farrow, Duplitrionics has been "using a patent that

we feel is invalid to intimidate" potential Concept Designs customers with threats of patent infringement suits. "We initiated the suit on the grounds of fair trade," she says. "We were calling a halt to those practices because it was keeping people from investing in new technology."

Duplitrionics' response to the suit was to countersue in defense of its patent infringement claims. The cross-complaint involves not only Concept Designs, but WEA as well. The company has asked to be awarded a royalty on every cassette produced by WEA using the RAM bin, which it claims could eventually amount to damages of over \$300 million.

Neither company actually invented the technology they use in their machines. Concept Designs licenses a patent assigned to Nippon Columbia in 1982 for the work of engineers under the direction of Yamamoto. Duplitrionics is the assignee of a patent issued in 1983 to Ron Newdollar of Accurate Sound.

According to Concept's Bob Farrow, the designs shown in both patent filings use hard drives as the

primary storage media. But Newdollar also mentioned the possibility of using RAM, while Yamamoto did not. To Duplitrionics, that means that Concept's use of RAM is an infringement of the Newdollar patent. Farrow responds that the idea of substituting RAM for hard drives was already common knowledge at the time the patents were issued, and was therefore not patentable by Newdollar.

Concept Designs further asserts that most of Newdollar's patent claims are invalid because they are overly broad for a patent that's not the first in its field. To resolve the infringement issue, Concept Designs asked for a re-examination of the Newdollar patent. In late April, the Patent Office granted the review "because the substantial identity of the disclosed subject matter in Yamamoto and... Newdollar" meant that a "new question of patentability had been raised."

Duplitrionics' Jeff Binder says his company isn't worried about the re-examination: "The Yamamoto patent doesn't cover the same subject matter as the Newdollar patent. It's

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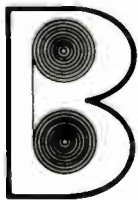
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totally different. So we're confident that our claims will be upheld, which will actually strengthen our patent."

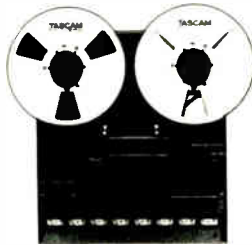
The suit and countersuit are currently on hold pending the outcome of the patent re-examination. And so, too, apparently, is industry progress toward digitization of the duplication chain. As Nick Doffelmeyer of MCA Records put it to *Billboard*: "A major portion of our indecision now is due to the litigation." Both parties to the action are painfully aware of the damage that delay at this crucial time could do to the future of the cassette. But both feel compelled to go forward in defense of their interests.

SPLICES

Harmonia Mundi Acustica has added an interface module for DEC VAX computers to its BW 102 line of digital interfacing and signal processing modules...Gauss and Electro Sound have combined their European sales and marketing networks for their high speed duplication lines. dBm Ltd. in London has been named exclusive representative of the gear throughout the region...Mainstay Media is the new name of Custom Recording and Sound (Greenville, SC). The company's audio and video duplication division will operate as Mainstay Duplication Services...Charly Records has taken delivery of a CEDAR Sound Restoration and Production System at their studios in London. The unit will be used to remove unwanted noise from old and new recordings...Recent mastering work at A&M in Hollywood included projects for the Milltown Brothers and Temple of the Dog, as well as reissue work for Rhino Records...Frankford/Wayne Mastering (New York, NY) reports sessions with producer Carlton Batts on singles from Alexander O'Neal and Shabba Ranks...Digital House (New York, NY) has handled replication on the CD single release of "Bring Him Home" by Marjorie-Jean. The song, from the musical *Les Miserables*, is dedicated to American soldiers who served in the Persian Gulf. ■

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TAPE & DISC

—FROM PAGE 160, IFA "HOW & WHY"

tions, Staats checked azimuth on ten cassettes ten times each on a stock Dragon, and another ten times on a modified Dragon. For each of the ten cassettes, the range of azimuth readings on the modified Dragon was far narrower, meaning that consistency was significantly improved. Staats urged the companies that supply Dragons to duplicators to incorporate the modifications, and it appears that TransTec (Rotterdam, Holland) has already done so.

Also speaking on azimuth standards was Arndt Klingelberg, a consultant to duplicators in Germany. He noted that the Dragon is a dual-capstan deck and thus yields different results from many other designs. So he suggested that facilities use the Dragon as a standard, but use at least two other machines of differing transport types to cross-check results. He also cautioned against relying on either peak or average error readings alone, arguing that a true picture of azimuth can only be had by considering both.

Shell Quality

Azimuth is obviously a prime criterion in assessing shell quality. With BASF's two calibration mechanisms, duplicators can eliminate error from the test transport as a prerequisite to measuring error introduced by a given shell (see "Tape & Disc," August 1990). So they are now better able than before to qualify the performance of incoming C-0s. But many other aspects of C-0 quality remain hard to evaluate.

Two speakers at the seminar expressed concern over the mechanical failure rate of shells. Henry Paris of the Library of Congress described his difficulties in finding shells rugged enough for use in his agency's through-the-mail lending program for the blind and physically handicapped. Unable to find suppliers whose C-0s consistently pass a series of tests, including drop tests, the library program suffers a high rate of failures in the field, especially of hubs. Noting that he would be willing to pay more for greater durability, and could guarantee an annual market of about

four million units, he appealed to the group to aid him in resolving the problem.

Paris' frustrations were echoed by Ron Drake of Canatron, a real-time duplicator in Canada. He reported having problems with every part of the shell and with quality that varied greatly from batch to batch. He wondered whether IFA shell standards are stringent enough and whether they are actually being implemented by suppliers.

The response of the shell suppliers in attendance was deafeningly silent, until an indignant Harold Canning of ICCA chastised them for their reticence. It was thereafter noted that price pressure for duplicating supplies is fierce and has driven all but three North American shell makers out of the business. Further, most shells seem to perform fine for most customers. Audiophile duplicators may have special needs, but even the willingness to pay more may not be enough to make it worthwhile for manufacturers to service that market. Finally, it was pointed out that IFA specifications relate to fit (dimensions) but not to performance, and are thus no guarantee of functional quality.

Tape Specifications

The question of specifications came up again in another panel, this time related to the usefulness of specifications provided by tape suppliers in assessing and comparing tape performance. The segment led off with Richard Clark of American Multimedia, who argued the need for duplicators to be better able to quantify differences between tape types within and between manufacturers. His views were amplified later by Guy Costa of real-time duplicator Quadim, who emphasized the current lack of means to compare practical aspects of tape performance. Costa suggested that specs like "dropouts per 100 feet" or "pounds of shed per 100 feet" would be welcome.

Dennis Staats weighed in with a report on Dolby's view of what kinds of noise specifications are meaningful and how they should be derived. He outlined several goals for a meaningful noise-rating system: a scale that ranks noise

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Steve Levine, Do Not Erase Productions

Alan Parsons

"The whole concept of the removable disk means hours saved... The DD1000 will find many a happy home among studios, musicians, post-production houses and in broadcasting."

Alan Parsons, MIX Magazine (February 1991)

Rick Schwartz

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Rick Schwartz, Recording Engineer/Producer (October 1990)

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File Edit Display Options Windows MD Drive SCSI

Cue List: QLIST 1 ...Unit 1

DELETED	INSRT	SLIP	BUTT	CPY	SCALE	TRAK	MIX
<< FADE >>	00:00:00:00:0	R	+0dB	0:00:00:0	0:00:00:0		
<< FADE >>	00:00:00:00:0	R	+0dB	0:00:00:0	0:00:00:0		
CUT 3P CHICAGO	00:00:01:00:0	R	+0dB	0:00:11:8			
CUT 1 PULLUP	00:00:03:00:0	R	+0dB	0:00:11:8			
CUT 1 DOOR	00:00:11:15:1	R	+0dB	0:00:00:0			

Cue Edit: QLIST 1

Sound Cue

TRAK: CHICAGO

CUT: WHOLE

CUT LENGTH: 00:00:03:23.5

EVENT TIME: 00:00:00:00

00:00:04:00.2

00:00:07:23.7

00:00:03:23.5

WHOLE 00:00:04:00.2 00:00:00:00

INTRO1 00:00:08:15.4 00:00:00:00

WRIS 1 00:00:04:00.2 00:00:00:00

WRIS 2 00:00:00:00.0 00:00:00:00

CHO 1 00:00:19:03.6 00:00:00:00

BRIDGE 00:00:24:09.0 00:00:00:00

QUIYAR 00:00:00:00.0 00:00:00:00

SAX 00:00:36:05.0 00:00:00:00

INTRO2 00:00:04:00.2 00:00:00:00

00:00:05:06.5

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parameters in terms of their actual importance to human beings; a way to scale noise types together that reasonably reflects their relative annoyance to listeners; and expression of results in numbers that correlate well with those generated by existing methods familiar to the industry and consumers. Further, to ensure wide acceptance of testing procedures, it's preferable that measurements should require no exotic test gear.

To meet the above goals, Dolby has advocated since 1978 the use of "CCIR/ARM" measurements, which involve use of an average responding meter (ordinary millivoltmeter) in conjunction with a noise-weighting filter. The filter's curve is defined in CCIR specification #468-1, though Dolby sets the zero crossing point (unity gain) at 2 kHz (rather than 1 kHz) to keep the numbers in the same ballpark as those generated by more familiar techniques. According to Staats, test devices are available from various manufacturers incorporating the CCIR/ARM set-

ting, and a stand-alone CCIR/ARM filter is also available from Dolby (Cat.#98A).

Bringing a tape supplier's perspective to the panel, Joe Kempler of Sunkyong began by noting why the IEC standards on which many of today's specifications are based were developed. They were not primarily intended for the comparison of duplication tapes, but rather to set references that hardware makers could use in designing cassette machines with compatible record/playback parameters.

For duplicators, Kempler said, the most important parameters are related to distortion. He suggested that a family of curves, charting output and distortion against input, might best show a given tape's usable range between noise floor and distortion. He pledged that Sunkyong would give immediate attention to providing duplicators with specifications in a more useful form.

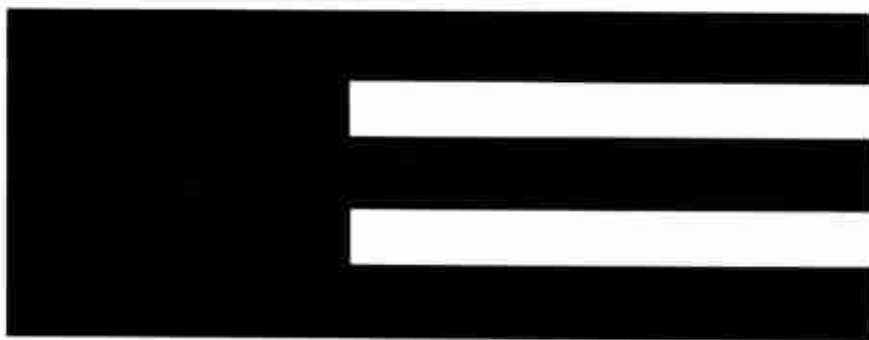
C-90 Tape

Two presentations were made regarding the use of C-90 tape for all

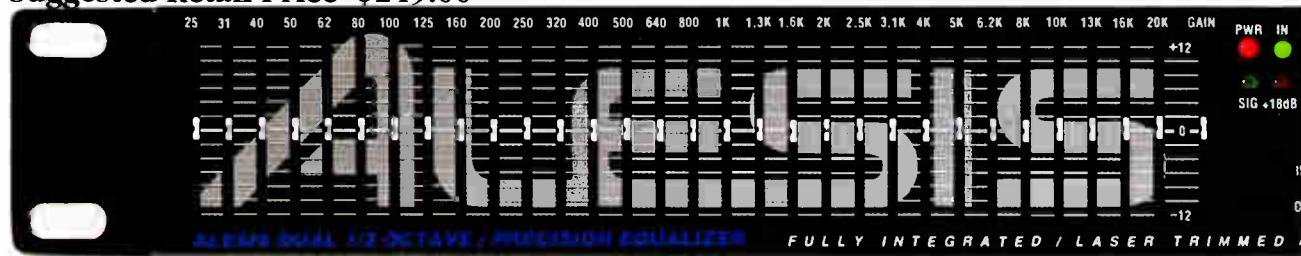
duplicated cassettes. The overall pros and cons of this idea were discussed in depth at last year's seminar ("Tape & Disc" September 1990), with no consensus emerging from the debate. This year, BASF's Rudy Mueller affirmed his company's support for the idea, citing duplicator productivity and supplier consistency among its advantages. He noted that while it would be possible to introduce a compromise "C-75" stock, it would be more expensive because it would require development of a new base film.

Mueller went on to talk about BASF's investigations of the C-90 durability issue. The experiments, which assumed a cassette lifetime of 400 plays over a ten year period, sought to compare the performance of C-60 and C-90 cassettes in a variety of player types under normal and adverse conditions. A half-dozen tests were devised to evaluate various parameters. Mueller reported the results, showing that C-90s suffered no disadvantage.

Peter Piotrowski, also of BASF, focused on the issue of print-



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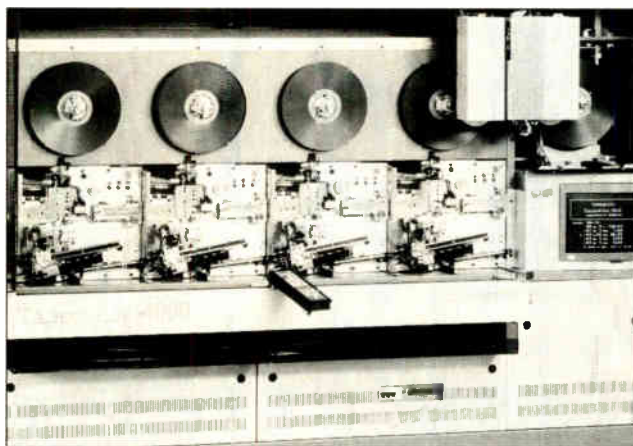
through with C-90 stock. He said that temperature is the biggest factor in development of print, with cobalt-ferric tapes being the most sensitive and regular ferric the least. He noted that the degree of high-temperature exposure is more important than the duration, and he stressed the importance of protecting the product from heat until it gets to the consumer.

Piotrowski acknowledged that print increases about 2.5 dB when switching from C-60 (12 micron) to C-90 (7 micron) base film, given equal coating thickness. But he asserted that even in the most print-sensitive application—spoken word—the use of C-90 tape had generally not been a problem for consumers.

Spoken Word

Spoken word was the subject of its own panel this year, addressing the question of quality requirements. The panelists described some of the production considerations and problems that are especially important to their part of the industry. The group seemed united in the

**Tapematic
Tapecentre
4000; see
page 173.**



view that spoken word duplication, though less critical in the area of extended high-frequency response, cannot be fairly viewed as a lower quality application than making music product. More than one panelist spoke of a move in the industry toward music-grade tape and shells as part of an effort to ensure consistent end results.

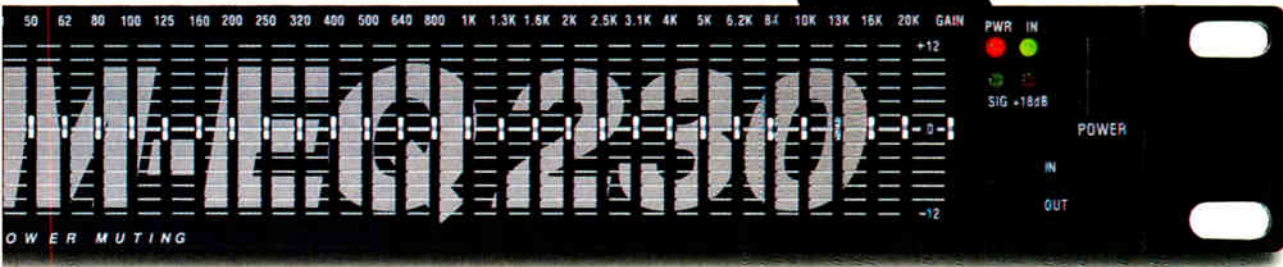
For those considering getting into the field, Ed Mitchell of Quality Associates International cautioned against the attitude that spo-

ken word is something that can be squeezed in on the side. He stressed the importance of getting educated to the needs of a market in which clients have different outlooks and requirements than those found in the music industry.

CD-R Duplication

For the more adventurous, a different kind of expansion of services was explored in a segment on CD-R (write-once CD) recording), pre-

—CONTINUED ON PAGE 173



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—FROM PAGE 171, N.Y. METRO

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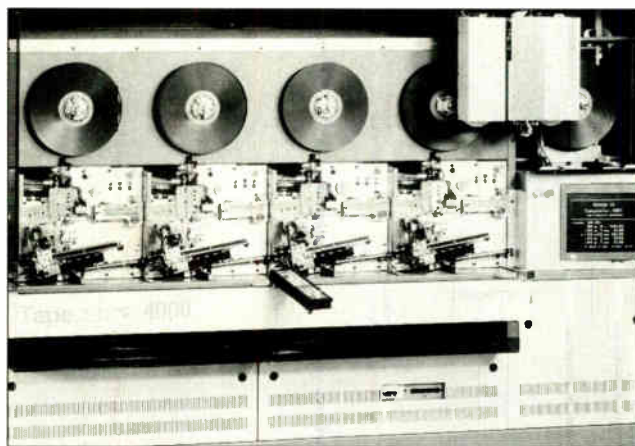
through with C-90 stock. He said that temperature is the biggest factor in development of print, with cobalt-ferric tapes being the most sensitive and regular ferric the least. He noted that the degree of high-temperature exposure is more important than the duration, and he stressed the importance of protecting the product from heat until it gets to the consumer.

Piotrowski acknowledged that print increases about 2.5 dB when switching from C-60 (12 micron) to C-90 (7 micron) base film, given equal coating thickness. But he asserted that even in the most print-sensitive application—spoken word—the use of C-90 tape had generally not been a problem for consumers.

Spoken Word

Spoken word was the subject of its own panel this year, addressing the question of quality requirements. The panelists described some of the production considerations and problems that are especially important to their part of the industry. The group seemed united in the

**Tapematic
Tapecentre
4000; see
page 173.**



view that spoken word duplication, though less critical in the area of extended high-frequency response, cannot be fairly viewed as a lower quality application than making music product. More than one panelist spoke of a move in the industry toward music-grade tape and shells as part of an effort to ensure consistent end results.

For those considering getting into the field, Ed Mitchell of Quality Associates International cautioned against the attitude that spo-

ken word is something that can be squeezed in on the side. He stressed the importance of getting educated to the needs of a market in which clients have different outlooks and requirements than those found in the music industry.

CD-R Duplication

For the more adventurous, a different kind of expansion of services was explored in a segment on CD-R (write-once CD recording), pre-

—CONTINUED ON PAGE 173



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C O A S T

L.A. GRAPEVINE

by Amy Ziffer

After months of missed connections, I finally got a chance to see the THX-outfitted LucasArts post-production facility, Skywalker South, when I attended the screening of a new Allan Holzman film, *Intimate Stranger*, with Deborah Harry, James Russo, Tim Thomerson and Grace Zabriskie. Two dub stages (complete with ping-pong tables when I toured them), two smaller video mixing stages, one Foley and one ADR room, a variety of transfer facilities, offices and a screening room are all housed in a pristine environment at 3000 W. Olympic Blvd. in Santa Monica. The Otari name is prominent, from multitracks to the new Premiere console to LarTec boards (which incorporate Otari components) on the Foley/ADR stages.

You may recall that Skywalker South was the site for the ADR/Foley recording and mix of *The Doors*, as described in the May issue of *Mix*. The new facility is an expansion of Skywalker facilities at

Legendary producer Shel Talmy was cutting tracks in L.A. with Jim Jamison for an upcoming Scotti Bros. release. Pictured here at Studio Masters (l to r) are Talmy, Jamison and engineer Howard Wolen.



the former Lion's Gate/New World complex on nearby Bundy.

Scotti Brothers record label studio, Santa Monica Sound, recently hit its tenth birthday and installed a 64-input SSL 4000 G console, displacing a Neve 8108 that will be moved into Studio B, currently under construction. "We're trying to stay better than state-of-the-art," says studio manager and chief engineer Tony Papa. Papa noted that all of Weird Al Yankovic's hits were cut on that Neve.

Studio B will be a smaller studio, primarily an overdub room, while Studio A has been redesigned by Vincent Van Haaff as a mix room. "The idea is to give people the option of recording in B and then mixing in A," explains Papa. "Studio A was totally gutted for the reconstruction. A former tape vault will serve as a machine room, which has opened up the space in there considerably."

The studio does almost exclusively in-house work, with fully 80% of the bookings consisting of artists on the Scotti Brothers label. Studio A reopened the second week of May with a Jimmy Jamison (former lead singer of Survivor) session. Studio B was expected online by the end of June. Santa Monica Sound is at (213) 450-2119.

Like the Dodgers, L.A. has another New York-migrant: Brooklyn Studio, housed in the DeMann Entertainment complex at 8000 Beverly Blvd. in West Hollywood. The complex is headquarters for Freddy DeMann, best known as manager of Lionel Richie, Madonna, Divinyls and the Smithereens. While Brooklyn will obviously be convenient to DeMann-managed acts, it's also a fully commercial studio. I even met an old friend there—a Neve 8708 that came,

—CONTINUED ON PAGE 172

SESSIONS

by Jeff Forlenza

SOUTHEAST

GET UP! GET ON UP! James Brown is back on the good foot: The Godfather of Soul was at Criteria Studios (Miami) working on a release for Scotti Brothers Records with a 17-piece band. Brown produced the entire record with NY-based engineer Mike Brauer and Criteria staff assistant Roger Hughes. After they finished up at Criteria, Mike Fuller of Fullersound Inc. mastered the album, entitled *Love Over Due*. . . Mark Knopfler was in at Digital Recorders (Nashville) working on steel guitar overdubs for the new Dire Straits project, with Jim Dineen engineering and Toby Seay assisting...

NORTH CENTRAL

Contemporary gospel group Zion were recording cuts for their upcoming release at Brown & Brown Recording (Portage, MI) with producer Daron Steward...

NORTHWEST

At Fantasy Studios in Berkeley, CA, Dizzy Gillespie was in Studio A tracking and mixing a project with saxophonist/flautist/producer Mel Martin, pianist George Cables and engineer Danny Kopelson. . . At Hyde Street Studios (San Francisco) Jello Biafra has been in doing vocal overdubs on an album project for Tumor Circus, with engineer Matt Kelley and second Tomi Doty; and Chris Isaak's new album was underway with overdub sessions produced by Erik Jacobsen and engineered by Mark Needham...

SOUTHWEST

Asleep At the Wheel fiddler Larry Franklin was at Studio West (Houston) doing fiddle overdubs for an upcoming release by the Mission Band Boys, with engineer J.R. Kuzniar, producer

C O A S T

Micheal Teague and Tom Pena...In Houston, Rivendell Recorders' chief engineer Steve Dady and MIDI specialist Brian Green were in Studio A cutting tracks with saxophonist Kirk Whalum for an upcoming Berman Films project...

NORTHEAST

At Greene Street Recording (NYC), Fishbone were in with producer Chuck D. Chris "Champ" Champion engineered, while Sam Ewen assisted on the Sony Entertainment project...Air Craft Recording Studios (Pittsburgh) had Joe Grushecky and The Houserockers in to record their latest, *Swimming with the Sharks* for Rounder Records. The project was produced by Bob Corbin and Barney Lee...Joe Jack of the Dead Milkmen produced the new album from Ashtray with engineer Scott Herzog at Third Story Recording in Philadelphia...Known for excellence in hip-hop and rap recording, Chung King Recording (NYC) reports the following activity: Big Daddy Kane was tracking and mixing new material for Warner Bros. with engineer Mike Fronda; and Slick Rick was working with producer Vance Wright and engineer Daryl Gustamachio on an album for Def Jam...

SOUTHERN CALIFORNIA

The Temptations were working on their upcoming release for Motown Records at Red Zone Studios (Burbank) with producer Ron Tyson, engineer Rick Clifford and assistant Joe McGrath...In L.A., Rumbo Recorders reports that Tom Petty and Barry Manilow were recently in recording...At Hollywood Sound Studio, the hard-rocking Masters of Reality (complete with ex-Cream drummer Ginger Baker) completed 28 tracks for their new Delicious Vinyl release. Production duties were split between MOR guitarist Daniel Rey and DV principals Matt Dike and Mike Ross. ■

N.Y. METRO REPORT

by Dan Daley

Sony Music Studio Operations, the formal title for what was once Columbia Studios, implemented a recent reorganization to position itself for the next decade. Director of administration and finance Rob Grabowski now heads the business side, including booking and sales; Tim Geelan, director of operations, handles all technical and engineering issues. The split responsibilities, according to Grabowski, will provide a better business structure in the wake of the facility's purchase by Sony Corp. several years ago. Former studio manager Bill Towmley is now head of archival projects at the studio.

While the live recording rooms were shut down in 1982, Sony Music now operates 12 audio post-production suites and several duplication rooms, as well as CD mastering operations over two floors. Its main clients are, as you might expect, the Sony Music and Epic labels. Once two more editing suites are finished with their on-going renovation, the entire facility will have been redone, acoustically and technologically. "We're probably the biggest [audio] post-production facility in New York," Grabowski says. "But we're also the best-kept secret."

Tubes, Tubes, Tubes—John French, president of JRF Magnetic Sciences in Greendell, NJ, reports a dramatic increase in the number of requests for upgrades for old tube ATRs, such as Ampex 350s. "I got caught a bit off guard," he says. "We're in the middle of a digital revolution and people are calling for 1/2-inch head assemblies for old tube 2-track decks." One reason for this, says French, is the continued perception that analog maintains a

certain, almost mythical, perception among engineers and producers. Then there's the boom in archiving, with huge numbers of older catalogs being re-released on CD. French has even done 3-track conversions for PolyGram's New Jersey facility, which has been particularly active in readying old archives for remastering. "We've been doing a lot of custom head assemblies to recover and retrieve old masters," says French. "New York seems to be a hub for that."

French also mentioned an increase in retrofits for time code-reading tracks for older machines as well, a function JRF makes a kit available for. And 1-inch video machine audio tracks can have the time between head changes doubled with the incorporation of edge release slots, which French developed in conjunction with 3M.

—CONTINUED ON PAGE 172

Rude Boy Larry Marcus (left) and producer/programmer/songwriter Jim Salamone were busy working on "Are You Lonely?," the follow-up to the smash hit "Written All Over Your Face," at Salamone's 24-track private studio in Philadelphia.



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TAPE & DISC

—FROM PAGE 169, ITA "HOW & WHY"

has done woodwork in Sound Emporium, Nightingale Recording, Woodland Digital and other Nashville rooms. Mattingly says that design upgrades—both aesthetic and functional ones—have increased lately, following an upswing in equipment upgrades locally. "Once they upgrade the equipment they have to upgrade the look of the room as well," explains Mattingly. "You want the look to keep up with the equipment."

The Spence Manor Hotel had been the best residence hotel on the Row before it went condo several years ago. I remember staying there on tours in the '70s and appreciated its location away from the main cluster of hotels downtown. A modified version of that past is going on at The Spence once again. About 20 condo suites of varying size and sumptuousness have been made available on a sort of custom-hotel basis. "Essentially a private music hotel," is the way manager Bobby John Henry describes it. There's even a recording studio with an Akai 12-track on the premises for resolution of late-night inspirations, which can be had either for a flat \$25 per hour or incorporated into the room rate. Several labels and publishers have availed themselves of the new Spence, and artists who've stayed there recently while working on projects include Willie Nelson, Marty Balin, Jefferson Starship, Peter Wolf, Larry Gatlin and Marla Maples.

Treasure Isle Recorders installed a 30-plus input Trident Series 80C earlier this year, continuing its history as an all-Trident facility, according to studio president and general manager Fred Vail. Vail has noticed a proliferation of unsigned album projects coming through the studio doors lately, financed outside the usual channels of record labels. He attributes this to the increased success of country music in general and to the evergreening of a number of critical acts like Alan Jackson, Garth Brooks and Randy Travis.

However, Vail voices a concern that despite a dearth of recent start-ups in studios and an increase of recording artists, the local studio community is still overbuilt by about 30%, and that studios will need to rely less on walk-in revenues than on ancillary projects like radio shows and relationships with labels to stay profitable. "If you removed the publishing and artist revenues that help support many Nashville studios," says Vail, "the picture might not look as bright as the surface appears." ■

sented jointly by Dan Garcia of That's America (a division of Japan's Taiyo Yuden) and Bob Doris of Sonic Solutions. Unfortunately, most of the time was spent on a generalized description and comparison of recordable CD systems, rather than concentrating on the specific applications and opportunities of the technology to cassette duplicators. But the point was made that duplicators should be able to use CD recorders to produce runs of up to 40 discs at a cost of about \$20 each by 1993. At that price, duplicators might be able to serve those who need quantities below the number, that may be cost-effectively replicated at a regular CD plant.

New Tapematic Loader

While some duplicators may be intrigued by new areas like CD-R, most are likely to apply more familiar techniques in order to stay afloat in the current stagnant market for their wares. In a segment introducing a new loader from Tapematic, Mark Nevejans of Electro Products Inc., underlined increased productivity as the key to survival. Saying that materials prices are as low as they're likely to get, Nevejans targeted labor as the next area in which costs must be trimmed. Presented jointly by Nevejans and Tapematic's Ron Goodwin, the Tapecentre 4000 is Tapematic's response to this labor productivity challenge.

The new machine integrates four loading modules, which are fed pancakes automatically from magazines that have been loaded by slave operators. Pancake coding allows the 4000 to load two programs simultaneously. C-0 infeed is direct from cardboard trays, while output may be to conveyors or to two stackers. Operational control and status info may be accessed from a 286 PC. With a built-in enclosure system and left hub winding, the machine is designed for use in DCC applications, without a clean room. Tapematic claims that one operator can run five

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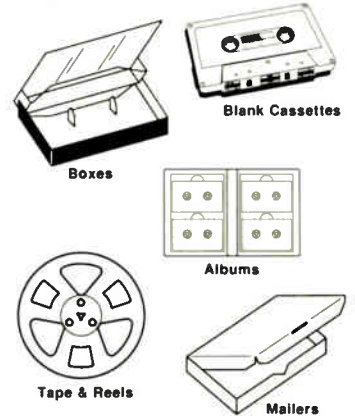
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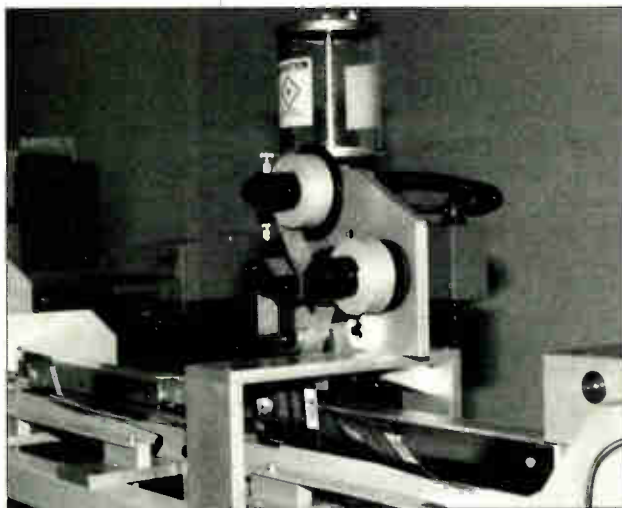
units, meaning 20 loaders, for a labor reduction of 75% over conventional designs.

Paper vs. Plastic

Another angle on cutting costs in hard times came in the seminar's final segment, organized to explore the relative merits of O-cards vs. Norelco boxes with J-cards. The plastic box is the norm for full-length programs, but paperboard O-cards are already in wide use for cassette singles. George McClellan of Sonopress described his plant's experience in handling the cards, and outlined some of the advantages of pre-formed cards (which use easier, cheaper machines) com-

for a move away from plastic to paper packaging. Paper, as a renewable resource, seems to have the edge in the public's perception of environmental friendliness. But as the controversy over CD packaging ("Tape & Disc," July 1991) has shown, not everyone accepts the validity of the assumption that paper is more environmentally responsible than plastic. The appropriateness of a packaging material depends largely on whether the package is meant to be disposed of or retained. But that notion often gets overlooked in partisan paper vs. plastic debates.

Responding to the paper boosters on the panel, Joe Ciccone of Poly-Matrix got in the last word,



**Paktec
Automation
O-card
manufacturing
equipment.**

pared with on-site wrapping around the cassette (which costs less per unit and uses lighter stock).

Richard Vincent of Media Supply spoke in favor of an industry switch to O-cards for albums, arguing that duplicators could save about 6.4 cents per unit over the Norelco J-card combination, not counting other benefits arising from greater shipping and storage efficiencies. The pro-O-card view was also heard from Darrell Zielke of Paktec Automation, who noted that the package was not only cost-effective but "purchase compelling" (attractive looking to potential purchasers). Zielke described his company's equipment for wrapping cassettes in the cards.

Both men stressed that current environmental concerns among consumers create an ideal climate

treating attendees to a lengthy defense of plastic's indispensable role in modern life. But he also raised some important environmental points about plastic: that it is more easily recycled than coated paper and less likely to leach toxics in landfills. Further, he argued that the Norelco box has a higher perceived value to consumers, and that O-cards, while acceptable for singles, are insufficiently durable for the long-term use consumers expect out of albums. Given the questions and comments for the panel from the audience, Ciccone can probably rest assured that the future of the Norelco box is, for the time being, secure. ■

Tape & Disc editor Phil De Lancie is a mastering engineer at Fantasy Studios in Berkeley, Calif.

Designers & Suppliers

Information in the following directory section is based on listings published 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.



Designed by Carl Yanchar of Lakeside Associates, 45RPM Recording is an all-new music production facility located in Minneapolis. Studio One features a 56-input Sony MXP-3000 automated console, Sony analog tape machines and custom L.A. monitors with all TAD components. The 2,000-square-foot performance area contains four isolation rooms, including an ambient glass and stone drum chamber. **Photo by David A. Das.**

CONTENTS

177	NORTHEAST
183	SOUTHEAST
184	NORTH-CENTRAL
185	SOUTH-WEST
186	NORTHWEST
188	SOUTHERN CALIFORNIA/HAWAII
190	OUTSIDE U.S.

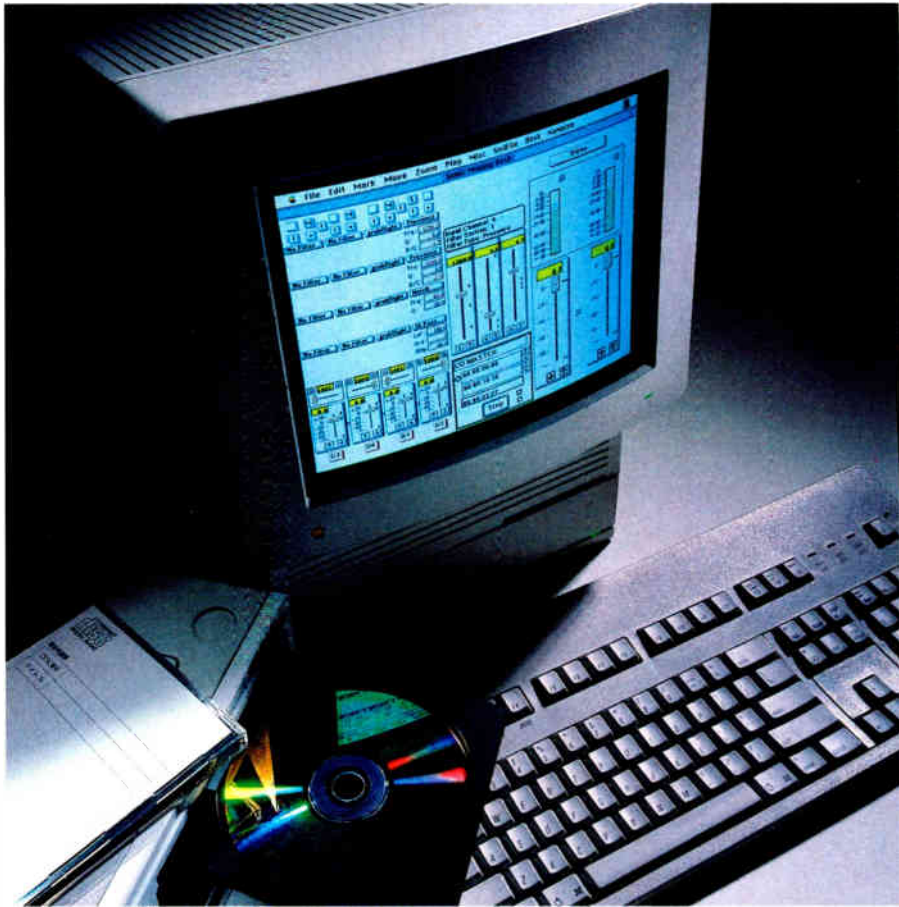
Upcoming Directory Deadlines:

North Central & Canadian Studios: **August 16, 1991**

Mastering, Pressing and Tape Duplication Facilities: **September 16, 1991**

Northwest Recording Studios: **October 16, 1991**

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 800-244-1157.



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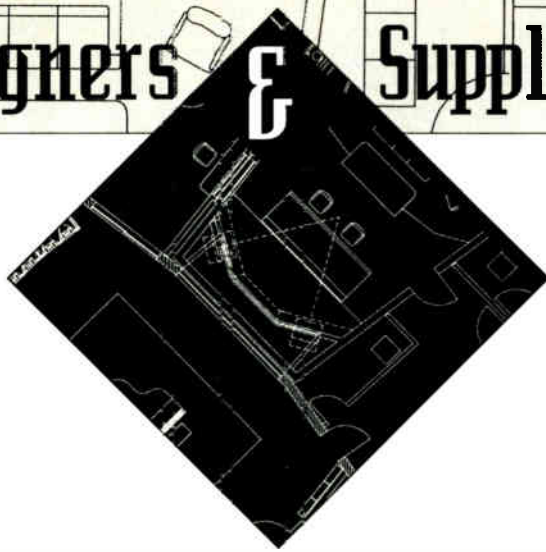
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A.F.A.

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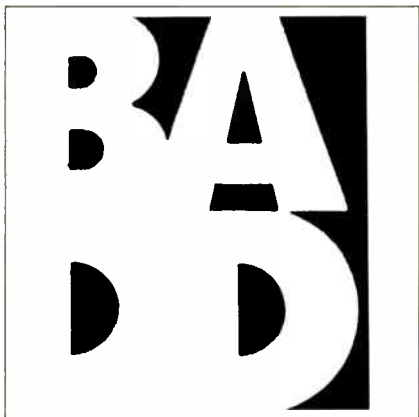
AUDIO ENTERPRISE; FD, AC, EI, MR; 115 S. 4th St.; Womelsdorf, PA 19567; (215) 589-4181. Contact: Bill Thompson.



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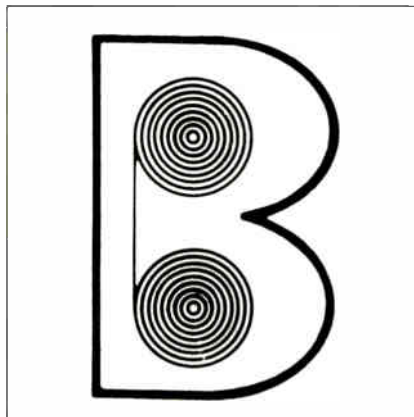
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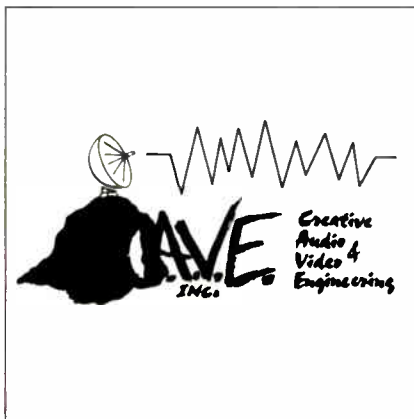
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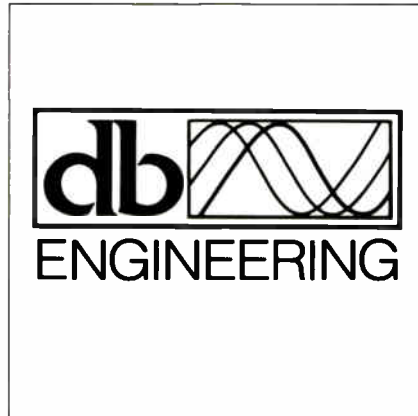
CYLINDER SYSTEMS INC.; FD, EI, MR; 160 West End Ave., Ste. 17N; New York, NY 10023; (212) 877-4843. Contact: Ira H. Kemp.

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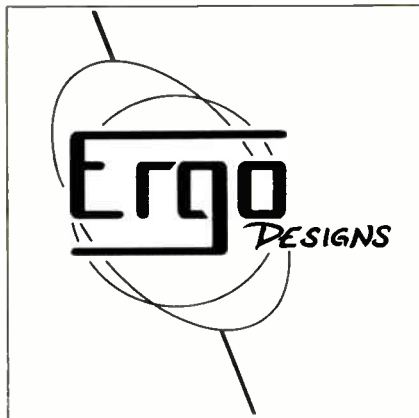
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DRD AUDIO; AC, EI, MR, ER; PO Box 1310; Presque Isle, ME 04769; (207) 764-0764. Contact: David Deschesne.



DREAMHIRE
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DREAMHIRE; ER; 137-139 West 25th St.; New York, NY 10001; (212) 691-5544; (800) 234-7536; FAX: (212) 627-4763. Contact: Chris Dunn, Ken Thornhill, Donna Winfield. **Services/Specialization:** With locations in New York City, Nashville and London, England plus plans to open a rental office in Los Angeles sometime in the near future, Dreamhire has rapidly become a major force to be reckoned with in fully professional audio and MIDI equipment rental. The combined inventory of the two USA locations is perhaps larger, more varied and updated than that of any other rental operation. Equipment available for rent includes a full range of digital and analog recorders; signal processing equipment; vintage and modern microphones; noise reduction; keyboards; sound modules; samplers; computers; sequencers, etc. All locations now have the Digidesign Soundtools digital hard disk recording/editing system for rent. A 12-channel Focusrite sidecar console floats between New York and Nashville as does a Lexicon 2400 time compression/expansion unit, a Calrec Soundfield microphone and the Intelix Studio Psychologist cue system to name but a few of our more hard-to-find items.



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GOTHAM SERVICE LAB LTD.; SES, EI, MR; 363 Seventh Ave., Ste. 500; New York, NY 10001; (212) 967-3120. Contact: Joseph Leung.

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HEAVY CUSTOM ELECTRONICS INC.; MR, ER; 2075 86th St.; Brooklyn, NY 11214-3261; (718) 946-9000. Contact: Elena LaSorella.

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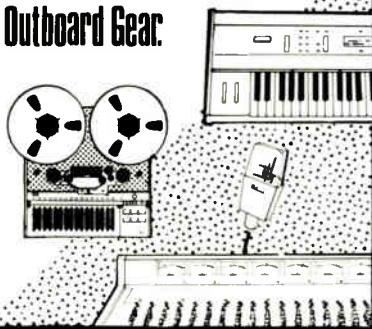
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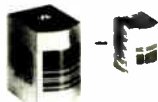
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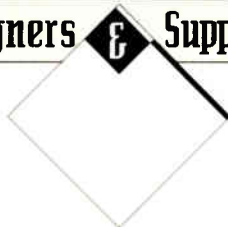
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MANNY'S MUSIC; SES; 156 W. 48th St.; New York, NY 10036; (212) 819-0576. Contact: Chris Tso.



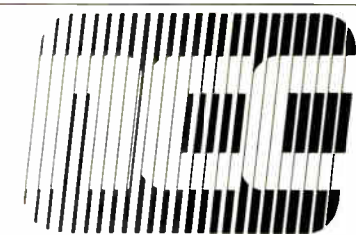
MARTIN AUDIO VIDEO CORPORATION PARTS DEPT.
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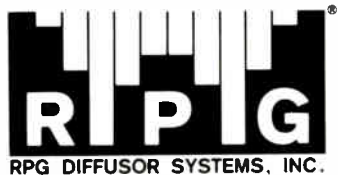
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Belgium: Studio Katy; Tokyo: Noah; New York: JSM Music, DK Studios, Tamarand Digital Studio, A&R, Bearsville, Electric Lady, Sorcerer Sound, MSP, Skyline; Los Angeles: Record Plant; Connecticut: Ace Frehley (KISS) studio. Mastering rooms: Sterling Sound, Frankford Wayne. Discos, Clubs and Restaurants: Tokyo: Rock & Roll Diner; Bangkok: NASA-Spaceadrome; New York: Planet Hollywood, Spo-Dee-O-Dee, The Sporting Club, America; Los Angeles: L.A. Stock Exchange; Hard Rock Cafe's; Reykjavik, Tokyo, Cancun, New York, Dallas, Boston, Washington, D.C., Acapulco, Singapore, Orlando; Honk Kong: Island Shangri-La.



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RPG DIFFUSOR SYSTEMS INC.; SES, AC; 12003 Wimbleton St.; Largo, MD 20772; (301) 249-5647. Contact: Dr. Peter D'Antonio, pres./CEO. Services/Specialization: The RPG Diffusor System is the complete architectural acoustic system of the music industry. Current products include: QRD Diffusor™—a patented broad-bandwidth wide-angle 1-D diffusor, now available in low-cost, ready-to-assemble kits and thermoformed Kydex™ modules; Divisor™—a see-thru diffusor; DiffusorBlox™—a patented lightweight concrete diffusive building block; Diffractal™—a patented full-spectrum fractal diffusor; FlutterFree™—a flutter control hardwood molding; Omnifusor™/Terra—patented 2-D QRD® Diffusors; Abfusor®—a patented broad-bandwidth abfusor; Absorbor™—a new graduated-density upholstered fiberglass panel with chemically treated edges; NDC Almute™—a new non-flammable, formable, sintered aluminum low frequency absorber; Trifusor®—a rotatable three-sided variable acoustics module containing diffusive/absorptive/reflective sides; Bifusor™—a rotatable two-sided variable acoustics module containing diffusive/abfusive, diffusive/diffusive or abfusive/abfusive sides; VAMPS™—a patent pending portable variable acoustics modular portable performance shell. Call for clients.

SCHARFF WEISBERG INC.; ER; 599 Eleventh Ave.; New York, NY 10036; (212) 582-2345. Contact: Scott Schachter.

VICTOR SCHWARTZ A.I.A. ARCHITECT; FD, AC; 720 Greenwich St.; New York, NY 10014; (212) 727-9644. Contact: Victor Schwartz.

SIGNET SOUND; FD; 115 E. 87th St., Ste. 10A; New York, NY 10128; (212) 348-9335; FAX: (212) 439-9109. Contact: D.B. Weiss.

SONEX-SOURCE; 58 Nonotuck St.; Northampton, MA 01060; (413) 584-7944. Contact: Win Ridabock.

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JOHN M. STORYK, A DIVISION OF WALTERS-STORYK DESIGN GROUP; FD, AC; 134 Main St.; New Paltz, NY 12561; (914) 255-2255. Contact: Beth Walters. Services/Specialization: John Storyk has provided design and construction supervision services for the professional audio recording community since 1969—completion of Jimi Hendrix's

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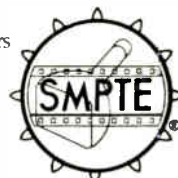
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Electric Lady Studios. Mr. Storyk studied architecture at Princeton and Columbia Universities. He has been responsible for over 400 world-class audio recording studios; radio stations; video facilities; as well as small clubs and theaters—including private studios for Whitney Houston, Bob Marley, Ace Frehley, several NPR-associated radio stations, and dozens of the nation's leading commercial audio recording facilities. Recent projects include: 6-studio complex for Full Sail/Platinum Post, Orlando; studio installations for Soundshop, Nashville; and Crawford Post, Atlanta; private studio design for Taylor Dane's producer—Rick Wake; HDTV video post facility for Rebo Video, New York City; Hollywood's newest commercial audio post facility—5-studio complex for the L.A. Studios—Margarita Mix; installation of the newest room for Howard Schwartz Recording, New York City; completion of Woodstock, N.Y.'s 15,000-sq.-ft. Bearsville Theater.

STUDIO CONSULTANTS INC.; SES, AC; 321 W. 44th St., Ste. 905; New York, NY 10036; (212) 586-7376. Contact: Doug Simon.



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SYNERGISTIC TECHNOLOGIES INC.; FD, EI, MR, AC; Three Pkwy. Ctr., Ste. 102; Pittsburgh, PA 15220; (412) 928-0448. Contact: Mark Albright. **Services/Specialization:** STI is a consulting and engineering firm highly experienced in the design of audio and video facilities for production, post-production and broadcast. STI is independent of any manufacturer. Our systems, therefore, represent our clients' needs, and not our available product line. We offer a complete range of services including project management, needs assessment, equipment specification, budget development, bid preparation and review, facility planning, space planning and architectural design, acoustic design and analysis, audio and video systems design, CAD documentation, and installation services. STI also offers technical support including on-site training and maintenance services, and maintains an extensive, state-of-the-art complement of audio, video, and acoustic test and measurement equipment.

SYSTEMS DEVELOPMENT GROUP; FD, EI, AC; 18601 Darnestown Rd.; Poolesville, MD 20837; (301) 972-7355. Contact: Skip Warrington, systems design. **Services/Specialization:** Systems Development Group is a full-service design/build company for music recording, video editing, ADR suites, multimedia presentation spaces and board rooms. Original design or expansion of existing space. Specializing in acoustical environments and technical/electronic configurations. Services include design, turnkey installation, project management, construction documents/costing/materials lists, and system performance and testing. All construction drawings are generated with CAD, providing the client with two- and three-dimensional views of the design and feature testing. SDG is the manufacturer/distributor of the Art Diffusor and Cutting Wedge acoustic treatment products. The Art Diffusor panels are available in various wood stocks, 15-by-15 inches square as well as custom configurations. The panels are arrayed like tiles to create as large a diffusor as required. The Cutting Wedge is an absorptive acoustic foam—available from one square foot to 4-by-8 foot sheets in various thicknesses and colors. Both offer superior performance and aesthetics.

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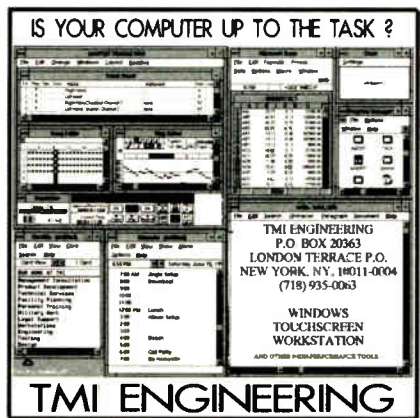
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TECHNICAL SERVICE SPECIALISTS INC.; FD, EI, AC; Box 540, Astor Square Mall; Rhinebeck, NY 12572; (914) 876-3999. Contact: Mr. Wasserbach, engineer.



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TEKCOM CORPORATION; EI, SES, MR, AC, ER; 1020 N. Delaware Ave.; Philadelphia, PA 19125; (215) 426-6700. Contact: Mr. Louis Maresca. **Services/Specialization:** TekCom is the leading supplier of professional audio equipment in the Mid-Atlantic region, offering the finest products with full support services. TekCom offers complete studio design and installation for broadcast, recording and video-post facilities, digital audio and computer-based MIDI systems, digital sampling technology, engineered sound reinforcement, and expert factory-trained tape recorder and loudspeaker repair. TekCom is the exclusive Mid-Atlantic dealer for the full line of Otari analog and digital tape recorders, DDA mixing consoles, DiskMix and J.L. Cooper automation systems, and KRK studio monitors. Other products include Dolby professional products, TimeLine Synchronizers, Eventide and Lexicon signal processing, Studer-Dyaxis digital audio editing systems, Macintosh computers and peripherals, Digidesign Sound Tools, and Neumann microphones. Plus a wide variety of amplifiers, equalizers, signal processors, loudspeakers, studio monitors, microphones, accessories, sound reinforcement, music software, synthesizers and keyboards.



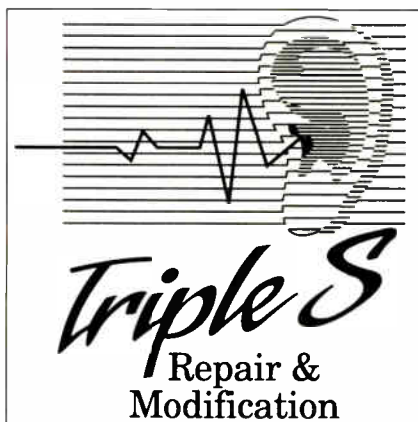
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TMI ENGINEERING; FD, EI, SES, MR, AC; PO Box 20363; London Terrace Stat.; New York, NY 10011; (718) 935-0063. Contact: Tom Magura. **Services/Specialization:** Many thanks to our valued clientele for another successful year! TMI is now able to offer a wider variety of technical and engineering service. Since 1971 we have provided expert audio design and facility management. In the last seven years we have grown to include Product Development: for the computer, automotive, military and control industries; Consulting Services: for the broadcast, cable, noise control, and electronic industries; Testing Services: for the legal, medical, journalistic and publishing industries. We also manufacture a high-resolution touchscreen workstation, which operates in the popular Microsoft windows environment and can replace low-powered computers attached to expensive consoles, digital editors and sequencers. Above all, TMI Engineering came into being as a technical conduit between the music in the soul of the artist and the need for that music in the soul of the listener. Everything we are is a means to that end. Technical services from \$100/hr.



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THE TOY SPECIALISTS; SES, ER; 333 W. 52nd St.; New York, NY 10019; (212) 333-2206; (800) 445-3330. Contact: Bill Tesar, Rita Tesar. **Services/Specialization:** The Toy Specialists is a fast-growing company specializing in pro audio and MIDI instrument rentals. By combining personal, expedient service with expert technical assistance 24 hours a day, seven days a week, the company has developed an enviable status in the U.S. rental marketplace. The Toy Specialists carry the largest inventory of digital tape and hard disk recorders anywhere. Most notably the Mitsubishi X-880, X-850, Sony 3348, 3324A, 1630 and Akai A-DAM. For classic tube buffs, our selection of equalizers, limiters and microphones is unrivaled. MIDI is our middle name. We stock a full line of computers, synthesizers, drum machines, synchronizers and interface boxes. Some of our most recent clients include Madonna, Phil Collins, Prince, Whitney Houston, Carly Simon, Run D.M.C.



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TRIPLE S; 228 Washington Ave., Bellevue, NJ 07109; 1600 Broadway; New York, NY 10019; (201) 751-0481 (in NJ); (212) 832-0072 (in NY). **Services/Specialization:** After 15 years of providing the music industry with superior quality service and custom design, Triple S has become one of the industry's largest and most complete technical-support facilities in the nation. Having been exclusively selected to represent the eastern region of the USA for Akai's Digital Multitrack machine and the N.Y. metro area for E-mu's entire product line. Triple S continues to be an industry standard for technical support with over 60 manufacturer factory authorizations. Our technical staff is comprised of some of the biggest names in the industry for custom-designing equipment ranging from hot-rodding Mar-

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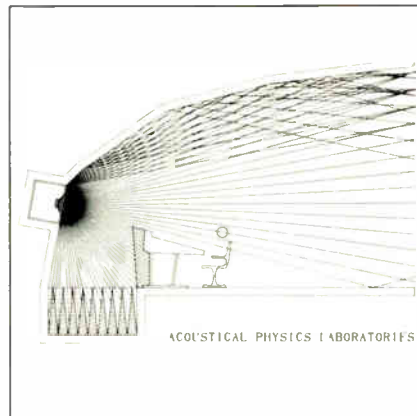
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M.A. BENINGTON CO.; *EI, SES;* 2459 Cuchura Dr.; Birmingham, AL 35244; (205) 988-0906. Contact: Mike Benington.

BLEVINS AUDIO EXCHANGE (B.A.E. INC.); *SES, MR;* PO Box 101238; Nashville, TN 37224; (615) 242-0596; *FAX:* (615) 242-0599. Contact: Randy Blevins. **Services/Specialization:** Blevins Audio Exchange (B.A.E. Inc.) is one of the largest full-service brokerage companies in the country. They sell and refurbish all kinds of audio and video equipment, from vintage tube gear to complete studio packages. Equipment is displayed in a 5,000-sq.-ft. warehouse, with new equipment arriving daily. They also handle the Studer Dyaxis workstations and are continuously adding used equipment listings. A current list of available equipment is just a phone call away.

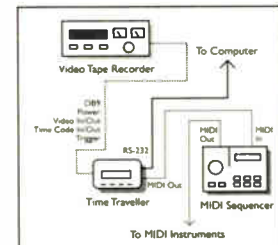
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COMMUNICATIONS ENGINEERING INC.; *FD, EI, SES, MR, AC;* 8530 Cinderbed Rd., Ste. 300; Navington, VA 22122; (703) 550-5800. Contact: Carlos Fernandini, Larry Brody. **Services/Specialization:** Engineering/management and technology consultation to the communications industry. Engi-

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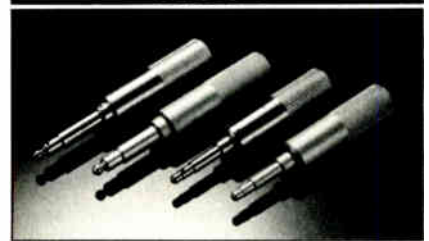
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DREAMHIRE; ER; 1217 16th Ave. South; Nashville, TN 37212; (615) 321-5544; FAX: (615) 321-0579. Contact: Patty Bossert/Jake Niceley/Paul Simmons. Services/Specialization: With locations in New York City, Nashville and London, England, plus plans to open a rental office in Los Angeles sometime in the near future, Dreamhire has rapidly become a major force to be reckoned with in fully professional audio and MIDI equipment rental. The combined inventory of the two USA locations is perhaps larger, more varied and updated than that of any other rental operation. Equipment available for rent includes a full range of digital and analog recorders; signal processing equipment; vintage and modern microphones; noise reduction; keyboards; sound modules; samplers; computers; sequencers, etc. All locations now have the Digidesign Soundtools digital hard disc recording/editing system for rent. A 12-channel Focusrite sidecar console floats between New York and Nashville as does a Lexicon 2400 time compression/expansion unit, a Calrec Soundfield microphone and the Intelix Studio Psychologist cue system, to name but a few of our more hard-to-find items.

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GHL; FD, AC; 2807 Azalea Pl.; Nashville, TN 37204; (615) 269-5183; FAX: (615) 385-0204. Contact: Gary Hedden.

KENT GREEN VIDEO GROUP; FD, EI; 1001 Shoreside Dr.; Hendersonville, TN 37075; (615) 822-3443. Contact: Kent Green.

HARNACK ENGINEERING INC.; FD, EI, AC, MR; 1385 Lamar Ave., Ste. 5; Memphis, TN 38104; (800) 366-7618. Contact: Kirk Harnack, Robert Benjamin.

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NELSON'S ELECTRONIC SYSTEMS; 1600 S. Oates St., Box 580; Dothan, AL 36302; (205) 793-7797. Contact: Ed Nelson.

PRECISION STUDIO ELECTRONICS; SES, MR; 5815 6th St.; Tampa, FL 33611; (813) 837-1224. Contact: Michael Vans Evers. Services/Specialization: We specialize in the design and construction of custom tube and solid-state mic preamps,

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Reliable Music

the professional audio division

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actual session experience with the equipment they sell and real-world experience in studio acoustics (both design and construction). Studioworks has supplied recording companies all over the country and has been a leader in sales of consoles and full turnkey systems. In fact, over 70 session-proven lines of equipment and supplies are available. We also offer complete consultation about systems for recording film sound, broadcast, theater sound and sound contracting. Studioworks is very interested in helping the "Artist Studio" get a good start as well as building multimachine 24-track complexes. We want to begin a long-term relationship with your company and back it with experience.

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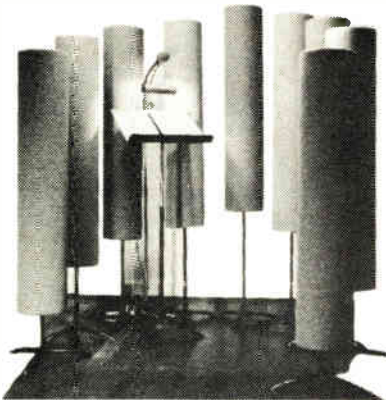
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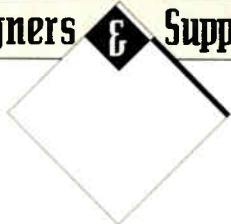
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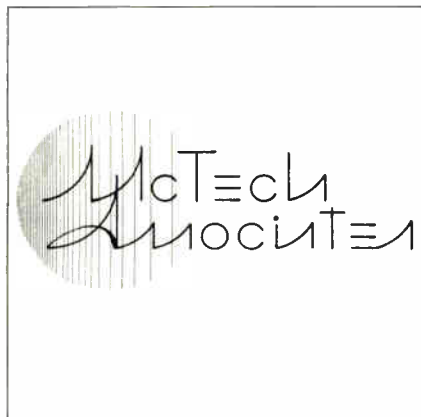


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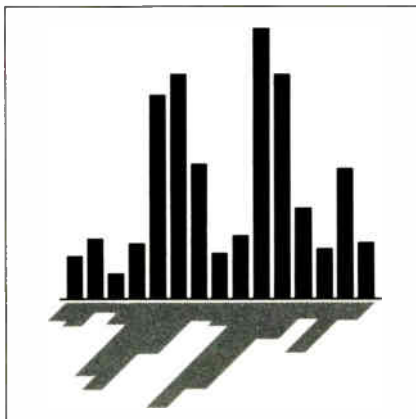
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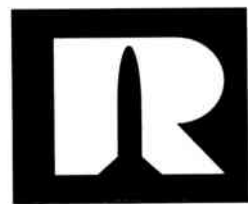
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ATM GROUP; *FD, SES, EI, MR, ER, 20960 Brant Ave.; Carson, CA 90810; (213) 639-8282.* Contact: Andrew Martin.

COMLOGIC INC.; *FD, SES, EI, MR, 2501 W. Burbank Blvd., Ste. 209; Burbank, CA 91505; (818) 845-0199.* Contact: Jim Kubit.



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Clients include: Directors Guild of America, Academy of Television Arts & Sciences, MCA-Universal Studios, Warner Bros., Warner-Hollywood, Saul Zaentz Film Co., Capitol Records, PolyGram Records, Mann Theaters, Cannon Films, Columbia Pictures, Lucasfilm, Steven Spielberg. Plus UCLA, Australian Film and Television School and others. **Services:** architectural design, acoustic consulting, electrical, mechanical and audio engineering, interior design, cost estimating, construction management. The 1986 edition of *Building a Recording Studio* by Jeff Cooper is available through this office.

DESIGN FX AUDIO; *ER, PO Box 491087; Los Angeles, CA 90049; (213) 838-6555.* Contact: Gary Ladinsky. **Services/Specialization:** Design FX Audio is a digital audio rental company. We specialize in state-of-the-art effects and digital recording equipment including Sony PCM-3348 and Mitsubishi X-880/850 digital multitrack machines. Our staff is comprised of music professionals able to help access equipment needs and to answer technical questions. Design FX Audio provides fast, efficient 24-hour service at competitive prices. We cater to the recording, film and video fields. Contact David, Steve or Gary.

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 Woodland Hills, CA

GEFEN SYSTEMS; *SES, 6261 Variel Ave., Ste. C; Woodland Hills, CA 91367; (800) 545-6900; (818) 884-6294.* Contact: Hagai Gefen, president. **Services/Specialization:** The M&E organizer system—sound effects and production music database search program with interfaces to NSM CD2101 (100 CDs) CD changer and Sony CDK-006 auto disc loader (60 CDs), CDJ Classic, CD SOUND, SoundTouch Music System—the ultimate CD music system for businesses, restaurants, hotels, nightclubs and homes. Continuous playback of CD tracks, programmable random playback, touch screen application and infra red remote control. NSM CD 2101 CD changer, Sony CDK-006 auto disk loader, Digifects sound effects library, BBC sound effects library on CD, Premier sound effects library, Sound Ideas and Valentino. We sell every sound effects library available. Over 30 major music and sound effects libraries on compact disc. Call (800) 545-6900.



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THE MASTERING LAB STUDIO PRODUCTS; *SES, ER, 6031 Hollywood Blvd.; Los Angeles, CA 90028; (213) 466-3528.* Contact: Phyllis Sax, mgr.



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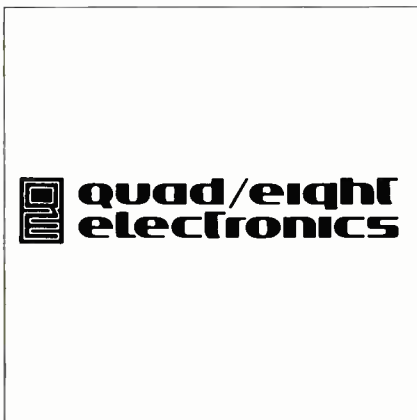
NEW WORLD MUSIC & SOUND; SES, EI, ER; 4792 Clairemont Mesa Blvd.; San Diego, CA 92117; (619) 569-1944. Contact: J.L. Scott.



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PERCEPTION INC.; FD, AC; PO Box 39536; Los Angeles, CA 90039; (213) 857-4912. Contact: G.L. Augspurger. **Services/Specialization:** Innovative designs for music, film and television facilities: Criteria Recording Studios—Miami, Fox Tape—Hollywood, Fono Rama—Guadalajara, Devonshire Studios—North Hollywood, Integrity Music—Mobile, Cherokee Recording Studios—Los Angeles, RMS Studios—North Hollywood, Sony Music Canada, Sony Music Mexico.

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QUAD EIGHT ELECTRONICS INC.; SES; 27771 Hopkins Avenue; Valencia, CA 91355; (805) 295-1324. Contact: Buddy Frisbee. **Services/Specialization:** For over 27 years, Quad Eight Electronics has specialized in the design, manufacture and installation of audio recording/remix consoles and systems for leading record, film, and video studios in the industry, as well as the world's most prestigious sound reinforcement facilities. In the past five years, Quad Eight has focused its efforts on developing advanced design and manufacturing capabilities to allow us to bring Quad Eight quality and performance to the marketplace at an affordable price. With innovative designs found exclusively in the Virtuoso music recording/remix console, the Screenstar video post-production console and the Filmstar film re-recording console, Quad Eight continues to bring to the audio industry a new level of flexibility and control.

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STUDIO BAU:TON
Los Angeles, CA

STUDIO BAU:TON; FD, EI, AC; 3757 Wilshire Blvd., Ste. 207; Los Angeles, CA 90010; (213) 251-9791; FAX: (213) 251-9795. Contact: Peter Maurer, Peter Grueneisen, George Newburn. Services/Specialization: studio bau:ton is a firm specializing in the design and construction of buildings with the demanding requirements for acoustic performance. Projects include music recording studios, post-production facilities, sound and film stages, TV, video and film production facilities. To create the cutting edge sounds of today's performing arts, musicians and producers depend on sophisticated technical equipment, just as contemporary architecture relies on the science of construction. studio bau:ton works within the dichotomies of both these fields. The varied acoustic requirements of listening and recording spaces become the primary generators of form and space. These limitations compel us to continuously look for new architectural solutions. studio bau:ton offers comprehensive services covering all aspects of the architectural design, acoustic engineering, electrical and mechanical design, cost estimating and construction management. Clients: Laface Records, Bad Animals, Walter Becker, Soundworks West, Post Logic, Neil Giraldo/Pat Benatar, Peter Frampton, Bobby Brown, Klasky/Csupo, Encore Studios, Soundcastle Studios, Bill Bottrell, Keith Olson.

THEATRE DESIGN ASSOCIATES; FD, EI, AC; 2219 W. Olive Blvd., Ste. 284; Burbank, CA 91506; (818) 887-9035. Contact: Clyde McKinney, Michael Karagosian.



WATERLAND GROUP
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WATERLAND GROUP; FD, AC; 1680 N. Vine St. #608; Los Angeles, CA 90028; (213) 469-7754; FAX: (213) 469-6757. Contact: Vincent A. Van Haaff, Ivan Kadey. Services/Specialization: Waterland Design Group offers design and construction supervision for audio, video and motion picture production and post-production facilities. Simple acoustical design and adaptation to innovation in electronic and production-technology are Waterland Group attributes. Certain electronic, structural and governmental rules apply to each project, but

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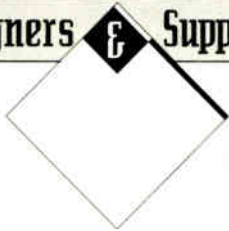
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WESTERN ELECTRO-ACOUSTIC LABORATORY INC.; AC; 1711 Sixteenth St.; Santa Monica, CA 90404; (213) 450-1733. Contact: Neil A. Shaw.

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AUDIO CONCEPT A.C. INC.; EI, SES, MR, ER; 2229 Ste-Catherine E.; Montreal, Quebec, Canada; (514) 527-8366. Contact: Pierre Guillotte.

BLACK BOX LIMITED; FD, SES, AC; 21-23 Greenwich Market; London, SE10 9HZ England; (081) 858-6883. Contact: Robert D'Arcy.



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DREAMHIRE; ER; 18 Chaplin Rd.; London, NW2 5PN England; (01) 451-5544; FAX: (01) 451-6464. Contact: Nick Dimes. Services/Specialization: Dreamhire in London was established over six years ago and, as a result, we now carry together the largest selection of pro audio and musical equipment available for rental in Europe. A vast inventory includes digital and analog recorders such as the Mitsubishi X-880 and Akai DR-1200, effects units, mixing consoles, keyboards, drum machines, sequencers, noise reduction, guitars, amplifiers, rare and not-so-rare microphones, studio monitors, tube and solid-state equalizers and compressor/limiters, synchronizers, samplers, and home-recording packages. The London operation boasts a full-time staff of a dozen personnel—even our drivers are budding musicians and engineers capable of installation and demonstration of most units. Service is 24-hours seven-days, every day of the year. Dreamhire has now established operations in New York City and Nashville with a branch in Los Angeles due to be open later in 1991.

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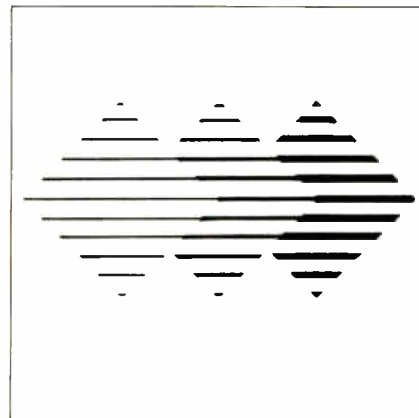
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PAGE	READER SERVICE NUMBER	ADVERTISER	ACTION FAX #	PAGE	READER SERVICE NUMBER	ADVERTISER	ACTION FAX #	PAGE	READER SERVICE NUMBER	ADVERTISER	ACTION FAX #
174	001	Ace Music Center		80	049	DOD		99	095	Professional Audio	
54	002	Acoustical Solutions		63	-	Dolby			-	Services & Supply	(818) 843-5754
186	003	Acoustic Sciences Corporation (ASC)	(503) 343-9245	69	050	Drawmer		23	-	Ramsa	
132	004	Acoustic Systems		122	051	Dreamhire		172	096	R & M Pro Audio	
141	005	Adams-Smith	(508) 568-0404	120	052	EAR Professional Audio/Video		88	097	The Recording Workshop	
109	006	Aircraft	(617) 367-1521	103	053	Effanel Music		165	098	Rhythm City	(404) 233-1581
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72	009	AKG Acoustics	(415) 351-0500	166	056	Europadisk		84-85	101	RolandCorp US (JD-800)	
60	010	Akron Music		183	057	Fast Forward Video		129	102	RolandCorp US (RSS)	
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115	012	Alesis (SR-16)		125	059	Full Compass		140	104	Sabine Musical Manufacturing	
168-169	013	Alesis (M-EQ 230)		148	060	Fullersound		190	105	Sendit Electronics	
180	014	AMP Services		107	061	Full Sail Center for the		145	106	Sennheiser	
IFC	015	AMS Industries (AudioFile PLUS)		160	062	Recording Arts	(407) 671-1112	58	107	Shure	(708) 866-2279
50	016	AMS Industries (ST-250)		114	063	Gold Line	(203) 938-8740	181	-	SMPTE	
34	-	API Audio Products		133	064	Bernie Grundman Mastering		11, -	-	Solid State Logic (SSL)	
47	017	Applied Research & Technology (ART)	(716) 436-3942	51	065	Hill Audio		116-117, 127	-		
162	-	Ashly Audio		191	066	The Hollywood Edge		176	108	Sonic Solutions	
149	018	Sam Ash Professional		88	067	Hot House Professional Audio	(914) 691-6822	12-13, 89, 151	-	Sony	
37	019	ATI		59	068	illbruck		71	-	Soundcraft	
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16	032	Case Component Network		35	081	MacBeat		156-157	120	Tascam (M-600)	
76	033	Century Music		172	082	Mackie Designs		43	121	t.c. electronic	
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25	035	Community	(215) 874-0190	55	084	Marshall Amplification		154	123	Telex Communications	
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82	039	D & R USA		179	087	Mix Bookshelf		126	126	Thrifty Electronics	
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54	041	The DAT Store	(213) 470-6176	104	090	Neutrik (A1)		41	127	Valley International (Signal Processors)	(615) 370-5907
73	042	dbx	(415) 351-0500	7	091	Neutrik		159	128	Valley International (Dynamite ²)	(615) 370-5907
161	043	DIC Digital Supply		104	092	Neve		183	129	Vertigo Recording Services	
36-37	044	Digidesign		74	093	Opcode Systems		132	130	Walters/Storyk Design Group	
81	045	Digital Audio Labs		143	094	Otari	(415) 341-7200	146	131	Washington Professional Systems	
60	046	Digital Integration		173	094	Paisley Park		136	132	Whirlwind Music	
IBC	047	DigiTech				Peavey		24	133	White Crow	
165	048	Disc Makers				PolyQuick		147	134	Yorkville	
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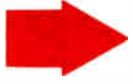
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003	033	063	093	123	153	183	213	243	273
004	034	064	094	124	154	184	214	244	274
005	035	065	095	125	155	185	215	245	275
006	036	066	096	126	156	186	216	246	276
007	037	067	097	127	157	187	217	247	277
008	038	068	098	128	158	188	218	248	278
009	039	069	099	129	159	189	219	249	279
010	040	070	100	130	160	190	220	250	280
011	041	071	101	131	161	191	221	251	281
012	042	072	102	132	162	192	222	252	282
013	043	073	103	133	163	193	223	253	283
014	044	074	104	134	164	194	224	254	284
015	045	075	105	135	165	195	225	255	285
016	046	076	106	136	166	196	226	256	286
017	047	077	107	137	167	197	227	257	287
018	048	078	108	138	168	198	228	258	288
019	049	079	109	139	169	199	229	259	289
020	050	080	110	140	170	200	230	260	290
021	051	081	111	141	171	201	231	261	291
022	052	082	112	142	172	202	232	262	292
023	053	083	113	143	173	203	233	263	293
024	054	084	114	144	174	204	234	264	294
025	055	085	115	145	175	205	235	265	295
026	056	086	116	146	176	206	236	266	296
027	057	087	117	147	177	207	237	267	297
028	058	088	118	148	178	208	238	268	298
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015	045	075	105	135	165	195	225	255	285
016	046	076	106	136	166	196	226	256	286
017	047	077	107	137	167	197	227	257	287
018	048	078	108	138	168	198	228	258	288
019	049	079	109	139	169	199	229	259	289
020	050	080	110	140	170	200	230	260	290
021	051	081	111	141	171	201	231	261	291
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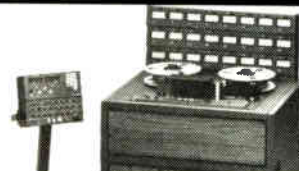
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FEEDBACK

Yamaha Responds

The article in the May issue by Bob Hodas and Paul Stubblebine on analog-to-digital converters contained a number of inaccuracies regarding the Yamaha AD2X A/D converter.

First, some technical issues: The analog input of the AD2X will clip signals of +24dBu and above, which is 6 dB higher than some of the other units evaluated. While it is possible to clip the input stage without showing meter clipping, you will need to apply signals in excess of +24 dBu. This simply has not been an issue with our customers.

The authors called attention to the AD2X's frequency response: Operating at 48 kHz, the AD2X is -0.5 dB at 19.6 kHz, and -4.2 dB at 20 kHz.

Perhaps the biggest point of misunderstanding concerns the AD2X's "Digital Floating" technology. Two simultaneous ADCs per channel are used, operating 18dB apart. The two outputs are inaudibly crossfaded at the 18dBFS threshold. This technique extends the performance of AD2X to 19 bits for input into Yamaha digital consoles such as the DMC1000 and to high-resolution digital recorders such as our DMR8.

Due to the use of Digital Floating technology, the "best case" for AD2X occurs at -20 dBFS, just below the threshold. Measured at -20 dBFS or below, the AD2X will measure better than any 16-bit system.

Similarly, the alias measurements shown are not relevant to the evaluation. To obtain results similar to those illustrated in the article, I had to input a 24kHz tone at +24 dBu! At "real world" high-frequency input levels (below +10 dBu) the alias levels are equal or better than that of the other units tested. I am confident that the alias product of the AD2X was not a part of the authors' perceptions.

Next, I would like to address some issues regarding the listening tests. Were these "blind" tests, or did the evaluators know what unit they were listening to? Was any effort made to

evaluate the coloration caused by the recording and playback system used in the tests? Certainly when evaluating such small sonic details, the system's collective coloration will affect perceptions about all of the units tested.

But, most importantly, I would like to underscore the fact that these are *subjective* evaluations. The old adage, "your mileage may vary..." was never more true than with this type of test. Many customers with very respectable credentials tell us how satisfied they and their clients are with the performance of the AD2X. Engineers such as Bob Vosgien (at Artisan Sound Recorders and CMS Digital) and classical engineer John Newton (at Sound Mirror) are among the growing number of pros who specify the AD2X. In fact, in a recent issue of *EQ* magazine, Grammy-winner Roger Nichols (known for work with Steely Dan and Rickie Lee Jones) said that "...no studio should be without one."

The bottom line, though, is that beauty lies in the ear of the beholder. It is always advisable to compare A/D converters carefully before you buy. In a fair, objective comparison, I am confident that quite often the AD2X will be selected.

Don Morris
Yamaha Corporation of America
Buena Park, CA

Miller on Digital

With all due respect to the research done by Paul Stubblebine and Bob Hodas ("Five Outboard Converters," *Mix*, May 1991), I seriously question the statement: "We could see some people choosing a converter personally for a certain type of music, just as one would make a microphone selection."

This suggestion by the authors was drawn from the fact that *not one* of the outboard A/D converters studied were linear, *i.e.*, accurate.

I had been led to believe that A/D converters are employed to accurately convert analog into the digital domain. Nothing more, nothing less. A/D converters are not intended to be signal coloration devices, although in the real world this coloration has resulted from numerous ill-designed and/or implemented units!

Further, the question of digital transfer anomalies continues to mystify me. In my experience (with the Colossus system), the 100th transfer or copy is identical to the first. So what's the problem? It certainly isn't the technology. Could it be the human application is the real culprit? Brad Miller

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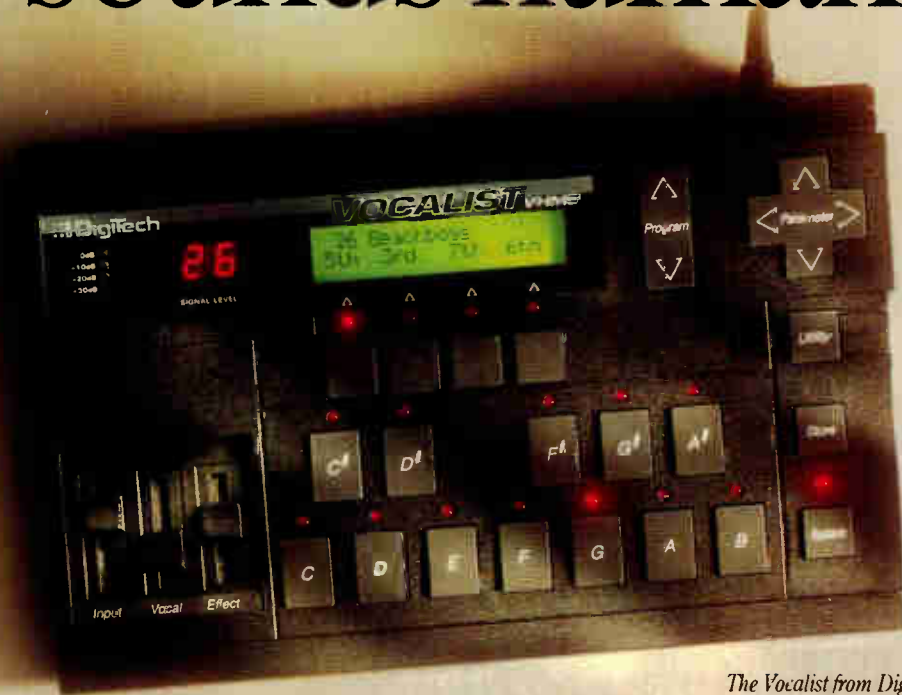
Dolby and The Doors

In the May *Mix*, two articles on the sound production for *The Doors* mention the use of Dolby SR for dialog and music recording, but fail to mention the Dolby was interfaced with the location recording equipment by a Bryston 480B portable noise-reduction interface. Prior to the availability of the Bryston unit, sound mixer Tod Maitland used Dolby mainframes modified for field use, and they weighed approximately 100 lbs. The Bryston unit is approximately two inches thick, weighs about ten pounds and attaches directly to the bottom of the Nagra IV-S.

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