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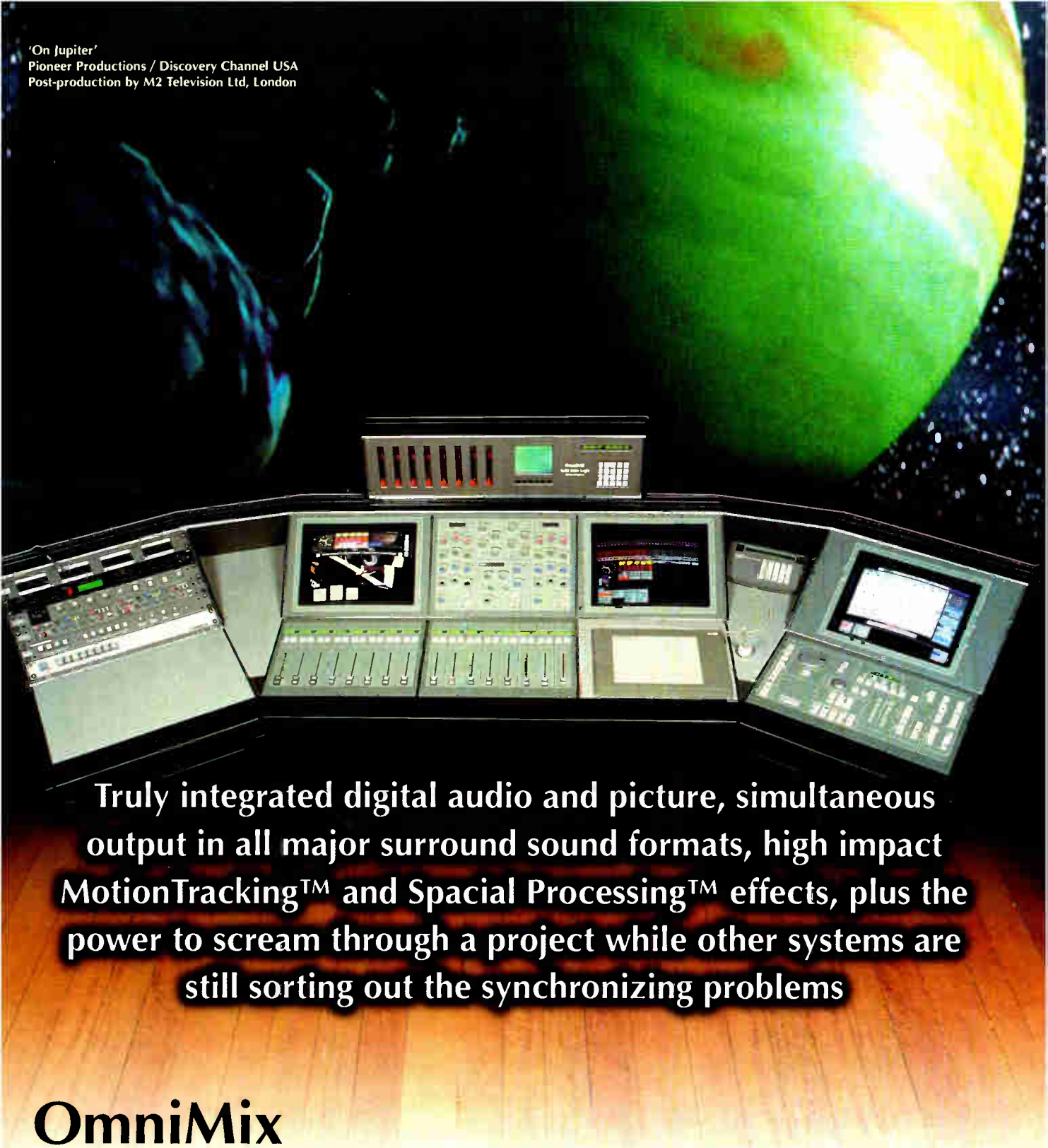

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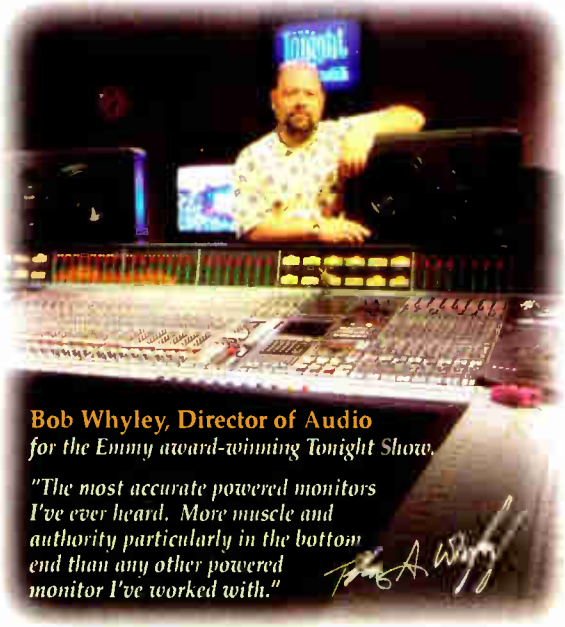

Bob Whyley, Director of Audio
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photo courtesy of Kingsway studios, LA

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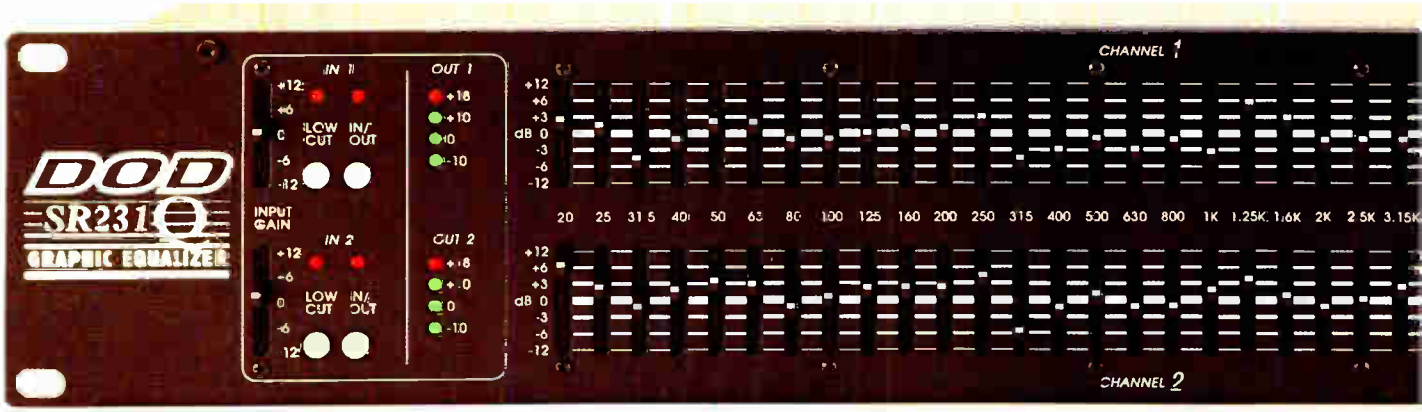

The new DOD SR series EQ's will surprise you with features you thought could only be found in EQ's costing $100's more. Constant Q filter technology ensures stable bandwidth and response at any slider setting. Impeccable THD and noise specs make your job easier by keeping your sound clean and the switchable low cut filter offers instant protection against sudden low frequency overloads. DOD delivers these and other professional features that today's sound engineers demand. Check out the new SR EQ's at your DOD dealer today and let your ears and your budget be pleasantly surprised.

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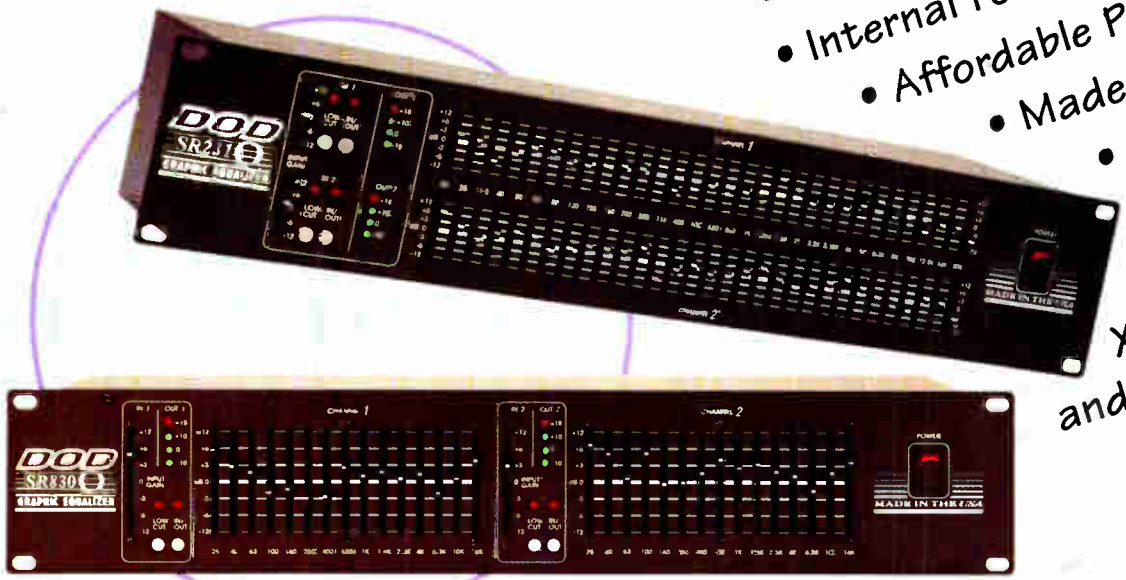

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MIX®

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OCTOBER 1996, VOLUME 20, NUMBER 10

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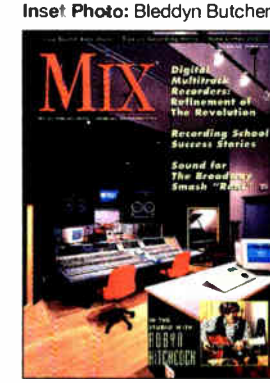
PRODUCTS

LIVE SOUND

DEPARTMENTS

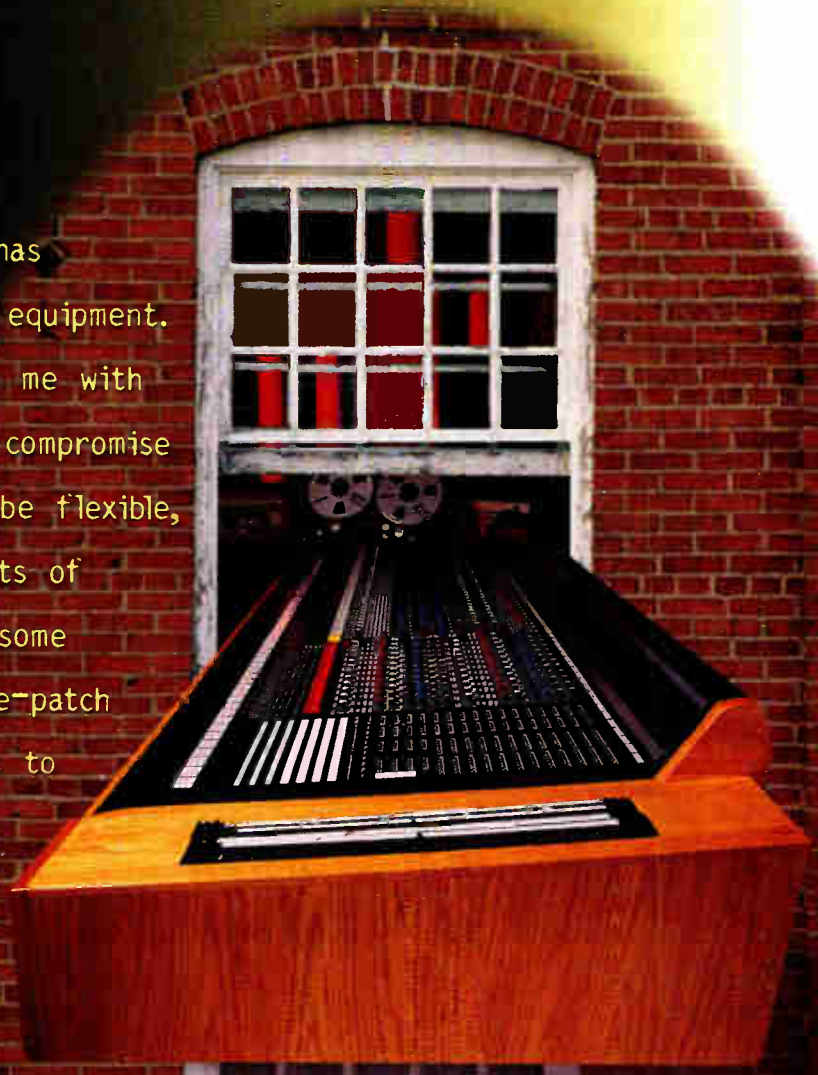
Check out Mix Online
http://www.mixmag.com

Cover: Studio A of World Studio Group member Presence Studios, located on the water in Westport, Conn., features a Neve VR Legend 60. Main monitors are ATC SCM300s, along with SCM 20 near-fields. Fairlight MFX-3 hard disk and Studer A827 analog multitracks with Dolby SR are available in both studios via common machine room interfacing. Design of the expanded two-room facility was by the Russ Berger Design Group.
Photo: James Wilson.
Inset Photo: Bleddyn Butcher.



are you cramped for space?

"I'm a songwriter who has invested in some great equipment. I need a mixer to help me with my projects that won't compromise my sound. It needs to be flexible, expandable, and have lots of features. I don't want some mixer that I have to re-patch and jump through hoops to record with."



"I need an 8 bus mixer that sounds good. However, I'm on a budget, and there are more things that I need, like another effects processor. And somehow, I need to fit all of this into my personal home studio."

maximum mixing minimum space

1682

1682 fx

Designed to deliver the highest quality sound in a compact unit, the ***1682 Series*** is made to be used with multitrack recorders found in today's project studios. The ***1682*** is also ideal for computer studios, mobile recording, and other applications where space is at a premium.

In addition to new features such as a dedicated sampling output bus, the 1682s provide Phantom Power, Phase Reverse, Solo in Place, Semi-Parametric EQ, Four Stereo Returns, and a lot of other features found in larger recording consoles. There are 34 Inputs for mixdown and tape inputs can be routed with a Flip Switch for additional mixing.

The ***1682-fx*** offers lots of easy-to-use effects. The effects processor is our great sounding 24-Bit ESP chip that can be enabled with a push of a button. You don't have to plug or unplug any cables.

The 1682s are professional and quiet, using an external rack mounted power supply, DC cancelling inserts, balanced inputs, and all are ground compensated.

Maximum mixing – minimum space. Once again ENSONIQ sets the standard.

In any of the eight positions, the patch panel remains fully attached to the 1682 chassis, insuring the integrity and reliability of the connections.

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FROM THE EDITOR

LESSONS FROM A SCREWDRIVER

Some lessons, such as Ohm's Law or the Haas Effect, are best learned in a traditional educational environment. Other bits of knowledge—such as analog machine alignment or using an RTA and third-octave graphic equalizer to smooth out room response—require hands-on field experience. And there's no substitute for the school of hard knocks: The next time, you'll know why the tool/work box or chain hoist motors should never be the first things you put inside a semi during load out, or the importance of using a brass screwdriver when repairing high-frequency drivers. Witness the unseen, awesome power of magnetic flux pulling your steel screwdriver through a $100 diaphragm, and you'll eventually get the idea. It's an expensive lesson, but one that makes a lasting impression on the mind (and wallet).

While you're at it, determine why that original diaphragm failed. Were protection limiters absent, bypassed or set improperly? Did someone connect the HF driver to a subwoofer output? Was the crossover adjusted correctly? If you have the answer, you can save the $100 for another diaphragm by not reinstalling that driver before correcting the system.

I frequently get queries from students interested in audio careers. Today, there are dozens of excellent audio education programs throughout North America, ranging from seminars to four-year and post-graduate studies. Although a diploma or certificate doesn't guarantee a job, the complexity of today's audio technology gives a clear edge to individuals with training, particularly in computers and/or electronics.

And these days, even being related to someone in the biz doesn't provide instant employment. You see, a P.A. company or recording studio is a business, and one untrained knucklehead can trash a master tape or kiss-off a client in a matter of minutes. Good clients are hard to come by, while there's a plentiful supply of qualified prospects for studio jobs.

You may be a seasoned pro or a budding novice, but a philosophy of lifelong learning is essential to anyone serious about audio. This doesn't mean we all need to go back to school—there are numerous ways of continuing education, i.e., visiting trade shows (World Media Expo, NAB, AES) and attending local events, such as dealer clinics or NARAS, SPARS and AES seminars. While we're at it, a little self-education—keeping up with trade magazines, new book releases, audio forums and newsgroups on the Internet—isn't a bad idea, either. After all, a little knowledge is cheaper than $100 replacement parts.

Sounds like a bargain to me.

George Petersen

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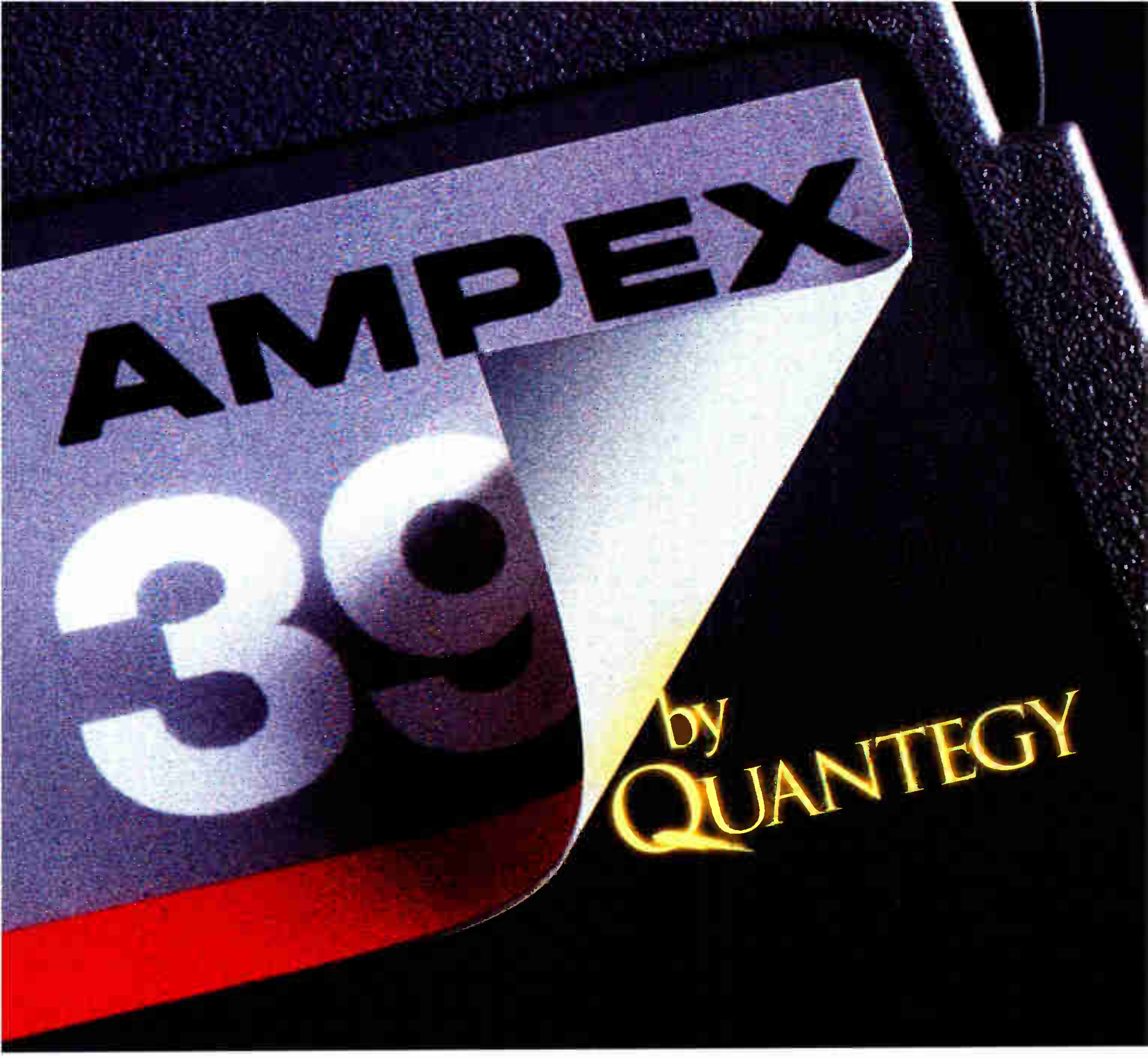

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With MasterList CD software, you can prepare your project for CD mastering. It's the recommended software with the necessary features for professional CD-DA creation. No need to worry about how a cassette will sound. Think about how the CD jackets will look.

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But great tools and great ideas are not the end of the story, they are the beginning. With the functionality that Pro Tools offers, you'll be creative in ways you've never imagined before. Experiment. Assemble a knock-out solo. Triple the tracks. Undo. Fly them in backwards. Re-do.

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CURRENT

QUANTEGY ACQUIRES 3M AUDIO/VIDEO, EXPANDS U.S. OPERATIONS

Strengthening its position as major U.S. supplier of professional audio and videotape products, Quantegy Inc., makers of Quantegy and Ampex media products, recently acquired the assets, intellectual properties and remaining inventory of 3M Corp.'s pro audio and video products. According to Quantegy president and CEO Jack Kenney, the acquisition reinforces Quantegy's position in the pro media market. "We will supply 3M customers with the product they want now," says Kenny, who stresses that Quantegy is ensuring that the acquisition does not affect 3M customers. Quantegy will honor 3M pricing, terms and conditions, and customers can order 3M products through the 3M customer service mechanism already in place.

In addition, Quantegy has relocated all administration, marketing and manufacturing offices to new headquarters in the Atlanta area. The address is 401 Westpark Court, Suite 110, Peachtree City, GA 30269. Phone 770/486-2800; fax 770/486-2808.

BASF SELLS TAPE DIVISION

BASF Magnetics' German parent corporation announced plans to sell its tape-manufacturing division to Turkish audio/video shell and CD manufacturer RAKS by January 1, 1997. No price was revealed in the announcement issued by the two companies. But they have both signed a letter of intent to pursue the sale, which will be subject to several national and pan-European regulatory agencies.

BASF said its tape-manufacturing capabilities reflect the magnetic media industry's continued move toward a down-priced economic environment. Professional studio audio tape, however, remains a high-margin product, and BASF national sales and marketing director Terry O'Kelly said that the division would proceed in a "business-as-normal" mode, including a more aggressive campaign to garner pro audio market share from the newly reorganized Quantegy. "Studio professionals want a choice in tape, and we're still going to offer that," said O'Kelly. *–Dan Daley*

SUMMER NAMM: BIGGER, BETTER

Years ago we'd never have expected it, but Nashville's Summer NAMM (July 12-14), was an overwhelming success, in terms of sold-out attendance and hot product debuts. Here are some highlights...

Four-track digital recorder/mixers were the talk of NAMM, with products from Yamaha (MD4, $1,199), Sony (MDM-X4, $1,250) and Tascam (Digital Studio 564, $1,499). All feature 37 minutes of recording on a "data" format MiniDisc, built-in analog mixers, MIDI sync, cut/paste editing and a write-after-read mode for bouncing four tracks onto two of its own tracks.

Korg is now the U.S. distributor for Soundtracs consoles. The big news is its Topaz range, now with models from $449 to $4,999, including a 24-input, 4-bus mixer at a rock-bottom $1,099.

Mackie amps? The M•1200 ($599) is a 600 W/ch (1,200W bridged) power amp with on-board CD horn compensation and subwoofer crossover. I also heard Mackie's FP-824 powered nearfields, which sounded great. These two-way, 8-inch/1-inch bi-amped (250 watts/side) monitors have two 6.5-inch passive radiators on the cabinet rear.

Tube outboard gear doesn't have to be pricey. ART's Levelar offers VCA-less compression with 12AX7A tube circuitry and balanced input/output at an amazing $159.

Spirit's Absolute Zero monitors combine a 6.6-inch woofer and 1-inch dome HF, and their red waveguides and cones are a perfect match for all that Focusrite Red Series gear in your rack. If these sound half as good as they look, then the NS-10 may have to roll over as the studio standard.

Remember cocktail drums? Those upright 1950s kits are back. For anything from bossa nova to rockabilly, Yamaha's Club Jordan Cocktail Drum System is irrepressibly cool, the *outré* choice for the creative percussionist.

There was much more. Watch our new product sections in the months to come for more NAMM product hits.

—George Petersen

FATHER GUIDO SARDUCCI TO HOST TEC AWARDS

The TEC Awards recently announced that Don Novello, aka Father Guido Sarducci, has taken a leave of absence from his job as assistant editor of the *Vatican Inquirer* for an encore performance as master of ceremonies for the Twelfth Annual Technical Excellence & Creativity Awards. The TEC Awards are set for the second night of the AES convention, Saturday, November 9, at the Regal Biltmore in Los Angeles. Father Guido proved to be a popular choice as emcee in 1994, singing and joking his way through the evening's festivities. In addition, this year's presenters so far include George Duke, Russ Kunkel, Waddy Wachtel, the Wilson sisters and Don Was.

In what is proving to be one of the biggest years ever, additional professional audio companies have signed on as sponsors of the TEC Awards, including Gold sponsor Kurzweil Music Systems. New Silver sponsors are Clair Brothers Audio, L'Acoustic and Mackie Designs. Bronze sponsors are Nashville Association of Professional Recording Services, Lisa Roy's Studio A, Howard Schwartz Recording Inc., Shure Brothers and Sony Music Studios New York.

A limited number of tickets are still available. For more information, call Karen Dunn at 510/939-6149.

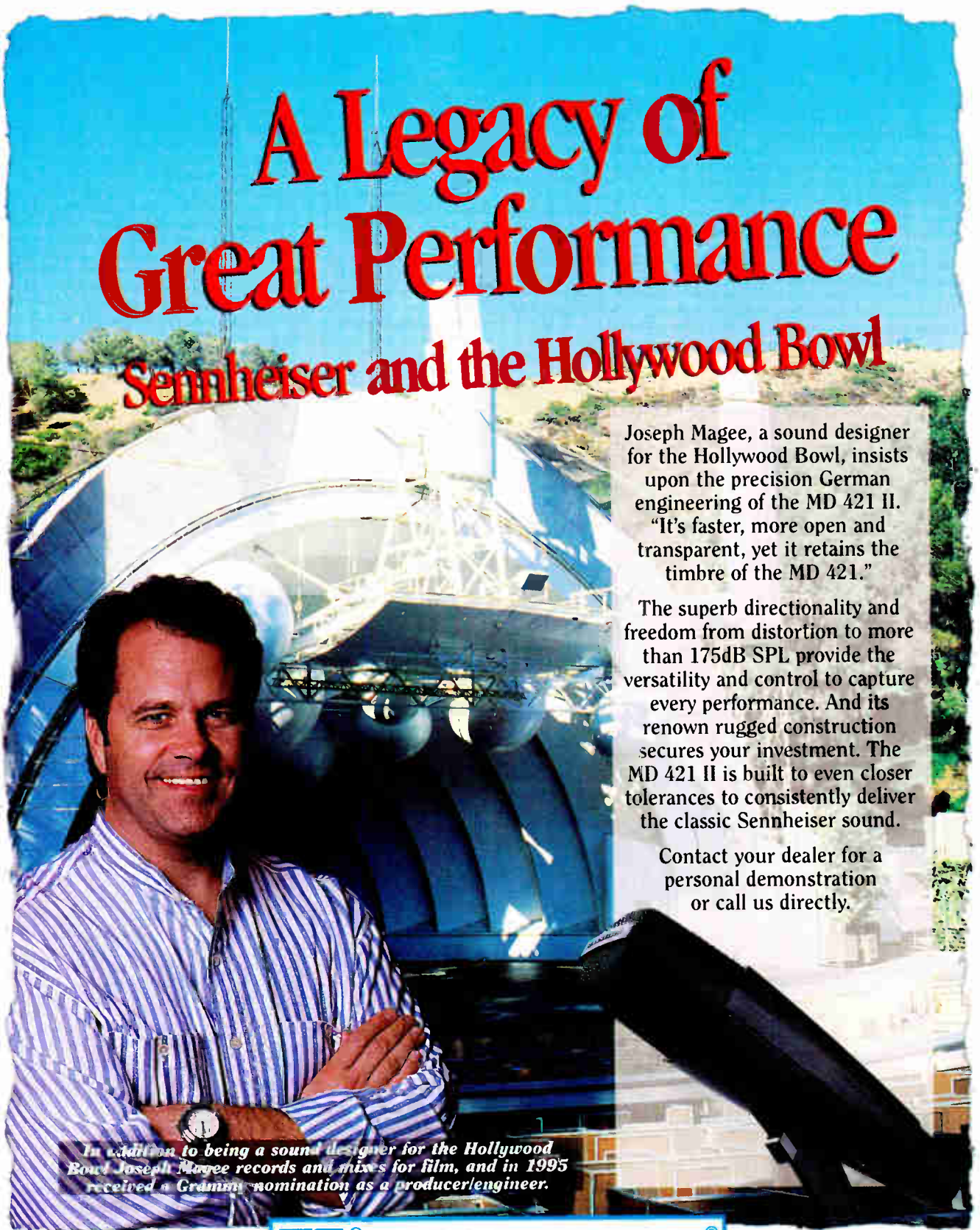
AIRWORKS ACQUIRES SYNCLAVIER ASSETS

In a move to strengthen its position as developer of automated software tools for audio and post-production, AirWorks Media Inc. of Edmonton, Alberta,

—CONTINUED ON PAGE 16

A Legacy of Great Performance

Sennheiser and the Hollywood Bowl



Joseph Magee, a sound designer for the Hollywood Bowl, insists upon the precision German engineering of the MD 421 II. "It's faster, more open and transparent, yet it retains the timbre of the MD 421."

The superb directionality and freedom from distortion to more than 175dB SPL provide the versatility and control to capture every performance. And its renown rugged construction secures your investment. The MD 421 II is built to even closer tolerances to consistently deliver the classic Sennheiser sound.

Contact your dealer for a personal demonstration or call us directly.

In addition to being a sound designer for the Hollywood Bowl Joseph Magee records and mixes for film, and in 1995 received a Grammy nomination as a producer/engineer.

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In 1992 we introduced low cost disk recording with our 4-track DR4d. Thousands of DR4d's have found their way into broadcast facilities, recording studios, post production houses, and project studios. Combining our experience with input from thousands of end users, we created the DR8 and DR16. Whether you're just starting out with your first 8-track, upgrading your current tape-based MDM, or even if you're planning on a double-whammy, 128-track, multi-interfaced, graphically-based, post production facility, the new DR Series from Akai will serve your needs and grow with you in the future. It's an important fact to consider when someone tries to sell you a "budget" digital recorder that never really meets your needs. Check out these features and you'll "see" what we're talking about.

MORE FEATURES:

- 18 bit ADC • 64X oversampling
- 20 bit DAC • 8X oversampling
- 24 bit internal processing
- 16 channel digital mixer
- Dynamic MIDI mix automation
- Built-in mic preamps
- 2AUX sends
- 109 point autolocator
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- 50 pin SCSI port

Record/Edit The new DR Series utilize our latest 24-bit internal processing technology enabling simultaneous 8-track recording with the transparent digital audio quality that has become an Akai trademark

Three dedicated LSI's (Large Scale Integrated circuit) for recording, mixing, and optional EQ provide real-time performance and stability of operation that computer based units simply cannot provide.

Real-time random-access editing features like copy, insert,copy + insert, move, move + insert, erase, delete, slip, and sliptrack inspire creative efforts that are simply unthinkable with tape based recorders. The TAKE function allows you to record up to five separate takes of a critical solo, or enables you to compare separate effects treatments of a singular passage. The jog and shuttle wheels make finding precise edit points a breeze, while the familiar tape-machine style transport controls and autolocator make operating the DR Series recorders like working with an old friend.

DR8 - $3495.00 Sugg. Retail Price
8 Track Disk Recorder

DR16 - $4995.00 Sugg. Retail Price
16 Track Disk Recorder

EVEN MORE FEATURES:

- Balanced 1/4" TRS in/out
- Switchable -4/-10dB line levels
- 8 in 8 out + stereo master (DR8)
- 8 in 16 out + stereo master (DR16)

Media The DR8 can be equipped with an optional internal 1 GB SCSI drive, while the DR16 is available with an optional 2 GB internal SCSI drive. The DR Series recorders are both equipped with a standard 50 pin SCSI port alowing a combination of up to seven SCSI drives with disk overflow recording capability. Lists of compatible drives are available from Akai product information.

Data backup is achieved through standard audio DAT or Exabyte.

At the time of this writing, the Iomega Company is preparing to go into production with their new 1 GB "JAZ" drive, a removable media SCSI drive which will greatly enhance the capabilities of our new DR Series recorders. Stay tuned for more info in our upcoming ads. Better yet, test drive a new DR Series recorder today at your local Akai dealer.

Now You Can See It.

OPTIONS:

- SuperView™ SVGA card - $699
- ADAT interface - $299
- MIDI interface - $299
- S.M.P.T.E. read/gen - $379
- RS422 video sync - $299
- BiPhase film sync - $299
- 2nd SCSI port - $299
- MT8 MIX controller - $799
- 8 channel 3 band parametric EQ - $559
- 16 channel 3 band parametric EQ - $699

Mixing Some of our competitors' disk recorders use a portion of their recording LSI to provide mix capability. While this saves money, it can also produce audio artifacts like "zipper" noise when adjusting such critical functions like EQ, pan, and fader level. On top of that, many disk recorders won't even let you make real-time adjustments during mix down, eliminating a critical part of the creative recording process. The heart of the DR mixer is a 16-channel, 24 bit custom LSI designed to provide real-time dynamic digital mix capability. Built-in 99 scene snap-shot automation for all functions and dynamic automation via external MIDI sequencers, combined with 8 or 16 channel 3-band parametric EQ option, ensures that the only limit in the DR Series mixer is your imagination. With its built-in 16 channel mixer, the DR8 becomes the perfect compliment to any 8-track recorder you might currently own. It can mix down its 8 tracks of internal digital audio with an additional 8 inputs from a sampler, tape machine, or a live performance, all in the digital domain. The MT8 mix controller provides a 16 track console format for dynamic remote control of all mix and EQ parameters.

(Monitor/Keyboard/Iomega Drive and Batteries not included.)

SuperView™ We sort of went into a frenzy packing new features into our DR8 and DR16. When we stepped back to take a look at what we'd done, we realized we crammed a whole roomful of equipment into a single 5U box. In order to help keep track of everything that's going on inside our "studio in a box", we developed the SuperView™ SVGA monitor board. SuperView™ mounts internally in the DR8 or DR16 and provides envelope and track information for up to 16 tracks of audio, as well as region highlighting for record, playback, and edit. SuperView™ is further enhanced by 16 track level meters with indicators for left/right master out and aux 1/2 out. The time indicator will read in the same format as the DR front panel. SuperView™ requires no external computer, simply plug your SVGA compatible monitor into a SuperView™ equipped DR Series recorder and you're ready to go. SuperView™ enables real-time video representation of audio status; no waiting for screen re-draws. What you hear is what you see.

ELECTRONIC MUSICIAN 1996 EDITORS' CHOICE

Keyboard Interface To increase the power of SuperView™ even further, we added an ASCII keyboard input to the SuperView™ card, allowing a standard ASCII keyboard to operate as a control interface for SuperView™ equipped DR Series recorders. Function keys will provide the ability to zoom in on a single track, as well as zoom in/out timewise for precise edit capability. All tracks and locate points can be named, allowing you to manipulate and track large amounts of data in a very simple manner. A unique interface has been developed to allow track arming, transport control, and edit functions directly from the keyboard, providing enhanced productivity through an intuitive human interface design.

AKAI DIGITAL

Akai Digital
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Fort Worth, TX 76102, U.S.A.
Ph. 817-336-5114
Fax 817-870-1271

INDUSTRY NOTES

Soundcraft Electronics, based in Northridge, CA, appointed **Alison Brett** as managing director...San Leandro, CA-based **Orban** recently acquired the product and development rights to the DDS product line from **Radio Systems**...**Graham-Patten** in Grass Valley, CA, named **Edward Lech** as chief operating officer and **Provide Systems** as new sales representative...**Mark IV Audio North America** (Buchanan, MI) hired **John Gatts** as director of marketing, professional sound reinforcement and **Kevin Rusch** as market development manager, professional sound reinforcement. Mark IV Audio also honored **Radon & Associates** as pro audio rep of the year...**Paul Freudenberg** was promoted to the position of national sales manager at **BSS Audio Ltd.** in Northridge, CA...**Apogee Sound** moved to new, expanded headquarters, located at 2180 S. McDowell Blvd., Petaluma, CA 94954. Phone 707/778-8887; fax 707/778-6923...**Opcode Systems Inc.** (Palo Alto, CA) hired **Janice Odell** as corporate controller, **Ken Johnson** to manage of Opcode's Educational Solutions program and **David Zicarelli** to head up Opcode's new Advanced Technogy Group...**Mick Whelan** joins Elkhart, IN-based **Crown International** as pro audio relations and amplifier product line manager...**Otari** announced plans to move its console manufacturing division to its Foster, City, CA, facilities effective November 1...**Celestion Ltd.** (Holliston, MA) announced a reorganization of its operations into separate professional and consumer divisions. Celestion Professional is based in Ipswich, Suffolk (UK) and is headed up by **Richard Wear. Kurt Rosness** was appointed CEO of KH America (Holliston, MA), the U.S. division and distributor of Celestion, KEF and NAD. In other U.S. Celestion news, **Bill Fox** was promoted to sales and marketing coordinator...**Community Loudspeakers**, based in Chester, PA, named **Chuck McGregor** to marketing relations, **Premjit Talwar** as Middle East marketing manager and **John Garbutt** as technical support specialist...**Summit Audio** relocated its corporate and manufacturing facilites to 2636 South Rodeo Gulch Road Unit C, Soquel, CA 95073. Phone 408/464-2448; fax 408/464-7659...Bill Brachhold was brought onboard as soft- ware developer/network administrator at **Sabine Inc.**, in Alachua, FL... **Tannoy Ltd.** appointed **Sound Productions** in Dublin (353-1-460-0470) as Tannoy Professional distributor for the Irish Republic, and **Philippos Nakas** in Athens (30-1-228-2160) as Tannoy Professional distributor in Greece...C.A.E. **Sound** (San Mateo, CA) hired **Debra LaPalm** as facilities manager/machining department mana- ger...**studio bau:ton** announced a move to expanded office suites at its complex at 3780 Wilshire Blvd. Suite 202, Los Angeles, CA 90010. Phone 213/251-9791; fax 213/251-9795... Lynwood, WA-based **Symetrix** named **CB Electronic Marketing** (Arvada, CO) as its sales representative firm for the Rocky Mountain region...**Connectronics** has moved. The new address is 411 Pequot Ave./PO Box 908, Southport, CT 06490. Phone 800/322-2537 or 203/256-0545; fax 213/256-0440...**Fostex Corp.** in Norwalk, CT appointed **Griffin Public Relations & Marketing** to serve as its U.S. PR agency...**AMS/Neve** is compiling an international directory of studio facilities equipped with its analog consoles, and welcomes contact from studios equipped with consoles not bought directly from the company or distributors. For info, call 212/977-5884...**Shallow Sea Music** has moved to 1811 S. West Temple B, Salt Lake City, UT 84115. Phone 801/487-8623...**Cakewalk Music Software**'s (Watertown, MA) new bundling agreement: Cakewalk Express™ MIDI software ships with all **Compaq** Presario Multimedia Enthusiast™ computers in the U.S. and Japan, and with **Olivetti** personal computers in Europe. ■

—FROM PAGE 12, CURRENT

acquired the key assets of SOC Associates L.P., the parent company of The Synclavier Company. Under purchase terms, AirWorks Media has obtained numerous patents and trademarks, and rights to use the Synclavier® name and software code, plus three software programs never officially introduced by Synclavier.

In addition, AirWorks acquired a Synclavier product development team. The group, headed by former Synclavier execs Griffith McRee and Harland Kirby, continues to be based in Lebanon, N.H., in a new office named AirWorks New England.

PRO AUDIO EXPO MEXICO

The 4th annual Latin-American Pro Audio & Music Expo Mexico '96, held in Mexico City at the World Trade Center from June 5-8, was once again a major success. Sponsored by Studio Sound International, the show drew more than 1,500 attendees, with 30 exhibitors representing 60 international manufacturers from the pro audio industry. Next year's convention will also be held in Mexico City, from June 4-7; for information, call SSI at 914/993-0489.

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Fostex: www.fostex.com.
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SSL: www.solid-state-logic.com.
Studio Audio: www.SADiE.com.
Turbosound: www.turbosound.com.

UPCOMING EVENTS

The World Media Expo (SMPTE, NAB Radio, SBE, RTNDA) rolls into the Los Angeles Convention Center October 9-12. Call 301/694-5243 for info. And in the same site a month later (November 8-11), the Audio Engineering Society will hold its 101st convention. Call 212/661-8528 for details.

CORRECTIONS

The August "Class of 1996" feature did not properly credit the design team of the Sega Music Group's Studio B in San Francisco. The acoustical designers were Charles Salter and Associates (San Francisco), and the architectural designers were Bottom Duvivier (Redwood City, Calif.). In addition, the Gallery Recording Studios caption incorrectly listed ARUS as a division of Systems Development Group. ARUS is a separate company. ■

MM-8

ELF

Time-Align®

An honest system
beyond audible response

While DC to LIGHT response is sometimes joked about in audio circles, it is very desirable to extend a system's bandwidth beyond the audible range because it provides a real sonic improvement.

Unlike any other monitor system, our Studio-A system responds flat from above 20 kHz down to 8 Hz and meets the Time-Align® specification from E.M. Long, even in the bass range.

The MM-8 is a precision 8" coaxial studio monitor with a calibrated flat frequency response and a licensed Time-Aligned™ crossover. Precisely manufactured and tested, the MM-8 system offers you an honest listen to your mix.

The D10E-S INFRA-sub™ utilizes patented ELF™ technology. Experts agree the ELF™ technology offers the most superior sounding and honest low frequency reproduction available.

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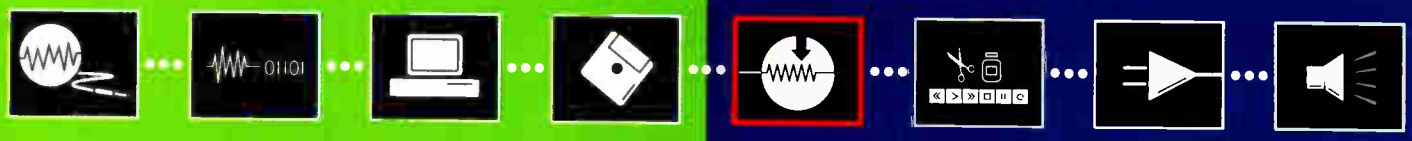


The 168RC is the first truly affordable, fully digital, 8 bus recording console. Use it with your ADAT or other digital recorder equipped with the ADAT optical interface to create the best sounding recordings you've ever made.

168RC Digital Recording Console

The heart of a new, component-based Digital Recording System from Soundlink

SoundLink DRS brings the reality of all digital, fully automated, component based recording to everyone working on the next great recording. For more information about the 168RC Recording Console or any of the SoundLink DRS components, just call ***(516) 333-8737.***

The 168RC is the first digital console to feature two ADAT optical interfaces (yielding 16 channels of digital input) and eight analog inputs as standard equipment. It makes the creative control and sound quality of an all digital, fully automated recording system an affordable reality.

Powered by Korg's proprietary MSP processor, our SoundLink DRS 168RC offers instantaneous control, processing and routing of all 24 inputs, 16 channels of mixing and 8 bus outputs.

With its combination of analog, ADAT optical and S/PDIF I/Os, the 168RC easily functions as the heart of a fully digital recording system while interfacing with any of your existing analog gear.

The 168RC is equipped with three-band EQs featuring semi-parametric high and low bands, fully parametric mid bands and 30 memories for EQ setups.

The 168RC also boasts two internal effects processors that run some of the finest algorithms available. Choose from 32 effects types and 50 preset programs.

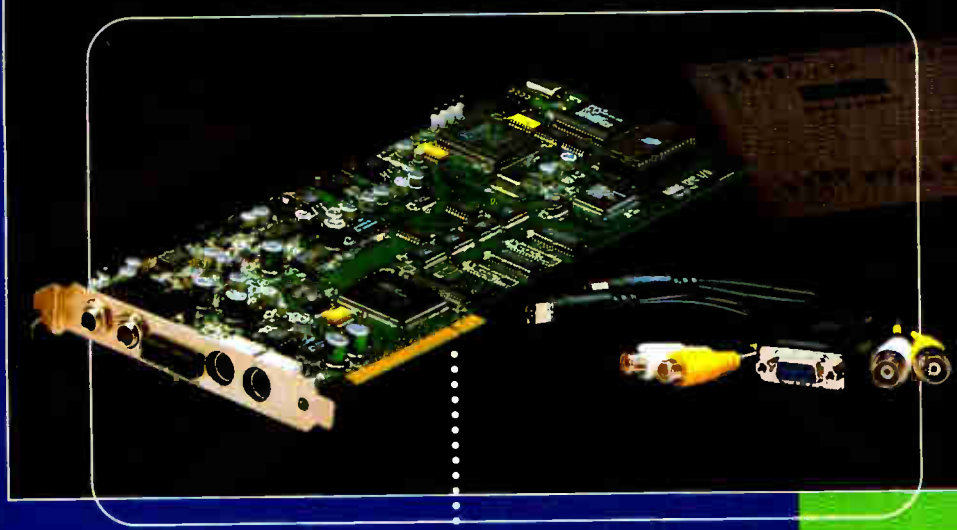
The 168RC even provides automation functionality that lets you save and recall console settings or record and playback dynamic parameter changes.

Affordable, fully integrated digital recording is finally here. So check out SoundLink DRS and the 168RC today. You can't beat this system.

SoundLink DRS
Digital Recording Systems

Affordable, fully integrated digital recording
Down to a System.

SoundLink DRS 1212 I/O
Multi-Channel Audio Interface



The SoundLink DRS 1212 I/O, along with Deck II software, brings the price of full-function, multi-channel computer based recording to a point that just about anyone can afford. And since the 1212 I/O conforms to the new PCI format, your investment will last longer than just a few months!

With the power of advanced personal computers, full-function multi-channel recording and editing is possible without the addition of costly specialized hardware. The only true limitation has been in the area of multi-channel I/O. With the introduction of the SoundLink DRS 1212 I/O Multi-Channel Audio Interface, that limitation no longer exists.

The 1212 I/O features 12 inputs and 12 outputs configured as two analog I/Os, an S/PDIF I/O and an eight channel ADAT optical I/O. All the I/Os can be used simultaneously. For even more control and flexibility, the 1212 I/O connects to Korg's 168RC Recording Console, or to the Korg 880A/D and 880D/A interfaces.

The new 1212 I/O even offers a Word Clock input and output, plus an ADAT time code input, for system synchronization. Between the 1212 I/O with Deck II software, the 168RC Recording Console, an ADAT and a Trinity Music Workstation DRS, the combinations and configurations can meet the needs of just about any music production application.

All of the devices will interface with your existing analog equipment and form the basis for a completely digital system that will give you sound and creative control that simply isn't possible in the analog world.

Affordable, fully integrated digital recording
Down to a System.

SoundLink DRS
Digital Recording Systems

KORG

DEEP DOWN DIGITAL

LESSONS FROM THE ANESTHESIA FRONT

As the focus of this issue is digital recording, and as I always adhere strictly to the magazine's focus in my column, I shall address a few digital recording points this month.

1) Interface. I am typing this entire column with one hand, as the other is currently useless due to problems interfacing to a digital recorder. More specifically, I had some surgery two weeks ago for a shredded kidney. This was done under a general anesthetic, and the hand that had the Heparin splint and all the other anesthesia tubes and data acquisition interfaces stuck in it got real unhappy. Something went wrong with some interface, and now two weeks later I am going back into the hospital as soon as I write this to try and discover why my hand exploded. So, see? It is *very* important to keep all I/O interface connections as clean as possible, and don't let air get in. And if you feel severe pain while plugging in that S/PDIF connector, Stop! Something may be wrong.

2) Forty-eight kHz. Come on! Now it is true that D-2 and all its brethren are addicted to 48 because of their video origins. By the way, does this make you wonder what *exactly* is going on when we happily force 44.1 into the 44.056-color world? I mean, there are several standard approaches to faking this—drop here, stretch there, or just clock up and ignore the pitch change—but by the time audio has been recorded, edited, conformed, locked and transferred, which of these Band-Aids has been applied, or which combinations?

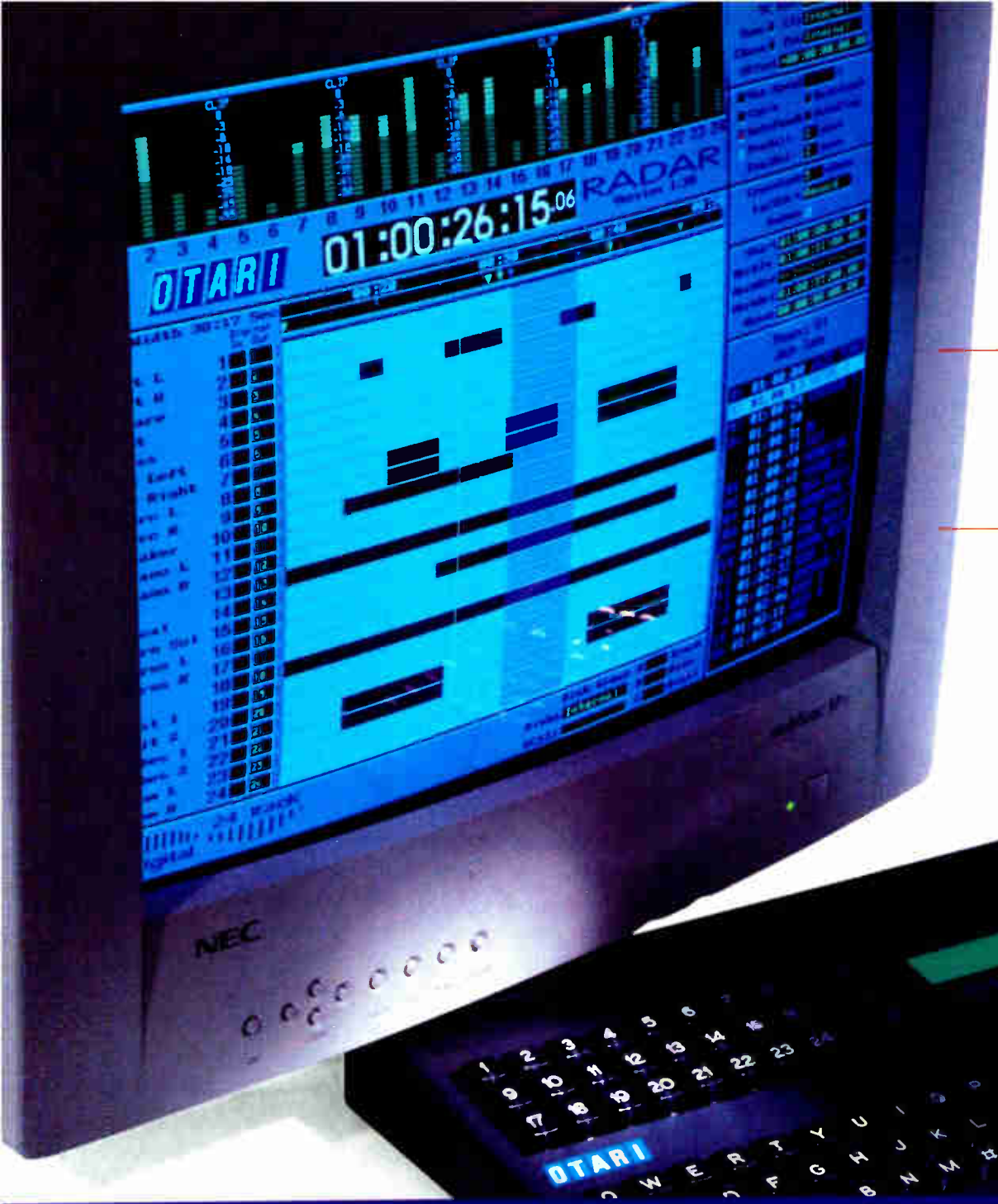
But I digress, though surely for the very first time. Forty-eight was foisted upon us audio folks simply because in the beginning, way back in the dark ages when A/D and D/A converters didn't oversample, the anti-aliasing filters were a huge source of trouble. In fact, there were more severe analog problems with digital back then than there were with analog. There, there. I will explain, and I will try to use the words then and there as often as possible. No I won't.

For those of you too young (or too old) to remember the DDA (Digital Dark Ages), we, as the naive, overconfident animals that

BY STEPHEN ST.CROIX

—CONTINUED ON PAGE 218

ILLUSTRATION: ROBERT ZAMMARCHI



RADAR VIEW™ Highlights

Fully self-contained, no external computer

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Random access, non-destructive, playlist editing

Superior sonics with the highest quality converters

Optional 48 track capability

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RADAR's Point of View

Replacing your analog 24 track can be a tough decision. All these formats, multiple units, synchronization and computers with mice. We at Otari feel that we have a far more simple solution. The RADAR with RADAR VIEW™.

The RADAR acts just like your multitrack. Punch in and punch out, no scrolling through menus. Just hit play or record on its familiar feeling, dedicated remote. You won't even know you are using a hard disk recorder, unless of course, you want to edit. Even then the RADAR is a pleasure to use. And the RADAR VIEW screen gives you all the information you need to know about your session, in large, easy to read graphics

We invite you to contact your local RADAR dealer or call us, at Otari, for a free demonstration video. *We're certain you'll see things our way.*

REALITY FOR $1500* A PAIR. INTRODUCING

If you've been trusting the quality of your creative product to passive monitors costing $400-$600 a pair, there's an astonishing revelation waiting for you at your Mackie dealer. In our opinion, the active, biamplified HR824 is the most accurate near-field monitor available. So accurate that it essentially has no "sound" of its own. Rather, the Mackie Designs High Resolution HR824 is the first small monitor with power response so flat that it can serve as a completely neutral conductor for whatever signal you send it.

HR HIGH RESOLUTION SERIES™

You'll hear the precise attack, texture and quality of individual bass notes exactly as they're being recorded. On instrumental and vocal tracks, you'll discern details of pitch, timbre and harmonics that passive monitors simply don't resolve.

Mackie acoustic engineer David Bie uses scanning laser vibrometry to map HR824 tweeter dome vibrations. Film at 11.

SCIENCE, NOT SNAKE OIL.

Internally-biamplified, servo-controlled speakers aren't a new concept. But to keep the cost of such monitors reasonable, it's taken advances in measurement instrumentation, transducers, and electronics technology. In developing the High Resolution Monitor Series, Mackie Designs sought out the most talented acoustic engineers (being able to live in perpetual drizzle was a plus) and then made an enormous commitment to exotic technology such as scanning laser Doppler vibrometry, analyzers, time delay spectrometers and machines that go "*ping*." The High Resolution Series HR824 is the result of painstaking research and money-is-no-object components. Not to mention thousands of hours of listening tests and *tens* of thousands of dollars in tooling.

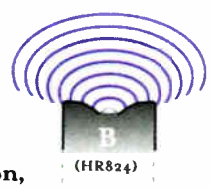
HR824 Active Monitors accept balanced or unbalanced ¼" and XLR inputs. Jacks & removeable IEC power cord face downward so that the speaker can be placed close to rear wall surfaces.

FLAT RESPONSE...ON OR OFF-AXIS.

One of the first things you notice about the HR824 is the gigantic "sweet spot." The detailed sound field stays with you as you move back and forth across the console — and extends far enough behind you that musicians, producers and your mom can hear the same accurate playback.

The reason is our proprietary exponential high frequency wave guide. Without it, a monitor speaker tends to project critical high frequencies in a narrow beam (Fig. A) — while creating undesirable edge diffraction as sound waves interact with the edges of the speaker (red lines in Fig. A). Imaging and definition are compromised. The "sweet spot" gets very small.

Like biamped speakers, wave guides aren't a new concept. But it takes optimized, internal electronics and a systems approach to make them work in near-field applications.



The HR824's wave guide (Fig. B) maximizes dispersion, time aligns the acoustic center of the HF transducer to the LF transducer's center, and avoids enclosure diffraction (notice that the face of the speaker is perfectly smooth.) The exponential guide also increases low treble sensitivity, enabling the HF transducer to handle more power and produce flat response at high SPLs.

CLEAN, ARTICULATED BASS.

When seasoned recording engineers heard the HR824 at a recent tradeshow, they couldn't believe the controlled low bass extension — several snooped around for a hidden subwoofer. They heard low frequency accuracy that simply can't be achieved with passive speakers using external amplifiers. There are many reasons.

The Mackie HR824 Active Monitor. ±1.5dB from 42 to 20kHz.

First, the HR824's FR Series 150-watt bass amplifier is directly coupled in a servo loop to the 8.75-inch mineral-filled polypropylene low frequency transducer.

It constantly monitors the LF unit's motional parameters and applies appropriate control and damping. An oversized magnet structure and extra-long voice coil lets the woofer achieve over 16 millimeters of cone excursion. Bass notes start and stop instantly, without overhang, distortion or "tubbiness."

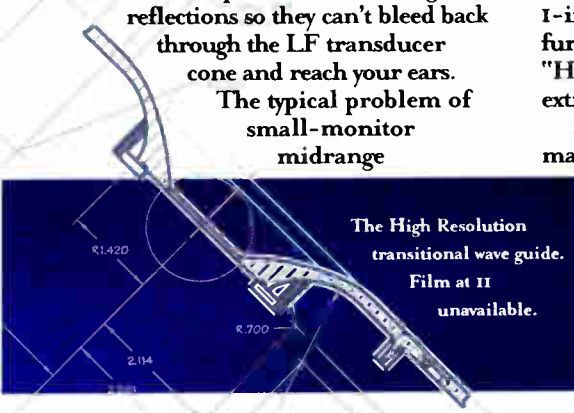
Second, instead of relying on ports or slots, the HR824's low frequency driver is coupled to a pair of aluminum mass-loaded, acoustic-insulated 6.5-inch passive drivers. While typical, undersized ports cause vent noise, power compression and low frequency distortion, our ultra-rigid drivers eliminate these problems and couple much more

THE HR824 ACTIVE MONITOR.

effectively with the control room's air mass. They achieve the equivalent radiating area of a 12-inch woofer cone, allowing the HR824 to deliver FLAT response to 42Hz with a 38Hz, 3dB-down point.

Third, the woofer enclosure is air-displaced with high-density adiabatic foam. It damps internal midrange reflections so they can't bleed back through the LF transducer cone and reach your ears.

The typical problem of small-monitor midrange "boxiness" is eliminated.



The High Resolution transitional wave guide. Film at 11 unavailable.

precisely match each transducer's actual output via electronic adjustments. During final assembly, each HR824 is carefully *hand-trimmed* to ±1.5dB, 42Hz-20kHz. As proof, each monitor comes certified with its own serialized, guaranteed frequency response printout.

The HR824's front board is 1-inch thick with "radiused" edges to further eliminate diffraction. An "H" brace bisects the enclosure for extra rigidity.

Mackie is the only active monitor manufacturer that also has experience building stand-alone professional power amps. The HR824 employs two smaller versions of our FR Series M•1200 power amplifier — 100 watts (with 150W bursts) for high frequencies, and 150 watts (200W peak output) for low frequencies. Both amps make use of high-speed, latch-proof Fast Recovery design using extremely low negative feedback.

Fig. C: Uneven fabric dome tweeter motion distorts high frequencies.

Fig. D: HR824 alloy dome's uniform, accurate pistonic motion.

Below: The HR824 Development Team. L to R, clockwise: Terry Wetherbee, Cal Perkins, Greg Mackie, David Bie, Paul Brengle, Jeff Hammerstrom, Dan Bonilla and Mats Jarlstrom holding P.D., our Over-20kHz Specialist.

A TRUE PISTONIC HIGH-FREQUENCY RADIATOR.

We scoured the earth for the finest high frequency transducers and then subjected the likely candidates to rigorous evaluation. One test, *scanning laser vibrometry*, gives a true picture of surface vibration patterns. Two test results are shown in the upper right hand corner of this ad. Figure C is a conventional fabric dome tweeter in motion. You needn't be an acoustic engineer to see that the dome is NOT behaving as a true piston.

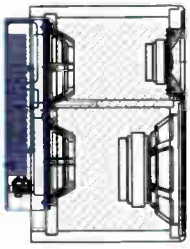


Figure D shows our High Resolution metal alloy dome at the same frequency. It acts as a rigid piston up to 22kHz, delivering pristine, uncolored treble output that reproduces *exactly* what you're recording.

INDIVIDUALLY OPTIMIZED.

You won't hear it from other manufacturers, but individual low and high frequency drivers can vary more than 10% in sensitivity due to production variations. Because our monitor is active, we can

HR HIGH RESOLUTION SERIES™
FR FAST RECOVERY SERIES®

TAILOR THEM TO YOUR SPACE.

Because control rooms come in all shapes, sizes and cubic volumes, each HR824 has a three-position Low Frequency Acoustic Space control. It maintains flat bass response whether you place your monitors away from walls (*whole space*), against the wall (*half space*) or in corners (*quarter space*). A low frequency Roll-Off switch at 80Hz lets you emulate small home stereo speakers or popular small studio monitors.

CONFRONT REALITY AT YOUR MACKIE DESIGNS DEALER.

We've made some pretty audacious claims in this ad. But hearing is believing. So bring your favorite demo material and put our High Resolution Series monitors through their paces.

If you've never experienced an active monitor before, you're going to love the unflinching accuracy of Mackie Designs' HR824s.

If you've priced other 2-way active monitors, you're going to love the HR824's $1498/pair price* AND its accuracy.

*$1498 suggested U.S. retail price per pair.

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AUDIO EDUCATION

WHAT I THINK WE'RE MISSING

BY PAUL D. LEHRMAN

Here we are at the annual Education issue of *Mix* and, surprise! I've got a few things to say. I mean, like many of you, I've been involved in education—giving it or getting it, at one level or another—for most of my life. But these days, I seem to be spending a particularly large amount of time and energy thinking about it because, as the saying goes, I never really wanted to be a college professor, but now I are one.

Astute readers (meaning those whose medium-term memory hasn't abandoned them completely) will recall that earlier this year, in this very column, I ran a lengthy (so long I had to break it up into two parts) transcript of a group discussion about education in the audio field. A lot of perceptive things were said in that group, but there was much more to talk about that we didn't get to. Like what *I* think. Because I was the moderator, I didn't get to do much talking in that group, outside of the occasional bad joke. So I'm going to take this opportunity to dissertate on what I think are a few aspects of audio engineering education that, at present, aren't getting enough attention.

KNOWLEDGE OF MUSIC

Even if you never make a record in your whole life, if all you do is edit vocals, record nature sounds or analyze distortion in a broadcast transmitter, a knowledge of music is crucial to success in audio. Music is, by one well-known 20th-century composer's definition, organized sound. The goal of audio engineering, no matter what aspect of it you look at, is the delivery of...organized sound. Music provides the best system we have for dealing with both the mechanics and aesthetics of sound. Learning music (not just as a listener but better as a player, and most advantageously as an ensemble player) involves analyzing and comprehending pitch, timbre, volume, and placement in space and time—just the things we need to know to make good recordings. All musical systems, especially (if I may be slightly less than P.C. here) the European tradition, provide powerful languages for un-

ILLUSTRATION DAVE EMBER

The First Name In Digital, The First Family In MiniDisc

MD Cart Series Recorders/Players *The DN-995R/990R recorders and DN-981F player offer all the advantages of MD without the conventional tape cart problems of wow and flutter or drop-outs and tape stretching. These full-function units provide audio and computer interface as well as a multitude of options, including synchronization. Optional "Hot Start" switchbox adds instant playback of any 10 tracks (DN-981F).*

The first name in digital, Denon has also become the premier manufacturer of MiniDisc products for broadcast and post production applications. Even the most demanding tasks of repetitive audio required by fixed installations are made easy and reliable with MiniDisc. Denon not only offers the most comprehensive line of MiniDisc products, they are totally committed to the further development of MD technology.

The MiniDisc format has proved to be the most convenient and reliable medium available. MD can literally be used millions of times without any signal degradation. The sonic quality is equal to Compact Disc and immensely superior to celluloid, while offering unsurpassed portability. More and more digital audio users are turning to MD for archival purposes.

From recording and replication to MD Carts and ENG MD recorders, Denon has a full family of products to integrate MD technology quickly and economically. Contact your favorite distributor and find out why Denon is the "first family in MiniDisc".

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derstanding and communicating these concepts.

Playing music is also a powerful discipline, and discipline is something that is required in the studio even if you're recording the most anarchic punk band in town. The skills that are learned in the course of a musical education, like which voice or instrument in an ensemble is out of tune, or whether two chords don't mesh or flow into each other, or whether a maraca is early or late, or whether one player in a group is too loud, are exactly the skills needed to run a smooth session, where the midrange ring of a snare drum might be covering up the vocalist, or the harmonics of a synthesizer patch are out of tune with the brass section, or the conga player isn't getting enough kick drum in the cans, or there's a buzz coming out of one of the 20 guitar amps in the room and you've got two minutes to find it and equalize it out.

Besides that, there's the empathy factor. If you're recording instrumentalists or vocalists, it really helps to know what they're up against. You don't necessarily have to be a French horn virtuoso, but if you know how the thing works, or better, how to make a sound out of it yourself, then when one starts to gurgle on a session, you'll know that there's condensation in the valve pipes and you can say, pleasantly and knowledgeably, "We're getting some water noise in the horns," rather than "Did someone leave the toilet running?" If you've ever sung on a recording, you'll know that when you serve coffee to a voice-over artist, chances are he won't want lots of cream—unless you're looking for a quick way to end the session.

If you play a woodwind instrument, you know that the sound of clarinets, bassoons and saxes does not emanate from the bell except on the lowest notes, and if you put a mic there, the pickup will be very uneven. If you play violin, you know that the sound of a good fiddle is much better from a few feet away than right on top of the bridge, and you won't stick a small-diaphragm condenser right on top of the player's nose, making her sound so tinny she'll wish she hadn't shown up. And if you play the guitar and a guitarist who's working on a really tricky solo breaks a string, you'll know that you should stop the session and wait for him to put on a new string and get it stretched out, rather than pull out a guitar the studio happens to have around and say, "Here ya go, do it on this, time's a-wasting!"

Perhaps most importantly, you'll know firsthand that playing music is a physical task, and people have limits on what they physically can do. If you've ever played an eight-hour gig, you'll have a much better handle at the end of a grueling session on whether it's worth trying "one more take," or whether the band has gone past the point of diminishing returns.

PEOPLE SKILLS

Audio is a very high-tech field, and it's also a high-glamour field. A lot of clients like the latter part, without understanding very much about the former. But they *think* they do, and that makes them dangerous. (The classic example, of course, is the girlfriend in *This Is Spinal Tap* who explains that a record didn't do well because the engineers "didn't use enough Dobly [*sic*].") Dangerous or not, however, you still have to deal with them. In a school situation, students are used to talking shop with their peers and instructors

who, to one degree or another, know what they're talking about. But in the real world, a client who asks for something to sound "less digital" probably hasn't got a clue about what that means, or what it implies. Do you, the engineer, immediately accede and transfer your tracks to the analog multitrack gathering dust in the corner, thereby wasting a couple of hours and driving up the tape cost several hundred percent, or do you rush out and buy a tube compressor and patch it into the mix, or do you just add some reverb?

When a client issues an order you don't agree with, you have to know what to do: Follow it to the letter, *pretend* to follow it to the letter, tell the client you can't do it and suggest something else, or pull out the lots-of-lights-and-knobs-but-it-isn't-connected-to-anything producer's busy box. The hardest, but ultimately the most useful response, is to try to find out what the client *really* wants, and translate that into something that makes sense for you. But that takes a skill most people don't have naturally, and to throw someone into a situation where they have to learn it on-the-fly, while they're learning everything else about the job, can be cruel. An educational institution can offer a unique opportunity to help students develop that skill by bringing in real-world clients—not just bands, but filmmakers, multimedia producers, and ad agencies—and exposing students to how these creatures work, think and talk. In some cases, students will immediately swear off the audio industry and go into something less stressful, like defusing explosives for the FBI, but better that should happen while they're in school than when they're in charge of a $300/hour session.

PROBLEM-SOLVING

There's no way that audio schools can keep ahead of the ridiculously rapid changes in technology that have characterized the industry over the past ten or 15 years. With 150 digital audio workstations on the market, each one with a completely unique operating system, and each one having an obsolescence cycle of about 18 months, for any school to try to offer even a hazy cross-section of the available systems is ludicrous. Industry players are fond of telling me, "XYZ is the hot system right now, and if you have any students who know it, they're guaranteed to get jobs!" in an effort to get me to buy an XYZ or two for my school. And they're probably right—except that next year, when XYZ Inc. is acquired by PQR Ltd. and the system suddenly disappears, if XYZ is *all* they know, those ex-students will soon be back out on the street and in their basements with the rest of the wannabe Hollywood sound editors, recording techno on second-hand ADATs.

What helps much more than teaching *how* these things work is to teach *why* they work the way they do. Systems, whether they're digital editing programs, MIDI sequencers, synchronizers, tape decks, signal processors, microphones or what have you, are designed to handle specific tasks and to solve specific problems. Teaching students how to operate them before they know just what those tasks and problems are, is putting the cart before the horse. "What do we want to accomplish?" has to be asked before "How do we accomplish this?" If they learn to think that way, then when they go into a commercial studio and

—CONTINUED ON PAGE 219

Recording School Success Stories

Graduates Making It in the Real World

It used to be that breaking into the recording business meant volunteering endless hours, months, perhaps even years of grunt labor in return for the chance to learn the board. You've heard all the horror stories: the guy who spent five years emptying garbage in order to become a second assistant...

Nowadays, these tales are becoming less common as audio education gains recognition in the industry. Alumni of audio schools are working their way up the industry ranks, and with enrollment on the rise, schools are turning out more graduates than ever. Employers now pick and choose from job candidates already armed with the essential skills, and more facilities are requiring a knowledge of the basics, even at the entry level. No longer is a willingness to work from the ground up (and a knack for operating a coffee maker) enough to get your foot in the studio door.

Audio schools run the gamut from month-long equipment seminars to postgraduate studies in audio engineering and acoustics, and each level of education has a different philosophy of preparing the student for a career. Some curricula offer extensive theoretical training; others offer more of a hands-on, practical education. Programs can be centered around learning technical expertise, or they can be structured from a creative perspective.

When choosing a school, it's a good idea to consider what aspect of the industry you want to pursue, and evaluate your time and financial commitment as well as set reasonable objectives. It's also helpful to talk to someone who has been there. *Mix* spoke with a group of audio professionals, all graduates of recording programs, to find out how going to school helped them reach their career goals.

BY SARAH JONES

ILLUSTRATION BY NICHOLAS VITACCO

TOM MCGURK

When Tom McGurk enrolled at the University of Massachusetts Lowell, he was planning on a career in audio, but his parents weren't. "I actually got accepted there to be an accountant. So I kind of snuck over to the music program; my mom told my dad a year later that I was in music school."

No doubt they've since forgiven him; he graduated in 1990 and later secured a job as composer/sound designer at Bad Animals/Seattle, where he recently won an Emmy Award for his work on *Bill Nye the Science Guy*.

McGurk graduated from UMass Lowell's sound recording technology program, an education he sees as consisting of "half music, half engineering—kind of an amalgamation of both. I really liked it because it gave me technical aspects but at the same time, it addressed the creative side of what most engineers have in them, which is the love of music."

McGurk says that one of the most valuable aspects of his education was the discipline that came from studying in school. "I remember thinking, 'What am I making graphs of reverb times for?' But man, half that stuff you don't even realize you know until you're working with someone who doesn't know it, who's also an engineer; and they have to adjust the parameters and you see them going through the pages, trying to hit a button and see if it works, instead of really knowing what's going on.

"Music theory was also immensely helpful, even in places you wouldn't think it would be," says McGurk. "I remember working for this one person—we were editing some music, and they had to edit a cut down to 60 seconds, and I'm sitting there keeping my mouth shut, because he wasn't landing it on the downbeat when he was making an edit, and he couldn't figure out why it didn't sound good.

"As far as vocational tech goes, it's one of those things that if you devote yourself fully to it, you're going to become really incredible, because they get a chance to use some really great equipment. But still, a lot of the people I know who are good at that, also on their own initiative are here at midnight learning new gear. I think that school weeded out a lot of people who really didn't have the dedication that you need to be able to succeed. Because you have to be really hungry."

GARY RIZZO

Gary Rizzo's career has been on the fast track. He graduated in October 1993 from a 53-week audio program at Full Sail Real World Education in Winter Park, Fla., and was hired immediately at EFX in Burbank, Calif. through his school's placement services. When EFX booked Lucas Digital's Skywalker Sound to work on *Disclosure*, they brought Rizzo. The Skywalker staff noticed him working to make sure the project ran smoothly and were impressed by his ability. "Six months after that project they decided that they wanted an assistant on the stage, and they gave me a call, so I jumped at the opportunity," Rizzo says. He is now a mix assistant at Skywalker Sound on the feature film stages, where he works with film rerecording mixers to combine editorial units in the final mix stage.

Rizzo attributes his job success to the real-world career preparation he had in school. "That was really the big payoff of Full Sail for me—the placement department and the faculty. The faculty had the knowledge and professional experience, so it wasn't like you're just talking to a teacher—you're talking to people that actually have done it."

However, like many audio professionals, Rizzo places an emphasis on hands-on experience. "Full Sail was the diving board that I jumped off of. Granted, the best education you can get is on-the-job training. I chose Full Sail because I thought it would offer me more of an opportunity to actually get the practice to do it hands on. I figured, four hours of lab a day, that's the closest thing that I can get to on-the-job training."

Rizzo's advice for those aspiring to a career in audio for film is to start early. "If you want to get involved in film sound, get a rock-solid audio foundation," he says. "Study movies, rent a lot of videos and listen to them with a critical ear. Listen to these movies, because the more that you know about what you're listening to, the more qualified you're going to be when you get on the stage to determine, 'Well this is right, and this is wrong.' Find out what good dialog sounds like, what bad dialog sounds like; find out what you like. It's in your heart. That's what it's really all about."

ANGELA PIVA

Angela Piva's name is well-known in the recording industry. She and her partner, Roey Shamir, run INFX Productions in New York City, where Piva is a mixing/recording engineer, producer and writer; her credits include Toni Braxton, Groove Theory and Michael Jackson, and the Naughty by Nature album she engineered and mixed, *Poverty's Paradise*, won a Grammy for Best Rap Album. Piva arrived in New York in 1986, after she graduated from Berklee College of Music's music production and engineering program, which was a new degree program at the time. Starting as an intern at Unique Recording, she eventually became staff engineer, and a few years later went freelance before starting her own production company.

Piva selected Berklee after considering various universities. "I was a musician at heart, and I heard so many good things about Berklee, and when I checked out what they were offering, it seemed perfect for me. I didn't necessarily go to Berklee thinking 'Oh, I'm going to be an engineer'—I was really a musician, and I was just exploring different opportunities. It's funny how things work out sometimes—you find out what really is right for you. It's not the easiest thing to do in the world when you're 17 years old and trying to find out what you should do in college or as a career."

At school, Piva came to appreciate the diverse student community. "Berklee was a great place to be, because even technically and engineeringwise, their [recording] program worked hand in hand with the rest of the school," she says. "There were so many different talented musicians, and a lot of the people that I went to school with are now working in the business with me. We've stayed in touch and consult with each other about different things.

"But I would definitely be lying if I said that you have to have a degree to work in this business, because the opposite is totally true. You could do it just as well without it. Some people don't go to school at all; you could go to a short audio program for six months or a year, or you could actually go to a college, like Berklee. It just depends—you have to decide how much time and money [to spend] and what your goals are.

"It's really working in the business," Piva says, " working in your field, where you start to hone your craft. Those basics in the back of your mind, that you don't have to think about—that's what school was good for, for me."

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GENE RADZIK

Many college graduates would envy Gene Radzik's career pace so far. He graduated from Middle Tennessee State University (Murfreesboro, Tenn.) in May, worked a few odd jobs in Nashville studios and by July, landed a job at Dolby Laboratories in San Francisco. As Dolby Surround production assistant, he performs product demonstrations, assists on trailers for video games, movies and new technology, fields technical support calls and works on the cataloging process of Dolby's film and videocassettes.

"MTSU has a well-rounded program—the emphasis is recording and new technology, but you also get the background of the business side, classes like copyright law, business law and legal problems, so you get a 'behind the scenes' look at the industry before you actually step in, or like I did, jump in headfirst."

Radzik was also able to customize his education to meet his own needs. "You take your basic core classes—survey of the recording industry, history of the recording industry—and you go from there and specialize," he explains. "I picked a bit of everything. I felt the need to have an electronics background, some film-related classes, multimedia classes. I think it paid off as far as my understanding of how the industry works.

"I think what has benefited me most," says Radzik, "is my knowledge of new technology, and hands-on experience at MTSU—we were given quite a bit of time, and all of the studios are loaded with the latest gear. So you get a feel for different manufacturers, and different designs and different schematics."

BRYAN CARLSTROM

Bryan Carlstrom, one of the earliest graduates of the Los Angeles Recording Workshop, has been out of school for 11 years. For the past six of them, he has been engineering for producer Dave Jerden during which time he's worked on some 26 records, including Alice in Chains' *Dirt* and albums by White Zombie, Anthrax, 4 Non Blondes and Public Image Ltd. Before that, he spent some time on his own and at Capitol Records. In addition, he's currently managing the band Offspring.

Sometime in the '80s, Carlstrom was tossing around different career ideas, when he says he came upon an inspiration. "I was in a bookstore and saw *Mix* magazine. I still remember the cover. I was a musician, and I was really interested in electronics, and the cover just grabbed a hold of me. It happened to be the issue that listed all of the schools in Southern California. And I found the Los Angeles Recording Workshop, and the reason I picked it was because it was by far the cheapest. So I got into the program, and I just seemed to have an aptitude for it."

When Carlstrom attended the Recording Workshop, the classes would travel to area studios in order to practice on equipment. "When I went there, the school had just started, so it had no facility at all," he says. "It was really just a little room with a blackboard, and the program was only ten weeks long. But it taught you the two most important things, which were tape machine align-

ment and studio signal flow. Those are probably the two most critical things that you need to know to get an entry-level position in a studio."

Carlstrom stresses the importance of learning in the field by working with seasoned experts, in real-life situations. "The real education for engineering," he says, "is getting the second engineering job in a good studio and standing behind great engineers and producers, and watching what they do and seeing how they're making decisions based on what they're hearing, because that's where you're going to learn the meat and potatoes of making records. I've always recommended people go to a school where they could get some of the basics, like signal flow, tape machine alignment, things like that, and then get a job in a recording studio as a second engineer, so they're getting paid for their education instead of paying for it. I can definitely see attending the longer educational programs if you want to go into working in movie studios and places like that, where you're going to have to start off knowing quite a bit. In schools, you have good instructors who know what they're doing, but as far as really great producers and engineers, they're probably going to be going out making money with their talents."

JONATHAN NULL

Jonathan Null knew he wanted to work at George Lucas' company years ago; he was inspired as a child when performing small acting parts in *Willow* and *Tucker*. "I wrote them a letter when I was 13 or something, one of those letters that said 'I'll do anything, I'll sweep the floors up there. Just give me a chance,'" he remembers.

When Null graduated from the University of Colorado at Denver in 1991, he worked for two years at Saul Zaentz Film Center in Berkeley, Calif., starting as an intern and moving to assistant, editing and assisting post-production audio on a few documentaries, and feature films like *Species* and *Johnny Mnemonic*. His chance to realize his dream finally came when the sound team was working on the final mix for *Species* at Skywalker Sound. Null ended up working there as an ADR assistant editor on *Jumanji* and *James and the Giant Peach*, and he is currently employed there on projects as first assistant.

Back in school, Null started out as a music theater major. "Basically my dad said get a job or go to school. So I took the latter and I got a scholarship to sing opera at the University of Colorado, Boulder." At school, he spent much of his time doing sound reinforcement for bands at local bars, and playing in a couple of bands. The turning point came when he got involved in a student film project, a movie called *Alfred Packer, The Musical*, a "musical comedy about cannibalism," he says. "I ended up doing location recording—we shot for a month in the Rockies, in the middle of winter in avalanche country; there were 30 of us with snowshoes trying to set up the table with the Nagra and the sound equipment in ten-foot banks of snow. After that experience, I decided film was the way I wanted to go."

He then transferred to the music engineering program at the University of Colorado at Denver. There he learned some of the audio basics he didn't already know. "One of the really important things that I did was get a job working in the music studios at school," he says. "I would spend hours in the studios experimenting, working on my own projects. That's basically where everything that you need to

know in the business was. The whole reason that I got hired at Saul Zaentz and Skywalker was because I had so much hands-on experience."

RANI HANCOCK

Since 1992, Rani Hancock has been the associate director of A&R administration at Arista Records in New York, where she manages various stages of the recording process for Arista artists. She graduated from Berklee College of Music in Boston in 1991, worked for a while as a production coordinator in Los Angeles, then migrated back east for the job she has now. In her spare time, she records in her own studio, which is equipped with a Mackie console, ADATs and "all sorts of fun things," she says.

Hancock's training as an engineer is vital to her job, she says, "because basically we're taking care of making records here. So I need to know all about the studio process, and what a producer does, and what an engineer does, and what the difference is between a 2-inch tape and a half-inch tape, and what that means, if there's Dolby on the tape, all those things."

When Hancock was researching universities, she had audio production in mind. "I was looking specifically for an engineering program, and I did pick Berklee for that reason," she says. "I was a music production and engineering major, and my focus was primarily on the engineering classes; I got into the studio as much as I possibly could. And at Berklee, you have to be a player as well, and take harmony and theory and arranging. I definitely wanted a bachelor's degree when I came out, and the people that I work for here would not have hired me had I not had a bachelor's degree. They're picky about that, because they need you to have pretty strong writing skills and communications skills.

"The thing that was beneficial about Berklee is that they didn't teach you: 'If you hit this button, the sound will get louder.' They taught you signal flow and structure, and why things happen. And then you can figure out how to make it happen. I think because of that—real practical thinking—and learning the nuts and bolts of why and how things happen, it's really easy to figure out anything new that's coming out. Even though I got to know specific pieces of gear there, and specific techniques for doing this and that, I learned the theory behind how they work, and can then turn around and use that for any kind of new technology, or any new practices that I have. Also having trained my ear as a musician was really very helpful, because I've become the resident sample expert at Arista; whenever they need somebody to listen to a sample or maybe a copyright infringement issue, they give it to me.

"I think school was overall a very good experience, as far as establishing relationships with people; just about everybody I knew there has graduated and gone on to working in the field, and that's been a great networking system. If you need help on something or need a contact in some certain studio, there's a Berklee grad almost everywhere. A Berklee grad hired me, and I just hired a Berklee grad."

MELISSA GENTRY-ELLIS

In the four years that Melissa Gentry-Ellis has been an engineer with Advantage Audio in Burbank, Calif., she's won three Emmy Awards and two Golden Reel Awards. The Emmys were for dialog editing on the *Back to Future* animated series, and for both dialog editing and re-recording mixing for the *Aladdin* animated TV series. She won the Golden Reels for her work on *Bonkers*, a Disney animated series, and for dialog editing on *Spiderman*. It's hard to believe that seven years ago, she was just learning the ropes.

Gentry-Ellis had a deep interest in music when she arrived in Los Angeles from North Carolina in 1989; even though she had two years of a university business program under her belt, she wanted to "have a career where I could say I loved my job," she says. She had thought about a career in recording, but she wanted to learn the basics, to find out if a job in audio was for her. "I started looking for something that could explain to me more of the engineering—the whole concept of sound," she says. She was flipping through *Rolling Stone* magazine when she saw her opportunity. "I saw an ad for the Los Angeles Recording Workshop, and I gave them a call and they sent me all of the information, and that's when I just decided to go try the Workshop. I took the program, ten hours a day, six days a week. And it was basically learning about music, the whole mix process, editing, signal flow, etc."

> No matter how much education you get, in this industry you're really expected to knuckle down and prove yourself.
>
> —*Andrew Garver*

Through placement at the Workshop, Gentry-Ellis got an interview at Hanna-Barbera, where she worked for a year as engineer for the music department. She then went on to DIC Entertainment, another animation studio, and got more involved with the music and dialog editing process. "It was everything I learned at school, so it really helped," she says. "It was running tape machines and doing splicing, and I got exposed more to the editing post-production part of it, and I hooked up with some guys that were opening up a studio, which is where I work now, and I've been here ever since." In addition to doing re-recording mixing and dialog editing, she now supervises two other dialog editors.

Gentry-Ellis says school gave her a solid foundation to build upon in any audio career. "A lot of places, when you finally get to a studio, it's almost like they don't want you to know too much because they want you to do it the way that they work," she says. "But you need to know the basics, if you know what you want to hear, how to create what you want to hear. School opened up that world for me. I built on that with the experience you get from working. Which is, I think, what they wanted me to get out of it—they wanted us to take what we learned and then add to it."

ERINN THORP

After Erinn Thorp graduated from the

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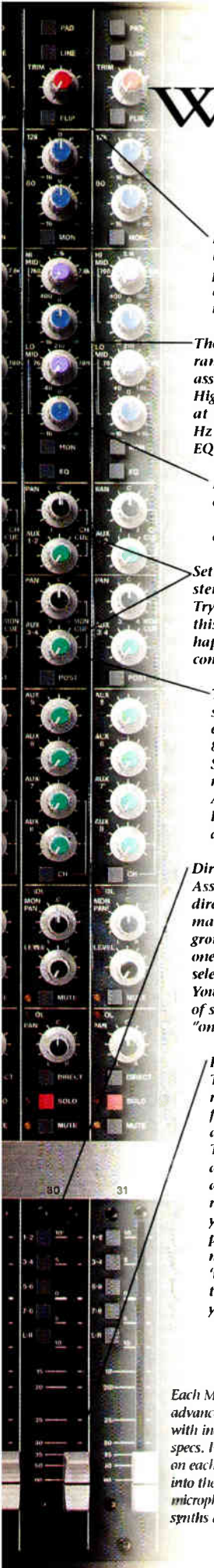

Balanced mic and unbalanced line inputs with phantom power and 20dB pad accommodate the widest range of input signals.

The only console in this price range with true Split EQ, each assignable to monitor or channel. High-frequency shelving control at 12 kHz, low frequency at 80 Hz for smoother, more musical EQ results.

Dual sweepable mids on each channel let you apply 16dB of boost or cut at critical frequencies.

Setting up two independent stereo cue mixes is no problem. Try this with other mixers in this price range, it just won't happen or you'll have to compromise something.

The most versatile AUX section in its class; rivaling expensive high-end consoles. 8 sends total, 2 in stereo. Send signal in stereo or mono, pre- or post-fader. Available all at once. Return signal through any of 6 stereo paths.

Direct channel input switching. Assign to one of eight busses, or direct to tape or disk, or to the master stereo bus. Because the group and direct-out jacks are one and the same, you can select either without repatching. You won't find this kind of speed or flexibility in a "one-size-fits-all" board.

Feel those 100mm faders! Turn those smooth and responsive knobs! They feel and work better than any other in its class. The M-2600's physical design takes the aggravation out of recording and lets you focus on the process of creating music. Everything is 'right where it ought to be'. Try it for yourself.

Each M-2600 channel features advanced-design mic pre-amps with incredibly low-distortion specs. Plus you get phantom power on each channel. Feed anything into the M-2600 from condenser microphones to line input from synths and sound modules.

For your personal or project studio, don't settle for anything less than a dedicated recording console. Some may try to convince you that a "multi-purpose mixer" works fine for multitrack recording. But don't take their word for it. The compromises, hassles and workarounds just aren't worth it.

Want proof? Ask your salesman how a multipurpose mixer handles these common recording situations. But listen carefully for workarounds, repatching schemes and other compromises. Then compare it to how easily the M-2600, a *true* recording console, sets up and does things.

SITUATION Separate headphone mixes for the talent and the producer. The talent wants a reverb-wet mix, but the producer wants it dry. Everyone wants it in stereo.

Compromise: Multi-purpose mixers require you to sacrifice 4 AUX sends and tape returns to get 2 stereo headphone mixes; but you need those sends/returns for outboard effects! What a dilemma.

M-2600 Solution: With a few buttons, assign up to two, independent stereo AUXs to be used as headphone mixes. Everyone hears the mix they want — and you've still got four AUX sends and returns free for signal processing gear.

SITUATION You're EQing tape tracks to get just the right sound. You're using the shelving EQ for the monitor mix, and the sweepable mids for the channel buss. Still, the drummer wants a certain frequency out of his mix — a job for the sweepable mids.

Available with 16, 24 or 32 inputs, the M-2600 is optimized for digital recording. Don't wait till your first session to discover the compromises and hassles other boards will put you through.

Compromise: Few multi-purpose mixers have EQ assignment. You're stuck with the shelving EQ on the monitor mix, and the sweepable mids on the channels *(if they even have split EQ)*. You've got no choice. Good luck trying to explain this to the drummer.

M-2600 Solution: Assign the shelving EQ, the sweepable EQ, or both to either the monitor or channel buss as necessary. The entire EQ section is splittable and assignable and can work in tandem.

SITUATION Mixdown. You're sending tracks to effects units for added studio polish. You want to take advantage of true stereo effects. How do you do it?

Compromise: Most multi-purpose mixers have fewer AUX sends than the M-2600's eight. Usually only in mono. And, some sends are linked, so you can't send them to different signal paths. So you settle for only a few effects, or forego stereo effects altogether.

M-2600 Solution: Pick one: 8 mono sends or 1 stereo and 6 mono sends or 2 stereo and 4 mono sends. Each with its own level control and separate output jack. So you can use true stereo effects and still have sends left over for effects. Send the effects signals back via 6 stereo returns.

That's not all! The M-2600 doesn't compromise sound, either. You'll appreciate the new TASCAM sound — low-noise circuitry and Absolute Sound Transparency™. It all adds up to the perfect console for any personal or project studio — combining great sound with recording-specific features you'll need when recording, overdubbing and mixing down. Features you can get your hands on for as little as $2,999 *(suggested retail price for the 16-input model)*.

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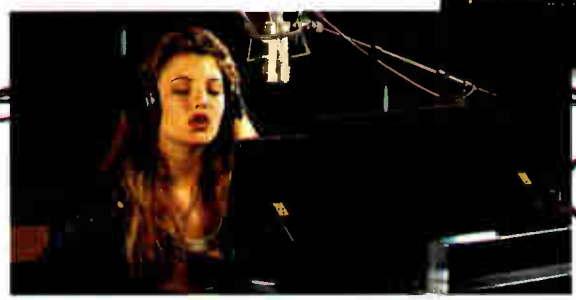
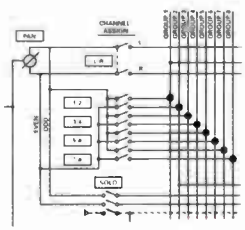


The incredibly flexible design of the M-2600 means signal routing is versatile and accomplished by the touch of a button, instead of a tangle of wire. Our decades of mixer experience has resulted in an ergonomic design that's exactly what you need: a board that speeds and facilitates recording and mixdown. Everything is where you intuitively think it should be. Dedicated solo and mute indicator lights on every channel, on master AUX sends, stereo returns, and each of the 8 busses so you always know exactly what you're monitoring. Plus, SmartSwitches™ protect you against redundant or canceling operations.



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University of Miami's music engineering technology program in 1995, he worked as an intern at Crawford Post in Atlanta. A few months later, after he helped install equipment in some of the studio's new rooms and renovate some of their existing rooms, they were ready to hire him on. Now he's employed there full-time as an "audio engineer/technician/technical support-type person," as he summarizes it. He is one of two engineers who maintain many of the studio's editing suites, "which is something I'd been doing at school," he explains. "I actually started doing tech work for the studios there, as work-study and as part of a workshop class where the students

actually have to take care of all the recording studio equipment."

In addition to teaching the hands-on skills that helped him land a position at Crawford, Thorp's school offered flexibility in choosing an emphasis of study. "The program that I was in," says Thorp, "was a bachelor of music with a minor in electrical engineering. Then, your core classes are recording-related—recording studio acoustics and basics of signal theories. You could really specialize in a number of areas—you could come out ready to become a DSP programmer, or maybe more an analog design person. You could spend all of your time doing classical recording and become a real expert at that, or conversely, you could spend all of your time doing pop and jazz-oriented recording. I tried to concentrate on a little bit technical, but I also tried to have fun and tried to take a lot of jazz electives, just because that interested me and that happened to be there at school."

Thorp found that the university experience prepared him much more on a theoretical level, as opposed to the practical groundwork many trade schools lay. As a college graduate, he says, "I think you almost feel you're not any better off at first because you didn't have as much practical experience. I think when you come out of a program like that you're very raw—there's a lot of potential but it hasn't been channeled yet. And that's one of the hardest things at first, applying a lot of the things that you've learned. But I think the thing that you get is you learn how to learn, which is important if you want to go beyond just the basics. With a broader-based education, you are given tools that allow you to go beyond the shift from the university-type experience to suddenly working. It's a big jump, and I have a feeling the trade school people might have an easier time making that adjustment at first. The trade schools seem to be very in tune with what the entry-level person needs to do, and they seem to be more ready initially to do that kind of service for these studios, although I think that graduates of longer, more extensive programs do better in the long run.

"I thought when I went to college I was going to get out and be a recording engineer, whatever that means—probably music," Thorp says. "I think it was fortunate that I went where I did and I was able to gradually change my direction. If you know you want to do audio but you're not sure you want to do any specific thing, I think a program with a lot more options provides you with a chance to pick a direction as you go."

ANDREW GARVER

These days, Andrew Garver is a mastering engineer for A&M Records, where his projects include Soundgarden and The Bodeans; but back in 1987, he had

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just graduated from college, with a degree in electrical engineering. Garver was always interested in audio and was looking to get into audio equipment design, but "Bills and all of those sort of things showed up first, so I took a more lucrative engineering job designing test equipment," Garver says. He got a job as an applications engineer at Teradyne, where he worked for seven years, designing test equipment for telephone companies. He eventually decided he wasn't going in the direction he wanted, so he decided to go back to school, and enrolled in a 15-week course at the Conservatory of the Recording Arts and Sciences (CORAS) in Phoenix, Ariz., to learn the basics of recording technology.

One of the things that attracted Garver to CORAS was a combination of hands-on experience and theoretical information he would get there. "The teachers were all still working in the industry, so they brought a lot of current knowledge to the table, as well as all of the past mistakes that they've all made, so that we wouldn't go out and look foolish making the same mistakes."

More importantly, says Garver, he knew that the school's intern program would help him make a sucessful transition into his career. "The thing that drew me to their program over others," he explains, "was that CORAS requires an internship, and they've got a great staff that help you get placed at studios, which is a great way to get your foot in the door. Their staff will actually contact the studio for you and make sure you get placed. They've got a great rapport with a lot of studios."

Garver interned at A&M Records for only two months before being hired on. He attributes the speed of his success partly to the solid foundation he got in school and built up while on the job. "I think the best thing that the courses gave me was a basic knowledge of how recording is done. We went through the signal path, how things are set up—and why—all the basics that you need to do recording. So when you get to the studios, you don't have to learn the basics, you just have to learn how that particular console works, or how they have the room set up. It allows you to move up that much faster."

There is a flip side to having an education, says Garver. Many people come out of programs with the idea that they've already learned everything they need to know, "which is almost the biggest danger that you could have, because you really come out knowing what terms are and how things work. You don't know how everything is being used.

"No matter how much education you get, in this industry you're really expected to knuckle down and prove yourself," Garver says. "It's odd—that in any other business they'll let you fly right out of school, but in recording there are so many people out in it, doing it, that you have to go above and beyond what everyone else has done before you, to prove that you've got the stuff to last." ■

Mix assistant editor Sarah Jones has bachelor of music degrees in sound recording technology and music business from the University of Massachusetts Lowell.

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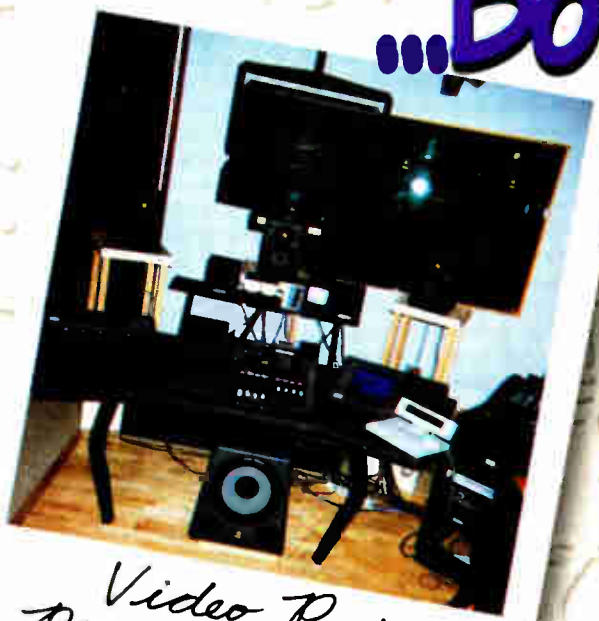

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RECORDING HORNS

PHOTO: BILL SCHWOB

BY RICK CLARK

Few things in popular music can elevate a track to new levels of excitement and richness like a well-placed horn arrangement, solo horn punctuation or lead ride. It would be hard to imagine many of the greatest pop, rock and R&B tracks of the past forty years without the key horn parts that drove them. This month, *Mix* talks to three great engineers and two legendary horn section leaders about how they capture brass parts. We've also taken the liberty of including the saxophone (a woodwind instrument) in our discussions, because it is crucial in the sonic chemistry of a typical horn section.

Mix would like to thank Greg Adams,

the Number One position on the R&R NAC charts for five weeks. Adams remains in high demand for his inventive horn and string arrangements, as evidenced on recent albums by singer/songwriter Lyle Lovett, Japanese superstars Dreams Come True and jazz/blues artist Dianne Schuur. These days, Adams' horn section generally consists of Chuck Findley (who plays trumpet on the Tonight Show), Gery Herbig, Nick Lane, Brandon Fields and himself.

"There are tried-and-true microphones that work well with horns," Adams says. "My favorite mic for trumpet is an RCA 44—the big old behemoth. It's real warm and personal, and it expresses well.

"On my solo record, I played a lot of Harman mute. We used an Audio-Technica version of a 57, and it sounded great. Ken Kessie, who is my producer, didn't even use the room sound for those parts. With a wind screen or foam pad in front, it was like I was pushing against the mic, just to get all of that lip and the mouth noise. That was part of the whole performance. We are not talking about acoustics here. It was just about capturing the sensuality of the instrument itself.

"I liked it because it sounded intimate like the way some of the old Miles Davis stuff sounded. I think that the way we did it, we took it a step further and put it right in your face. When you listen to my record, it comes across almost more like a voice than a trumpet.

"If we are performing in a really dry room, we will say, 'Wet it up and get some reverb going on in the 'phones.' We want to sound like we are making a record. It's a role that we are playing, and we are adding to the whole tapestry of the song. Even if we are recording in a nice big live room and the engineer is using that room mic ten feet above you, you may not be hearing that room sound in the 'phones. You may only be hearing the direct signal from the individual mics, which are like a foot or two away and you are not getting much slap off of them. A little reverb goes a long way, if you are not getting that from the room. We will always ask for stereo 'phones, but inevitably, everybody will have the left or right side of the 'phones off just a little bit to hear the room. It always seems to be that way.

"You depend on the engineer to give you a good balance of the horn section in the stereo 'phones, along with the track. You should be hearing enough keyboards or guitar for the pitch and drums for the time. The vocal is always important, because that'll help you find a spot on the tape, if you have to stop and go back and punch in for a lyric cue or something like that.

"There are engineers who stand out in my mind as really taking time to make it all work for horns. Ken Kessie, Al Schmitt and George Massenburg are engineers who really take the time to do it right. Another engineer I like a lot is Russ Kunkel's son, Nathaniel. He has done the last two Lyle Lovett records, which I worked on. He is a brilliant up-and-coming engineer.

"Probably my favorite room is Studio A at A&M in Hollywood. It's a big room and there is a lot of wood. It has a great vibe and I have worked there for years. It just seems to always be there. Capitol A, Skywalker and Conway are great rooms too."

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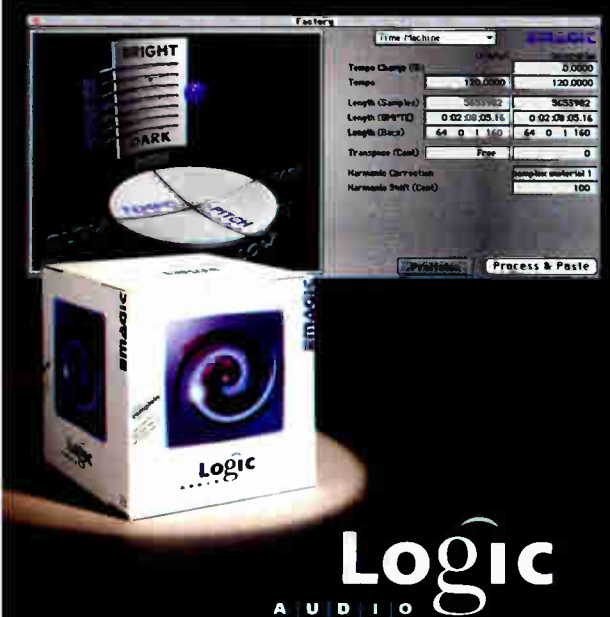

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RECORDING HORNS

JEFF POWELL

B.B. King, Afghan Whigs, Jolene, Bob Dylan, Primal Scream, Stevie Ray Vaughan and Sixteen Horsepower are among the many artists who have benefited from Jeff Powell's engineering expertise. Powell, who is mainly based at Memphis' legendary Ardent Recording, has recorded more than 20 albums with the Memphis Horns (see Wayne Jackson's part below for more on their sessions), as well as sessions with B.B. King's big band.

"I generally don't like compressing horns to tape. I know a lot of people do that, but if you are not very careful, you can thin out the sound and squash the dynamics, which I try and bring out as much as possible. I like the little things that are swelling in and out, going from inaudible to the mighty sound that they can have. I think it's very important to keep as much of that as possible, and you need to get as much of that to tape as you can.

"The Memphis Horns are a lot of fun to work with, and they definitely have a formula on how they stack their parts. They usually do a pass with just the sax and the trumpet. Then they double that and either switch parts, do a harmony or double a part. They do all head arrangements on the spot. Then Wayne [Jackson] adds a trombone to it. He usually plays the bari sax line, or something similar to that. With the trombone, it's really the glue that holds it all together. It's really cool, and it's an instantly recognizable sound.

"Typically, I would use an M249 on Andrew Love's saxophone. It is an old tube mic, and it's really warm-sounding. It does a good job of capturing the air around it. I don't ever mic it directly coming out of the bell. I'll put it off the side a little bit, to the side where the keys are. It's also back a ways, about a foot-and-a-half to two feet away.

"On Wayne, I will use a U87, or sometimes a 414. I usually have to pad it with him, because he is really strong. "I usually don't EQ the horns at all. I move the mics around until I get the right sound. I usually go straight to tape with them. I just keep my finger on the 'trigger,' on the channel fader, as it's going down. If I compress anything, that is how I do it! They play very dynamically, but I've worked with them so

Andrew [Love] and I prefer to work in a live room that has a lot of ambience or natural echo, so that to our ears, we sound wonderful. —*Wayne Jackson*

many times that I have a feeling when it's about to go up...or when I need to pull it back a little bit. That's how I keep it within the realm and get it to tape at the right level.

Sometimes, if I have the luxury of enough tracks, I will cut them each to their own track. If not, I will take the time to get the blend of the trumpet and the saxophone to one track, and then when we double, it's the same kind of thing, and I try to blend it really well. They work very fast, and you've got to be on your toes, because they will do head arrangements.

"They're really very good about vocalizing their opinions about how something should go. They'll do whatever you ask them to do, but they're very helpful sometimes, like 'I don't know if that part needs to be there. I don't really think that we need to play there.'

"They will go through the song and say, 'Let's do all of the choruses. Let's back up now and get all of the verses.' You've got to make sure that you don't run into the other parts. It isn't like going from top to bottom with a song. You pretty much have to memorize the licks of the songs as they are playing them. It always helps to have a good assistant looking over your shoulder, saying 'They want the third ba da bomp bomp.' You've got to be able to get back there and punch that one place.

"Generally, I've have the most success when I've just used three tracks. They sound very full and definitely have their own sound. Their instruments sound great, too. Like anything you record, the quality of the player and the instrument make a huge difference.

"For the trombone, I usually use a Neumann U47 FET. I have that mic set up to the side, so Wayne actually points at the trumpet mic, when he is playing trumpet. Then he sets it down and grabs the trombone and points at the trombone mic, off the side a bit. He actually turns around sideways in his seat, and plays pretty directly into the bell. Sometimes I will stick in an extra room mic farther back and get some extra ambience. I might use a 67 or a 249. Andrew and Wayne are very good at listening to each other and blending. They are among the very best at doing that.

WAYNE JACKSON

Mention the Memphis Horns to anyone who has paid attention to pop music over the past thirty years, and the raw, sensual immediacy of recordings by Al Green, Sam & Dave, Otis Redding, and Rufus and Carla Thomas come to mind. Wayne Jackson and Andrew Love, founders of this revered two-man ensemble, created a sound that has been the blueprint for great tracks with inspired horn charts. Since the Horns' classic mid-Sixties dates, Jackson and Love have played on more than 300 Number One hits, including releases by

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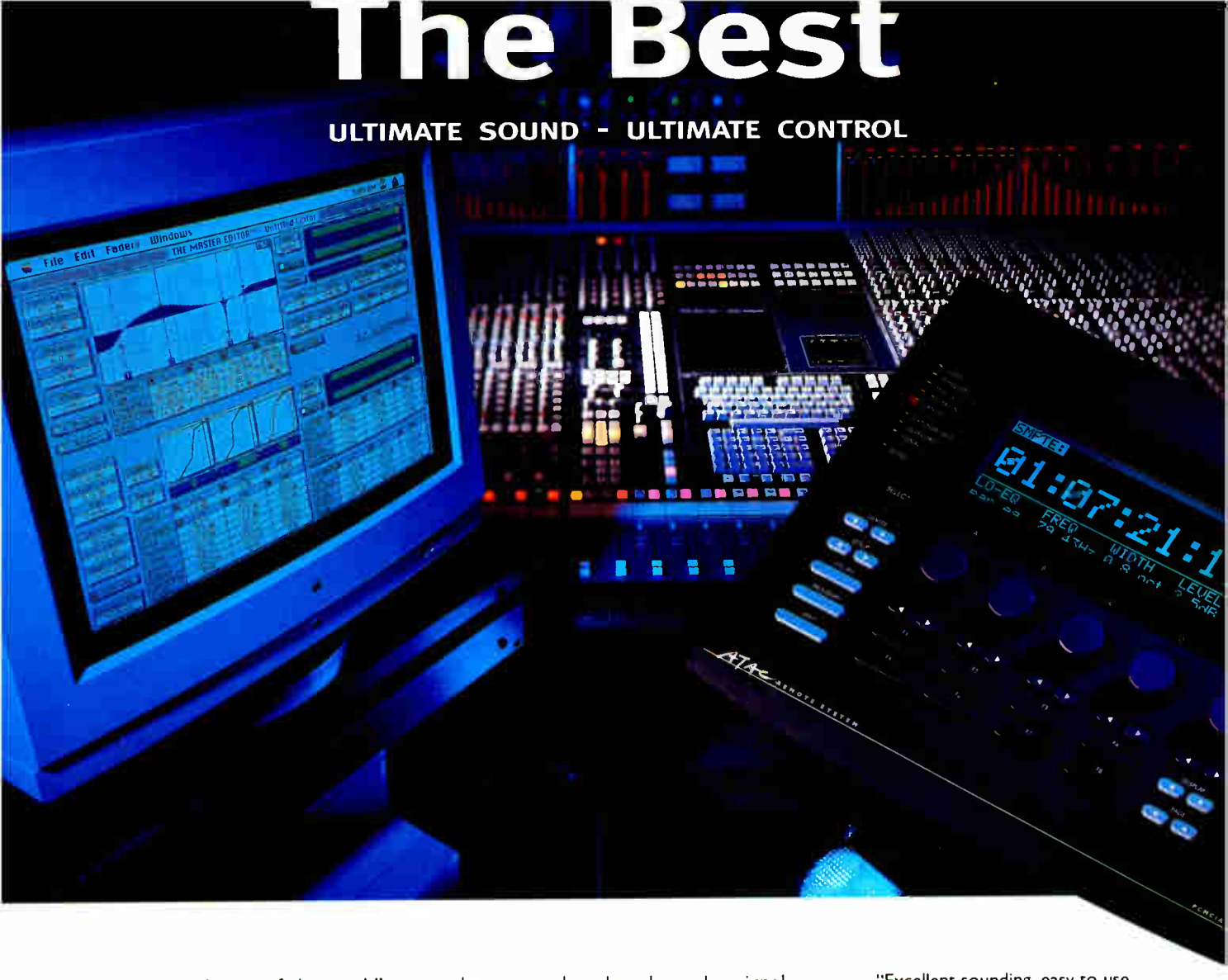

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RECORDING HORNS

Elvis Presley, Aretha Franklin, Rod Stewart, Sting, Jimmy Buffett, the Doobie Brothers, Fine Young Cannibals, Neil Diamond, Dionne Warwick, Willie Nelson and many others.

"My philosophy is this," Jackson says, "if it's not happening on the floor, it can't get on tape. If it's happening on the floor, then there is little you can do to screw it up.

"The ambient room sound is important to me when we play. Andrew and I prefer to work in a live room that has a lot of ambience or natural echo, so that to our ears, we sound wonderful. If an engineer deadens something behind us, that's okay. It's what bounces back from the wall in front of us and above us that is probably what we hear the most.

"Andrew and I prefer the Neumann U87 microphone for trumpet and sax. That's the microphone that has been giving us the sound we like since back in the Stax Records days. It's a timeless microphone. For trombone, I like the old RCA ribbon mic. It gives it sort of a splatty sound, but not too much.

"We have a technique that we have worked out for overlaying horns that involves overlaying three tracks in sequence: trumpet, tenor sax, then trumpet, tenor sax and finally slide trombone. We do that very quickly.

"We have to have an engineer who is attuned to the process that we use, because we will listen to a song and at any moment either one of us may hear a part that needs to be in the track; we stop the tape and we stack all three parts to that little section immediately. Then we go through the song and find all of the sections that are just like that and do all of the same parts, because we have the phrase fresh in our minds and we are hot on that phrase. So we do all of them at the same time.

"We may come back and do the first one take again, because by the time we reach, let's say, the fourth chorus, we are hotter than we were when we did the first one; so we will go back and redo the first one. Then we will go through the song and find another part that we like, whatever pops out of either one of our minds, and do the same process. The intros and the endings are usually spontaneous and inspired.

"Andrew and I are big on unison parts, because unison is powerful. We

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SPIRIT

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do harmony parts, but normally, on the first track, we always do unison. On the second track, we put on harmony parts and then the final harmony comes with the trombone track. Still, it all just depends on the song."

SHELLY YAKUS

Shelly Yakus learned under the great Phil Ramone and made a name for himself, from 1967 to 1978, at the New York Record Plant. In 1978, Yakus went independent, working on Tom Petty & The Heartbreakers' classic commercial breakthrough album, *Damn the Torpedoes*. Just a few of Yakus' other credits include John Lennon, Van Morrison, Don Henley and U2. Most recently, Yakus has been working with Edgar Winter and John Hiatt.

"The last thing that I did [with horns] was Edgar Winter and the White Trash Horns. Edgar played baritone sax, and then there was a tenor sax and a trumpet. It was a three-piece section. You have to make sure that it sounds right when you are recording the horns, or you won't get anything worthwhile. Basically, what we did was record the horns in Edgar's house in a hallway that had a granite or marble floor. I went into the hallway and talked to Edgar and the guys, and listened to my own voice and, if my voice didn't sound right, I put a few small throw rugs on the floor in different places to try to make it sound natural. That is the key to recording anything—having the instruments sound like they're supposed to sound, not altered so much by the room.

"We weren't trying to deaden the room down, we were just trying to make it a little less wild-sounding because of the hard floor and the hard walls in the hallway. It tended to make it a little too live and a little too ringing for the track.

"We then positioned the guys in a north, south, east/T-shape kind of position in this narrow hallway. The sax player and the trumpet player were facing each other about ten feet apart. Edgar was intersecting them in the middle, and he was back about five feet from the center. We positioned that way because you couldn't put two people side by side in the hallway—there wasn't enough room. But it worked out great. The hallway filled up with sound when they played. The mics picked all of that stuff up, and it translated into a good, solid horn sound from bottom to top. It was one of the first times that I have recorded horns where it absolutely fit this raging track. Usually you have to EQ them a little too much to get them through the track, and then they start sounding small.

"We put an 87 on the trumpet. Normally, once you put a pad on those mics, they are only good for banging nails in the wall. They are like blunt instruments. It kind of kills them, and they just aren't that great-sounding with the pads. But for trumpet, it sounds very good, because it is such a loud instrument.

"On a baritone sax, I prefer to use a tube mic like an M49 or a 47, but all we had to work with was the PLM-170, and it worked very well. For trombone, I would use an 87. Trombones, even more than trumpet, tend to clip. They break up easy soundwise. They seem to have overtones and, if you're not careful, the console will overload, or the

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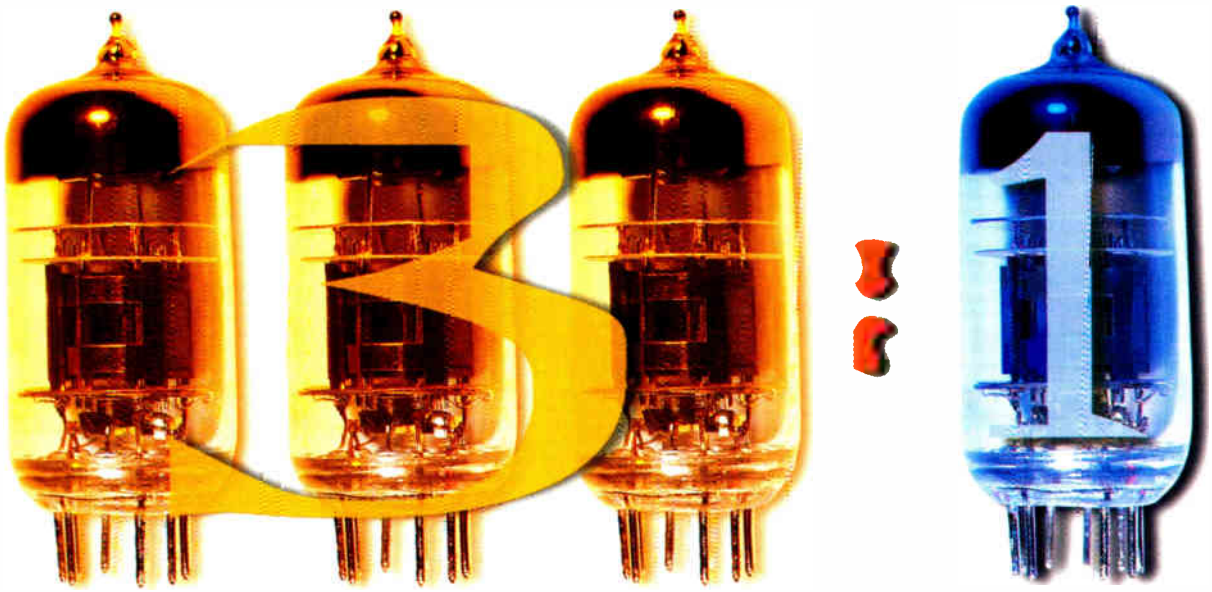

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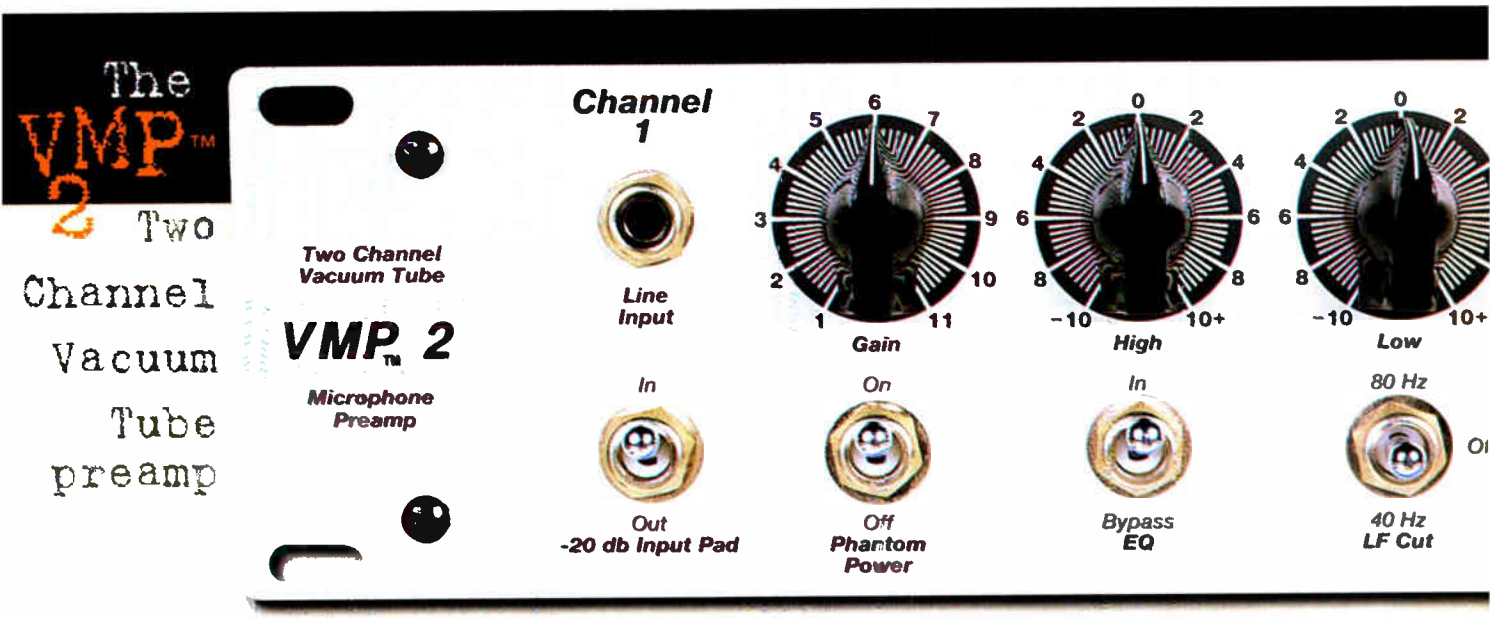

The VMP™ 2 gives you three tubes for every one found in our competitors' preamps. While others create the illusion of being a tube preamp, in reality most only provide a single tube in the front end, leaving a cold transistor back end to do all the work. The VMP-2's all-tube preamp gives you true tube texture because we use tubes EXCLUSIVELY throughout the signal path. And high-voltage power rails utilize 100% of each tube's energy for extended warmth—something you can't experience with a preamp powered by a wall wart. Many consider the VMP-2 a two-for-one product because of the built-in all-tube EQ, which allows the artist to deliver crisp highs or robust lows to any track or mix. Odds are, you'll love the VMP-2: the vacuum-tube power tool for the professional and the professional-at-heart.

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console or tape machine will clip. So I find that I have to use a mic I can put a pad on when I'm doing a trombone.

"Sometimes, if you get the mic far enough away, you can use a tube mic, and they can sound really good. It just depends on what the player is playing. If you put a bright mic on a bright horn, you are going to get a little sound. So I find that if I use an 87, it warms the horn up in the right way. I've tried other mics, and the 87 seems to work the best on loud instruments.

"As far as positioning, I always pull the mics back quite a ways from the bell. I get it back as far as I can. I really believe that the sound doesn't become the sound until it's a few feet away. What I am looking for is the fullness. Typically, we were putting them all on one track.

"When you pull that horn section down into the mix, if you don't get it right all you are going to hear is the trumpet peaking through all the instruments and you lose anything else. Everything is sort of in there, but it isn't in there loud enough. So by getting a lot of body on the instrument, you are more assured that when you pull the horns down into the track, you're going to hear everything that they are playing.

"What I would do is limit the low horn, like the bari sax. Typically, when you drop the horns into the track, you are going to lose the lowest horn first. The brightest horn, in pitch and frequency, is the one that is going to stick out. So if you limit the low horn a little bit, or the low two horns, like the bari or the tenor, it holds those horns in a place on the track, so that you won't lose them in the final mixdown.

"I don't limit the trumpet, because it just doesn't sound right to me. You also lose a lot of the dynamics. The trumpet being unlimited seems to make the other horns sound not limited, even though they really are. Another reason why I leave limiting off the top horn, is that is appears to give the whole horn section life. It's sort of an audio trick.

"I find that if I take the mic and move it around to get what I am looking for on the horn, there are enough places you can face that microphone to get what you want." ■

I always pull the mics back quite a ways from the bell. The sound doesn't become the sound until it's a few feet away. —*Shelly Yakus*

STEREO DIES

Wahoo, NE. April 1999. John Q. Stereo dies. Best known for being able to fit into two narrow grooves on a circular piece of vinyl, J.Q. Stereo is survived by multiple children of the Digital age who, although they loved their father, have no patience for numbers under **four**. In fact, they much prefer the number **5.1**. Truly sorry about their father's untimely demise, they are joyfully spending their inheritance on six channel surround systems for every room of their new homes.

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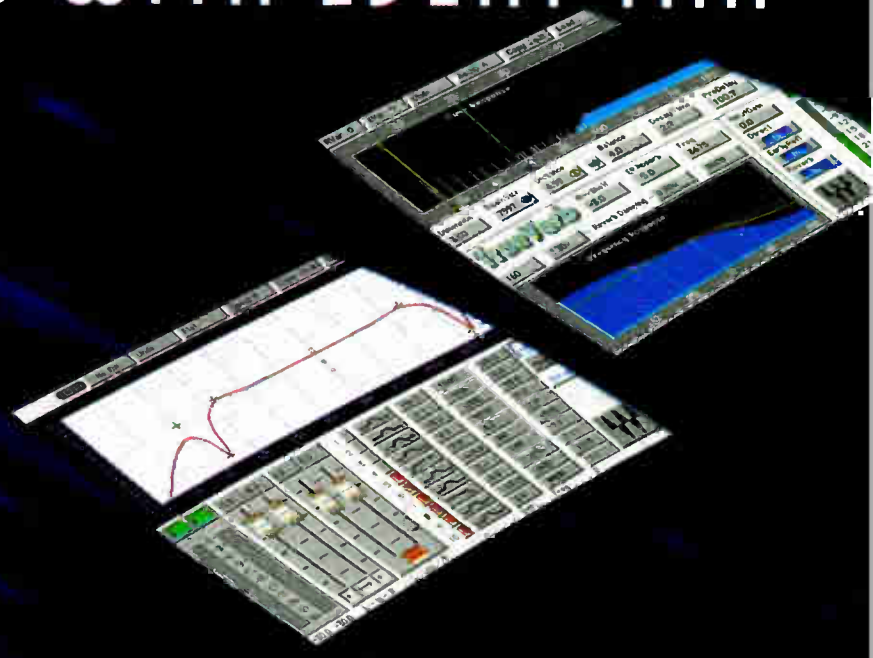

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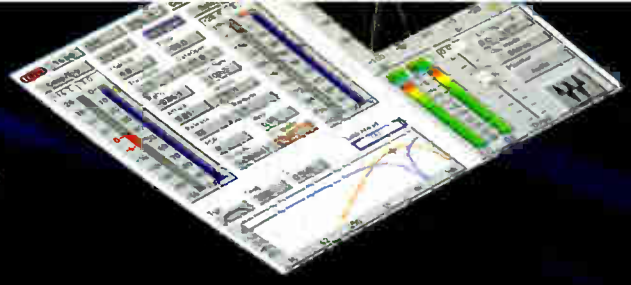

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CITY FOCUS

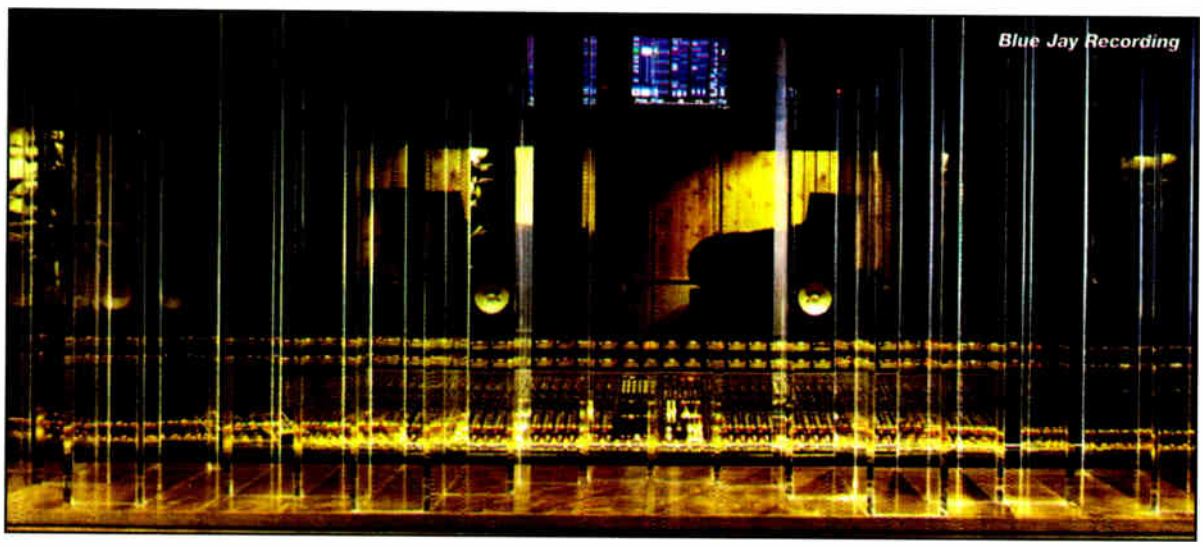
A Thin Upper Crust Covers a Growing Base of Alternative Rooms

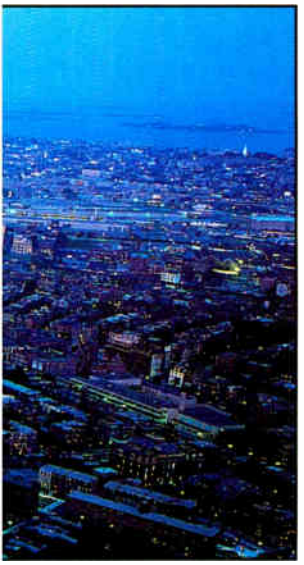
Boston

by Dan Daley

When thinking of Boston, one tends to focus on lobsters, the Red Sox and postcards of Faneuil Hall. It's only when watching television after midnight and the Time/Life oldies collections being hawked by failed 40-year-old VJs wearing their baseball caps backward that one gets a shot of "More Than a Feeling" or "First I Look at the Purse." Boston (the band) and J. Geils defined Boston (the city) for a sweet run of a decade from the late 1960s through the '70s. Abetted by acts like The Cars and Aerosmith, Boston had a long moment in the sun, musically speaking. Dave Loggins warbled "Please Come to Boston," and we responded.

That was then. Now, Boston's music scene is possibly even more robust, certainly more diverse. But it's often about as invisible as that lobster under the waters of Boston Harbor. Aerosmith remains as the lone survivor from the glory years, and at last look, they were sunning themselves in Miami's South Beach working on





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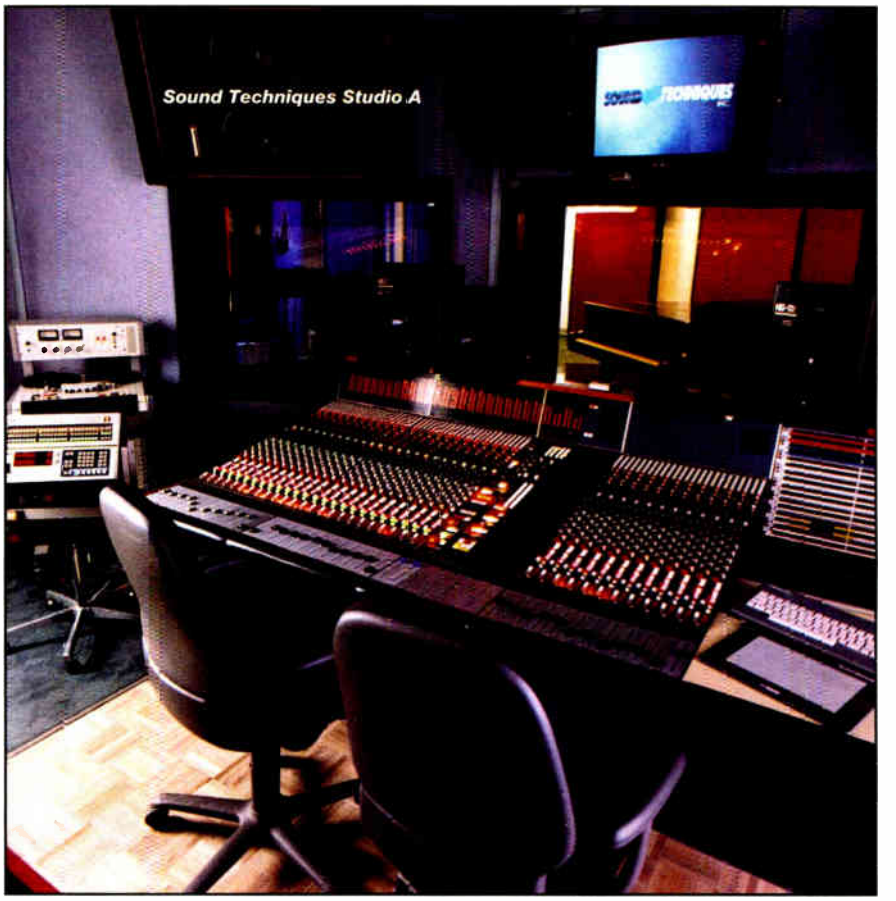

their next record. It's become axiomatic that Boston's music often abandons the city once it gets the big deal.

But it's not all gray skies over the Common these days. As noted, the local music scene is thriving. And thanks to a record industry that's increasingly divorced from the functions of A&R, the alternative studios of Boston are fanning the future flames of alternative music. A tight but active base of one- and two-room studios is providing a nurturing haven for Boston's music in the wake of a local shakeout that saw the former Cars studio, Synchro Sound, and Downtown Recorders pass from the scene in the past few years. But what's left is a new generation of studio owners, generally with considerable experience as both businesspeople and musicians, building that base back toward the middle in a city crowned with a couple of major commercial/music facilities.

BUILDING THE ALTERNATIVE STUDIO NATION

"Some of the new, successful bands are staying in Boston and recording, but not all of them," says Tony Felos, who with partners Dave Spivey and John Hsu, owns Prophet Sound in the suburb of Stoughton. "What happened was there were a few studios in Boston that didn't keep up with the times, didn't keep up with the equipment. The old school and its MCI consoles fell away, but there wasn't enough of a studio base left to hold a lot of acts. The studio base has gotten better and hipper, but I don't know if it's enough to convince the producers and the [major] record labels that Boston acts should record in Boston."

Prophet is an example of the new wave of alternative music-based studios that is trying to rebuild the city for just that. Felos and Spivey have their own record label, Prophet Records, catering to a World Beat clientele, and will open a mastering room this year to augment their two-room facility equipped with Neotek Elite and Trident 65 consoles, and Studer A827, Sony/MCI JH-24 and Alesis ADAT multitracks. The studio is "80 percent dependent" upon the local music scene, a situation that Felos says is common in Boston's music studios of any size and type. And that base is keeping both rooms booked consistently at $45 to $65 per hour, allowing them to double their revenue base annually for the last four

Prophet Sound Studio A

years. "What's also happening is that the music base is maturing," he says. "That's why we can run two levels of rooms and rates and why we're adding mastering. So the bands that do stay have a wider range of studios to choose from."

Q Division's co-owner Jon Lupfer says his studio has grown significant roots in Boston in the one-room, Neve 8068-equipped studio's ten years of operation. Following the pattern set by the local music scene, the studio grew from a 16-track Tascam room to the current vintage Neve and 32x20-foot recording room. In-house productions have been a major source of growth, and the studio's Q Division Records, distributed by Boston-based DNA, is partially funded by Sony/Columbia Records, giving the major label a first look at their finds. Partner Mike Denneen engineered Aimee Mann solo records and produced/engineered Letters To Cleo on Revolution Records there, and Lupfer co-produced the Dead Milkmen. "In many ways, the studio is becoming more of a base for our own production work and less for hire," Lupfer says, "which is the way the studio originally started out. By focusing on the recordings that leave the studio, rather than on the facility alone, we've developed a 'brand loyalty' that saves us from having to compete agressively in studio rate wars. I think the move toward studio-based production has caused the level of studios here to creep upward, something that was happening even as the older studios were dying out. So Boston is quietly becoming something that I think a lot of studio markets will move towards in the future—studio-based labels where the label is the main focus of the business and selling time is secondary."

Over at Squid Hell (the name's a long story), studio manager Eric Cohen says the studio is undergoing a move to larger quarters that will be complete later this year, with a new API Legacy console and a redesign by local designer Bob Alach's Alactronics. Squid Hell has moved in the opposite direction businesswise, with in-house productions giving way to more outside bookings as the studio grows. In the process, Squid Hell is encountering more impact from project studios, whose proliferation in the region is described by Mercenary Audio owner Fletcher as "being so dense you can't swing a cat in any direction and not hit four of them." Squid Hell's Cohen agrees. "There's too many studios in Boston when you count in project studios," he says. "[Producer] Tim O'Heir brought the Dirt Merchants in here to mix tracks that were recorded in someone's rehearsal space."

But Squid Hell is gaining recognition on the larger alternative grapevine, with projects from as far afield as North Carolina (Polvo and Touch and Go) coming through its portals. With local bands like The Heretics, Smackmelon, Chainsuck (TVT), Come (Matador) and Slapshot using the facility regularly, Cohen's only concern is that they stay in Boston to record when the big deals come through. "Boston's music scene is the best it's been in ten years," he observes. "Whether they stay to record, I don't know."

Fort Apache is perhaps the best-known of the alternative studios of Boston, and the most complex in terms of ownership. The studios—two in two locations on the same block with a Neve 8078 and a Neotek—are jointly owned by Gary Smith and British angst singer Billy Bragg; Fort Apache Records is owned jointly by Smith and producers Paul Kolderie, Sean Slade (Radiohead, Hole), Lou Giordano (Goo Goo Dolls) and Tim O'Heir (Dirt Merchants, Superdrag), all of whom regularly work at the studio.

The label has a two-year-old distribution deal in place with MCA Records; and Smith is also the sole owner of a management company which represents Juliana Hatfield, Belly, Polara, Fuzzy and Flying Nuns.

The studios have become one of the three businesses, rather than the core entity, despite the fact that the studios were the first business started, Smith says. Commenting on the trend toward studio-based labels, he observes, "It's not necessarily a paradigm for the future. It takes more commitment to run multiple businesses than many studios are willing or capable of giving." What is happening, though, is that the studios are following a progressive track in which the second of the two rooms was originally opened as a lower-cost studio to win back the local bands that were priced out of it as in-house productions became successful. Despite the constant improvements, Fort Apache hopes to always have a moderately priced room. "When the new room gets priced beyond the local market, we'll open a third room for low-cost productions," says Smith. "It's important that we stay accessible to the local Boston music market. A lot of our success is based on that."

WORKING IN THE MIDDLE

As Boston's new wave studios juggle record deals, Bob Lawson's Blue Jay Recording in nearby suburb Carlisle remains true to the historical studio paradigm: a single-room, owner/manager operation that targets music exclusively. When pressed, Lawson concedes his approach has become something of an anachronism at a time when many studios are pursuing links with record labels and their own custom labels based on in-house productions. But the 16-year-old studio is thriving, he says, perhaps for that very reason—selling to a niche that others have abdicated.

"We've become unique in this town because this is a studio that you come in to and the ownership and management isn't going to become involved in your career other than providing a great place to make your record," says Lawson. "There's something to be said for a professional approach to providing a quality recording studio space and not being the producer on the record. When you're getting involved in other aspects of your clients' careers, the service that you provide as a studio can suffer." However, even Lawson concedes that the time is coming when he will consider other options for revenue streams. He acknowledges that project studios are hurting his SSL-equipped, Russ Berger-designed studio and other service-based studios in the area, as they are everywhere else in the country. "I'm not able to charge as much as I'd like to, but I refuse to participate in a rate war," he states. He does, however, expect to remain focused on Boston's music community, which he says is vibrant and has enough work to support its studios profitably. "But I'm not ruling out considering other options within the studio business," he adds.

COMMERCIAL POST

The thin layer at the top alluded to in the title refers to the two multiroom audio facilities of Boston, Soundtrack and Sound Techniques, both of which rely mainly on commercial audio work for revenues. At Sound Techniques, co-owner Jim Anderson's four rooms cater to a 60-40 split favoring commercial spot work, signifying a major expansion in focus since the studio

LONGVIEW FARM——CLOSE ENOUGH YET FAR ENOUGH

Longview Farm is in North Brookfield, an hour's drive from Boston and a million miles away in terms of its pastoral setting. Two studios, The Barn and The Farmhouse, offer users a choice of an SSL G (soon to switched out for a vintage Neve) or a Sound Workshop 54 and large, ambient spaces with accommodations right in the same buildings. Opened in 1974, the studio has hosted many regional and national acts, although it may be best known as the rehearsal site for the Rolling Stones' *Steel Wheels* tour. Studio co-owner/manager Bonnie Milner has expanded the studio's revenue base with the opening of Longview Entertainment, an artist management firm, but believes that the studio remains the core business.

"We're more in competition with other residential studios than we are with Boston studios," says Milner. "Very rarely do artists and producers drive in from Boston and use the studio for a day and then drive back that night. But we do feel an emotional allegiance to Boston. But our location has kept us out of the price wars that happen in Boston studios, and that I think were part of the reason Boston lost some studios in recent years. But while we're not directly connected to Boston, we want to see that music scene do well. Because the Boston music studios are only going to do as well as the music that comes out of Boston."

— Dan Daley

opened primarily as a music facility several years ago. "We've seen the commercial clientele in Boston become more sophisticated and more willing to pay for the higher level of investment in equipment," says Anderson, noting a newly added Foley stage and the Scenaria and pair of Screen-Sound systems that flank his SSL G Plus studio. Anderson says that work for advertising agencies, cable television (he and a partner write scores for The Discovery Channel) and ADR work for feature films and video will account for a growing portion of the facility's revenues. Interestingly, though, Anderson notes that much of that work is Boston-based, which provides him with a heightened level of optimism about the city's future as a commercial base. "I think that Boston has a significant future ahead of it in a lot of ways."

Although Sound Techniques has seen increased post work, music production remains stronger than ever; an SSL 24-input E Series desk was acquired to handle lower-budget music work, supplementing the studio's 48-track analog and digital recording facilities, complete with Neve V36 with Flying Faders. Tori Amos and Duran Duran were both in recently mixing new material, and Extreme guitarist Nuno Bettencourt recorded and mixed some tracks for his solo release.

Jeanne McGrail, studio manager at Soundtrack, says that studio does very little music production but that commercial work is steadily growing and feeding the studio's seven post rooms, which are equipped with Euphonix and SSL consoles, SSL Scenaria systems and a Lexicon Opus workstation. The addition of the 3D2 satellite transmission system has broadened Soundtrack's access to talent and thus enhanced its attractiveness to both Boston and out-of-town agencies. That's led to the studio raising rates for the first time in eight years, by 10%. "There's growth here," says McGrail. The growth, however, is mainly in commercial work; music is not seen as a growth niche, although the facility has a sister studio complex in Manhattan that does do substantial album work. "We refer a lot of music work there," she says. "This facility is staying focused on what's been making it successful."

The commercial studios of Boston will likely see their good fortunes continue as the audio-for-video business becomes more global and less geographically dependent. Boston's new wave of music studios will take a number of varied approaches towards success, but they share the common bond of remaining focused on the local music community. And that music community, as it waits for the corporate checkbook of contemporary American entertainment culture to open their way, couldn't ask for much more. ■

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LOU GIORDANO

UP FROM THE UNDERGROUND

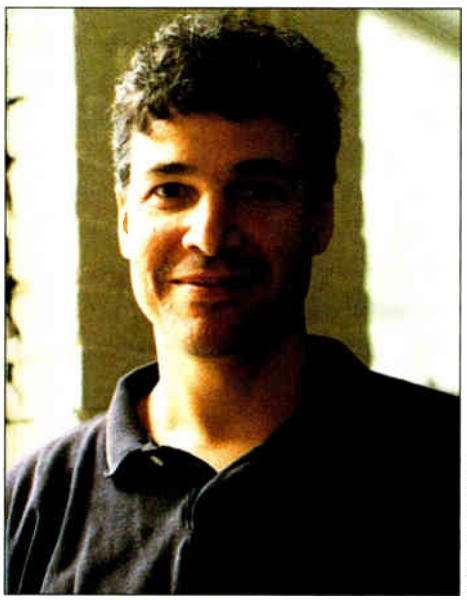

PHOTO: JENNIFER DE FORGE

Fifteen years before Green Day and their ilk patted mainstream America on the back and said it was officially okay to listen to punk rock, bands in cities across the U.S. were lighting the flame with shows in basements and garages, or if they were lucky, on the occasional Sunday afternoon at a local club. As it became increasingly clear to a prescient few that they were witnessing important times in American rock 'n' roll history, individuals in cities such as Washington, D.C., Los Angeles and New York set out to document the revolution. Among those was Lou Giordano, who captured the unbridled aural terrorism of early Boston hardcore combos such as Society System Decontrol, The F.U.'s, and The Proletariat.

Staff gigs at the 8-track Radiobeat and an earlier incarnation of Fort Apache (Boston's leading studio for challenging rock) gave Giordano the opportunity to work with a new breed. As the '80s wore on, bands such as Mission of Burma and Husker Du began to leverage punk's energy with a newfound sophistication. Touring stints with the Huskers gave Giordano exposure to scenes outside of Boston, and the association gave him a measure of early reknown among the indie rock cognoscenti. He continued to work with bandleader Bob Mould through 1992, when the pair co-produced the breathtaking *Copper Blue* by Mould's recently split group Sugar.

Here in 1996, plenty of the original folks have grown up and slowed down, but the charts are packed with youngsters carrying the torch lit by those local hardcore scenes in the late '70s and early '80s. Giordano is more active than ever; he's still based in Boston, but he travels all over producing and engineering an array of acts from independents to major-leaguers. He recorded Live's multi-Platinum monster *Throwing Copper* and helped the Goo Goo Dolls break out after a ten-year warmup when he produced, recorded and mixed their 1995 hit *A Boy Named Goo*. But despite having hit the big time, Giordano still gets just as fired up talking about recent projects with lesser-knowns, such as Fig Dish and Lustre, as well as the current beneficiaries of his talents, Toronto's Treble Charger. In a recent discussion, reminiscences of George "Boomer" Scott, Bill "Bowlegged" Buckner and their respective heartbreaking Red Sox teams eventually gave way to talk of more important matters.

How did you get started?

With music in general, it was getting my first radio at eleven. I listened to AM radio in the New York metropolitan area in 1968, and it freaked me out. I heard amazing stuff like Jefferson Airplane, Jimi Hendrix, The Beatles, and played my bongo drums along with the songs. What really got me was the contrast between the pop junk and the really heavy stuff. I always gravitated toward hard rock: Led Zeppelin, Hendrix, Cream, that's what did it for me. After hearing all that, I begged for a guitar for my twelfth birthday.

You started recording at MIT, putting some stuff together with a friend of yours...

Right. There was a studio there that was used by Dr. Bose (the speaker manufacturer) for his doctoral thesis research in about 1958, then it sat there for 20 years. A friend of mine, Seth Gussow, took it upon himself to restore it to working condition. There was a 300 Series tube Ampex 1-inch 8-track and other military surplus gear. We got a few local bands to record, and some MIT student bands as well, but nothing ever really came of it.

At what point did you realize that this was what you wanted to do for a living?

Not until a few years later. After graduating MIT, I moonlighted doing live sound. Around 1981, hardcore was just breaking. The all-ages shows were the most exciting thing going on, and it really attracted me. The funny thing was that the owners of the sound companies hated the bands that were paying them to rent their equipment. A lot of times they would set the faders and walk away. I was shocked by that because I loved the music. If a band didn't have a sound man, I would do it just for fun. I didn't get paid much but I wasn't looking for that—these were your buddies up onstage, and you just wanted them to sound good.

I started mixing for a lot of the bands here in Boston, and that eventually led to going back into the studio. I got involved very quickly in making records. The first project I recorded was *This is Boston, Not L.A.*, a hardcore compilation record. I preferred studio work to live sound because you

BY ERIC BRADFORD

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had something to show for it after the show. I hooked up with Husker Du, and they invited me to be their sound guy. I kept my day job as an electronics designer at MIT for a while. I eventually decided to go full-time with music and give up the academic career.

It seems that your entree to recording put you in a position to work strictly with bands that you enjoyed.

I've been lucky in that respect. When Husker Du broke up in 1988, I joined the staff at Fort Apache. There were two rooms and steady work. By keeping in touch with the local scene and indie labels, I was able to eke out a living with bands I believed in. I like working with bands that I feel are the underdogs or outcasts, or just not that predictable. I like to work with people who will be coming up with some unusual stuff.

What types of things do you tell newer bands who are striking out on their first big recording project?

The biggest thing is to not try to build Rome in a day. You have to take things in small chunks, and figure out the most basic way of being productive and getting things done. That could involve stripping things down a bit and not necessarily cutting songs live. Every situation is different, particularly with the younger bands. You have to suss it out and see what will get these people to really put out. Sometimes it's a shock to hear the brutal truth of what you really sound like on tape, and it can be incredibly intimidating. You've got to break the red light fever, get them to loosen up and unload their goods.

Some of these bands must be looking at the earlier part of your resume and coming in wondering if they're going to be held to some kind of indie code of ethics.

We used to joke around that the indie ethic is to make things as difficult as possible for the listener, or as non-obvious as possible. But I find that falls into the Spinal Tap thing: "There's a fine line between being clever and stupid." You can name your songs funny, quirky things that have nothing to do with the music, but there's only a few "Smells Like Teen Spirit"s, only a few exceptions to that rule, where they succeed. What I'm trying to advise folks to do these days is to not be so difficult with the music, that it's not going to compromise their ideas to help somebody remember the song. I don't think it's going against the indie ethic to hear the vocals and remember the melody.

When you work with an artist who's been around for a while, like Bob Mould or Paul Westerberg, how is the process different from with a new band? Do you tend to defer to the way they want to work?

Yeah, completely, especially with Mould and Westerberg. They're two very experienced studio fellows. Both have a very formed style of recording. And the Smithereens certainly had studio chops. Pat DiNizzio used to do voice-overs, and he would break into a radio commercial in the middle of vocal takes and have us on the floor laughing. You look at what you can contribute to their method. They know where they want to go, and you've got to drive the car along the smoothest road to get there. However, you might know a few shortcuts they didn't know of.

PHOTO: ERIC BRADFORD

Giordano in sessions for Samiam at Coast Recorders, San Francisco, with assistant Zac Allentuck

You're part of a production deal that Fort Apache has with MCA—can you explain exactly how that works?

Five members of the staff—Gary Smith, Paul Kolderie, Sean Slade, Tim O'Heir and myself—decided to formalize what we had been doing all along: A&R. We signed a production deal with MCA where we find bands and record a few demos and present them for consideration of a full deal. The hard part is getting all of us to agree on a band. We have different tastes, and the dynamic of making that work is new to all of us. I never would have thought that being an A&R person is as difficult as it's turning out to be, and it's given me a lot of respect for those folks.

In the last few years, reviews of records you've worked on have shifted from comments about your roots and credibility to admiration of the sonic impact of the recordings. Do you think that you have an identifiable "sound"?

I hear it on the radio, that's where it really hits home; I hear something and feel like I really contributed a lot to it. Not only in the sound, but in arrangement as well—ideas for guitar solos, harmonies, song structure. I think I have a way of becoming a fifth band member and suggesting things that are completely in context with what a band would do, and yet sort of above and beyond what they can think of. That, to me, is the definition of what a producer should do. He should suggest ideas that blow everybody away, and get a band through all the difficult times in the studio. There's never any single right way to do it, and you have to be the guy who gets it done.

The last time you were in San Francisco, you hauled a nice Mac setup across the country with you. What's in that rack, and what role does it play in a typical session?

It's a 16-channel Pro Tools system. I use it throughout a project. In basics, I use it to compare different takes. I generally like to comp as much as I can, especially with vocals and drums. With drumming, timing is critical, and with vocals, pitch is critical. I can't explain why, but when a drum groove is really dead on, the drums sound better, and when a person is singing right on key, it just brings a whole harmonic richness to a piece that's lost if they're as little as five or ten cents off their note. Its tough for people to execute with such perfection, yet that's what everyone wants to hear when they listen back.

I like to get a few takes of a song or a vocal and sift through it, and see where the guy's really excelling and where he's just going through the motions. I try to pick out the moments of excellence and make a whole record out of those. With any studio tool, be it a hard disk recorder or a 2-inch multitrack, it's a creative tool, and it can be used and abused like anything else. You have to apply your own aesthetic to how you're going to use it, and resist the temptation to *fix* everything. Sometimes, the ugly, out-of-tune, late hits, etc. have the most soul.

What equipment would you want to have in the studio with you every time you work, if possible?

Or let's say, if I built my own studio, how would I do it? For a recording room, I'd love to have a room that's huge, but also had the capability for isolation. Everybody would play in the same room, with individual headphone or monitor mixers, with the amps separated. As far as consoles, my choice for tracking would be a discrete console—

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API, 80-series Neve, something like that. I use a console a lot. I'm not one of these people who just uses mic pre's and runs them straight to the tape; I like to submix things. I really need a console that's going to be pretty pure in sound and not have a bunch of excess circuitry.

As far as tape machines, the Studer 827 is the ultimate for me. The modern Studer machines have the best tape handling and sound. For mixing, I like the SSL G Plus Ultimation. It's a really intuitive system, and it's got all the goodies, the gates and the compressors. As far as recording vocals, the best tube mic you can get. U47, C12, can't have enough of 'em. Everybody uses the same mics pretty much, it's more the sounds that are coming through. The acoustic tuning of the drums and the room that you're in has a lot more to do with the drum sound than the mics.

Do you have any kind of minimum technical criteria for a studio before you'll work in it?

It depends on the duration of the project. If I'm going to be spending months at a place and expected to deliver a Gold record, then a certain level of professionalism is necessary. But if it's a quick thing, you work with what you've got. Part of being a pro in this business is an ability to work with junky gear and sounds and get them to sound cool. A few songs on the new Westerberg record incorporate his home demos as the basis of the song. He got a tremendous vibe on those demos that we couldn't re-create. The obvious thing to do was to use them and beef up the sound as much as possible.

You've seen the biz from all sides at this point, the best and the worst of it. What keeps you from getting jaded?

I always remember the uplifting effect music has on people. Any contribution I can make to the overall pool of good music will hopefully improve the quality of life for the folks who enjoy it. My parents teased me about having a fun job when I abandoned my MIT education for a recording gig. But when they see how hard I work on projects now, they know it's as tough a job as any. The main thing is, if you really love music, you're driven to do this. ■

Eric Bradford pays the bills cutting client/server code, but gets real gone by matching wits with indie rock illuminati for his own magazine, Thicker. *For information, e-mail Thicker1@ix.netcom.com.*

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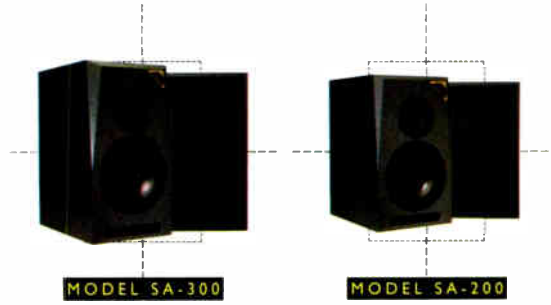

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THE ARTIST GROUP

SHOWING HOW FAR A PROJECT STUDIO CAN GO

You can tell you're getting close to Bill Chinnock's project studio about midway between Portland and Bangor, Maine, when the moose start to outnumber the humans along the two-lane blacktop road. Pastoral settings are not all that uncommon for personal recording studios, but Chinnock's is downright remote. It is also, however, hardly your average project studio, and his client list and technical capabilities outstrip most of the usual fare that's crammed into the spare bedroom.

Audio suite at The Artist Group Inc.

The first floor of the 3,200-square-foot renovated barn on Chinnock's 12-acre farm, where he lives with his wife (whose father was the late country music great Dick Curless) and parents, is dedicated to a highly ambient recording studio and control room. The studio has 26-foot ceilings and a venerable Trident Series 65/70 console with a MOE submixer sidecar feeding a pair of Alesis ADATs and a vintage Revox 2-track deck. Up above, making digital hay in the loft, is a video editing and animation post-production suite equipped with Media 100 component video editing system, an SGI animation workstation and a few Macs with more GBs than Maine has flies in the summer. Chinnock's philosophy—presumably born of the fact that living this far north requires a high degree of self-reliance—is that a project studio can offer a much larger range of services to clients than just audio, thanks to low-cost digital technology.

"The key is to know the limitations of the equipment, and choose the best of the old and the new," Chinnock explains. A former blues recording artist, Chinnock spent the first three decades of his life on the road or in the studio making his own records for Atlantic and CBS. Along the way, he began picking up television and film credits, including a 1987 Emmy for the theme to the afternoon soap "Search for Tomorrow" and a duet with Roberta Flack for the theme to "The Guiding Light." In 1991, after a less-than-pleasant experience with his last record contract, he founded The Artist Group back in his adopted home state and has been letting the road come to him ever since.

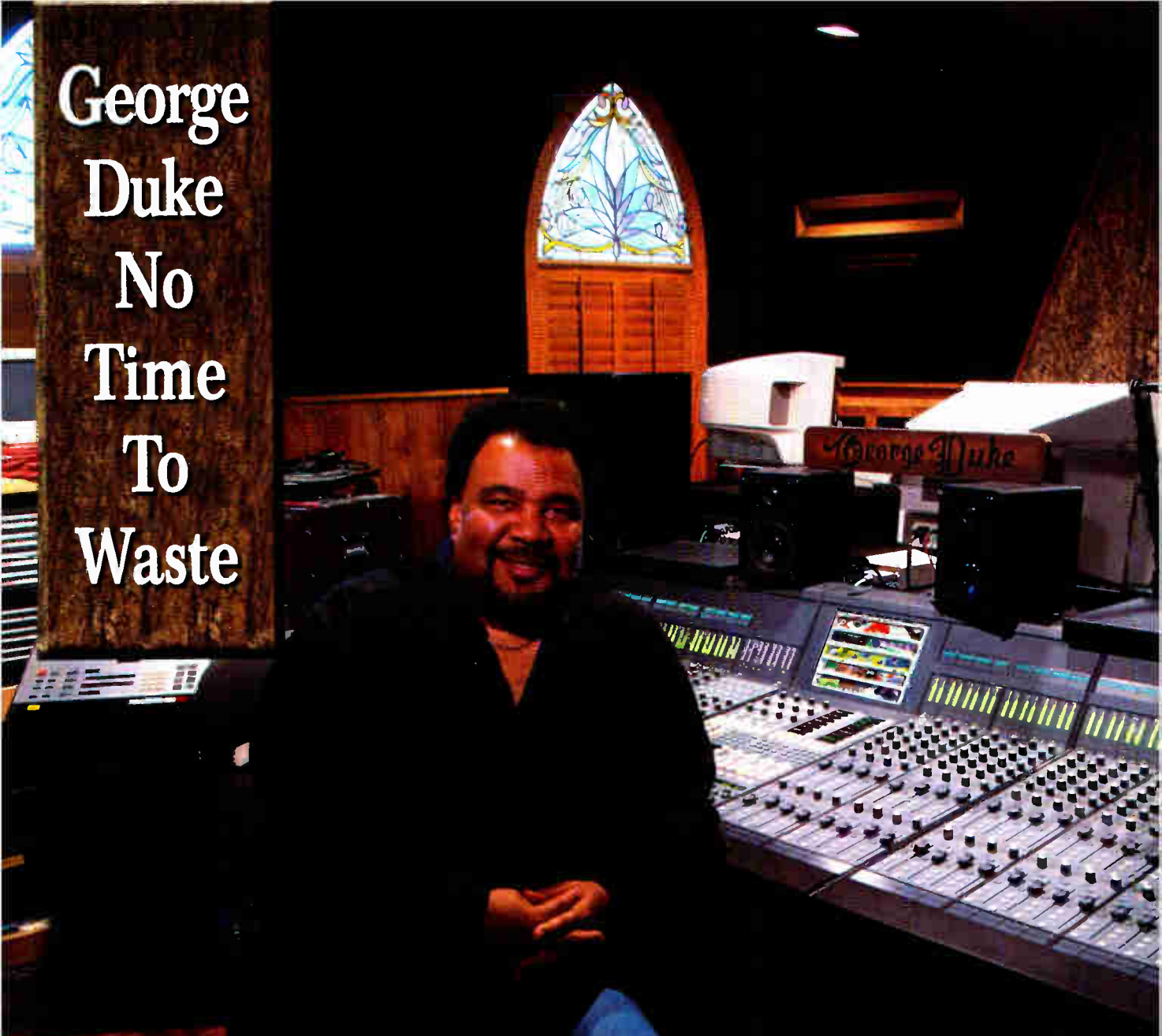
"The intent was to create an audio, video and CD-ROM facility that could handle everything, and that was within reach because of the way the equipment had developed," he explains. "It was affordable, and it was operable, with the kind of talent base I found up here." Audio engineer Lincoln Clap works with video and film director Richard Searls on a freelance basis for The Artist Group. Along with a few other graphics freelancers, Chinnock and company have turned out multimedia productions (films, videos, CD-ROMs, television shows, Web sites and print ads) for L.L. Bean, construction company Ciambro, Nickelodeon, Golf America and the Doobie Brothers.

Word of mouth has been The Artist Group's main source of work, although Chinnock is quite pleased that he's been getting work from his own Web site. A typical project is the 16-minute promotional/motivational video the company did for catalog retailer L.L. Bean. Chinnock's crew shot in the field on 16-millimeter film, bumped that to Beta SP and then digitized it in the Media 100 for editing and optical effects. Downstairs, he assembled local musicians and scored the work print live to picture, then added voice-overs and sound effects from the Hollywood Library discs. He edited the score and other audio components using Digidesign's Audiomedia II software, then laid it all back and mixed it, again on the Media 100.

"The clients love it because they don't have to go to five different places to get the project done," says Chinnock. "And it doesn't matter how far we are from them; we've been doing a weekly set of commercial edits and voice-overs for an advertising company in Florida by [them] FedEx'ing the DATs and videos to us and then, after we do our work, FTP-ing the files back. And as long as you know what your equipment can and can't do, it doesn't matter whether you're working on an old Trident or a new SSL. A project studio can be anything it wants to be these days." ■

BY DAN DALEY

George Duke No Time To Waste



Working on projects with artists such as Natalie Cole and Al Jarreau, George Duke has built a reputation for producing superior sounding recordings. Now George uses his Euphonix CS2000's digital control to produce faster than ever, moving between projects and tracks quickly and accurately. Euphonix instant reset and dynamic automation maximize his creativity eliminating repetitive set up and remixing that slows the creative process.

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AMERICANS IN PARIS

RECORDING AND MIXING IN THE CITY OF LIGHT (AND FOOD)

Left: Toots Thielemans live at the Cafe Savoy. Below: Producer/engineer Ken Kessie (seated in black) with (L to R) engineer Tulio Torrinello Jr., artist Doc Gyneco and Virgin A&R rep Thierry Planelle in Studio Plus XXX.

Thanks to efficient global communications, working abroad is no longer the trial it used to be. SSLs are everywhere, outboard gear is plentiful, and English is the language of choice. Even France, once thought to be the haughtiest of nations, is eager to embrace foreign business these days. In the '90s, everybody's on good behavior.

So with a relatively level playing field in the equipment games, how do you choose where to make your record? Some people choose convenience—working close to home. Others go to L.A. or New York; in a major recording center, you can be confident that all your needs will be easily met. Still, sometimes the musical heart yearns for more. And if you're inspired by beauty and *joie de vivre*, it's hard to pick a better place to work than Paris.

These days Paris has even more to offer than divine architecture and fabulous food (although everyone I spoke to for this article placed food as Number One on their Parisian Top Ten). A new music scene has been developing over the last few years, a combination of indigenous French music and African-based rhythm and rap. And, as always with a burgeoning music scene, the recording arena has been expanding as well.

Paul Simon was one of the first American artists to make the trek to the City of Light for recording. He'd met up with guitarist (and former Paris resident) Vincent Nguini, a native of Cameroon, during the making of 1990's *Rhythm of the Saints*. Nguini wanted to introduce Simon to his Parisian community of African musicians. There, the players were assembled for the song "Proof," which was tracked in Studio B at what may be the grande dame of Paris recording, Studios Guillaume Tell. Marc Silag, who now manages, among others, Ladysmith Black Mambazo, was production coordinator for the project and recalls, "The vibe of the studio was wonderful. It's in a quiet, little, unpresuming neighborhood. We could come in and work undisturbed for ten or 11 hours, and it was a perfect, not high-pressure, environment.

PHOTO: MAUREEN DRONEY

BY MAUREEN DRONEY

PAUL WEIJENBERG STUDIOS

Amsterdam, The Netherlands

Paul Weijenberg Studios in Amsterdam, The Netherlands, bears the name of its owner. Weijenberg is a former audio engineer at NOB, Holland's national broadcast center in Hilversum. In 1985, he began operating his own 24-track music-recording studio, and he continued working solely on music projects until '89, when he expanded the facility to include a dedicated post-production room, Studio 2. Early this year, Weijenberg made his return to post work complete; Studio 1 was turned into a post suite as well.

Studio 2

Studio 1

Studio 1 contains Europe's first Yamaha 02R digital mixing console. Other featured equipment includes an Akai DD 1500 16-track hard disk recorder, Sony 7010 DATs, Dolby Surround encoding, Tannoy and Genelec surround monitoring, and a complement of MIDI and outboard gear from Akai, Lexicon, Roland and Alesis. Studio 2 offers a Korg Soundlink workstation with Total Recall, a 32-input D&R console, an Akai DD 1000 and monitors from Tannoy and Genelec. There is an assortment of AKG and Neumann mics that can be used in either studio.

Playback equipment in the facility's central machine room includes an FED V-MOD hard disk video recorder, Sony Betacam SP and U-matic SP systems and a Pioneer 300-CD sound effects jukebox with custom software.

Weijenberg studios is linked via analog lines to NOB's studios and uses ISDN lines to link with other outside clients. This facility's clients, which include a number of Dutch ad agencies and broadcasters, have hired Weijenberg to do recent commercials for Heineken, Pepsi, Sony, McDonalds, Canon and others. ■

BY BARBARA SCHULTZ

"Studio B was originally a movie theater—dark, moody and really comfortable," continues Silag. "The control room and iso booths are underneath the canopy of the balcony, and they still have the stage where the movie screen was mounted. That gives you another recording area up off the floor. Because the room is so irregularly shaped, the sounds available in the room are really fascinating. While there, in addition to working with Vincent Nguini and guitarist Georges Seba, we recorded a French horn section led by Alain Hatot. The horn players had worked in the room a lot, and at their insistence we put them up on the stage, which worked out great. Actually, though, most of our recording was done in the control room, because it was so spacious."

The pleasures of the table are a common theme that runs through almost everyone's recollections of working in Paris. "I'll never forget the food we ate while recording at Guillaume Tell," Silag says. "Every day, the assistant would go out to get us lunch, and come back with the most amazing sandwiches. Long baguettes with ham and cheese and paté. It doesn't sound that special, but [engineer] Roy [Halee]

PHOTO: MAUREEN DROONEY

and I still talk about it, and that was six years ago."

These days rap is a vibrant presence in French music and studios. At Studio Plus XXX in Paris, Producer/engineer Ken Kessie (En Vogue, Tony!Toni!Tone!, Bel Biv Devoe, Celine Dion) recently completed a project for Virgin France rap artist Doc Gyneco. (After first recording tracks in Los Angeles, the project moved to Plus XXX for vocals and mixing.) Situated next to the picturesque Buttes Chaumont park, Plus XXX is a friendly, two-room studio that caters to cutting-edge acts as well as more established artists. Studio 1 features an SSL 4064 G Series console and Genelec monitors. Studio 2 has a 60-in Neve VR with Flying Faders, also with Genelec monitors. Studio 3 is set up as a programming and pre-production room with an SSL 4048E. All three rooms have Sony digital recorders; 1 & 2 are fitted with 3348s while 3 has a 3324. Kessie mixed in Studio 1.

"What's unique about Paris," he says, "is what makes the difference in recording there. The buildings are astounding, and the food unbelievable. There is also a New York grittiness, and a tremendous black influence on Parisian music that makes Paris easily the funkiest city in Europe. My experience working in foreign countries has often been a bit iffy, what with communication and equipment problems. But at Plus XXX, after sussing out the monitors and dusting off the 2-inch analog machines (is analog dead outside of the U.S.?), mixing began and ran smoothly. My compliments to the studio's owner Claude Sahakian and manager Nathalie d'Hardemare. They are a class act. My engineer, Tulio Torrinello Jr., would get the mix rolling, while I would be out...enjoying Paris! You may believe that Paul Simon's lyrical phrase 'angels in the architecture' is about some imaginary third-world city, but, to me, it fits Paris perfectly. I would come back to the mix inspired.

"I've always heard stories about French attitude," Kessie says, "but one night out on the Paris streets with my Virgin A&R man Thierry Planelle taught me more about it than two weeks of listening to my artist rap. 'This is MY city!' he would mutter, dusting off lazy drivers with violent honks and that famous shrug. Upon parking, he would shove other cars out of the way with his well-dented bumpers. Then he would tame those snotty French waiters with just a sneer and a dangling cigarette. Needless to say, my mix the next day had a little more attitude in it. And if I had to deal with a maintenance problem or some recalcitrant background singer, *c'est la vie*."

Nathalie D'Hardemare, studio manager, and Claude Sahakian, owner, Studio Plus XXX

Torrinello found the vibe to be a bit more calm. "I found the Euro experience to be very relaxing," he says. "We worked the same hours as in L.A., but to be able to walk out the studio door and see instant culture—it just gave me so many other things to think about besides what went on the studio. There's so much pressure and tension when you are mixing, and in L.A., you just get in your car and go to the studio and back home, kind of carrying it all with you. But in Paris, when I'd leave the studio and walk back to my hotel, I really left the tensions and stress of mixing behind."

It's a unanimous feeling among the people I spoke with—consoles and outboard gear may be uniform wherever you go, but what's outside the door of the studio can and does make a difference to the music. Robin Crookshank Hilton, an American currently living in London, is co-owner of H_2O (formerly Hilton Sound), a company that specializes in project coordination, recording consultancy and location

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recording. She has put together many recording sessions in Paris and says that "recording in Paris is the ultimate creative experience. The ambience, the food and the recreational activities combine to make even the most ordinary project special. Professionally speaking, technical backup used to be the real downfall over there, but the situation has improved dramatically over the past couple of years. There are three or four top studios that are on a par with any other international studios I could name, and we recommend them frequently.

"My only frustration when working in Paris these days is that I find the mentality in the music business can sometimes be rigidly conventional," Hilton continues, "both in the studio and out. Any deviation from the normal accepted methods is met with subtle resistance. But, ironically, once the ground has been broken and a 'unique approach' is proven to be effective, this then becomes the new fashion.

"For instance, over the past five years we have recorded album projects in a museum, several chateaux, as well as the odd cafe, and you can't imagine the difficulties we had at first in convincing people that it was even possible, much less getting them to cooperate. Now there are a couple of small companies that have sprung up in Paris that specialize in this kind of location recording, and the French music industry press routinely features articles about them. But, everything considered, if I had to name my favorite places in the world to record, Paris would top the list every time."

Private Music recently used H_2O to help out on a project for harmonica player Toots Thielemans, with the husband and wife team of Kathryn and Joel Moss organizing both studio and remote recordings. Kathryn is a production coordinator and administrator for Private Music; Joel is a recording engineer/producer whose eclectic credits include work with Tony Bennett, Cissy Houston, Herbie Hancock, and soundtracks for *The Cable Guy*, *Sister Act*, and *Ace Ventura, Pet Detective*. For the Thielemans project, they recorded the bulk of the album in the Neve room at Plus XXX studios, with a side trip to Cafe Savoy in the 2nd Arrondissement for a live recording *avec* audience.

It wasn't the first time working in Paris for Joel, who has recorded film scores and other projects with French national treasure Maurice Jarre. "I haven't in the past had great experiences working in France," he says, "and when we planned to do this project we all felt a little trepidation. We were working with musicians that we didn't know, in a studio that we hadn't worked in before. It looked great on paper, but you never know. It turned out to be a terrific experience."

Addressing the eternal problem of maintenance, Joel Moss says, "Well, it is a bit different in general there. Someone comes in the morning and sets up, and then they disappear. So if you have a problem, you might sit around and wait for them to show up. Fortunately, we had no problems. Plus XXX in particular seems to be very conscientious about making sure that everything is done. The piano tuner came in on time, the Dolby SR was ready for us—all those things that you take for granted!

H_2O's Simon Bohonnon, recording Toots Thielemons in the Cafe Savoy

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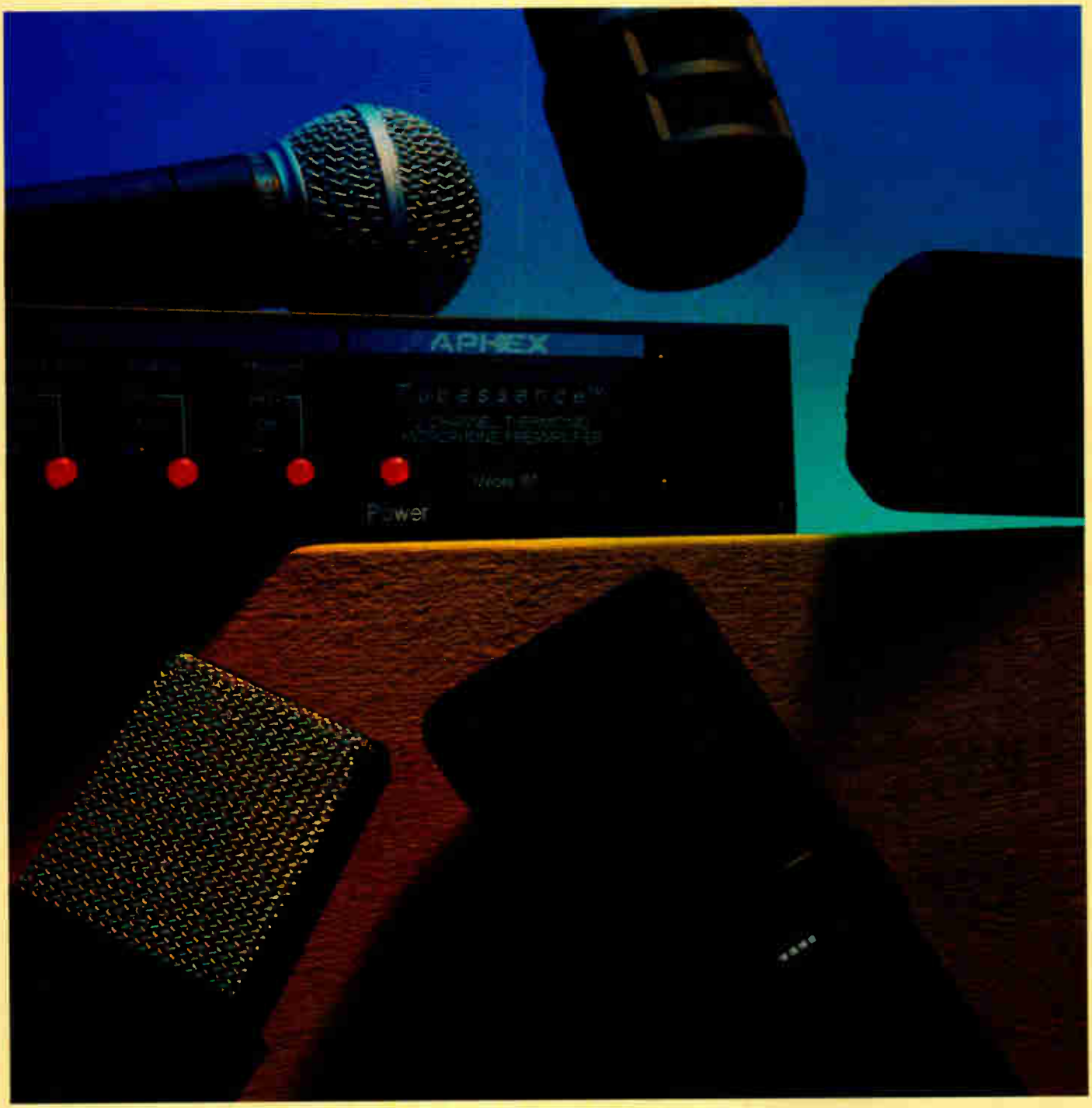

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here [in L.A.], but if you don't ask for specifically when you go other places you may not get.

"This is my fourth project with Toots and the third that we've done for Private Music," he continues. "When we were looking for the next thing to do with him, we found that he's always wanted to record the really classic French songs. [Producer] Miles Goodman believes that if you are going to do something like that, then you must go to the source and get all the flavor of what you are doing. And since Toots lives in Brussels, it was easier to go to Paris and find the right musicians to accompany him."

"We asked everybody for recommendations on musicians in Europe," Kathryn Moss explains. "Joel does a lot of jazz projects, and most jazz musicians spend at least half of their time traveling around Europe—there are just more places to play. We talked to musicians that we knew here in the U.S., talked to their recommendations abroad and then followed the thread. The studio and H_2O came about through Chris Stone's World Studio Group. Bernard Arcadio was our contractor; he is very well-known over there and, through him, we hired six French vocalists. He also contracted the string quartet. The musicians had only one rehearsal, but they were wonderful.

"For the recording at Cafe Savoy," she continues, "we brought in equipment from London—mainly because the equipment that we needed wasn't available in Paris on that day. We needed 16 Neve preamps and Tascam DA-88s, and it seems that ADAT has really taken over on the continent. Robin Crookshank Hilton came to Paris to oversee the project and also brought an English assistant engineer, Simon Bohannon. Their expertise and experience helped us overcome any obstacles that might have gotten in the way.

"One thing that people should be aware of, if they are planning on using French musicians," Moss continues, "is that it can be a bit more difficult than recording in the states due to the French musicians' union. There are a lot of regulations, paperwork and additional licensing fees—for example, they receive a royalty on sales of blank cassettes. We were able to work through everything, but it can take a lot of time."

Overall, the Mosses feel they got the right vibe by going to Paris. Kathryn concludes, "For this project, since it was a French traditional project, I think ambience and the atmosphere that's created played a very important role in the recording process. There are several projects that Joel and Oscar and Miles are working on where they do just that—go directly to the source, directly to the heartland."

Studio Gimmick

Some people can't make being in Paris just a part-time thing. Musician Peter Kingsbury, originally from Los Angeles, has been living in Paris for the past five years. When I spoke with him via phone, he was working on his new album in an attic atelier (studio). Kingsbury was a longtime member of the band Cock Robin, who, although they were Sony U.S. recording artists, found

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much of their acclaim and record sales in Europe and are still a vital, radio-play band there. As Kingsbury explains it, "The band broke up, and by '91 I had an album of my own that I'd made in the garage in a home studio in Sunland. I took it and I came over here with a record and a knapsack, so to speak, and I've been here for five years now. I took the first three years really to learn the language and get acclimated, and in the last two years, I got serious about my music again."

Asked why he chose Paris over other European cities, Kingsbury laughed and replied, "If you were in my shoes and your options were Munich, or Strasbourg, or whatever, what would you do? I loved the lifestyle. I just got on with the French, and they had no questions about my music. It was accepted, and I thought I could get started again and grow here—just grow as an artist, compared to in the States; it's one of the things that's depressing about the States. It's more about the music here, about the artistry and the

BITS & PIECES

Dutch artist **Robby Valentine** recently installed a 32-channel Soundtracs Solitaire console with VCA automation in his new home studio. The console, as well as the rest of Valentine's new gear, was supplied by distributors Morel Muziek...Studio Audio reports recent SADiE system sales to a number of UK radio stations, including **Orchard FM, Radio Aire, Radio City** and **Galaxy FM.** Several radio stations in mainland Europe, such as **Hessischer Rundfunk** in Frankfurt and the Estonian **Broadcasting Company,** have also purchased SADiE systems...**Alchemea,** the London College of Professional Audio Engineering, Production and Multimedia, recently hosted a series of lectures by producer Julian Standen. Standen's credits include Siouxsie & the Banshees, The Soupdragons and The Smiths, among others. The

—CONTINUED ON PAGE 84

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record. In the States, it seems to be more about numbers.

"The priorities are just a little different," he continues, "we can start with the cuisine if you want. I mean, the concept of going out and ordering in Chinese food or something to the studio, well, I don't think so. Like at Studio Plus XXX, you have the culinary skills of a girl named Lydia. She's from Bretagne, on the west coast, and she cooks very much from the provinces. She comes in with these meals, and they are so simple, and so basic, and so wonderful, and it's always done with pleasure. If you want, I could just talk about that for hours!"

Being a working musician in Paris, Kingsbury has been around quite a few of the studios. He says, "I've worked at Davout, which is almost like working at Fox in L.A. It's a big soundstage. There's another studio like that here, Studio Ferber, where they also have a very big soundstage and a lovely piano. An old, sort of rock '70s vibe with really good people. And there's an SSL studio in Montmartre that I really like called Studio Musika—one room, very personal and private. It's in the back of a court-

—FROM PAGE 82, BITS & PIECES

seminars included recording and mixing workshops with the band Minibar in the school's SSL-equipped studio... Other recording schools that have recently purchased SSL consoles include the **Hochschule** in Düsseldorf and the **Institute of Sound Technics** in Japan...**Swedish Radio** (Stockholm) ordered 18 Philips IS5022 Sound Enhancers...The **Canadian Broadcasting Company**'s French-language network (Society Radio Canada) in Montreal installed a Euphonix CS2000 console with 48 channels of Dynamics processing in its TV Studio 42. Studio 42 provides live mixing and post-production... **John Cale** recently equipped his home studio with an Oram BEQ console...**Turtle Recording** (Richmond, BC, Canada) recently hosted sessions with Noise Therapy, the Hard Rock Miners and Hissy Fit. ■

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yard, and they will break their back for you."

Kingsbury, who now records for the French Barclay label, commented on the openness of the French to different styles of music. "Of course there is the Arab and African influence—not only Senegalese or Ivory Coast black, but you also have great Algerian singers and musicians. I think it's much more accepting of international exchange here than in the states. The idea of exposing someone like Khaled or Alpha Blondy in the U.S.—we just wouldn't think to do that. It's like, 'It's not in English, so get out of here!'

"Because of the language barrier, probably the majority of the people that buy my records here don't know what the hell I'm doing—but they respond to it! It's the idea that the most immediate thing is the musical dialog between the artist and the listener, and the listener responds first to the feel."

Sometimes, an American engineer or producer's sound becomes in demand in Paris. Grammy-nominated engineer/producer/songwriter Carmen Rizzo is one of those. "I did the Cheb Khaled record with Don Was for Barclay Records," he says, "and ever since I did that record, I kept getting phone calls from France wanting me to do projects."

Rizzo's credits include Seal, Geffen artist Doyle Bramhall, the UK-based Freakpower, Wendy & Lisa and Prince. When I caught up with him, he'd just returned from his new favorite Parisian studio, Studio Gimmick. Actually situated in the town of Yerres, about a half-hour southeast of central Paris, Gimmick has just been remodeled and is becoming popular with Americans, having recently hosted producer/engineers Mitchell Froom and Tchad Blake recording the French artist Kent. Like Guillaume Tell, it was originally a cinema, and now features an SSL 64 G Plus console with Ultimation, a Studer D820 48 and a Studer A820 24 with Dolby SR. The control room looks out through floor-to-ceiling glass onto a large recording room with several small iso booths. "I found it to be a great mix room," Rizzo says. "I was very happy with the results I got there. Although I stayed in Paris, they have rooms if you wanted to stay at the studio. And they have lots of equipment—a B3, a Fender Rhodes, and great vintage gear like Vox amps.

"The first project I did [in Paris] was for Les Rita Mitsouko about three years ago," Rizzo continues. "They are a great band that was being produced by Tony Visconti of David Bowie fame. We mixed at Studio Davout, where they have two SSL rooms, and had the first Ultimation in France, at the time. That was a very good room. But probably the most exotic place I've worked in France is Studio De Miraval, which is not in Paris, but in the south near Nice and Cannes. It's a twelfth-century chateau with an SSL room that is quite outstanding. I did Zebdah, who is also on Barclay Records, there.

"They definitely are into technology [in Paris]," Rizzo says. "Every room is 48 digital, and they always are into whatever box is new—the flavor of the month. One big difference in France that can be a problem is maintenance. Often they just don't have it. They wait till something breaks, and how they deal with it then is they call the manufacturer! It's different from, for example, working in England where things are always technically excellent. But while I love working in England, doing a project in France really has those great fringe benefits that make the technical problems worth it. It's just a better way of life, and, you have to realize, there is a lot more to life than just making records." ■

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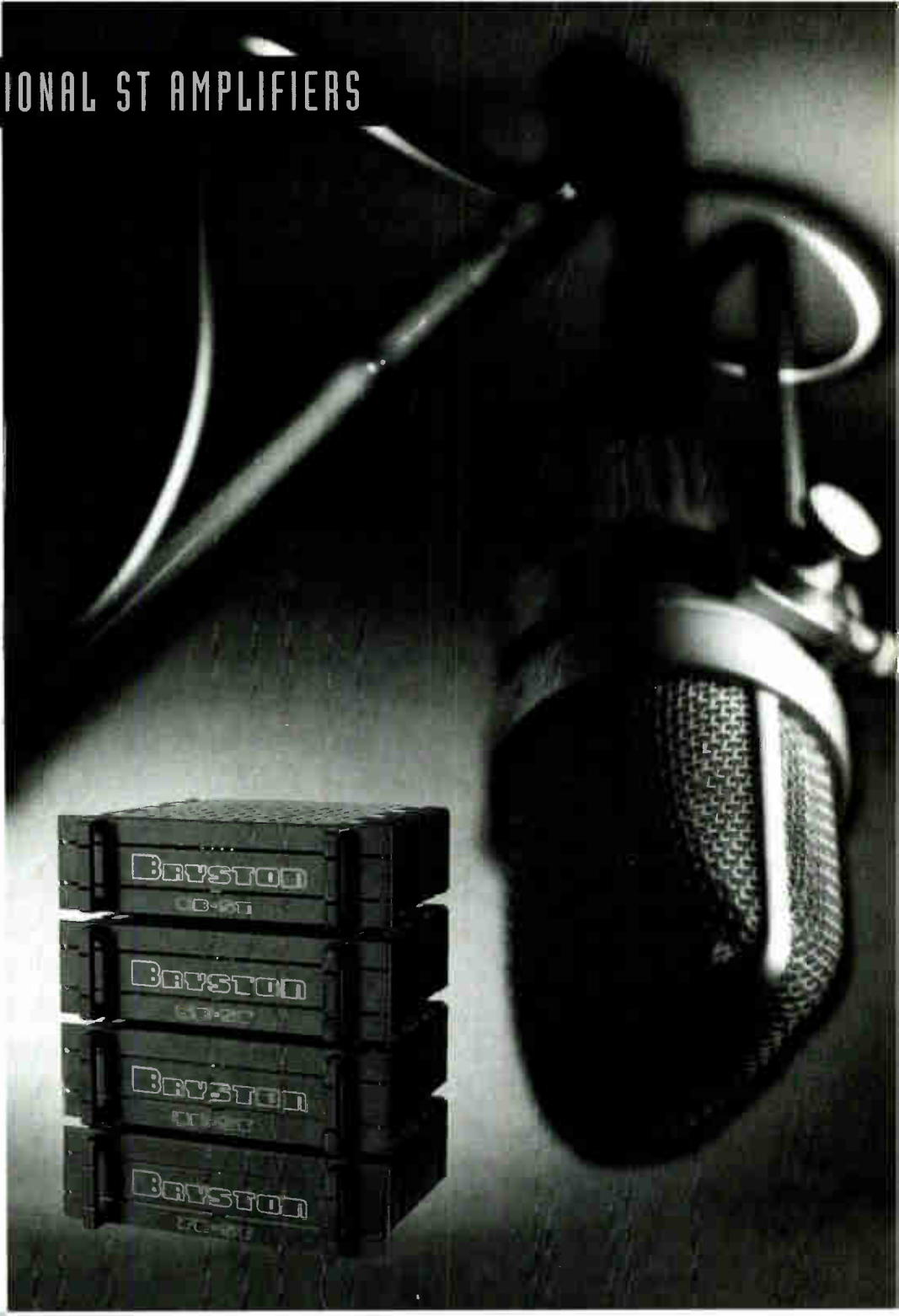

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Digital Versatile Disc

ALMOST READY FOR PRIME TIME?

by Philip De Lancie

After covering the launches of DAT, MiniDisc and DCC, those of us in the business of reporting on prerecorded media formats may be forgiven for approaching new formats with a bit of caution. The latest entry, the Digital Versatile Disc (DVD), has been in the pipeline for years, and its progress from concept to reality has been covered from time to time in the "Tape & Disc News" section of this magazine.

But now that actual DVD products are on the threshold of release, and most (but not all) of the details are in place, it seems like the right time to dig deeper into the new format—actually a family of formats—to see what it has to offer and what obstacles may lie in its path. With that in mind, I recently packed up my pencils and notepad and headed to San Jose for a DVD briefing that was offered in conjunction with this year's Replitech conference and exhibition.

As is to be expected around format launch time, a good helping of what was said about DVD at both the briefing and at Replitech had the ring of boosterism, the usual presentation (by those who have a stake in a product's success) of the hoped-for outcome, as if it is the only likely scenario. Warner Home Video president Warren Lieberfarb, for example, offered the following painstakingly objective assessment of DVD's prospects: "The success of DVD is inevitable." But along with the standard cheerleading, the sessions offered a good helping of valuable information that clarified the overall rationale for the DVD family, while highlighting the fact that some important issues, most notably copy protection, remained unresolved just months before the projected launch.

The copy-protection issue arises from the fact that DVD is intended to be a single, unified format in the service of at least three masters: the major movie studios, represented by the Motion Picture Association of America; the consumer hardware manufacturers, represented by the Consumer Electronics Manufacturers Association; and the computer industry, represented by the Information Technology Industry Council. The copy-protection (encryption) needs of these various groups are simply not the same, and agreement has proven elusive. The parties apparently can't even agree

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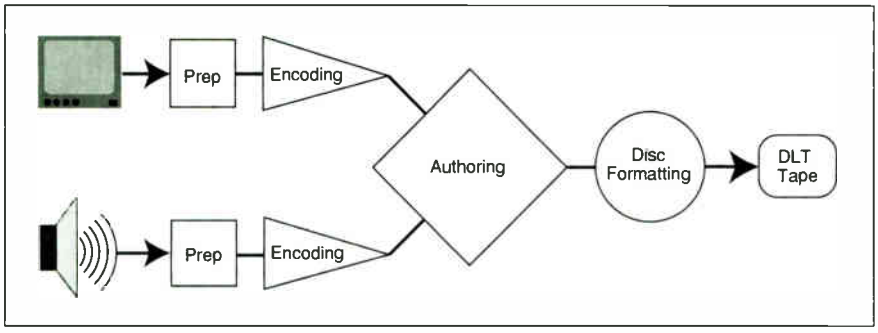

DVD production flowchart

about not agreeing; according to *Variety*, representatives of Toshiba in Japan have twice claimed agreement (most recently in late July), only to be contradicted by representatives of U.S. companies with whom they supposedly agreed.

The copyright problems are serious enough that as of this writing most of the major studios have yet to commit to title availability at launch. According to *Billboard*, this has caused at least some of the major hardware manufacturers to consider delaying their rollouts until early 1997. An additional challenge has been posed by the need for a "one-stop" rights clearinghouse to handle all the licensing issues raised by the integration of patented technologies from a wide variety of sources, most of whom are fierce competitors. But delayed or not, DVD is coming, and with it the possibility of major changes to the process of preparing entertainment content for delivery to consumers.

DVD'S HISTORY

To understand what DVD is, it is helpful to go back briefly and look at how it evolved. The primary impetus for a new entertainment carrier came from the film industry, which has been looking for a better way to serve the home video segment of its market. With the dramatic drop in retail home video prices in recent years, the movie studios would like to find a means of delivering their products to consumers that is less expensive to mass produce than VHS tapes.

In the long run, perhaps, that may mean electronic delivery through cable or telephone networks, but—barring unforeseen technological breakthroughs—the expense of putting in place a true high-quality video-on-demand infrastructure to reach every household that currently rents or buys videos means that such a system is a decade or more from full deployment.

In the meantime, seeing how easy life is for their friends in the music and software industries, who enjoy raw disc replication prices well under a dollar per unit, the film studios have developed disc envy. Although the price of CDs is right, the capacity of the CD family is limited by the data density of the underlying format. Proponents of the White Book standard tried to get around that problem by using MPEG-1 video compression, but enthusiasm for their Video CD format was muted both within the industry and among consumers, mostly because it took two discs to hold feature films, and the image quality was not noticeably better than VHS.

The need for a higher-density format was clear, but the path to that goal was not. A consortium of studios and hardware manufacturers, led by Time Warner and Toshiba, coalesced around a proposal they named SD, while Sony and Philips, traditional tenders of the CD flame, came up with an alternative, dubbed MMCD. SD offered longer playing time (up to 270 minutes), but its dual-sided, bonded construction raised the specter of significantly higher production costs.

For much of 1995, it looked as if another format war was in the offing. But eventually, largely through the intercession of the computer industry, cooler heads prevailed. Computer vendors were anxious to avoid a replay of the development history of CD-ROM, where a free-for-all environment resulted in a haphazard patchwork of formats. It was hoped that this time around a common platform could be agreed on for disc-based entertainment and information delivery, thereby allowing all to share in the benefits of compatibility and economies of scale. Miraculously, that vision has largely been realized in the form of the Digital Versatile Disc.

THE DVD FAMILY

At first glance, DVDs closely resemble their CD forebears, with physical characteristics including a diameter of 12 cm (approx. 4.75 inches) and a thickness of 1.2 mm (two .6mm layers). For prerecorded discs, four physical variants are envisioned; the single-sided/single-layer model (Fig. 1a), with a data capacity of 4.7 Gigabytes will be the first to hit the market, followed eventually (not necessarily in this order) by single-sided/dual-layer (8.5GB; Fig. 1b), double-sided/single-layer (9.4GB; Fig. 1c) and double-sided/dual-layer (17GB) types. As of this writing, however, important details of the dual-layer and double-sided technologies remain obscure, effectively leaving the 4.7GB disc as the DVD standard for the time being.

DVD's increased storage capacity over CD comes from reducing both the size of the disc's pits and the distance between adjacent tracks of pits. The overall system design, however, is still close enough to that of the CD that any prerecorded CD-Audio or CD-ROM disc will be readable on a DVD system, though current CD-Recordable discs will not be, due to differences in the color of their reflected light.

Surprisingly, given the advent of 6x,

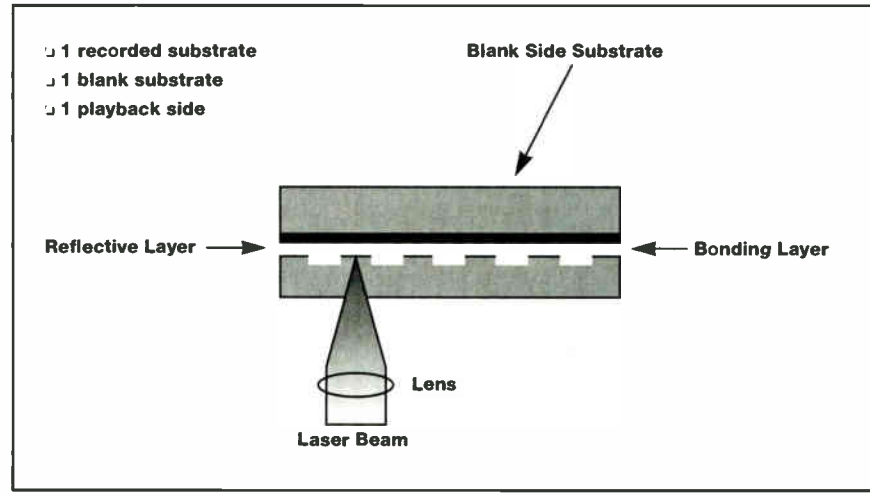

Figure 1a: the single-sided /single-layer model DVD

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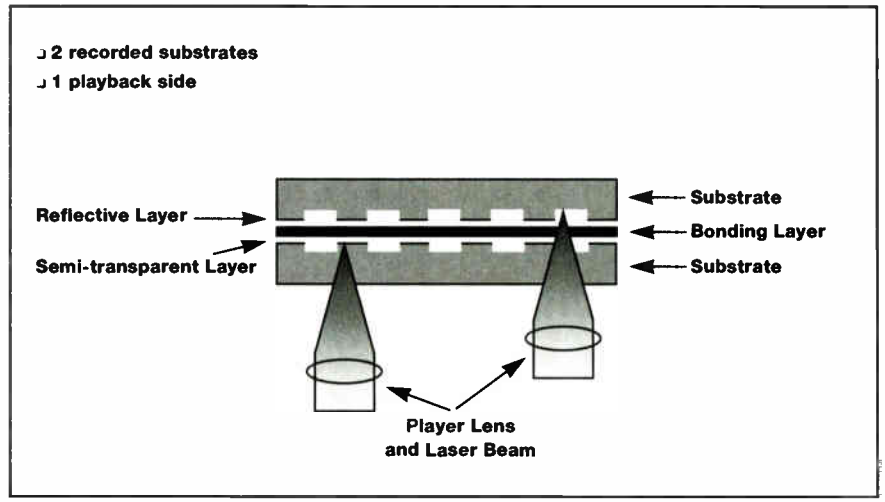

Figure 1b: single-sided/dual-layer

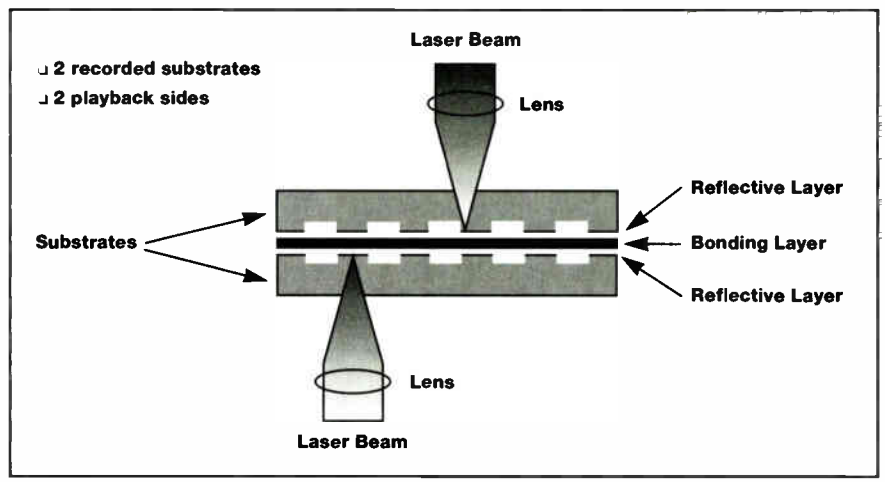

Figure 1c: double-sided/single-layer

8x and even 10x CD-ROM drives, the initial rotational speed of DVD drives (based on a reference linear velocity of 4 meters/sec.) will be equivalent to only about two to three times the nominal rotational speed of the CD format. According to Dr. Jan Verhoeven of replication gear vendor OIME, current firmware limits the playback system to a data throughput of about 1.37 Megabytes/second, compared to roughly .6 MB/second for a quad-speed CD-ROM drive. File access time is in the range of 40 milliseconds. Speaking at Replitech, Verhoeven said he expects speed to increase with further development efforts.

The system uses a Reed Solomon error correction scheme and 8-to-16 signal modulation. The data structure of the disc is based on sectors of 2,064 bytes comprised of 12 bytes for the header, 2,048 bytes of main data and 4 bytes of error-detection code. Built on this foundation is the core of the DVD system, the Universal Disc Format file system, which provides the common platform-independent structure for storing and accessing the various data types. The structure is a hierarchy made up of volumes, discs (in a multidisc volume), sides (in a double-sided disc), title sets (up to 99 per side) and cells.

As with CD formats, DVD specifications are referred to in terms of "books." Applications of the format are broken into five main categories (books A to E, respectively): DVD-Video, DVD-ROM, DVD-Audio, DVD-R (write-once) and DVD-RAM (rewritable). According to a Replitech presentation by Geoff Tully, chair of the Interactive Multimedia Association's DVD special interest group, there are no current standards for either of the recordable forms of DVD. The prospects for early agreement in these areas, however, appear to be fairly good, judging from the comments of other conference participants. Allen Bell of IBM said he expects the rewritable disc to employ phase-change technology (currently in use in Panasonic's PD-format drives) and offer 2.6 GB per side, while a write-once DVD would deliver about 4 GB/side. And Mary Sauer of Sonic Solutions said

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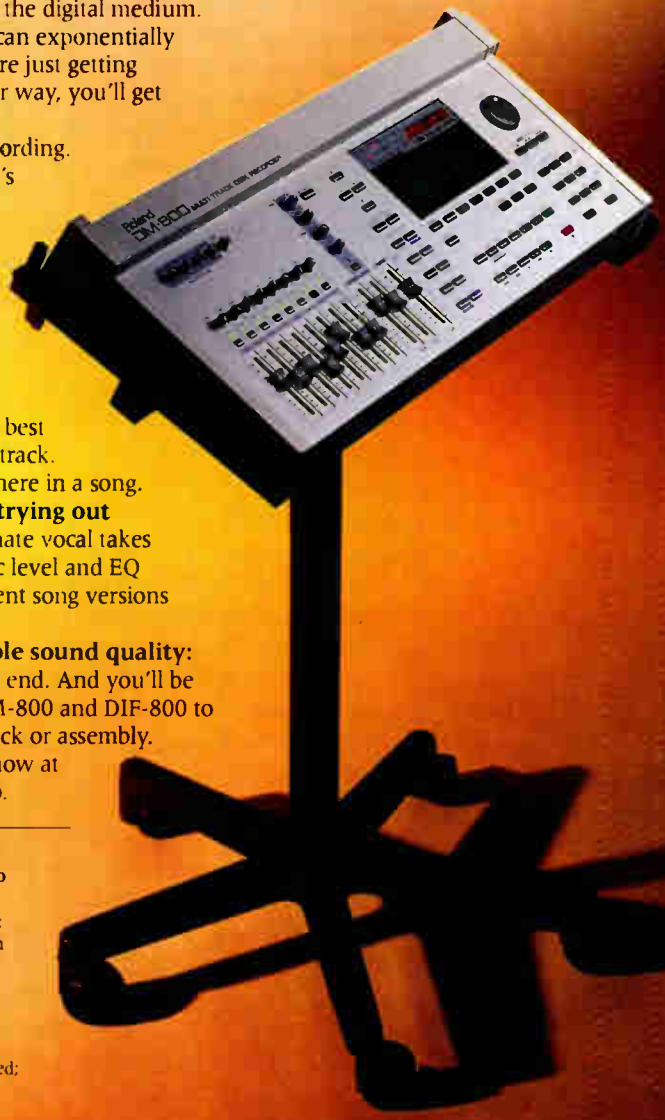

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that she believes that write-once systems—crucial to disc developers for prototyping their work—will be available as early as the beginning of 1997.

DVD-VIDEO AND DVD-ROM

For now, the main focus is on the prerecorded DVD applications, specifically DVD-Video and DVD-ROM. Copyright issues aside, these variants are nearly completely defined, with specification versions "0.9" having been available to licensees since May. The video specification calls for MPEG-2 variable-bit-rate encoding using 1 to 10 MBits/second, depending on the complexity of the image at any given moment.

Up to eight audio streams will be available to accompany the video. For NTSC DVDs (those released outside of Europe, where the PAL video standard predominates), audio will normally be compressed using Dolby's AC-3 algorithm, which allows up to "5.1" channels (left/center/right, left/right surrounds and a low-frequency-only track for subwoofers). Linear PCM stereo at 16-bit/44.1kHz or MPEG-2-compressed audio may be used as well.

The multiple audio streams may be used to deliver a movie on one disc in several languages (subtitling in up to 32 languages is also supported). Users will gain access to these various language options, as well as navigational options (go directly to a given scene, etc.) by means of graphical menus; the code required to offer these and other "interactive" features will be embedded in the multiplexed bit stream and interpreted by the player at playback. The combined audio/video data stream is limited to an average of 4.69 Mbits/second, which yields a maximum play time of 133 minutes for a single-sided/single-layer disc.

DVD-Video set-top players, which plug into TVs, are expected to include features such as slow motion, freeze frame, repeat track or segment, multiple camera angle display, closed captioning and parental lockout. According to Tully at Replitech, manufacturers including Panasonic, Philips, Pioneer, Toshiba and Thomson had announced specific models that were supposed to be on sale before the end of 1996 at prices ranging from $500 to $700. Given continuing uncertainties, those announcements may no longer be valid. Replicators including Warner Advanced Media, DADC, Cinram and Nimbus were said to be either ready to go or planning to be ready in time for a launch late in the year.

DVD-ROM is expected to roll out soon after DVD-Video. According to Tully, the format uses the "UDF Bridge" file structure, a UDF variant that maintains a link backward to the ISO 9660 standard employed on most CD-ROMs. According to the IMA's DVD SIG Web page, "In order to view the DVD movie discs on a computer, the system must be equipped with a special DVD MPEG video decoder and Dolby AC-3 audio decoder (neither of which is currently available). This could change if some manufacturers made a DVD-ROM drive that included the DVD Movie player decoding circuits, but this would be a very expensive drive (the MPEG circuit requires a significant amount of RAM, plus other expensive circuitry not needed in a plain vanilla data drive). No manufacturer has announced plans to make such a product."

Thus the main application for DVD-ROM will be as a bigger CD-ROM, useful for multimedia content rich in video, audio and graphics, but not of much interest for delivering application software (a less glamorous but extremely important part of the CD-ROM market). According to Tully, Compaq and Gateway are expected to be the first to include DVD-ROM drives in their systems, with IBM hinting at a possible launch by year's end. Other major movers such as Microsoft, Apple and Intel have been active participants in the specification process.

DVD-AUDIO

DVD-Audio is still in the exploratory stage, and no agreement on what, if anything, to do with the format is expected for the time being. Groups such as the AES, the Japan Audio Society and Acoustic Renaissance for Audio have been looking into the possibilities. ARA has floated a wish list that allows for both stereo and 6-channel versions of program on a single disc using linear PCM at 48 kHz and/or 96 kHz, and companies such as Pioneer and Philips have made noises about some form of DVD-Audio player.

Despite this DVD-Audio activity, there remains little evidence that consumers are eager to rush out and add yet another type of music carrier to their collections, or that retailers would be willing yet again to wade into the dual-inventory morass. Surround-sound for home theater has been steadily gaining popularity for years, but the idea of multichannel sound for audio-only programs was a notorious flop in its last outing (Quad). The fact that the tech-

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nology employed today would be far superior does not necessarily translate into greater consumer demand for the product category, or into a willingness on the part of record labels to spend extra time and money in the studio producing multichannel mixes.

As for the fidelity benefits of higher sampling rates and greater bit depths, I suspect that in true double-blind comparative listening tests few listeners (in or out of the music industry) would be able to tell much difference between a standard CD and a 24-bit/96kHz DVD for most types of music. Indeed, there remains so much room for improvement in other links of the audio chain, all the way from microphone placement through to home speaker design, that the fidelity of the CD can hardly be singled out as a limiting factor for contemporary musical enjoyment.

All this is not to say that the potential for improved fidelity should be ignored, or that DVD-Audio proponents should not be applauded for their efforts to save us from a world in which lossy compression schemes such as AC-3 and MPEG-2 become the audio norm. It's just that what made the CD such a marketing success (eventually) was the obvious advantages over existing carriers; the case for DVD-Audio is nowhere near as clear-cut, especially since CDs will play in DVD players, but not vice versa. Thus, the outlook for audio becoming a driving force in DVD's initial adoption appears doubtful at best. Further, given the existing body of work digitized at 44.1 kHz, the prospect of a new 96kHz standard raises real concerns regarding sample rate conversion; 88.2 kHz would seem to be a far more sensible alternative.

ASSESSING THE MARKET

So what is likely to be the driving force in DVD's adoption? Given the format's genesis, and the history of the CD's development, one might think that the consumer market for DVD-Video players would provide the base on which computer applications like DVD-ROM will be built. And at least two speakers at the DVD briefing presented research suggesting strong international interest among consumers for the new format. For instance, interviews conducted by Lieberman Research with 5,600 comfortable to affluent consumers in the U.S. and Europe suggests that about a third would be strongly interested in purchasing DVD-Video at a $499 price point. Lieberman predicted first-year player sales in the range of 6 million

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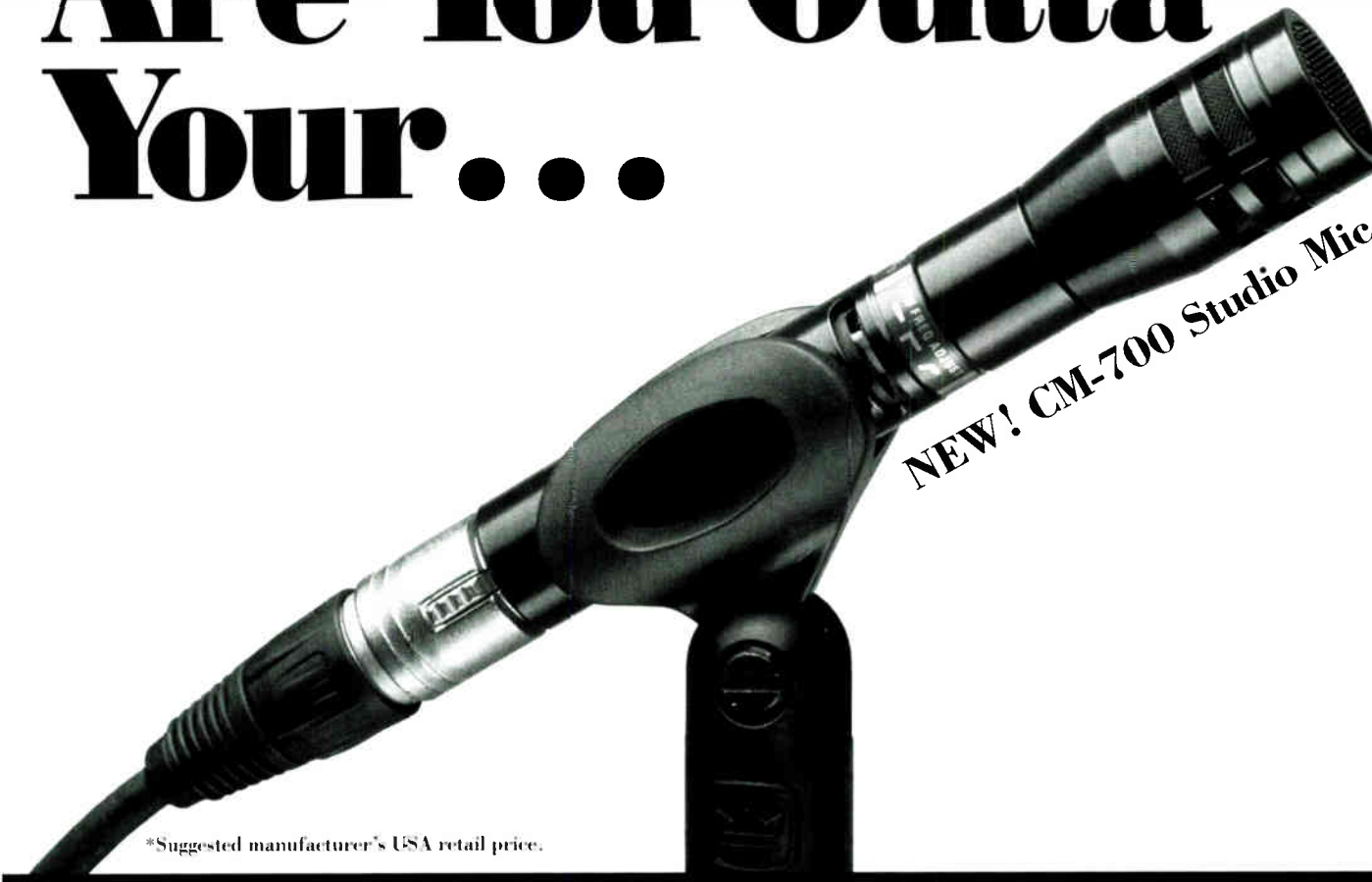

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– Dave Foister, Reviewer, Studio Sound

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worldwide, while Ed Wolkenmuth of The BASES Group offered a range of 2.8 to 3.7 million. Either of these would represent an extraordinarily successful launch compared to devices such as the CD, the VCR and the PC.

Surprisingly, however, most analysts see the greatest long-term potential for DVD not in the consumer electronics market but in the computer industry. Ted Pine of Infotech presented estimates at the DVD briefing showing DVD drive sales of 1 million in 1997. Pine noted that other estimates had been far more optimistic, but that his view was tempered by the continuing sharp decline in OEM prices for CD-ROM and CD-R drives, which will be competing for the same "slot" in the computer. By 2000, however, Pine expects DVD to be chosen for about half of all computers that sell with an included optical drive, bringing sales up to the 40-million mark. At that point, he sees economies of scale sufficient to allow set-top player prices to fall to the magic $200-$300 range, where DVD-Video can really take off.

If the predictions of the market watchers are true, the replication industry is in for a DVD bonanza down the road. But DVD is a substantially more complex format to produce than CD, requiring new investment in equipment and tighter tolerances in manufacturing. Are the industry's vendors ready to provide the tools needed to gear up for the new format?

Judging from the exhibition hall at Replitech, with 50 companies offering "DVD Ready" production gear, many vendors are eager to get the format off the ground and are more or less ready for the initial single-sided/single-layer version. Injection molding, metalizing, bonding and printing lines were all in full swing on site, and companies such as Sonic Solutions and Panasonic were showing systems for MPEG encoding and DVD authoring. It is not clear how many of these exhibits are backed up by products currently deliverable in final usable form, and in that sense, launch delays may in fact be a blessing, giving everybody a bit of breathing room in their delivery schedules. But eventually DVD will come out of the exhibition hall and into the marketplace, where the format will face its ultimate test: the battle for the hearts and pocketbooks of consumers. ■

Mix *media and mastering editor Philip De Lancie is a mastering engineer at Fantasy Studios in Berkeley, Calif.*

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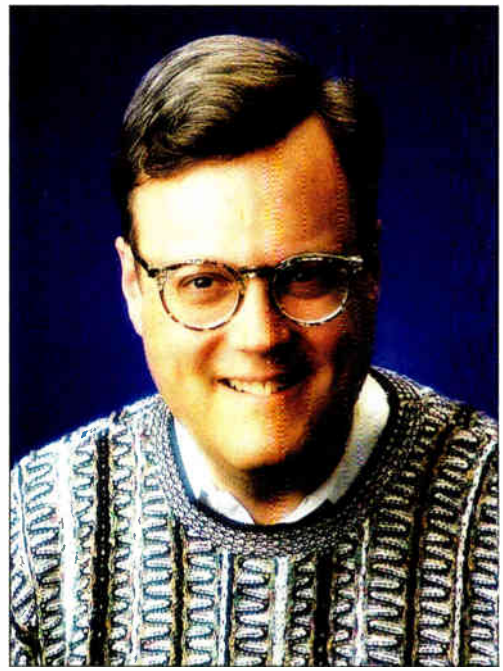
Tomlinson Holman's contribution to the understanding of theoretical and practical audio has had a profound impact on creators and consumers alike. His distinguished career in audio, video and film spans 28 years; his influence has been felt by virtually all sectors of the motion-picture production and exhibition, and home playback system markets.

As a theoretician well-grounded in the practicalities of designing and building professional and consumer playback systems, Holman has the unique ability to push the state of the art and, in doing so, challenge entire industries to achieve new quality standards.

All THX (Tomlinson Holman's eXperiment) patents come directly from Holman's experiments and research. Serving for 15 years as corporate technical director for Lucasfilm Ltd., he spearheaded the concept, development, design and implementation of the technical infrastructure for George Lucas' Skywalker Ranch, including the Skywalker Sound post-production complex. From 1987-1992, he designed many aspects of the Hollywood Bowl's sound system, including electronic enhancements.

Holman has also been teaching film sound at the USC School of Cinema since 1987 and is currently an associate professor. Late last year, he resigned his position with Lucasfilm to set up and head a new company, TMH Corporation, which will research and develop new professional audio and consumer electronic systems. We caught up with Holman during a rare break from his teaching at USC and ongoing research with TMH Corp.



Can it really be true that you've been involved with the audio industry for close to three decades?

I started working full time as a professional the moment I got out of college; I have a degree in broadcasting and communications from the University of Illinois. I started in EE and shifted midway through undergraduate school to broadcasting. Engineering, at that time, was a very narrowly focused view of the world. I wanted to work at the kind of things I'm doing now—engineering for entertainment, for the arts—but everyone around me in engineering school seemed to be on the straight and narrow for the corporate path, and that was something that didn't interest me.

During my career, I've been in some very different areas; while they have all been related to audio, they've ranged from film sound production to high-fidelity equipment, and back to post-production and sound systems for theaters. Even though it is eclectic, the one thing that links it together more than anything else is inquiry. Once it becomes a boring job, I move on.

Without your focused attention to both technology and the creative aspects, many developments wouldn't have taken place.

One thing that links all this has been knowledge that already exists; I go to technical libraries frequently. It isn't so much that you have to be a genius—because I don't think that I am—just that you do need to know what the developments are in a variety of fields. While designing a sound system, for example, you're dealing with a lot of different aspects, from the mechanics of how it works to the psychoacoustics of how it's perceived. Experts get to be experts in fairly narrow fields; they don't have the time to look at what's been done in parallel fields, or ones that might be relevant.

It's great fun to cross all of these borders and have a competent conversation with the world's leading people in psychoacoustics or loudspeaker design. I'm not a real expert in any of these things; I'm just knowledgeable enough to talk to people in all those areas.

You spent some time at Advent, designing loudspeakers and amplifiers.

I came aboard in 1973 as an engineer; the chief engineer left about six months later, and I got his job. The nice thing about Advent is that at that time I could take it as far as I could. The company was already successful in the video market; therefore the audio electronics and loudspeakers fell to me and others, including Andy Kotsatos, who is now president of Boston Acoustics. Those of us who worked at Advent often reminisce about the experience; the concentration of intelligence was amazing for a few years and crossed so many boundaries, from sales and marketing to music and engineering—a real amalgamation of talents.

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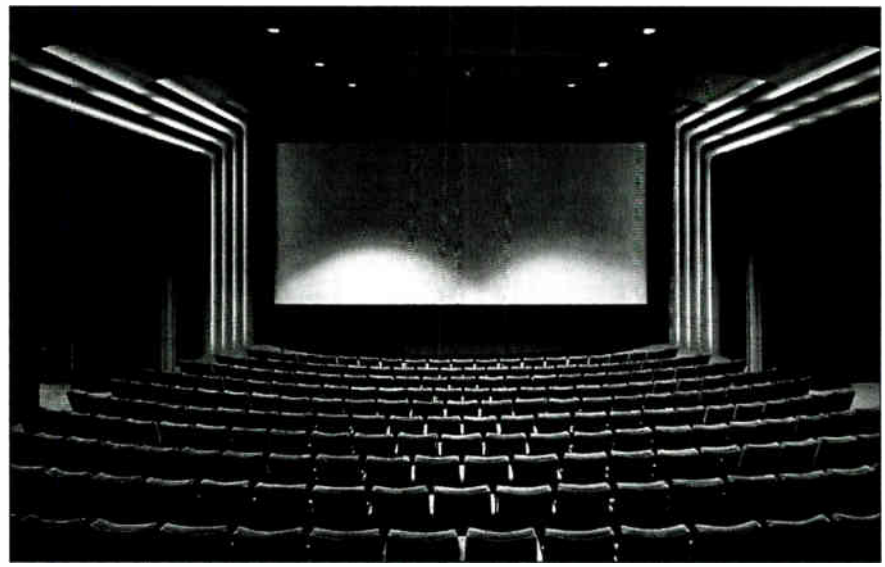

The Stag Theatre, a THX room at Skywalker Ranch

I started in the film industry [as a mixer] and went into hi-fi because of the miserable state of sound. I would have stayed if the soundtrack hadn't wound up on mono Academy optical. At the University of Illinois, I did everything: production recording, editing, mixing for film documentaries. I stayed at school five years after graduation—that's the time I got to read everything in the library. Today, people automatically become specialized, because the fields grow; people who are in the nitty-gritty of digital audio, for example, are unlikely to be as expert in psychoacoustics, which is unfortunate.

So you had a broad foundation. How did the move to Lucasfilm come about?

Well, they looked for six months for someone to be the chief engineer; the contact was ultimately made through Dolby Laboratories, who were using my preamps and power amps at their lab. I was with Advent for four years and left [to found] Apt Corporation, a company making preamplifiers and power amps. Apt got up to about 50 employees and had about 30 percent market share in preamps. But the high end had a "Preamp of the Month" syndrome, which was that certain units would be blessed for a certain time and then collapse. While ours went on for eight years and are still in service today, it was a very tough field.

Apt was a 50-50 partnership [Holman served as director of engineering], which made it very difficult to leave, but I decided to do it because the opportunity at Lucasfilm was so great. Here was the first movie studio to be built from the ground up since the '30s. We had a music-scoring stage, mix-to-picture, sound editorial—a typical full-function film post-production facility.

Starting in 1980, I got the opportunity to examine the whole filmmaking process. Should we buy dubbers? Or should we buy multitrack digital machines? What technology should we get into? All of this was in parallel to a very significant project that eventually became DroidWorks; ultimately, it transitioned outside the company to make digital audio workstations. This was George's [Lucas'] dream in 1980, to make films digitally, save money and increase quality.

In theory, that meant that post-production, editorial and mixing was going to be all-digital; analog was only meant to be a stop-gap measure. When we looked at film-dubbing consoles, they weren't very good audio quality. Then we looked at music-industry consoles and found that those built in serial production in relatively larger numbers were much better quality. So we took a Neve quad console and reconfigured it for film sound mixing by designing a panner—we put over 3,000 hours into that console with multichannel panners and the monitor matrix you need for film sound, which today are off-the-shelf items.

That year-and-a-half gave me the ability to look at everything in the production and theatrical chain—to clean up parts of it, to adopt others and, in the case of the theater loudspeaker, to start over. At that time, Dolby Stereo had made such an obvious advance in film-sound quality that the loudspeakers and room acoustics of movie theaters needed attention. THX was the result of attempting to improve the overall playback quality of film sound, given the Dolby advances.

Did you continue to work with Dolby on the evolution of its 4-track 35mm systems and 6-track 70mm formats?

To a certain extent. What we did on *Return of the Jedi* was change the magnetic oxide. When we looked at the magnetic oxide they were striping on 70mm prints in 1983, it was equivalent to Scotch 102 from the early '50s! The problem was there was only one vendor, but a second vendor was interested and had bought up the old MGM striping plant. We went with them because they were striping a much better oxide. The interesting thing was that the difference you got in headroom was 11 or 12 dB—a major improvement.

Jedi was pretty good-sounding on 70mm, but there were still a few orchestral passages where you could hear IM. What was happening was that the accumulated distortion over all those [dubbing] generations had suddenly become audible; it wasn't audible on the [print] master but became obvious on the release print—it was just one generation too many. By the next year, we pushed 3M into making much better mag film stock for the post-production generations. When we had got to *Indiana Jones and the Temple of Doom*, there was an incredible passage for IM where the bass drum is banging with choral music above it—the [new formulation] passed the test, and it did not intermodulate audibly.

The biggest problem in the chain was the theater loudspeaker. The [Altec] A4 was developed in 1947 and was very good for its era. But by the '70s, it was way out of date. It was a chicken-and-egg situation, with Hollywood using it because it had 80 percent market share in theaters. I set out to design a more compact, better-sounding system.

A large amount of what makes [Lucasfilm's THX System] work was researched in the library by patching together various developments—spotting the right ones, discarding the wrong ones and stitching it all together into a comprehensive system. THX's stock in trade was to get the room acoustics right, and then apply a good sound system. Then you make translation from the dubbing stage into the theater sound far better.

In other words, get the room sounding right, and then put in a system that will work correctly in that environment?

Right. There were some obvious observations. I took home a copy of *Star Wars* and listened on a wide-range sys-

tem that went down really low. There were rumbles on the soundtrack that would cut in and out from one shot to the next—the mixers would never have left that there if they'd heard it at the dubbing stage! So the first THX design was merely an attempt to build a system for the dubbing stage.

Was there an attempt to keep the design relatively simple?

Yes, it's all in the two-way active crossover. As a matter of fact, I did look at three-way designs rather extensively—the later-generation Apogee Sound design for smaller rooms uses a three-way configuration—but a two-way was serviceable. I couldn't figure out a way to get the three-way to work as well—I couldn't get a match in amplitude, phase and directivity plus timing in that environment. Given the screen and its action, the top-octave response of modern compression drivers is ragged but is there. It would be nice to have some device that worked as a piston at those frequencies—you'd get more consistent results—but I still don't know of one.

But isn't the key aspect of the THX design that it uses both electronic and acoustic functions at the crossover point—using the propagation properties of the LF drivers and the 90-by-40-degree MF/HF horn to dramatically smooth the transition between the two components' frequency ranges?

It's not really a new idea; Don Keele wrote about it in an AES pre-print, and it was used in the standard JBL studio monitor with a bi-radial horn. JBL built that horn to match the directivity of the 15-inch driver crossover. The directivity index increases the amount of the direct sound to the user—which helps us localize sounds—compared to the reflected sound. What people don't realize about film sound systems is that we are our own worst enemies in terms of intelligibility! We put up all this interfering music and effects in front of the dialog, which gets buried. If you don't deliver it with a sufficient direct-to-reflected ratio, and an adequately low background-noise level, you are going to lose it in the mix.

It's not only a directivity match, but the phase alignment at the crossover point. To be in-phase at the crossover, Linkwitz-Riley filters depend on the acoustical response and not just the electrical response. The system's electrical response is buttered up in order to make it come out such that acoustically it is fourth-order, which means tailoring the crossover to the exact drivers. And that's what hardly anyone does.

You have also emphasized the importance of using a hard defined center channel while mixing for film and video, and ensuring that three identical, front-channel loudspeaker systems are used for playback in the home.

That's not a new concept; it started in 1932. The biggest problem is that even though center-channel loudspeakers are selling in large numbers for the home now, people think it's the dialog channel—that it has different requirements than the others. The truth is that it should be perfectly matched to the other channels, because sounds move. What most consumers don't understand is that the music elements are made 3-channel, and ought to be reproduced via 3-channel systems.

You also make a good case for using more than the traditional four LCRS channels for playback.

And of course that's what was found in the '30s, when three front-oriented channels were used for orchestral music playing in concert halls; interestingly they really had a surround channel. If you look at the drawings, they used microphones placed close to the orchestra and picked up relatively little hall sound.

What they did was to play it back in another hall. They now had the direct sound of the orchestra picked up from the original hall and created the reverberation in the receiving hall. This was so much smarter in 1932 than what we do today to trick the consumer into thinking they need added reflections in their playback equipment using DSP algorithms, which is foolish.

Tell me about your new focus these days. How did TMH Corporation come about?

I was an employee of Lucasfilm until 1987, and then a consultant until a couple of years ago when my company became a contractor. The employment and consulting was exclusive to Lucasfilm until about a year-and-a-half ago. I felt it was constraining to have to justify everything to George's executives. Now I am working in a number of fields, including multichannel audio. I'm making professional products that probably wouldn't offer big enough markets to interest companies like Lucasfilm—one thing we're making is a multichannel panner. And there are other products I plan to make in that series which will be relatively simple and inexpensive. People have already asked me for a 6-channel fader.

One of your major projects is the Microtheater monitoring system. How did that come about?

The Microtheater desktop-based dubbing project is a monitor system that al-

TOM HOLMAN'S '90s MANIFESTATION

TMH CORPORATION

Tom Holman's latest focus is TMH Corporation, a start-up technology firm that creates, manufactures and licenses products for the entertainment industry and related consumer markets. "A core asset of the new company," Holman says, "is a compre- hensive system-design philosophy that links artists' original conception with its final presentation. Initial products are targeted for producers of entertainment software, whose needs for sophisticated and refined production tools is ever increasing."

TMH Corp. will examine market opportunities created by the converging cinema, computer and communications industries. "We are actively developing multichannel sound products for a variety of professional and consumer applications. High-definition video systems are also under investigation. In addition, TMH consults for digital production studios, exhibition, consumer electronics companies, and high-tech companies wishing to apply digital technology to entertainment."

Company founders include Friederich (Fritz) Koenig, who first worked with Holman in 1980 as GM of Apt Corporation; the duo were instrumental in Lucasfilm's Theater Alignment Program. S. Ross Hering is the former director of business development for Lucasfilm's THX Division and worked closely with Holman while expanding TAP and in developing the THX Laser Disc Program. *—Mel Lambert*

lows true film mixing in a DAW environment. C41, as it is called, will let you make competent temp dubs, premixes, print masters, etc. In this way, facilities can do a lot of things that traditionally require dubbing stages; time required on the stage can be spent instead in editing rooms. We have some tricks that get rid of the room-acoustics problems of small rooms, and how to scale the sound from one environment to another.

Today in Hollywood, it's largely perceived that digital audio workstations are for editorial work and not for mixing. But, as these DAWs become more sophisticated, with control surfaces and more automation, it's clear that they are capable of doing more jobs—especially when they have a multichannel panner. So the direction we're headed in is for the sound designer/editor/mixer to produce more finished goods in the editing room, and being able to do that [simultaneously] in multiple rooms.

The direction we're headed in is for the sound designer/editor/mixer to produce more finished goods in the editing room.

Because of the nature of the system in smaller rooms, you have to employ a phantom center. You asked me earlier about a dedicated center channel. I've come full circle; now I have a phantom center. If you're doing 4-channel work, C41 uses left and right satellites, a subwoofer and one surround; two surrounds if you're handling 5-channel dubs. It's currently mostly analog electronics, although there is some digital in it. We intend to incorporate more DSP as time goes by.

The C41 Microtheater monitoring system will be leased; it comes complete with everything you need, and TMH will handle final tuning and adjustment of the playback environment. Obviously, we can't fix background noise and other big problems—like the editor next door with a louder sound system than you—but we do fix the standing waves and so forth in small-room acoustics. We have very tight control over its installation because we're supplying the hardware. There are various application areas for C41: post-production, DDD Compact Disc and CD-ROM mastering, for example.

You and John Eargle recently organized IAMM '96, "International Alliance for Multi-Channel Music," a two-day colloquium that looked at the basics of multichannel audio, and hardware requirements for studio and consumer users.

There was some time pressure to get something to happen, because the theory was that people in smoke-filled back rooms were going to make a decision on the audio-format Digital Versatile Disc. We wanted to be certain that all opinions were aired and given an overview, including the use of 5.1-channel formats with split surrounds, and more.

I may be seen as tilting at windmills when I ask for more than 5.1 channels on a new Audio-DVD format, but really I'm not. What I'm trying to do there is to produce some kind of future-proofing of this disc medium. There are three things that determine the bit rate on an audio disc: sample rate, word length and number of channels.

INSIGHTS

While we could go on all day about sample rate and word length, the truth of it is that they will make a very small difference to most people compared to what 16-bit and 44.1 kHz can achieve if done properly. What will make a bigger difference than anything else is the number of audio channels; how many we have and how they're disposed. As I have pointed out in various articles, three or five up-front channels and split surrounds can achieve wonderful results for music, while overhead channels—where available—can add enhanced realism.

From a psychoacoustic point of view—that your perception is better in some parts of space than others—you should put more channels in the front hemisphere than in back. (Not that you don't want them in the back; it's just more important in the front sector because you have better resolution in that sector.) There's a lot of evidence which says that more channels would be nice—dating back from the work done at Bell Labs in the '30s on up through [the late] Michael Gerzon's work. But vinyl, FM broadcasting and the compact disc only offer two channels, so we have become used to 2-channel stereophony. But now there are maybe 20 million home theaters around the world that can play back at least 4-channel [Dolby ProLogic] soundtracks; and we now have a greater potential of using such 5.1-capable systems with audio-DVD.

How would you categorize the improvement in replay quality moving from 2-channel to 5.1 formats?

It is plainly audible to the casual observer. Most people who get a surround-sound system tend to exaggerate the surrounds—we are in the "ping-pong" era. Yet when it's done right, the [surrounds] are probably unnoticeable a good deal of the time.

As you add more channels, everyone can hear a difference from one to two; no question. Under the right comparisons, everyone can hear the transition from two to five, but I don't know where we reach the point of diminishing returns. It's clearly above five channels. In terms of sample rate and word length, increases here only satisfy a vanishingly small part of the audience. Going from 48 kHz to 96 kHz is so infinitesimal that it's simply not worth the bits, compared to adding more channels.

And what about enhanced bit resolution, from 16- to maybe 20- or 24-bit?

Well, the difficulty with that is that we need extra bit capacity for the recording and mastering medium, compared to the release medium. In the early days, we had a 2-channel, 16-bit Soundstream recorder and 2-channel, 16-bit releases; no problem. The first time you use a 16-bit multitrack recorder you've got a problem, [because] you can't have a 16-bit result if you add channels together. The professional always has to have greater word length than the release format. So it's kind of crazy to jump the release format to 24 bits because you'd have to increase the professional requirement very much greater than that.

Recent papers have shown that 16 bits are inadequate because the noise level is audible in the frequency range around 2 kHz, where we are most sensitive. When the replay level for 0 dB FS is 120 dB SPL, okay. But how many people play their systems aligned so that 0 dB FS equals 120 dB SPL? So if you turn it down from there and you have 100 dB maximum—those are pretty loud levels. Not levels you use in studios, but levels civilians use. Then that 16-bit noise is already below minimum audible threshold.

I think there will be a mass market in 5-channel material simply because you've got millions of people asking: "How do I light up these other loudspeakers?" And not being satisfied necessarily with the results they're getting now.

Do you plan to organize another IAMM?

Yes, we are currently formalizing that. We think it will bracket the AES conference; we're not trying to compete with AES in any way, but make it easy for foreign guests. One of the most important things we did was multichannel demos with multiple replay formats. John [Eargle] and I also co-chair the AES Subcommittee looking at new multichannel DVD, among other considerations. We had another big meeting at the recent AES convention [in Copenhagen], at which the European contingent raised a lot of [reactions] to the proposal that had come out of the L.A. group. The fact that DVD is behind schedule is actually very helpful, since the pressure is not quite as much as it was. It will be several years before we'll see an audio-only disc. ■

Mel Lambert currently heads up Media-&Marketing, a consulting service for pro audio firms and facilities.

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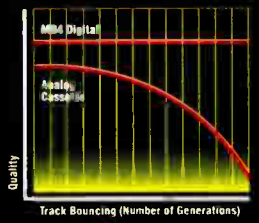

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BY TOM KENNY

POST SCRIPT

JOHN BONNER
1929-1996

by Larry Blake

It's such a shame that there are so many "phonies" (as Holden Caulfield would say) in the entertainment industry. I guess the glamour associated with it can sometimes draw the wrong "element," but if you're in it for the right reasons (love of your art or craft), you're going to have a good time. And indeed, the movie industry has its share of world-class people.

If you would poll the small part of the industry that I inhabit—film sound—in search of the best, the brightest and the most loved, you would almost certainly reach a consensus very quickly. Without question the benchmark is John Bonner, who had been the chief engineer for Warner Hollywood Studios for over 20 years before he passed away last March.

His film career began in 1954 at Twentieth Century-Fox right in the midst of the development of CinemaScope; he later worked at Todd-AO before returning to Fox to head their sound department in the late '60s. He was part of that generation of filmmakers who saw the last great push by major studios to develop technology, and John never lost his sense of discovery and wonder at the process. Blasé just wasn't in his vocabulary, and it's virtually impossible to talk to someone who knew him without hearing the phrase "twinkle in his eye."

I remember coming across an old Bell Telephone Laboratories LP that contained various tones and listening tests. John grasped it as if it were the Holy Grail and asked if he could make a tape of it so that he could play it for his grandchildren on driving trips! This from a former fighter pilot, a fact that was rarely mentioned and certainly never a source of braggadocio. (John had been an Air Force jet fighter pilot in the Korean War, and although he had left the service with an offer to fly jets for TWA, he thought that flying a commercial jet would be like driving a bus.) Indeed, most of my memories of his talking about those days concerned his rhapsodizing about how much fun he had at the reunions with his fellow pilots. Typical John, bringing everything down to a human level.

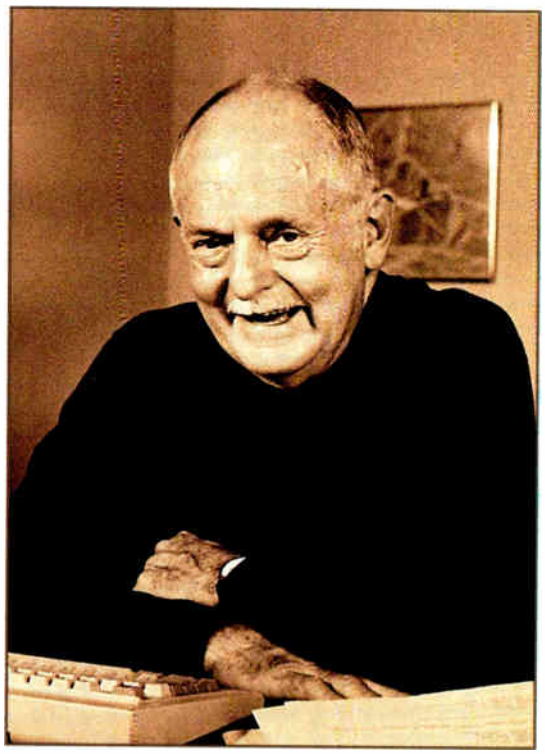

PHOTO: ENGLE MEREDITH

What made John so special in everyone's mind was that in spite of the fact that he truly had forgotten more about film sound (not to mention the whole technical side of filmmaking) than most of us would ever know, he was also the best *listener* that any of us had ever met. There was no question I ever asked him (and I'm sure there were some clinkers) that didn't command his complete attention. Where some people will hear in your words the question that they want to be asked, the one that will either show you up or put you down, John had a way of telling you what you *really* wanted to know in a way that made it seem that he was reminding you of something you'd merely forgotten. He was the virtual personification of the "there are no stupid questions, only stupid answers" maxim. In asking friends for their remembrances about John, this was one point that constantly came up: He never gave a "no" answer. If he didn't know how you could do what you wanted, he was there in the trenches helping you.

—CONTINUED ON PAGE 112

FACILITY SPOTLIGHT

BROADWAY SOUND

by Tom Kenny

Breaking into the audio post-production for television market in New York is a daunting prospect. The competition is fierce, the product limited and the talent as creative as it gets anywhere in the world. So it helps to have the backing (and clients) of a world-class video house.

Broadway Sound opened in April 1995 as a division of Broadway Video, occupying the fourth floor of the historic Brill Building in midtown and under the direction of engineers Ralph Kelsey and Michael Ungar, both formerly of Howard Schwartz Recording. In addition to extensive design and mixing credits for commercial post, cable and network movies, on-air promotions, marketing spots, and television series and specials, Kelsey and Ungar are the principals and creative partners in Hum This Music, a music production and sound design company headquartered in, and providing tracks for, Broadway Sound. They are supported by Frank Cabanach, who logged six years as senior audio mixer in Broadway Video's online facility, and John Crenshaw, a voice-over talent and dialog-editing specialist.

Kelsey and Ungar hold fort over two identical mix studios, each centered around a 32-channel Sonic Solutions workstation and Soundcraft 32-channel automated console. Typically, video is digitized in real time onto hard disk while audio elements are simultaneously stripped from the video master, allowing for frame-accurate scrub without waiting for a VTR to lock up.

The facility also has an extensive Sonic MediaNet network system that provides access to any sound or video file on any other workstation in the facility and makes it possible to load sounds in the background while editing/mixing continues. Or, a transfer operator can lay back one project while loading another. The facility currently makes use of 17 drives, accessed from any room at any time. "It allows us total flexibility," Ungar says. "All of us can access any and all files simultaneously."

Besides dedicated voice-over booths, each of the mix rooms also has its own selection of Neumann, Sennheiser and Gefell microphones, along with an extensive selection of outboard gear, a Kurzweil PC-88 MIDI controller and E-mu ESI sampler, and Genelec 1031A self-powered monitors. A central machine room houses a 24-track analog machine (with 24-channel Dolby A/SR), 2- and 4-track analog decks, Tascam DA-88s, Fostex timecode DAT and D-2, D-3, 1-inch, Betacam SP and ¾-inch video recorders/players. A third smaller audio room handles mixing overflow, voice-over work, digital patches and audio prep functions.

But the big news at Broadway Sound is the plan for a fourth audio room, Studio 4, to open in January 1997. It will be centered around an AMS Logic 2 console with integral AudioFile hard disk recorder/editor, along with an additional Sonic System. Plans are for the room to handle long-format television work in 24-bit mode. "We're excited about Studio 4," Ungar says. "There are no compromises in the acoustics or equipment of this room...It's gonna be killer."

Clients at Broadway Sound run the gamut, from Showtime, USA, MTV, VH1 and Warner Bros. to ad agencies Lintas, DDB Needham, Ally Gargano, Kirschenbaum & Bond and Burson Marsteller. Kelsey and Ungar have also produced soundtracks for the animated features *The Twelve Days of Christmas* (NBC), *Noel* (CBS),

—CONTINUED ON PAGE 113

Left: One of two identical Soundcraft-Sonic Solutions audio suites at Broadway Sound. Below: Michael Ungar asks Ralph Kelsey to lay down the guitar and get back to work.

PHOTO: NANCY DWYER BROWN

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POST NOTES

James Nichols, 1996 Grammy-winning engineer and scoring engineer for many of the soundtracks produced in New York, has joined the staff of **Manhattan Center Studios**. He'll be working on the new Neve VR96 out of Studio 7 when it's completed in November...Award-winning Hollywood sound editorial house Soundelux has promoted **Charles Meister** to president. Meanwhile, Intermedia Partners, parent of Soundelux and Signet Sound Studios, named **Kim "Kiwi" Waugh** president of Signet and named three new VPs: **David Dubow**, **Stanley Johnston** and **Bill Johnston**...World Wide Wadio has added chief engineer **Lukas Bower** to its Hollywood staff...**Wayne Freeman**, formerly of Fairlight USA, has joined Otari U.S. in the role of marketing manager... **Andrew Pigsley** has been hired as an editor at Henninger Richmond, where he will work on agency and corporate accounts...**Allen Falk**, after eight years with Chace Productions in Burbank, has been promoted to general manager...BritHaus, a new post facility in Orlando, Fla., has hired **Kim Deardorff** to work on music composition and sound design. Also, the company recently installed a VLAN fiber-optic network that sends a single video channel and two audio channels locally and links up to the VYVX network internationally...**Chicago Recording Company** has seen a lot of feature film work recently, including recording source music for *My Best Friend's Wedding*, starring Julia Roberts (music supervisor Bonnie Greenberg, engineer Gus Mossler); recording/mixing jazz classics for *Hoods*, with music supervisor Andy Hill, engineers Frank Wolf and Tim Butler; and recording All-4-One for the soundtrack to *The Hunchback of Notre Dame*, with producer Walter Afanassieff...**Thomas Dolby Robertson** and his company **Headspace** will host Hyperactv8, a new area in America Online's MusicSpace Channel; and, Dolby will provide music and audio effects technology for the WebTV network... **615 Music Productions** has finished the main title themes for six new shows on The History Channel and produced the network ID for A&E. The pieces were written by Blair Masters, Don Hart and Randy Wachtler, and recorded at **SyncroSound Studios** on Nashville Music Row...Keith Goldstein, mixer and sound designer at **SoundHound** in NYC, finished the design and mix for *Away We Go*, a half-hour children's video featuring songs by Bob Golden and the late composer Jonathan Larson, of *Rent* fame... Oscar-winning mixer Tom Johnson and Michael Semanick handled the dialog and effects premixes for *Jack*, the Francis Coppola picture starring Robin Williams, at **American Zoetrope** in San Francisco...**Non-Stop Productions** of Salt Lake City developed new music packages for

—CONTINUED ON PAGE 113

—FROM PAGE 108, JOHN BONNER

John was always the first person in film sound to give people from outside the Hollywood club a chance. It didn't matter to him that you were Dolby Labs in the pre-*Star Wars* years, Cinema Digital Sound in 1990, or even the French digital format L.C. Concept that was never used in the U.S., you knew you had a sympathetic and open mind in John, someone whose integrity and knowledge were unquestioned in the industry. You knew you would get a fair shake.

If you think all of this sounds like he mentored a whole generation of budding film sound professionals, you're right. Eventually, all of us have come to realize that he was not so caring because of who we were (or in the sordid tradition of Hollywood, what he thought we could do for *him*), he was doing it because he was John.

I met him at a local SMPTE chapter meeting in late 1979, and the next day I was at Samuel Goldwyn Studios (before it became Warner Hollywood) getting a cook's tour. John gave me his home phone number and made sure that I knew that I could call on him. This meant the world to a kid just out of New Orleans who had come to Los Angeles to write a book on the history of film sound. And indeed he was always available, always ready to help and listen. Two examples of many:

Back in the early '80s I was trying to develop a widescreen picture format and wanted to run before and after, side-by-side comparisons in sync at the Academy's Samuel Goldwyn Theater in Beverly Hills. What we eventually did—starting two projectors manually by counting down—was quite adequate for my purposes, but I originally had the idea that I would really *need* to have them both in dead sync, something that could only be obtained by hard-locking two projectors, as in the days of two-strip 3-D films. When I expressed my plan, John didn't tell me that I was crazy, as he should have; he investigated the rear projection equipment that he had at Goldwyn to see if it could be used to lock the Norelco AA-II projectors in the Academy's booth. Thank God it never came to that, but just the thought that he *considered* it was something that I never forgot. I think many people in film sound have a similar story regarding John's generosity and kindness.

My other most heartfelt memory of John was a phone conversation concerning a political matter that was raging in the world of film sound at the time. I was quite upset with the situation, and instead of trying to calm me down, John simply said, "Don't lose your anger." Clearly implied in this was his trust and belief that I was not going to let my anger get the best of me, and that I should try to use that energy to keep the issue always in sight.

The last time I worked with John Bonner was on September 28, 1994, when we were preparing the memorial tribute for our mutual friend Murray Spivack at the Goldwyn theater. *[Ed. note: See the August 1994 issue of* Mix *for Larry Blake's comments on the career of one of the most renowned people in all of film sound.]* I can't describe the thrill of standing in the middle of that glorious room, alone with John, listening to a 4-track CinemaScope print of *Beneath the Twenty Mile Reef* and a 70mm 6-track print of *The Sound of Music*. Murray had recorded and mixed them, and John had been in the sound department at Fox at the time. It was like a dream come true tweaking the preamps by ear (there were no tone rolls!) to ensure that what the audience heard that night at the tribute would represent what Murray and John had heard decades earlier. To bring everything full circle, Murray had been responsible for getting John into the film industry 40 years earlier. John had a special love for the Academy and its ideals, and that theater was his pride and joy.

A few months before the Spivack tribute, John found out that he had mylo displasia, a failure of the bone marrow, that would eat away at him for almost two years, requiring that he receive lengthy blood transfusions every week. John handled this period with the same low-key honesty and humility that we all had come to expect from him.

He was irrefutable proof that one can be competent and skilled yet modest and patient, and *I'm* therefore less inclined to be patient with arrogance and stubbornness. As a result, I find myself acting less like John and his considerate manner with *everyone*; most of all obnoxious fools. I've got a ways to go.

John Bonner left behind his wife, Shirley, five children, 15 grandchildren and a few generations of film sound editors, mixers and engineers who are immensely richer for having known him. The beauty of people like John is that the same reason that you are instantly attracted to them is the reason that you

will never forget them when they're gone. ■

Larry Blake can be reached at PO Box 24609, New Orleans, LA 70184; fax 504/488-5139, or via the Internet: swelltone@aol.com.

—FROM PAGE 109, BROADWAY SOUND

Peppermint Rose (Fox) and mixes for National Geographic specials and Explorer series. They also voice, edit and mix the interstitial programming for the increasingly popular "Nick in the Afternoon," hosted by Stick Stickley. The roughly two-minute blurbs are shot to scratch tracks, and voices are laid in after picture is complete. Broadway does about 60 spots a week for Nick in the Afternoon alone.

Perhaps the highest-profile job in the past year, however, has been landing the sound design and mix for the ten-episode Nickelodeon series *The Adventures of Pete and Pete*. "That job makes full use of our sound design capability here," says Kelsey. "From scenes of garbage men boxing Santa Claus to a giant, creamed-corn-spewing ear, we always delivered." ■

—FROM PAGE 111, POST NOTES

WCBS-TV and WPIX-TV in New York, along with all-new music and network theme for The Family Channel...The producers of MGM's new *Poltergeist* film made use of EDnet's FFD (Fast Forward Delivery) to transmit visual effects over ISDN lines, touting it as the video equivalent of e-mail...As part of a nationwide radio promotion, Trisha Yearwood made use of Soundwave Post's (Arlington, VA) AMS Neve Logic 3 and ISDN lines to carry on real-time dialog with radio station personalities...Newton Bard in Portland, Ore., recorded and edited interviews with tennis star Andre Agassi, track Gold medalist Michael Johnson, football great Barry Sanders and Cobi Jones for Nike's "Product Leadership" campaign...Robb Wenner of Nu Noyz Music and Sound Design, Nashville, finished work on a new Warner Bros. cartoon short called *From Hare to Eternity*, starring Bugs Bunny and Yosemite Sam. The Gilbert and Sullivan-inspired show was directed/produced by the legendary Chuck Jones...As part of a 10,000-square-foot expansion, Magnolia Studios purchased a second AMS Neve Logic 2 for its new mix room and added a Fairlight MFX3 24-track hard disk recorder as part of its conversion to a tapeless THX Stage A...Class6 Entertainment has opened Class6 Audio Group in Hollywood to provide music, sound design and voice-over services for animated television and multimedia projects. The new division will be headed by Glenn Scott Lacey...Euphonix News: Deluxe Toronto, part of the Rank Organisation's North America Laboratories, added a two-operator CS2000F film mixing console; and Buzz Inc. in NYC added a CS2000P to its new audio suite...Lotus Communications outfitted its 21 Western radio stations with 16-channel versions of the PC-based SAW Plus production workstations by IQS...National/ Westport in Connecticut has installed 3D2 phone patch capability for access to voice talent around the world... Todd-AO West purchased its second Otari Status console to link up with its Premieres and add inputs at the final mix. The board was immediately put to use on *Courage Under Fire*, followed by *Evita*...Glenn Sound in Seattle has added a new production space dedicated to editing and ADR work. ■

NEW PRODUCTS FOR FILM/VIDEO SOUND

AKAI DIGITAL VIDEO RECORDER/PLAYER

Akai Digital (Fort Worth, TX) announces a new, random-access digital video recorder/player based on removable magneto-optical media. The DV1500 is designed to replace traditional VTRs in post applications; random access offers virtually instantaneous location to any point, and Sony 9-pin RS422 control allows complete control from external devices, such as the Akai DD1500 recorder/editor. Variable compression to M-JPEG standards allows up to 80 minutes of offline-quality recording per 1.3GB MO disk. At S-VHS quality, 28 minutes of video recording is possible; removable hard disks provide the option of 90 minutes of Betacam/MII quality recording. Other options include LTC reader/ generator, full-function remote and Steenbeck™ Motion Controller.

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LECTROSONICS MULTICOUPLER

The QUAD 195 from Lectrosonics (Rio Rancho, NM) is a compact, modular RF multicoupler/power supply that accommodates four Lectrosonics UHF wireless mic receivers. The active multicoupler has front-end filters to prevent RF amp overload. A single antenna input and RF splitter provide four isolated antenna leads for the removable receivers. The system can be powered by supplied internal gel cell batteries, external 12VDC or 9-volt batteries in the receivers and distribution module. Battery charger and UHF groundplane antenna are supplied.

Circle 191 on Reader Service Card

TELEX WIRELESS MICROPHONE SYSTEM

The ENG-500/UT-500 UHF wireless microphone system from Telex (Minneapolis, MN) offers at least six hours of continuous operation when powered by 9-volt batteries. The ENG-500 receiver, which runs on 9 to 18 VDC, is a true diversity receiver, featuring Posi-Phase™ auto diversity, a headphone output jack and multifunction metering for easy monitoring during a shoot. Operating in the 524-608 MHz and 614-746 MHz frequency range, the ENG-500 offers a S/N ratio of 110 dB, Posi-Squelch™ III circuitry, adjustable line and mic level outputs, and RF channel selector switch. The UT-500 transmitter accepts any standard low impedance mic and offers six to eight hours of continuous battery operation.

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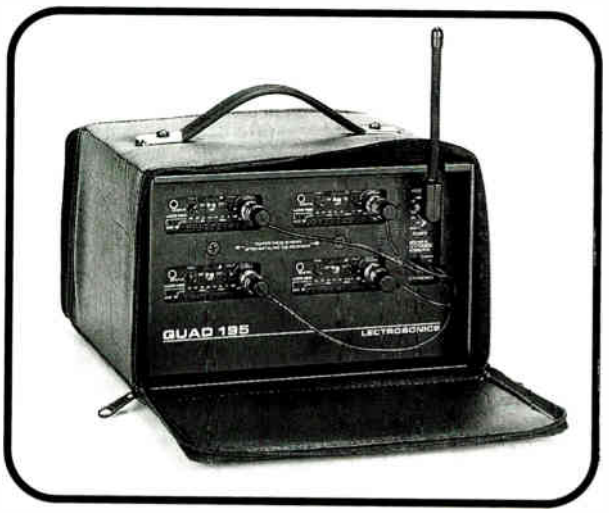


BROADCAST CONSOLE ADDS FUNCTIONS

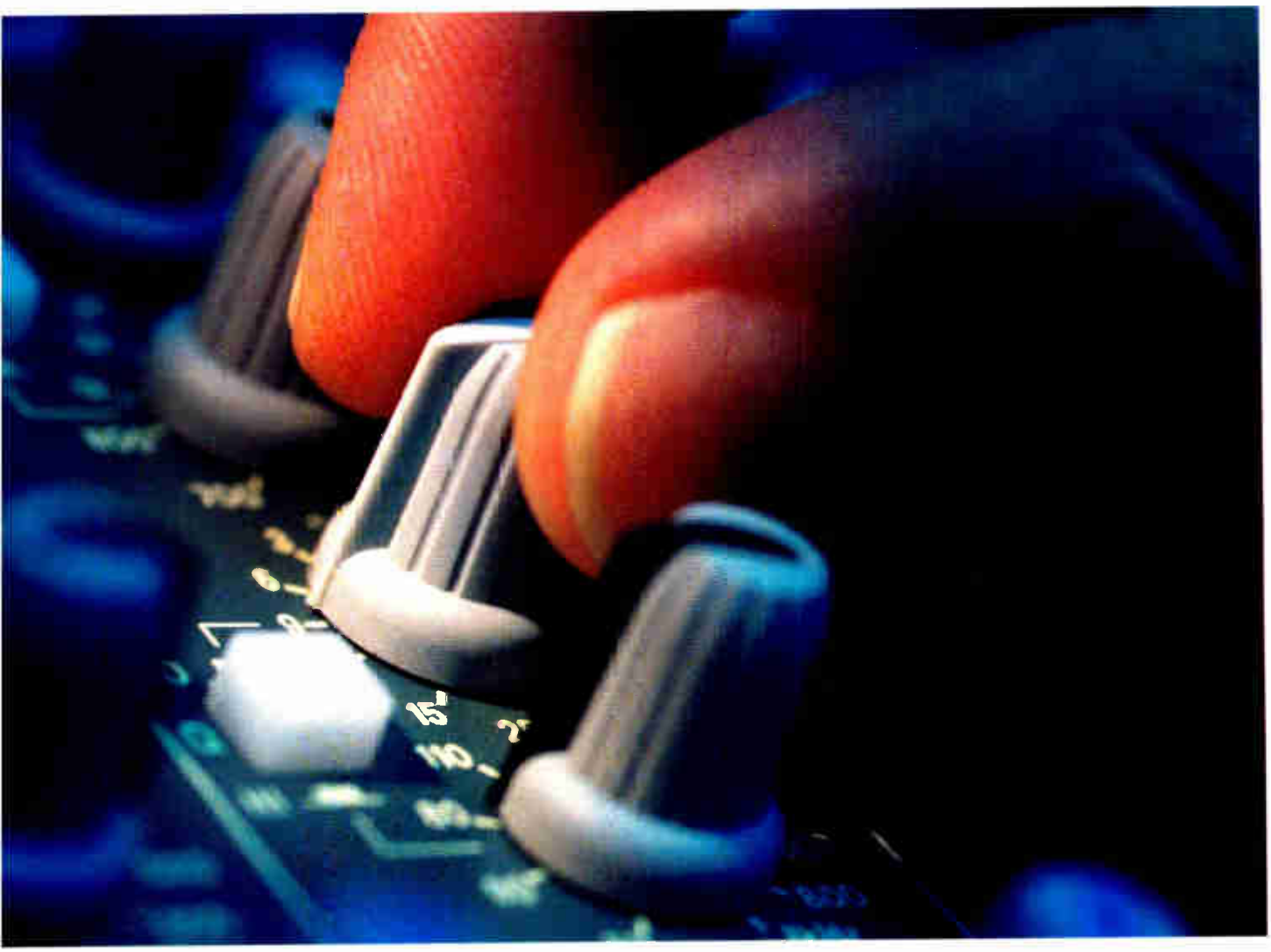
AMS Neve (Burnley, UK) announces a new mix-minus/IFB function for the AMS Neve 55 Series analog broadcast console. A new, matrixed IFB system designed specifically for multiple feeds allows for up to eight independent mixes. A new bi-colored LED tally for telephone and satellite patches adds to the console's circuit integrity assurance system, which includes a "confidence" source that follows the master control.

Circle 193 on Reader Service Card

FAIRLIGHT ADR SOFTWARE FOR THE PC

Fairlight ESP (U.S. offices are in Culver City, CA) introduces AD-Dub, a new PC ADR software package that allows offline spotting and cue list creation. Finished AD-Dub cue lists may then be transferred to the Fairlight MFX3. Lists may be sorted according to actor; in and out times may be adjusted quickly and intuitively; and takes are automatically named and numbered. New features of the MFX3 software include a new GPI menu for triggering external cues and backup tape recorders, enhanced multitrack editing, internal bounce and merge and MIDI interfaces to a Yamaha 02R digital console.

Circle 194 on Reader Service Card



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DIGITAL AUDIO DATA COMPRESSION

CODECS COME OF AGE

BY MEL LAMBERT

PART ONE

Digital technology is very much a case of balancing sonic advantages against operational disadvantages. While 16-bit PCM audio is the norm in most aspects of production, it requires much more storage capacity and/or spectrum space than conventional analog techniques. Think about it. At a sampling rate of 44.1 kHz, a 16-bit A/D converter is producing some 86.2 KB per second per channel, exactly 16 times as much information as the original 20kHz signal. Stereo signals require slightly more than 10 MB of data capacity—per minute. A hungry beast indeed.

ILLUSTRATION: TIM GLEASON

Fortunately, a variety of digital audio data compression techniques will dramatically shrink the amount of disk storage needed for such signals, as well as reduce the spectrum capacity required to carry a signal via telephone, networked or satellite links. Many facilities now enhance their revenue by using such techniques to combine removable media with integral data compression, in addition to ISDN and related links for remote ADR and voice-over sessions.

As with any new audio technologies—such as SMPTE synchronization, MIDI or disk-based recording—data compression and long-distance audio transfers have a language all their own, and at some point, we're all beginners. Let's consider some leading compression techniques and explore real-world applications of the commercially available codecs.

A BASIC GUIDE

In simple terms, codecs digitize an input waveform, eliminate redundant information to reduce the number of bits needed to carry the same data, and then decode the data at the receiving end without those deletions being audible. The degree of success claimed by any data-compression system depends on the degree of sonic transparency the system exhibits—including less than perfect transmission and recording media—and other technical parameters. Today, systems that require between ¼ and ½ the equivalent bandwidth of a conventional digital system are available for audio applications.

Such techniques can reduce the data rate of 16-bit audio signals—with no subjective difference in sound quality—so that they can be carried over T1 and fractional T1 phone lines, plus 64kb/s ISDN and Switched 56kb/s lines. Or, by increasing the capacity of hard disk and MO drives by a factor of four, six, eight or more, random-access editing and replay systems can provide enhanced online storage capacity.

All data compression technologies rely on a variety of encode/decode algorithms to eliminate redundant information, without making it obvious that any acoustically relevant data has been deleted. Look at music and speech signals on an oscilloscope. Two things are immediately noticeable: The waveforms are reasonably periodic and repetitive in nature; and the spectrums are normally weighted toward the lower frequencies. From these two fundamental properties, schemes are devised that examine the audio waveform in one of two ways, and then delete unwanted and unnecessary material. An input signal can be analyzed either within the Time or Temporal Domain—the familiar time/amplitude response—or within the Frequency Domain, by performing a Fourier Transform on the relevant waveform.

In essence, compression techniques based on temporal analysis will encode periodic information in fewer bits than required by conventional 16-bit PCM systems (by coding level-change differences, rather than instantaneous levels measured every sampling period), while frequency-based analysis will allow bits to be assigned that designate the contents of important "critical" bands of information, particularly within the low-frequency region.

Let's combine this objective analysis with two subjective properties of human hearing:

1. Loud signals, continuous tones and transients mask a broad range of lower-level signals centered around the primary masking frequency; and

2. Peak hearing sensitivity is centered around the 1kHz to 2kHz region.

This explains how further redundancies in the audio waveforms can be used to save valuable data bits during the encoding process. By analyzing the primary high-level

regions in a signal, a coding system can make intelligent estimates of the material being masked or hidden by the dominant tones or transients, and then eliminate that data from the bit stream. And because the ear is less sensitive at medium to higher frequencies, in certain coding schemes such regions are afforded fewer bits.

SUB-BAND ADPCM AND TRANSFORM CODING

These techniques of looking for redundant information within the audio waveform—or, more prosaically, looking for patterns that require fewer data

MUSICAM OR LAYER II

WHAT'S IN A NAME?

Licensors CCETT, Philips and the IRT initially dubbed their ISO/MPEG Layer II audio coding scheme "MUSICAM," an acronym for Masking pattern adapted Universal Subband Integrated Coding And Multiplexing. The three organizations used the name MUSICAM before the algorithm was selected by the ISO/MPEG as Layer II of the MPEG-1 audio standard. Throughout much of the world, the protected name MUSICAM is held by the French broadcasting organization TDF, and Thomson Brandt. However, in the States, the trademark MUSICAM is protected by one of the licensees of Layer II.

To avoid confusion in the marketplace and enhance user awareness of compatibility worldwide, many of the algorithm's implementers now describe the coding scheme as "MPEG Audio Layer II," or just Layer II. The ISO/MPEG-1 Audio Layer II standard defines the bit stream syntax and the decoder specifications. The encoder's open architecture allows continuous improvements and accommodates application-specific requirements.

—Mel Lambert

bits to code unambiguously than conventional 16-bit digitized information—have resulted in the development of two main design approaches: Sub-band ADPCM, which performs a complex time-domain analysis of the program material; and Transform Coding, which analyzes the signal in the frequency domain. (Again it should be emphasized that neither of these techniques reduce the effective sampling frequency of the

WHAT EXACTLY IS ISDN?

Integrated Services Digital Network is a low-cost, bidirectional digital data service that can carry audio signals. ISDN is currently available in all major markets around the world, thus assuring nearly universal connectivity. Each ISDN line consists of two circuits that can carry 64 kbits of information per second, for a total of 128 kb/s.

ISDN circuits carrying 56/64 kb/s via a single ISDN B-channel might be used for radio reporting and similar applications, while a 128/192 kb/s link using two/three ISDN B-channels would be used for program distribution. For high-quality broadcast contributions, or music sessions, a 256/384 kb/s connection using four/six ISDN B-channels could be established.

Within the Pacific Bell territory, ISDN BRI lines cost approximately $70 to install per line, plus $125 for ISDN features and $23 per month. ISDN BRI (Basic Rate Interface) is also referred to as 2B+D, which specifies 2 B (Bearer) channels, each providing 64 kb/s of data capacity and a D (Delta) channel that performs the dialing function. A system requiring 256 kb/s of bandwidth from the ISDN network would comprise two ISDN BRI connections. In parts of the country that operate at 56 kb/s per B channel, three 3 BRI circuits would be required for 256 kb/s bandwidth.

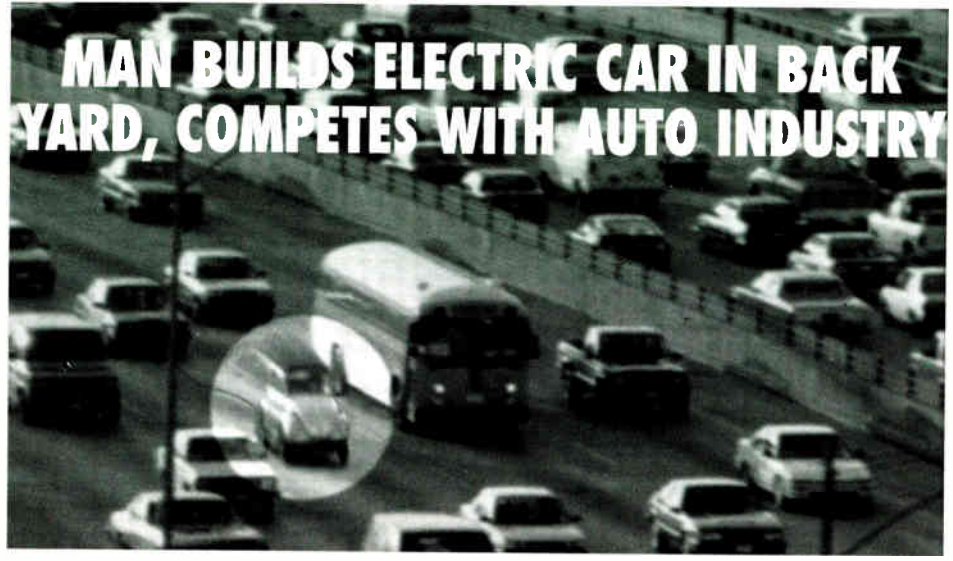
—Mel Lambert

newest fling. Dubbed a "music sequencer," the QY700 is much more like a complete, professional MIDI production studio. In addition to QY700's ability to take MTC (with start time offset), it boasts a 110,000 note, 480 ppq resolution sequencer with 48 tracks.

QY700 also has a database of 3,876 professionally programmed drum patterns, bass lines, guitar and keyboard riffs, chords and arpeggios. 100 preset and user programmable playback effects and "groove quantizing" templates allow anyone to change quantize, clock shift, swing, gate and velocity values to completely personalize the groove with or without changing the original data.

Friends of Yamaha MD4, though, say that it is strongly attracted to QY700 for its 480 voice, 11 drum kit XG tone generator and three independent digital effects processors. And QY700 has a micro keyboard with pitch and modulation wheels so MD4 can push its buttons and turn its knobs for only $1495.

The two seem to be a pair made in music heaven. 52 digital tracks of audio and MIDI, ready for CD mastering, for only $2694 MSRP combined. One music industry exec thinks MD4 and QY700 could be the ultimate relationship. "They're cool and hot, yin and yang, MIDI and audio, Lennon and McCartney, Rogers & Hammerstein, Anthony and Cleopatra, Bogart and Bacall, Tarzan and Jane, Starsky and Hutch..."



MAN BUILDS ELECTRIC CAR IN BACK YARD, COMPETES WITH AUTO INDUSTRY

Norman Futzmeyer thinks he has the answer to the gas crisis. Over the last three years, he has developed his own version of an electric automobile that he contends has a longer range than any of the auto industry giants.

The most important element of this car is, of course, the power. "My car is powered by a Yamaha P3500 amplifier because it has an extraordinary watts-per-dollar ratio, it can run non-stop and it delivers whopping power—150 watts per channel into 8 ohms in stereo mode. Of course, stereo isn't so important when you're tooling down the highway."

Another difference, Norman points out, is that with other cars you have to recharge every 200 miles. But his car, the Futzmobile GT, comes standard with a 400 mile long extension cord. "Who has time to stop!"

Norman is planning more models in the near future, all using Yamaha P-Series amplifiers. They all provide hi-power BTL coupled mono mode, versatile and reliable connectors (phone jack and XLR) with heavy-duty binding posts and barrier strips, thorough circuit protection and a small size that fits easily into the rack in the Futzmobile trunk.

There's one more advantage the big guys don't give you," adds Norman. "You can't plug their car into a set of speakers."

P3500 Amplifier

MAN SUES INTL MFR: FALSE ADVERTISING!

Harvey Rubinesky, of Climax, Ga. filed suit with a large professional audio manufacturer for false advertising. He contends that the Yamaha ProMix 01 was advertised as a "smart" mixer, but, in reality, it can't answer even the simplest question! "For example, the ProMix 01 does not even know the capital of New Jersey", stated Harvey! Rubinesky freely admitted that one might be "smart" and not know the capital of New Jersey. "However", continued Harvey, "how about an opinion? When I ask the ProMix for its favorite color it just sits there!"

Yamaha, when asked to comment, pointed out the ProMix was extremely smart when compared to other mixers. It is Yamaha's position that no audio mixer knows state's capitals or can offer an opinion of any kind. Where the ProMix is really smart is in the area of MEMORY - this mixer remembers every setting of all 18 input channels. This means at the touch of a button you can store and instantly recall the position of faders, mutes, aux sends, pan pots, eq, at any time, to allow you to return precisely to a previous mix. When connected to a MIDI sequencer or data recorder, real-time moves (such as actual movement of faders, pan, eq and aux send controls) can also be stored and replayed with precision. With 20 bit A/D converters, 3-band true parametric eq on every channel, and 3 internal compressor/limiter/gates, sonically the ProMix 01 is a giant - and has performed impeccably on top film scoring sessions, classical recordings, in high-end professional sound reinforcement and broadcast applications. As a digital mixer, the ProMix can connect directly to digital recorders like RDAT and other devices, keeping signals in the digital realm. At a suggested price of $2,199 the ProMix 01 competes with the finest mixers, replaces a ton of outboard gear and allows you to get back to your favorite settings in a snap.

Rubinesky was asked for comment after hearing Yamaha's response. Harvey maintained that having a good memory did not necessarily make one smart. When we asked Rubinesky what the capital of New Jersey was, he said he couldn't remember.

Promix 01

Surfing Tragedy

Reeve O'Neal, a popular local surfer, was sucked into the falls and knocked flat by the laptop on his longboard. Friends report that O'Neil had wanted to surf to the new Yamaha guitar internet site, **www.yamahaguitars.com,** which features a complete guitar "catalog," artist information, news and cutting edge graphics.

Yamaha is dedicating the site to Reeve. "He was a cool dude and he had guts, but he wasn't very bright" remembered a close friend.

FOR MORE INFORMATION ABOUT ANY OF THE PRODUCTS SHOWN IN THIS ISSUE PLEASE Call (800) 291-4214 ext.822 or visit us at www.yamaha.com.

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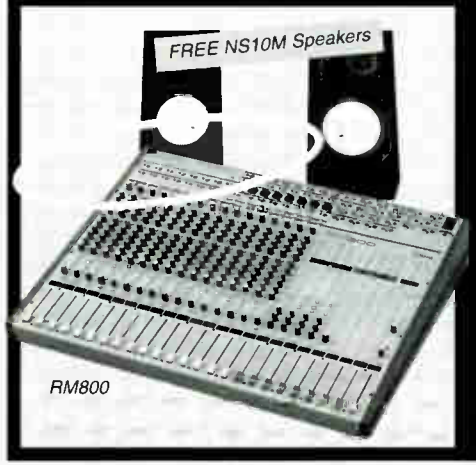


RM800

Material items really do go to heaven. And we have the heartwarming story to prove it!

Blues harpist Marv McGuire has always been especially fond of his Yamaha RM800 Recording Mixer...so much, in fact, that he never found it necessary to spend thousands more on a comparable mixer. "For just $1699, this little baby gives me everything I need," crooned the smitten Marv. "It has superb sonic quality for direct compatibility with digital and analog multitrack recorders."

Last month, the 37-year old Marv found himself under the knife on an operating table following a tragic SkyFari crash at a well-known amusement park. His near-death experience gave him an unforgettable glimpse into the afterlife.

"I couldn't feel anything, but somehow I knew I was dead," recalled Marv. "I remember seeing myself floating above my body, then drifting through a long, dark tunnel towards a tiny pinpoint of light. The light got brighter and I could make out a shape coming toward me. It was my trusted RM800 mixing console!"

Even more vibrant than the original, everything was as he remembered—all 16 channels and 40 feature-packed inputs, six aux sends, eight buses and direct outputs. He even saw a FREE pair of legendary Yamaha NS10M studio speakers valued at $478!"

"I loved my mixer more than anything in the world," exclaimed Marv. "We had a wonderful time together when we were reunited in heaven, but then I felt something tugging at me, pulling me back to the realm of the living."

Back in Ohio, Marv no longer dreads death and continues to strengthen his bond with the RM800. "Now that I know you CAN take it all with you, I'm gearing up for more!" Before his next trip to heaven Marv plans to visit his Yamaha dealer to buy, for just $2399, a new RM800-24 with 24 input channels and 56 inputs and a FREE pair of NS10M speakers! "He who dies with the most toys really does win!"

Sex & Rock 'n Roll

Two high profile players in the music industry have been seen by several witnesses emerging together from a tawdry hotel. The hotel's front desk clerk reported to the Inquisitioner that "a whole lot of loud music and some serious funny business" was going on in the room in question.

Inquisitioner readers may recall that the Yamaha MD4 digital four track recorder, one of the parties in question, has been in the news for bedding down with "anything related to MIDI." MD4's attraction to MIDI devices is apparently quite potent: it sends out MIDI timecode and MIDI clock with tempo mapping (without using up a track) and accepts stereo sends from MIDI systems through its sub inputs.


QY700

"MD4 itself has a lot to offer," said a jilted lover. "A beautiful voice that sounds as good as a CD, loss-less track bouncing, the ability to combine all four tracks with no open track required, precise punch in and punch out, simultaneous four track recording, song editing and instant search and locate. (MD4 doesn't use tape. It records digitally on irresistible removable MD data discs.) And I spent just $1199 romancing it. Oh, I miss MD4 so much."

Yamaha QY700, itself a virile player, is MD4's

NATIONAL
The Inquisitioner
Nobody Expects The Inquisitioner. Vol.16 Issue 1276

NEW REPORT: FUN WILL KILL YOU!

The Norwegian Center for Public Health dropped a bombshell yesterday, divulging exclusively to the Inquisitioner: FUN WILL KILL YOU! This supports the Center's previous reports that chocolate, air and sex are bad for you.

Björn Nsyglyd, the Center's Director, elaborated. "Our laboratory tests on mice clearly illustrate that if you have too much fun in a 3 second span, you could spontaneously combust. If the fun is spread over minutes or days, the results are diminished. However, you will definitely croak."

Richard Simmons, aerobics instructor known for his obsessive optimism, was rumored to respond, "Oh HELL!"

But the news comes especially hard to Yamaha Corporation which has recently released two XG MIDI synthesizers that are actually fun to play.

The CS1x is a throwback to the 70s where people didn't have to program synths. They just dialed in the patches on rotary knobs and played away. Music was spontaneous and life was good. The CS1x features 6 realtime effects knobs for voice editing of up to 4 elements. It also includes an Arpeggiator that lets the musician play around with all kinds of fun sound patterns. And the CS1x offers over 1,000 XG and GM voices and performances plus 17 drum kits. After reviewing the synth, Nsyglyd concluded, "It's a death sentence."

The Yamaha CBX-K1XG is also an XG and GM compatible synth. Because it's a self-contained XG studio (tone generator, touch sensitive mini-keyboard and speakers) and because the battery powered unit can fit in an overnight bag, a musician could make music anywhere, including a roller coaster. The CBX-K1XG has 737 voices and 22 drum kits, a huge selection by any standards, and 32-note polyphony. Nsyglyd's only advice, "run fast, run far."

Both Yamaha instruments have a TO-HOST connector for linking directly to computers. Nsyglyd's institute has not found any health problems related to computers but he promised, "We're working on it."

CS1x

signals being carried, a factor that both ensures complete compatibility with existing digital interfaces and transmission links, and also implies consistent bandwidth and frequency response.)

During transform encoding, which is used in Dolby AC-2 and MPEG codecs, an input signal is analyzed within the frequency domain as a series of narrow bands; an AC-2 encoder/decoder, for example, uses some 256 narrow bands. Frequency bands whose information is masked by continuous tones or transients will be ignored by such systems, thereby enabling the compression algorithm to concentrate its bit allocation to the bands containing subjectively relevant information. In addition, transform-based systems use a system of predefined waveform patterns from an established "look-up" library of sound models, and send an ident for the decoder to "resynthesize" the closest-fit library model.

Adaptive Differential Pulse Code Modulation (ADPCM) techniques, implemented in APT's apt-X100 codecs, use a combination of conventional linear PCM and Adaptive Differential coding to reduce the PCM bit rate by coding level differences between samples, rather than the absolute level of each sample. According to the characteristics of the audio signal, ADPCM adapts the step size represented by each quantizing interval to accommodate rapid changes in level caused by high frequencies or transients, thereby providing an overall reduction in bit rate.

Additional split-band techniques, such as sub-band coding, are used to take advantage of the spectral redundancies within the audio spectrum. As part of the sub-band coding process,

EDNET: CONNECTIVITY FOR THE ENTERTAINMENT INDUSTRY

One of the better-known companies providing interconnectivity products and services for various sectors of the pro audio industry is EDnet, a private network that encompasses post facilities, advertisers, directors and voice-over talent. EDnet enables exchange of compressed audio, video and multimedia data via ISDN, T-1 and 45Mbit networking services, using a variety of codecs. The firm's proprietary network management software enables convenient "point-and-click" connections to both domestic and international EDnet sites, which are listed in a regularly updated electronic directory. ZeroC, its latest product, allows bit-for-bit transmission of uncompressed digital audio in real time.

Other products include:

• **apt-X/384**, a full-bandwidth stereo plus timecode system operating at a rate of 384 kb/s, using three ISDN BRI lines or six Switched-56 lines, to provide two simultaneously 20kHz mono connections, or a single stereo 20kHz connection. The system is available with an integrated Pro-Link ISDN terminal adapter, which offers management of all lines and speed dial.

• **apt-X/128** is the apt-X/384's little brother and provides a 15kHz mono connection.

• **AC-2/256**, a full-bandwidth stereo system using Dolby AC-2; compatible with Dolby Fax.

• **MPEG/128**: EDnet offers a variety of systems using MPEG Layer II and Layer III algorithms, using codecs from CCS and Telos.

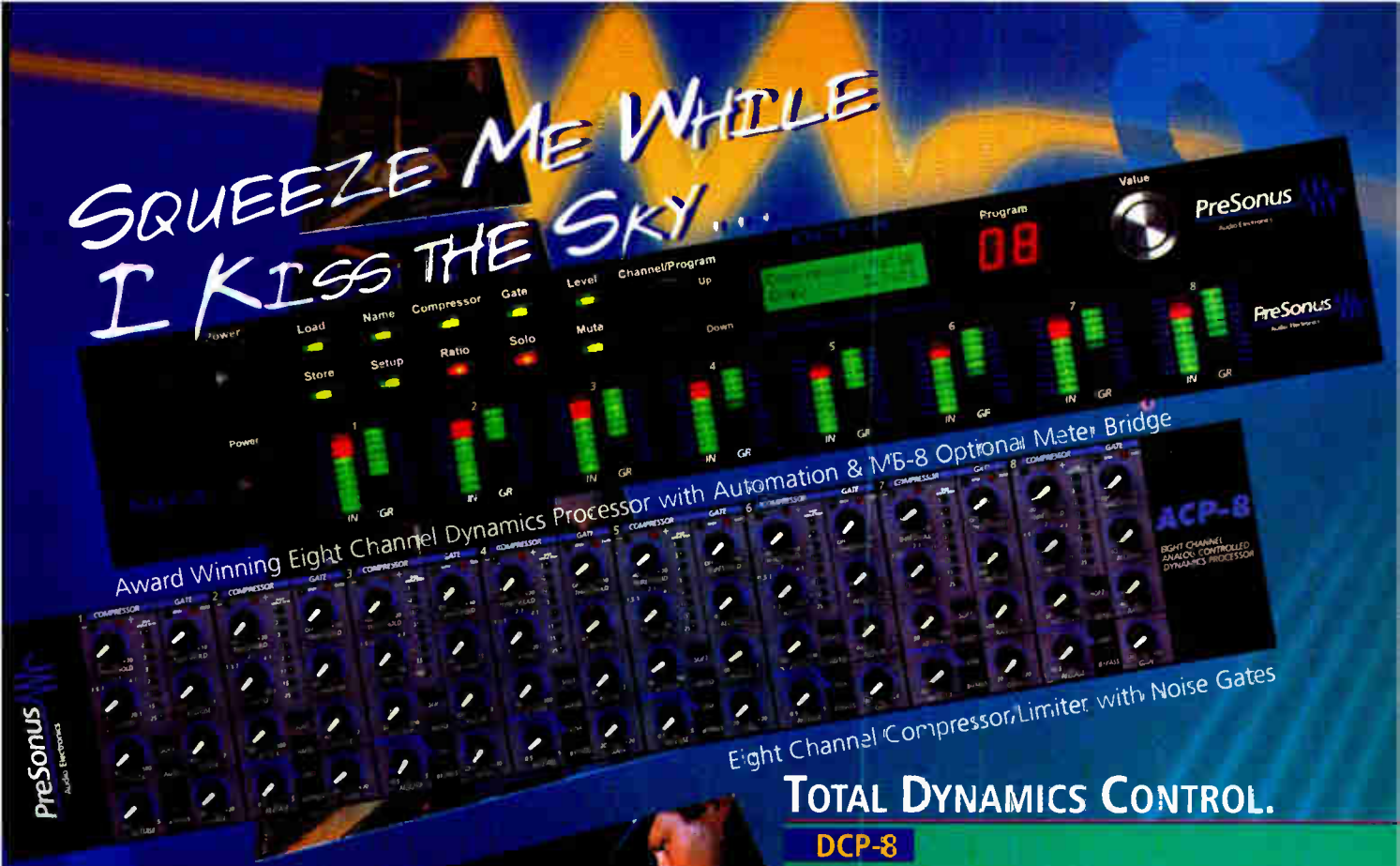
• **EDlink** bridging service connects users to virtually any codec in the world, including apt-X, AC-2, MPEG Layers II/III, and G.722.

• **WheelerDialer** PR/Mac software provides an integrated database and dialer, allowing instant access to any of EDnet's affiliates.

EDnet manages a network of over 200 North American affiliates, and nearly 150 international associates. It provides international networking services not only through its own private network, but through its managed gateway—EDlink—to other affiliated networks and off-network studios in over 100 cities.

—Mel Lambert

SQUEEZE ME WHILE I KISS THE SKY...



"I HAVE MIXED TWO RECORDS IN THE PAST YEAR ON AN SSL-E SERIES, VCA-BASED AUTOMATED CONSOLE AND I DON'T PARTICULARLY LIKE THE HARSH EDGE THE CONSOLE'S VCA'S ADD TO THE SOUND. SO I WAS EAGER TO SEE HOW THE VCA'S IN THE DCP-8 COMPARE TO THE GAZILLION-DOLLAR SSL. I LIKE THE DCP-8 VCA'S BETTER."

Rob Shrock,
Electronic Musician

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Bob Doiron, 'Big Bob D.' of World Audio & Lights on tour in Texas with Candlebox

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the signal is split into a number of independent bands, and the accuracy of the quantization is varied in each band according to the input-signal energy. Critical regions of the audio spectrum can therefore be coded more accurately, with quantizing energy being biased toward the high-sensitivity, low-frequency region. High-energy regions are also coded more accurately than in PCM techniques, which yields a lower coding noise platform.

SUBJECTIVE/OBJECTIVE ASSESSMENTS

But, of course, such economies in transmission and storage medium cannot be secured without a few inherent drawbacks. The genius of any perceptual coding design comes in reducing the subjective artifacts introduced by the encoding algorithm, and paying close attention to its intended applications.

The laws of physics and information theory tell us that *all* of these data-compression systems are going to—however slightly—degrade the audio quality; we'd be naive indeed if we expected the universe to behave otherwise. For the majority of applications, however, if we are aware of the limitations to be weighed against the costs resultant in bandwidth and disk-storage capacity, virtually any of the currently available systems will get the job done.

ENCODING DELAY

As with any complex signal-processing function, it takes a finite amount of time to analyze a waveform, remove any redundant information, and then output the resultant data-reduced bit stream. Ditto for the receiving end, where the 16-bit data is reconstituted and converted to analog.

Due to the need to divide input data into a number of discrete "frequency slices," transform-based compression schemes tend to require more time to do their processing than time-domain systems. By way of an example, the Dolby AC-2 coding process has a quoted time delay of 45 milliseconds (encode/decode cycle). And MPEG Layer II—in essence, a "hybrid" codec using both sub-band and frequency-domain techniques—involves an encode delay of around 20 ms, and a decode delay of just under 20 ms. (For the mathematically inclined, delay time is related directly to the block length used in transform-based codecs; increasing the number of discrete blocks extends the overall encode/decode times.)

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Generally, time-based compression schemes require less time to perform an encode/decode cycle. The speech-quality CCITT G.722 process, for example, has an overall processing delay of 1.4 ms, while apt-X 100 Sub-band ADPCM requires 2.5 ms to perform an encode/decode cycle at a sample rate of 48 kHz.

For the majority of distribution or recording instances, these delays will cause few problems. But consider a case where bit-reduction is for a broadcast studio-to-transmitter link (STL), or to carry audio back to the station from a remote site while the talent/DJ is listening off-air. Most of us become confused if we encounter a delay of up 10 ms between source and return—we simply slow down as we talk and find it difficult to ignore the fact that something is decidedly wrong. Professionals might be able to handle maybe 20-25 ms; beyond that, even seasoned voice talents find it virtually impossible to accommodate over-the-air delays.

ASYNCHRONOUS OPERATION

All data-compression schemes require a word-clock signal to synchronize the encode and decode processors. Such signals are a way of life for hard disk recorders, for example, and enable bit streams to be identified with the start of each data bit and discrete word. For STLs and satellite links, a modem at each send and receive point will usually multiplex the word clock with the compressed signal, then modulate the carrier signal. This overhead is a small penalty required by most systems but can increase the complexity of certain links.

Some decoder units will automatically synchronize the local bit/word clocks with the encoded bit stream by looking for a series of specially encrypted word pointers. Such "Smart-Sync" functions allow asynchronous modem and similar links to be established, thereby reducing the potential data overhead. (In reality, the decoder "slides" its derived word-clock reference against the local divided-down word clock extracted from a master bit clock.)

STEREO IMAGING

In those bit-reduction systems offering enhanced levels of digital compression,

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U.S.: Brian Heimerl, General Manager; 213/463-2963

DOLBY LABORATORIES
Kevin Tamm, director of marketing, communications products Group; 415/558-0200

SONY CINEMA PRODUCTS CORPORATION
Bill Mead, marketing director; 310/280-5791

PHILIPS KEY MODULES GROUP
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MUSICAM USA
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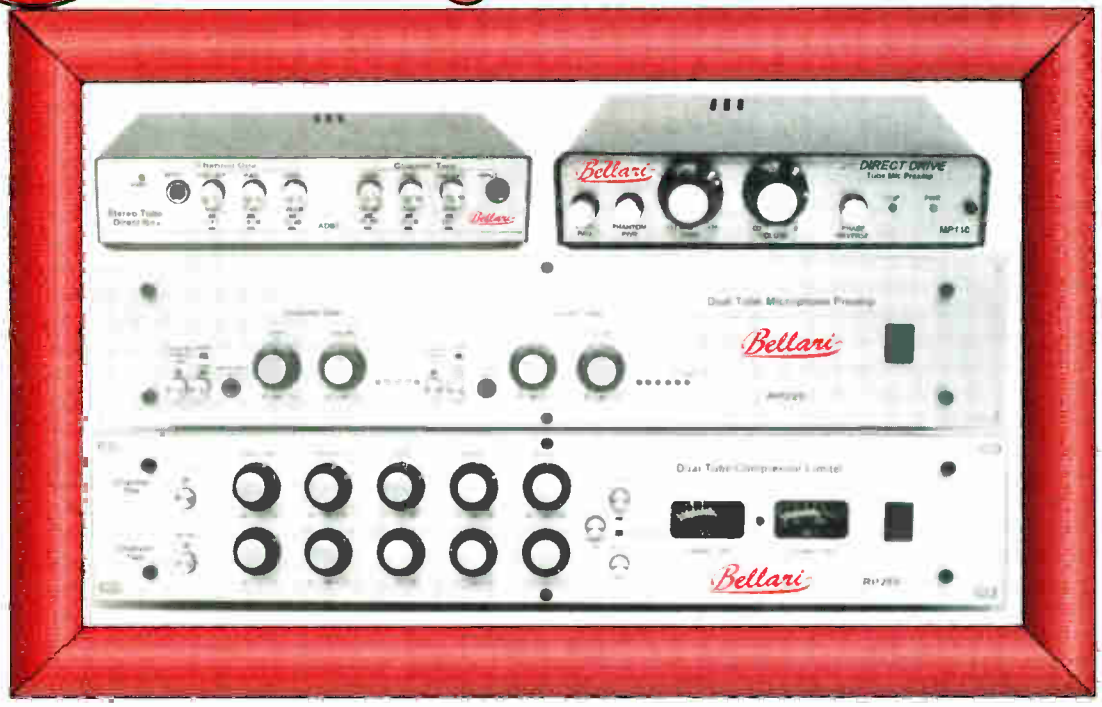

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individual channels might be processed individually, rather than as a stereo pair. For instances where the data channels are uncorrelated—speech on one, for example, and music on the other—it makes sense to process them differently, perhaps snatching a few valuable bits from either left or right channels via Adaptive Bit Allocation, a technique used in some transform-based systems.

However, such schemes can cause audible image shift on stereo material, as our hearing is unforgiving of subtle frequency- and time-related phase shifts between left and right channels, and quickly interprets that something sounds wrong.

PRE-ECHO WITHIN DECODERS

Depending upon the width of each frequency band in a transform-based scheme, and the degree of overlap (if any), it is sometimes possible for the decoder to produce variable amounts of pre-echo. Consider, for example, the case of a sudden transient that has its rising edge *within* a frequency band. The codec quite correctly detects its presence and codes the information within the appropriate frequency band, and also uses that information to steal valuable data bits from the surrounding masked envelope.

Upon decoding, however, the output level is turned on for the complete duration of the coded frequency band, which means that the signal will be heard *before* the arrival of the actual transient. Such pre-echoes sound very much like analog tape print-through, and may be unacceptable for more critical applications—particularly on material containing large numbers of sharp level excursions.

MULTIPLE GENERATIONS

Obviously, the number of times an encode/decode cycle can be performed on audio material is limited. In most instances, a signal might be processed once via an ISDN voice-over link, but consider a situation where the signal is sent from a remote location to the studio, stored to hard disk, output to a second hard disk during CD mastering and then routed to the mastering plant via another link. The effects of sequential or tandem coding can exacerbate any artifacts produced by one species of codec; in reality, the overall effects of Codec A, for example, followed by Codec B and so on, is virtually unknown.

Or what about the case of random-access recording and editing systems that use data compression? Each time the material is re-recorded to disk, it passes through another generational stage of compression—and any processed audio normally has to be decompressed before it can be edited, and then re-processed before passing back to hard disk. For most applications, these are minor operational limitations, but sometimes, the audio will undergo several generations of processing before, during and after passing through a hard disk system. In such cases, we need to ensure that no significant problems will be encountered after as many as maybe a half-dozen encode/decode cycles.

Other parameters to keep in mind include: Assessing how the coding scheme handles random and sequential errors in the transmission or recording medium; and artifacts produced when we later decide to equalize, compress or otherwise process a signal that has been through a bit-reduction system.

Next month we will present "Codecs, Part 2," which will include specific product offerings and descriptions from each of the major manufacturers. Stay tuned. ■

Mel Lambert heads up Media&Marketing, a consulting service for pro audio firms and facilities.

DIGITAL MULTITRACK RECORDERS

BY GEORGE PETERSEN

Refinement of the Revolution

Just a few years ago, everybody in the industry was talking about the upcoming tapeless revolution. Disks were in, and our old friend magnetic tape—even digital tape—would soon be visible only in the outmoded technology sections of museums, alongside the 8-inch floppy drives, record lathes and Farfisa organs of years past.

Panasonic MDA-1

Without a doubt, random-access, disk-based recording offers numerous advantages, yet over the past few years, studios have bought hundreds of thousands of tape-based digital recorders, including DATs, modular digital multitracks, PD format recorders and DASH format decks. And although disk-based recorders continue to rise in popularity (especially with drops in the prices of media and hardware), sales of tape-based systems show steady increases.

Enterprise West CEO Craig Huxley with the studio's new Studer D827

The reasons for this are many: Tape doesn't crash, and tape recorders tend to have more longevity than disk-based systems. Today, a 24-track DASH tape recorded in 1986 plays on today's equipment with no problems. How many usable floppy disks do you have that hail from a decade ago? And even if the disks are in perfect condition, how accessible is vintage disk-based equipment?

Tape requires no load-in/load-out time, and digital tape systems—unlike their analog cousins—need no time-consuming pre-session calibration or alignment procedures. Walk in, pull the tape out of the box, and you'll be cutting tracks or mixing in a matter of minutes. To be fair, affordable removable media is available for most disk-based systems. However, tape maintains the advantage in storage capacity.

Whether disk-based or tape-based, 16-bit digital recordings consume approximately 5 MB per track-minute of storage at 44.1 kHz. Using this formula, a 65-minute reel of double-density, 48-track DASH tape

Tascam DA-38

would consume the equivalent of 5MB/min. x 65 minutes x 48 tracks = 15,600 MB. That's more than 15 gigabytes, which represents a stack of 1.4-meg high-density floppies 116 feet tall.

A Hi-8mm 8-track tape on a Tascam or Sony MDM provides 4,400 MB (4.4 GB) of storage for about $10! Compare this to an Iomega 1GB Jaz cartridge, which—even with its excellent price-to-storage ratio—offers less than one-quarter the storage for about ten-times the price. In this situation, tape beats out disk by a margin of 40:1. Until disk storage prices or technology improve dramatically, tape has the obvious edge in cost per megabyte over disk systems.

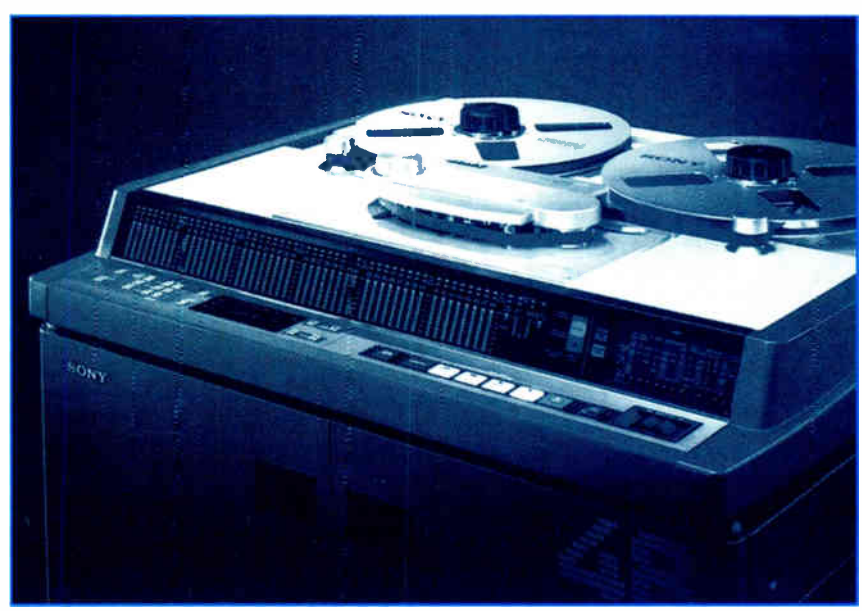
Alesis XT

Since both tape and disk systems have their relative strengths and weaknesses, a common situation is one of peaceful coexistence with hybrid systems; users pick either the tape or disk approach, or a combination of the two, depending on project needs. Cutting and pasting drum loops using multimachine offset assembly techniques on digital multitracks is tedious, to say the least. However, when a couple of measures of drum tracks are "flown" over to a multichannel workstation for looping, with the result then transferred back to tape, the task can be performed in a few minutes.

REEL-TO-REEL MULTITRACKS

Reel-to-reel digital recorders have always represented the upper crust of studio decks, and a large user base of the DASH and ProDigi PD formats exists in top studios worldwide. All reel-to-reel digital multitracks also include analog tracks for recording SMPTE timecode or cue information. The decision to go—or not go—with a reel-to-reel system (Otari, Sony or Studer) may be dictated solely by price. The least expensive DASH-format machine, Sony's PCM-3324S 24-track, carries a retail tag of $62,830 for a base unit—without options such as remote controllers, digital I/O cards, SMPTE timecode reader generator/synchronizer and RAM playback for editing/track-bouncing functions.

Sony's PCM-3324S is compatible with double-density, 48-track DASH recorders, such as Sony's PCM-3348 and Studer's D827 MCH. A session can begin on a 24-track machine and continue on a 48-track deck; the original tracks play back normally.



Sony PCM-3348HR

and the 48-track recorder lays down the data for tracks 25–48 in between the first 24 tracks.

Introduced in 1988, Sony's flagship 48-track PCM-3348 recorders continue to sell well into top studios and post facilities. Features include a multiple ping-pong mode for bouncing up to 48 tracks simultaneously within the machine; built-in SMPTE timecode reader/generator and expanded sample memory—20 seconds of 16-bit stereo audio (or 40 seconds mono), with manual or external source triggering and reverse sample playback. An internal synchronizer handles sample-accurate lockup of multiple PCM-3348s. Also standard is a dedicated electronic edit mode for dual-machine assembly editing in the digital domain. List price is $252,300.

Unveiled at this year's NAB show in Las Vegas, and available in the first quarter of 1997 is Sony's new 24-bit PCM-3348HR (high-resolution) 48-track recorder, a DASH-format reel-to-reel machine with 45-minute 24-bit recording capacity on a reel of ½-inch tape. A wide selection of interfaces (including MADI) are included, along with serial and parallel control ports and 80 seconds of stereo sampling memory. Compatibility with existing 24- and 48-track DASH tapes is assured, according to Sony. Pricing was not finalized at press time, but Sony plans to offer a trade-up program for current and future PCM-3348 customers.

Studer's D827 MCH can be ordered as a basic 24-track machine and later retrofitted to 48-track operation as budgets allow. The basic machine (24- or 48-track) in the standard configuration is sold without converters (presumably for use with external converters and/or a digital console) and includes onboard SMPTE synchronization (with full editing capabilities), as well as 56-channel MADI and 2-channel AES/EBU interfaces. Options include an A/D converter package that uses advanced noise-shaping techniques to impart many of the benefits of 18-bit conversion for storage on the 16-bit DASH format. The A/D converters are available in groups of eight channels, with and without noise shaping. The D/A converters are also available in 8-channel blocks but do not require noise-shaping circuitry, as the noise shaping is a single-ended process (encode-only), with no decoding necessary. A 24-track machine retails for $175,000 including computer, MADI and autolocator.

A 24-bit recording option ($15,000)

for the 48-track D827 MCH converts the machine to 24-bit/24-track operation, where the additional 8 bits for each channel are stored on tracks 25 to 48. This 24-bit/24-track configuration is compatible with standard DASH 24-tapes.

Otari's DTR-900-II records 32 tracks on 1-inch tape and is compatible with earlier Otari digital multitracks as well as the (now-discontinued) Mitsubishi X-850 and X-880 PD-format machines. Price is $80,000, including Apogee filters in the A/D and D/A sections and a comprehensive remote. All session data—such as autolocator information and channel setups—can be stored on the tape and loaded into the remote. Also standard are parallel and serial control ports, built-in SMPTE reader/generator, digital overdubbing and ping-pong capabilities, simultaneous recording from digital and analog inputs (if desired) and a transport that resolves to any common time-base reference, such as composite video or line frequency.

GOING MODULAR

Although we now think of ADAT- and DA-88-compatible recorders as modular digital multitracks, the MDM revolution really began nine years ago, with the unveiling of the first Akai A-DAM 12/24/36-track systems on March 17, 1988, at the 83rd AES convention in Paris. The first 20-bit MDMs—the Yamaha DMR8—debuted 18 months later at New York AES in 1989. With basic unit prices hovering in the $30,000+ price range, neither the Yamaha nor Akai system exactly set the world afire. Once Alesis ADATs began rolling off the assembly line in the first few months of 1992, the industry was ready to accept this newfangled world of modular recorders. The $3,995 pricing of the first ADATs was another strong incentive, both to buyers and to other manufacturers, such as Tascam, Fostex, Sony and Panasonic, who later offered machines bearing their names.

Based on a concept of interlocking up to 16 8-track recorder modules for up to 128 tracks, the modular digital multitrack movement has evolved from phenomenon to full-blown revolution, with more than 100,000 MDM units from five manufacturers in use worldwide. Don't expect this to slow down any time soon, because sales in the MDM market are hot. In fact, several other manufacturers are considering releasing their own machines in the near future. Watch upcoming issues for

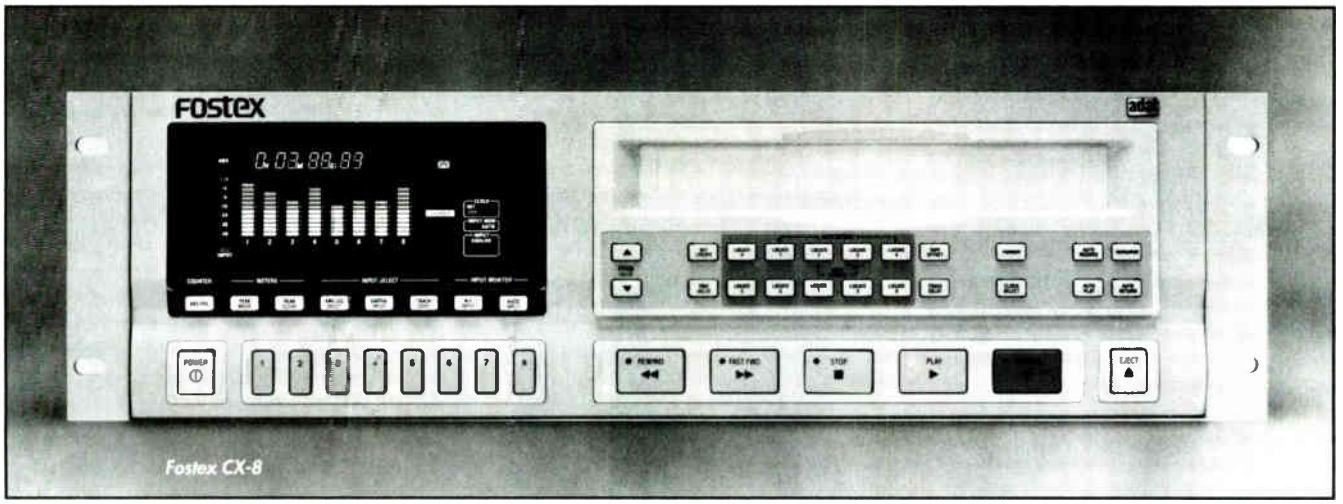
more details...

Essentially, the MDM market is divided into two competing (and incompatible) formats using consumer videotapes as a storage medium: Both are 8-track systems, but the DTRS format records on Hi-8mm tape and is used by Tascam (DA-88 and DA-38) and Sony (PCM-800); the ADAT format records on S-VHS tapes and is used by Alesis (ADAT and XT recorders), Fostex (CX-8 and RD-8) and Panasonic (MDA-1).

By now, everybody on the planet knows about the new Alesis XT, the second generation of the company's ADAT modular digital multitrack system. In case you missed it, the $3,499 unit improves on the original with 20 new enhancements, including improved transport control and lockup (four times faster than the original), along with assembly editing features, onboard track delay (up to 170 ms on any track), auto-punch rehearse functions, a die-cast, one-piece aluminum chassis, servo-balanced analog I/O, ten locate points, running time of more than one hour (on T-180 tapes) and an alphanumeric fluorescent display with three modes of meter ballistics and running time accurate to 1/100 second. One noticeable change between the XT and the first ADATs is that the new models have replaced the ¼-inch unbalanced analog I/O connections with RCA jacks; however, as with the original ADAT, access to the +4 dB balanced signals is via a 56-pin EDAC multipin connector.

Immediately following the Alesis XT unveiling, other new ADATs—based on the XT—were announced by Fostex and Panasonic. Both machines are completely compatible with earlier ADAT recorders. Priced at $3,495, the CX-8 from Fostex is essentially similar to the Alesis unit, save for front panel cosmetics and the replacement of the XT's 56-pin EDAC connector (for balanced line analog I/O) with the D-25 sub connector used on the Fostex RD-8 ADAT.

Two years ago, Panasonic announced that it was licensing the ADAT format and is now shipping the MDA-1, which is similar to the XT but adds a few twists of its own. Rather than providing a multipin connector for access to the servo-balanced analog inputs and outputs, the MDA-1's rear panel has a full set of eight XLR inputs and outputs. The MDA-1 also incorporates muting relays on the outputs, which avoids power on/off transients and improves the deck's signal-to-noise performance while the machine is in Stop mode. Re-



tail pricing of the MDA-1 is $3,495.

The Fostex RD-8 ($4,395) uses the same S-VHS transport and record electronics as the original Alesis ADAT but adds sophisticated synchronization and control features. The RD-8 is compatible with the Alesis system and can be used as a master or slave deck; tapes recorded on the two machines are completely interchangeable. Standard features include an onboard SMPTE chase-lock synchronizer/reader/generator, RS-422 (Sony P2 9-pin) control, pull-up/pull-down (44.056 and 47.952kHz sampling for 29.97 fps resync) and MIDI Machine Control.

The Tascam DA-88 ($4,499) can record 108 minutes of digital audio on a standard Hi-8mm videotape (slightly longer with extended-length formulations). Besides the usual transport functions, the DA-88's four-rackspace front panel includes controls for tape shuttle, sample-rate select, two locator points, rehearse and auto-punch modes, and clock source select. The optional SY-88 synchronization board ($799), is a plug-in SMPTE card for MIDI Machine Control, chase-lock to timecode sources and RS-422 video editor control. The RC-848 ($1,499) is a large multimachine autolocator with record-select buttons for up to 48 tracks (six DA-88s). Beyond the standard transport commands, the RC-848 also provides programmable pre/post-roll, along with 9-pin RS-422 output for interfacing to video systems, ports for controlling Tascam analog decks, 99-point autolocation, shuttle wheel, LCD status screen and two time displays.

New from Tascam is the DA-38, a scaled-down version of its TEC- and Emmy Award-winning DA-88 digital 8-track. Now shipping, the DA-38 does not support video sync or 9-pin protocol (as does the DA-88/SY-88 combo),

but MIDI sync and MMC can be added via the optional MMC-38 adapter. However, the DA-38 adds a few new tricks of its own, such as track-to-track copying within the machine, dither on/off switching, A440 digital tone generator and bargraph error rate display.

The DA-38 retails at $3,499—about the same as the ADAT-format Alesis XT, Fostex CX-8 and Panasonic MDA-1, so life in the MDM lane should be very exciting in the months to come.

Sony's PCM-800 ($5,995) MDM is compatible with the Tascam DA-88, offering eight tracks of digital audio on Hi-8mm. Standard features include up to 108 minutes of recording time on an NTSC-120 tape; two 25-pin D-sub connectors, which carry eight channels of AES/EBU digital information (on stereo pairs); and break-out cables with XLR connectors for interfacing with other digital devices. The RM-D800 ($1,500) is an autolocator/remote unit, which can control up to eight PCM-800s. Another option, the DABK-801 sync board ($800), is similar to Tascam's SY-88 card, in that it adds SMPTE timecode chase, 9-pin RS-422 control, MIDI Machine Control, timecode generation and MIDI sync capabilities.

Like it or not, digital tape will be with us for some time to come, and whether you're looking for a simple 8-track system for a home rig, or a pair of 48-tracks for the ultimate recording facility, today's digital multitracks offer something for everyone. And for the majority of us who fall somewhere between the two, great-sounding, affordable alternatives exist for any budget. I like that. ■

Mix editor George Petersen is the author of Modular Digital Multitracks: A Power User's Guide, *available through Mix Bookshelf.*

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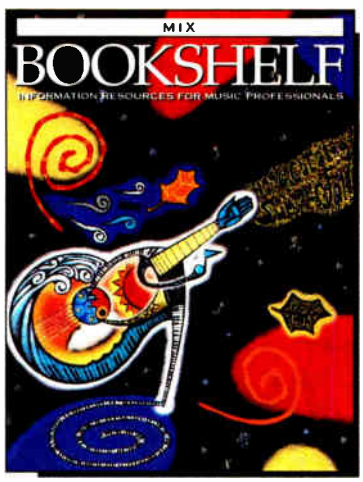

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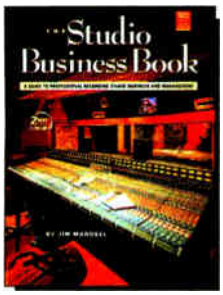

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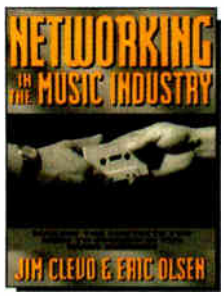

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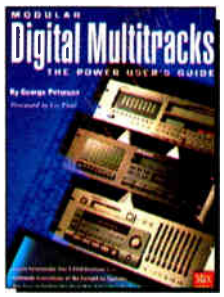

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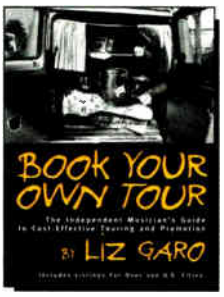

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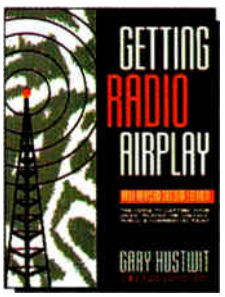
Liz Garo

©1995, 175 pp. (P) **3049) $19.95**

By far the most complete title of its kind, this book gives you city-by-city directories of clubs, promoters, record stores, radio stations, print media and other fun stuff, like where to sleep and eat for cheap. Includes sections on putting together promo packages for clubs, dealing with club owners and promoters, getting paid and using local media, as well as sample contracts and tons of interviews with folks who've been through it all. There's even a van buyer's guide and directions for building a loft! This book has it all.



GETTING RADIO AIRPLAY 2nd Edition

Gary Hustwit

©1993, 125 pp. (P) **3027) $19.95**

Want to get your music played on the radio (and who doesn't!)? *Radio Airplay* will teach you how to get positive responses when sending out review albums. Features interviews with radio station music directors, record label promotions staff and independent artists who've done it. Includes new, updated college and commercial radio directories.

MIX REFERENCE DISC

From Mix *magazine*

©1994, one compact disc **MRD) $14.95**

This versatile, professional CD is an all-in-one tool with a variety of applications, including tape-deck alignment, audio-equipment calibration, testing sound-system performance, troubleshooting and diagnostics. It features alignment tones, 1/3-octave bands, frequency sweeps, a digital black-noise check and frequency response tests at a fraction of the cost of competing test-tone CDs.

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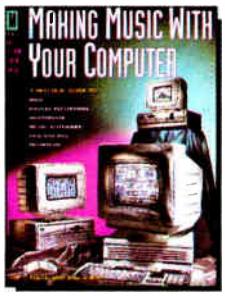
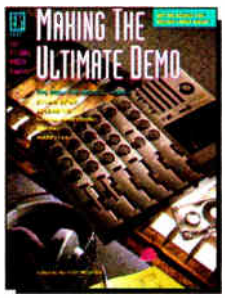
BOOKSHELF Bestsellers



MAKING MUSIC WITH YOUR COMPUTER

David (Rudy) Trubitt, ed.
©1993, 128 pp. (P) **013) $17.95**

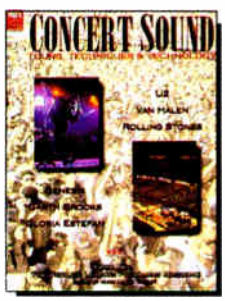
This book provides an invaluable introduction to the basics of computer music—whether you're a computer user just entering the world of music and sound or a musician searching for the right computer. *Making Music* will help you get the most out of today's electronic music technology by teaching you how computers contribute to the creative process; offering tips on selecting programs and gear and providing info on MIDI sequencing, music notation, hard-disk recording and desktop multimedia. It also includes a directory of manufacturers and an extensive glossary.



MAKING THE ULTIMATE DEMO

Michael Molenda, ed.
©1993, 128 pp. (P) **017) $17.95**

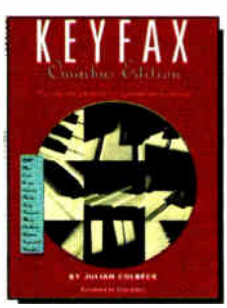
This book will teach you how to record and market a demo tape—a critical step toward gaining the exposure you want for your music. You'll learn how to record killer vocal and instrumental tracks, use signal processing like the pros and make intelligent mixdown decisions. And once your ultimate demo is "in the can," you'll know how to release and promote your recording on a budget and approach record labels without wasting your time. Packed with tips from industry veterans, this book will improve both the sound of your recordings and your prospects for success.



CONCERT SOUND: Tours, Techniques & Technology

David (Rudy) Trubitt, ed.
©1993, 180 pp. (P) **004) $24.95**

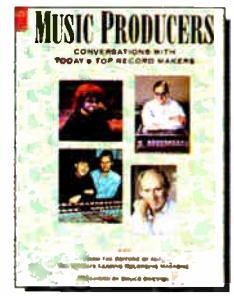
Go behind the boards with today's top touring acts and learn the basic principles of live sound from the pros. *Concert Sound* combines exclusive coverage of 24 major tours, including U2, the Rolling Stones, Garth Brooks and k.d. lang, with practical chapters on live sound techniques and business, safety issues and new technologies. Special sections on monitor mixing, drum miking, noise regulations and computer control make this a unique introduction to professional sound reinforcement.



KEYFAX OMNIBUS EDITION

Julian Colbeck
©1996 (P) **7080) $24.95**

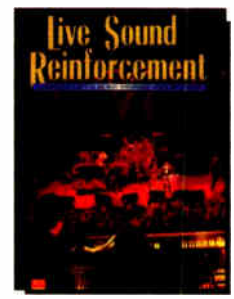
This compendium of the previous five volumes in the *Keyfax* series includes tons of new historical information from the world's foremost expert on classic synths. Colbeck features the top 100 keyboards of all time, each with specific design history and technical information, original and current value and specs on features such as effects, storage capabilities and options. He also includes company profiles of the 13 leading synth manufacturers, plus loads of never-before-published stories about how these classic machines were conceived, designed and built and the people behind them. Finally, Colbeck provides technical specifications for hundreds of other synths, making the *Keyfax Omnibus Edition* a buyers guide like no other!



MUSIC PRODUCERS: Conversations With Today's Top Record Makers

The Editors of Mix
©1992, 128 pp. (P) **006) $17.95**

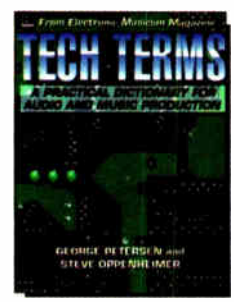
Twenty-four producers, including Don Dixon (R.E.M.), Bruce Fairbairn (Aerosmith), Daniel Lanois (U2), Bill Laswell (P.I.L.), Jeff Lynne (Tom Petty), George Martin (Beatles), Hugh Padgham (Sting), Phil Ramone (Billy Joel), Rick Rubin (Red Hot Chili Peppers), Don Was (Bonnie Raitt) and 13 others, discuss how they got started, how they mediate between labels and artists, what equipment they prefer, analog/digital format decisions, how they "build" a mix and much more.



LIVE SOUND REINFORCEMENT

Scott Hunter Stark
©1996, 310 pp. (P) **1408) $29.95**

This reprint of the classic textbook is new from MixBooks. Its simple language, detailed illustrations and concrete examples convey the fundamentals of sound reinforcement theory in an intelligent and intelligible manner, making it an invaluable resource for aspiring live sound technicians and musicians alike. Written for novice to intermediate-level users, it outlines all aspects of P.A. system operation and commonly encountered sound system design concerns, with in-depth discussions of microphones, speaker systems, equalizers, mixers, signal processors, crossovers, amplifiers, system wiring and interfaces, indoor and outdoor sound considerations and psychoacoustics.



TECH TERMS: A Practical Dictionary for Audio and Music Production

Petersen & Oppenheimer
©1993, 50 pp. (P) **012) $9.95**

Keep this handy guide near your mixing console or musical instrument for precise, plain-English definitions of MIDI terminology, synth and sampler jargon, computer buzzwords and audio abbreviations. Written by the senior editors of *Mix* and *Electronic Musician* magazines, *Tech Terms* explains 300 of the most commonly misunderstood words and phrases in the field of studio recording, digital audio and electronic music.

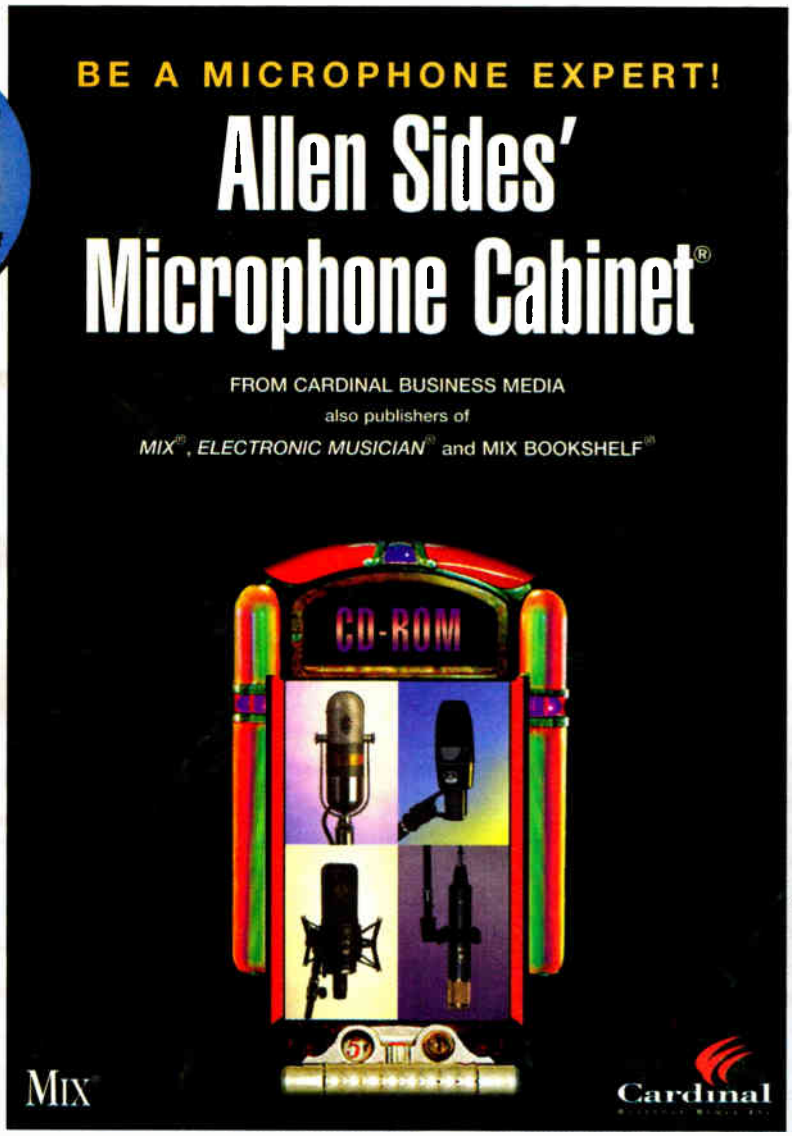
SOUND FOR PICTURE: An Inside Look at Audio Production in Film and Television

The editors of Mix
©1993, 140 pp. (P) **011) $17.95**

Sound for Picture is packed with film-scoring secrets! Take a look behind the scenes as top Hollywood sound professionals reveal how dialog, sound effects and musical scores are recorded, edited and assembled into seamless soundtracks. Exclusive case studies spotlight such blockbusters as *Terminator 2, Malcolm X, The Simpsons, The Doors, Twin Peaks* and many others, focusing on both the equipment used and the philosophical side of sound design.

Be a microphone expert... and save money at the same time!

As our way of saying thanks to *MIX* subscribers, we are now offering **Allen Sides' Microphone Cabinet** for **only $49.95**. That's more than **25% off** its regular list price of $69.95.



Allen Sides has recorded and mixed sessions for dozens of world-class artists such as Ry Cooder, Count Basie, Ray Charles, Sinead O'Connor and Brian Setzer.

David Schwartz, producer of this CD-ROM project, is the founder and former editor-in-chief of *Mix*.

"The Microphone Cabinet is now a required reference tool for all of our classes. It really shows students the importance of subtle differences between mics, but best of all, I can secretly use it too!"
David Gibson
Founder and Chief Administrator
California Recording Institute

"What a great educational tool! My students can now learn the technical specifications and the sonic characteristics of microphones which normally aren't available to them. With studio time in such demand, it's a great way to get to know the mics before going into the studio."
Wesley Ballo
Coordinator of Recording Studio Curriculum
Belmont University

"Hey, I got the CD-ROM and it's great! Finally, you get a chance to look in a top engineer/producer's toolbox without having to buy all of the tools."
David Miles Huber
Author and musician

This unique, fully interactive CD-ROM lines up 66 of the top classic and contemporary professional microphones (chosen from the world-renowned collection at Sides' Ocean Way/Record One studios in Los Angeles) for a series of audio comparison tests on dozens of instruments. The disc features:

- A "Selector Cabinet" of both popular and classic mics for recording each instrument.
- 16-bit Red Book audio samples of the selected mics and instruments.
- Allen Sides' "Tips" for getting the best sound from each microphone.
- A high-resolution color photograph of each microphone and the mic placement setup for each instrument.
- Complete specifications for each microphone.
- A color photograph and description of each musical instrument.
- A "Microphone Basics" section by noted author John Woram.
- A directory of the microphone manufacturers.

Just phone or fax in your order by December 1, 1996, and this amazing resource can be yours.

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MIX Bookshelf

You've spent countless hours working to get your mix to sound right only to have the life squeezed out of it when you master for CD. Well, not any more. Now you can preserve the depth and emotion of your performance by mastering with the remarkable new High Definition Compatible Digital process. Call us for more information, or ask a mastering engineer who has it. And show everyone what you're really made of. *Available at Future Disc • Gateway Mastering • Georgetown Masters • Masterdisk • Masterfonics • MasterMix • OceanView Digital • Sony Music Studios, NY • Sterling Sound*

PACIFIC MICROSONICS HDCD

PREVIEW

TEF HANDHELD RTA

Crown International's TEF® Products (Elkhart, IN) announces the TEF Portable Audio Device (PAD) real-time analyzer (RTA), a 10x6-inch battery-powered unit weighing only 4.3 lbs. Features of the TEF PAD include a 3x5-inch backlit LCD touch screen with a soft "keyboard," two mic preamps, two line inputs and phantom power. DSP functions include ANSI-standard filters and octave and ⅓-octave display modes with variable resolution. Peak Hold, Freeze and Difference modes allow on-the-spot analysis and a PCMCIA slot enables loading of programs, data storage and software upgradability.

Circle 226 on Reader Service Card

DIGITAL WINGS FOR AUDIO

From Metalithic Systems (Sausalito, CA) comes Digital Wings for Audio, a complete multitrack recording/editing system for use with Windows 95-compatible PCs. Priced at $1,995 (with break-out box for AES/EBU and S/PDIF digital I/O and eight analog I/Os on XLR and ¼-inch jacks), the system offers waveform editing, digital mixing (with stereo effect send/return), MIDI sync and 128 virtual tracks. Processing is handled on the card, rather than the PC's CPU, allowing sophisticated DSP (such as reverb, chorus and delay) and audio preview during processing.

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SPATIALIZER TDM PLUG-IN

Spatializer® PT3D™ from Spatializer Audio Laboratories (Woodland Hills, CA) is a Pro Tools TDM plug-in that provides real-time 3-D audio processing for the Pro Tools III and Pro Tools II/TDM systems. PT3D provides on-screen level meters, sum/difference meters, and a Spatial Impression Meter™ for an intuitive display. Spatializer PT3D, which may be used on individual tracks and/or an entire mix, is designed to create a soundstage that expands beyond the boundaries of any two speakers.

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DSE 7000 MULTI-EFFECTS

Orban (San Leandro, CA) has introduced a digital multi-effects upgrade for its DSE 7000 digital audio workstation. The upgrade includes a replacement DSP board with 24-bit internal processing and new (Version 6.0) software. Presets (tailored for broadcast applications) include parametric EQ, Optimod compression, digital delay and Lexicon digital reverberation. The upgrade package is offered at no cost to 1996 customers. New Version 6.0 software will be shipped free to all users, though the DSP hardware upgrade is necessary to take advantage of the new software's full potential.

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TASCAM M1600 CONSOLE

Tascam (Montebello, CA) is shipping the M1600 8-bus recording console in 16- and 24-channel configurations. Features include one stereo and four mono aux sends (plus four stereo returns), 3-band mid-sweep EQ, TRS balanced line inputs, stereo solo-in-place, mute and insert points on every channel. Phantom power is provided on the first eight channels. Balanced and unbalanced tape I/O connections are via 25-pin D-sub connectors, eight channels per connector. Optional 16- and 24-channel meter bridges are $500 and $650.

Circle 230 on Reader Service Card

STUDIO PSYCHOLOGIST

Intelix® (Middleton, WI) has upgraded its Studio Psychologist remote-control cue and monitor-mixing system, that allows individual performers to mix their own headphone mixes using miniature belt-pack- or stand-mounted remote-control units. These 8- and 16-channel mixers communicate via RS-232 data communications protocol to a central digitally controlled matrix mixer, which routes individual mixes to the monitor power amps (no audio signal passes through the remote-control units). Intelix has switched to VCAs in the matrix for improved fader control and better S/N ratio. Available in 8x8, 16x16 and 32x8 configurations, complete Studio Psychologist systems range from $2,900 to $9,500.

Circle 231 on Reader Service Card

PREVIEW

SOUNDCRAFT GHOST L.E.

Soundcraft (Nashville, TN) introduces a low-cost ($4,350) version of the Ghost console. Suitable for recording or P.A. use, the Ghost L.E. features four-band EQ (two bands fully parametric), individual switched phantom power and phase reverse, and a new low-noise mic preamp. Six mono and two stereo aux buses, four stereo returns and multiple monitor outputs are among its other features.

QUANTEGY DTRS TAPE

Quantegy (Mountain View, CA) has introduced a new DTRS™-format digital tape for use in Tascam DA-88, DA-38 and Sony PCM-800 modular digital multitracks. Available in 30-, 60- and 113-minute lengths, the Ampex DA8 tape features an advanced metal particle formulation for improved durability, high output levels and low error rates. A newly designed cassette shell contributes to the tape's output stability and error-free performance.

Circle 232 on Reader Service Card

HYPERPRISM TDM1.1.2

Arboretum Systems (San Francisco, CA) has released Hyperprism-TDM 1.1.2, a real-time multi-effects processing package for TDM-equipped Pro Tools systems. The new version, compatible with Digidesign's new PCI Pro Tools hardware, adds full MIDI Time Code support and offers 23 effects including filtering, modulation, pitch shifting and delay and extensive stereo manipulation. Hyperprism-TDM 1.1.2 is also compatible with Opcode's Studio Vision 3.0 and Logic Audio 2.5. Price is $1,195.

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SYMETRIX 551E PARAMETRIC

Symetrix (Lynnwood, WA) introduces the 551E 5-band parametric EQ priced at $429. Featuring five fully overlapping bands of equalization, the unit offers adjustable center frequency, cut/boost, and bandwidth on each EQ band. Additional low- and highcut filters are provided, and the unit comes standard with both XLR and ¼-inch connectors.

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TEKTRONIX DIGITAL SCOPES

The new family of lower-priced InstaVu™ digital acquisition oscilloscopes from Tektronix (Beaverton, OR) feature color displays, bandwidths up to 1 GHz, sample rates up to 4 GS/s and acquisition rates up to 400,000 Wfm/sec., equaling the speed of the fastest analog 'scopes. The TDS 700A Series includes three models, ranging from $12,200 to $34,495; the lower-cost TDS 500 B Series includes the 4-channel TDS 540B ($14,950) and the 2-channel TDS 520B ($9,500). Both series feature the intelligent TekProbe™ interface to connect with Tektronix's new P5205 high-voltage differential probe and TCP202 AC/DC-current probe.

Circle 235 on Reader Service Card

TRACER DART PRO

Tracer Technologies (York, PA) announced its DART PRO™ (Digital Audio Reconstruction Technology) software for removing clicks, pops and surface noise from a .WAV file. Features include DENoise and DE-Hiss functions, which can remove constant noise sources, such as hum, air-conditioning or tape hiss noise. Also included in the $399 package is a Wave file manager that allows the creation of play-lists of renovated materials, and a spectrum analyzer. Current DART software users may upgrade to DART PRO™ for $49.

Circle 236 on Reader Service Card

BASF 931 DIGITAL TAPE

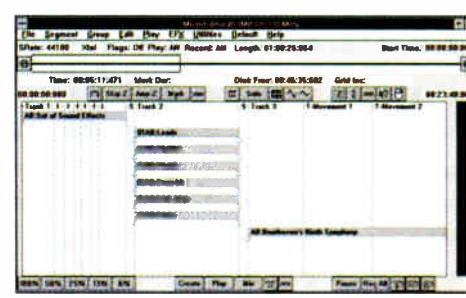
Digital Master 931 digital tape from BASF (Bedford, MA) is compatible with DASH, Nagra-D and PD formats. Available in a variety of lengths and widths, Digital Master 931 uses ultrafine magnetic particles within a special binder for low error rates. A new tape-slitting technique enables tape edges to be cut to fine tolerances, ensuring high batch consistency and reliability.

Circle 237 on Reader Service Card

MTU MICROCD

MicroCD™ 2.0 is a CD mastering program for Windows that allows users of the MicroSound DAW from Micro Technology Unlimited (Raleigh, NC) to create single-session audio CDs or Red Book production masters. The CD running order may be prepared as a MicroSound MicroEditor project; opening the project in MicroCD then allows creation of the required audio image (AIFF) file and writes the PQ code file to the computer hard drive (HD must be at least 2 GB to store project sound files and the AIFF file). MicroCD writes to any SCSI CD recorder at 1x, 2x, 4x or 6x speeds. MicroCD is priced at $395.

Circle 238 on Reader Service Card



PREVIEW

FOCUSRITE GREEN RANGE
Focusrite (distributed by Group One, Farmingdale, NY) intros the Green Range Series of rackmount processors. The Green 1 Dual Mic Pre ($1,099) is a 2-channel mic preamp with phantom power, phase reverse and mute switches for each channel. The mute switches are externally triggerable via jack sockets. Green 2 Focus EQ ($1,249) is a multi-input, single-channel equalizer featuring a mic preamp and six stages of EQ: low- and high-pass filters, low-mid and high-mid parametrics, and low- and high-shelving sections, which are switchable to bell curves. There are three inputs (balanced XLR mic and line inputs and one balanced ¼-inch jack) and the unit includes a bar graph VU meter and an output fader. Green 3 Voicebox ($1,349) is a combined mic pre, 3-band EQ, and dynamics processor including compressor, de-esser and expander sections.
Circle 239 on Reader Service Card

DECK II/SOUNDEDIT 16
Macromedia (San Francisco, CA) is now shipping DECK II™ with SoundEdit™ 16 as a complete desktop audio editing and multitrack recording package for the Macintosh. The package provides an all-in-one digital audio solution that requires no additional hardware or software. DECK II is a software-based multitrack digital audio recording and mixing application featuring continuous video sync to all SMPTE formats, mixing automation, and unlimited virtual tracks and playlists. SoundEdit™ 16 is designed for multimedia developers needing a visual sample editor for high-resolution audio. The SoundEdit 16 plus DECK II package is priced at approximately $389; registered users of either may upgrade for $199.
Circle 240 on Reader Service Card

DUNMORE TUBE MICS
The DR747 vacuum tube condenser microphone from Dunmore Vintage Audio (Universal City, CA) is a double large-diaphragm design modeled on the Neumann U47. Featuring five switchable polar patterns, the mic has a frequency response of 20 to 18k Hz. As the DR747-E, the system includes 3-band equalization, controllable at the rackmount power supply unit or via an optional remote unit. Dunmore also offers a vocal personalizing service that customizes the microphone's response to best suit the owner's voice. Price is $1,795 for the DR747, $2,195 for the DR747-E.
Circle 241 on Reader Service Card

HOT OFF THE SHELF

The first in a series of **Ensoniq wave expansion boards** for the MR-61, MR-76 and MR-Rack instruments, "The Real World" is a 24MB collection of world instruments gathered from eight countries. Retail is $500. Call 610/647-3930 or surf to www.ensoniq.com...**The Jensen Tools Catalog** lists service products for broadcast sound and video equipment. Products available include Tektronix oscilloscopes, Fluke meters, and various tools and maintenance kits. Call 800/426-1194...An environmentally benign magnetic head cleaning solution for professional recording equipment, **Maxell's CL-S fluid** is a non-Freon, fluoride-based solvent that is nonflammable and will not deteriorate plastic, rubber or metal parts. Call 201/794-5900...**Sescom's Audio Solutions catalog** offers interfacing products including useful items like the TR-151 in-line transformer that connects a professional stereo mic to a camcorder or DAT machine and the TR-152 50 dB pad that matches consumer level headphone output to professional mic input levels. Call 800/634-3457...**Promusic's Screen Two Music** is a new collection of full- and commercial-length production music for film and broadcast applications, in a variety of styles. Call 800/322-7879...**Panasonic's Blue Series digital audio tape** derives features from its D3 and D5 broadcast videotapes. A durable binder withstands repeated use, while its backcoating formulation assures transport stability. Priced from $5.50 to $11, it's available in 19-, 34-, 64-, 94- and 124-minute lengths. At your dealer now or call 714/373-7277. ■

SMART RESEARCH COMPRESSOR
The C2 stereo compressor from Smart Research (Abingdon, UK) is a 2-channel unit offering low noise performance and a Crush mode for unusual dynamic effects. The one-rackspace C2 has separate controls for threshold, compression ratio (five ratios plus limit), attack and release time and gain makeup. Each channel has analog gain reduction metering, an in/out switch and sidechain insertion switch. Remaining front panel switches select Crush compression mode and stereo/dual operation (channel 2 controls are rendered inactive when Stereo mode is selected). Inputs and outputs are balanced.
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AMEK DMS
DIGITAL CONSOLE

Amek has never been the type of company to rush into new ventures, instead taking the time to carefully and completely develop the technology before releasing product. Amek's latest console—the Digital Mixing System—is no exception. After years of hardware and software development, with particular attention paid to the ergonomic design and user interface, the Amek DMS has arrived.

The system consists of a control surface, along with various rack-mount modules, including analog and digital I/O modules (with digital and analog crosspoint matrix switching) and a DSP engine.

Depending on user requirements, the control surface can be fairly comprehensive or as simple as an 8-fader configuration, yet be capable of controlling a 40x24x2 mixer. DMS supports up to 160 channels, from any size controller. And in keeping with the concept of the virtual console, inputs can be defined as mono, stereo, LCRS or 5.1 sets. Going one step beyond, users can redefine the console (via software) to suit the individual preferences of any user, yet with a few commands, the board can be quickly reset to any previous configuration.

The control surface combines moving faders, with rotary controls (and a ring of LED positional indicators) for sends, aux, dynamics and EQ. The latter is 4-band, with sweepable LF/HF and parametric midrange bands. Up to 18 aux buses (12 mono/3 stereo) are standard, and all have muting and pre/post switching. Users can work from a central panel—without leaving the sweet spot—or the mixer can be ordered with one knob per parameter, allowing the user a choice of ways to work. Less-used parameters—such as MS decoding, phase reverse, mix-minus select, individual channel delay (up to 265 ms), phantom power and signal routing—are controlled by the high-resolution, color touch-screen display, and data can be manipulated via keyboard, mouse or data wheel. Here again, DMS users are free to decide what works best for their methods.

DMS runs on Amek's familiar SuperTrue automation, with dynamic control of DSP, EQ, faders, mutes and up to ten VCA-style groups. Changes can be SMPTE timecode-driven or walked through by recalling individual snapshots, such as in a live performance or broadcast production.

Also built into the mix controller are alphanumeric displays above each channel strip for identifying track/source names, comprehensive control room monitoring/talkback facilities and tape recorder-style transport keys that issue MMC data. Metering is via onscreen meters (users can select preferred meter type, ballistics, scaling, etc.) and/or an optional meter bridge with VU, plasma or digital meters. Onscreen phase metering is standard.

By swapping various modules and cards, any type of digital or analog format (mic/line analog; AES/EBU or S/PDIF digital; and multitrack digital) is accommodated in the DMS I/O system. A/D and D/A conversion (if necessary) is 20-bit, with the possibility of upgrading the converters as improved chipsets become available. Optional is Amek's Automated Crosspoint Matrices, which are software-controlled 16x16 routers for instantaneous input/output reconfigurations.

But the power behind DMS is the DSP Core, a rack-mount unit that can be installed with the I/O in a machine room. The DSP Core is expandable by adding more DSP cards, and the amount of DSP available at any time is allocated to the particular task at hand. For example, multiple controllers in different rooms could access the same DSP core, with one system mixing while the other tracks. Other than track delay, no time-domain DSP—such as reverb—is currently available. However, Amek offers a Visual Effects (VFX) system that can tweak parameters of ten popular outboard devices (Lexicon, TC Electronic and Yamaha, so far) directly from the DMS touchscreen.

Overall, the Amek DMS packs a powerful, professional digital console in a compact chassis. Priced starting around $130,000, it's not inexpensive, but a clever approach to ergonomics results in a mixer that has a familiar look and feel that will appeal to users who'd rather be creating audio than reading manuals. This, combined with its ease of expandablility and instantaneous reconfiguring to any specific application, make DMS one to watch in the months to come.

Amek U.S. Operations, 10815 Burbank Blvd., North Hollywood, CA 91601; 818/508-9788; fax 818/508-8619. Main UK office: 0161 834-6747. ■

BY GEORGE PETERSEN

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FIELD TEST

TC ELECTRONIC M-2000 WIZARD

DIGITAL EFFECTS PROCESSOR

TC Electronic's M-2000 Wizard combines two digital effect processors in a one-rackspace unit which, at first glance, appears to be a poor man's M-5000. As the proud owner of an M-5000 with a low serial number, I have become attached to its elegant design and performance. But the M-2000 Wizard lists for $1,995; apart from the change to a single adjust wheel instead of the five on the M-5000 and a slightly more opaque sound quality, the Wizard stands up to the comparison with a machine costing more than twice as much. Many will find that the Wizard provides a great deal of functionality in a small, user-friendly package, compares favorably with anything in its price range, and makes a perfect fit for project studio needs and budgets. Sound companies looking to add a high-performance multi-effects device to their inventory will get the added benefit of two effects in a single rackspace.

The Wizard's two effects "engines," accessible through two pairs of male and female balanced XLR analog connectors, may be split or combined to share the two inputs and outputs in several configurations. There are five routing choices for the two effects machines and the stereo input and outputs. Serial routes one stereo machine's output to the second's input. Parallel effectively shares both inputs and outputs between the two effects engines. A dual-input split provides a separate input for each machine but combines both outputs as a single stereo output. Dual mono configures the system as two completely separate mono devices. Stereo sets it up as two linked dual mono machines, an arrangement that will, for example, preserve hidden information in Dolby Surround™ material.

A sixth routing option, called Dynamic Morphing,™ runs a single stereo effect at a time, allowing a smooth crossfade to a second effect controlled by a threshold control that senses the input material's level. This offers some unique and creative possibilities. How about a slap delay that moves into a short ambient reverb, or a hall that changes size with level? The range of options is fascinating. Morphing can be chosen with either machine running as the initial effect, and the speed of transition can be adjusted. It's unfortunate that the morph can't be controlled with the unit's foot pedal control input as well, as some signals don't give a precise enough level change to allow easy programming of the threshold that triggers transition between the effects.

The Wizard is only 8 inches deep and weighs only 5 pounds, making it easy to cart from session to gig. If you just want to bring your programs, there is a slot for a Type I PC card on the front. When a PC storage card is inserted, RAM and snapshots are automatically loaded and stored to and from the card. User RAM presets can also be dumped from one machine to the next via MIDI.

The system includes 128 single-machine ROM factory presets and another 128 two-machine combined presets that also include the preferred routing configuration. Another 128 RAM locations are available for storing user settings for single and combined presets; these can be protected in whole or in part with an upper and lower limit. The two machines and the combined pair each have their own MIDI channels.

The Wizard function, which gave the M-2000 its name, is a cross reference that sorts factory presets by type of effect, instrument and category of intensity, allowing the user to quickly home in on a small group of presets to suit a specific purpose. However, there is no provision for assigning these designations to presets in RAM or for applying the Wizard cross-reference to custom user effects.

In addition to the single and combined effect presets, there are four 'snapshot' locations for storing

BY MARK FRINK

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two effects plus associated routing as a combined preset; each snapshot has its own front panel button, making each instantly accessible. The four snapshot memories can be protected; one file management strategy is to go through the factory settings, fine-tune them and then store them in RAM as combined presets. You can then call up four favorites and load them into the snapshot locations for quick access and comparison. A digital effects unit with this many possibilities requires some forethought and planning to make the most of it as a creative tool, but once you have started to tweak algorithms and organize presets you will find working with such a wide variety of options quick and easy.

In the standard user mode, the adjustable parameters for Hall, Room, Plate and Gated reverb programs include only decay, pre delay, low, mid and high; other parameters are automatically optimized. However, the reverb presets are based on a larger set of expert parameters, each of which may be preprogrammed for each reverb. At the end of each reverb's short user menu is an Expert button, which lengthens the parameter menu by adding more than a dozen items, like high cut frequency, high damping attenuation, and distance, to name just a few. This Expert parameter menu matches the M-5000's Reverb-3 algorithm with the addition of gate threshold, attack and release for the gated presets. Instead of the previous simple three-band frequency contouring, the expert menu adds low, mid and high crossover frequency parameters to the EQ multipliers. Further additional parameters are for diffusion type and level, and modulation rate and depth. Once one of the reverbs is modified in Expert mode it must be stored that way and can no longer be addressed with the original short menu of parameters.

Effects systems like this that use a forward and reverse cursor to get from one item to the next sequentially can become cumbersome once the list gets past a certain length. Many Expert reverb menus have 20 items and are better tweaked on headphones, during lighting focus, for example. Those happy to invest time learning and organizing the hierarchy of the Wizard will be able to take advantage of the power this machine puts at their fingertips.

The Ambience and Reverb-FX presets have just four items in their short user menus: decay, pre delay, low and high. These two effects presets are based on a second Expert reverb algorithm called the CORE,™ and it has a slightly different set of software handles than the previous group. Several presets are written directly in the CORE's Expert mode, and these are some of the nicest-sounding ones. They have the same items on the menu as the M-5000's Reverb-1 algorithm, featuring a two-way EQ crossover and a variety of room shapes to control the reflection pattern. Those familiar and comfortable with the M-5000's reverb programs will be at home once they get used to the menu being in a slightly different order, and to scrolling up and down instead of paging four parameters at a time.

Other effects programs include delay, chorus, flanger and phaser. Similar to the Learn button on TC's 2290, the Tap button on the front panel allows the user to input a tempo value by manually tapping the tempo. The value can be multiplied to match note values from whole notes to 30-second note divisions, including triplets. The tempo is converted to BPM, which equals the quarter-note value. Setting the subdivision to ¼ and tapping on 2 and 4 is an easy way to lock in the tempo at the beginning of each song. A benefit of the Tap function is that two or three settings

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for delays will give you all the presets you need if you don't mind tapping in the tempo each time. (The footswitch could not be used for this with the review unit's Version 1.08 software, meaning that tempos can only be tapped in via the front panel button. I was told that this oversight would be fixed by press time.) The BPM value can also be modified manually by using the Adjust wheel. Alternatively, pressing and holding the Tap button for 3 seconds allows it to learn MIDI tempos. The tapped-in tempo can be applied to either or both presets, and besides adjusting the delay time, it can also be used to set the decay time on reverbs, or the speed parameter on chorus, flanger, phaser and tremolo algorithms.

Wait, there's more. There is also a six-voice pitch-shift program, and each voice has parameters for delay, pan, level and pitch, with pitch set in hundredths of semitones, to a maximum of plus or minus 1,200 cents, or an octave in either direction. There is a tremolo and a stereo enhancement function. Other effects include a 3-band semi-parametric EQ with high- and low-shelf filters, and a variety of dynamics processing configured for compression, limiting, gating and de-essing.

A couple of welcome extras built into the Wizard are an instrument tuner and a MIDI monitor. The tuner, which automatically mutes the outputs, can be set for guitar or bass, responding only to the open-string notes of either instrument. It can also be used in manual mode, where the desired note is set using the adjust wheel. Concert pitch can be adjusted from 440 Hz up to 445 Hz. The MIDI monitor shows a matrix with a column for each MIDI channel and several rows to illustrate various kinds of MIDI activity: program changes, notes, controllers, system exclusive commands and the channel assignment of individual and combined machines. Another feature allows the user to enter a name and phone number, which are displayed for a few seconds during power-up.

On the I/O menu, analog audio connections can be independently set for either professional or consumer sensitivity. An Auto Level function looks at the input signal for five seconds and adjusts the input gain for 6 dB of headroom. Other audio connections include both AES and S/PDIF stereo digital input and output connections. The digital connections offer a multitude of applications, including use as a multi-effects device in an all-digital environment. A separate control on the digital inputs can increase gain by up to 6 dB, useful for maximizing digital program level. Although the processed signal appears at all three outputs, dithering is automatically selected depending on the primary output chosen, with 20-bit for analog, and 16-bit for S/PDIF. It can also be set manually to 8-bit, 16-bit and up through 24-bit, at which point no dithering is applied and raw data is sent to all outputs. The I/O screen also offers a global parameter control that can be used to change all presets to 100% effect without rewriting them, allowing users to easily go back and forth between using the Wizard in-line or as an external effects loop.

Other rear panel connectors include MIDI In, Out and Thru, and a quarter-inch jack for a bypass foot pedal. The extra two pins on the MIDI connector are intended for use with an optional RS485 interface. The AC connector allows for connection to any international voltage. ■

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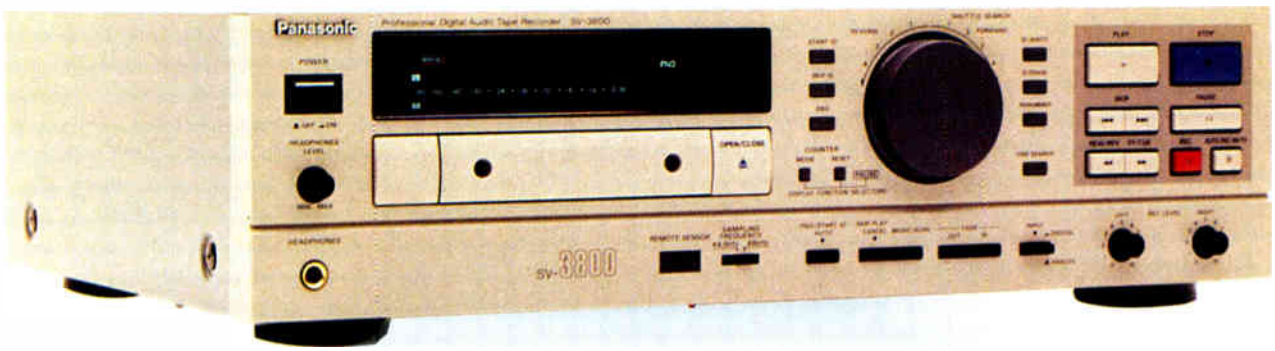
FIELD TEST

PANASONIC SV-3800

DAT RECORDER



When the Panasonic SV-3700 was introduced in 1990, its unprecedented low price ($1,599 at the time) guaranteed that this DAT recorder would become standard equipment, even in smaller commercial and project studios. Six years later, more than 60,000 SV-3700s have been sold worldwide, making it one of the ubiquitous tools of the recording industry. Most recently priced at $1,695, the SV-3700 has been retired to make room for the new SV-3800, which offers more features and higher-resolution D/A converters for the same price.

At first glance, the SV-3800 looks identical to the SV-3700. Closer examination reveals just a few minor front panel differences, which belie the extent of the unit's functional upgrades. All system settings (selected digital I/O terminals, nominal output level, etc.) that were inconveniently positioned on the SV-3700's rear panel have been moved to the SV-3800's front panel. The unit's operation has also been enhanced in several other significant ways to make it more user-friendly than its predecessor. According to Panasonic, the grounding layout has also been improved to minimize RF interference and hum from connected equipment.

COMMON GROUND

Unless you've been in a coma for the last six years, you're already familiar with features of the SV-3800 that were previously found in the SV-3700. The transport (including shuttle search dial) and front display panel are identical to that used in the SV-3700, and the same (two) amorphous composite-type heads are used, which have a life expectancy of between 1,000 and 2,000 hours. The shuttle search dial allows you to cue the tape at speeds ranging from half-speed to 15 times the normal playback speed. Search and fast-wind speeds are up to 250 times that of normal playback. Standard accessories are a rack-mount kit and infrared remote control. The latter gives you direct access to specific programs and allows you to program them to play back in a set sequence and repeat the playback of that sequence or the entire tape.

The SV-3800 retains four of the SV-3700's five counter modes: Absolute Time, Program (elapsed) Time, Remaining Time on tape, and a tape counter based on the rotational speed of the tape reel. Gone is the ill-fated Table of Contents mode for prerecorded commercial DAT releases. In its place is a most welcome peak margin display. The display's resolution increases to tenths of a dB when the margin is less than 3 dB. Although DAT "overs" (levels exceeding 0 dB) are indicated, the SV-3800 does not specify which channel(s)—left, right or both—clipped on playback.

Both 48kHz and 44.1kHz sampling frequencies are supported (selectable for analog inputs via a front panel switch), as well as a 32kHz rate for digital recording only. Fade in/out functions are provided, as well as the standard facilities for writing/erasing start and skip IDs, writing and searching for end marks, and renumbering. A headphone jack with volume control graces the front panel. The SV-3700's single record level control and balance control have been replaced in the SV-3800 with separate record level knobs for each analog channel input.

The unit's rear panel looks simi-

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lar to that of the SV-3700, with the same balanced XLR connectors for analog I/O, and both AES/EBU (XLR) and IEC-958 (co-ax and optical) digital I/O ports. There is an 8-pin terminal for connecting a wired remote.

Ten hidden modes are accessed by pressing these buttons. You can select which digital I/O ports to use and which output format (AES/EBU or IEC), display the error rate for either or both heads, implement or defeat SCMS copy protection, view the cumulative head cylinder rotation time and display the current peak level for each channel. The latter mode shows resolution down to tenths of a decibel around the nominal level of -18 dB (from -16.8 dB to -19.3 dB) and approaching full scale (0 dB to -3 dB). This mode is helpful when calibrating nominal analog record levels with a signal generator; but, as the meters and decibel readout are not "peak hold" in this mode, they don't provide the best method for determining headroom in a mix. The deck's peak margin display serves this function better.

The SV-3800 offers a new single-program Play mode that plays one program and then pauses at the next start ID until the Play button is pressed again. This should come in handy for broadcast, theatrical and post-production applications. Finally, you can set the SV-3800's nominal output level to -10 dB or +4 dB. In this mode, the shuttle search dial and skip buttons can be used to attenuate or boost the output level between -6 and +4 dB in 1dB increments.

ENGAGE!

When you power up the SV-3800, it defaults to Auto Start ID mode, a welcome change from the SV-3700. Also new: When you skip forward or backward to a start ID from Stop mode, the SV-3800 enters Pause mode at its destination. Skip ahead or back while in Play mode, and the unit enters play when it gets there.

You can also put the unit into Record Ready mode to monitor your source and set record levels *without* having a tape loaded. This is especially appreciated during the first few hours of setting up a mix. It also allows you to switch the sample rate to 44.1 kHz (from the default 48 kHz on power up) during this time. Engineers who work on a digital mixing console will note that the SV-3800, like the SV-3700, will not lock to the mixer's word clock until the R-DAT is put into Record Ready or Record mode, even if the sampling frequencies are ostensibly set the same on both devices. (This is because the mixer's word clock must be passed through the R-DAT's input to its output in order to be looped back to the mixer's digital 2-track return.) It's great to be able to lock clocks—simply by pressing Record—without having to load a tape into the SV-3800.

Interestingly, although the tape is wrapped against the heads in Record Ready mode, an air gap between the spinning heads and the tape prevents any tape wear due to friction. Panasonic purportedly has parked an SV-3800 in Record Pause for an entire day without showing any increase in error rates. That said, I would still rather keep my already finished mixes out of a DAT's hot innards and not have to keep track of where I last parked the write head, until I'm almost ready to print the current mix.

The SV-3800's separate L/R record level controls are a mixed blessing. You can adjust the level on one side of the mix without affecting the other—difficult if not impossible with a balance control. When used in conjunction with the SV-3800's high-resolution peak level meter mode, the separate controls allow

[This approximates the amount of noise found in a *Topaz* console.]

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you to fine-tune the calibration of L/R record levels for critical applications such as printing alignment tones, performing A/B tests and remastering. But a single record level knob, or singular-action dual concentric knobs, would allow you to ride the deck's noise floor down with an end fade while keeping the stereo image stable.

The SV-3800 employs the same 1-bit delta sigma A/D converters, with 64-times oversampling, that were in the SV-3700. But the SV-3800 has dual 18-bit converters on its analog outputs, not the 16-bit ones found on the SV-3700. (The "20-bit playback resolution" that Panasonic's ads boast of is arrived at by adding the two 18-bit converters together, which is a bit misleading.) Two colleagues of mine, both highly respected technical writers for our industry, had different takes on the benefit—or folly—of using 18-bit D/A converters for a 16-bit system. One colleague postulated that 18-bit converters would add headroom (or "floor room") to the least significant bits of a 16-bit system, decreasing quantization error at low levels. The other argued that, if you're printing at 0 dB, the lower two bits would never be used.

To compare the SV-3700 and SV-3800's D/A converters, I recorded identical program excerpts at matching levels on both decks via their digital inputs, without dither. I then A/B'd the playback on both decks via their analog outputs. I could not hear any definitive difference between the two decks on recordings cut at full scale (peak levels at 0 dB). But extremely low-level recordings (containing average peak levels around -60 dB) exhibited slightly less quantization noise when played back on the SV-3800, regardless of which deck they were recorded on. The difference was very subtle, but definitely there.

As the SV-3800's advantage is only realized on its analog outputs (and therefore does not affect the quality of the recording itself), the main benefit of having the higher-resolution D/As is hearing your mix a tad clearer during extremely quiet passages—assuming you're monitoring at very loud levels. This subtle improvement at the very bottom of the dynamic range would probably not survive anything but the cleanest analog domain remastering. (It's a bad idea to leave the digital domain once you're in, anyway.) And you'll never hear the difference on a cassette dub. That said, improved quality *anywhere* in a system is always a good thing.

CONCLUSIONS

The SV-3800 is a lot more user-friendly than its predecessor, the SV-3700, which was pretty slick in 1990 but ultimately needed both ergonomic and functional upgrades. The addition of a peak level margin display and output level control are especially appreciated, though diddling with numerous button pushes to gain access to these features is a tad tedious. I also wish the cassette load/unload mechanisms were beefier, but that would surely have added to the unit's cost. On the bright side, the fact that all functions are now accessible from the front panel makes rack-mounting the unit a much more inviting proposition.

Any minor quibbles I have with the SV-3800 become academic when you consider that you're getting all of its new features for the same price as the SV-3700, along with the time-proven performance of the latter. I call that a bargain.

Ramsa/Panasonic Pro Audio, 6550 Katella Ave., Cypress, CA 90630; 714/373-7277; fax 714/373-7903. ■

Michael Cooper is a producer, engineer and owner of Michael Cooper Recording in Eugene, Oregon.

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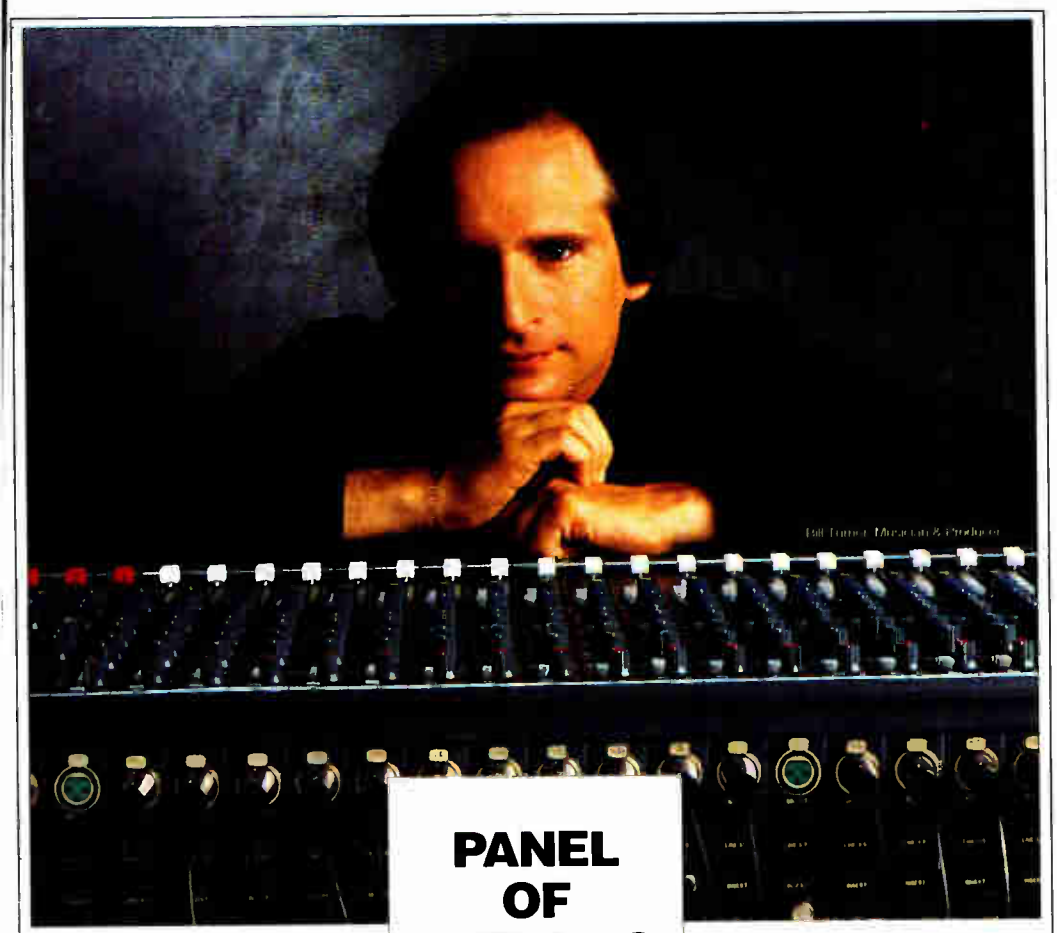

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JENSEN 990 AND NIGHT PREQ3

MIC PREAMPS

There's an old saying, "A man with one watch always knows what time it is. A man with two watches never does." That applies somewhat to mic preamps. A mic preamp will leave its signature on the audio that passes through it, and the same mic will sound different when amplified by different preamps. So when the Night Technologies PreQ3 and Jensen Twin Servo 990 preamps both hit the door in the same week, I knew I was in for a major listen fest.

Both Night and Jensen boxes occupy a single rackspace and, when fully loaded, hold four preamps each. Both have individual 48V phantom supplies, balanced XLR inputs and outputs and phase reversal switches, but from there on, they differ quite a bit. The Night PreQ3 has a 90-260V, 50-60Hz switching power supply. The Jensen Twin Servo has a huge and heavy, 4-inch diameter, electrostatically and magnetically shielded toroidal transformer with 100-240V selector. Symmetrical, bipolar DC supplies with short-circuit-protected regulators are attached to pieces of ⅛-inch grounded copper plate. The PreQ3 uses a Jensen JT-16-A transformer on its input, and has actively balanced outputs. Instead of using transformers on the PreQ3 outputs, its designers have taken an unconventional approach; a 47-ohm resistor in parallel with a coil. The company's explanation is that the outputs are so clean that the capacitance of the wire they're hooked to becomes one of the bigger factors of distortion. The solution is to place the coil in parallel to a 47-ohm resistor so the output impedance at audio frequencies is about 2 ohms. At radio frequencies the resistor becomes the limiting factor.

The Twin Servo 990 uses a Jensen JT-16-B for inputs and a JT-11-BMQ for outputs. According to John Hardy, who makes his own MI pre's and builds the Jensen preamps, the 16-A and 16-B transformers are identical, with 150 primaries and 600 ohm secondaries, resulting in 5.6 dB of voltage gain. I've steered away from transformer I/Os until recently, probably because my earlier experiences left me with the opinion that they took a lot off of the top end, resulting in a flannel-shirted sound. Neither the PreQ3 nor the Twin Servo have this problem.

BY TY FORD

NIGHT PREQ3

The PreQ3 is not just a mic preamp. Night has also included an iteration of their Air Band EQ—a step-switched single-band equalizer that includes 2.5kHz, 5kHz, 10kHz, 20kHz and 40kHz center frequencies. Once a frequency is selected, the Vari Air control can be used to increase the gain at that frequency, with a maximum of 30° phase shift, typically a lot less. The PreQ3 is configured to accept mic or line-level sources via a mic/line switch on the front panel. There's also a 48V phantom switch, a highpass filter switch (60 Hz, 12dB/octave), -20dB mic pad, phase reversal and mic gain switch—the brief Night documentation notes that the two gain stages (25-45dB balanced and 45-65dB) double the resolution of the continuously variable mic gain knob. Following that is the Vari Air section, consisting of a six-position (off/2.5/5/10/20/40 kHz) frequency selector and a gain-control knob. There are no level indicators except a peak LED. In fact, the only sign that the PreQ3 is powered up is a blue LED that indicates that the Air Band is in the circuit.

Night is very protective about its technology—to the point of rubbing off the numbers on the chips on their boards—and expects to remain so until final patent approval. I did learn that Air Band processing takes place within the mic/line amp stage, not after it. At very high gain levels, inserting the Air Band results in a very small amount of added noise. I could only hear it when taking the PreQ3's output directly to the monitor amp and

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cranking the monitors up to a very healthy level. Under normal console routing conditions, bus noise will render the noise inaudible.

According to Lance Parker, co-inventor with Cliff Maag of the Night boxes, the PreQ3 doesn't use capacitors in cross-coupling. In addition, Night uses caps on the negative inputs of the op amps, but puts the audio on the positive input because they've found using the positive input of the op amps results in less phase shift. This configuration results in a more gradual Q for the Air Band, and therefore, less phase error.

JENSEN TWIN SERVO 990

Operationally, the Jensen Twin Servo 990 is a straight preamp with continuously variable gain control, polarity reversal switch, +48V phantom switch and a 20-ohm/150-ohm source impedance switch. Jensen suggests the 20-ohm setting for ultra-low impedance sources such as the Sennheiser P48, Schoeps transformerless and a few B&K mics. The Jensen has large-LED metering that is switchable between VU and fast peak. There's also a separate peak LED that lights when the signal approaches clipping. There are four ground lift switches on the back panel that disconnect audio ground from chassis ground for each of the four preamps.

The Jensen Twin Servo uses DC servos instead of coupling capacitors to block DC. The servos use polypropylene capacitors in an auxiliary feedback loop to null the DC. Jensen believes in high-grade transformers in and out. Their belief is based on the idea that, at frequencies at or above a few hundred Hertz, the IM in a transformer is less than the harmonic distortion. The transformers also reject common mode and ground loop noise. Jensen designs are based on the philosophy that limited bandwidth, rolled off with Bessel filters to a usable bandwidth of 25 kHz, result in flatter group delay or linear phase. On the bottom end, output transformers help to achieve a ±2° phase variation down to 20 Hz.

Part of Jensen's crusade has been to raise awareness of the problems caused by complex waveforms passing through stages that aren't precisely linear. According to Jensen's Bill Whitlock, all op amps have less gain

—CONTINUED ON PAGE 220

FIELD TEST

HARRISON MPC

DIGITALLY CONTROLLED MOTION PICTURE CONSOLE

The film-dubbing industry places specialized demands upon mixing technology. During the preparation of pre-dubs and final production of 4/6-track DME stems, various sources are assigned to a front panel control, equalized, mixed and then routed to an output. A film console also needs to provide flexible loudspeaker monitoring. During final print mastering, the composite DME stems will be rerouted through the board, as the various 2-channel and surround-format mixes are prepared.

Designing a comprehensive film-dubbing console user interface that will handle flexible input selection, output routing, loudspeaker monitoring and transport control is no simple task. The success of the Motion Picture Console (MPC) suggests that Harrison has developed a system that addresses the major concerns of this narrow market niche. And, as I discovered during extended exposure to the large-format MPC within the Busby Berkeley Stage at Sony Pictures Studios, the MPC is an intuitive design that offers a great deal of flexibility and creative control. (And in case you didn't know, the MPC was co-developed by Harrison and Sony Pictures Studios, under the direction of executive VP of post-production facilities, Mike Kohut.)

At the heart of the MPC is a rack of assignable analog mixing and signal processing subsystems that are connected to the comprehensive user interface. Digitally-controlled attenuators (DCAs) are a proprietary design. All audio switching in the console is electronic, with LEDs used throughout to indicate switch status. An integral 256x256 routing matrix handles crosspoint assignment of all bus outputs to recorder channels and monitoring inputs. All system parameters can be automated as snapshots or dynamically to timecode.

There are no menus or nested command structures on the MPC control surface. Its layout is intuitive, and will appear immediately familiar to any experienced mixer or re-recording engineer. Software-controllable functions are handled via a high-res, touch-sensitive VDU at each of the music, effects and dialog mixing stations (assuming a conventional three-person console layout). Multiple pages on the MPC's Interactive Touchscreen Interface (ITI) are quickly accessed from the menu bar located at the top of the display.

Channels are displayed in groups of 48 channels per page. Normally, touch-screen pages are divided into input and master pages. A Slate window provides a four-character label for each channel on the control surface and the touch screen. All Slates can be loaded with either mix or recall automation.

An Apple Macintosh handles interconnection between the VDUs and the master system rack over high-speed (10Mbit) serial links, plus ADB keyboard and trackball interfaces. Custom NuBus cards within the Mac process all data passing between the control surface and racks over the proprietary serial links, as well as feeding the high-res monitor and interrogating the touch-screen overlays.

BY MEL LAMBERT

SYSTEM INPUT/OUTPUT CONFIGURATIONS AND CONTROLS

To date, Harrison has shipped just under 20 MPC systems to dubbing stages around the world. Eight currently reside at Sony Pictures Studios' film lot in Culver City, Calif., capable of handing between 160 and 360 inputs, routing to 48/72 mix buses. The MPC is available in versions with up to 256 audio channel cards, in any combination of mono channels or 4/6/8-channel predub inputs. The system can be specified with up to 48 main buses, which are separately accessible but arranged in six groups of 8-track buses labeled M(usic), D(ialog) and E(ffects) plus A, B and C. Any input channel may also be assigned to any or all of the 24 re-assign buses, and/or the main buses.

The MPC input panel performs the functions necessary to support two line-level "A" or "B" returns; one input panel, combined with one fader panel, contains the controls for four separate channels. Each input channel also features an auxiliary section capable of handling eight aux sends, configurable in mono or as stereo pairs. All aux settings and levels can be automated.

The pan section per channel provides conventional LCR controls, plus

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8 different Effects in any order	yes	no	no	no
Graphic Display	yes	no	yes	no
A/D	18 bit 128X	16 bit	20 bit 64X	16 bit
D/A	20 bit 8X	16 bit	20 bit 64X	16 bit
Sampling Freq.	44.1, 48kHz*	n/a	32, 44.1, 48kHz	n/a
Freq Response	20-20kHz	2-18kHz	10-20kHz	2-16kHz
Digital I/O	AES/EBU, S-PDIF (optional plug-in)	none	AES/EBU, S-PDIF	none
THD @ 1kHz	<0.003%	<0.0032%	0.003%	<0.0032%
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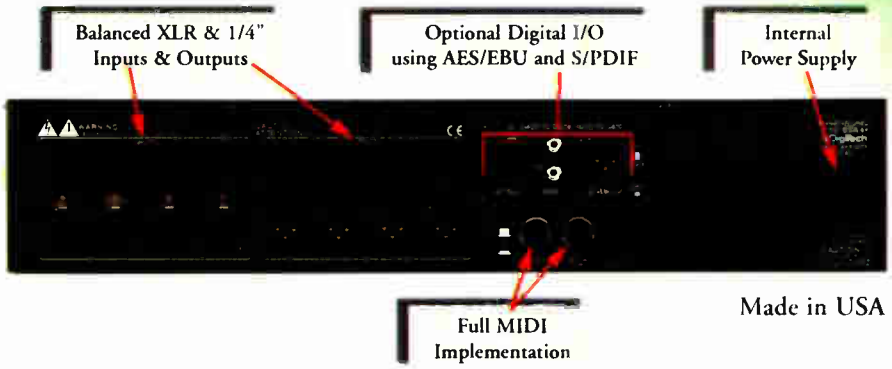
* selectable with optional digital I/O card



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a separate Surround control for the rear channels. A variety of software-controlled panning laws can be assigned to each input; depending on the selected function, the various user controls provide pan across sectors of a multichannel sound field, including 2/4/5/6/8-speaker surround formats. A dedicated button changes the LCR pot into a Divergence control. Fully automated, motorized panning joysticks are optional.

Each input panel has a 4-band EQ, with overall and individual bypass controls for the bands. All bands have 15 dB of cut/boost; bandwidth controls are also available; in the case of the high and low bands, at full adjustment they select Shelving mode. Separate high- and low-pass filter sections provide two shelving filters, settable between 40 Hz and 800 Hz, or 800 Hz and 16 kHz. The EQ section is simple to use; the digitally controlled equalization functions are smooth in operation, with a wide range of adjustment and plenty of overlap.

Each input panel's Dynamics section can insert a gate and a compressor into the channel's signal path, with controls for attack, release, threshold, ratio and related parameters for the compressor-limiter or noise gate. Again, the system is easy to access and adjust; a series of LEDs on the calling input channel show the current status of important functions, plus a gain-reduction indicator. A pair of line-level insert patch points on each input panel can also be used as a channel direct feed. The patch return can return an alternate signal to the channel; both patch returns are simultaneously active.

Main level control for each channel is provided by a P&G 104mm moving fader. A touch-sensitive fader knob is used as a switch in some automation modes, and as a modifier for some of the switch commands. Mute, Solo and Group functions are also provided. Solo can be set up via a master system control page on the VDU as PFL, APL and WET (destructive solo). A "GRP" LED shows when the channel fader is attached to one or more remote faders.

All rotary controls on the user surface feature shaft encoders and a skirt of LEDs to show the control's current setting. In addition, all switches on the MPC control surface are soft in operation, and can be scanned/reset under automation control. A series of ATT (attention) buttons cause parameter settings—such as EQ and dynamics values—to be shown in the associated channel display window. Double-clicking the ATT button normally clears the selected settings. (Level settings return to zero, while a frequency setting, for example, returns to the center of its range.)

SIGNAL ROUTING VIA MAIN BUSES OR RE-ASSIGN

MPC offers a flexible system of signal routing via the Main bus, which becomes an actual console feed, and the Re-assign bus, which serves as an intermediate processing path. Each MPC Assign panel provides a display of bus assignments for four input signals; one section handles assignments to main and the other for the re-assign bus. A central panel, accessed via the ubiquitous ATT buttons, displays the current assignment of the selected channel output on a matrix of LEDs.

The MPC's total complement of 48 Main buses is divided into six groups of eight; three of these groups (Music, Dialog and Effects) are standard, while the three extra A, B and C groups are optional. When all six groups are present, Groups M and A return to the Music section; Groups D and B to the Dialog section; and Groups E and C to the Effects section. Any input channel can access any of the main buses.

A powerful softkey display/re-assign matrix panel handles many of the shared operations that are executed via the touch screen. The panel can be used to write macros for automatically executing some more common setting changes: to assign input, predub and re-assign signals to main/re-assign buses; to attach channel faders, predubs, and re-assigns to remote faders for level control and grouping; to assign inputs of the 32x8 monitor matrix to its outputs; to protect faders from entering or exiting the master status accidentally; and so on. Copy/paste keys allow settings to be copied from one channel to another. The channels can be local (located in the same console section) or global (located in different console sections).

The Re-assign master panel has all controls for panning, level adjustment, and patch insertion for eight re-assign buses. The MPC Predub panel allows the user to combine and route signals without using input channels. The Predub panel is easy to use and offers powerful

DIGITAL DEVELOPMENTS AT HARRISON

The Harrison MPC incorporates a proprietary Analog/Digital Transition Architecture (ADTA) designed to allow control and automation of analog or digital audio paths. Rather than locking its customers into existing digital hardware that will become obsolete, Harrison has designed a system that allows freedom of choice for digital signal processing hardware. At the same time, this approach provides operators with a traditional style of control surface that does not change. MPC owners can migrate from analog to digital audio as needs dictate, and also upgrade DSP components as digital technology improves.

Harrison's first ADTA digital interface is the Klotz Digital VADIS system, which supports all popular digital formats. Other interfaces are under way, including one to Harrison's proprietary digital hardware system. Third-party manufacturers could adopt the ADTA control protocols for their audio processing hardware designs. Harrison's analog processing hardware and 256x256 router/monitor system will continue to be available for the MPC.

As the control surface interface remains constant—whether controlling analog or digital audio processing—there is no additional learning curve. MPC supports fully automated panning and monitoring in any of the two-, four-, six- or eight-speaker surround formats, in addition to fully automated, motorized pan-joysticks.

In other news, Harrison's Version 3.0 software represents a major development, as both the MPC and its smaller cousin, the SeriesTwelve, now share a common hardware configuration. In other words, either control surface can be used with the same audio processing tower and routing matrix. Both the MPC and SeriesTwelve have high-res graphics and an interactive touchscreen interface that work in conjunction with the control surface to provide operator access to every console function. The interactive touchscreen interface can be configured for film, post-production, music recording or broadcast applications. —*Mel Lambert*

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functions in a small amount of space.

The MPC's remote fader panel is capable of controlling a number of peripheral devices, including the level of the predub mixers, the level of groups of channel faders, or both. As many predubs as needed can be attached to each Remote fader. MPC Remote faders have the same automation capabilities as the channel faders.

An optional graphic equalizer module provides automated moving fader control of seven frequency bands, with ±10 dB per band. Two groups of center frequencies are available: one group (100 Hz, 200 Hz, 400 Hz, 800 Hz, 1.6 kHz, 3.2 kHz and 6.4 kHz) for the Dialog Section and another group (65 Hz, 160 Hz, 400 Hz, 1 kHz, 2.2 kHz, 4.5 kHz and 6.4 kHz) for Effects and Music sections. (A useful button toggles the upper band between 6.4 and 8.2 kHz.)

The assignable highpass/lowpass filter panel, accessed via corresponding ATT buttons, offers simultaneous control of four channels. Filter slopes are up to 24 dB per octave rate of attenuation. The LPF extends from 800 Hz to 15.245 kHz, while the HPF extends from 40 Hz to 800 Hz. All functions can be automated.

MPC installation at Sony Pictures Studios

CENTRAL CONTROL FUNCTIONS

Monitor flexibility and the ability to control external transports separates film-dubbing consoles from music desks. Normally when the music and effects mix engineers are preparing a series of multichannel stems that will be bused and recorded on separate mag, analog or digital tape machines, the console's central section handles dialog stems and blending of these elements with the music and effects mixes. In terms of providing a relatively clear and unambiguous overview of the process, the MPC does a great job of letting the rerecording engineers get on with the complex mixing chores, without having the run through complex pages on a VDU, or burrowing down into alternate "layers."

The MPC's monitor section employs a large-scale switcher-router to direct console bus outputs and record-machine feeds to a 32x8 Monitor Matrix via PEC/DIR keys. The software-controlled router is accessed via a switch matrix, or

—CONTINUED ON PAGE 221

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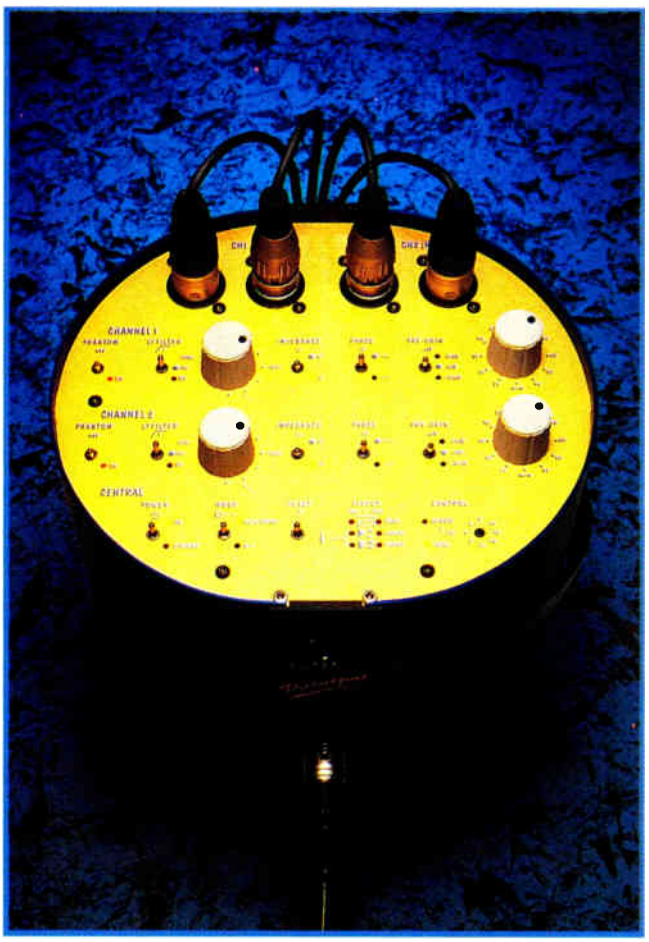
CROOKWOOD PAINTPOT

TWO-CHANNEL MIC PREAMP

Without a doubt, this is one of the strangest-looking mic preamps you can buy; its packaging resembles a gallon of Sherwin-Williams latex semigloss. But the Crookwood Paintpot is a serious tool for recording professionals.

So who exactly is Crookwood? The company's co-founder is former Focusrite and SSL design engineer Crispin Herrod-Taylor, and Crookwood is the name of the farm in southern England where he lived as a child. The Paintpot is a 2-channel mic preamp available in several forms. The standard version is $2,895. A similar model that adds an internal power supply for B&K high-voltage mics is $3,525; a rack-mount, programmable remote-control box for controlling one or multiple Paintpots is $1,395; and a Headless Paintpot which omits the top panel controls for remote-only operation, is $2,450. For those with more conservative tastes—or who merely want a lot of preamps in a small space—Crookwood offers the $3,295 Rackpot, with four mic pre's in a single-rackspace, remote-controlled unit.



I spent a couple months recording with the standard Paintpot, which in addition to its numerous controls (they are numerous!), can also be manipulated via the Head Pot remote. Paintpot takes an innovative approach in terms of circuit design, features and ergonomics. Housed in a heavy anodized aluminum chassis, the unit seems robust and rugged, but the real magic of Paintpot begins with the top panel controls.

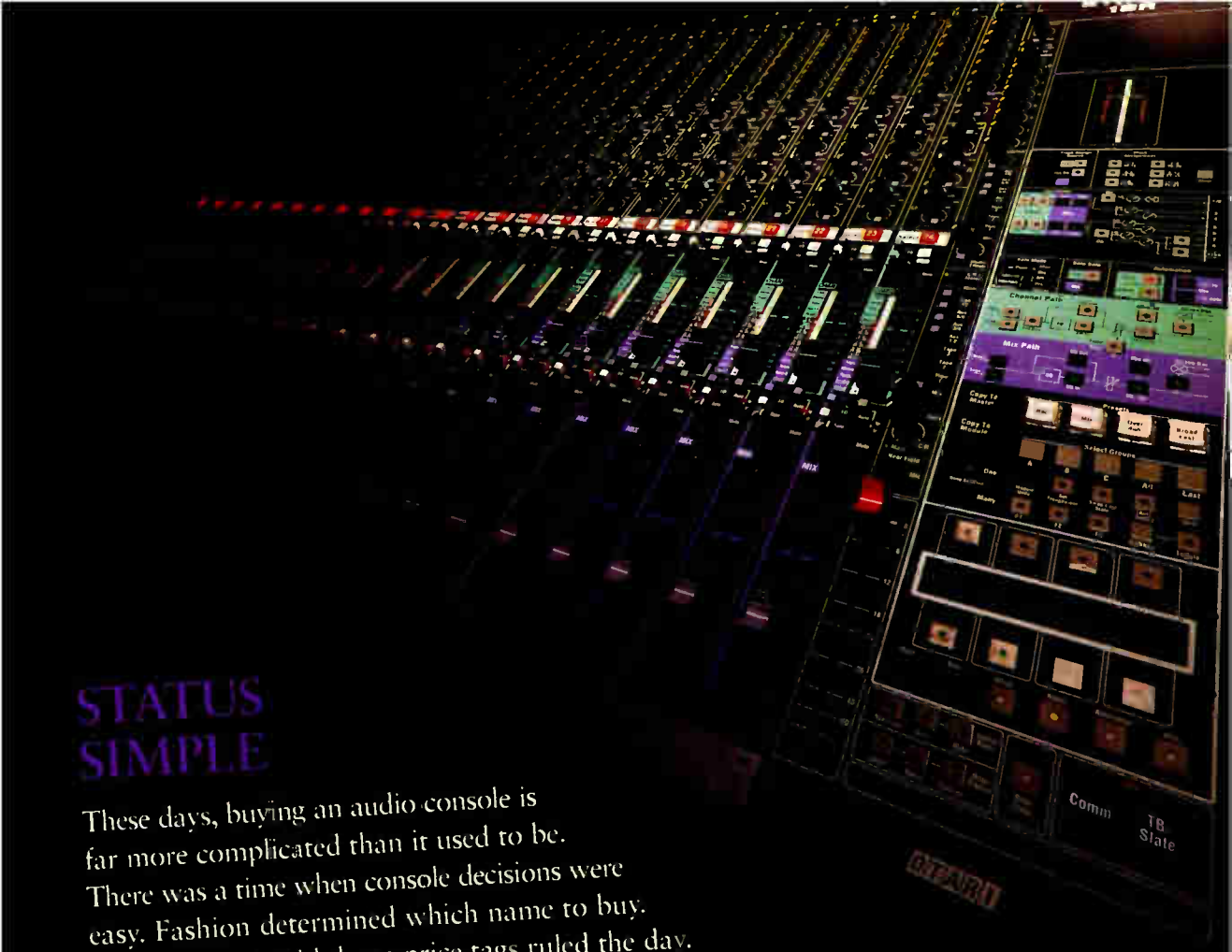
The top panel XLR inputs and outputs (pin 2 hot), gain, polarity reverse, low filter and phantom power switches are straightforward enough and aren't much different from most other preamps. But its other controls take some getting used to. Even the simple top panel power switch is not really an AC switch (that's located on the unit's underside) at all: It changes from "on" to a Standby mode, where power to the relays and phantom circuits is disconnected. The Paintpot offers a feature rarely found on preamps: each channel has a high/low impedance switch for matching the preamp loading to the mic. This is a really subtle change—those who match cables to certain mics will appreciate this—but it's a nice touch nonetheless, and more noticeable at higher frequencies.

Each channel's LF filter selects between an AC-coupling 1Hz setting (roll-off actually starts at 5 Hz), which keeps DC out of the Paintpot (particularly when using phantom power), and a subsonic removal setting with a gentle 50Hz slope. A third position on the LF filter switch offers a DC-coupling mode, which is ideal for dynamic mics, transformer-coupled tube mics with outboard power supplies or instrument pickups. If in doubt, stick with the AC-coupling setting. The pre-gain controls have 4, 24 or 44 dB of gain, expanding the 20dB range of the stepped gain control into a true 60dB control. "Tilt" provides a ±6dB passive equalizer centered at 1,500 Hz, which is designed to adjust for overly bright (or dull) rooms, or to compensate for the HF losses that occur when distance miking in a diffuse field. It's just the thing for getting that Neumann M50 effect when using a Neumann TLM170 or AKG C-414.

The only other mystery of the Paintpot's controls is a dual mono (standard stereo) or M-S mode selector. This inserts a mid/side decoder circuit into the output chain. The decoder circuit is clean and does the job but on the standard Paintpot the ms width controls

—CONTINUED ON PAGE 239

BY GEORGE PETERSEN



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RENT MAKES noise ON BROADWAY

BY ERIC RUDOLPH

Rent is an energetically staged Broadway musical that celebrates youth, with its rousing mainstream rock score, kick-out-the-jams choreography and wild downtown clothing and lifestyles. It is the story of a group of young people who are (sometimes literally) dying to be artists, and who live in the squalor of Manhattan's Lower East Side, a world filled with junkies, transvestites and HIV- and AIDS-infected people who never have enough money, heat and other comforts most of us take for granted. It's a milieu where only the young are suited for survival.

Rent is based on Puccini's opera *La Bohéme* and was conceived in 1989 by playwright/songwriter/lyricist Johnathan Larson. After struggling for seven years to bring his play to the stage, Larson died of an aortic aneurysm just after the final dress rehearsal, less than three weeks before the show had its February 13, 1996, premiere at the New York Theatre Workshop. Larson was posthumously awarded the Pulitzer Prize, and the show won four Tony Awards this year. Now, just hitting the stride of its enormously successful run, *Rent* is not only notable for its history, its consistent overflow crowds and its nearly half-million-dollar weekly grosses. The show is also using what is believed to be the largest sound package currently on Broadway.

Rent differs from most Broadway musicals in key aspects of audio production. "We've completely abandoned the pretense of naturalness in amplified sound that most Broadway shows work hard to create," explains sound designer Kurt Fischer. "Usually on Broadway they try to mix the sound so that at least in the front rows you can hear the vocalist singing acoustically, only aided by the amplification. Here, you always know all the sound is coming out of a speaker. They're singing over a rock band, don't forget. The show is basically a wall of sound."

Significantly, the show makes no effort to hide the cast's wireless mics; the mics and their wires and transmitter packs are considered an essential part of the look of the show. In fact, Larson indicated in the script

L to R: Brian Ronan, FOH engineer; John Cooper, assistant sound operator, deck; Tucker Howard, monitor mixer

PHOTO: ERIC RUDOLPH

PHOTO JOAN MARCUS CAROL ROSEGG

Above: The cast of Rent*;*
right: The theater exterior on Broadwoy

PHOTO ERIC RUDOLPH

that the visibility of lighting and sound gear onstage was as important, if not more so, than the scenery.

"There were two main reasons for choosing to mike the actors this way instead of the traditional Broadway route of hiding mics in their hair or behind their ears, as they did on *Tommy* on Broadway," Fischer says. "From a technical point of view, we chose to go with booms to obtain greater sound level and proximity effect, which is important in rock 'n' roll. We also needed to increase gain before feedback; we have a lot of monitor wedges onstage." The tiny neck-mounted boom mics, which resemble sleek telephone headsets, are Countryman Isomax models refitted with Sennheiser MKE-2 Red Dot omnidirectional capsules. Body pack transmitters are Sennheiser SK 2012s, and receivers are Sennheiser EM 1036 modular units.

The boom-mounted headset mics do make *Rent*'s powerful vocals sound vastly different from those in other Broadway shows. At first, it appears that the singers must be lip-synching to prerecorded vocal tracks, because the sound levels and proximity effect of the vocals are so pronounced. "The show would sound totally different if the actors were wearing head mics," acknowledges FOH engineer Brian Ronan. "Some of the cast members are really aware of the mics and how to work them, more so than others. I

can tell that some of the actors feel like they're holding a 58 in their hand a half-inch from their mouths, which is the effect we wanted, without them having to do that, of course.

"I think it takes some audience members a little while to adjust to the up-front sound of the show," he continues. "I designed the sound for *State Fair*, which is a very natural-sounding show, where the idea is for the audience to not think of the sound as coming from speakers at all. I saw *State Fair* the other day, after running the board here for several months, and I thought for a split second 'where is the volume and the presence?' until I remembered that the two shows were designed to be totally different in approach."

In addition to the Countryman/Sennheisers, there are a few stand-mounted wireless mics onstage, but the Sennheiser SKM 4031s are there more as props than anything else. "There's a scene where a performance artist uses one to blurt out the words 'Diet Coke' as part of her act, and we've got a lot of reverb on it, but that's about it," explains assistant sound operator and deck man John Cooper. "Also they're vestigial from the downtown production, where the chorus didn't have the boom mics, and they were kept in as part of the staging."

Cooper uses the Sennheiser Microport Computer Display (MCD) system to monitor audio and radio output from the 15 radio units. "The Sennheiser interface is driven by an Amiga computer and generates this display of all the mics at once, with bar graphs of each one's audio and radio output. Also I can zoom in on two at a time. Each mic graph is labeled on screen with the actor's name, to make it easy. This system is used by most shows that have a lot of Sennheisers and has been around since *Phantom*," Cooper notes.

Two Sennheiser antennae are used for the wireless mic receivers at *Rent*: a 950Hz and a UHF broadband 700Hz. The system is what Sennheiser calls "active and selective"; the signals are amplified to compensate for splitter and cable-length loss, and the radio frequencies are filtered so that only the desired frequencies receive amplification.

Sound levels "never hit rock concert volume," Ronan says. "We're usually in the 120s somewhere, sometimes a little higher," although he acknowledges he does not take regular measurements. Amplification certainly was not stinted on; the sound system includes 52 amplifiers from Yamaha and Crest (12 Yamaha H 5000s and 14 H 7000s; eight Crest 6001s, four 4801s, thirteen 8001s and one 9001).

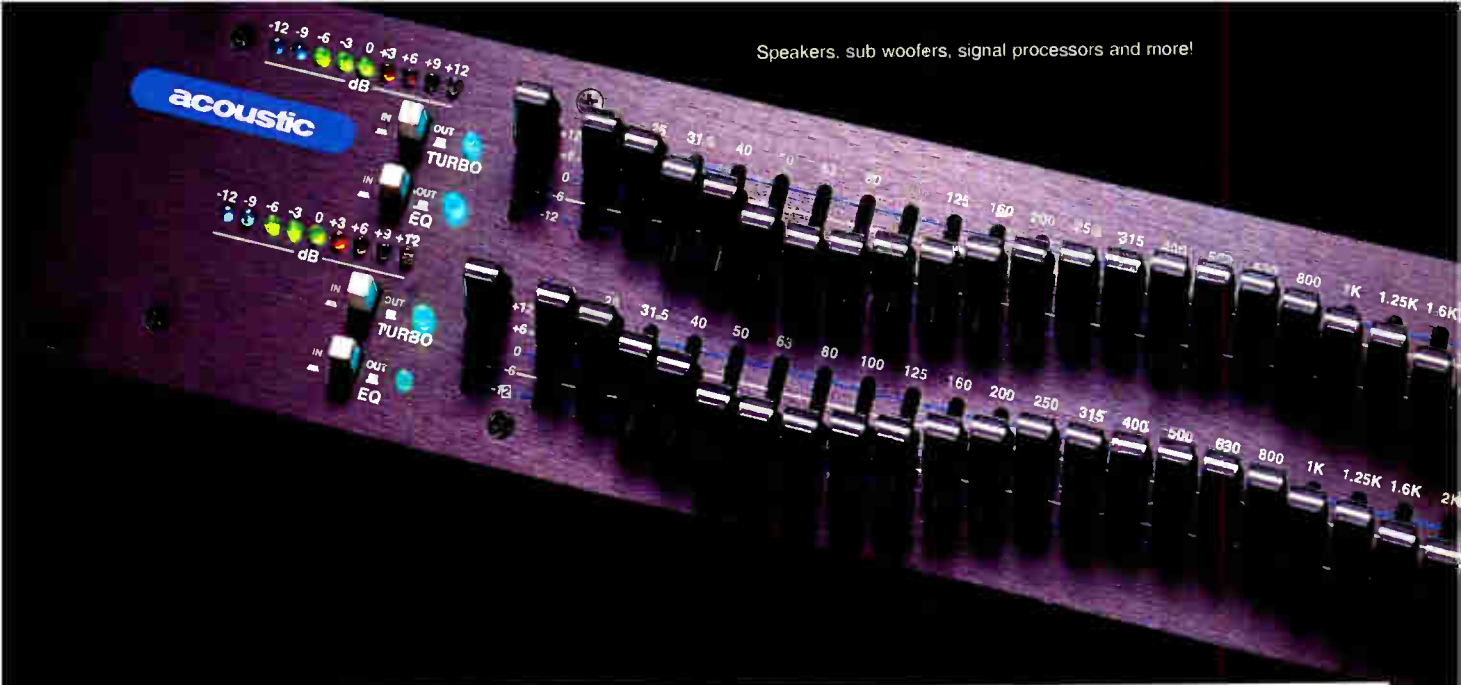
PHOTO: JOAN MARCUS, CAROL ROSEGG

Rent cast members Adam Pascal (left) and Antony Rapp

House speakers are a mixture of EAW, Apogee and Meyer, and acreage is extensive; *Rent* uses more than 60 speakers. Main speakers include six EAW KF 300s on the proscenium, along with five KF 850s, two KF 650s and two SB 250 subs. Four JF 200s are used for effects, and 10 EAW UB 82s and eight JF 80s are used for balcony delay. Four SB 1000 dual concentric 18-inch sub cabinets are on each side of the stage, and four Meyer USW subwoofers are used under the stage. Twenty-three small column speakers, Apogee SSMs, are used for front fills and under-balcony delay.

Another big difference between *Rent* and many other Broadway shows is that *Rent* employs a dedicated monitor mixer. "I'm mixing the monitors like I'm FOH," says monitor mixer Tucker Howard, whose Crest Century LMX 52-input board is located just beside the band, stage right. "At first I was taking a more laid-back approach. When I went to a more active style of mixing, the cast really noticed the difference. It makes the mix more exciting for them, and they respond to it. Simply stated, the more active style means finding the lead instrument and getting it up front. It involves the singers more with the music. They can feel the excitement, and it keeps them more in touch with the band.

"Another advantage of having a dedicated monitor mixing board is that the tech people can get a custom monitor mix," Howard adds. "We can give them whatever mix they feel will help them do their jobs better." The follow spot operators and stage managers have cues linked to a certain instrument, such as one of the guitars, and so will get more of whatever instruments they need the most to hear



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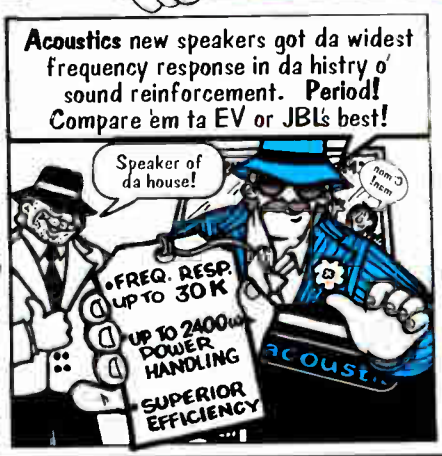

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in their mix; the dressing room gets a general mix for cues.

Main onstage monitors consist of three EAW JF 80s on the lip of the stage. "We originally had wedges," Ronan explains, "but some audience members couldn't see over them. In a rock concert, that's not such a consideration; if the monitor is in the way of an audience member, no one worries about it too much. But theater is different." The monitor array is fleshed-out by EAW SM 260 wedges on both sides of the stage. Each member of the five-piece band has an EAW SM 260 or 200, and Galaxy Hot Spots are used wherever needed, mostly for cues.

Another unusual aspect of *Rent*'s monitor mixing is that Howard gets the mics and lines post-fader from FOH mixer Ronan. "Other sound people hear that and say 'What?' But Brian's mix is clean and beautiful, and I don't have to worry about what is on or off, so I can concentrate on creating the best mix for the cast that is possible. Besides, if I screw up I can blame Brian!" Howard jokes.

Sound effects, which are used sparingly (mostly for ringing telephones and answering machine beeps), are cued and triggered by the Level Control System when the operator hits Return on the keyboard of the Macintosh that runs the program. Lexicon PCM 80s and a 480L, and a Yamaha SPX-990 handle reverb and effects. Three channels of Aphex 661 compressor are used on the kick, snare and bass, and four channels of Aphex 622 compression on the toms. Two songs have prerecorded orchestral backing tracks played back on an Akai DR-4 hard disk, triggered by an Akai sampler.

Rent also uses the LCS for effects triggering, routing, subcues, panning and sending reverb to ambient speakers. "We have a motorcycle effect, and we use the LCS to move the sound out into the house, as if the bike is moving," Ronan explains.

Only two vocalists are treated with compression, Ronan says. "We're using a Valvetronic Gain Rider, which is a very transparent compressor, and a BSS 901 Dynamic EQ, for compression on two of the women, to handle dynamics. They both go from very soft to very loud suddenly and often. Daphne Rubin-Vega [Mimi] will whisper and then scream in the same line, and the compression helps us manage those dynamics. I'm using the BSS 901 on Gwen Stewart [Ensemble], who just hits some astonishing highs in her gospel song. I've got it set right around the 2kHz range, and it works very well."

Like a lot of musicals, however, the compression is mostly in the fingers of the board operator. "There are certain words in the songs which are hard for the singers to project, so every night I'll pump up a certain syllable or two in many numbers, to help the singer land a consonant. I'll also pull the faders down at a few very precise points where there's just too much signal going out. Singers who make it to Broadway *really* know how to put out the SPL."

Rent's two Cadac "E" Type 36-slot frame FOH boards use VCA automation on the show's 58 inputs via Cadac's Console Automation Manager Version 3.11. Ronan only occasionally touches the individual input faders during the show; all of his mics and inputs are automatically slotted onto nine VCA faders in ever-changing groupings for each cue (the VCA faders must be manually reset for each new cue).

"This type of automation, where a VCA fader can have one mic on it for one cue and the very same fader could set levels for 12 mics for the next, has the potential to be confusing, but I programmed it, and I run the board every show, so I know where everything is," Ronan says. "I try to keep the principals and the band on the same faders from cue to cue as much as possible. Again, when I went to see *State Fair* recently, where there is no automation, I was watching the poor operator trying to put up a whole row of faders, practically using his forearms and elbows to get them all, and I wished I'd held out for automation there. When you have 15 or 30 or more mics, which is not unusual these days, automation helps.

"Cadac does make VCA-controlled boards with alpha-numeric readouts over each VCA fader, which you can program so that with each cue change there will be a readout of what is on which fader. But you have to wait so long to get one of those, and we just needed to open this show on Broadway fast, after the huge success it had downtown," Ronan recalls.

Rent is breaking new audio and stylistic ground on Broadway, and Fischer expects that other shows will follow its lead: "We will almost certainly see more of this type of show on Broadway in the future, due to *Rent's* financial and artistic success, as Broadway producers look to develop a younger audience raised on rock and rap." ■

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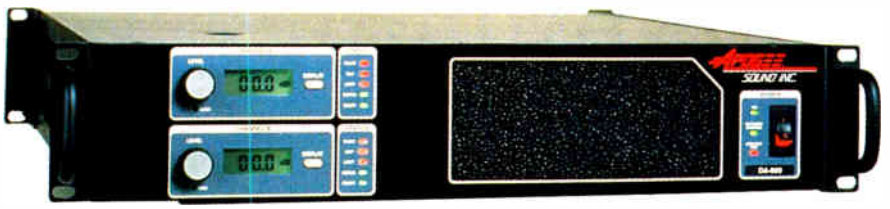
SOUNDCHECK

TOURING AMPLIFIERS

Choosing an amplifier, for many audio professionals, isn't always based on the simple comparison of specs, features or performance bench tests. For example, some people's loyalty to specific manufacturers seems almost tantamount to tribal affiliation, with many claiming undying fidelity to their make of choice; brand loyalty probably accounts for more repeat sales than does the user's actual need to standardize inventory. However, a high level of competition has provided a wide range of choices for sound reinforcement professionals, and sophisticated users look beyond pricing, features—and even brand loyalty—to issues of reliability and sonic quality. And that requires careful listening.

Listening tests are essential when selecting amplifiers, because even models with good specs that were bench-measured by the manufacturer under controlled conditions with resistive loads may perform differently in real-world situtations. And models with unimpressive distortion specs can sometimes sound better than their stats suggest, depending on the design criteria employed by the engineers.

Chevin Q900 and A6000 amplifiers



Apogee DA-800

Listening tests are typically done at reasonable SPLs in moderately sized rooms, using prerecorded material. However because of the wide dynamic range of live sound, touring amplifiers are often required to run near and into clipping for hours on end. During these tests, it is understood that the human ear is easily biased in favor of sounds that are louder by as little as 1 dB. Well-designed comparisons make significant effort to ensure that the results are fair and that all other variables are held equal. In the time it takes to make a thorough decision to purchase, it is likely that new products will have appeared on the market. The following overview examines many of the professional choices available.

The 9620 from AB International (Roseville, Calif.) is the company's top-of-the-line touring amp and is used by touring companies, such as Roadworx. The 9620 is rated at 1,400 watts into 4-ohm loads (2,000 watts at 2 ohms), and these specs seem to be a benchmark for professional touring amplifiers. This three-rackspace, 51-pound amp features dual fan cooling and 11-segment LED metering. It lists for $2,410. Introduced at NSCA, AB's latest is the 3-channel SUB 3600, which has one high-powered channel derived from the 9620 and two more half-powered channels; it lists for $2,599. Although it can be used as a straight 3-channel amp, its intended application is full-range stereo systems with subwoofers, with built-in 24dB/octave crossovers for each channel, each switchable to four different frequencies. Other applications for the SUB 3600 include tri-amped systems or 3-channel operation with an external speaker processor. Another high-powered offering

—CONTINUED ON PAGE 178

BY MARK FRINK

ON THE ROAD WITH THE MAVERICKS

Front-of-house engineer Jon Schimke (left) and production manager/monitor mixer Rick Stanley

The Mavericks are enjoying widespread popularity, following the success of last year's *Music for All Occasions* on MCA and their support slot on Mary Chapin Carpenter's 1995 tour. This year, they won a Grammy for best country vocal performance for the song "Here Comes the Rain" and are headed back to the studio soon to record some material they say will have "a little more of an edge."

The Mavericks are also spending a good part of this year criss-crossing North America, using sound reinforcement company Sound Image of Southern California. After catching the group at San Francisco's Warfield Theatre, *Mix* touched base with The Mavericks' crew by phone from the Cape Cod Melody Tent, and again briefly at Atlanta's House of Blues during the Olympics. A week later, we found them back in the West at Champoeg State Park Amphitheater, just outside of Portland, Ore.

Jon "Rasta Man" Schimke, who mixes FOH and doubles as system tech, has worked for The Mavericks for the last couple of years, starting out mixing monitors. He first met the group working as third man for Sound Image on the Chapin Carpenter tour when Rick Stanley was her production manager. Before that, he and Stanley both worked on a Dan Fogelberg tour. Schimke has also worked CSN and Melissa Etheridge tours for Sound Image. He mixes The Mavericks on a Yamaha PM-3500, and effects this summer include two Lexicon 200s, a PCM-80 and a Roland SDE-3000 delay, though when they pick up full production again this fall, Schimke hopes to replace at least one of the 200s with either a PCM-90 or a TC M-5000.

Paul Deakin's drum kit is miked in a rather standard fashion, with a Sennheiser 421 on kick, Shure SM57 on snare, SM81 on hi-hat, SM98s on toms and Audix SCX-1 condensers for overheads. There are two bass DIs: one for Robert Reynolds' electric and a second for his Guild acoustic. In addition to Jeri Dale McFadden's Yamaha P-300 keyboard mounted inside a real upright piano, there is a Hammond B-3; its Leslie is miked with two Sennheiser 409s on the high rotor and a 421 on the lows. A 421 is also used over the center of the vibes he plays on "La Paloma," an instrumental tune in the encore set. "We're probably the only country band with a set of vibes," Schimke says. Lead

BY MARK FRINK

—CONTINUED ON PAGE 186

TIBETAN FREEDOM CONCERT

View of the Red Stage

Red Hot Chili Peppers

Bjork

Beck

The Tibetan Freedom Concert, presented by the Milarepa Fund and Bill Graham Presents on June 15 and 16 in San Francisco's Golden Gate Park, drew an audience of 100,000 over two days, making the event the largest benefit concert since 1985's Live Aid. The central focus of the event was provided by a score of musical acts appearing alternately on two main stages, but there were a variety of musical and non-musical events going on at all times around the perimeter of the football stadium-sized Polo Field. At the East end of the field, for example, was a large tent in which the Gyuto Tantric Choir chanted more or less continuously, their two- and three-note vocal harmonics amplified through an UltraSound/Meyer Sound D-1 system. (For a fuller account of the Gyuto Tantric Choir's use of amplification, see the July 1995 *Mix*.)

Though the authentic-looking stage set and the seriousness and dedication of the Choir evoked the serenity of a mountain-top sanctuary, it was hard to ignore the high-decibel output from the main stages at the West end of the Polo Field. Electrotec (Westlake Village, Calif.) supplied a main speaker system arranged in three hung clusters flanking the two stages, which were set up side by side and angled in a total of 20 degrees toward the Polo Field center line. Each P.A. cluster was made up of 20 Electrotec Q2 mid/high and 20 Q2 2x15-inch bass cabinets hung in an array eight columns wide and five rows high, supplemented by underhung mid/high and bass enclosures arranged on the lowest row of each cluster. Sub-bass frequencies were provided by 40 Q2 Aura 18-inch subwoofer enclosures distributed at ground level among the three clusters in a 10/20/10 arrangement. (Electrotec special projects manager Ted Leamy notes that this was the largest complement of Q2 Aura subwoofers that Electrotec had ever fielded.) Powered by Crown Reference and Crown Macro amplifiers, the system was clearly capable of pinning ears back at the far end of the Polo Field, and in fact, complaints from neighborhoods adjoining the park led to the upper sections of the P.A. being turned down for the event's second day.

Given the tight scheduling and often extensive FOH effects requirements, Leamy and Mike Brady of UltraSound (San Rafael, Calif.), who had overall responsibility for the sound system design, elected to provide four Gamble EX56 mixing consoles, two for each stage. Thus, while artist A was playing on the Red Stage and artist B was performing line checks and setting monitors on the Blue Stage, the FOH mixer for artist C could set up the board and test effects patches on the second Red Stage console. Outputs of all FOH consoles were fed to a fifth console, a Crest GTX, which fed the P.A. and provided matrix mixes for MTV and

BY CHRIS MICHIE

—CONTINUED ON PAGE 186

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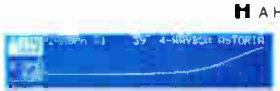
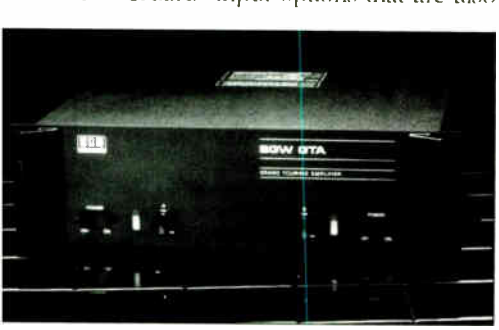


—FROM PAGE 174, TOURING AMPLIFIERS

from AB is the 1200C dual mono amplifier, which features a modular design that allows individual channels to be replaced. The 1200C is rated at 1,350 watts at 4 ohms, 1,950 watts at 2 ohms, and it lists for $3,308.

The **DA-800** amplifier series from **Apogee** (Petaluma, Calif.) was introduced at AES two years ago. Built at Apogee's new 30,000-square-foot plant, the two-rackspace DA-800 derives its name from its 800-watts-per-channel rating into 4-ohm loads. All DA series amps employ the MTA 1567 VCA for low noise and distortion. The DA-800, DA-700 and DA-600 list for $2,321, $2,179 and $2,036, respectively. DA amplifiers have an onboard microprocessor and two large LCDs, one per channel, which can be toggled to display temperature, load impedance, AC line voltage, output voltage or output wattage. Control capabilities include channel linking with scaling between channels and the ability to disable front panel control for tamper-resistant installations. The DA amps are also available in Processor-Amplifier versions designated DPA with onboard circuitry for specific speaker models. Apogee has reintroduced its two-rackspace SA series amps, previously supplied to OEMs and is manufacturing the SA series II using the same basic "engine" as is in the DA series amplifiers. SA amplifiers may be upgraded to full computer control from the same Windows® software as the DA amps, and are also available in Processor-Amplifier versions.

Ashly Audio's (Rochester, N.Y.) high-powered offering for touring as well as installations is its **MFA-8000** dual-mono amplifier, rated at 1,200 watts per channel into 4-ohm loads and 1,500 watts at 2 ohms. This 61-pound, three-rackspace amp lists for $2,780 and features Neutrik Speakon® connectors in addition to binding posts on its outputs, 11-segment LED metering and a variety of PowerCard™ input options that are also available for Ashly Audio's other amplifiers. Standard PowerCards have ¼-inch and balanced XLR connections, as well as a barrier strip with ground lift provision. Other PowerCards include a compressor/limiter, a two-way crossover and a three-way crossover ($140 list). The optional Mic/Line Mixer PowerCard lists for $160 and has four line inputs and two microphone inputs with low-cut filters and phantom power as well as insert points for each channel. The MFA-6000 is rated at 800 watts into 4 ohms and lists for $2,160. Unlike Ashly's FTX-Series MOSFET amps, the MFA amps use standard bipolar output devices.



BGW GTA

BGW (Hawthorne, Calif.) has two models in its Grand Touring series of amplifiers. The dual mono **GTA** has independent power supplies and is available with either a single four-conductor power cord or two 110V cords. The three-rackspace GTA weighs 78 pounds, is rated for 1,100 watts per channel into 2-ohm loads and lists for $2,095. Features include a switchable 15Hz highpass filter, modular construction and optional frequency-selectable crossover cards that can be installed in each channel. The **GTB** is a single-power-supply version of the GTA. It is rated for a hundred watts less output, weighs 50 pounds and lists for $1,539. Both amps are fan-cooled, and they have full protection, front panel attenuation, and signal and clip indicators. The "engine" in both amps also serves as the power plant in BGW's self-powered M1100 and M2200 subwoofers.

Bryston's (Monrovia, Calif.) **ST Professional** series of three-rackspace amplifiers come in 1-, 2-, 3- and 4-channel models. Long respected in recording studios as reference amps, the Pro series is gaining popularity for use in live sound (Schubert Systems recently purchased a dozen ST amplifiers for the John Tesh tour), though their specs exceed the demands of most sound reinforcement vendors. The ST series features a noise floor typically greater than 114 dB, low distortion from a unique ultra-linear input stage and a slew rate in excess of 60 volts per microsecond. Bryston's amps come with a fully transferable 100%, 20-year warranty. The **7B ST-PRO** is a monaural amp rated at 500 watts into 8 ohms, 800 into 4, and it lists for $4,795 per pair. The 4B is rated at 250 watts at eight, 400 watts at four and lists for $2,265. The 8B is a 4-channel amp rated at 120 watts per channel into 8 ohms and lists for $2,995.

Crest Audio 7301 Professional Monitor Amplifier

Brooke-Siren Systems (Nashville, TN) manufactures the **EPC-780** and **EPC-760** amplifiers in addition to its line of high-quality signal processing gear. Specified for use with Turbosound's Flashlight system, these amps are rated at over 1,000 watts and 675 watts into 4-ohm loads respectively. A high-capacity power supply is directly coupled to high-slew-rate MOSFET output devices. The front panels feature 6-segment LED indicators for both channels and a third for temperature headroom, plus there are attenuators and mute switches, as well as independent power switches for each channel. The EPC-780 lists for about $6,000, and the EPC-760 lists for about $4,000.

Crown MacroTech 5000VZ

Carver Professional was bought by Phoenix Gold last winter and is manufacturing Carver amplifiers in Portland, Ore. Carver's new **PX** amplifier line has three models. The **PX1450**, which lists for $1,125, is rated at 725 watts into 4-ohm loads and can also run at 2 ohms. The **PX850** and **PX450** also get their names from their total power output figures into 4 ohms, and they list for $850 and $625, respectively. These three-rackspace, fan-cooled amplifiers have a PowerSave feature that turns them on

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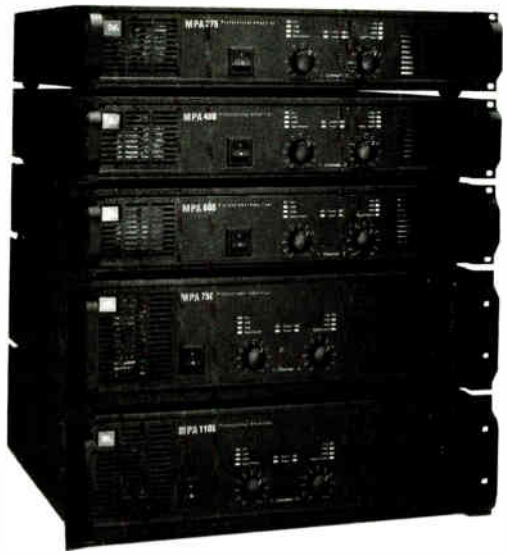
from a Standby mode when they sense signal on their inputs, and sensitivity can be configured for 0.775V, 1.5V or fixed +28dB gain.

Chevin Research amplifiers from Britain are now distributed by QMI (Holliston, Mass.), the folks who bring products such as Drawmer and Nexo to the States. Chevin amps combine MOSFET drivers with switching power supplies to provide high-performance in a lightweight package. The 2-channel **A6000** weighs 55 pounds and is rated at 3,000 watts into 2-ohm loads. QMI has reduced pricing on Chevin amps: The A6000 now lists for $4,999. The **Quad900** is a 4-channel version that is rated at 900 watts per channel at 4 ohms, 1,600 at 2 ohms and lists for $5,499. Two- and 4-channel models rated at better than half these specs are available in a two-rackspace chassis. There is also the two-rackspace **A-2500**, a single-channel amp rated for 2,500 watts at 2 ohms and listing for $2,999.

Crest's (Paramus, N.J.) touring series of amplifiers has been a hit since the introduction of the 8001 a decade ago. Additions to this line include the 4-channel **10004**, rated at 1,400 watts into 2-ohm loads and listing for $7,120. This amp offers four channels of 8001 power in a four-rackspace chassis; it is a prime example of Crest's Power Density engineering design philosophy. Another example is the recently introduced three-rackspace **9001**, rated at 3,000 watts into 2 ohms and listing for $4,600. An overlooked model in this line is Crest's **7301** amplifier, a derivative of the two-rackspace 7001. The 7301 is the same size and weight as the 7001 but is designed for bi-amp speaker applications with two different channels. The 7301 has one high-power, class H low-frequency channel rated for 990 watts into 2 ohms and 940 into 4. The high-frequency side is a class AB channel similar to Crest's 3301, rated at 125 watts into 8 ohms and 220 into 4. Crossover signal processing is effected with 24dB-per-octave octal sockets that plug into the back. The 7301 lists for $2,190; for use with a bi-amp speaker system add octal socket processors like the XO-2 mono crossover for $120 or the LX-2 with constant directivity equalization and a limiter for $200. Sound vendors on tight budgets have discovered that Crest's CA line of amplifiers have many of the same features found in its touring series. The CA-12 is rated at 1,400 watts into 2 ohms and lists for $2,390.



JBL MPA Series

Crown (Elkhart, Ind.) has been a leading name in touring amplifiers since the DC300 was a basic building block of sound reinforcement. Crown has expanded on its **MacroTech**™ line of amps by introducing two high-power models, the **3600VZ** and more recently the **5000VZ**. Variable Impedance (VZ) technology permits these amps to adapt dynamically to signal and load requirements in real time, optimizing the power match over a wide range of loads. The two-rackspace MA-3600VZ weighs 56 pounds, lists for $2,995 and is rated at 1,800 watts into 2-ohm loads. The three-rackspace MA-5000VZ weighs 72 pounds, lists for $3,795 and is rated at 2,500 watts into 2-ohm loads. The 5000 also features Loudspeaker Offset Integration to prevent asymmetrical wave forms that can cause off-center woofer cone movement. Each channel also has an internal compressor that can be set for a fast 4ms attack or a slower 12ms attack. Following on the success of the **MA-24x6** amp for bi-amplified applications like stage monitors, Crown's **MacroTech 36x12** combines two separate power supplies into a single compact, two-rackspace chassis. It lists for $2,550. Channel one provides the power of half an MA-3600VZ, while channel two is rated for the same 480 watts into 4 ohms as a single channel of an MA-1200. When used with a P.I.P.-AMCb input card ($219 list), the 36x12 provides 24dB/octave frequency division, CD horn EQ on the highs and vented-bass equalization for the lows, as well as variable threshold compression.

Cyberlogic, of San Rafael, Calif., produces a line of multichannel power amplifiers based on its Power System Architecture™ approach that removes redundant parts for multi-amp setups. Amplification modules in the **NC-800** and **NC-400 Power Systems Series** (8 or 4 channels maximum from a single chassis) can be tailored to nearly any application, and users can pick from a wide range of options to configure a custom system. Options include internal crossovers and I/O panels with various combinations of XLRs, barrier strip, Neutrik Speakon or binding post connectors. Depending on amp selections, up to 11,000 watts can fit into only six rackspaces. A 3-phase power supply version is also available for large installations.

The **MPA** series of amplifiers from **JBL Professional** (Northridge, Calif.) use an Open Input Architecture™ allowing optional input cards to be installed to add active crossover and alignment functions. For example, the **IM-11** lists for $219 and provides a 30Hz or 40Hz subsonic filter and a crossover frequency of 80, 120 or 250 Hz, plus an external highpass output. The **IM-10** is an adjustable 2-channel, two-way, 24dB/octave cross-over with time delay for transducer alignment and EQ for JBL's 2360 and 2380 horns. The three-rackspace **MPA-1100** amplifier is rated at 1,200 watts per channel into 4-ohm loads, weighs 64 pounds and lists for $2,595. The **MPA-750** is rated at 800 watts into 4 ohms and lists for $2,195.

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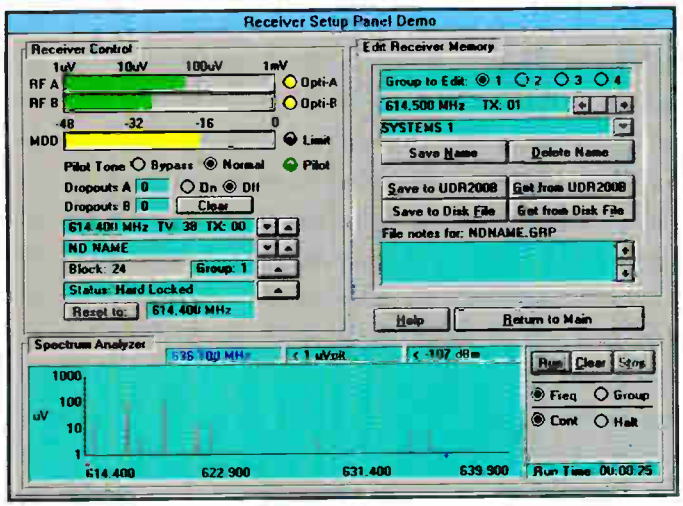

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There are three smaller two-rackspace amps in the line: The **MPA-600, -400** and **-275** are rated at 660, 400 and 275 watts, respectively.

Having found success in the mixer industry, **Mackie Designs** (Woodinville, Wash.) has expanded into the amplifier market. Designed by Greg Mackie and ex-Marantz/Ramsa/Fender designer Cal Perkins, the **M-1200** was unveiled at Summer NAMM. It is the first in Mackie's new line of FR Series (Fast Recovery). Priced at $599, this two-rackspace, 2-channel amp features built-in sweepable CD horn compensation, sweepable highpass filter, switchable lowpass subwoofer cross-over, defeatable clip eliminator, T-design forced-air cooling, detented level controls and front panel LED indicators for input level and status displays. Power is rated as 1,200 watts into 4 ohms bridged mono mode, 600 W/side into 2 ohms or 400W/side at 4 ohms.

Peavey's (Meridian, Miss.) **CS-800**, a popular entry-level amplifier, has evolved over the years and continues to be one of the company's best-selling models. The **800X** lists for $800, and this 47-pound, three-rackspace amp is rated at 400 watts into 4-ohm loads and 600 into 2 ohms. Peavey's newer **G Series** uses a class G topology in a two-rackspace chassis for improved efficiency and higher power. The G-series is rated at 600 watts into 4 ohms and 900 into 2. The **CS-1800G** amplifier lists for $1,300 and weighs 35 pounds.

QSC (Costa Mesa, Calif.) released the three-rackspace **PowerLight 4.0** amp at last year's AES; this year, the PowerLights are on tour with top companies such as Sound Image and Jason Sound. The PowerLight 4.0 weighs 30 pounds. It can produce over 2,000W/side at 2 ohms and lists for $2,998. The 4.0 is rated at 1,400 watts into 4-ohm loads and draws 14 amps or less. It achieves this performance by teaming QSC's Powerwave Switching Technology™ power supply with an efficient 3-step class H output design. Other features include remote AC power control via contact closure and improved "touch-proof" binding post output connectors.

Other amps in the PowerLight series are the two-rackspace **1.0, 1.4** and **1.8** models, which list for less than $1,300, $1,500 and $1,800 respectively. By next month's AES, all PowerLight amps will have a uniform feature set, including defeatable clip limiters and a data port. The data port interfaces to QSC's new MultiSignal Processor, which can perform DSP, amplifier control and monitoring, and load monitoring, all remotely controllable over a standard Ethernet network. Several new PowerLight models will be introduced, including a more powerful version that incorporates breakthrough technology for ultra-high power applications.

Ramsa (Cypress, Calif.) has been manufacturing amplifiers for years. Two newer models were in abundance at the Olympic Games in Atlanta this summer. The **WP-1400** is a three-rackspace amp rated at 400 watts per channel into 4 ohms and listing for $840. Seven of these were installed in the Morehouse College Gymnasium sound system for the Olympic basketball competition. The **WP-1200** is a two-rackspace amp with a 200-watt at 4 ohms rating, and it lists for $680.

Renkus-Heinz (Irvine, Calif.) introduced its own amplifier at last year's AES show to complement the innovative R-H speaker line. The **P2800** is a two-rackspace amp rated at 500 watts into 8 ohms and 750 watts into both 4-

Stewart Electronics World series

NEWSFLASHES

The **City of Chicago** purchased 30 Celestion KR8 loudspeakers for the 16th annual Taste of Chicago festival held in Grant Park. TOC is attended by more than 3 million people every summer; this year, performing artists included James Brown, Harry Connick Jr., Patty Loveless and the Grant Park Symphony Orchestra...The **American Museum of Natural History** (NYC) installed a custom EAW loudspeaker system in its new Hall of Vertebrate Origins. The speakers had to be installed in a wall that's only 8.5 inches deep, so EAW developed a modified JF-60 speaker, called the JF-63 NHM (Natural History Museum). Bradley Stuart Berlin, the acoustical consultant for the museum, says that the speaker is "40 degrees, down firing, to minimize the reflections in this highly reverberant environment."...Nashville club **Green's Grocery** recently took delivery of four Bag End TA-12 loudspeaker systems and a pair of Bag End S18E-I subwoofers, controlled by the company's ELF-1 integrator. The 120-seat venue has hosted John Hiatt, Brooks & Dunn, Suzy Boguss and others within the past year...Recent purchasers of Sabine FBX Feedback Exterminators include Seattle's **Museum of Flight**, various **United Artists theaters, Disneyland** and **Portland, Oregon's federal courthouse**...The **Edwards Theater complex** (Orange County, CA), a 21-screen, 157,000-square-foot multiplex, contains two theaters, known as the Stadium Theaters, with seating at a highly raked, arena-like angle. Each of these rooms has eight JBL 4670D dual-15-inch driver/horn speakers and enclosures. JBL also reports that Boston's **Bull & Finch** (which inspired *Cheers*) installed a JBL EON PowerSystem and EON loudspeakers...This year's **Lionel Hampton Jazz Festival**, held at the University of Idaho, used an Allen & Heath GLF console in its main performance arena. Artists who appeared at the festival included Diane Reeves, Herb Ellis, Shirley Horn and Hampton himself. The **Barter Theatre** (Abingdon, VA) acquired an Allen & Heath GL3000 console. Purchase of the new board was part of an extensive restoration program that the 160-year-old theater underwent this year...Sound Company **Firehouse Productions** (Brooklyn, NY) toured this summer with The Cure, Garbage and Oasis. Aphex reports that the company is using Aphex Dominators for each of these bands...Garth Brooks' '96/'97 world tour is using three ATI Paragon mixing consoles. All gear for this tour is being provided by Nashville's **MD Systems**. ■

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and 2-ohm loads. List price is $2,150. Renkus Heinz' PM2100 crossover modules, which plug into the front of the amp, are tailored for the different products in their speaker line, and they provide protection, EQ, and LF delay for optimizing each speaker model.

Stewart Electronics (Rancho Cordoba, Calif.) has released the next generation of its TEC Award-winning class H power amps. New for 1996 are the **World Series™** amps based on Stewart's previous line of lightweight Switch Mode power supply amps. The **World 2.1** ($1,399) is a two-rackspace amplifier that weighs just 17 pounds. It's rated at 775W/ch into 4 ohms and more than 1,000 watts into 2-ohm loads. The **World 1.6** is a lower-power version rated at 650 watts at 4 ohms and priced at $1,199. Like the previous Switch Mode line these amps use Stewart's Harmonic Shift Correction,™ giving them a unique sound. Under development with delivery scheduled for after the first of the year is the Mondo 4.2. It weighs about 29 pounds and is based on the World series, packing twice the 2.1's power for a 2-ohm rating of 2,100 W/ch. A larger amplifier, the **Mondo 4.2**, will double that power again and weigh 46 pounds.

Yamaha (Buena Park, Calif.) has three models in its professional two-rackspace amplifier line, the **H7000**, **H5000** and **H3000**, which are rated at 950, 700 and 450 watts respectively into 4-ohm loads. List price for these amps is $2,250, $1,700 and $1,400, respectively.

Last but not least, **Yorkville Sound** (Niagara Falls, N.Y.) has been quietly gaining recognition for its AudioPro line. The two-rackspace AP-3000 ($1,649) is rated at 750 watts into 4 ohms and 1,200 watts at 2 ohms. The AP-3400 ($1,689), the same amp optimized for 4-ohm loads, is rated at 1,200 watts and has no 2-ohm rating. The $1,249 **AP-1200** is switch-reconfigurable to produce 600 watts per channel into 4-ohm or 2-ohm loads. A switchable subsonic filter boosts LF 3.6 dB by transferring wasted energy below 30 Hz to the octave above that. The **AP-800** has been redesigned with added features. It can be switched to optimize its output into either 4- or 2-ohm loads and is rated at 400 watts per channel. Listing for $899, its features include a switchable 40Hz highpass filter and three Speakon® connectors—one for each channel, plus a third for bi-amp connections. ■

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—FROM PAGE 175, MAVERICKS

singer Raul Malo's Hi-Watt Combos are miked with Sennheiser 409s. Nick Kane's Hi-Watt 4x12 guitar rig has a 57 on it. The hallmark of The Mavericks' show is Malo and McFadden's vocal harmony, and they rely on Audix OM-5 vocal mics. "Sometimes we'll do festivals and forget to grab them, and then we remember why we like them so much," Schimke adds.

Stanley, who again wears the production manager's hat, also mixes monitors on a Ramsa SX-1, which is the first of five that Sound Image bought this year to replace their PM-3000 and Ramsa WR-S840 consoles. "It grows on you," Stanley comments, "and I love the EQ on it." Malo and McFadden each listen to a pair of Sound Image's G-2 lightweight carbon-fiber composite enclosures that they have been manufacturing for several years and recently introduced to contractors at the NSCA show. These single-12, two-way speakers are loaded with proprietary JBL transducers and rely on a spherical constant-directivity waveguide. "Unlike traditional wedges, where the highs have an on-axis edge from their tendency to beam," Stanley comments, "the G-2 has a smoothness that allows the performer to move around and hear a consistent sound field through a wider angle that matches the low end's coverage." The rest of the band is on pairs of Sound Image's double-12s. "Those give the other guys more of what I call a rock 'n' roll sound that they like, with lots of kick and bass."

The main speaker system is Sound Image's proprietary five-way, two-box Phase-Loc system, powered by QSC amplifiers, as is all of their speaker inventory. Though they've been carrying full production most of this year, The Mavericks have stripped down to wedges and consoles for the summer leg of the tour (the fair season in the country music market), relying on local production for racks and stacks.

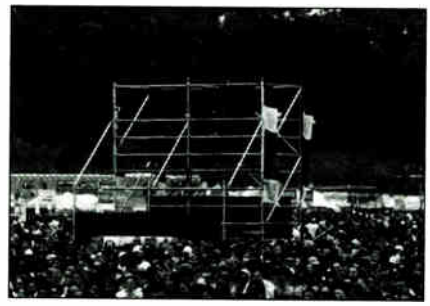
"We usually go with the promoter's recommendation," Stanley explains, "but there are a lot of regional vendors with EAW 850 systems. At least you know what you're getting and it seems to be the most consistent." When they go into theaters this fall, they'll be back to carrying a full Sound Image P.A. "I never really appreciated our speaker system until I had to use a different one each night," Schimke says. "I'm looking forward to getting our Phase-Loc speakers back." ■

—FROM PAGE 176, TIBETAN FREEDOM CONCERT

the various delay, VIP and backstage systems, plus press pools. All of this equipment was set up on the first level of the FOH mix pagoda, the second level of which was entirely devoted to MTV's camera crew and live VJ set. The MTV setup included a surprisingly powerful daytime lighting rig mounted on a cherry picker and powered by its own generator truck, one of several provided for the event by Aggreko Entertainment Services (Smyrna, Tenn.).

The three main P.A. clusters were run in a hybrid stereo arrangement. Each stage was flanked by a Left and Right system, but the center cluster was fed both the Right signal for the South stage and the Left signal for the North stage. Because the FOH mix position was on the center line between the two stages, facing the center cluster, it seems unlikely that the mixers themselves heard much of any stereo effects they may have selected.

Though lack of stereo separation may be an inevitable compromise in a festival situation, Electrotec's Leamy went to great lengths to satisfy the various artists' extensive FOH signal processing requirements. It was not possible to meet every equipment request, but Leamy juggled the assignment of outboard equipment racks to consoles in order to best match the 20-odd FOH mixers' requirements. Drawmer DS201 gates, TC Electronic 2290 delay systems and Lexicon 480L reverbs topped the list of "must have" items. Units from Aphex, dbx, Yamaha, Roland and Eventide were also pulled



from Electrotec's substantial inventory of analog and digital processing gear.

Monitor mix setup paralleled the FOH setup: Each stage had two complete monitor mix stations—a total of four Midas XL-3 mixers—and two snake/splitter systems per stage. This way, monitor mixers could preset their boards during the previous two sets, though the technical necessity to interlink each stage's consoles in order to drive common monitor speakers prevented actual testing until the local stage was clear.

For audience members who chose not to risk the mosh pits and high SPLs close to the stage, UltraSound provided three delay towers on the main field, 250 feet out from their respective P.A. clusters and similarly arranged in a 160-degree "V." The center cluster consisted of four Meyer Sound MSL-10s supplemented on the ground by four Meyer 650-R2 subwoofer cabinets; the two outer delay towers each carried two MSL-10s and two 650-R2s. UltraSound's Brady used Meyer Sound's SIM measurement system to align each of the delay systems independently and created necessary delays with TC Electronic 1280 and Klark Teknik DN-716 multitap delay lines. (As it turned out, the output from the Electrotec system was such that the delays were typically run at 6 to 20 dB below the main system SPL, and the delay subwoofers were unnecessary.) Brady also spent some time in pre-production attempting to find wireless links suitable for transmitting line-level signals to delay towers and other remote systems but found none that met his specifications for distortion, frequency response and dynamic range. He therefore ran cables for the delay towers and used Vega T-667/R-662 wireless transmitter/receivers for the press pool and as backups in case any of the hard-wired feeds went down.

Despite the logistical difficulties of getting ten musical acts, plus religious and secular speakers, on and offstage between noon and 5 p.m. for two days, the festival ran extremely smoothly. Set changes were almost instantaneous, and the only overrun was caused by an act that played longer than its allotted time slot. At the end of the second day, the P.A. crews swung into high gear, as UltraSound's equipment was scheduled to go to Atlanta for the 1996 Olympics (where some of it was later damaged in the pipe-bomb explosion at Centennial Park), and an Electrotec system was ear-marked for a Def Leppard tour due to leave Los Angeles the following day. In fact, Leamy's crew started breaking down the vacant stage during the Red Hot Chili Peppers' final set and completed the load out within three hours—surely some sort of record for a festival rig. ■

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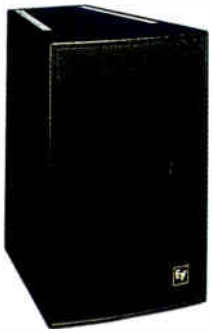
New Sound Reinforcement Products

EV DELTAMAX SERIES II

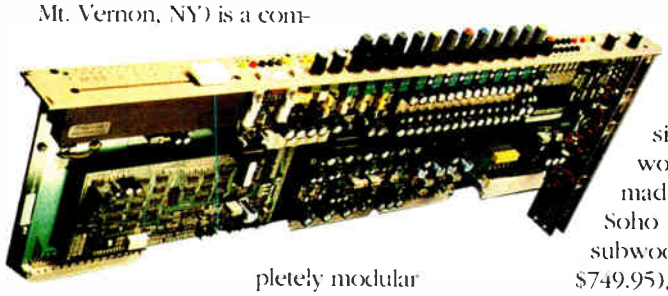
The DMS-1183/64 from Electro-Voice (Buchanan, MI) is an active three-way system with a single EVX-180A woofer, a 12-inch mid-bass driver mounted on a 60°x40° horn, and an N/D4 compression driver mounted coaxially with the mid-bass on a modified HP64M horn. The rotatable mid-bass/HF section allows the 18° trapezoidal cabinet to be oriented upright or sideways. Other new DeltaMax™ Series II loudspeaker systems from EV include the DMS-1152/64 and DMS-1122/85 two-way systems and the DMS-2181 and DMS-1181 sub systems. All DeltaMax Series II rigging is now the same as that of EV's MT line, and companion control electronics have been revised to match the Series II systems.



Circle 212 on Reader Service Card

CADAC F-TYPE CONSOLE

The F-Type live production console from Cadac (distributed by ProMix of Mt. Vernon, NY) is a completely modular design allowing any of the five input module types to be placed anywhere in the compact (32-inch front-to-back) frame. Input modules may be single or dual and feature 4-band parametric EQ plus high- and lowpass filters and switched inserts. The F-Type may be specified with up to 12 subgroups, 24 matrix groups and 16 aux buses, and integral I/O metering eliminates the need for a meter bridge. The F-type uses the same automation as the J-Type and Concert consoles; VCA and moving faders are optional.



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APOGEE DIGITAL CONTROLLER

The D-1 digital loudspeaker controller from Apogee Sound (Petaluma, CA) provides preset response curves for all Apogee loudspeakers, as well as an extensive set of general-purpose signal processing functions. Based on Motorola DSP technology, the D-1 offers 1,800 ms of delay, driver offset correction, 48dB/octave crossover slopes, user-programmable protection algorithms, noise gate, parametric EQ and other features. The 2-input, 4-output device may be configured for stereo bi-amped and three-way systems, and an RS-432 port allows remote control and monitoring from a Windows PC. The D-1 is available in one- or two-rackspace formats, with I/O connectors front or rear panel-mounted.

Circle 214 on Reader Service Card

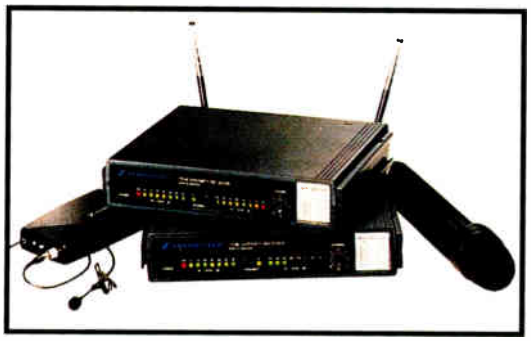
TECHNOMAD UPDATE

Technomad (Northampton, MA) announces price reductions of up to 25% on the company's entire loudspeaker line, thanks to improvements in design and manufacturing. These U.S.-made components feature increased weather resistance and cast metal woofer frames. Technomad also unveils the Soho 12 compact 350W subwoofer (list price $749.95), designed to complement the Noho C loudspeaker. All systems feature waterproof polyurethane foam-enclosed cabinets and recessed Neutrik connectors; T-nut flypoints and an OmniMount bracket are available on the Noho C and Soho 12; all fullrange systems feature a 3-position screwdriver-adjustable EQ contour switch. Systems are available in custom colors with grille color matched to cabinet color (including white at no extra cost). Visit the Technomad Web site at www.technomad.com.

Circle 215 on Reader Service Card

SENNHEISER UHF WIRELESS SYSTEMS

Sennheiser (Old Lyme, CT) has introduced two new UHF wireless systems based on the BFR1081 true diversity receiver. The BFR1081 features 16 switchable UHF channels for up to eight channels of operation, weighs 25 oz. and includes noise reduction and automatic squelch circuitry, with a stated frequency response of 40 to 20k Hz. The BF1081 system includes a dynamic supercardioid microphone/transmitter, which offers eight-hour operation from a 9V battery. The BF1083 system includes a pocket-sized transmitter and MKE2-1053 clip-on lavalier mic.



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ATM FLY-WARE RIGGING SYSTEM

ATM Fly-Ware (Carson, CA) has introduced a two-component series of loudspeaker rigging hardware. The MEGS-PB pivotal brace mounts on the sides of a cabinet and can support 400 lbs. The MEGS-PF pivotal fitting snaps onto the MEGS-PB to provide several suspension points and down-tilt angles. The MEGS-PF is rated at 2,000 lbs. The MEGS rigging system is claimed to be the first to provide coherent acoustic wavefront alignment in vertical and horizontal planes for columnar loudspeaker clusters.

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Left (L to R): Viji Krishnan, Martin Simpson, P. Srinivasan, David Hidalgo
Below (L to R): Jerry Douglas, Edgar Meyer, V.M. Bhatt

ANALOG RULES!

RECORDING THE WATER LILY ACOUSTICS WAY

by Paul Tingen

Kavichandran Alexander prints his home phone number on his CD sleeve notes, because, he says, "one of the reasons that we're going down is because of corporate games and bullshit. You can never get to the man who needs his ass kicked. So if anyone wants to tell me in person that my records suck, they can do so." With a loud belly laugh Alexander admits that in fact he only gets appreciative phone calls, though too few of them are from women for his taste. He is very happy for *Mix* to print that women are strongly encouraged to ring him, for "one must always be in love. I believe that ecstatic love is the only state human beings should be in constantly. It is the greatest joy in life." Almost in the same breath he adds that we should all be encouraged to pursue our "childlike dreams. That initial spark that hits you is spirit descending into you, and from that moment you're mad in the conventional sense. But that spark becomes your muse and is what turns you into a happy and healthy human being."

Alexander roars again with laughter. If the word eccentric didn't exist, it would have to be invented for him. He is ebullient and gregarious, and spikes the story of his label, Water Lily Acoustics, one of the most successful independent labels in the U.S., with strong and often hilarious opinions. CDs, for example, sound terrible and can possibly be dangerous to your health. To justify the fact that he releases his music on them he conjures up an analogy: "I'm like a wine maker, and I offer you the best wine that I can make. Yet if you insist on drinking it out of a Styrofoam cup, be my guest, even if I will tell you point blank that it's an absolutely stupid thing to do."

Kavi Alexander's all-analog Water Lily recordings, exclusively done on gear built by the British electronics wizard Tim de Paravicini, have given him the image of

—CONTINUED ON PAGE 193

L to R: Jie-Bing Chen, Kavi Alexander, P. Srinivasan, Martin Simpson

ROBYN HITCHCOCK

BACK TO THE "MOSS"

by Adam Beyda

England's Robyn Hitchcock emerged in the late '70s as the leader of retro-rockers the Soft Boys, a band whose quirky psychedelia was oddly out of step with the era's prevailing punk rock scene. But being out of sync with the times has never deterred Hitchcock. A self-described child of the '60s and a true original, he has always pursued his own idiosyncratic course, first with the Soft Boys, subsequently as a solo artist, then with his next group, the Egyptians.

He's often labeled an eccentric, due to his oblique lyrics and tendency to focus on strange themes such as insects and fish. But Hitchcock's actual hallmark is the unusual force of personality behind his music, expressed in his inventive melodic sensibility and his distinctive singing. At his best his warm, rich voice captivates and beguiles as he projects a sly-humored, fanciful vibe, with occasional lapses into profundity.

Over the years his recordings have reflected and embodied his strengths with varying degrees of success. By the early '90s, he and the Egyptians had fallen into making heavily produced records, apparently in a bid for elusive commercial acceptance. Hitchcock seemingly sought to contain this trend on his last record with the Egyptians, 1993's *Respect*. He put a mobile recording setup in the garden of his home on the Isle of Wight with the idea of recording everything live and acoustic in the kitchen. But when it came time to mix, the record evolved into something more dense and elaborate. "It got away from what I think I'm good at," Hitchcock says. "It might have been what the Egyptians were collectively good at, but I don't think it's necessarily what suited my songs the best. The voice and the guitar were kind of sublimated to the overall texture. It was music that you could have on in the background, and it made you feel nice, but you didn't really have to listen to it too hard. And that's not really what I'm about."

After *Respect* failed to make a big dent in the charts, Hitchcock lost his deal with A&M, and the Egyptians broke up. But apparently this was the best thing that could have happened to him, judging by his new record on Warner Bros., *Moss Elixir*. A welcome return to form, *Moss Elixir* presents a wonderful batch of new Hitchcock songs in often acoustic, mostly uncomplicated settings. Once on his own, Hitchcock explains, he felt free to structure his songs entirely to his liking. "What I wanted with [*Moss Elixir*] was to have the recording be based around the song and the performance, rather than any attempt at some kind of beguiling texture in the background. I wanted it to be more about the tone of the voice and the guitar."

Another aspect that played a crucial role in shaping *Moss Elixir* was Hitchcock's approach to recording. "I particularly enjoy recording piecemeal," he says, "which is what I've always done up to the last two Egyptians albums, which were done as recorded projects. I like it because it gives you time to get away from what you've done for a couple of months, to figure out whether you need to overdub a track or whether to keep working with that particular take. It's easy to work intensely for two or three days; it's much harder to work intensely for two or three weeks. You may work just as hard, but it becomes a routine, and you lose your perspective. And in the end, the studio becomes its own life, recording becomes its own object, whereas I think it should be a treat to record."

Moss Elixir was three very discontinuous years in the making, and in a first for Hitchcock, the sessions were extremely spread out geographically as well. A peripatetic sort, Hitchcock would go into the studio wherever he happened to be. Studios he recorded and/or mixed in included The Complex in L.A., Hanszek in Seattle, Dub Narcotic (Olympia, Wash.) Manfred Knoop's (New Jersey), and Blah Street and RMS in London. Hitchcock produced the record ("inasmuch as that I caused it to exist"), working with different engineers and a co-producer or two at the various studios.

Toward the end of the process, Hitchcock ended up doing a lot of work at The

—CONTINUED ON PAGE 196

CLASSIC TRACKS

NEIL DIAMOND'S "KENTUCKY WOMAN"

by Blair Jackson

By 1966, the sound of rock 'n' roll on the radio was beginning to change. George Martin's increasingly ambitious and adventurous productions for The Beatles would forever alter the sonic landscape of pop music. In the top New York recording studios, engineers and producers warily looked over their shoulders at the new sounds coming across the Atlantic, but continued churning out hits in much the same way they had for the previous decade. *Sergeant Pepper* was still a year away; that's when all hell really broke loose in the recording industry.

Neil Diamond was only 25 in 1966—a contemporary of The Beatles and the Stones—but he was already very much a part of the New York music establishment. A native of Brooklyn, he began writing songs in his teens, and made his first recordings shortly after graduating from Erasmus High School. Although he briefly attended NYU, where he was pre-med (attending on a fencing scholarship of all things!), he left school in 1962 to devote his energy to selling his songs to Broadway publishers, and it wasn't long before he landed a job making $50 a week as a staff songwriter. In 1965, his friends Jeff Barry and Ellie Greenwich, a married couple who were already well-established pop songwriters (they wrote a number of Phil Spector-produced hits, including "Da Doo Ron Ron," "Be My Baby," "Then He Kissed Me" and "Chapel of Love") helped Diamond get his own recording contract with Bert Berns' Bang Records label. Berns was a formidable songwriter, too, having co-written such classics as "Twist and Shout," "Here Comes the Night," "Hang on Sloopy," "Everybody Needs Somebody to Love" and many other hits.

Beginning in the spring of '66, Diamond began cutting some of his own songs for Bang, working in three different New York studios: Dick Charles Recording (later called Masters Studio), where Diamond recorded his first smash, "Cherry Cherry"; A&R Studios, which was already established as one of the top music and jingle studios in the city; and Century Sound, another top music house, which was co-owned by Bang's principal engineer, Brooks Arthur (profiled in *Mix*, March '95). Jeff Barry and Ellie Greenwich produced the early Diamond sessions, with plenty of input from Berns, and Brooks Arthur engineered.

When I asked Arthur what Barry and Greenwich brought to these seminal Diamond sessions, he said, "What they brought to the studio was happiness, joy and *a beat*. They had a street feel—and by that I don't mean in today's term, which is a lot darker than it was in the late '50s and early '60s. They were happy. They were the 'Goin' to the Chapel' kids. Of course the other things Jeff brought were tambourines, shakers and maracas; and Ellie brought those innovative background parts.

PHOTO: MICHAEL OCHS ARCHIVES

"What Neil brought to the sessions were a great attitude, those wonderful songs, and as Bert Berns used to say, 'the feel of Neil.' It's hard to put your finger on what that was, but you knew it when it was happening."

I suggest to Arthur that perhaps some of the "feel of Neil" is a little swagger in the singer's style, but Arthur disagrees. "Confidence, maybe, but never a swagger. Then and now, Neil is much too thoughtful a man to have a swagger. But he had a *sway*, and the rhythm guitar that he had in his hands matched the movements of his body. It was something to behold from my perch in the control room. He'd be moving to his left and his right and his guitar would be moving with him in perfect rhythm. I would see that kinetic thing happening. It had a little Latin feel to it almost—a little mambo or cha-cha vibe to it, and yet, it was always still a very rock 'n' roll feel."

Arthur says that typically, Diamond would get together with Barry, Greenwich and Berns for several days prior to a session "and they'd also usually brainstorm with the arranger of choice, which in those days was usually Artie Butler. Neil always liked to be totally prepared when he went into the studio and he usually had a lot of ideas about how things should go."

This month's Classic Track, "Kentucky Woman" was cut in the summer of 1967 at A&R Studios. Although it wasn't one of Diamond's biggest hits (it made it to Number 22), Arthur believes "it was still a landmark record for him. He had a streak of hits, and then he wanted to release a different kind of record, a song called 'Shilo,' which he had cut. Bert Berns was being mentorial to him and felt that 'Shilo' wasn't going to be a big hit, so he urged Neil to go back to the well, and write another song. And the song Neil came up with was 'Kentucky Woman,'" which remains a favorite from the early Diamond era for many of his legion of rabid fans.

At the time the song was cut, the control room at A&R was equipped with "an old custom board with Daven rotary pots," Arthur recalls, "they looked like broadcasting pots." The studio had a pair of Ampex 4-track recorders, "and I loved all the tube gear we had back then. I used a lot of Pultecs [EQs], I had Teletronix and Universal tube limiters. We had these big EMT reverbs we kept in the stairwells. From time to time, too,

A&R would convert a room to a natural chamber."

Arthur used a wide selection of available mics, including a Neumann U47 on Diamond's lead vocal, EV 666s, Neumann U87s, Altec "salt shakers" and the then-new Sennheiser 421s. One interesting technique he used in the studio with Diamond was to mic the acoustic guitar conventionally in front, but also put a mic *behind* the singer "so I could pick up some air and some body; some ambience and the wooden feel of the guitar—I'd merge those two together," Arthur says.

Diamond had a stable of top New York session musicians who worked with him on almost all of his early records, including drummer Herbie Lavelle; guitarists Hugh McCracken, Al Gorgoni and Eric Gale; bassist Bob Bushnell and Russ Savakus; keyboardist/arranger Artie Butler; and percussionists George Devons, Jack Jennings and Specs Powell. (Arthur wasn't sure which combination of players were on that specific session.) "The band fit Neil's music hand-in-glove," Arthur says.

The band usually cut its tracks live as a unit, with Diamond laying down a vocal that was usually a guide, but that also might be a keeper. Arthur says that a typical session might involve six or seven run-throughs of a tune, and then the punch-ins began, whether it was correcting a vocal or instrumental part. Background vocals, solos and horns (when they were used) were recorded separately.

Arthur notes that a lot of the magic in those early Neil Diamond recordings is a result of painstaking work during mixing sessions. Listen to "Cherry Cherry" or "Kentucky Woman" or "I Got the Feelin'" and it's hard not to be impressed with the amount of punch in those recordings. And in terms of the air in the arrangements and the ambience on the tracks, it's clear that from a recording perspective, the early Diamond sound was, as Arthur puts it, "on the line from Phil Spector." Some of that is the percussion taste of Jeff Barry, some of it is the creative but judicious use of reverb and delays.

"We had to make our decisions early in the process because we didn't have a million tracks to work with," Arthur says. "If I've got the rhythm section on one track, I have to decide in advance if I want some echo on the bass drum or whatever, because once the track is down it's locked, and if I want more echo, it goes on everything on that track. But I think that's one reason those records have that punch—they didn't have to go through a lot of additional processing and line amps and yada-yada-yada. They were full frequency. They had a lot of height and depth. The good thing was when you committed to a rhythm section sound on 4-track—bass and drums on one track, two guitars on the other, percussion on the next—you lived and died with that mix. You loved it and you worked as hard to get to that level of excellence as you might do now with 48 tracks."

Arthur used to mix his work on "these tiny little speakers I'd set up—I took the guts out of a little plastic portable AM radio; I just left the speaker in there and stuffed the rest of it with foam rubber. I'd mix on these little speakers to see how our record would sound. Not only that, I'd take 45s of other records and A-B it to my mixes to see how much voice there is, how much bass there is, how competitive am I with what's out there?

"But I also knew where the drum should be banging away and how I wanted the guitars behind him left and right, and where the tambourine should sit. I was sound designing at the same time I was mixing. But I also had, from time to time, right over my left shoulder and my right shoulder, Ellie Greenwich or Jeff Barry and Neil himself and maybe Bert Berns, and between the four of us we'd all make little notes for [mixing] cues, because there was no computerization obviously. So we made mental notes of who was going to cue what when, and if my hands were tied up doing one move, someone else would dig in on one fader and ride a voice up or whatever needed to be done. It was hard work but also a lot of fun."

Whatever it was the gang at A&R and Century were doing, it worked. The Neil Diamond hit machine was well-oiled and continued to pick up speed over the next few years. While musical fads came and went, Diamond kept churning out one hit after another—"Sweet Caroline," "Holly Holy," "Cracklin' Rosie," "I Am...I Said," "Song Sung Blue," and that just scratches the surface up through 1972. The early career of Neil Diamond shows what can be done with strong hooks, an appealing front man and a simple approach to recording.

"Neil was always a total professional," Arthur says. "He was very disciplined at a time when a lot of artists weren't very disciplined. He came to work completely prepared. He worked hard and he was always very courteous to the musicians, the people in the studios, *everybody*."

Thirty years later Neil Diamond is still regarded as one of the nicer guys in the music business, and though he doesn't land songs on the charts much anymore, he remains perhaps the most popular touring pop singer in America. Not bad for a gangly, introspective kid from Erasmus High. ■

—FROM PAGE 190, ANALOG RULES!

a purist audiophile, yet he's happy to unload on that rarefied world, too: "Few audiophiles are truly interested in music. Many of them are a bunch of f—heads who prefer to listen to a perfectly recorded motor car revving inside a garage. Most audiophile labels in the U.S. put out awful, terrible stuff. And to do this in a country as rich with talent as the U.S. is a disgrace. Walk down a few blocks in Manhattan, and you'll find a dozen incredibly gifted musicians who will record for you for free!"

It may be tempting from a journalistic point of view to milk the eccentricity angle, but the fact is that people's eccentricities can all too easily distract from their achievements. Alexander is no exception. He may be "mad" by certain orthodox standards, but his "madness" has led him to realize some of his dreams and be extremely successful—by any standard.

Alexander was born in 1949 in what he calls Tamil Eelam, the northeastern part of Sri Lanka—he's an active supporter of the militant Tamil Tigers' Liberation Army—and was educated in an English-speaking boarding school there. From 1968 to 1976 he lived in Paris, where he studied cinematography and painting, and started doing some freelance professional recordings, all the while dreaming of starting his own record label. He moved to Sweden in 1976, recorded Indian music and jazz there for the Amigo label, and emigrated to the U.S. in 1981. He spent several years in New York working as an independent engineer/producer. Finally, in 1984, he settled in California, and started Water Lily Acoustics.

His initial aim was to record—in a straight, almost documentary fashion—master musicians from Asia and Africa playing traditional music. Alexander's label got off to a flying start with a recording of a live concert by the legendary Indian master musician Ali Akbar Khan. Since then, Water Lily Acoustics has released about 35 recordings, among them traditional recordings

of the master sitar and surbahar player Ustad Imrat Khan; the stunning, virtuoso playing of Indian violinist L. Subramaniam (who has recorded with Herbie Hancock, Stanley Clarke, Stephane Grappelli and some of the world's premier orchestras); the amazing Egyptian oud player Hamza El Din; and Indian master vocalists Pandit Jasraj and Salamat Ali Khan.

Yet ever since hearing the Indian-Western crossover music of one of India's most legendary musicians, Baba Allauddin Khan (Ali Akbar Khan's father), Alexander had been alert to the fertile possibilities of meetings between musicians from different cultures. His chance to realize this particular dream didn't come until 1993, but then it arrived with a bang. Alexander's recording of a largely improvised exchange between Ry Cooder and the Indian mohan vina player V.M. Bhatt, called *A Meeting by the River*, was a huge success, earning rave reviews and spending 42 weeks on the *Billboard* world music chart. It sold well over 100,000 copes, won a Grammy Award and topped the "best of" lists of many folk and world music critics the world over.

Since then there has been a string of intriguing crossover releases on Water Lily Acoustics, including the excellent *At the Court of the Chera King*, a blend of Indian court and American folk music played by a mixed, 8-piece ensemble; a strangely lackluster collaboration between Taj Mahal, V.M Bhatt and N. Ravikiran (on chitra vina) called *Mumtaz Mahal*; plus the exciting and highly acclaimed meeting of Jerry Douglas on dobro and V.M. Bhatt plucking and sliding his self-made, guitar-based mohan vina, called *Bourbon & Rosewater*. Forthcoming releases include a meeting of the eminent English guitarist Martin Simpson with Chinese virtuoso pipa player Wu Man; banjo innovator Bela Fleck with Chinese erh-hu virtuoso Jie-Bing Chen and V.M. Bhatt; South-Indian saxophone legend Kadri Gopalnath with top jazz flautist James Newton; plus Simpson, Los Lobos's David Hidalgo and South-Indian musicians Viji Krishnan (violin) and P. Srinivasan (maridangam). On top of all this there are fascinating, first-ever recorded meetings of different musical cultures in the offing: collaborations between classical North-Indian and classical Chinese music (V.M. Bhatt and Jie-Bing Chen), classical Iranian and classical South-Indian music (Hossein Alizadeh and N. Ravikiran) and classical Arab and classical North-Indian (Simon Shaheen and V.M. Bhatt).

THE MAN BEHIND THE EQUIPMENT—TIM DE PARAVICINI

Tim de Paravicini does not come far behind Kavi Alexander in the eccentricity stakes. Yet where Alexander is a high-energy extrovert, de Paravicini is serious, private and legendarily rude to lovers of digital audio. He may be unknown in the pro audio industry at large, but there is a small and growing band of people who have become fans of his pro audio technology, and they are invariably people who work at the top of their chosen profession. In addition to Alexander, they include artists like Vince Clarke of Erasure and Lenny Kravitz, engineers and producers like Bill Bottrell (Michael Jackson, Sheryl Crow), James Guthrie (Toto, Pink Floyd), Tony Faulkner (one of Britain's foremost classical engineers), Terry Manning (ZZ Top), Chris Rice of the U.S. classical label Alterus, and leading London mastering facility The Exchange. De Paravicini is generally spoken of by the people who are familiar with his work with the highest regard—in some cases almost awe—and is described as an analog audio pioneer who is light-years ahead of his competitors.

De Paravicini started his company, called Esoteric Audio Research, or E.A.R, in 1978, initially specializing in successful tube (pre-) amplifiers for the high-end audio consumer world, some of them costing as much as $40,000. During the '80s de Paravicini became increasingly active in the pro audio field, modifying bits and pieces of analog gear, like tape recorders and microphones, and producing his own tube mic amps, tube compressors and tube EQs, usually only available on special order. It was during the late '80s that he started to rebuild Studer C37 tape recorders to his own design and specifications. He uses the C37 as a carcass, he explains, because "from a mechanical point of view Studer have made the most reliable and logical transport system. It's a well-thought-out product." His own version upgrades the ¼-inch C37 to ½-inch or 1-inch, and boasts a stunning frequency response of 7 to 35k Hz ± 2 dB at 15 ips and 17 to 50k Hz ± 2 dB at 30 ips for both ½-inch and 1-inch. On top of this he has carried on making equipment on special request, like 4-track and 8-track tape recorders (based on the Studer J37), a few A/D converters, and Tony Faulkner's 8x2 tube mixing desk.

De Paravicini's tube EQs, compressors (the latter loosely based on the Fairchild) and microphones are a not uncommon sight in U.S. studios. "I built my first mic ten years ago," he says, "and there are now about 40 to 50 in the world. I used to use a Milab capsule, now it's a Pearl. They both are rectangular capsules that behave like a ribbon mic. All stereo in a room requires a perfect line source, so I try to emulate a line source in reverse in a mic. Neumann or Schoeps are not good enough. They suffer the problem of round capsule coloration, with its corresponding resonance frequency that gives a 4 to 5dB peak between 8 to 10 kHz. I find this objectionable. And they don't discriminate between vertical and horizontal sound. A rectangular capsule does that much better, and has only a 1½ to 2dB peak with much broader resonance, which results in much less coloration. The frequency response of my mics is 5 to 18k Hz ± 3 dB, with a gradual fall-off of 12 dB per octave above 18 kHz. This still gives you a usable output even beyond 30 kHz."

Like Kavi Alexander, de Paravicini is a firm believer in analog, and especially tube gear, and a passionate opponent of digital. He argues that digital was introduced for purely commercial reasons at a stage when it was technically still in its infancy, resulting in pathetically inadequate technical standards. "They didn't do their sums right. They choose a very compromised data rate and sampling rate. A 44.1kHz sampling rate only has an effective frequency range up to 3.5 kHz, for mathematical reasons that are too complicated to explain here. But the gist of it is that Nyquist's implication of a 2:1 ratio of carrier to modulator only relates to sine waves and not square waves. The assumption made with digital is

While the musical contents of Water Lily Acoustic's releases are striking and wildly diverse, in terms of atmosphere, philosophy and recording technique, there is a strong unifying element that runs through them all. Alexander's guiding hand is very obvious in the uniform aesthetic of the CD inlays, which are white, with a framed picture on the front, and usually feature Alexander's extensive sleeve notes and sometimes even his poetry inside. The other thing that typifies virtually all WLA releases is the fact that the music is recorded "live" in a few chapels and churches around Santa Barbara, where the label is based. There are a minimum of edits and second takes, and the music is often improvised, or only very briefly rehearsed, leading to very alive and electric performances. And finally, all Water Lily Acoustics' output has been recorded in a very basic, all-analog way. In the early days this was with Milab LC-25FET microphones and an Ampex MR70 (using nuvisters, a miniature tube developed in the '60s), but since 1990 the entire recording chain is all-tube, designed and built by Tim de Paravicini.

Alexander's eccentric recording approach has earned him much admiration and respect. Ry Cooder, for example, remarked about the solo album by V.M. Bhatt, *Saraswati*, that it contains "the richest and most dynamic picture of guitar music that I know. Why don't my records sound like this?" Alexander explains: "I use a very purist setting, namely two microphones in the classic Blumlein arrangement that go, via a mic preamp, straight into an analog 2-track—no mixing desk, no effects, no equalization, compression or limiting. The Blumlein arrangement is two figure-8 microphones placed coincidentally on top of each other, at 90 degrees. This gives you the best phase and amplitude response of any stereo arrangement, and therefore the best localization and stereo image. With good speakers you can re-create a true three-dimensional image of the recording set-up in your living room. All balancing is achieved by physically moving the musicians around. So my attitude to recording is very much old-school: making a documentary of a performance with nothing changed or added."

The gear that Alexander uses are two custom-built, vacuum tube mics, designed by de Paravicini, using dual rectangular Pearl capsules from Sweden. The mic preamp is also a custom-built vacuum-tube design by de Paravicini, as is the tape recorder, a rebuilt Studer C37, configured as a 1-inch 2-track recorder with proprietary EQ, run by Alexander at 15 ips, using 3M 996 tape. Alexander remembers that a friend mentioned de Paravicini's equipment to him during his time in Sweden, when he had an "expensive, all-American rig that I was convinced was cutting-edge." After initial "arrogant" skepticism, because "it didn't look that great," he gave de Paravicini's gear a try. "It blew me away, and it was a very humbling experience. What he was producing was way better than anything I had ever heard. So we became comrades in arms."

After Alexander stopped pressing his records on vinyl, because "people don't buy it anymore," he initially mastered his recordings to a Paravicini-modified Sony U-Matic at a San Francisco mastering facility. Now, however, Alexander prefers to master with Chris Rice of the Altarus label, using de Paravicini's custom A/D converter with tubes in the analog section. "All editing and sequencing is done prior to mastering, using the old razor blade method. I avoid the digital domain to the last possible moment. I master my recordings straight onto CD-R and send the CD-R to the plant with the specific instruction that the glass master is made directly from the CD-R, and not from an Exabyte copy or something. I want to avoid digital copying as much as possible. Finally I listen to the finished CD once for quality control, which is the only time I will ever listen to CDs, because I hate digital."

So what, exactly, is so bad about

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that 20 kHz is a pure tone that is perfectly constant and without sidebands. But real-life audio obviously doesn't obey that rule, and this changes the mathematics dramatically. As a result, the standard digital system goes wrong above 3.5 kHz, even though today there is a lot of filtering that hides the problems. But it doesn't actually cure them.

"Nyquist stated his mathematics as an absolute, but that doesn't mean that it gives you perfection in reality. I would say that generally speaking your carrier frequency has to be eight to ten times as high as your modulating frequency. This is why I suggested in 1982—long before anybody had even thought of going that far—that proper digital audio should have a 400kHz sampling rate and a 24-bit word length. This will give you a pristine frequency range of up to about 35 kHz. The current suggestions for a 96kHz sampling rate are a joke, and I wish that they would increase the standards in one go to what's needed, rather than in incremental steps. The reason for my 400kHz sampling rate suggestion is that our hearing mechanism perceives sound up to 45 kHz. We don't necessarily hear sound above 20 kHz as a recognizable, tuneful sound, but our brain is acutely aware of it, because if you have it at reasonable levels and switch it off, the brain knows. It's aware of these frequencies as a stimulus."

Whoever thinks that de Paravicini is telling fairy tales should tread carefully, for during recent years a number of eminent individuals, reports and experiments have pointed towards the importance of 20kHz+ sounds for our perception of music. Among them are Rupert Neve and a 1991 AES report called "High-Frequency Sound Above the Audible Range Affects Brain Electricity Activity and Sound Perception" by Tsumotu Oohashi and others.

Asked why analog is so much better, de Paravicini replies, "The resolution of analog is down to atomic level. The number of vinyl molecules passing the needle per minute is 500 million, so the sampling frequency is in digital terms half a gigaHertz. With tape it's the same. It's very wide band, very high resolution. The number of magnetic particles passing a tape head on a ½-inch 2-track tape machine corresponds to a 23-bit word, of a one-inch tape machine to a 24-bit word. On top of this there is the fact that the human hearing mechanism has the equivalent of a rise time of 11 microseconds, which is more than twice as fast as a CD, which has a rise time of 25 microseconds. The rise time is the speed with which a square wave rises. Digital is to all intents and purposes woefully inadequate and doesn't match the capacities of the human ear. My aim has always been to build machines that are only limited by what top microphones can pick up. Only then is it right." ■

digital? Alexander sighs: "I did give digital a fair shake. I bought the first digital recordings and even made some digital recordings. But after a while I noticed that it sounded wrong. Remember that Indian classical music is a real test for digital, because it has masses of complex overtones, and the first thing that you hear is that the tamboura drone doesn't sound right. From there on it went downhill and I noticed other instruments sounding wrong, too. The reason is that our ear-brain system is starved of a lot of information with digital. You're listening to a digitally recorded violin, and your brain says: 'That sounds like a violin, but somehow it doesn't.' So it's trying to decipher half-cooked information and fatigue sets in. That's when your mind tells you, 'Hey, let's read a book,' or 'Let's get a glass of wine.' I know of nobody who listens to CDs for more than two hours in one go, yet I can listen for four to five hours to records. It would be interesting to hear from people whether their listening patterns switched after switching to CDs."

The idea that CDs contain too little information obviously connects to the argument that the sampling rate and word length are too low. Yet unlike de Paravicini, who suggests a 400kHz sampling rate and 24-bit word length, Alexander doesn't think that digital is redeemable: "Digital is at odds with the natural laws of the universe. I think that we should only create and use technology that is holistic and governed by natural laws. Since we are created in the image of the Divine, when we create we should reflect the divine paradigms, and our creations should be governed by the natural, or spiritual, laws. Digital is the opposite of what occurs in nature. For example, in nature, the louder a sound gets the more distortion there is; with digital it's the other way around. With analog you're dealing entirely and more directly with the electromagnetic domain, which is also the spiritual domain. In digital you're sampling and storing bits of information that are not a direct analogy to the original. Psychologically, human beings function through analogy; we are impressionistic entities. I know various people who have done research into this area and claim that it could in the long run be detrimental to the human being, to be exposed to long hours of digitized music, although I myself don't have any concrete proof of this."

Yet, given his exuberant laughter, it's clear that Alexander doesn't seriously think that the Styrofoam cup that he serves his excellent musical wine in is actually a poisoned chalice in disguise. He affirms once more that he sees good purpose in selling his wine, regardless of the way we choose to consume it: "The moments I record are like frozen time that gets bottled, and someone in the private seat of their home can release the spirit and be touched and transported into another world. For a few moments they can transcend whatever drudgery and pain that is going on in their lives, and realize that this is a beautiful life and that we are wonderful, spiritual human beings." ■

—FROM PAGE 191, ROBYN HITCHCOCK

Greenhouse Studios in London, with the studio's owner, producer/engineer Pat Collier. Collier is an ex-member of original punk combo The Vibrators and a veteran of many sessions behind the board with everyone from the Soup Dragons to the Men They Couldn't Hang. He also happens to have been Hitchcock's main recording man from the Soft Boys era all the way through the solo and Egyptian albums of the '80s.

Collier says that in his work with Hitchcock, the emphasis has always been on live tracking. "We always do a lot of overdubbing," Collier says, "but the whole thing starts from quite a live, large band point of view. It doesn't start with a click track or anything." He adds that Hitchcock works very intuitively in the studio. "He's very easy to work with, and he's very decisive—he knows if it's working well and going down to tape. If he's going to get it, he's going to get it in two or three goes. We don't spend two hours doing a vocal—if it doesn't work out in 20 minutes, then the best bet is to come back to it the next day."

The Greenhouse is a two-studio, 7,000 square-foot facility, occupying four floors. On *Moss Elixir*, Hitchcock worked in the top floor studio, which features a vintage 56-channel Amek 2520 with Master Mix 1 automation, and an Otari MTR-90 24-track. He mainly overdubbed and mixed at the studio, except for the song "De Chirico Street," which was entirely recorded and mixed at The Greenhouse.

"De Chirico Street" is one of only three songs on the album that features a rhythm section (though the drums in particular are mixed relatively far back). The basic track consisted of three acoustic guitars, drums, bass and Hitchcock's lead vocal. Collier set the band up in the large tracking room. He used a 57 on Hitchcock's voice, to keep the leakage down, and compressed the vocal with an 1176. "His voice isn't particularly dynamic," Collier says, "but sometimes I'll stick in an old 160 as well after the 1176, because for vocals I prefer to hit two compressors gently rather than hitting one hard."

James Fletcher overdubbed numerous sax parts, an instrument Hitchcock had almost never used on previous outings. ("I've never been a sax fiend," he says, "mainly because of the way the saxophone is deployed—the ghastly mellow tooting as the lovers ooze through Central Park in corporate movies, or the brassy squiggles that emerge whenever a rock act is wealthy enough to afford extra musicians.") It may seem strange that he would choose to use horns (and strings) on such an explicitly unproduced project. But Hitchcock is quick to point out that though the album is very much built around the sound of his voice and guitar, he was not trying to make a stripped down record; rather, he was simply focused on adding only what he deemed necessary to bring his songs to life.

Recording piecemeal helped him in this process, and he says that when he did add parts, "I was trying to go for sound a bit more rather than musicianship. If I had someone there to play, it wasn't to be a great player—though I think they all are great players; it was more to create the sound that was needed in that place, to add color, rather than 'here I am, and I'm going to feature a violin solo here' or whatever it is."

In terms of sounds, Hitchcock admits to being heavily influenced by the '60s palette. The song "Beautiful Queen," for example, prominently features backward guitars, multiple harmonies and a variety of psychedelic touches. Hitchcock mentions that his two chief influences from that era are Dylan and The Beatles, and in fact in much of his recorded work there is often a creative tension between two currents: the distinctive tonality and immediacy of a singer/songwriter, and the kind of melodicism, sounds and song structures usually associated with more band-type efforts. If he's juggled these two tendencies throughout his career, on *Moss Elixir*, at any rate, Hitchcock has succeeded in striking a good balance between them. "I have cut both ways," he says, "and I'm not sure whether that's been a good thing. Who knows? But I'm definitely at the moment cutting one way. I'm cutting as me." ■

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TAPE & DISC NEWS

TOTAL CD OUTPUT UP 36%

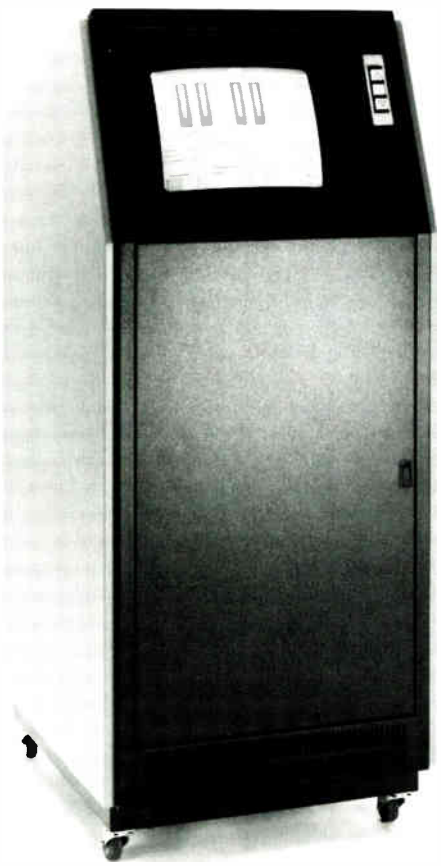
North American CD replication in all formats rose 36% in 1995 over 1994 levels, according to figures announced by the ITA. The RIAA had previously announced a rise of about 10% in the music CD units shipped by its members. The ITA figures pegged the rise in audio CDs replicated at 22%, up from 1.01 billion to 1.2 billion. The real jump, however, came in CD-ROM replication, up 101% to 421 million units. The ITA figures are derived by combining actual numbers from 15 participating major replication companies with estimates on nonparticipating companies.

UPCOMING CONFERENCES/ EXHIBITIONS

The ITA has also finalized dates for the Eighth Annual Magnetic and Optical Media Seminar, to be held in San Francisco October 31 to November 1. Dates for the 1997 Replitech shows, of which the ITA is a co-sponsor, have also been set. Replitech Europe is scheduled for March 13-15 in Barcelona, Spain; Replitech International runs June 3-5 in San Jose, Calif., and Replitech Asia will be held October 14-16 in Singapore. According to Replitech organizer Knowledge Industry Publications, attendance at the 1996 Replitech International in San Jose was more than 6,600.

PHILIPS OFFERS FREE CD-ROM ABOUT MPEG

With DVD on the horizon (see page 88), technical workers in the converging worlds of audio, video and software will likely be required to get up to speed on MPEG-2 and MPEG audio, the compression schemes (along with Dolby's AC-3) that will be used to squeeze feature-length films onto a single disc. Philips, one of the prime movers behind MPEG technology, has prepared a CD-ROM explaining how the schemes work and answering questions regarding encoding procedures and compatibility. The CD-ROM is available free by calling 408/453-7373 or by faxing 408/453-6444.



Telemetrics DB-1000 Digital Bin

CD MATCH GOES MULTILINGUAL

The Interactive Multimedia Association announced that Version 3.0 of its CD Match program is now available for download from the IMA at www.ima.org/cdmatch or from Horizons Technology, which developed the software, at www.horizons.com/cdmatch. CD Match was developed at the IMA's behest to help overcome consumer confusion and frustration related to the proper installation of CD-ROM programs for home computers. The problem is thought to be largely responsible for a return rate that reportedly has run as high as 40% for CD-ROMs purchased for the Windows/Intel platform. Returns of Macintosh CD-ROMs, generally considered comparatively easy to install, are in the 10% range, suggesting what the base rate of returns might be if programs were easier to get up and running.

CD Match is intended to help by analyzing the user's system and displaying or printing its attributes (amount of RAM, system software version, sound and video capabilities, etc.) in a standard form that can be matched against a standardized "requirements" form printed on CD-ROM packaging. This will allow consumers to tell in advance of purchase whether a given CD-ROM is playable on their machines. Available for Windows, Macintosh and OS/2, CD Match 3.0 now recognizes the following native languages (on Windows machines only): French, German, Spanish and Italian. Information on the CD Match Implementation Kit for CD-ROM developers is available at the IMA Web site, listed above, or call 410/626-1380. ■

BY PHILIP DE LANCIE

SPLICES

Saki Magnetics (Calabasas, CA) has expanded its WK line of ferrite audio cassette duplication slave heads with a new model featuring a .250 contour radium for use at 64:1 and 80:1 duplicating speeds. The company also reports sales of ferrite heads to 11 domestic dupli-

cators, including **Cinram** in Richmond, IN, as well as to duplicators in Switzerland, Holland and Canada...Audio cassette loaders from **Electro Sound** (Sun Valley, CA) have been sold to companies in the Philippines, Thailand, India and China, while Series 7500 duplicating systems have been sold to duplicators in India and Indonesia. Sister company **Gauss**, meanwhile, has sold duplicating systems in China including components from the Series 2400 and Series 9000 lines, as well as a MAX digital audio bin...**Telemetrics** (Campbell, CA) announced upgrades to the DB-1000 digital bin system, including internal tone generation for alignment procedures, filter plug-ins for faster speed conversion, double-speed mono duplication and the addition of parity error checking at the DAC board for improved QC monitoring. Sister company **Versadyne** announced sales of high-speed audio systems to three domestic duplicators, as well as operations in China, Colombia, Santo Domingo and the Philippines...**Concept Design** (Graham, NC) announced the sale of CD 9000V loaders to **AmeriTAPE**...**BASF** (Bedford, MA) announced the introduction of VT 19 SPR back-coated videotapes for high-speed Sprinter duplication. The formulation is available in two grades, SHG and SG, both of which are suitable for Sprinters in either shuttle or loop bin configurations...**Disc Manufacturing Inc.** announced a new Internet-based ordering system available at www.discmfg.com...**Marcan** (Bellevue, WA) introduced the ColorScribe 6000, a 720x720 dpi resolution color printer for printing on recordable CDs...Recent mastering projects by engineer Robert Vosgien at **CMS Digital** (Pasadena, CA) include releases by No Doubt, Angela Bofill and Green Day...**Future Disc**'s Tom Baker mastered albums by Cher and Molly McGuire at the Hollywood, CA, facility, while colleague Steve Hall handled projects from N.W.A. and Dave Koz...**Rocket Lab** (San Francisco) unveiled three projects from its new enhanced CD production service, including works by artists Haunted By Waters and Dorothy's Melting. Engineers at the facility also mastered projects by Pele JuJu, Brian Carter, Breno Brown and Dave Crimmen...A special two-CD compilation of live performances by Pearl Jam, available only through radio station KOME, was mastered at **Music Annex** in Menlo Park, CA, by engineer Tom Carr. ■

COAST TO

L.A. GRAPEVINE

by Maureen Droney

Tucked away on North Sycamore in Hollywood you'll find Image Recording Studios—and once through the door you'll realize that there is a lot more going on inside than you might guess from the unprepossessing exterior. High ceilings, brick walls and green plants greet you and evoke the feeling of an art gallery, or a San Francisco-style warehouse, and as you continue down the hall, more and more rooms open up on either side.

(L to R) John Van Nest, Chris Lord-Alge and Harry Maslin at the SSL 4056E in Image Studio A

The two-studio facility has been co-owned by engineer/producers Harry Maslin and John Van Nest since 1983, and has played host to Gold and Platinum projects from *The Bodyguard* soundtrack album to the Red Hot Chili Peppers' *Mother's Milk*, R.E.M.'s *Life's Rich Pageant*, Quincy Jones' *Q's Jook Joint* and Cypress Hill's *Black Sunday*. Van Nest and studio manager Nikki Woods showed me around and filled me in on some of the history. The complex that houses Image was originally, in the '60s and early '70s, a record pressing plant for RCA, hence the high ceilings and thick walls. Later, noted mastering engineer Allen Zentz moved in and built his own facility, where he worked on numerous projects for, among others, Bruce Swedien and Quincy Jones. When Zentz expanded, adding a recording studio in the back of the space, one of the first projects in was the Jones-produced and Swedien-engineered *Off The Wall*. That Michael Jackson super-success spawned a lively musical scene at Image, as the Jones-Swedien team worked together on a plethora of acts, including the Brothers Johnson, Rufus with Chaka Khan, and George Benson. Van Nest had signed on as assistant engineer at Image in '79 at the end of the *Off The Wall* project. "Quincy, Bruce and I were all from Chicago," he reminisces, "and so we had a certain rapport. It was a great time—I mean, I was working with the godfather of engi-

—CONTINUED ON PAGE 202

NY METRO REPORT

by Dan Daley

The Russians Are Here. The plans were first reported here last November, and now a new studio has opened on the site of the former Skyline Studios on West 37th Street. **Alien Flyers** is on the third floor of what was once the two-floor, five-room Skyline, which closed in 1994. Redesigned only slightly by local acoustician/designer Fran Manzella, the focus has been on new technology, including a new 56-input SSL G Plus console, Studer A827 multitrack deck, Quested monitor system and new outboard, including a Lexicon 480L.

But perhaps of equal interest is the fact that Alien Flyers is owned by Russian emigres. Robert Rubeni was a musician and concert promoter in the former Soviet Union. He came to the States in 1991 and quickly became immersed in Manhattan's studio environment. Rubeni formed a partnership with another emigre, business manager Mark Satanovsky, and Mikhael Davidov, a former Bolshoi Ballet star and owner of one of the most successful nightclubs in Brooklyn's thriving Russian community on Ocean Avenue in Brighton Beach.

As tight as the New York market is for bookings, Rubeni and company are focusing on the immigrant community from which they came, and through it back to the old country. Rubeni has produced a 30-minute video documentary of the studio for shipment back to Moscow, where it is distributed like a bit of electronic samizdat throughout the music community there. The tape has been sent to both central Russia and to many of the former republics, such as Belarus and Byeloruss, as well as circulated in the Brighton Beach community.

Studio principals Robert Rubeni (L) and Mikhael Davidov in Control A at Alien Flyers

PHOTO: ROBERT WOOD

"There are no good studios in Russia, but there are lots of good musicians who need studios," said Rubeni, who added that since the fall of communism, the once-perva-

—CONTINUED ON PAGE 204

COAST

SESSIONS & STUDIO NEWS

Leon Huff is flanked by his partner Ken Gamble (L) and Steve Strassberg (president of Strassberg Associates) behind the newly installed Otari Concept I 48x48 MF at Gamble/Huff Music productions in Philadelphia.

NORTHEAST

Sky Heros mixed an upcoming Fort Apache Records release with engineer **Dave Cook** and assistant **Ted Paduck** at Boston's **Sound Techniques**. **Powerman 5000** have also been in mixing a Dreamworks/SKG release (due out early next year) with co-producer/engineer **Andrew Murdock** and assistant Tom Richards...Queen Latifah worked on her new Motown release in Studio A at Giant Recording (New York). **Chris Hilt** was behind the recently refurbished SSL. **Chad Elliot** was in producing new artist Daddy Blaq for Jimmy Jam and Terry Lewis' label, Perspective...**Showplace Studios** in Dover, NJ, had Swedish guitarist **Clas Yngstom** in working with producers **Ben Elliott** and **Pete Brown**. Elliott engineered and mixed with assistants **Rick Deardorff** and **Chris Badami**...Recent activity at New York's **Dessau Recording Studios** included Rollins Band drummer **Sim Cain** producing material for Epic artist **Barbara Brousal**; **David Lee** co-producing and engineering Ugly Beauty's TAG/Atlantic debut, mixed by **Bryce Goggin**; and **Matt Johnson** recording for the next The The release...Pat Metheny recorded a Geffen release at **Right Track Recording** in New York with co-producer David Oaks and engineer **Rob Eaton**. The all-digital, 24-bit recordings were made on the studio's Neve Capricorn...The **World String Quartet** tracked for Justin Time Records at **BearTracks Recording** in Suffern, NY, with producer **John Purcell**, engineer Phil Goodbody and assistant **Kristen Koener**. **Chris Botti** recorded self-produced songs at the studio for Verve/PolyGram with engineer **Kevin Killen** and assistant Koener...Bands recently at work in **Trod Nossel Recording** (Wallingford, CT) included **Electric Water**, **After the Fall**, **Suckerfish** and **Path to Reality**...

The Turtle Creek Barn addition to the Bearsville Studios complex (Bearsville, N.Y.) has hosted sessions for artists such as Cassandra Wilson, Phish, Dinosaur Jr. and the Dave Matthews Band. The control room (designed by Michael Bellows and John A. Holbrook) features an API Legacy with Flying Faders, a Neve BCM-10 console, Professional Monitor Co. MB 1s and a Studer A800.

Mike Mainieri (L) and engineer Dan Gellert worked on Mainieri's project **An American Diary: The Dreamings** *in New York's Avatar Studios (formerly Power Station). Inspired by folkloric symbols and myths, the album (due out early next year on NYC Records) features original compositions and new arrangements of folk songs. Musicians included George Garzone, Mark Johnson and Peter Erskine.*

SOUTHERN CALIFORNIA

Luke Wood tracked Geffen act **Phantom Planet** at Ocean Studios, Burbank. Engineer **Ed Douglas** was assisted by DeWayne Barron. Perennial faves **Red Kross** tracked and overdubbed for a Mercury release with producer/engineer **Chris Shaw** and assistant **Bryan Golder**...At Ocean Way in Hollywood guitar hero **Dweezil Zappa** layed down a blazing solo on the Deep Purple classic "Smoke on the Water," as covered by **Pat Boone** (!). Yes, it seems the reactionary family man is releasing a metal covers album this month on MCA...Bernie Taupin's new band **Farm Dogs** remixed material for their Discovery Records release at **The Village Recorder** (L.A.) with producer/engineer **David Cole**. **Jack Mack & The Heart Attacks** tracked a new release at the studio with producer **Bill Wray** and engineer **Nate Kunkel**...Producer **Jorge "G-Man" Corante** and engineer **Rob Chiarelli** mixed cuts for

—CONTINUED ON PAGE 204

—FROM PAGE 200, L.A. GRAPEVINE

neering, learning a lot and having fun."

In 1983 Zentz was ready to leave the music business. "By then I was kind of managing the studio for him," says Van Nest, "so when he wanted to sell, I approached our biggest client, producer Harry Maslin, who at the time was working with Air Supply. And Harry and I bought the business."

Studio B now features a Trident A-Range board originally from Trident Studios, London. "There were only 13 or 14 A-Ranges made," explains Van Nest. "They were all made by hand and were all slightly different. When producer Roy Thomas Baker was here, he recognized our board right off as the one on which he had recorded Queen and T-Rex. Trident, of course, had started as a studio, and wanting to upgrade their boards, they built the first A-Range. Then they went on to build those 13 or 14 before they started in actually manufacturing, with I think the B-Ranges, which were mass-produced, not hand-built like the A-Range. We bought ours in 1986. As an old desk, it requires attention, which we give it, because it is a gorgeous desk, beautiful on the high end and really transparent."

Studio B, which has a private upstairs lounge, is often used for overdubs and vocals, with Van Nest calling it "an inexpensive overdub room with just enough gear." That gear includes 48 tracks of analog recording, LA-2A and Tube-Tech compressors, and Neve 1073 preamp/EQ modules.

Studio A's console is an SSL 4056E with G Series computer—one of the first SSLs in L.A. "We had one of the best installers, David Kulka," Van Nest says, "and I really believe we have one of the quietest SSLs in the city. And I ought to know, because I've worked on a large majority of the rest in town."

Studio A also has its own spacious upstairs lounge, along with two Studer A827s, a Yamaha C7 grand piano, an EMT 140 plate reverb, eight Neve 1073 modules, Lang, Tube-Tech and Langevin equalizers, and LA-2A and black-face 1176s. Engineer Chris Lord-Alge is a frequent client in A, along with producers Ron Nevison, Jamey Jaz, and noted Japanese producer Tetsuya Komuro. Recent projects have included Tina Arena, Quincy Jones protege Tamia and Japanese superstars Globe.

Owners Maslin and Van Nest stay busy, both at Image and at other studios about town. Maslin (whose credits besides Air Supply, include production and engineering on David Bowie's *Young Americans* and *Station to Station* albums, as well as records by James Taylor and Bonnie Raitt) was most recently one of the engineers for Michael Jackson's *HIStory* album. Van Nest is currently producing tracks for MCA artists Jaze and has also been engineering for Tevin Campbell, David Foster's vocal group Millennium, and Changing Faces.

On that busily creative Burbank block called South Glenwood Place, **Front Page Recorders is remodeling** and has installed the first 96-fader Euphonix CS2000 console in a commercial L.A. music studio. Industry vet Biff Vincent, (a musician and producer/engineer with credits that range from Social Distortion to Brownstone to the Righteous Brothers and Jose Feliciano) opened the two-room Front Page 18 months ago in what was originally Kendun's Studio One. The space had more recently spent some years as Take One Studios, then sat empty until Vincent, who ran a two-room studio in Orange County's Costa Mesa, decided to move his operation to L.A.

The Euphonix is set in a spacious, 500-square-foot control room that has been upgraded and refurbished. The ceiling has been raised and the front wall redesigned and rebuilt, to give a lighter, more modern feel to the room while still retaining the classic Tom Hidley rock walls. A 50-inch Mitsubishi monitor is set between the mains to facilitate sessions that require lock to picture. "It's mainly designed to be a mix room for music," Vincent says, "but we can do post as well. The console is capable, and we have 'the cube,' so we can do surround sound."

Front Page Recorders owner Biff Vincent (L) and studio manager Eric Rathgeber

Features of the CS2000 include 56 channels of dynamics, 20 aux sends per module, and, of course, that well-known Euphonix snapshot recall. Asked why he chose Euphonix, Vincent explains: "I thought it was the only decision that made sense. The board sounds amazing, and I believe that if you are willing to spend a day on it, you will never want to use anything else. I looked at my options; I already own a Neve 8128 in my tracking room. I don't like VRs, and I didn't want to go to putting two 80 Series Neves together. I think SSL consoles are great, but there are so many in L.A. that unless you are going to buy the 9000 and charge the necessary rates to pay for it, you won't have a competitive edge. And I really believe that a large, monolithic approach to hardware is outdated. If you are sitting in a room like this, working on a traditional 96-in console, to EQ your bass drum you have to go way down to the end of the board, away from the near-field monitors. You get up and walk down there and try to listen, and it's like, 'What's goin' on?' That's reality with a board of that size! It's like working on a P.A. system! Then, to recall a mix, you sit at a screen for one-and-a-half hours and hope that everything comes back right, instead of just pushing a button and instantly being reset.

"I'm a producer/engineer by profession and a studio owner by default, so I look at things a little differently. From a creative standpoint, I feel that there's nothing that can touch this board. There are a lot of great records out now made on Euphonix consoles, like Seal and Alanis Morissette. It's a desk that can make amazingly tricky things become easy—we just need to get the word out and get people's hands on for them to realize it. Engineers should call me about this, because I'm interested in demonstrating the capabilities to qualified people with a serious interest."

Front Page's second room is a large tracking studio with a private feel and a 12x9 iso booth. Also a Tom Hidley room, it was locked out with the Jive/Zomba artist Spice One on the day I visited. It contains a 56-in Neve 8128 with GML automation, a Yamaha C7 concert grand with Lazier MIDI, a Hammond B3 with Leslie, an Akai DR 4 hard disk recorder, ¾-inch video, 48 tracks of analog recording, and outboard that includes Summit Tube EQs, Neve 33609 and UREI LA-2A compressors, along with a solid collection of mics, including an Elam 251 and Neumann U47 and U69 tubes.

"I feel with the business the way it is now, with ADATs and the like," concludes Vincent, "if you are going to have a studio, there are only two things to concentrate on—tracking, where there is a need for live rooms and more professional consoles, and high-end mixing. So that's what we offer here." ■

Maureen Droney is Mix's L.A. editor. She can be reached by fax at 818/346-3062.

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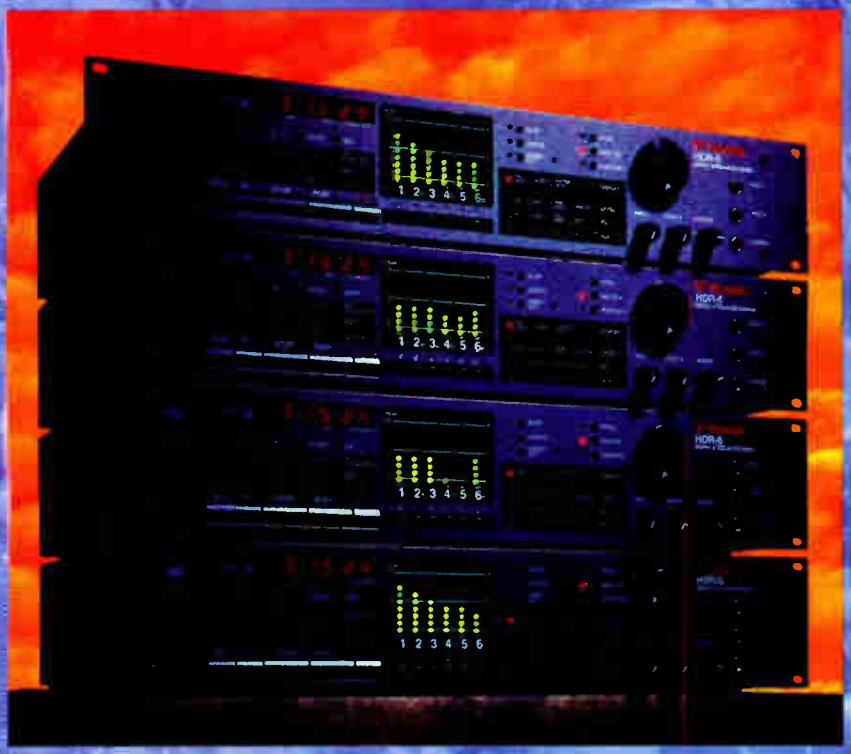

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Vestax

—FROM PAGE 200, NY METRO

sive state-owned Melodiya record company and recording studio has fallen significantly below par. "There is a big studio there now that PolyGram opened, but it's not of the same quality that you would find here," he said. And, he added, the local Russian music community needs a facility at which the management can relate to them linguistically and culturally. Ruberi is also aware that not every Russian has prospered equally since the wall fell down. Interestingly, it is the Russian clients to whom he is most intensely marketing the main studio, which has a card rate of $150 per hour; for less affluent clients, particularly those already here, Alien Flyers is building a smaller second studio on the same floor that will be equipped with Tascam DA-88 decks and a Yamaha 02R digital console.

Producer Skip Scarborough and engineer Jonathan LaSane tracked vocals and mixed for jazz diva Nancy Wilson at Oz Recording Studios in Baltimore, Md. Pictured (L to R) are Scarborough, LaSane, Oz co-owner Steve Palmieri and assistant Michael Rippe.

However, Ruberi believes that ultimately the majority of the new studios' business will be domestic and stresses that he and his partners have kept intact the fundamental elements that made Skyline successful for many years. "What we're counting on is that producers are familiar with the Skyline room," he said. "That's why we haven't changed it."

Another Russian-owned facility is in the same building, also in the space of a former Skyline studio—the sixth floor **Interlude Recording** (owned by Eric Schwartz, who came to the States 15 years ago), which opened last year. The facility (designed by Schwartz with Julius Feinstein) has one operational studio equipped with a 96-input D&R console with JLCooper V-Desk Elite automation, an Otari MTR-90 MkII multitrack deck and 32 tracks of Tascam DA-88s. A second room featuring a Euphonix console and aimed at record and film audio work is under construction.

"The studio is intended to mix both live recording and MIDI-types of applications," explained studio manager Keith Senior, noting that the studio has more than 30 sound modules and samplers available. Clients so far have included jazz musician Gil Goldstein and producer/rapper KRS-One. "The fact that two studios owned by Russian emigres happened at the same time in the same building is purely coincidental," he said. "We're going after mostly the same types of work that every other studio in New York does. But we do get some Russian work because Russian recording artists would be comfortable here. Most of the Russian recording is pop music, and most of it goes back to Russia. There's a market here for it, but a very small one. But it's one more thing that a studio can use to set itself apart in a place like New York."

Power Station has been tentatively renamed. Pending the finalization of trademark searches, the studio will be known as Avatar Entertainment Corp., trading as **Avatar Studios**. (The name refers to a Hindu myth about the incarnation of gods in Earthly form.) The studio was operating as it underwent refurbishment over the summer, getting everything from a new paint job to new technical systems. An official opening was scheduled for sometime in September. ■

Fax your New York news to Dan Daley at 615/646-0102 or e-mail danwriter@aol.com.

The cast of hit Broadway musical Rent recorded the show's soundtrack album on the SSL 9000 J at Right Track Recording in New York with producers Arif Mardin (third row, R) and Steve Skinner (rear, L) and engineer Michael O'Reilly (next to Mardin).

—FROM PAGE 201, SESSIONS & STUDIO NEWS

A&M artist **Jessica James** at the Record Plant in Hollywood...**Lighthouse Recorders** in North Hollywood had The Tubes in mixing with engineer **Bill Drescher** and assistant **Dave Huron**. **Boyz II Men** were in mixing with **Joe Primeau** and assistant **Tommy V**...Warner Bros. artists **Something for the People** mixed their new LP at **Skip Saylor Recording** (L.A.) with engineer **Kevin Davis** and assistant **Rod Michaels**...Legendary guitarist **Steve Cropper** tracked the Tower of Power Horns at Mad Dog Studios (Burbank) on a session for **Joe Louis Walker**'s new release, which Cropper is producing. **Ken Kessie** engineered...**Val Garay** was at the Neve in Blue Palm Studios in North Hollywood

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mixing three sides for **Monty Carlos**...

NORTHWEST

Ex-Nirvana bassist Krist Novoselic's new band **Sweet 75** worked on some material for Geffen Records at **Soundhouse Recording** (Seattle). **Love & Rockets** remixed singles at the studio with **Mark Walk** for American Recordings. **Scott Crane** assisted...At **Toast** in San Francisco, owner **Phil Steir** broke in the newly finished Studio B by producing a remix of the **Butthole Surfer**'s song "Pepper" for Capitol with engineers **Craig Silvey** and **Chris Haynes**. **Third Eye Blind** were also in tracking for their Elektra debut with producer **Stephen Jenkins** and engineer **Eric Dodd**...**50 Paces** tracked and mixed songs for Warner/Chappel at **Room One Recording** in Tacoma, WA, with the studio's new chief engineer, **Andy Beck**...

NORTH CENTRAL

Smashing Pumpkins locked out a couple of weeks at Chicago facility **Soundworks** to track and mix songs for a new B-side box set on Virgin. **Jeff Moleski** engineered, assisted by **George Langis**...**Lance Alexander** and **Tony Tolbert** of LoKey recently completed a remix for Motown Records of **Carol Riddicks**' "Time After Time" in Studio C at **Flyte Tyme** (Minneapolis). The project was mixed by **Steve Hodge** in Studio D...**Sheffield Audio**'s remote truck was in Detroit recording a live **Jean Luc Ponty** album for Atlantic. **Bill Mueller** engineered...

SOUTHEAST

Brendan O'Brien and **Nick DiDia** mixed the new **Pearl Jam** set for Epic at **Southern Tracks Recording** in Atlanta. Also, O'Brien produced and DiDia engineered on **Michael Penn**'s new project for Sony/'57 Records...**Stewart Digital Audio** (Arlington, VA) recently completed mixing and mastering on their location recording of the **Lesbian and Gay Chorus of Washington, D.C.**...**Cool for August** spent a couple of months in Studio A at **Criteria Recording** in Miami working on their Warner Bros. debut with producer **Matt Serletic**, engineer **Jeff Tomei** and assistant **Mark Dobson**. Death metallers **Six Feet Under** were also in tracking an EP for Metal Blade with label president and producer **Brian Schlagel** and engineer **Bill Metoyer**. **Chris Carroll** assisted...**John Hampton** mixed a new Capitol Records project for **Tanya Tucker** in Studio B at **Ardent Studios** (Memphis, TN) with producer **Gregg Brown**. **Matt Martone** and **Erik Flettrich** assisted. **Radio Iodine** mixed their Radioactive/MCA debut with producer/engineer **John Fryer** and assistant Martone...At Masterfonics in Nashville, **John Michael Montgomery** overdubbed and mixed on a project for Atlantic with producer/engineer **Csaba Petocz** and assistant **David Hall**. **John** and **Audrey Wiggins** tracked and overdubbed for Mercury with producer **Dan Huff**, engineer **Jeff Balding** and assistant **Carry Summers**...A plethora of Olympics-related work at Atlanta's **Doppler Studios** included sessions with **Stevie Wonder**, **Gloria Estefan**, **Wynton Marsalis** and many others. Other recent projects included overdubbing for **The B52's**... The new **Firehouse** album (Epic) was recorded at **Telstar Studios** in Sarasota, FL. The band produced, and **Mark Severns** (an instructor at the Full Sail school) engineered...At **Cockpit Studio** (Atlanta), producer **Garret Factory** and engineer **Ross McCort** mixed and mastered the Interchange Records debut of the **Crucial Dread Reggae Band**...

SOUTHWEST

Galactic Cowboys mixed several tunes for their new Metal Blade EP at **Houston Sound Studio** with producer **Allan Doss** and engineer **Ryan Birsinger**...**Arlyn Studios** in Austin, TX, had **Barry Richman** in co-producing his work with **Paul Kelly**. **Richard Mullins** and Stuart Sullivan engineered. Big Holiday were also in with producer/engineer **David Eaton** and assistant **Abe Consadine**...At **Pedernales Studios** in Spicewood, TX, **Tommy Randall** self-produced material with engineer **Boo McLeod**, and **Mark Andrew** recorded for a Big Blue Dolphin release with producer **Josh Noland** and engineer **Eric Paul**...**Jeffrey Alan Wade** worked on his new release at Houston's **Rivendell Recorders** with producer/engineer **Jeff DeVerter**...

STUDIO NEWS

Starstruck Entertainment's new 24,000-square-foot media and office complex in Nashville is now open and includes two new recording studios occupying 5,000 square feet. Designed by **Harris Grant Associates**, the studios are equipped with two SSL 9000 J consoles and Sony 3348 and Studer A827 multitracks...New York facility **Howard Schwartz Recording** purchased an SSL Axiom digital production system...The Texas Society of Architects awarded the Dallas-based **Russ Berger Design Group** its 1996 award for excellence in Interior Architecture for the company's work on Daryl Simmons' **Silent Sound Studios**.. **Sound Emporium** in Nashville added an Otari DTR 900II digital recorder in Studio A and a Mitsubishi X-850 digital machine in Studio B...New owners **Paul Goldberg** and **Matt Bien** changed the name of Seattle facility MacDonald Recording to **Pure Audio**...New North Hollywood, CA, facility **Audities** is a keyboard-only studio specializing in classic instruments of the past; the huge collection ranges from a custom-built Bosendorfer 200 grand to a late-'60s-era Muse Box, a rare synthesizer that writes its own compositions based on preselected choices...**Kenny Loggins** purchased an Otari RADAR system for his home studio...**Music Grinder**'s Web site at www.musicgrinder.com offers the Producer Engineer Contact Directory, a listing of more than 200 professionals that includes credits, musical focus, etc...New residential facility **BuckDancer Studios** recently opened in rural Redway, CA (four hours north of San Francisco). Designed by **Tom Flye**, the studio is based around a Mackie 24x8 with 16-channel expander, 24 tracks of ADAT and a Sonic Solutions DAW. Engineer **Rob Seifert** (Mike Watt, Porno for Pyros, The Eels, The Heptones) runs the studio. ■

Studio executive VP of production Scott Page (R) and chief engineer Paul Ray stand in front of the Euphonix CS2000 in a newly added room (designed by George Newburn) at 7th Level Studios in Glendale, Calif.

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▪ STUDIO SHOWCASE ▪

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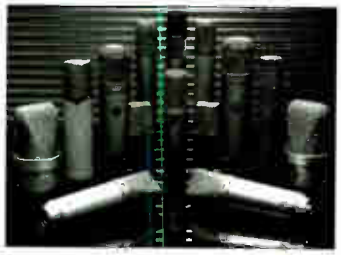
Located just 25 minutes from Manhattan in Staten Island, Laughing Dog Studios combines state-of-the-art equipment with an exceptionally talented staff to deliver the highest-quality final product. Equipment includes an 88-input Amek Big with SuperTrue Automation and Total Recall; three Alesis ADATs w/BRC; Pro Tools III Digital Editing; StudioVision; Lexicon 300, Eventide H3000SE; cool tube gear; Neumann, AKG, Sennheiser and Shure mics; four isolated rooms, kitchen, lounge & ample parking!

Savebone Music Inc.

130 West 42nd St., Suite 952
New York, NY 10036
(212) 997-0206; Fax (212) 997-0481

Recent projects feature former Rolling Stones guitarist Mick Taylor, Sasha, Carlos Alomar, Lenny Pickett, Robin Clark, Steve Ferrone, T.M. Stevens, Vivian Cherry and Tawatha Agee. The engineer is Nenad Gracanin, and the producer is Sasha. Studios feature SSL 4064, G Series computer, Studer A827, Sony PCM 3324, Sony PCM 800s, state-of-the-art recording, mixdown and mastering. Highest possible quality is our main concern.

▪ STUDIO SHOWCASE ▪



The Hook Studios

12623 Sherman Way, Suite 8
North Hollywood, CA 91605
(818) 759-4665 Fax (818) 759-0263

"The best overdub facility in L.A."

Our goal is to achieve the best sound to tape with a focus on overdubs and vocals. Check this out! Neve 8068/Studer A-827, AKG C-12s, C-24s, Neumann U47s, U67s, M249s, Neumann SM2s, 582s, Schoeps C221s, Telefunken Elam 250, 251.

Caravell Recording Studios

2361 Fall Creek Rd.
Branson, MO 65616
(417) 334-7040; Fax (417) 334-2014

Located in the heartland of America, designed and operated *by* artists *for* artists. Three recording rooms include a Euphonix console with 56 channels of automation; Trident 80-B console; Sony/MCI 24-track analog tape machines; 48 tracks of Alesis digital ADAT machines, Sony PCM 7030 timecode DAT machine; Pro Tools digital audio workstations; and a vast array of world-class microphones and monitors.

RECORDING INSTITUTE OF DETROIT
Golden Section RECORDING
56 Track Recording

Recording Institute of Detroit

146141 E. 9 Mile Road
Eastpointe, MI 48021
(810) 779-1388; Fax (810) 772-4320

R.I.D. / Golden Section features up to 56-track analog/digital recording blending the latest technology with classic equipment. Record through the Yamaha 02R all-digital console or API preamps with model 550 equalizers. Learn the art of recording, from basic music theory to complete advanced studies. We have had 20 years of experience in training people to make and in making hit records. Our rates are 50% of the industry norm. Contact Bob Dennis (800) 683-1743.

TASCAM

102 MKII / 103

Stereo Mixdown Cassette Decks

Best values for musicians, studio operators and production houses the 102 MKII and the 103 consistently produce only the highest quality tape recorded output

They Feature:

- 60dB signal-to-noise ratio combines with wide frequency response for high-fidelity sound reproduction using any type of cassette tape
- Industry-standard Dolby B/C noise reduction and Dolby HX Pro sound technology extends high frequency performance up to 6dB and minimizes distortion
- Advanced bias -sensing electronics automatically chooses optimal recording settings for the type of tape you load in—Normal, Metal or CrO2
- Record/Mute autospacer automatically inserts 4 seconds of silence between songs or broadcast segments
- Multi-function display clearly indicates transport mode, tape counter position, tape type and level indicator
- Multi-counter with both tape counter and run-time modes
- Independent L and R stereo level controls and master record level control

Tascam 103 Advanced Features:

- 3-head system allows you to record on a tape and monitor it at the same time without rewinding
- MPX filter button eliminates pilot and sub carrier broadcast tones that can interfere with Dolby noise reduction

202 MKIII

Dual Auto Reverse Cassette Deck

The 202 MKIII provides high-fidelity sound reproduction and a wide frequency response, as well as a host of features that help you dub, edit, record or playback onto/from one or two cassettes easily and efficiently

- Normal speed and high-speed dubbing
- Autospacer automatically inserts 4 seconds of silence between songs or broadcast segments for pro quality tapes
- Incorporates Dolby HX Pro sound technology to extend high frequency performance and minimize distortion on Normal, Metal and CrO2 tape
- Allows you to quickly and easily create a professional-sounding composite tape from several sources. Functions like Intro Check, Computerized Program Search, Blank Scan and One Program quickly find the beginning of tracks you want
- Twin two-head cassette decks in a durable rack-mount housing that can be used separately or in tandem during recording and playback for total flexibility

–Play material on deck 1 while deck 2 records on one or both sides

–Record simultaneously on both decks from an external master

–Play back both sides of one or both decks in a continuous loop, up to five times

–Auto Reverse automatically reverses tape direction during playback and record

–Repeat rewinds tape and allows infinite looping during playback

–Timer switch for unattended record/playback (timer required)

New! 302

Double Auto Reverse Cassette Deck

All the features of the 202 mkIII, the new 302 adds even more recording and playback flexibility. Thats because the 302 is actually two fully independent cassette decks. Both decks have their own set of interface connectors, transport control keys and noise reducing functions

- Auto-reverse capability on both decks
- Individual/simultaneous record capability–both decks
- Independent RCA unbalanced in/out for each deck
- Cascade and Control I/O let you link up to 10 additional machines for multiple dubbing or long playing record and playback applications

CD-601

Professional CD Player

Frame-accurate cueing precision, extremely high-fidelity and a small form factor make the CD-601 ideal for post-production applications where sound effects and music are "flown-in" from compact discs. The CD-601 integrates with most post-production equipment including mixers, video editors and computer studio controllers

- Balanced XLR and unbalanced RCA outputs
- Precision cueing control and Auto cue
- Linear motor-driven pick-ups eliminate dead air
- Optional RC-601 remote control adds additional features and conveniences
- Optional BU-2 RAM for instant start and seamless loops up to three minutes

marantz

PMD-101/201/221/222/430

Portable Professional Cassette Recorders

The world standard for field recording, the PMD line is also the value leader. They all feature RCA line input/outputs, 1/4-inch headphone jack, built-in speaker, pause control, audible cue and review, tape counter, full auto shut-off and low battery indicator

- All models except the PMD-430 have 1/2 speed playback/record capability. With 1/2 speed playback, musicians can slow down complicated passages for analysis. And when played back at 1/2 speed, the pitch is lowered by exactly one octave, so the notes are still musically correct—ideal for figuring out complicated solos or picking patterns
- By recording at 1/2 speed, a three hour meeting can be recorded on a single tape. A built-in microphone and automatic level control make operation simple, and built-in speaker makes transcription convenient
- 1/2 speed recording is equally ideal for churches, because 90 minutes can be recorded on a single side of tape—no interrupting your recording to flip the tape over. Line inputs make it easy to use and connect to your existing sound system
- Three standard 'D' cell batteries provide up to 7-1/2 hours of operation and the optional RB430 rechargeable battery delivers up to 5-1/2 hours

	PMD-101	PMD-201	PMD-221	PMD-222	PMD-430
General					
Stereo/Mono	Mono	Mono	Mono	Mono	Stereo
Heads	2	2	3	3	3
Inputs/Outputs					
Mic Input	1/4-inch	Miniplug	Miniplug	Mini/XLR	1/4-inch
Condenser Mic	Built-In	Built-In	Built-In	Built-In	—
Remote Jack	—	Yes	Yes	Yes	—
Modular Tel. Jack	—	Yes	Yes	Yes	—
External Speaker Jack	—	Yes	Yes	Yes	—
Record Controls					
VU Meters	—	1	1	1	2 (Illuminated)
2-Speed Recording	Yes	Yes	Yes	Yes	—
Dolby B NR	—	—	—	—	Yes
dbx NR	—	—	—	—	Yes
Mic Attenuation	—	0,-10dB, -20dB	0,-10dB -20dB	0,-10dB, -20dB	0,-15dB -30dB
Ambient Noise Cont.	—	Yes	Yes	Yes	—
MPX Filter	—	—	—	—	Yes
Manual Level Control	—	Yes	Yes	Yes	—
Limiter	—	Yes	Yes	Yes	Yes
ALC	Yes	Yes	Yes	Yes	—
Peak Indicator	—	—	Yes	Yes	—
Playback Controls					
Pitch Control	±20%	±20%	±20%	±20%	±6%
Bias Fine Adj.	—	—	—	—	Yes
Tone Control	Yes	Yes	Yes	Yes	—
Half-Speed Playback	Yes	Yes	Yes	Yes	—
Memory Rewind	—	—	Yes	Yes	Yes

Telex

ACC2000/4000 Series Cassette Duplicators

Designed for high performance and high production, Telex's ACC Series (ACC2000/ACC4000) and (ACC2000 XL/ACC4000 XL) of expandable duplicators also offer easy maintenance and unsurpassed ease of use. The ACC2000 is a two -channel monaural duplicator, the ACC4000 is a four-channel stereo duplicator. Each produces 3 copies from a cassette master at 16 times normal speed and each can expand up to 27 copy positions (with additional copy modules). With the extra copy modules, you can duplicate up to 27 copies of a C-60 original in less than two minutes. And they copy both sides at once. The XL Series feature "Extended Life" cassette heads for increased performance and wear characteristics. They also offer improvements in wow and flutter, frequency response, signal-to-ratio and bias. Additionally the ACC4000 XL allows for either chrome or ferric cassette duplication. XL- models are available in stereo (ACC4000 XL) or mono (ACC2000 XL) versions

Fingertip Operation

- Individual rotary audio level controls allow for an increase or decrease of audio levels as the master translates to the copies.
- Peak reading LED indicators allow quick and accurate monitoring of audio fluctuations.
- Side A or A/B select button let you set up for duplication of either 1 side or both sides of a cassette at once.
- Stop all tapes instantly, at any point during the copy or rewind cycle.
- Short tape indicators alert you if a tape stops before the original does, identifying incomplete copies caused by jam or short.
- Automatic or manual selection of rewind and copy operation:
  –Rewinds tapes to the beginning or end automatically (AUTO mode) or manually.
  –In AUTO mode the copy button activates the entire rewind/copy/rewind sequence. In manual it starts copying immediately.

Easy Maintenance:

- Slanted work surface and unique "heads-up" cassette platform allow less oxide build-up on the heads and makes cassette loading and unloading much easier.
- Each cassette position has a three point tape guidance system that eliminates skew problems. Plus, when a tape is inserted, each cassette position is activated to prevent unnecessary wear and tear on the tape head mechanism.
- Audio and bias, along with head adjustments, are made easily from the top of the unit and a switch on the back engages the head and pinch roller for convenient cleaning.

ACC2000 Mono MasterModule:

- 1/2 track,two-channel monaural duplicator produces 3 copies from a cassette master at 30ips (16X normal speed)
- Expands up to 27 copy positions by adding ACC2000 copy modules (four positions each)
- Erase heads in the copy positions automatically erase existing audio as new material is being recorded
- Track select short tape indicators,auto/manual operation
- Includes removable power cord and protective dust cover

ACC2000 XL Mono Master Module:

- Same features as ACC2000, ***plus***– Extended Life cassette heads

ACC4000 Stereo Master Module:

- 1/4 track, four-channel stereo duplicator. Same features as ACC2000 Mono Master Module/

ACC4000 XL Stereo Master Module:

- All features as ACC4000, ***plus***– Extended Life cassette heads. Can be configured for chrome or ferric cassette duplication

ACC2000 Mono Copy Module:

- 1/2 track, two-channel monaural copy module
- Each module has four copy positions with erase heads and controls for side select
- LED displays indicate end-of -tape status for each pocket
- Includes ribbon cables for connection to ACC2000 master and other copy modules
- Includes removable power cord and protective dust cover

ACC2000 XL Mono Copy Module:

- Same features as ACC2000 Copy Module ***plus***–Extended Life cassette heads. Connects to ACC2000 XL Master Module

ACC4000 Stereo Copy Module:

- 1/4 track,four-channel copy module. Has all the features of the ACC2000 Copy Module

ACC4000 XL Stereo Copy Module:

- Same as the ACC4000Copy Module ***plus***–Extended Life heads. Configurable for chrome or ferric cassette duplication

Copyette EH Series Duplicators

The popular Copyette series produces high quality, low cost cassettes in large quantities at nearly 16 times normal speed. This means you can reproduce both sides of a C-60 tape in less than two minutes. Available in two versions, the Copyettes are capable of duplicating either one cassette or three at a time. In addition each are available in both mono and stereo models. They couldn't be easier to use. You simply insert the cassettes, press the START switch and they do the rest. They rewind all tapes to the beginning, copy, then rewind to the beginning again before stopping. The whole process can be stopped at any time by pressing the CYCLE button. Side Select feature allows you to set them up to copy one side of a tape or both sides at once.

Stereo Copyette 1•2•1

Weighing only 8 lbs. (3.6 kg), this unit has a durable, impact resistant housing and includes a removable power cord, carrying handle and protective cover. It also has an optical, non-reflective end-of -tape sensing system that provides gentle tape handling. A mono version is also available.

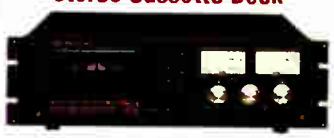
Stereo Copyette 1•2•3

This duplicator copies both sides of three cassettes at once, yet it's as small as the 1•2•1. It weighs only 12 pounds (5.4 kg) and includes a hard cover to protect the unit while not in use. It uses all DC Servo motors for the ultimate in reliability. A mono

TASCAM

112 MKII

Stereo Cassette Deck



The classic "no frills" production workhorse, the 112 MK II is a 2-head, cost effective deck for musicians and production studios. Extremely rugged and reliable, the 112 MK II is ideal for production mastering and mixdown. It also features a parallel port for external control an and optional balanced connector kit means it is flexible enough to integrate into any production studio

- Utilizes Dolby B or C noise reduction with Dolby HX Pro
- Automatically selects proper bias type, so you get optimal recording & playback response with Normal, Metal or CrO2 tape
- Gear independent input dials let you dial in stereo VU calibration with one dial. You can also adjust for channel specific calibration
- Offers two Autolocator buttons and a MEMO IN control. These controls allow you to select two points on any tape for one button forward/reverse to wherever the action is. Additionally, RTZ (return to zero) quickly spools the tape back to 0000 on the tape counter
- Rear-mounted RCA input/output jacks for easy connection to high-quality sources
- Optional LA-112 connector provides additional balanced or unbalanced XLR inputs and outputs. Installation is simple and requires no special tools
- 25-pin D sub connector (parallel port) on the back, links the deck to the optional RC-134 remote control unit or for fader start from any mixer that use the same protocol

112R MKII

Bi-Directional Stereo Cassette Deck

The 112R MKII is a sonically uncompromising, auto reversing and continuous play cassette deck. It offers the finest independent head auto-reverse design at this price level, plus it has extra dubbing and editing features that make it ideal for long program recording

All the features of the 112 MK II *plus*—

- Three-head transport with separate high-performance record and playback heads. Manufactured from resilient Cobalt Amorphous materials, the independently-operating heads combine with precision FG servo direct-drive capstan motors to provide the highest standards of reproduction quality and performance
- Frequency response is 25 Hz to kHz with less than 1% total harmonic distortion
- Equipped with Hysteresis Tension Servo Control (HTSC) the 112R MKIIvirtually eliminates wow and flutter. HTSC is an advanced servo control system that maintains consistent back tension on the tape all through the reel, combatting inconsistencies brought on by extreme temperatures and humidity
- Super Acculign Rotating Head System allows recording or playback tape direction to be changed with one button. A single-screw azimuth adjustment makes it easy to maintain the head alignment after many hours of continuous use
- For unattended record/playback of material that is longer than one side of a tape, there are two features that spare you from constantly attending to the deck
  —Auto Reverse mode plays or records in both directions before stopping, switching sides on the fly
  —Continuous Reverse mode allows you to loop the tape during playback up to 5 times, or record in both directions, without pausing to flip the tape and re-engage the record mechanism. Both features are accessible from the front panel with one-button selection

122R MKIII

3-Head Stereo Cassette Deck

The standard for production and broadcast facilities, the 122 MKII features smooth faultless tape handling mechanisms, a three head transport with high-performance Cobalt Amorphous record/playback heads and precision servo direct-drive capstan motors

All the features of the 112R MK II (no reverse of course) *plus*—

- XLR balanced and unbalanced RCA inputs and outputs are selectable with the flip of a back-panel switch. There are 1/4-inch inputs on the front panel for simple and direct plug-in of line-level gear
- MPX filter button eliminates pilot and sub carrier broadcast tones that can interfere with Dolby noise reduction
- Bias and level fine tuning for each channel. These tuners can be used in conjunction with the one-touch 400 Hz or 10 kHz oscillator adjustment signals to get proper VU calibration before or during each recording session
- Record/mute autospacer automatically inserts 4 sec. of silence between songs or broadcast segments for pro quality tapes

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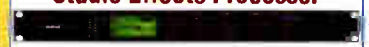
B&H PHOTO - VIDEO - PRO AUDIO

ALESIS 3630 Compressor

The 3630 provides two full-featured professional compressor/limiters in one rack space. Ideal for any application from studio recording and mixing to live sound reinforcement and broadcast

- Dual mono or linkable true stereo operation.
- Choose between RMS and peak compression styles as well as hard knee /soft knee characteristics.
- Dual 12-segment LEDs display gain reduction and input/output levels
- Each channel's built-in noise gate has an adjustable threshold and close rate to ensure clean, transparent performance.
- Variable attack and release times and a sidechain function for "ducking" in broadcast applications

t.c.electronic Wizard M2000 Studio Effects Processor



The M2000 features a "Dual Engine" architecture that permits multiple effects and six different routing modes. There are 250 factory programs including reverb, pitch delay, delay, chorus, flang, phase, ambience EQ, de-essing, compression, limiting, expansion, gating and stereo enhancement. The M2000 also features 20-bit analog conversion,AES/EBU and S/PDIF digital inputs/outputs. "Wizard" help menus, 16-bit dithering tools, Tap and MIDI tempo modes and single page parameter editing

- The array of enhanced pitch shift (up to 8 voices), chorus, and delay effects are characterized by their precision and versatility. Everything from the fine and subtle to the wide and spectacular is handled with equal superiority. The algorithms in the dynamics section (compressor, limiter, expander, gate and de-esser) are unique as stand-alone effects, but are particularly useful in combination with other effects. Those might be de-esser/room, gated hall or compressed pitch. The possibilities are endless.
- Tempo Tap function lets you match effects to the beat. Tempo can be adjusted in beats-per-minute and sub-divided any way you like—even in triplets. The tempo can also be read from MIDI
- Preset "Gilding" (morphing) function ensures seamless transition between effects. Very useful in live and mixing situations

JBL Control 5 Compact Control Monitor Loudspeaker

The Control 5 is a high performance, wide range control monitor for use as the primary sound source in a variety of applications. It's smooth, extended frequency response combines with wide dynamic capability to provide acoustic performance that is ideal for recording studios, A/V control rooms and remote trucks.

- 6-1/2 inch (165mm) low frequency driver provides solid, powerful bass response to 50 Hz and a pure titanium 1-inch dome handles high frequency response to 20 kHz
- Both transducers are magnetically shielded, allowing use in close proximity to video monitors
- Dividing network incorporates protection circuitry to prevent system damage and utilizes high quality components including bypass capacitors for outstanding transient accuracy.
- Molded of dense polypropylene foam with a choice of black, gray or white finish.
- Pleasing enclosure allows it to easily fit into any environment
- A host of mounting systems including ceiling, rack and tripod allow positioning in exactly the right spot for best performance

4200 Series Studio Monitors

The 4200 Series are console-top monitor models designed specifically for use in the near field. Both the 6.5-inch (4206)and the 8-inch (4208) offer exceptional sonic performance, setting the standard for today's multi-purpose studio environment

- Unique Multi-Radial sculptured baffle directs the axial output of the individual components for optimum summing at the most common listening distance (approx. 3 to 5 ft)
- The baffle also positions the transducers to achive alignment of their acoustic centers so that low, mid and high frequency information reaches your ears at the same point in time, resulting in superb imaging and greatly reduce phase distortion
- Curved surface of the ABS baffle serves to direct possible reflections of the shorter wavelengths away from the listening position, eliminating baffle diffraction distortion
- Vertical alignment of the transducers across the baffle center produces natural mirror-imaging
- Pure titanium diaphragm high frequency transducer provides smooth, extended response
- Magnet assembly is shielded, allowing placement near magnetically sensitive equipment like CRT's, tape recorders, etc
- Low frequency components also feature magnetic shielding making the 4200 Series monitors ideal for use in video post production facilities as well as music recording studios

FOSTEX XR-5/XR-7 Multitrackers

XR-5 Features:

- High-speed (3-3/4 ips) four-track (2-tracks simultaneously) recorder with built-in Dolby noise reduction (can be turned off)
- Pitch controller varies the tape speed within a range of ±12%
- Punch in/out function makes corrections and phrase insertions when necessary, can be done easily with optional footswitch.
- Four inputs accommodate two microphones in channels one and two. Has convenient insert points for connecting a compressor/limiter and other devices for the mic channels.
- Each channel is equipped with two-point high/low shelving equalizers to help shape the sound, and an AUX send function for processing ambient system effects.
- Trim function lets you switch High/Mid/Low input levels for channels one and two
- Alternate Mix mode lets you independently select the signal from the input jack or the tape playback. Prefader effect send, inline monitor & other functions are also possible using this mode
- Post foldback (monitor) send function routes the foldback signal to the AUX send. When the foldback is activated you can actually mixdown at the same time you add reverb to tape
- MIDI/TAPE multi-mix mode supports MIDI synchronization. Together with the Alternate Mix mode the XR-5 can simultaniously mix all MIDI sound source output with tape playback sound and effect output while monitoring!

The XR-7 has all the features of the XR-5 *plus*—

- 6 inputs, plus the ability to record four tracks simultaneously
- Dolby C noise reduction plus dual speed recording
- During recording, Channels 5 and 6 are the primary inputs for microphones and acoustic instruments. They have trim controls and mid-sweep EQ. During mixdown, these channels act as the main stereo L/R bus.
- Auto rehearsal mode let's you concentrate on the music instead of the machine

TASCAM PORTA 03 MKII Ministudio

The easiest way to get into multitrack recording, the PORTA 03 is an extremely economical 4-track recorder that lets you overdub as well as mixdown to standard cassettes.

- 4-track recorder with integrated two channel mixer
- Two 1/4-inch MIC/LINE inputs with trim control
- Extended dynamic range with Dolby B noise reduction
- 3-digit tape counter keeps track where you are on the tape
- Master level control for the entire mix, and the level sent to LINE OUT for stereo mixdown
- Track selector indicates which of the 4 tracks you're recording to
- SAFE selection keeps you from inadvertently recording over tracks you've recorded earlier
- Headphone jack for comfortable monitoring
- RCA output jacks for mixdown to cassette

PORTA 07 Ministudio

The PORTA 07 packs high-end features into a compact and economical package. Achieves great sound with high speed tape transport, high-low EQ and DBX noise reduction

- 4-track recorder with integrated four channel mixer
- Two 1/4-inch LINE inputs and two 1/4-inch MIC/LINE inputs with trim control
- Separate high and low EQ for each track provides 10dB of boost or cut.
- dbx noise reduction for improved signal-to-noise ratio
- Punch-in/out (manually or with optional RC-30 footswitch.
- Effects send with stereo return can be applied in varying amounts to all four channels
- "Bounce or "ping pong" a submix of multiple mono or stereo tracks onto a single empty track, leaving the original submix tracks free to overdub new material onto. You can even add a "live" track to the submix while you're bouncing down, to squeeze in yet another track.

424 MKII Portastudio

The 424 is premium Portastudio that takes multitrack recording to the next level. Features superior audio quality, balanced XLR inputs, enhanced equalization and a big-studio style AUX section

All the features of the PORTA 07 *plus*—

- 4-track recorder with 8-input mixer (4 mono MIC/LINE inputs with 1/4-inch and balanced XLR jacks and 2 stereo inputs with 1/4" jacks)
- Separate 3-band EQ section for each of the four mono channels with 10dB of boost or cut and sweepable midrange
- Auto Punch in/out with rehearsal, plus a Repeat switch lets you set up a tape loop that goes over the same area of a tape while you practice your punch-in/out and overdub moves—without committing a single note to tape
- Two independent dedicated AUX sends let you use more effects or use one as tape cue during tracking
- Dual-speeds, logic-controlled tape transport system improves tape handling and sound quality. Select 3-3/4 inch per second HIGH speed for the best possible recording quality or NORMAL 1-7/8 ips speed.
- Monitor output makes it easy to connect an external monitor amplifier without repatching—at mixdown
- Tape DIRECT OUTS are provided for integration with external mixers.

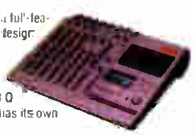
MIDI Musicians Take Note—If you've got MIDI keyboards, drum machines and sound modules in your set up, you can exploit the power of "virtual tracking" with either the PORTA 07 or 424/464/488 Portastudio. You can use a MIDI synchronizer like the Tascam MTS-30 MIDI-Tape Synchronizer to record (stripe) a code onto track 4 (track 8 with the 488). Just select SYNC mode on the DBX switch and record the tone to tape. After striping the tape with FSK or Song Position Pointer information, all your MIDI instruments will faithfully follow the tape during playback and recording, even if you slow or speed the tape using the PITCH controls. The big benefit is that your MIDI tracks (called virtual tracks) don't actually have to be recorded until final mixdown, giving you lots more unused tracks to record on.

464 Portastudio

The functionality of a pro recording studio in a small, lightweight package, the 464 Portastudio is a full-featured eight input, four-track cassette recorder complete with a 12x2 internal mixer and dual buss design that lets you create separate recording and cue mixes.

All the features of the 424 MK II *plus*—

- 4-track recorder with 12-input mixer (4 mono MIC/LINE with 1/4-inch and balanced XLR jacks, 4 stereo-1/4" jack pairs.
- Channels 1-4 offer High and Low shelving EQs and a sweepable Mid EQ. Tracks 5-6 and 6-7 have shelving EQ only, while 9-10, 11-12 are best used with input that has its own internal EQ.



488 MKII Portastudio

When 4 tracks are just not enough, then you need the perfect creative tool—the 488 MKII Portastudio. The most cost-effective 8-track recorder on the market, the 488 not only offers additional capacity but versatile capability and intuitive operation for easy capturing & manipulation of your ideas. Whether recording acoustic or electronic instruments or vocals, the 488 offers maximum creative freedom to produce your best work. With all the functionality of a professional studio, the 488 may be the ultimate demo recording machine.

All the features of the 464 MK II *plus*—

- Includes phantom power for use with high-quality condenser microphones.
- Built-in mixer features low-noise circuitry with 12 inputs and 2 group busses. There is a separate input for your stereo master recorder
- Each of the 8 main input channels includes individual 3-band equalizers. You get Hi and Low shelving EQs, plus a semi-parametric sweepable midrange EQ.
- Unique multi-mix mode with the capability of handling up to 20 inputs at mixdown.
- The only 8-track cassette that offers a servo controlled tape transport complete with electronic braking. Equipped with a high-performance Hysteresis Tension Servo Controlled (HTSC) tape transport, the 488 delivers better sound than the first 8-track reel-to-reel machines
- HTSC maintains precise and consistent tape tension from the beginning until the end of the tape. It actually dynamically adjusts the back tension on the tape as it moves from one end to the other, allowing precise locating capability.

ALESIS Monitor One

Near Field Studio Reference Monitor

Designed by engineers with decades of experience, the award winning Monitor One provides the last critical link in the recording studio's signal chain; giving you an accurate reproduction of what is being recorded.

- Delivers excellent image and transient reproduction, powerful bass, and smooth, extended high frequency detail
- Exclusive SuperPort speaker venting technology eliminates the "choking" effect of port turbulence for solid high-power bass transients and extended low frequency response
- Ferrofluid cooled 1" silk-dome driver eliminates the harshness and ear fatigue associated with metal or plastic tweeters, making it easy to mix on for extended periods
- Monitor One's powerful bass incorporates a proprietary 6.5" low frequency driver with a mineral-filled polypropylene cone and a 1.5" voice coil wound on a high-temperature Kapton former
- They come in a mirror-image left/right pair covered with a non-slip rubber textured laminate for stable mounting

Monitor Two

Mid Field Studio Reference Monitor

With much of today's popular music demanding more bass at louder volumes than a small near field monitor can possibly produce—the Monitor Two delivers—at a price no higher than many of these smaller speakers.

- Utilizes a 10" three way speaker design with a unique asymmetrical crossover to maintain the same accurate tonal balance and imaging of the Monitor One—but with a much larger sound field
- 10" low frequency driver incorporates Alesis' SuperPort speaker technology to provide powerful, extended bass.
- 5" mid frequency driver offers exceptional mid frequency detail
- 1" silk dome high frequency driver delivers a broad but natural frequency response from 40Hz to 18kHz
- Covered in a non-slip rubber finish, the Monitor Two comes in a mirror imaged pair for mixing accuracy

TANNOY PBM Series II Reference Monitors

The PBM II Series is the industry standard for reference monitors. They feature advanced technologies such as variable thickness, injection molded cones with nitrile rubber surrounds and the highest quality components including polypropylene capacitors and carefully selected indicators. With a Tannoy monitor system you are assured of absolute fidelity to the source, true dynamic capability and most important, real world accuracy.

PBM 5 II

- Custom 5" injection-molded bass driver with a nitrile rubber surround for extended linearity and accurate low frequency reproduction. They are better damped for reduced distortion and exhibit more naturally open and detailed midrange
- Woofer blends seamlessly with the 1" polyimide soft dome ferro-fluid cooled tweeter providing extended bandwidth for extremely precise sonically-balanced monitoring
- Designed for nearfield use, the PBM 5 II cabinets are produced from high density medite for minimal resonance and features an anti-diffraction radiused front baffle design

PBM 6.5 II

- Transportable and extremely powerful, the PBM 6.5 II is the ideal monitor for almost any project production environment
- 6.5" lowfrequency driver and 3/4" tweeter are fed by a completely redesigned hardwired hand selected crossover providing uncompromised detail, precise spectral resolution and flat response
- Fully radiused and ported cabinet design reduces resonance and diffraction while providing deep linear extended bass.

PBM 8 II

- High tech 1" soft dome tweeter with unmatched pattern control and enormous dynamic capability. 8" driver is capable of powerful bass extension under extreme SPL demands
- Hard wired crossover features true bi-wire capability and utilizes the finest high power polypropylene capacitors and components available
- Full cross-braced matrix medite structure virtually eliminates cabinet resonance as a factor
- Ensures precise low frequency tuning by incorporating a large diameter port featuring laminar air flow at higher port velocities

SPIRIT

FOLIO LITE
Compact Professional Mixing Console

- 12 inputs as standard (up to 16 at mixdown)
- 4 mono channels & 4 stereo channels
- Inserts on all mono inputs and mix outputs
- Ultra low-noise (-129 dB EIN) mic inputs
- Musically responsive 2-band EQ
- 2 Aux sends on all channels, Aux 1 switchable pre/post fader
- PFL Sololo on all inputs, dedicated tape return
- Headphone socket and discreteL/R outputs for monitors
- 10-segment three color bar graph metering
- Consistent high performance controls, global phantom powering
- Optional rack mounting panel and PortaPower Unit

FOLIO SI
Stereo Input Mixing Console

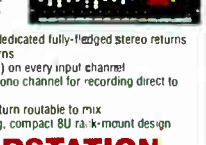
All features of Folio Lite PLUS—

- 18 inputs as standard (20 including stereo returns)
- 8 stereo channels and 2 mono channels, with 60mm faders
- Comprehensive 3-band EQ on inputs 1-14
- High pass filter on mono inputs
- Dedicated tape return and control room outputs
- Insert points on L and R master outputs
- 12-segment bar graph metering
- Main outputs are ground compensated and impedance balanced
- Free standing or rackmount versions available
- Optional Porta Power unit allows battery powered operation from various sources

FOLIO RAC PAC
4-Bus Multi-Purpose Mixing Console

- 14 input channels with up to 28 inputs at mixdown
- 2 stereo inputs with 60mm faders and 2-band EQ
- Low-noise (-129 dB) mic inputs
- Comprehensive 3-band EQ with swept Mid, plus high pass filter on every mono input
- 6 versatile Aux sends, 4 dedicated fully-fledged stereo returns plus 2 stereo effects returns
- Stereo solo-in-place (PFL) on every input channel
- Direct outputs on each mono channel for recording direct to multitracks
- Dedicated 2-track tape return routable to mix
- Global phantom powering, compact 8U rack-mount design

POWERSTATION
Powered Mixer



Studio quality mixing, with integrated power amp and effects provide an all-in-one solution for live performance.

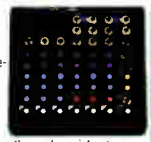
- 8 mono and 2 stereo input channels
- 18 inputs at mixdown, including tape and effects returns
- Bullet-proof UltraMic pre-amps with 60 dB gain range for stunning signal handling capability
- High-spec 265W +265W (RMS) power amp
- Built-in Lexicon effects mixer
- Consistent high performance controls, PFL solo on all channels
- 3-band EQ with swept mid-frequency on mono channels
- 2 auxiliaries for effects and foldback
- 7-band precision dual graphic EQ
- High pass filter on mono inputs
- 40 Hz subsonic filter on outputs to protect speaker cabinets
- 48v phantom power
- Inserts on mono channels and main outputs
- Separate power amp input to amplify external sources
- Dedicated record outs and tape returns, dedicated mono output
- Rugged steel chassis, hinged cover for protection

PROTRACKER
In-Line Multitrack Recording Console

- In-line monitoring signal format – 2 discrete inputs per channel
- 8 channels with 60mm faders
- Expansion sockets for daisy-chaining ProTrackers
- High quality, high gain mic pre-amp (-129 dB), 5Hz-150kHz) with switchable 48v phantom power on every input
- Switchable high pass filter on every channel
- Built-in limiter (300ms attack time/3 sec release) selectable on every channel. Overload and limiter indicators on each channel.
- Insert and aux switchable between channel and monitor paths
- Aux globally switchable pre/post fader
- Monitor fader and pan control
- Balanced tape & send/return, switchable between 4dB &-10dB
- Separate pre -fade Insert and return sockets, eliminating the need for Y-cables
- Inputs switchable to mix to allow simultaneous front -of -house mixing and recording
- Mix routable to tape sends 7/8 for simultaneous 2-track recording on a single multi-track, without effecting multitrack feeds from channels 1 to 6
- Headphone monitoring of 2-track return, aux 7/8 or mix
- Monitor outputs follow headphone output
- Mix output & 2-track return accept +4dB XLRs or -10 dB RCA phonos

SAMSON® MIXPAD 9

Ultra-Compact 9-Channel Audio Mixer

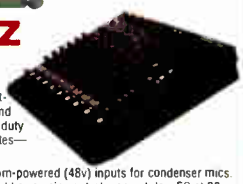


A remarkably compact 9-channel mixer, the MIXPAD 9 offers professional audio performance and a wide range of user-intensive features. It boasts low noise and distortion specifications, includes wide-range gain trim controls for both mic and line inputs and provides exceptionally low group delay over the full frequency bandwidth for a more transparent, open sound. It also has a very high slew rate—usually found only on larger, more expensive mixing consoles—allowing it to react very quickly to transients and maintain a crisp, articulate sound. It offers phantom power (48v) for use with condenser microphones and an in-line power supply eliminates magnetically-induced hum.

- 3 mic/line inputs and 3 stereo channels (total 9 inputs).
- 2 auxiliary sends for effects and two Stereo returns.
- Independent 2-band shelved EQ, pan control for mono channels and balance control for stereo channels.
- Adjustable mic input trims allow use with a wide variety of mics.
- Phantom powered XLR mic input connectors.
- Peak LEDs for left and right main outputs.
- Extremely durable, extruded aluminum chassis

MACKIE.

MICRO SERIES 1202-VLZ
12-Channel Ultra-Compact Mic/Line Mixer



Usually the performance and durability of smaller mixers drops in direct proportion to their price. Fortunately, Mackie's fanatical approach to pro sound engineering has resulted in the Micro Series 1202-VLZ, an affordable small mixer with studio specifications and rugged construction. It delivers no-compromise, non-stop, 24-hour-a-day professional duty in permanent PA applications, TV and radio stations, broadcast studios and editing suites—where nothing must ever go wrong.

- Working S/N ratio of 90dB, distortion below 0.025% across the entire audio spectrum and +28 dB balanced line drivers.
- 4 mono channels with discrete, balanced balanced mic/line inputs and 4 stereo channels (12 inputs total)
- Line inputs and outputs work with any line level, from instrument level, to semi-pro -10dB, to professional +4dB.
- Switchable phantom-powered (48v) inputs for condenser mics.
- Every input channel has a gain control, pan pot, low EQ at 80 Hz, high EQ at 12.5 kHz and two aux sends with 20dB gain
- Master section includes two stereo returns, headphone level control and metering.
- Sealed rotary pots resist and other contaminants.

NEW!

MS1402-VLZ
14 x 2 Compact Mic/Line Mixer

Mackie's fanatical engineers have done it again. Balanced inputs and outputs, 3-band EQ, AFL/PFL and deluxe tape monitor/Control Room feature. Nice long 60mm faders, six studio-quality mic preamps and extra Alt 3-4 stereo bus—in less than 1.3 square feet of space.

- Studio grade mic preamps (chs. 1-6) with high headroom, low noise and phantom power. Also incorporate low cut filters to cut mic handling thumps, pops and wind noise. Lets you safely use low shelving EQ on vocals.
- Trim controls (ch. 1-6) with ultra wide range (+10 to -40dB) handle everything from hot digital multitrack feeds to whispering lead singers and older, low output keyboards.
- Pan control with constant loudness and high L/R attenuation so you can pan hard left or right without bleed-through.
- Two aux sends per channel with 15dB extra gain above Unity
- 60mm log-taper faders are accurate along their whole length of travel and employ a new long-wearing contact material for longer fader life & uper resistance to dust, smoke etc.
- Control room/phone matrix adds incredible tape monitoring, mixdown and live sound versatility.
- Mute switch routes channel output to extra ALT 3-4 stereo bus. Use it for feeding multitrack recorder channels, creating a sub-group via controlroom/phones matrix, monitoring a signal before bringing it into the main mix or creating a " mix minus".
- Solid steel chassis instead of aluminum or plastic.

The new MS-1202, 1402 and 1604 all include VLZ (Very Low Impedance) circuitry at critical signal path points. Developed for Mackie's acclaimed 8•Bus console series, VLZ effectively reduces thermal noise and minimizes crosstalk by raising current and decreasing resistance.

NEW!

CR-1604 VLZ
16-Channel Mic-Line Mixer

The hands-down choice for major touring groups, studio session players, as well as broadcast and sound contracting.The new CR-1604 VLZ features everything you would expect from a larger console, and then some! 24 usable line inputs with special headroom/ ultra-low noise Unityplus circuitry, seven AUX sends, 3-bandEQ, constant power pan controls, 10-segment LED output metering and discrete front end phantom-powered mic inputs.

- Lowest noise and highest headroom (90 dB working S/N and 108 dB dynamic range). Many drummers consider it the only mixer capable of handling the attack and transients of acoustic and electronic drums.
- Genuine studio-grade phantom powered, balanced input mic preamps on channels 1-6. All CR-1604 VLZ (and optional XLR10 for ten more) discrete input mic preamp stages incorporate four conjugate-pair, large-emitter geometry transistors. So, whether recording nature sound effects or heavy metal, miking flutes or kick drums, you get the quietest, cleanest results possible.
- True 4-bus design with channel assigns to 1-2, 3-4 or main L-R.
- 3-band EQ with mid-frequency sweep and low cut switch.
- AFL/PFL solo and mute switches with overload andsignal present indicators.
- Rear panel features include insert points and 1/4-inch /XLR connectors on every channel, as well as RCA tape inputs/outputs.
- New, standard size channel trim pots are found at the top of each channel.
- Rotary input/output "pod" allowing three different positions for set-up

TASCAM

M2600 MKII Series

NEW

16/24/32-Channel 8-Bus Mixers

LOW NOISE CIRCUITRY

- Combining completely redesigned low noise circuitry with Absolute Sound Transparency™ the M-2600 delivers high-quality, extremely clean sound. No matter how many times your signal goes through the M-2600, it won't be colored or altered. The signal remains as close to the original as possible. The only coloring you hear is what you add with creative EQ and your outboard signal processing gear.
- Double reinforced grounding system eliminates any hum. World-class power supply provides higher voltage output for better headroom and higher S/N ratio.

PREMIUM QUALITY MIC PRE-AMPS

- The M-2600's mic pre-amps yield an extremely low noise floor, enormous headroom and an extremely flat frequency response. It also increases gain control to an amazing 51dB. Plus, you get phantom power on each channel.
- Accepts balanced or unbalanced 1/4" inputs, and low-impedance XLR jacks. Better still, the TRIM controls operate over a 51dB input range. For the hottest incoming signals, all it takes is a press of the -20 dB PAD button atop each channel strip to bring any signal down to manageable levels. Plug in anything – keyboards, guitars, basses, active or passive microphones, samplers and more.

THE BEST AUX SECTION IN THE BUSINESS

Versatile AUX section has 8 sends total, 2 in stereo. Send signal in stereo or mono, pre-or post-fader. Available all at once. Return signal through any of 6 stereo paths.

FLEXIBLE EQ SECTION

Bi-directional split EQ means you can use either or both EQ sections in the Monitor or Channel path...or defeat the effect altogether with one bypass button. Other comparably priced mixers will lock the shelving mix into the Monitor path only, limiting your EQ application.

ADVANCED SIGNAL ROUTING OPTIONS

Direct channel input switching. Assign to one of eight busses, direct to tape or disk, or to the master stereo bus. Because the group and direct-out jacks are one and the same, you can select either without repatching.

ERGONOMIC DESIGN

The M-2600 has a big studio feel. All buttons are tightly spring loaded, lock into place and accomodate even the biggest fingers. The faders and knobs have a tight, smooth "expensive" feel and are easy to see, reach and manipulate. Center detents assure zero positions for EQ and PAN knobs. Smooth long throw 100mm faders glide nicely yet allow you to position them securely without fear of accidentally slipping to another position.

BEHRINGER

MDX 1200 Autocom

- Attack and release times, with Intelligent Program Detection, prevents common adjustment errors.
- Newly-developed, powerful noise gate.
- Switchable soft knee/hard knee characteristics for varied sound pressure levels.
- Bright, illuminated LEDs show gain reduction.

MDX 2100 Composer

- Integrated auto/manual compressor, expander & peak limiter.
- Compresses "musically" in dynamic range without any audible "pumping" or "breathing".
- Attack & release times are controlled automatically or manually.
- Interactive Gain Control (IGC) combines a clipper and peak limiter for distortion-free limitation on signal peaks.
- Servo-balanced Inputs and outputs are switchable between +4dB and -10dB.

Stewart

Power Amplifiers PA-1000 PA-1400 PA-1800

- High frequency switch mode power supply fully charges 120,000 times per second (1000 times faster than most power supplies) requiring far less capacitance for filtering and storage.
- High speed recharging also reduces power supply "sagging" that afflicts other designs.
- Incredibly efficient, 5 PA-1000 or PA-1400's (4 PA-1800's) can be run on one standard 20 amp circuit. No need for staggered turn-on configurations or other preventive measures when using multiple amp set-ups.
- They produce smooth and uncolored sound, while offering very full detailed low end response and tons of horsepower.
- Each amp carries a full 5 year warranty on parts and labor

PA-1000 weighs 9 lbs, is 15" deep and occupies one standard rack space. Delivers 1000 watts into 4Ω when bridged to mono.

PA-1400 weighs 16 lbs, is 15" deep and takes 2 standard rack spaces. Delivers 1400 watts into 4Ω when bridged to mono.

PA-1800 weighs 17 lbs, is 17" deep and takes two rack spaces. Delivers 1800 watts into 4Ω when bridged to mono.

BGW

Performance Series Amplifiers

Performance Series 1
300 Watt Power Amplifier

- Measuring only 3.5 inches high and weighing 26 pounds, the Series 1 delivers more than 150 watts per channel.
- Its welded steel chassis is unbelievably strong while a custom heat sink extension provides exceptional thermal capacity.
- An internal fan provides quiet background noise levels for critical monitoring applications and when pushed hard the cooling system insures continuous cool operation even in the most demanding situations.
- Active balanced inputs with both XLR and 1/4" phone jacks.
- Supplied with quality 5-way binding posts for highly reliable speaker connection.
- Front panel handles are reversible for either rack mount installation or easy handling.
- LEDs are provided for signal presence and clip indication; the detented gain controls have large knobs for easy front panel adjustments.

Performance Series 2
600-Watt Power Amplifier

- Same as above except the Series 2 weighs 32 pounds and delivers more than 300 watts per channel.

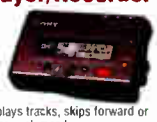
Performance Series 4
1200-Watt Power Amplifier

- Same as above except the Series 4 weighs 53 pounds and delivers more than 600 watts per channel.
- Has a switch selectable clipping eliminator that prevents damage to the speakers.

TASCAM
DA-P1 Portable DAT Recorder

- Rotary two head design and two direct drive motors for the best transport in its class.
- XLR-balanced mic/line inputs (with phantom power) accept signal levels from -60dB to +4dB.
- Analog line inputs & outputs (unbalanced) plus S/PDIF (RCA) digital inputs and outputs enable direct digital transfer.
- Uses next generation A/D & D/A converter for amazing quality.
- Supports 32/44.1/48kHz sample rates & SCMS-free recording.
- MIC limiter and 20dB pad to achieve the best possible sound without outside disturbances.
- TRS jack & level control to monitor sound with any headphones.
- Built tough, the DA-P1 is housed in a solid, well-constructed hard case. It includes a shoulder belt, AC adapter & 1 battery.

SONY
TCD-D8
DAT Walkman Player/Recorder



- Long Play (LP) mode allows 4 hours of record/playback of 12-bit audio on a single DAT cassette.
- Equipped with digital coaxial and optical input connector. Also has analog Mic and Line inputs.
- High-speed Automatic Music Sensor search function finds & plays tracks, skips forward or back up to 99 tracks, all at 100x normal speed.
- Digital Volume Limiter System increases listening comfort & sound quality by automatically adjusting for sudden level changes.
- Two-speed cue-review lets you hear sound while player is in fast-wind modes, up to 3x or 25x normal speed.
- LCD display with backlit windows clearly shows recording level, track number, operating status and 4-segment battery indicator, even in low ambient light conditions.
- Optional RM-D3K System Adapter Kit for complete digital interface. It has input/output connectors for both the optical cable & the coaxial cable. Also includes a wireless remote control.

TCD-D10 PRO II
Portable DAT Recorder

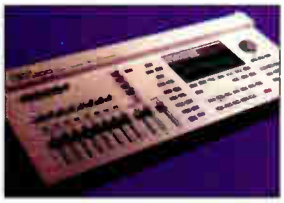
- Has balanced XLR input, switchable mic (-60dB) or line (+4dB) inputs. A 12-pin digital connector provides interfacing with AES/EBU digital signals of 32/44.1/48.0 kHz sampling rates.
- Comprehensive self-diagnostics function constantly monitors the rotation of the head drum, capstan and reels. The tape transport mode and load/unload time are continuously checked as well.
- Up to 99 start IDs can be recorded in the subcode area. When the record button is pressed, the start ID is recorded automatically for 9 seconds. During recording, IDs can also be added manually to any position of the tape. Search for start IDs is 100X normal speed.
- 20-segment digital peak level meters include overload indicators. Closely tracks input signal for accurate level indications.
- During playback, the date and time of recording is displayed.
- Has a record-level limiter with a fast attack time of 200ms. Mic attenuator prevents distortion by suppressing signal level 20 dB.
- Immediate playback is possible through a built-in speaker.
- Supplied wired remote controller also accepts a mic holder. Two mic stand screw adapters are also supplied.
- Supplied NP-22H rechargeable battery provides 1.5 hours of operation. Optional NPA-D10 battery adapter enables 1 hour on AA batt. Supplied ACP-88 AC adapter operates on 100-240v 50/60 Hz.

HHb
PORTADAT
PDR1000/PDR1000TC
Professional Portable DAT Recorders

- Direct drive transport with 4 heads for confidence monitoring.
- Balanced XLR mic and line analog inputs and two RCA analog line outputs. Digital inputs and outputs include S/PDIF consumer (RCA) and AES/EBU balanced XLR.
- Left/Right channel mic input attenuation selector (+4dB/-30dB).
- 48v phantom power, built-in limiter & internal monitor speaker.
- Illuminated LCD display shows clock and counter, peak level metering, margin display, battery status, ID number, tape source status and machine status.
- Supplied Nickel Metal Hydride rechargeable battery powers the PDR1000 for two hours. The battery has no "memory effect" and is charged in two hours with the supplied AC Adapter/charger.

PDR1000TC Additional Features:
In addition to all the features of the PDR1000 recorder, the PDR1000TC is equipped to record, generate and reference to time code in all existing international standards.
- All standard SMPTE/EBU time codes are supported, including 24, 25, 29.97 (drop frame and non-drop frame) and 30 fps.
- External synchronization to video, field sync and word sync.

Roland® DM-800
Digital Audio Workstation



A compact, stand-alone multi-track disk recorder that provides an amazing array of features at an unbelievably low price. Whether for music production, post production or broadcast, the DM-800 lets your work easier and faster. A full function workstation, the DM-800 performs all digital mixing operations from audio recording, to editing, to rotation track-bouncing, to final mixdown. It fully supports SMPTE and MIDI time codes and also features a built-in Sample Rate Resolver to synchronously lock to any time code.

HIGHEST QUALITY SOUND
- Sampling rates of 48/44.1/32 kHz • 24-bit internal processing
- 18-Bit A/D and D/A with 128 and 8 times oversampling

POWERFUL EDITING
- Time compression, pitch compression
- Non destructive cutting, erasing, copying
- Fast looping for music or ambiance editing
- Six levels of waveform zoom
- Optional RS-422 interface

FULL AUTOMATION
- Microscope editing of automation data
- Dynamic and snapshot automation of level, pan, 2-band EQ, including frequency select, boost and cut •Phase level editing of level, crossfade and fade in/out

TRIGGER FEATURES
- Trigger mode to play any combination of 8 tracks for vocal fly ins or sound effects placements
- Advanced trigger mode for live operation with preset or dial up cue of phrases to be played one after another

FLEXIBLE I/O STRUCTURE
- Full digital patch bay
- Stereo AUX send buss, 2 stereo AUX returns
- Digital stereo input and two digital stereo outputs • Direct channel outs
- 4 balanced analog inputs with gain control, and 4 balanced analog outputs

MIDI FEATURES:
- MIDI machine control • Internal tempo maps •MIDI clock and song position pointer output •8 MIDI triggers for instant phrase playback •MIDI trigger of record and punch in/out • Tempo maps from external sequences, MIDI or tap input

PROJECT CATALOGING
- Up to 150 projects on line at once
- Cataloging of sound effects and projects
- Easy transfer of sounds from one project to another

ACCURATE SYNCHRONIZATION
- Frame accurate sync to any time code
- Generates/reads SMPTE time code—24 ,25, 29.97 (Drop/non-drop) and 30 frames per second • Locks to MTC

RECORDING OPTIONS
- Records to standard SCSI hard drives
- Up to 24 hours recording time possible
- Uses MO,Syquest or Jazz drives for fast project change overs

VIDEO OUT
- Composite, S-video, digital RGB output
- All track overview with infinite level of project zoom
- Views of phrase and waveform editing
- Very accurate level meters
- Track status and time location

Digital Multi-Track Recorders

TASCAM DA-88

The first thing you notice about the eight channel DA-88 is the size of the cassette - it's a small Hi-8 video cassette. You'll also notice the recording time - up to 120 minutes. These are just 2 of the advantages of the DA-88's innovative use of 8mm technology.
- ATF system ensures no tracking errors or loss of synchronization. All eight tracks of audio are perfectly synchronized. It also guarantees perfect tracking and synchronization between all audio tracks on all cascaded decks - whether you have one deck or sixteen (up to 128 tracks!)
- Incoming audio is digitized by the on-board 16-bit D/A at either 44.1 or 48kHz. The frequency response is flat from 20Hz to 20KHz while the dynamic range exceeds 92dB.
- Execute seamless Punch-ins and Punch- outs. This feature offers programmable digital crossfades, as well as the ability to insert new material accurately into tight spots. You can even delay individual tracks to generate special effects or compensate for poor timing.

SONY PCM-800

- Flawless sound quality, outstanding reliability and professional audio interfacing with AES/EBU digital I/O and XLR analog I/O connections
- Combines audio functions such as precise auto punch in/out digital cross fade technology, external synchronization with SMPTE/EBU time code and selectable sampling frequencies of 44.1 and 48kHz
- Shuttle dial for precise tape control, variable speed playback of 6% in 0.1% increments and a flat frequency response from 20Hz to 20kHz
- Operate up to 16 PCM-800's in perfect sync with optional RCC-S1 sync cables,for up to 128 channels of digital audio recording.
- Optional DABK-801 Sync Board provides SMPTE/EBU time code generation and chase sync. It locks to the incoming time code with subframe accurate offset— ideal for audio-follow-video applications. Also synchronizes to external video reference signal.
- Optional RM-D800 provides comprehensive remote control over all PCM-800 functions. The RM-D800 can control up to six units for up to 48 channels of digital audio.

ALESIS adat xt
8-Track Digital Audio Recorder

An incredibly affordable tool, the ADAT-XT sets the standard in modular digital multitrack recording. With new features & enhanced capabilities, the ADAT-XT operates up to four times faster than the original ADAT, offers an intelligent software-controlled tape transport and provides onboard digital editing and flexible autolocation.

Stunning Audio:
- Incorporates ultra-high fidelity 18-bit, 128 X oversampling A/D converters which provide better-than-CD audio quality.
- For outputs, the D/A converters provide 20-bit, 8x oversampling performance for a flatter frequency spectrum, improved phase response and much less low-amplitude distortion.
- 20 Hz to 20kHz ±0.5dB frequency response, 92dB S/N ratio, crosstalk between channels better than -90dB @ 1kHz.

Onboard Autolocator with Auto Record:
- Onboard 10-point autolocate system provides quick access to multiple tape locations. Four specialized locate points make your recording sessions quicker and easier.
- Auto play the moment any autolocation point is reached. Auto Return automatically rewinds at the end of a loop.
- Auto Record function lets you automate punch-in/punch-out times that are accurate to 1/100th of a second.
- Rehearse Mode allows you to enter or exit record modes without actually laying tracks to tape.
- To record on the fly, you can even use the individual Record Enable buttons to punch in and out of tracks.
- Includes remote control with transport and locate functions, offers a footswitch jack for hands-free punch-in.

Intelligent Transport:
- Advanced transport software continuously monitors autolocation performance and the head constantly reads ADAT's built-in sample-accurate time code—even in fast wind modes.
- Dynamic Braking software lets the transport quickly wind to locate points while gently treating the tape.

Flexible Inputs and Outputs:
- Servo-balanced 56-pin ELCO connector operates at +4dB to interface with consoles with +4 dB bal/unbal inputs/outputs. Also unbalanced -10dB inputs/outputs (phono connectors).
- Has an electronic patch bay built-in so it can be used with stereo and 4-bus consoles.
- Multiple Optical Digital I/O carries up to eight tracks at once. The digital I/O combined with the ADAT Synchronization Interface make it completely compatible with any ADAT-format recorder or other devices that use Alesis' proprietary digital protocol.

Digital Editor:
- Make flawless copy'paste digital edits between machines or even within a single unit. Track Copy feature makes a digital clone of any track (or group of tracks) and copies it to any other track (or group) on the same recorder. This allows you to assemble composite tracks for digital editing.
- Use multiple ADAT-XTs and Tape Offset lets you copy and paste not only track to track, but from location to location. Tape Offset assembles your project with a minimum of repetitive overdubbing and changes the tape position of a slave XT to its master, so you can "fly" audio to different locations on each tape.
- Track Delay can delay the time reference of a track by up to 170ms. Also easily change sthe groove of a tune. Track Delay is individually adjustable on each channel and is excellent for fixing slight timing errors in recorded tracks (player lags behind or rushes the beat). In recordings with multiple microphones, you can time-align each track, precisely compensating for the spacing between mics with accuracy to 0.0001 seconds.

Panasonic
SV-3800/SV-4100
Professional DAT Recorders

Designed for professional applications, the SV-3800/SV-4100 have highly accurate and reliable transport systems with search speeds up to 400X normal, and 20-bit D/A converters to satisfy the highest professional expectations both in terms of sound and functionality.

SV-3800 Features:
- Recording via analog inputs offers sampling rates of 44.1 or 48kHz. When recording through digital inputs, it automatically clocks to incoming frequencies of 32/44.1 or 48kHz.
- XLR-balanced digital inputs/outputs plus consumer format coaxial and optical inputs/outputs. XLR-balanced analog stereo inputs/outputs. Output level is selectable between +4db and -10db. The input level is +4db.
- Built-in shuttle wheel has two variable speed ranges: 3 to 15x in Play mode and 1/2 to 3x normal speed in Pause mode.
- High speed transport enables searching up to 250x normal speed. Search up to 400x normal speed is possible once the tape has been scanned in Play, FF or REV mode. This ensures access to any point on a two-hour DAT in under 30 seconds.
- Ramped record mute and unmute with three seconds fade-in and five seconds fade-out provides automatic level changes at the start and end of a recording.
- Comprehensive display includes program numbers, absolute time, program time, remaining time and Table of Contents.

SV-4100 Has all the features of the SV-3800 Plus—:
Offers enhanced performance required for professional production, broadcast and live-sound systems. Features such as instant start, external sync capability and enhanced system diagnostics make the SV-4100 the DAT quality standard.

FOSTEX
D-5
Digital Master Recorder

With professional features and a consumer price tag, the D-5 satisfies a lot of requirements. It records or playsback four hours of music. Includes optical and digital input/output, and TOC functions that are as easy to use as a CD player. It's also equipped with basic pro features such as ID editing function, GPI and XLR connectors and 300X speed locate and search functions.
- Playback/record audio with 32/44.1/48 kHz sampling in SP (standard play) mode. Equipped with LP (long play) mode, it can play/record at 32 kHz up to 4 hrs. on a 120 minute cassette.
- Analog interface includes switchable (+4dB/-10dB) balanced and unbalanced XLR inputs and outputs.
- AES/EBU digital interface (XLR) for professional use and optical (S/PDIF) input/output for consumer/semi-pro connections.
- 5-pin GPI input connector allows Play, Stop & S-IO search to be implemented through commands from an external source.
- Records CD-Q code sync ID, enabling precise music start up. When performing digital signal transfer from CD through it's optical input, the D5 precisely records S-IOs according to the track number and index information of the CD-Q code. So even if there is a break in the middle of a song or there isn't a non-recorded section between two songs, you can locate to the S-IO location (eg beginning of song) precisely.

D-10
Digital Master Recorder

- Switchable 44.1 and 48kHz sampling frequencies.
- Analog interface includes switchable XLR-balanced (+4dB) and unbalanced RCA -(10dB) inputs and outputs.
- Equipped with and XLR-balanced AES/EBU digital interface and optical (S/PDIF) input/output conforming to IEC consumer.
- Built-in 8MB RAM (4 MB x 2) offers instant start as well as scrubbing at 1m/second accuracy.
- Advanced jog/shuttle for precision cueing and monitoring.
- Auto Cue provides automatic locating to the exact start of audio modulation during ID search and tape loading.
- Universal GPI input/output enables easy and fast assemble editing, based on A-time between a pair of D-10s.
- Switchable 2-position reference level: -12dB/-20dB.
- Start and Skip IDs as well as up to 799 P-NOs can be recorded and played back.
- 10-digit key-pad lets you store and recall 100 cue points.
- Continuous or peak reading level meters can display available headroom with an accuracy of ±0.1dB.
- Reads and displays A-time or Pro R-time, also provides PCM monitoring.
- Optional 8333 interface card adds timecode and RS-422 (X 2) functionality to the D-10.
–Reads an external timecode and records on the sub-code area.
–Reproduces and outputs the timecode from sub-code area.
–Switchable RS-422 and ESbus protocols. Using the ESbus, up to 16 D-10s can be daisy chained.

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—FROM PAGE 20, DEEP DOWN DIGITAL

we are, figured that we could capture 20 kHz simply by sampling at twice that frequency to satisfy the Nyquist Theorem, plus 10% more to fit an anti-aliasing filter in there, plus another 100 hertz so that we could pretend to lock to video. So 40 plus 4 (that 10%) plus 100 Hz got us 44.1. Fine. Now we have to build these anti-aliasing filters to cleanly pass 20 kHz, but be out (-90 dB) by 22 kHz. Yeah, right. We tried various combinations of Butterworth and Cauer (elliptical) filters and other hybrids, but the truth is that you can't dump that much level in that little frequency band without huge phase problems in the analog or even the digital IIR domains. This means that the early converters suffered more phase shift and high-frequency ringing than all of the other gear you owned put together. No wonder they didn't sound good.

And it's not just the phase shift of these steep filters. Super-sharp filters require lots and lots of capacitors, resistors and amplifier stages; so we get noise and distortion. Just what we want. I don't remember, but wasn't noise and distortion what we were hoping to leave behind in our exodus to digital?

So They (the digital "they") gave us 48 to make a little more room for the filter. For those who didn't waste years learning analog filter design, it works like this: With all things equal (type of filter or same type combinations), the sharper the filter, the more phase and ringing problems. So it stands to reason that more room means a less aggressive slope. Ergo, less bad stuff, technically speaking. And so it is. This actually worked. The 48kHz systems sounded noticeably smoother, warmer and more accurate than their 44.1 predecessors.

There was, of course, an obvious price; 48 uses more media and is yet another standard. Oh, well. But wait. There was another less obvious, insidious price as well; rumors and confusion. Stories began to circulate that 48 was better because you got wider recorded bandwidth. I would occasionally hear otherwise sane producers and engineers on or near Sunset telling unsuspecting young women that they were getting 21, 22 or even 24kHz recordings because of their new, bigger 48kHz sample rate systems. And it worked! These women were happily following these guys to their studios to see this amazing technological advancement. I can't tell you how many times I saw a Chevy Nova following a Porsche Carrera down Sunset at 2 a.m. I knew. I had a 48kHz system, too.

Ah, but then the clever Japanese decided that this entire race was bogus and should in fact be MASHed to nothing. So they came out with oversampled converters. Great idea! Sample up in the hundreds of kilohertz and pop one little capacitor on the output for a nice, shallow slope that takes forever to attenuate -90, but has only a few degrees of phase shift, and even that is out at 80 kHz. Life is a lot easier (and sounds a lot better) when you are trying to pass 20 kHz and kill 352.8 kHz than when you are trying to pass 20 kHz and kill 22 kHz! Along with noise-shaping and other evolutionary tricks, 44.1 now works. So don't let me catch you driving down Sunset in a Porsche at 2 a.m. unless the road behind you is clear. Repeat after me, "I know better sampling at 48 kHz does not give me wider audio bandwidth."

Now just to keep things complicated, there actually were and still are a very few systems which *do* deliver slightly higher bandwidth, but...with CDs being 44.1, anything mastered at 48 must be gear-boxed (sample-rate converted). And I have yet to hear sample rate conversion that's inaudible.

3) Glass. From personal experience, I feel so strongly that you should only connect digital gear to digital gear with glass that this is the *only* way I do it in my place. If this is impractical for you, please consider my warning: Metal is bad for data. Each piece of gear in your digital chain has a power supply, and so we are *not* free from the old analog nemesis: ground loops. Digital gear connected by metal coaxial cable *will ground loop*! This will introduce timing errors and other problems. In addition, RF induced into the cable can mess you up even more in the digital domain than the old analog world. Glass (or even plastic) will totally stop both of these demons. Please use it wherever you can. Lots of gear has optical I/O that you might not have even noticed. I wish it all did.

After all, vernacular tells us what is good. Isn't the expression "smooth as glass"? ■

Stephen St.Croix is a guy. But he has never owned a Porsche.

—FROM PAGE 27, AUDIO EDUCATION

confront an unknown DAW, they won't be stymied when they ask "Where's the crossfade slope linear/log switch?" and find out there isn't any. Instead, they'll know to ask, "What tools are available to get these two sounds to go together smoothly?"

Knowing the answers to specific questions is far less valuable than knowing which questions to ask. If they work from the ground up, they'll learn new systems much faster. What does this do? How well does it do it? What problems *doesn't* it solve, and is there anything the manufacturer should be doing about that? It will also help with the inevitable limitations and bugs they'll encounter. When something breaks down, how do you figure out exactly what's not working, and once you've done that, how do you get around the problem so you can salvage the gig? If students are comfortable with all of these concepts, and are happy to solve problems on-the-fly, then there's little you will be able to throw at them in the future that will faze them. As one educator I know likes to put it, "Teach carpentry, not hammer."

HISTORY REPEATS

If Santayana were alive today, he would have postulated that those who ignore history are doomed to repeat it, only this time in surround. Today's audio studio didn't just spring up overnight. Our industry has grown the way it has due to pressure on three fronts: artistic, technological and commercial. Some developments were necessitated primarily by musicians' and producers' needs for new sounds or better fidelity; some were driven by new technologies searching for an outlet; and some were driven by facilities' needs to do tasks faster and cheaper. In actuality, *all* of these forces, in varying proportions, are represented in just about every studio and every piece of audio gear. Recognizing that none of them functions in isolation is crucial to understanding how we got to where we are.

It's also crucial to understand why certain practices evolved. In many, many cases, techniques that we consider artistic today started out as responses to technical problems. Tape saturation, at least initially, was not supposed to make the sound of a recording "warmer," it was supposed to make it cleaner, since higher levels meant a better signal-to-noise ratio. Rock 'n' roll engineers whose meters pinned at the first chord of a song and stayed there until the final fade were often laughed at. Only later, when digital made it so that the sound stayed the same no matter what level you recorded it at, did it occur to most people that the medium itself, more than being just a necessary evil, was actually making an important contribution to the sound. The same with tube mics, tube limiters, discrete transistor equalizers and so on. When they first came out, all anybody cared about was how well they controlled and/or reproduced the sound, not what they added to it. Plate reverbs were, once upon a time, substitutes—for studios that didn't have the money or space—for an acoustic reverb chamber. Same thing with slapback echo. But they took on a life of their own, as engineers made virtues out of compromises, and today no digital processor is without its plate and slapback simulators.

The study of our history is also valuable so that we don't spend a lot of time and energy re-inventing the wheel. Many problems facing engineers and equipment designers today are similar to those encountered years ago. Thanks to technological change, some of the solutions are different, but that doesn't mean we can't learn from the solutions of the past. And we have to teach the failures as well as successes—like why quadraphonic stereo didn't make it in the market, and what's so different about today's multidimensional technologies; or why the designers of the AES/EBU digital audio standard didn't include a discrete clock signal, and how this held up development of true digital mixers and led to the current frenzy over boxes that deal with nonsynchronous audio and timing jitter.

So yes, teach mic placement, teach equalizers, teach SMPTE, teach delay lines, teach room acoustics and tape deck alignment, teach automation and soldering, teach MIDI. But also teach the whys, the whences, and the wherefores—so that the next generation of audio professionals will be able to develop their own tools to deal with the challenges they will face, challenges which we, with all our skills and all our wonderful playthings, can barely imagine. ■

Paul D. Lehrman teaches at the University of Massachusetts Lowell, and thinks of these columns as his own continuing education.

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—FROM PAGE 158, MIC PREAMPS

as the frequency goes up, so the possibility of cross-modulation increases at high frequencies. Though negative feedback will reduce distortion, when there is no more open loop gain available than the closed loop gain is demanding, the amplifier's distortion will no longer be reduced by negative feedback. Any audible sum and difference frequencies that result from cross-modulation will clutter and color the sound.

THE SOUND

My first experiments were done with a Microtech Gefell UM 70 condenser and my own voice, connecting the two preamps to a Mackie 1604 and on to a Panasonic SV-3900 DAT machine. The overall response of the PreQ3 and the Twin Servo 990 are similar, but the Twin Servo 990 has a more existent bottom. I also recorded both preamps directly to the SV-3900 using an RCA 44B, RCA 77DX, Sennheiser 421 and the Gefell. Listening tests confirmed the more noticeable low end response of the Twin Servo 990 and the slight 4 to 6kHz presence in the PreQ3, as did later listening to the DAT at other studios.

My next stop was High Heels Studio in Baltimore, where chief engineer Mitch Allen and pianist Charles Dockins helped me interface both preamps with the studio's Amek Mozart console. We set up a pair of AKG 451s in a close X/Y pattern inside a Kawai 6-foot grand and fed the mics to pairs of the PreQ3s and Twin Servos. This particular Kawai was very bright. The Twin Servos were smoother than the Mozart preamps, which were a bit edgy. The Twin Servo also captured the bottom end—around 40 Hz, we thought. The PreQ3s were brighter than the Twin Servos and the Mozart, fairly smooth on the bottom, but they didn't extend as low as the Twin Servos.

On the piano, we noticed that use of the PreQ3's Air Band opened up the top of the piano's sound, without making it edgy. We set the frequency to 20 kHz and raised the gain of the effect. As we toggled the effect in and out, the effect was rather like the change of hearing when you yawn and pop your ears open after a plane ride; very noticeable, very open, very pleasant.

There has been a lot of street talk about using the Air Band on vocals, and how intimate it makes them sound. As Dockins vocalized into a U89, we set the Air Band for 20 kHz and increased the effect. Unlike high-band shelf EQ, which typically brings up the high-frequency noise floor when boosted, at 20 kHz, the frequencies boosted by the PreQ3 were above the noise. What we heard as we raised the amount of Air Band was the

The PreQ3's Air Band opened up the top of the piano's sound, without making it edgy.

sound of air passing through Dockins' vocal passages. Call it breathy, intimate or in-your-face; he definitely sounded closer and more expressive. The frequencies we were boosting made it sound as if the mic was placed down his throat—a bit strange at first. As with most effects, we overdid it at first just to hear the effect, and soon found that a little Air Band made a big difference. Of course, dynamic mics, with their limited high-frequency response, didn't produce the same dramatic effects as the Neumann condenser, but even at 20 kHz, the Air Band was able to open up the sound to some degree. Experiments with the 2.5kHz, 5kHz and 10kHz center frequencies were more dramatic, but

The Twin Servos were much more flattering on the drums and bass than the Amek Mozart pre's.

also brought some noise. Applying Air Band at the 40kHz center frequency produced very subtle increases in the openness.

As we were finishing up, Plugged, a local group, was starting a session to lay tracks for a new demo. After hearing the preamps, they asked to use the Twin Servo for drums and bass. The drum kit was a DW Drum Workshop with a Keith Larsen snare. The Peavey 5-string bass was recorded direct and though an Acoustic 150 amp head, powering an Ampeg SVT-1 cabinet. Allen chose SM57s for the top and bottom snare and put an RE27ND on the bass cabinet. After some experimenting, we found the bottom-snare SM57 unnecessary. Flat, slamming, real and very clear: Everyone in the control room agreed that the Twin Servos were much more flattering on the drums and bass than the Amek Mozart pre's. Several days later when I came back to retrieve the gear, Plugged was mixing the session. They were still taken by how well the drums and bass sounded when placed in the mix.

As a final test, I headed to Fat Lulu's, a townhouse turned restaurant/bar/music venue, where Craig Hopwood was mixing live sound for the reggae group Strykers Posse. The house mixer was a Yamaha M2000 with SM58s all around. At the console end of the mic snake, we used two channels of the Twin Servo for the front vocals. The difference in bandwidth and openness was amazingly apparent. The background vocals sounded closed and gritty. We swapped the lines and mics to make sure other problems weren't contributing to the compromised sound, but found that the Twin Servos made a profound difference in the house system and in the monitors. For the record, the Twin Servo's two 990 amp stages deliver a lot of gain. So much so that we had to back them all the way down for more than moderately loud sources. If you plan to use them up close on high-SPL sources, you may have to pad the mics.

Choosing a preamp these days can be a daunting task, if only because of the sheer number of units available. But on both counts, there are good reasons for having either or both of these preamps in your rack.

Jensen Twin Servo 990: 4 channels, $4,250; 3 channels, $3,350; 2 channels, $2,450; 1 channel, $1,550. Jensen Twin Servo Preamps, distributed by The John Hardy Company; PO Box AA631, Evanston, IL 60204; 708/864-8060; fax 708/864-8076.

Night PreQ3: 4 channels, $2,595; 2 channels, $1,595; 2-to-4 channel upgrade, $1,295. Night Technolgies International; 22900 Ventura #360, Woodland Hills, CA 91364; 818/224-4857. ■

After a mysterious disappearance, Ty Ford's Advanced Audio Production Techniques *is back on the Mix Bookshelf. He can be contacted at tford@jagunet.com.*

—FROM PAGE 164, HARRISON MPC

the various touch-screen displays, and also provides access to/from external Dolby matrix-encoding systems. PEC/Direct keys switch between tape return and console bus feed; physical toggle switches are provided on each mix position, with programmable control of logical feeds that enable record/bias for a variety of different analog/digital tape machines. A total of 32 logical PEC/Direct switch locations are provided by the systems, and can be activated by the physical keys, touch screen or both.

The 32x8 monitor matrix is capable or routing and summing inputs into outputs. The 32 available inputs are divided into four sections of eight inputs each, and might comprise dialog PEC/DIR signals (inputs 1 thru 8), Music PEC/DIR signals (inputs 9 thru 16), Effects PEC/DIR signals (inputs 17 thru 24) and user-defined (inputs 25 thru 32). All crosspoint settings can be stored and recalled as part of the MPC automation data. The master section also provides a monitor control display panel, which includes mute controls for up to eight loudspeaker channels (left, left-center, center, right-center, right, boom, left-surround and right-surround), plus overall on/off and dim buttons.

MIX AUTOMATION FUNCTIONS

The MPC's Total Automation System, capable of storing all dynamic changes referenced to SMPTE timecode, is best described as comprehensive. It can memorize all fader moves, equalizer sweeps, panning, input selection, routing, auxiliary send levels, gates, compressors, etc. Automation can be either static or dynamic, with mix file management being accomplished from the touch-screen page and system management from the master Macintosh PC.

Eight automation controls are provided on each channel strip for recording, overwrite and protection of level and mute data. Current modes include Absolute, Update or Fixed. Write Active places the fader or the entire channel into that mode; when the button is pressed once, only the fader moves are recorded, and a double click selects the entire channel. When a channel is in the Write Active mode, touching, turning or pressing a control activates its Auto Enable push-button.

Different registers of information are stored by MPC: Panel Register (static information being constantly updated during the mixing process); Last Register (static information is maintained on every section of the console); and Read Register (dynamic automation sent from the Read pass of the current mix). Six options are provided to update panel data.

The mix automation system allows the user to define the section to be recorded, and the option to override the record function from a centralized location. The console and touch-screen interface have local Write Enable switches for every section, as well as a consolewide master Write Enable switch. As passes are written to the mix file, the positions of the Write, Read and Swap passes advance automatically, following each other through the eight passes. A consolewide mix editing system allows portions of a real-time automated mix to be copied and pasted to a specified location. Timecode can also be added or deleted from a real-time mix.

A variety of options are available for writing fader levels during mix automation; they can be written as new information (absolute) or updated by combining the Read pass with the new fader information (relative). A Demand mode allows the operator to write to the Mix pass when the fader is physically touched, and is disabled when the fader is released. Write Active mode allows the operator to insert the fader into the Mix pass from the point where the fader is touched until either the timecode source is stopped or the fader-write is disabled.

Two different ways are available to automatically disable the fader from a Mix—Drop and Ramp—which work in conjunction with the null point. Drop mode allows the user to automatically disable fader-write when the fader crosses the null point of the Read pass; Ramp mode allows the user to create a specific slope between the fader levels and the Read pass. Update mode allows the operator to update a current mix relative to the Read pass. Fader-write and Ramp can be used to automatically ramp back to the null point when the fader is released. Couldn't be easier.

BEST OF BOTH WORLDS

The Harrison MPC combines the best of both worlds: familiarity and extendability. Feature film mixing is not for the faint-hearted: During premixes and finals, many decisions must be made as multiple music, effects and dialog elements are crafted into a multichannel soundtrack. Any device in the chain that holds up the proceedings is not going to last more than a subframe; you cannot learn a new system on the director's dime.

In many ways, film-dubbing consoles are technological "dinosaurs," combining features and functions that have evolved during years of practical experience. To music mixers and post engineers, these features appear archaic and sometimes just plain odd. But the MPC represents the current state-of-the-art in digitally-controlled analog designs. The virtual control surface is easy to master; all important functions have their own dedicated controls, while less important functions—such as dynamics and routing—can be set up quickly via assignable panels. The touch-sensitive screens and menus are clear and well-laid-out; you can find the correct page quickly via pull-downs, and you're never more than a single point-and-click away from the targeted area.

Sonically, the MPC is hard to beat. The performance headroom and bandwidth easily exceed that of 16-bit digital; the EQ, in particular, is smooth and sweet-sounding in operation. The dynamics are very easy to set up and implement. All in all, the Harrison MPC is a system that inspires deep confidence in both the operator and technical crew, and is destined to move forward the creativity of film re-recording facilities.

Harrison Inc., 7104 Crossroad Blvd., Suite 118, Brentwood, TN 37027; phone 615/370-9001; fax 615/370-4906; www.glw.com ■

Mel Lambert currently heads up Media & Marketing, a consulting service for pro audio firms and facilities.

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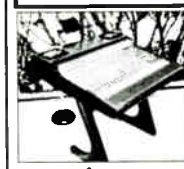

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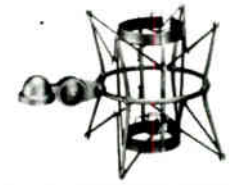

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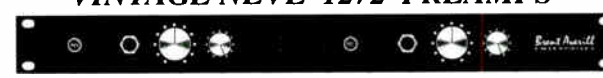

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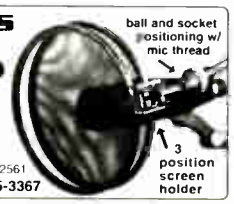

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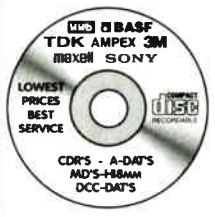

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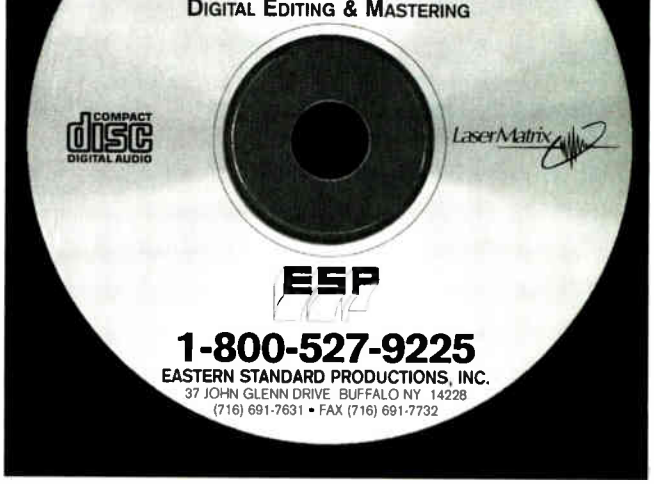

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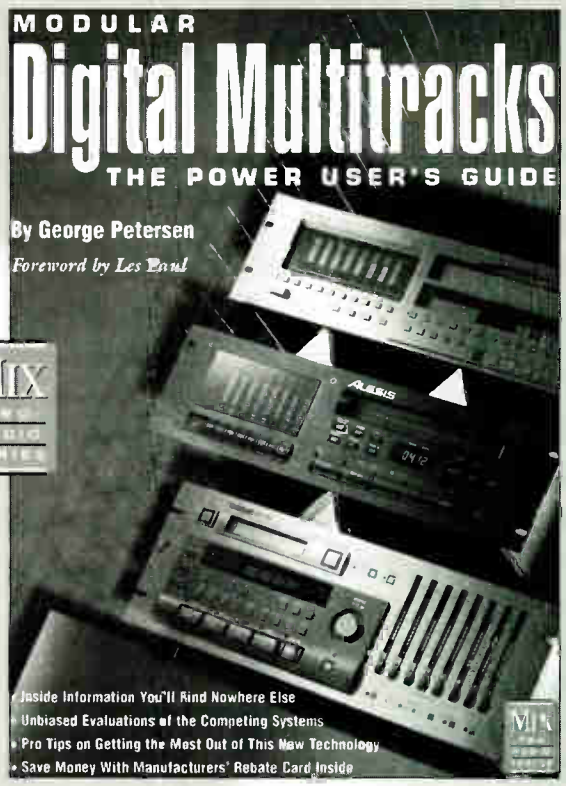

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—FROM PAGE 166, CROOKWOOD

aren't marked–the gain differance between level controls determines width. Unless the Paintpot is used in a live broadcast situation, most M-S users will probably use the decoder circuit as a quick means of monitoring the M-S effect during setup and then switch it out before the actual recording begins.

Once past the mystery controls, the Paintpot is quick to set up and easy to use. The top panel has more than 50 LEDs indicating status of every function; some implementations of these are clever. For example, LEDs are provided for every 2 dB on the gain control, so there's an LED at 32 dB and another at 34 dB. If you set the gain between the two, at 33 dB, then both LEDs light, to indicate you're exactly between the two. This allows quick, repeatable settings in precise 1dB steps. All internal switching is via relays, which offer a reassuring click of quality when changes are made. The Paintpot is capable of output levels to the 400+ mA range, so driving long feeds or snakes is a snap.

One of my first sessions with Paintpot was a rather low-tech affair, recording male and female narration for a long-form radio documentary. I was using EV RE20 mics, and I used the Paintpot to track the vocals on the second session. I didn't really expect to hear much of a difference with Paintpot on dynamic mics, but the improvement was evident, with a noticeable increase in clarity. Next up were vocals and sax overdubs using the Soundelux tube condenser mic, a superb unit. The results were wonderful: rich, full and lush, with awesome articulation. Compared to the stock preamps in my studio's now-vintage Soundcraft 600 console, the Paintpot sounded like someone had removed a towel covering the monitors.

When its filters are bypassed, Paintpot imparts no particular "sound" of its own. What you'll hear is the sound of the microphone itself and the source material: The preamp becomes a neutral—but accurate—component in the chain. Of course, anyone who wants to twiddle with the filters, impedance matching and tilt controls always has this option.

In stereo recording applications, including a classical guitar duet and a three-piece string (cello, viola, violin) ensemble, I paired the Paintpot with two B&K 4011 cardioid condensers and recorded directly to 20-bit using the Rane PaqRat. The results were absolutely first-rate, offering a sense of transparency and detail that made playbacks sound like you were standing in the room. Sweet!

Locating preamps in the studio or onstage—as close to the microphones as possible—provides optimum performance in the audio chain, and Paintpots are ideal in this application. The top-mounted controls simplify adjustment and the checking of operational status better than a rack-mounted preamp sitting on the floor. But one of the disadvantages of remote preamp placement is that it is difficult—and sometimes impossible—to tweak the preamp during a performance.

With this in mind, Crookwood offers the Paintpot Remote, an optional controller that allows access to all functions for up to 32 channels of Paintpot in any combination, with storage of all parameters in up to 400 Takes across 99 Sessions. The remote is built into a two-rackspace box with a slanted back that allows it to be used as a desktop unit. It connects to a Paintpot via standard, 3-conductor XLR mic cables (watch that you don't accidentally connect the remote jacks to mic lines or vice versa!). By the way, if AC power to the Remote fails, all connected Paintpots revert to local control.

After a few sessions with the Paintpot Remote, I was comfortable with its use. There are a few points I didn't like, such as the cute Paintpot logos screened across the remote's front panel, making it hard to see some of the controls. And due to the unit's small status screen, I occasionally got lost in the page for storing presets. The Paintpot Remote also supports MIDI control, but I couldn't imagine any plausible applications for a MIDI-controlled mic preamp, except for using MIDI Sysex to make bulk data dumps for backing up settings. On the other hand, the XLR connections to the remote allows sending control signals over studio mic snakes, so tweaking preamp settings—gain, impedance, tilt and filters—is quite convenient when sitting behind the console and immediately hearing the results. What a luxury...

Crookwood, The Old Police House, Station Hill, Cookham, Berks. SL6 9BS, England; phone 44/1628/528-026. In the U.S., Crookwood is sold by Planet Audio, 805/969-3482, and Zero THD, 312/665-9066. ■

FEEDBACK

SOUNDSTAGE SNAFUS

I found a couple of mistakes in your "L.A. Grapevine" article in the April issue. It is stated that the Sony Soundstage (formerly MGM) is unchanged since the music for *Gone With the Wind* was recorded there in 1939. This is wrong on two counts. *Gone With the Wind* was not recorded on the MGM scoring stage but in Hollywood at the Samuel Goldwyn Studio (now known as Warner Hollywood) on Stage 7. This stage was utilized by David O. Selznick for most of his independent productions and was the preferred scoring stage for Hollywood composers at the time. Unfortunately, it has been converted to a shooting stage.

The other mistake was that the stage was unchanged since 1939. When John Green became music director at MGM in the late '40s, one of his goals was to improve the sound on the MGM scoring stage. The booth was moved from the second floor downstairs into what was an annex of Stage 1. The recording axis of the orchestra was changed, and some acoustic treatment to the stage walls was altered. This improved the sound of the stage immensely.

I do not know if you are aware that Twentieth Century Fox is currently renovating its scoring stage. Currently known as Stage 1, it will be renamed the Newman Stage after Alfred and Lionel Newman. The old booth has been torn down and a new booth will be constructed on Stage 2. Installed in the new booth will be an SSL 9000 console with 96 inputs. When the construction is completed later this year, the stage will be the largest in Los Angeles. It is also the only scoring stage in Los Angeles with a pipe organ.

Edward Nassour
Senior Vice President,
Post-Production
Twentieth Century Fox Television
Beverly Hills, Calif.

ROUGH AROUND THE EDGES

A thought for Mr. St.Croix: While your concept of the "Vulcan Mind Meld" (August "Fast Lane") is certainly a valid one, I suspect that looking for explanations of the difference between analog and digital in the interaction of oxide particles on tape is digging deeper than necessary. It's like trying to determine why people look different by examining their molecular makeup...valid, but excessively detailed.

I've always thought that the essential difference between A & D is one of "edges." In an analog recording we use one piece of tape to rearrange rust in a more or less continuous stream to represent continuous waveforms of sound. In a digital recording we take thousands of static "snapshots" of existing sound frequencies and then run them in rapid sequence to produce the illusion of waveforms...just as a motion picture flashes a bunch of still photos at us so fast they give the illusion of movement.

And there is the biggest difference: edges. The human mind is still the hottest computer in creation, and it can tell the difference between a single recording with only one beginning and ending edge (tape), and thousands of juxtaposed recordings with around 90,000 edges per second!

Of course, I have no credentials or research to support this theory, just a "feeling." Call it "edgy."

Thanks for continuing to make me think about what I do, as well as entertaining me each month.

Joe Van Riper
Jay Howard Production Audio
Charlotte, N.C.

CLEARMOUNTAIN ON ST.CROIX

I was quite pleased to read Stephen St.Croix's article titled "Something Is Missing Hear" in the August issue of *Mix*. I thoroughly appreciated the way he clearly explained the reasons behind the many frustrations we've all encountered recording and mixing in the analog formats—the frustrations that convinced many of us years ago that there had to be something better.

As Stephen states, "analog...mixes the tracks; they interact, they 'meld' and produce a new result..." Thanks to digital, we are no longer at the mercy of how the *storage medium* chooses to "mix the tracks"—full artistic control over the mix can now be ours! We never have to put up with things like "commonality" in our records anymore.

Stephen clearly pointed out the many horrible analog artifacts we can now be free of, like the "130kHz or so bias" that causes "homogenization" not to mention "proximity influence," "print through," "tape aspiration artifact" and *oh, man*..."high-frequency self-erasure," "time slur," "low-frequency echo components" and "modulation tails" and "a dynamic pattern of tracking noise harmonics." Yeech—he really makes analog recording and mixing seem like some horrible evil entity spontaneously generated out of toxic chemical discharge from the Ampex factory! Well, Steve, I really don't think it's *that* bad. In fact, analog recordings actually can and do sound quite good, depending of course on the dude at the dials (not to mention the singing, musicianship and songwriting—the elements that *really* do make a difference).

Although I was aware that music recorded on analog tape changes in quality over time, I was particularly intrigued by his analogy to the aging of wine. Looking at it his way, I suppose it's pointless to even listen to your analog recording until it's aged for at least, say, five or ten years after it's been recorded—then I wonder what you do before it "turns to mud"? I suppose... *transfer to digital*!

As much as I'm obviously in total agreement with Mr. St.Croix's observations, when he starts to talk about "noise energy," "ghosts" and "harmonics" that are observed when playing back a 1kHz tone recorded on a piece of analog tape, I would strongly advise for the sake of his own sanity (and ours) that he'd be much better off listening to tapes with *music* recorded on them—analog *or* digital.

Bob Clearmountain
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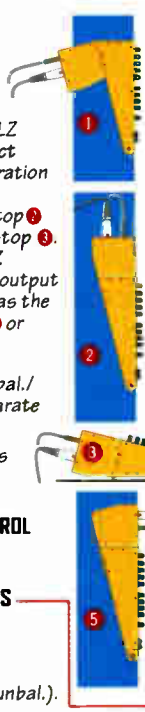

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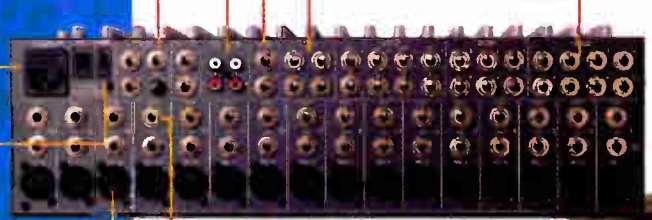

BUILT-IN power supply.

PHANTOM POWER switch.

Studio-quality **DISCRETE MIC PREAMP** on every channel.

Pre-fader **INSERT** on every ch.

*Suggested U.S. retail; higher in Canada.

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